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	UNIT: PRODUCTION SYSTEMS AND UNITS		PD: *PD-00913*
CENPES	TITLE: METOCEAN DATA FOR PLANNING OF OPERATIONS		

INDEX OF REVISIONS

VER	DESCRIPTION AND / OR AFFECTED SHEETS
0	ORIGINAL

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	07-01-07								
EXECUTION	PDP / MC								
AUTHORS	JLIMA/GDF/LCA								
VERIFICATION	ERIC								
APPROVAL	AMAIA								

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1. OBJECTIVE 4

2. BRAZILIAN WEATHER FORECAST SITES 4

3. PROTECTED HARBOURS FOR SOUTHERLY STORMS 5

4. SEASONAL WIND DATA 6

4.1. SANTOS'S BASIN DISTRIBUTION OF WIND SPEED AND DIRECTION 6
4.1.1. SUMMER (January, February, March) 6
4.1.2. AUTUMN (April, May, June) 6
4.1.3. WINTER (July, August, September) 7
4.1.4. SPRING (October, November, December) 7
4.2. SANTOS'S BASIN WIND EXCEEDANCE CURVES 8
4.2.1. SUMMER (January, February, March) 8
4.2.2. AUTUMN (April, May, June) 8
4.2.3. WINTER (July, August, September) 9
4.2.4. SPRING (October, November, December) 9
4.3. CAMPOS'S BASIN DISTRIBUTION OF WIND SPEED AND DIRECTION 10
4.3.1. SUMMER (January, February, March) 10
4.3.2. AUTUMN (April, May, June) 10
4.3.3. WINTER (July, August, September) 11
4.3.4. SPRING (October, November, December) 11
4.4. CAMPOS'S BASIN WIND EXCEEDANCE CURVES 12
4.4.1. SUMMER (January, February, March) 12
4.4.2. AUTUMN (April, May, June) 12
4.4.3. WINTER (July, August, September) 13
4.4.4. SPRING (October, November, December) 13

5. SEASONAL WAVE DATA 14

5.1. SANTOS'S BASIN DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD 14
5.1.1. SUMMER (January, February, March) 14
5.1.2. AUTUMN (April, May, June) 14
5.1.3. WINTER (July, August, September) 15
5.1.4. SPRING (October, November, December) 15
5.2. SANTOS'S BASIN DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND MAIN WAVE DIRECTION 16
5.2.1. SUMMER (January, February, March) 16
5.2.2. AUTUMN (April, May, June) 16
5.2.3. WINTER (July, August, September) 17
5.2.4. SPRING (October, November, December) 17
5.3. SANTOS'S BASIN WAVE EXCEEDANCE CURVES 18
5.3.1. SUMMER (January, February, March) 18
5.3.2. AUTUMN (April, May, June) 18
5.3.3. WINTER (July, August, September) 19
5.3.4. SPRING (October, November, December) 19
5.4. CAMPOS'S BASIN DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD 20
5.4.1. SUMMER (January, February, March) 20
5.4.2. AUTUMN (April, May, June) 20
5.4.3. WINTER (July, August, September) 21
5.4.4. SPRING (October, November, December) 21
5.5. CAMPOS'S BASIN DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND MAIN WAVE DIRECTION 22
5.5.1. SUMMER (January, February, March) 22
5.5.2. AUTUMN (April, May, June) 22
5.5.3. WINTER (July, August, September) 23
5.5.4. SPRING (October, November, December) 23
5.6. CAMPOS'S BASIN WAVE EXCEEDANCE CURVES 24
5.6.1. SUMMER (January, February, March) 24

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5.6.2. AUTUMN (April, May, June) 24
5.6.3. WINTER (July, August, September) 25
5.6.4. SPRING (October, November, December) 25

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1. OBJECTIVE

To present metocean operational data and list a few Brazilian weather forecast sites (public INTERNET sites, internal PETROBRAS site) and protected harbours against southerly storms to be used as subsidiary information in the planning of operations for Santos and Campos Basins, south-southeast Brazilian shelf.

STATEMENT

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2. BRAZILIAN WEATHER FORECAST SITES

There are a few Brazilian weather forecast sites that can be used to predict wind and wave conditions along the south-southeast Brazilian shelf:

- Center of Hydrography of the Brazilian Navy (CHM) provides maritime weather forecast, synoptic charts for the Brazilian shelf (METAREA 5) and bad weather warnings (wind speeds . At the time of edition of this specification (December 2006), they were providing wind forecast up to 72 hours for wave and wind models. The site is given below:
  http://www.mar.mil.br/dhn/chm/meteo/index.htm

- Center of Weather Forecast and Climatic Studies of the National Institute for Space Research (INPE/CPTEC) provides weather forecast and satellite images charts for the Brazilian shelf. At the time of edition of this specification (December 2006), they were providing wind forecast up to 5, 7 and 15 days for distinct scale wind models and up to 72 hours for wave models. The site is given below:
  http://www.cptec.inpe.br/

- The Geodesy Department of PETROBRAS´s E&P-SERV (E&P-SERV/US-SUB/GDS) contracts a specific weather and wave forecasts for Santos and Campos Basins. At the time of edition of this specification (December 2006), they were providing wind and wave forecasts up to 96 hours. The site is given below:
  http://www3.ep-serv.petrobras.com.br/previsao/index.htm#

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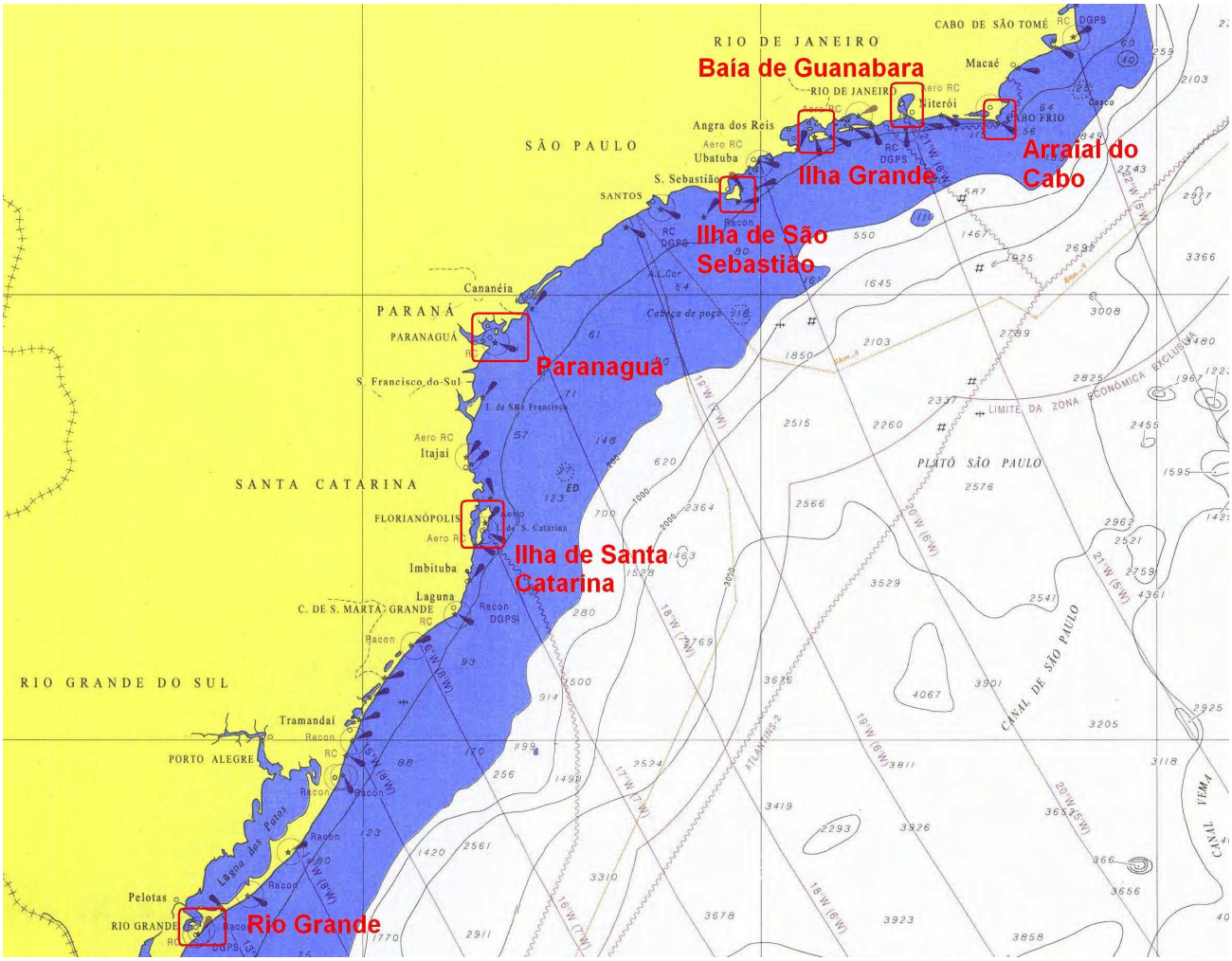
3. PROTECTED HARBOURS FOR SOUTHERLY STORMS

There a few protected harbours between the Port of Rio Grande, state of Rio Grande do Sul, southern Brazilian shelf and Campos Basin, state of Rio de Janeiro, eastern Brazilian shelf. The figure below present these protected harbours:



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4. SEASONAL WIND DATA

4.1. Santos's Basin Distribution of Wind Speed and Direction

4.1.1. SUMMER (January, February, March)

Lines: Wind speed intervals (m/s)
Columns: Wind direction sectors (degrees – True North)

INTERVALOS DE CLASSE		N 337.5 22.5	NE 22.5 67.5	E 67.5 112.5	SE 112.5 157.5	S 157.5 202.5	SW 202.5 247.5	W 247.5 292.5	NW 292.5 337.5	TOTAL	%	DIREÇÃO MEDIA
.00	1.00	63	63	65	33	46	16	13	27	326	2.74	59.58
1.00	2.00	122	206	205	118	100	54	40	62	907	7.62	74.65
2.00	3.00	194	364	431	206	113	48	79	77	1512	12.71	73.33
3.00	4.00	279	432	453	284	136	58	60	121	1823	15.32	70.29
4.00	5.00	280	519	427	303	158	60	56	104	1907	16.03	70.38
5.00	6.00	253	576	373	309	130	37	37	83	1798	15.11	68.84
6.00	7.00	208	470	330	232	117	17	37	61	1472	12.37	68.72
7.00	8.00	135	355	225	123	93	10	13	24	978	8.22	68.36
8.00	9.00	87	170	93	116	86	8	6	9	575	4.83	81.86
9.00	10.00	44	67	43	59	72	6	1	4	296	2.49	99.01
10.00	11.00	18	16	20	38	73	2	1	4	172	1.45	139.96
11.00	12.00	6	11	9	15	26	3	3	1	74	.62	137.80
12.00	13.00	6	1	6	5	12	4	1	0	35	.29	138.92
13.00	14.00	0	8	2	1	2	0	0	0	13	.11	70.34
14.00	15.00	0	1	0	0	1	1	0	0	3	.03	188.08
15.00	16.00	0	1	0	3	1	0	0	0	5	.04	144.86
16.00	17.00	0	1	0	0	0	0	0	0	1	.01	23.70
17.00	18.00	0	1	0	0	0	0	0	0	1	.01	51.50
18.00	19.00	0	1	0	0	0	0	0	0	1	.01	35.60
19.00	20.00	0	0	0	0	0	0	0	0	0	.00	999.90
20.00	21.00	0	0	0	0	0	0	0	0	0	.00	999.90
21.00	22.00	0	0	0	0	0	0	0	0	0	.00	999.90
22.00	23.00	0	0	0	0	0	0	0	0	0	.00	999.90
23.00	24.00	0	0	0	0	0	0	0	0	0	.00	999.90
24.00	25.00	0	0	0	0	0	0	0	0	0	.00	999.90
25.00	26.00	0	0	0	0	0	0	0	0	0	.00	999.90
26.00	27.00	0	0	0	0	0	0	0	0	0	.00	999.90
27.00	28.00	0	0	0	0	0	0	0	0	0	.00	999.90
28.00	29.00	0	0	0	0	0	0	0	0	0	.00	999.90
29.00	30.00	0	0	0	0	0	0	0	0	0	.00	999.90
TOTAL		1695	3263	2682	1845	1166	324	347	577	11899		
% POR COLUNA		14.24	27.42	22.54	15.51	9.80	2.72	2.92	4.85			
MEDIAS DE INTENS.		4.84	5.07	4.63	5.12	5.59	4.08	4.02	4.15			

4.1.2. AUTUMN (April, May, June)

Lines: Wind speed intervals (m/s)
Columns: Wind direction sectors (degrees – True North)

INTERVALOS DE CLASSE		N 337.5 22.5	NE 22.5 67.5	E 67.5 112.5	SE 112.5 157.5	S 157.5 202.5	SW 202.5 247.5	W 247.5 292.5	NW 292.5 337.5	TOTAL	%	DIREÇÃO MEDIA
.00	1.00	20	29	13	15	18	19	20	19	153	1.37	347.17
1.00	2.00	64	88	70	64	86	122	88	76	658	5.87	226.31
2.00	3.00	171	156	132	127	130	382	174	146	1418	12.66	242.97
3.00	4.00	252	285	184	154	193	179	233	218	1699	15.17	354.01
4.00	5.00	354	346	227	204	185	158	117	190	1781	15.90	42.30
5.00	6.00	285	362	209	145	190	117	64	100	1472	13.14	55.51
6.00	7.00	298	275	188	108	192	102	63	80	1306	11.66	52.04
7.00	8.00	214	193	113	94	182	81	56	59	992	8.86	62.69
8.00	9.00	143	93	42	37	143	88	40	55	641	5.72	1.62
9.00	10.00	75	47	16	9	99	65	42	30	383	3.42	243.83
10.00	11.00	53	51	4	4	44	46	43	9	254	2.27	290.55
11.00	12.00	18	31	3	1	34	37	26	12	162	1.45	250.79
12.00	13.00	4	30	1	1	5	29	22	6	98	.87	269.51
13.00	14.00	3	9	1	0	10	21	17	5	66	.59	245.46
14.00	15.00	4	5	0	0	6	11	12	4	42	.37	261.89
15.00	16.00	0	0	0	0	4	6	5	1	16	.14	232.77
16.00	17.00	0	3	0	0	4	6	5	0	18	.16	231.36
17.00	18.00	0	1	0	0	1	2	6	0	10	.09	254.84
18.00	19.00	0	0	0	0	0	0	0	0	0	.00	999.90
19.00	20.00	0	0	0	0	0	0	2	0	2	.02	275.15
20.00	21.00	0	0	0	0	0	2	5	0	7	.06	261.02
21.00	22.00	0	0	0	0	0	2	1	0	3	.03	226.57
22.00	23.00	0	0	0	0	0	4	2	0	6	.05	236.04
23.00	24.00	0	0	0	0	0	3	3	0	6	.05	245.02
24.00	25.00	0	0	0	0	0	2	0	0	2	.02	230.10
25.00	26.00	0	0	0	0	0	4	0	0	4	.04	225.64
26.00	27.00	0	0	0	0	0	2	0	0	2	.02	236.85
27.00	28.00	0	0	0	0	0	1	0	0	1	.01	234.30
28.00	29.00	0	0	0	0	0	0	0	0	0	.00	999.90
29.00	30.00	0	0	0	0	0	0	0	0	0	.00	999.90
TOTAL		1958	2004	1203	963	1526	1491	1046	1010	11202		
% POR COLUNA		17.48	17.89	10.74	8.60	13.62	13.31	9.34	9.02			
MEDIAS DE INTENS.		5.60	5.54	4.94	4.72	5.95	5.50	5.56	4.78			

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4.1.3. WINTER (July, August, September)

Lines: Wind speed intervals (m/s)
Columns: Wind direction sectors (degrees – True North)

INTERVALOS DE CLASSE		N 337.5 22.5	NE 22.5 67.5	E 67.5 112.5	SE 112.5 157.5	S 157.5 202.5	SW 202.5 247.5	W 247.5 292.5	NW 292.5 337.5	TOTAL	%	DIREÇÃO MEDIA
.00	1.00	19	18	13	16	15	10	16	22	129	1.43	.53
1.00	2.00	65	65	48	68	41	33	50	44	414	4.59	49.62
2.00	3.00	85	99	78	67	68	51	73	96	617	6.84	9.19
3.00	4.00	176	158	141	121	115	55	63	97	926	10.27	58.10
4.00	5.00	246	272	169	130	145	42	39	81	1124	12.46	55.20
5.00	6.00	252	334	186	175	182	63	40	45	1277	14.16	68.70
6.00	7.00	225	371	142	171	177	40	25	43	1194	13.24	66.69
7.00	8.00	186	363	114	91	168	29	19	30	1000	11.09	60.79
8.00	9.00	140	374	97	53	178	46	17	16	921	10.21	62.69
9.00	10.00	97	302	35	34	136	36	5	8	653	7.24	58.66
10.00	11.00	61	129	30	22	88	28	12	7	377	4.18	71.02
11.00	12.00	20	50	9	11	72	17	7	2	188	2.08	139.60
12.00	13.00	8	20	4	2	36	6	3	2	81	.90	163.97
13.00	14.00	9	19	4	0	27	12	0	2	73	.81	153.39
14.00	15.00	2	7	1	0	10	9	0	1	30	.33	204.38
15.00	16.00	0	2	0	0	5	2	0	0	9	.10	189.97
16.00	17.00	0	1	1	0	1	0	0	0	3	.03	86.70
17.00	18.00	0	2	0	0	1	0	0	0	3	.03	31.86
18.00	19.00	0	0	0	0	0	0	0	0	0	.00	999.90
19.00	20.00	0	0	0	0	0	0	0	0	0	.00	999.90
20.00	21.00	0	0	0	0	0	0	0	0	0	.00	999.90
21.00	22.00	0	0	0	0	0	0	0	0	0	.00	999.90
22.00	23.00	0	0	0	0	0	0	0	0	0	.00	999.90
23.00	24.00	0	0	0	0	0	0	0	0	0	.00	999.90
24.00	25.00	0	0	0	0	0	0	0	0	0	.00	999.90
25.00	26.00	0	0	0	0	0	0	0	0	0	.00	999.90
26.00	27.00	0	0	0	0	0	0	0	0	0	.00	999.90
27.00	28.00	0	0	0	0	0	0	0	0	0	.00	999.90
28.00	29.00	0	0	0	0	0	0	0	0	0	.00	999.90
29.00	30.00	0	0	0	0	0	0	0	0	0	.00	999.90
TOTAL		1591	2586	1072	961	1465	479	369	496	9019		
% POR COLUNA		17.64	28.67	11.89	10.66	16.24	5.31	4.09	5.50			
MEDIAS DE INTENS.		6.00	6.87	5.64	5.42	7.03	6.29	4.37	4.34			

4.1.4. SPRING (October, November, December)

Lines: Wind speed intervals (m/s)
Columns: Wind direction sectors (degrees – True North)

INTERVALOS DE CLASSE		N 337.5 22.5	NE 22.5 67.5	E 67.5 112.5	SE 112.5 157.5	S 157.5 202.5	SW 202.5 247.5	W 247.5 292.5	NW 292.5 337.5	TOTAL	%	DIREÇÃO MEDIA
.00	1.00	52	63	57	40	24	18	23	48	325	2.64	44.10
1.00	2.00	98	152	144	109	73	36	60	91	763	6.21	62.05
2.00	3.00	177	264	273	198	134	63	69	116	1294	10.53	72.95
3.00	4.00	244	428	348	228	149	50	57	121	1625	13.22	66.81
4.00	5.00	290	484	404	278	152	54	47	92	1801	14.65	68.54
5.00	6.00	256	577	435	241	146	54	38	48	1795	14.60	68.74
6.00	7.00	200	508	319	200	135	45	32	37	1476	12.01	69.96
7.00	8.00	130	422	218	156	141	31	9	25	1132	9.21	74.24
8.00	9.00	74	367	168	111	111	33	12	14	890	7.24	74.29
9.00	10.00	46	193	63	81	98	25	8	13	527	4.29	86.31
10.00	11.00	29	114	34	48	63	7	5	14	314	2.55	81.26
11.00	12.00	10	47	24	27	45	9	0	5	167	1.36	108.98
12.00	13.00	9	25	7	11	16	6	3	5	82	.67	86.08
13.00	14.00	9	9	0	4	8	1	1	5	37	.30	20.55
14.00	15.00	3	5	2	1	6	1	0	1	19	.15	84.36
15.00	16.00	1	4	0	5	3	1	0	0	14	.11	124.61
16.00	17.00	0	1	0	3	4	4	0	0	12	.10	178.07
17.00	18.00	0	1	1	0	1	1	0	0	4	.03	132.09
18.00	19.00	2	2	0	0	1	0	0	0	5	.04	17.49
19.00	20.00	1	1	1	0	0	0	0	1	4	.03	21.97
20.00	21.00	2	0	0	0	0	0	0	0	2	.02	358.25
21.00	22.00	1	0	0	0	0	0	0	0	1	.01	8.90
22.00	23.00	1	0	0	0	0	0	0	1	2	.02	345.55
23.00	24.00	0	0	0	0	0	0	0	0	0	.00	999.90
24.00	25.00	1	0	0	0	0	0	0	0	1	.01	342.90
25.00	26.00	1	0	0	0	0	0	0	0	1	.01	12.00
26.00	27.00	0	0	0	0	0	0	0	0	0	.00	999.90
27.00	28.00	0	0	0	0	0	0	0	0	0	.00	999.90
28.00	29.00	0	0	0	0	0	0	0	0	0	.00	999.90
29.00	30.00	0	0	0	0	0	0	0	0	0	.00	999.90
TOTAL		1637	3667	2498	1741	1310	439	364	637	12293		
% POR COLUNA		13.32	29.83	20.32	14.16	10.66	3.57	2.96	5.18			
MEDIAS DE INTENS.		5.17	5.89	5.15	5.40	6.12	5.37	4.00	4.11			

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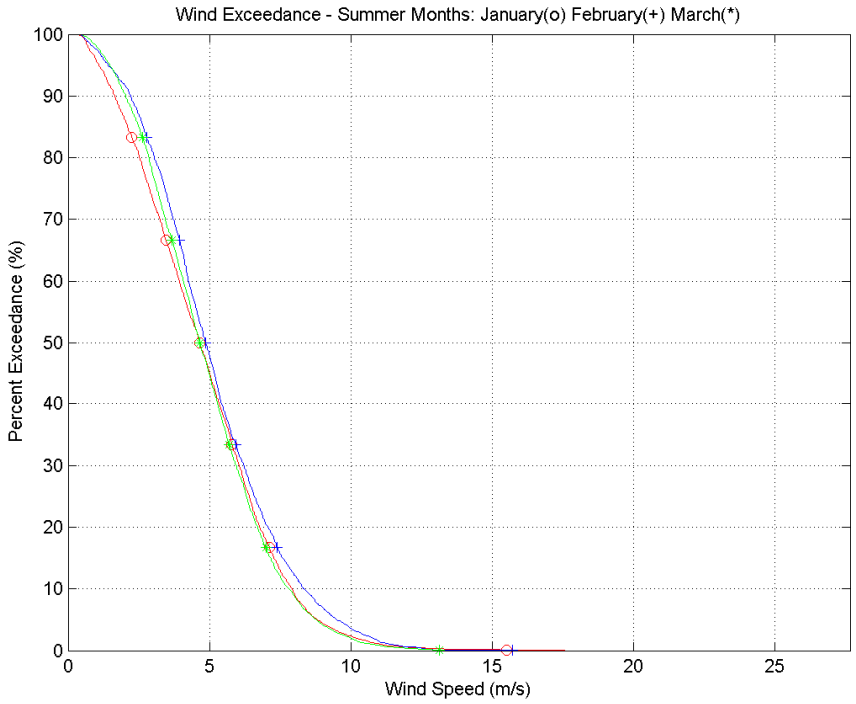
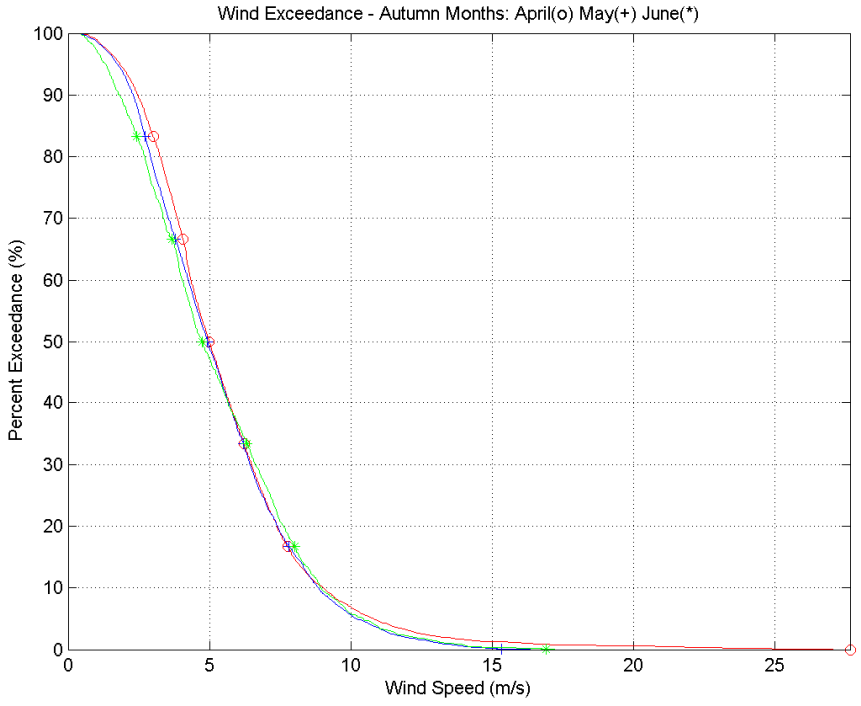
4.2. Santos's Basin Wind Exceedance Curves

4.2.1. SUMMER (January, February, March)



4.2.2. AUTUMN (April, May, June)



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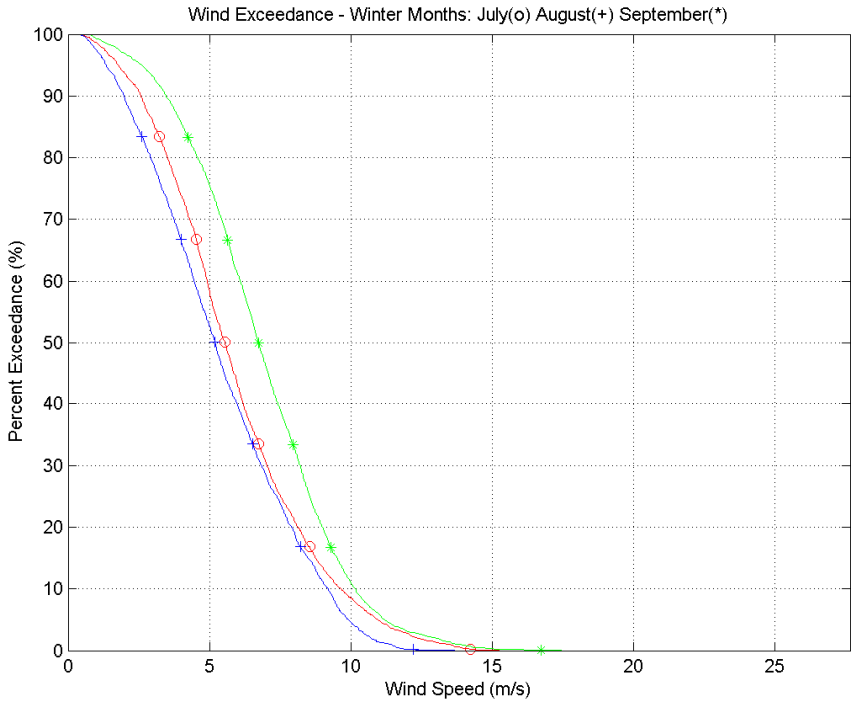
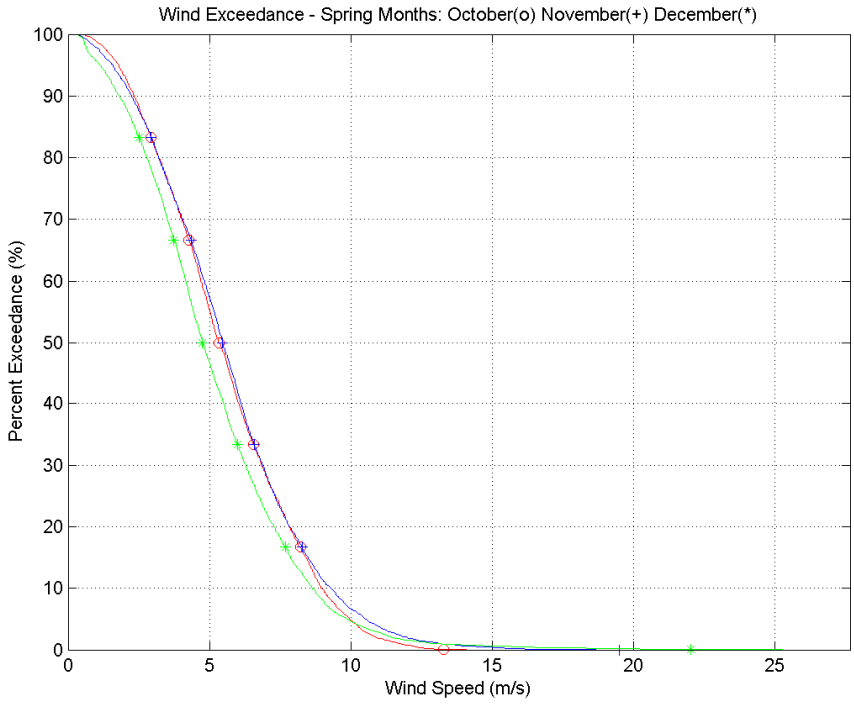
4.2.3. WINTER (July, August, September)



4.2.4. SPRING (October, November, December)



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4.3. Campos's Basin Distribution of Wind Speed and Direction

4.3.1. SUMMER (January, February, March)

Lines: Wind speed intervals (m/s)
Columns: Wind direction sectors (degrees – True North)

INTERVALOS		CALMA	N	NE	E	SE	S	SW	W	NW	TOTAL	%	MEDIA
DE	CLASSE		337.5	22.5	67.5	112.5	157.5	202.5	247.5	292.5			
			22.5	67.5	112.5	157.5	202.5	247.5	292.5	337.5			
CALMA		186	-	-	-	-	-	-	-	-	186	0.54	-
0.00	1.00	-	92	96	53	58	71	34	49	71	524	1.51	22.25
1.00	2.00	-	179	171	148	97	92	80	87	124	978	2.82	32.21
2.00	3.00	-	327	408	332	224	205	145	193	151	1985	5.72	57.08
3.00	4.00	-	470	676	518	309	237	200	188	181	2779	8.01	57.45
4.00	5.00	-	700	1264	727	432	257	216	126	154	3876	11.18	56.79
5.00	6.00	-	811	1575	703	401	257	179	89	133	4148	11.96	52.76
6.00	7.00	-	998	2106	699	356	237	145	71	86	4698	13.55	48.71
7.00	8.00	-	963	2104	509	251	211	83	44	66	4231	12.20	44.17
8.00	9.00	-	1096	2020	281	135	149	60	51	31	3823	11.02	36.88
9.00	10.00	-	980	1436	144	58	73	26	22	15	2754	7.94	31.86
10.00	11.00	-	754	1061	49	36	33	15	22	14	1984	5.72	28.24
11.00	12.00	-	500	530	33	19	20	11	11	8	1132	3.26	25.45
12.00	13.00	-	307	345	18	11	12	8	6	3	710	2.05	25.54
13.00	14.00	-	186	334	6	10	22	4	6	1	569	1.64	28.80
14.00	15.00	-	48	55	2	1	1	0	0	1	108	0.31	23.44
15.00	16.00	-	47	93	0	0	2	0	0	0	142	0.41	27.78
16.00	17.00	-	16	3	0	1	0	0	0	0	20	0.06	16.20
17.00	18.00	-	1	27	0	1	0	0	0	0	29	0.08	34.21
18.00	19.00	-	2	0	0	1	0	0	0	0	3	0.01	49.98
19.00	20.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
20.00	21.00	-	0	1	0	0	0	0	0	0	1	0.00	28.00
21.00	22.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
22.00	23.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
23.00	24.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
24.00	25.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
TOTAL		186	8477	14305	4222	2401	1879	1206	965	1039	34680		
% POR COLUNA		0.54	24.44	41.25	12.17	6.92	5.42	3.48	2.78	3.00			
MEDIAS INTENS.		0.00	7.62	7.50	5.54	5.33	5.45	4.89	4.46	4.27	6.71		

4.3.2. AUTUMN (April, May, June)

Lines: Wind speed intervals (m/s)
Columns: Wind direction sectors (degrees – True North)

INTERVALOS		CALMA	N	NE	E	SE	S	SW	W	NW	TOTAL	%	MEDIA
DE	CLASSE		337.5	22.5	67.5	112.5	157.5	202.5	247.5	292.5			
			22.5	67.5	112.5	157.5	202.5	247.5	292.5	337.5			
CALMA		289	-	-	-	-	-	-	-	-	289	0.81	-
0.00	1.00	-	79	72	90	122	126	100	98	82	769	2.17	177.38
1.00	2.00	-	149	193	247	214	199	151	171	125	1449	4.08	117.27
2.00	3.00	-	311	419	492	386	338	230	195	172	2543	7.17	93.93
3.00	4.00	-	416	780	855	536	486	301	202	209	3785	10.66	89.07
4.00	5.00	-	698	1027	1110	682	545	391	186	210	4849	13.66	82.20
5.00	6.00	-	797	1275	1023	662	585	375	168	137	5022	14.15	75.32
6.00	7.00	-	1010	1371	859	603	537	378	142	98	4998	14.08	65.92
7.00	8.00	-	965	1103	495	368	429	261	65	68	3754	10.58	54.07
8.00	9.00	-	968	801	297	255	305	263	64	51	3004	8.46	40.26
9.00	10.00	-	572	435	151	132	167	207	70	35	1769	4.98	33.96
10.00	11.00	-	414	272	53	86	140	205	69	24	1263	3.56	20.84
11.00	12.00	-	284	155	12	38	51	136	63	7	746	2.10	5.12
12.00	13.00	-	190	89	7	12	44	89	30	2	463	1.30	2.98
13.00	14.00	-	136	107	16	7	25	99	40	1	431	1.21	357.00
14.00	15.00	-	48	12	5	2	6	28	23	0	124	0.35	323.44
15.00	16.00	-	28	27	1	0	3	35	38	0	132	0.37	295.23
16.00	17.00	-	4	6	0	0	0	7	25	0	42	0.12	271.15
17.00	18.00	-	1	7	1	0	0	13	12	0	34	0.10	260.64
18.00	19.00	-	0	0	0	1	2	2	15	0	20	0.06	253.75
19.00	20.00	-	0	0	0	0	0	0	4	0	4	0.01	270.00
20.00	21.00	-	0	0	0	0	0	0	1	0	1	0.00	262.50
21.00	22.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
22.00	23.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
23.00	24.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
24.00	25.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
TOTAL		289	7070	8151	5714	4106	3988	3271	1681	1221	35491		
% POR COLUNA		0.81	19.92	22.97	16.10	11.57	11.24	9.22	4.74	3.44			
MEDIAS INTENS.		0.00	7.16	6.37	5.20	5.29	5.69	6.67	6.05	4.41	6.03		

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4.3.3. WINTER (July, August, September)

Lines: Wind speed intervals (m/s)
Columns: Wind direction sectors (degrees – True North)

INTERVALOS DE CLASSE		CALMA	N 337.5 22.5	NE 22.5 67.5	E 67.5 112.5	SE 112.5 157.5	S 157.5 202.5	SW 202.5 247.5	W 247.5 292.5	NW 292.5 337.5	TOTAL	%	MEDIA
CALMA		163	-	-	-	-	-	-	-	-	163	0.45	-
0.00	1.00	-	47	89	88	70	72	60	59	36	521	1.45	109.77
1.00	2.00	-	82	143	175	130	140	77	67	57	871	2.42	107.01
2.00	3.00	-	152	405	411	278	227	161	101	104	1839	5.11	92.74
3.00	4.00	-	210	557	603	441	347	184	105	94	2541	7.05	97.20
4.00	5.00	-	345	796	820	573	489	287	134	130	3574	9.92	94.14
5.00	6.00	-	357	1071	823	651	501	293	115	74	3885	10.79	89.90
6.00	7.00	-	508	1417	920	729	563	398	99	79	4713	13.08	84.76
7.00	8.00	-	492	1507	725	574	480	331	81	55	4245	11.79	76.37
8.00	9.00	-	593	1628	590	455	423	349	92	44	4174	11.59	64.82
9.00	10.00	-	477	1283	233	237	296	226	47	32	2831	7.86	53.69
10.00	11.00	-	405	1203	147	137	211	191	37	29	2360	6.55	46.13
11.00	12.00	-	251	801	94	64	145	123	17	10	1505	4.18	43.30
12.00	13.00	-	196	556	42	20	77	78	12	2	983	2.73	36.72
13.00	14.00	-	165	550	49	10	59	94	14	0	941	2.61	35.18
14.00	15.00	-	85	204	17	1	20	52	5	2	386	1.07	28.09
15.00	16.00	-	47	180	5	1	6	50	17	0	306	0.85	21.65
16.00	17.00	-	17	47	2	1	2	19	3	0	91	0.25	21.33
17.00	18.00	-	17	34	0	0	3	12	0	0	66	0.18	21.32
18.00	19.00	-	1	4	0	0	3	2	0	0	10	0.03	91.95
19.00	20.00	-	1	5	0	0	2	0	0	0	8	0.02	50.44
20.00	21.00	-	1	0	0	0	0	0	0	0	1	0.00	20.00
21.00	22.00	-	0	3	0	0	1	0	0	0	4	0.01	57.47
22.00	23.00	-	0	0	0	0	1	0	0	0	1	0.00	162.00
23.00	24.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
24.00	25.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
TOTAL		163	4449	12483	5744	4372	4068	2987	1005	748	36019		
% POR COLUNA		0.45	12.35	34.66	15.95	12.14	11.29	8.29	2.79	2.08			
MEDIAS INTENS.		0.00	8.04	8.24	6.01	6.05	6.62	7.38	5.75	5.03	7.17		

4.3.4. SPRING (October, November, December)

Lines: Wind speed intervals (m/s)
Columns: Wind direction sectors (degrees – True North)

INTERVALOS DE CLASSE		CALMA	N 337.5 22.5	NE 22.5 67.5	E 67.5 112.5	SE 112.5 157.5	S 157.5 202.5	SW 202.5 247.5	W 247.5 292.5	NW 292.5 337.5	TOTAL	%	MEDIA
CALMA		156	-	-	-	-	-	-	-	-	156	0.44	-
0.00	1.00	-	88	78	59	43	75	36	51	47	477	1.34	48.23
1.00	2.00	-	156	211	161	133	144	72	71	77	1025	2.89	77.74
2.00	3.00	-	237	361	398	240	266	156	78	98	1834	5.16	89.23
3.00	4.00	-	305	578	526	328	371	186	122	100	2516	7.08	87.80
4.00	5.00	-	417	826	727	508	434	211	123	112	3358	9.45	84.84
5.00	6.00	-	412	909	749	517	419	239	94	92	3431	9.66	83.65
6.00	7.00	-	539	1220	798	541	436	206	72	66	3878	10.92	75.01
7.00	8.00	-	628	1536	635	394	327	169	69	59	3817	10.74	59.98
8.00	9.00	-	770	1940	484	338	294	158	57	45	4086	11.50	49.98
9.00	10.00	-	724	1758	264	145	158	93	28	17	3187	8.97	40.65
10.00	11.00	-	645	1542	157	125	88	63	17	11	2648	7.45	38.41
11.00	12.00	-	508	943	71	61	61	34	14	5	1697	4.78	34.82
12.00	13.00	-	339	619	50	56	42	14	9	3	1132	3.19	34.24
13.00	14.00	-	301	696	32	43	55	32	5	0	1164	3.28	33.97
14.00	15.00	-	133	273	8	16	11	2	3	0	446	1.26	31.35
15.00	16.00	-	82	242	11	9	8	2	5	1	360	1.01	29.47
16.00	17.00	-	35	76	1	6	4	1	0	0	123	0.35	29.78
17.00	18.00	-	33	61	0	1	2	0	0	0	97	0.27	27.24
18.00	19.00	-	19	44	0	1	1	0	0	0	65	0.18	27.10
19.00	20.00	-	9	16	0	1	0	0	0	0	26	0.07	27.18
20.00	21.00	-	0	3	0	1	0	0	0	0	4	0.01	42.24
21.00	22.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
22.00	23.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
23.00	24.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
24.00	25.00	-	0	0	0	0	0	0	0	0	0	0.00	999.90
TOTAL		156	6380	13932	5131	3507	3196	1674	818	733	35527		
% POR COLUNA		0.44	17.96	39.22	14.44	9.87	9.00	4.71	2.30	2.06			
MEDIAS INTENS.		0.00	8.39	8.61	6.02	6.16	5.97	5.99	5.12	4.61	7.39		

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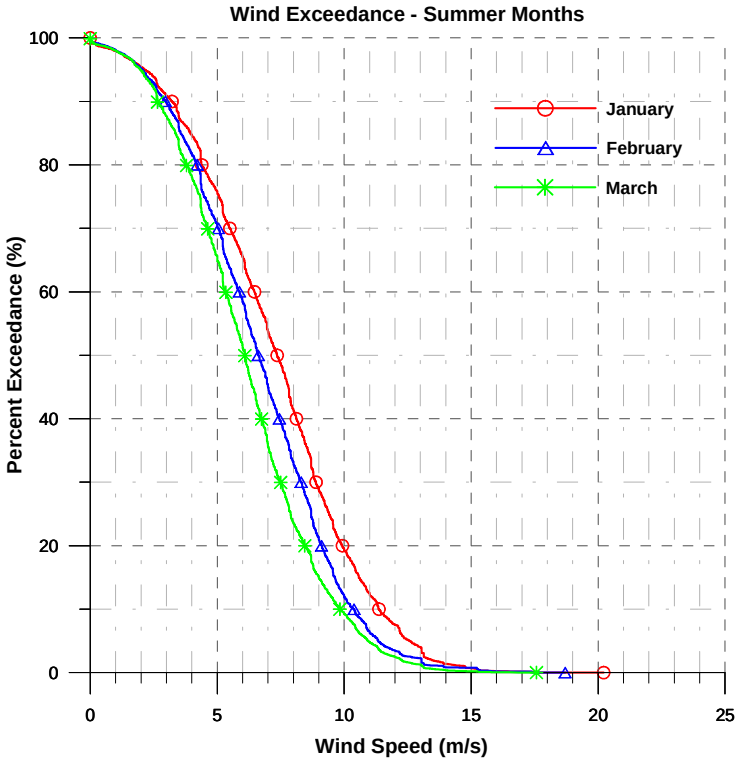
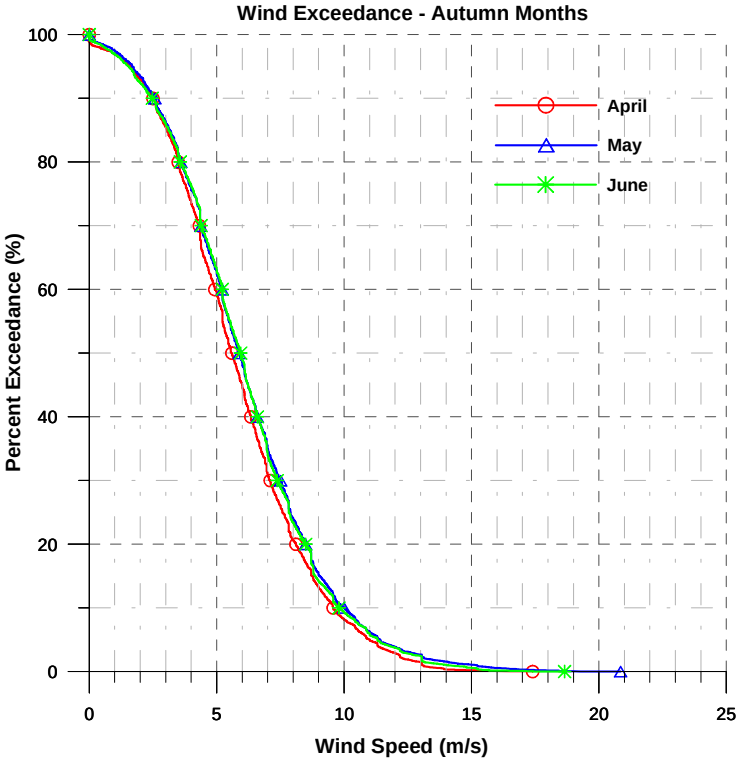
4.4. Campos's Basin Wind Exceedance Curves

4.4.1. SUMMER (January, February, March)



4.4.2. AUTUMN (April, May, June)



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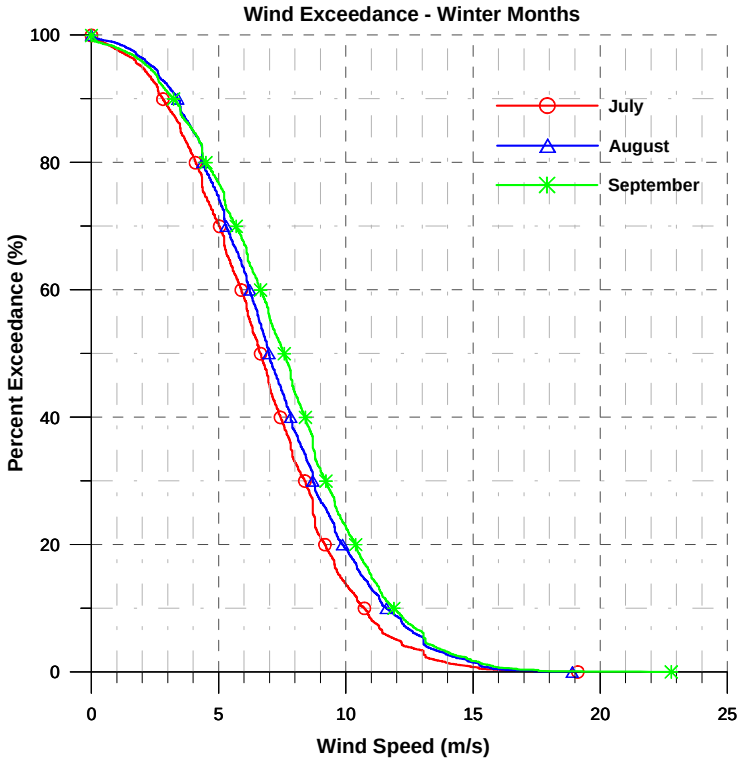
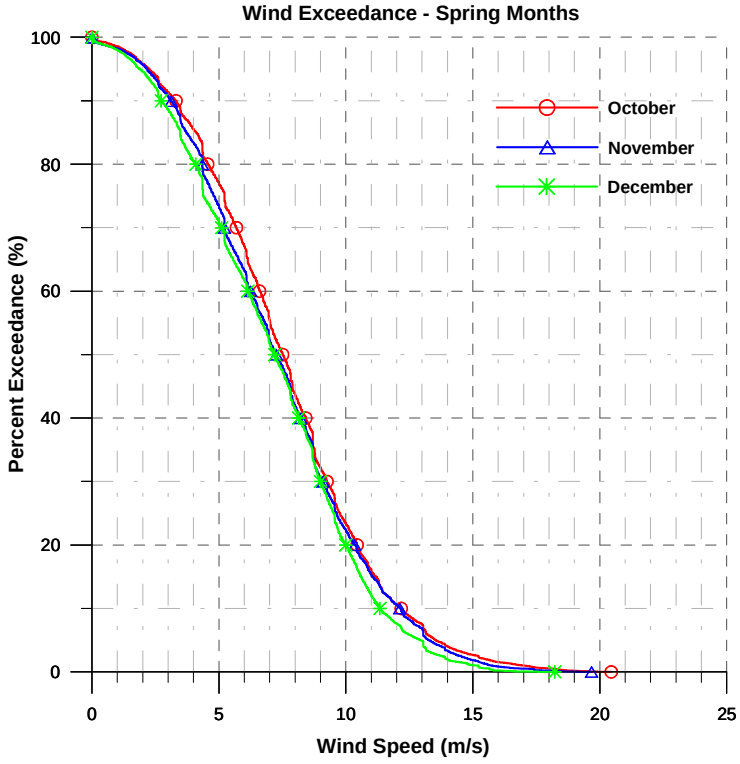
4.4.3. WINTER (July, August, September)



4.4.4. SPRING (October, November, December)



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5. SEASONAL WAVE DATA

5.1. Santos's Basin Distribution of Significant Wave Height and Spectral Peak Period

5.1.1. SUMMER (January, February, March)

Hs		Tp → 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total Hs	%Hs	Mean Tp
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
0.00	0.50	43	0	11	13	2	6	3	0	2	1	2	0	4	0	0	0	0	87	1.06	5.78
0.50	1.00	120	171	354	568	306	73	83	72	41	13	25	19	3	0	1	0	0	1849	22.53	6.83
1.00	1.50	8	498	433	1066	765	261	115	133	127	110	25	19	5	5	5	1	0	3576	43.58	7.21
1.50	2.00	0	20	264	231	460	198	131	103	73	50	22	7	4	1	0	1	0	1565	19.07	7.95
2.00	2.50	0	0	24	153	83	82	55	73	69	34	20	12	5	0	0	2	0	612	7.46	9.02
2.50	3.00	0	0	0	32	34	54	47	69	39	13	27	4	3	0	1	0	0	323	3.94	9.92
3.00	3.50	0	0	0	24	17	10	14	15	15	10	7	0	3	0	2	0	0	117	1.43	9.70
3.50	4.00	0	0	0	6	15	6	1	9	9	0	1	2	0	1	0	0	0	50	0.61	9.42
4.00	4.50	0	0	0	0	0	1	7	2	6	0	0	1	2	1	0	0	0	20	0.24	11.40
4.50	5.00	0	0	0	0	0	0	1	0	0	0	0	0	3	3	0	0	0	7	0.09	15.08
5.00	5.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
5.50	6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.00	6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.50	7.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.00	7.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.50	8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
8.00	8.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Tp		171	689	1086	2093	1682	691	457	476	381	231	129	64	32	11	9	4	0	8206		
%Tp		2.08	8.40	13.23	25.51	20.50	8.42	5.57	5.80	4.64	2.82	1.57	0.78	0.39	0.13	0.11	0.05	0.00			
Mean Hs		0.64	1.15	1.24	1.30	1.42	1.62	1.68	1.78	1.81	1.66	1.85	1.58	2.20	2.82	1.79	1.82	0.00			

5.1.2. AUTUMN (April, May, June)

Hs		Tp → 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total Hs	%Hs	Mean Tp
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
0.00	0.50	51	0	7	12	7	7	3	3	6	7	1	5	2	0	0	0	0	111	1.15	6.53
0.50	1.00	236	139	186	260	252	164	76	104	81	95	68	45	19	10	1	0	0	1736	17.99	7.76
1.00	1.50	14	377	255	464	504	220	210	107	166	161	122	86	10	5	1	0	0	2702	28.01	8.17
1.50	2.00	0	34	346	188	409	315	163	164	122	146	76	78	17	2	0	0	0	2060	21.35	8.74
2.00	2.50	0	1	43	156	87	199	159	153	103	116	57	29	26	3	3	3	0	1138	11.80	9.77
2.50	3.00	0	0	4	68	51	64	102	114	72	74	74	37	12	3	1	1	0	677	7.02	10.52
3.00	3.50	0	0	0	20	72	37	39	53	40	56	31	33	26	6	1	0	0	414	4.29	10.87
3.50	4.00	0	0	0	0	44	58	19	48	41	28	65	22	7	0	0	0	0	332	3.44	10.95
4.00	4.50	0	0	0	0	4	32	27	15	34	47	31	21	8	10	0	0	0	229	2.37	11.85
4.50	5.00	0	0	0	1	3	28	38	8	10	9	3	7	9	7	0	0	0	123	1.27	10.89
5.00	5.50	0	0	0	0	0	12	18	9	0	3	3	3	5	4	0	0	0	57	0.59	11.03
5.50	6.00	0	0	0	0	0	0	11	11	4	2	2	0	0	3	0	0	0	33	0.34	11.25
6.00	6.50	0	0	0	0	0	0	2	5	0	0	1	0	0	0	0	0	0	8	0.08	10.64
6.50	7.00	0	0	0	0	0	0	0	7	5	0	1	1	0	0	0	0	0	14	0.15	11.44
7.00	7.50	0	0	0	0	0	0	0	2	3	0	0	1	0	0	0	0	0	6	0.06	11.69
7.50	8.00	0	0	0	0	0	0	1	3	0	0	0	1	0	0	0	0	0	5	0.05	11.28
8.00	8.50	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	3	0.03	10.54
Total Tp		301	551	841	1169	1433	1136	869	808	687	744	535	369	141	53	7	4	0	9648		
%Tp		3.12	5.71	8.72	12.12	14.85	11.77	9.01	8.37	7.12	7.71	5.55	3.82	1.46	0.55	0.07	0.04	0.00			
Mean Hs		0.68	1.15	1.40	1.48	1.62	1.97	2.22	2.30	2.13	2.09	2.25	2.16	2.58	3.11	2.07	2.31	0.00			

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5.1.3. WINTER (July, August, September)

Hs		Tp → 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total	%Hs	Mean Tp
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Hs		
0.00	0.50	58	4	18	5	2	10	0	2	0	0	0	0	0	0	0	0	0	99	0.96	4.62
0.50	1.00	117	120	64	114	159	106	44	50	43	29	14	14	0	0	0	0	0	874	8.48	7.27
1.00	1.50	11	346	245	346	580	297	189	84	102	84	56	42	6	0	0	0	0	2388	23.18	7.72
1.50	2.00	1	36	535	287	555	415	247	224	139	122	126	31	3	1	0	0	0	2722	26.42	8.35
2.00	2.50	0	0	120	450	180	264	207	246	149	112	101	46	7	4	0	5	2	1893	18.38	9.07
2.50	3.00	0	0	5	207	148	115	142	126	101	92	44	41	0	0	5	0	0	1026	9.96	9.51
3.00	3.50	0	0	0	40	92	57	54	64	33	67	40	30	3	3	3	0	0	486	4.72	10.24
3.50	4.00	0	0	0	0	44	87	35	31	33	43	29	19	2	0	0	0	0	323	3.14	10.33
4.00	4.50	0	0	0	0	3	65	63	11	21	28	31	14	0	0	0	0	0	236	2.29	10.58
4.50	5.00	0	0	0	0	0	14	31	3	6	33	12	12	0	0	0	0	0	111	1.08	11.37
5.00	5.50	0	0	0	0	0	8	28	9	2	5	6	9	2	0	0	0	0	69	0.67	10.97
5.50	6.00	0	0	0	0	0	2	12	10	1	2	4	6	1	0	0	0	0	38	0.37	11.41
6.00	6.50	0	0	0	0	0	0	1	6	2	0	1	5	1	0	0	0	0	16	0.16	12.39
6.50	7.00	0	0	0	0	0	0	0	2	0	0	0	5	4	0	0	0	0	11	0.11	14.18
7.00	7.50	0	0	0	0	0	0	3	3	0	0	0	1	0	0	0	0	0	7	0.07	10.88
7.50	8.00	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0.02	9.94
8.00	8.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Tp		187	506	987	1449	1763	1440	1058	871	632	617	464	275	29	8	8	5	2	10301		
%Tp		1.82	4.91	9.58	14.07	17.11	13.98	10.27	8.46	6.14	5.99	4.50	2.67	0.28	0.08	0.08	0.05	0.02			
Mean Hs		0.65	1.18	1.60	1.89	1.77	2.08	2.40	2.29	2.21	2.49	2.44	2.81	3.30	2.55	2.97	2.22	2.05			

5.1.4. SPRING (October, November, December)

Hs		Tp → 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total	%Hs	Mean Tp
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Hs		
0.00	0.50	3	0	0	3	6	2	1	0	0	0	0	0	0	0	0	0	0	15	0.18	6.66
0.50	1.00	32	54	66	173	200	134	59	28	32	14	9	8	0	0	0	0	0	809	9.63	7.57
1.00	1.50	5	345	277	546	683	334	136	104	81	78	12	13	5	0	0	0	0	2619	31.16	7.40
1.50	2.00	0	37	448	333	716	509	200	117	84	71	37	19	0	0	0	0	0	2571	30.59	7.88
2.00	2.50	0	0	86	345	237	338	190	117	66	54	38	12	0	0	1	0	0	1484	17.66	8.44
2.50	3.00	0	0	0	104	84	74	110	66	32	19	7	4	1	2	1	0	0	504	6.00	8.96
3.00	3.50	0	0	0	26	40	28	49	41	19	16	9	6	1	0	0	0	0	235	2.80	9.58
3.50	4.00	0	0	0	0	10	23	7	28	14	30	8	0	0	0	0	0	0	120	1.43	10.66
4.00	4.50	0	0	0	1	13	3	2	4	5	1	0	0	0	0	0	0	0	29	0.35	8.95
4.50	5.00	0	0	0	0	0	3	5	3	0	5	0	0	0	0	0	0	0	16	0.19	10.33
5.00	5.50	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3	0.04	10.86
5.50	6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.00	6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.50	7.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.00	7.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.50	8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
8.00	8.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Tp		40	436	877	1531	1989	1448	760	509	334	288	120	62	7	2	2	0	0	8405		
%Tp		0.48	5.19	10.43	18.22	23.66	17.23	9.04	6.06	3.97	3.43	1.43	0.74	0.08	0.02	0.02	0.00	0.00			
Mean Hs		0.82	1.23	1.57	1.67	1.63	1.79	2.00	2.11	1.95	2.10	2.06	1.80	1.66	2.89	2.58	0.00	0.00			

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5.2. Santos's Basin Distribution of Significant Wave Height and Main Wave Direction

5.2.1. SUMMER (January, February, March)

Direction →		N	NE	E	SE	S	SW	W	NW	Total	%	Mean
Hs (m)												
0.00	0.50	5	40	24	7	8	2	1	0	87	1.06	68.1
0.50	1.00	36	618	684	232	207	46	18	8	1849	22.53	87.4
1.00	1.50	45	1293	1160	566	416	83	7	6	3576	43.58	89.8
1.50	2.00	1	401	364	372	363	63	1	0	1565	19.07	116.1
2.00	2.50	0	121	104	122	225	40	0	0	612	7.46	137.4
2.50	3.00	0	19	34	77	170	23	0	0	323	3.94	163.6
3.00	3.50	0	7	32	31	45	2	0	0	117	1.43	146.1
3.50	4.00	0	4	21	18	7	0	0	0	50	0.61	109.8
4.00	4.50	0	4	1	11	0	4	0	0	20	0.24	126.5
4.50	5.00	0	1	0	0	2	4	0	0	7	0.09	196.9
5.00	5.50	0	0	0	0	0	0	0	0	0	0.00	NaN
5.50	6.00	0	0	0	0	0	0	0	0	0	0.00	NaN
6.00	6.50	0	0	0	0	0	0	0	0	0	0.00	NaN
6.50	7.00	0	0	0	0	0	0	0	0	0	0.00	NaN
7.00	7.50	0	0	0	0	0	0	0	0	0	0.00	NaN
7.50	8.00	0	0	0	0	0	0	0	0	0	0.00	NaN
8.00	8.50	0	0	0	0	0	0	0	0	0	0.00	NaN
Total		87	2508	2424	1436	1443	267	27	14	8206		
%		1.06	30.56	29.54	17.50	17.58	3.25	0.33	0.17			
Mean		0.97	1.27	1.30	1.56	1.72	1.67	0.92	0.93			

5.2.2. AUTUMN (April, May, June)

Direction →		N	NE	E	SE	S	SW	W	NW	Total	%	Mean
Hs (m)												
0.00	0.50	16	23	21	17	25	7	2	0	111	1.15	103.4
0.50	1.00	85	337	508	233	372	169	11	21	1736	17.99	111.6
1.00	1.50	90	540	813	378	616	223	31	11	2702	28.01	114.6
1.50	2.00	50	273	462	326	632	295	16	6	2060	21.35	144.0
2.00	2.50	13	80	72	191	502	258	18	4	1138	11.80	176.7
2.50	3.00	5	19	37	99	291	209	13	4	677	7.02	182.9
3.00	3.50	0	15	11	41	159	174	14	0	414	4.29	194.0
3.50	4.00	0	0	19	43	112	146	12	0	332	3.44	192.5
4.00	4.50	0	0	0	67	71	85	6	0	229	2.37	186.3
4.50	5.00	0	0	2	10	22	77	12	0	123	1.27	210.3
5.00	5.50	0	0	0	8	4	34	11	0	57	0.59	217.2
5.50	6.00	0	0	0	14	2	13	4	0	33	0.34	192.9
6.00	6.50	0	0	0	0	0	6	2	0	8	0.08	233.0
6.50	7.00	0	0	0	0	0	13	1	0	14	0.15	230.5
7.00	7.50	0	0	0	0	0	6	0	0	6	0.06	233.6
7.50	8.00	0	0	0	0	0	5	0	0	5	0.05	227.8
8.00	8.50	0	0	0	0	0	3	0	0	3	0.03	227.3
Total		259	1287	1945	1427	2808	1723	153	46	9648		
%		2.68	13.34	20.16	14.79	29.10	17.86	1.59	0.48			
Mean		1.20	1.32	1.34	1.88	1.95	2.56	2.77	1.29			

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5.2.3. WINTER (July, August, September)

Direction →		N	NE	E	SE	S	SW	W	NW	Total	%	Mean
Hs (m)												
0.00	0.50	12	50	8	4	17	6	0	2	99	0.96	68.5
0.50	1.00	31	214	268	144	159	53	2	3	874	8.48	103.8
1.00	1.50	23	634	787	279	538	111	11	5	2388	23.18	104.3
1.50	2.00	26	642	657	373	790	222	9	3	2722	26.42	122.5
2.00	2.50	7	336	266	262	634	362	7	19	1893	18.38	154.4
2.50	3.00	0	101	148	159	406	193	12	7	1026	9.96	161.5
3.00	3.50	0	53	26	98	199	105	4	1	486	4.72	172.6
3.50	4.00	0	32	13	45	121	104	8	0	323	3.14	184.1
4.00	4.50	0	8	20	28	81	90	9	0	236	2.29	189.2
4.50	5.00	0	5	8	7	47	44	0	0	111	1.08	185.6
5.00	5.50	0	4	14	3	17	31	0	0	69	0.67	178.7
5.50	6.00	0	0	6	0	16	16	0	0	38	0.37	193.3
6.00	6.50	0	0	0	0	7	9	0	0	16	0.16	210.0
6.50	7.00	0	0	0	0	9	2	0	0	11	0.11	199.6
7.00	7.50	0	0	0	0	1	6	0	0	7	0.07	225.7
7.50	8.00	0	0	0	0	0	2	0	0	2	0.02	230.6
8.00	8.50	0	0	0	0	0	0	0	0	0	0.00	NaN
Total		99	2079	2221	1402	3042	1356	62	40	10301		
%		0.96	20.18	21.56	13.61	29.53	13.16	0.60	0.39			
Mean		1.19	1.69	1.67	1.99	2.20	2.67	2.60	1.98			

5.2.4. SPRING (October, November, December)

Direction →		N	NE	E	SE	S	SW	W	NW	Total	%	Mean
Hs (m)												
0.00	0.50	0	10	2	3	0	0	0	0	15	0.18	73.1
0.50	1.00	8	248	292	118	109	27	0	7	809	9.63	93.9
1.00	1.50	25	800	943	360	379	98	6	8	2619	31.16	95.3
1.50	2.00	21	853	692	369	513	117	2	4	2571	30.59	101.9
2.00	2.50	4	371	259	281	448	111	10	0	1484	17.66	126.3
2.50	3.00	2	101	71	103	183	43	1	0	504	6.00	139.9
3.00	3.50	0	23	39	57	95	21	0	0	235	2.80	151.7
3.50	4.00	0	8	7	40	50	15	0	0	120	1.43	158.8
4.00	4.50	0	9	10	3	6	1	0	0	29	0.35	94.3
4.50	5.00	0	0	2	0	7	7	0	0	16	0.19	198.8
5.00	5.50	0	0	0	0	0	3	0	0	3	0.04	217.7
5.50	6.00	0	0	0	0	0	0	0	0	0	0.00	NaN
6.00	6.50	0	0	0	0	0	0	0	0	0	0.00	NaN
6.50	7.00	0	0	0	0	0	0	0	0	0	0.00	NaN
7.00	7.50	0	0	0	0	0	0	0	0	0	0.00	NaN
7.50	8.00	0	0	0	0	0	0	0	0	0	0.00	NaN
8.00	8.50	0	0	0	0	0	0	0	0	0	0.00	NaN
Total		60	2423	2317	1334	1790	443	19	19	8405		
%		0.71	28.83	27.57	15.87	21.30	5.27	0.23	0.23			
Mean		1.48	1.63	1.55	1.84	1.97	2.02	1.87	1.13			

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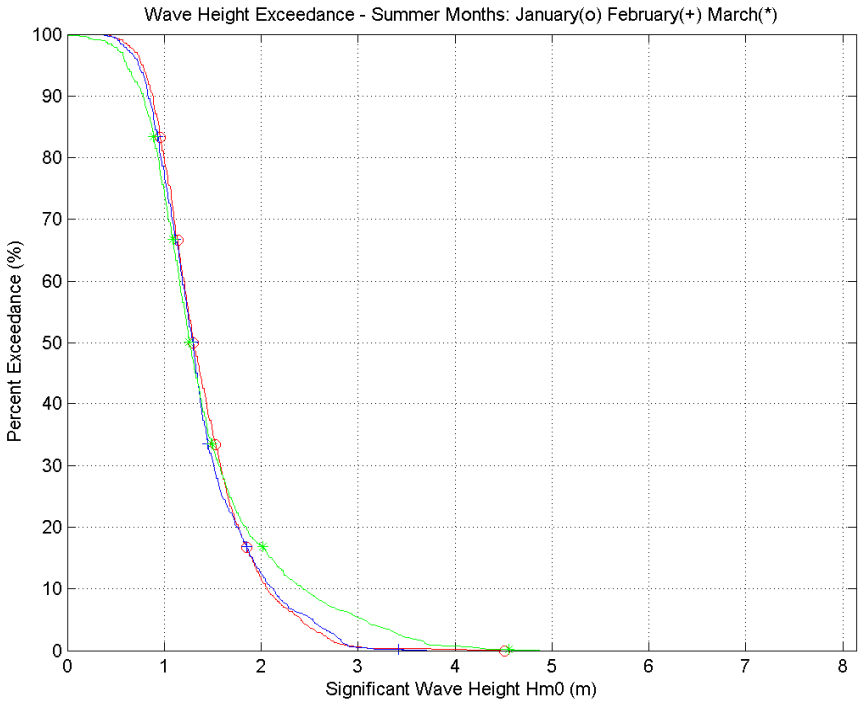
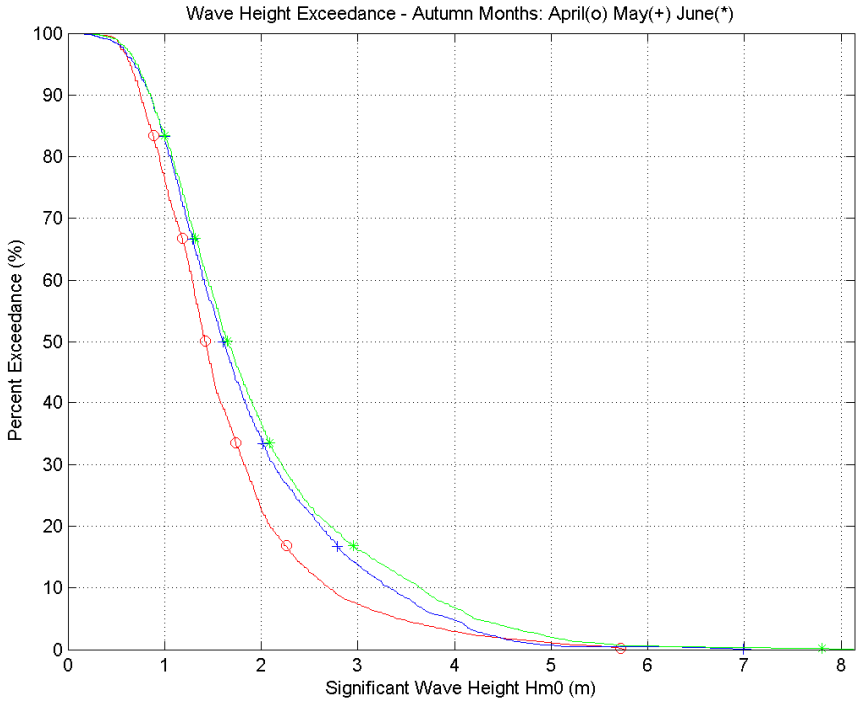
5.3. Santos's Basin Wave Exceedance Curves

5.3.1. SUMMER (January, February, March)



5.3.2. AUTUMN (April, May, June)



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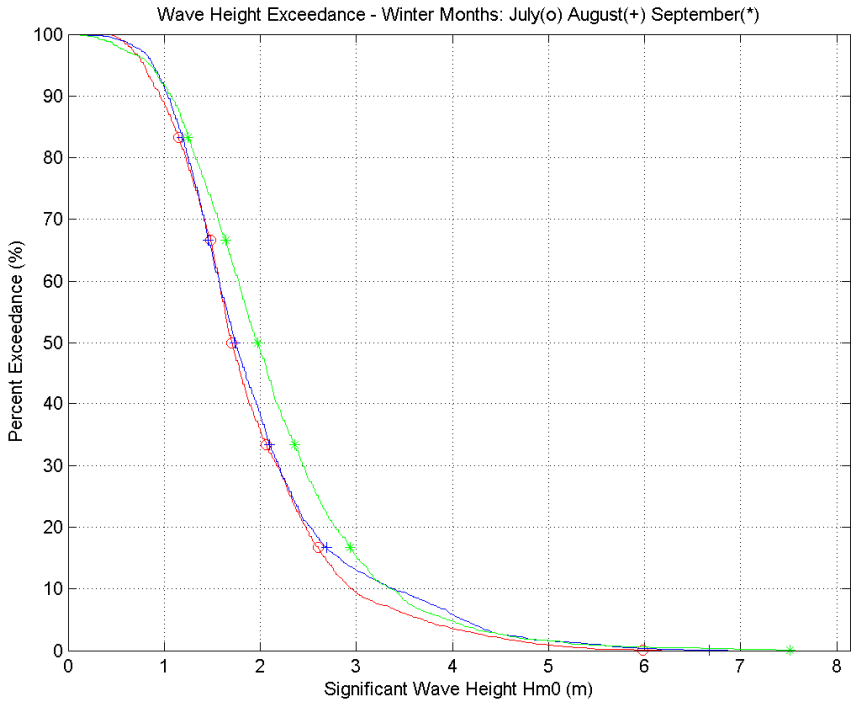
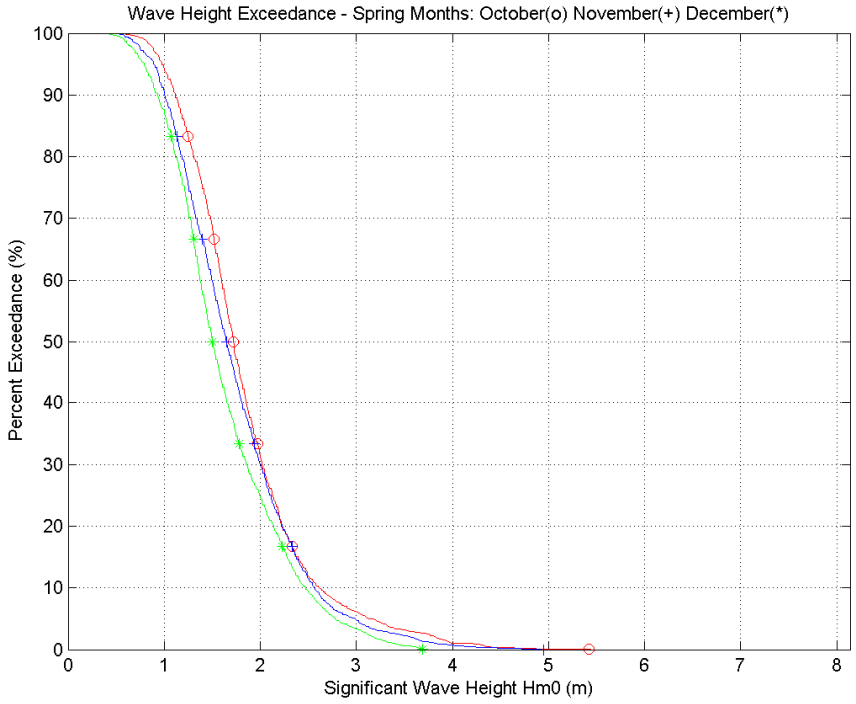
5.3.3. WINTER (July, August, September)



5.3.4. SPRING (October, November, December)



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5.4. Campos's Basin Distribution of Significant Wave Height and Spectral Peak Period

5.4.1. SUMMER (January, February, March)

Hs		Tp → 3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	Total Hs	%Hs	Mean Tp
0.00	0.50	0	0	1	0	0	0	0	0	2	1	0	0	0	0	0	0	0	4	0.04	10.32
0.50	1.00	35	57	136	92	98	46	49	26	16	7	7	11	3	0	0	0	0	583	6.54	7.16
1.00	1.50	2	404	767	1074	480	222	171	152	144	76	42	14	2	1	4	0	0	3555	39.89	7.10
1.50	2.00	0	27	621	892	574	171	151	138	120	90	39	25	6	3	7	1	0	2865	32.15	7.55
2.00	2.50	0	0	70	394	366	110	82	66	62	70	37	13	6	3	4	0	0	1283	14.40	8.24
2.50	3.00	0	0	3	57	146	76	26	41	32	23	25	9	5	3	3	0	0	449	5.04	9.18
3.00	3.50	0	0	0	7	13	30	11	20	13	1	6	6	8	1	2	0	0	118	1.32	10.29
3.50	4.00	0	0	0	0	0	1	6	15	3	1	1	2	2	4	2	0	0	37	0.42	12.01
4.00	4.50	0	0	0	0	0	1	0	6	2	0	0	1	5	0	1	0	0	16	0.18	12.73
4.50	5.00	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.01	12.34
5.00	5.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
5.50	6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.00	6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.50	7.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.00	7.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.50	8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
8.00	8.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Tp		37	488	1598	2516	1677	657	496	464	394	270	157	81	37	15	23	1	0	8911		
%Tp		0.42	5.48	17.93	28.23	18.82	7.37	5.57	5.21	4.42	3.03	1.76	0.91	0.42	0.17	0.26	0.01	0.00			
Mean Hs		0.87	1.22	1.45	1.61	1.76	1.78	1.68	1.85	1.77	1.82	1.93	1.95	2.62	2.72	2.25	1.83	0.00			

5.4.2. AUTUMN (April, May, June)

Hs		Tp → 3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	Total Hs	%Hs	Mean Tp
0.00	0.50	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	3	0.03	8.65
0.50	1.00	17	27	28	49	88	119	30	22	54	38	9	17	13	3	0	0	0	514	5.77	8.87
1.00	1.50	1	220	237	427	525	340	151	185	204	151	84	34	14	5	6	0	0	2584	29.01	8.33
1.50	2.00	0	29	361	314	528	388	268	227	212	183	91	61	34	7	2	0	0	2705	30.37	8.82
2.00	2.50	0	0	50	224	224	218	180	143	184	167	68	40	29	6	0	0	0	1533	17.21	9.60
2.50	3.00	0	0	1	49	78	84	96	105	115	121	60	48	15	2	4	3	0	781	8.77	10.72
3.00	3.50	0	0	0	9	35	47	60	79	77	77	43	16	5	4	4	0	0	456	5.12	10.94
3.50	4.00	0	0	0	0	4	17	14	23	51	28	37	20	3	1	1	0	0	199	2.23	11.86
4.00	4.50	0	0	0	0	1	6	7	10	6	16	14	28	10	1	0	0	0	99	1.11	12.80
4.50	5.00	0	0	0	0	0	0	1	6	0	1	6	4	7	0	0	0	0	25	0.28	13.27
5.00	5.50	0	0	0	0	0	0	1	0	3	0	1	1	1	0	0	0	0	7	0.08	12.49
5.50	6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.00	6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.50	7.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.00	7.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.50	8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
8.00	8.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Tp		19	276	677	1072	1483	1220	808	800	906	782	414	269	131	29	17	3	0	8906		
%Tp		0.21	3.10	7.60	12.04	16.65	13.70	9.07	8.98	10.17	8.78	4.65	3.02	1.47	0.33	0.19	0.03	0.00			
Mean Hs		0.80	1.25	1.56	1.68	1.68	1.77	2.04	2.08	2.08	2.15	2.32	2.45	2.29	2.11	2.28	2.70	0.00			

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5.4.3. WINTER (July, August, September)

Hs	Tp → 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total Hs	%Hs	Mean Tp
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
0.00 0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
0.50 1.00	12	29	13	37	37	23	11	19	12	16	5	5	0	0	0	0	0	219	2.48	7.96
1.00 1.50	9	151	175	195	290	215	109	95	104	83	40	15	7	0	0	0	0	1488	16.84	8.11
1.50 2.00	0	32	488	423	502	408	212	196	172	140	107	52	7	0	2	0	0	2741	31.01	8.37
2.00 2.50	0	0	78	504	367	375	278	221	194	176	79	32	5	5	2	0	0	2316	26.21	8.96
2.50 3.00	0	0	5	146	234	158	125	177	134	105	68	33	3	1	2	0	0	1191	13.48	9.65
3.00 3.50	0	0	0	17	53	58	58	71	103	71	41	31	9	2	4	0	0	518	5.86	10.85
3.50 4.00	0	0	0	0	17	19	30	29	28	43	14	12	4	0	0	0	0	196	2.22	11.02
4.00 4.50	0	0	0	0	0	5	10	12	15	36	7	1	1	0	0	0	0	87	0.98	11.61
4.50 5.00	0	0	0	0	0	0	4	3	6	15	8	8	0	0	0	0	0	44	0.50	12.54
5.00 5.50	0	0	0	0	0	0	0	1	0	5	9	2	2	0	0	0	0	19	0.21	13.30
5.50 6.00	0	0	0	0	0	0	1	0	1	1	5	5	2	0	0	0	0	15	0.17	13.62
6.00 6.50	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	4	0.05	14.32
6.50 7.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.00 7.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.50 8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
8.00 8.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Tp	21	212	759	1322	1500	1261	838	824	769	691	385	196	42	8	10	0	0	8838		
%Tp	0.24	2.40	8.59	14.96	16.97	14.27	9.48	9.32	8.70	7.82	4.36	2.22	0.48	0.09	0.11	0.00	0.00			
Mean Hs	0.97	1.26	1.68	1.97	1.99	2.04	2.22	2.28	2.32	2.45	2.46	2.56	2.98	2.66	2.66	0.00	0.00			

5.4.4. SPRING (October, November, December)

Hs	Tp → 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total Hs	%Hs	Mean Tp
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
0.00 0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
0.50 1.00	11	19	29	41	47	17	7	9	2	5	9	5	0	0	0	0	0	201	2.23	7.42
1.00 1.50	2	171	327	473	476	149	127	118	64	55	25	14	9	5	0	0	0	2015	22.35	7.50
1.50 2.00	0	24	577	840	799	294	189	193	147	108	53	40	16	5	6	0	0	3291	36.51	7.85
2.00 2.50	0	1	89	588	590	312	127	127	105	89	42	14	5	7	4	1	0	2101	23.31	8.25
2.50 3.00	0	0	1	134	330	177	118	60	48	50	28	11	3	1	1	0	0	962	10.67	8.74
3.00 3.50	0	0	0	7	62	130	34	27	24	14	12	0	0	0	0	1	0	311	3.45	9.16
3.50 4.00	0	0	0	0	7	30	31	13	9	9	2	1	0	1	1	0	0	104	1.15	9.84
4.00 4.50	0	0	0	0	0	3	5	2	7	1	2	1	0	0	0	0	0	21	0.23	10.92
4.50 5.00	0	0	0	0	0	0	0	4	2	1	0	0	0	0	0	0	0	7	0.08	10.79
5.00 5.50	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.01	14.22
5.50 6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.00 6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6.50 7.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.00 7.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
7.50 8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
8.00 8.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Tp	13	215	1023	2083	2311	1112	638	553	408	332	173	87	33	19	12	2	0	9014		
%Tp	0.14	2.39	11.35	23.11	25.64	12.34	7.08	6.13	4.53	3.68	1.92	0.97	0.37	0.21	0.13	0.02	0.00			
Mean Hs	0.93	1.27	1.61	1.84	1.95	2.20	2.11	2.02	2.09	2.06	2.08	1.93	1.81	1.96	2.16	2.72	0.00			

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5.5. Campos's Basin Distribution of Significant Wave Height and Main Wave Direction

5.5.1. SUMMER (January, February, March)

Direction →		N	NE	E	SE	S	SW	W	NW	Total	%	Mean
Hs (m)												
0.00	0.50	1	0	0	1	2	0	0	0	4	0.04	150.7
0.50	1.00	43	221	129	70	97	19	2	2	583	6.54	82.8
1.00	1.50	217	1453	1026	364	399	85	7	4	3555	39.89	76.3
1.50	2.00	312	1300	414	322	385	126	6	0	2865	32.15	68.0
2.00	2.50	210	558	81	133	215	85	1	0	1283	14.40	60.6
2.50	3.00	52	182	22	60	103	30	0	0	449	5.04	78.6
3.00	3.50	10	34	4	32	23	15	0	0	118	1.32	117.5
3.50	4.00	0	1	0	19	11	6	0	0	37	0.42	157.3
4.00	4.50	0	1	0	7	2	6	0	0	16	0.18	172.7
4.50	5.00	0	0	0	0	1	0	0	0	1	0.01	176.0
5.00	5.50	0	0	0	0	0	0	0	0	0	0.00	NaN
5.50	6.00	0	0	0	0	0	0	0	0	0	0.00	NaN
6.00	6.50	0	0	0	0	0	0	0	0	0	0.00	NaN
6.50	7.00	0	0	0	0	0	0	0	0	0	0.00	NaN
7.00	7.50	0	0	0	0	0	0	0	0	0	0.00	NaN
7.50	8.00	0	0	0	0	0	0	0	0	0	0.00	NaN
8.00	8.50	0	0	0	0	0	0	0	0	0	0.00	NaN
Total		845	3750	1676	1008	1238	372	16	6	8911		
%		9.48	42.08	18.81	11.31	13.89	4.17	0.18	0.07			
Mean		1.79	1.64	1.41	1.73	1.74	1.91	1.49	1.15			

5.5.2. AUTUMN (April, May, June)

Direction →		N	NE	E	SE	S	SW	W	NW	Total	%	Mean
Hs (m)												
0.00	0.50	0	0	0	1	1	1	0	0	3	0.03	175.3
0.50	1.00	18	118	123	95	116	39	4	1	514	5.77	114.5
1.00	1.50	115	475	830	447	523	187	2	5	2584	29.01	110.8
1.50	2.00	160	488	672	442	625	303	11	4	2705	30.37	120.6
2.00	2.50	99	207	155	227	492	346	5	2	1533	17.21	160.8
2.50	3.00	35	55	48	119	257	266	0	1	781	8.77	180.0
3.00	3.50	11	5	15	86	143	187	9	0	456	5.12	188.8
3.50	4.00	1	1	3	18	57	118	1	0	199	2.23	200.1
4.00	4.50	0	0	0	2	33	64	0	0	99	1.11	204.8
4.50	5.00	0	0	0	0	10	15	0	0	25	0.28	208.6
5.00	5.50	0	0	0	0	3	4	0	0	7	0.08	201.4
5.50	6.00	0	0	0	0	0	0	0	0	0	0.00	NaN
6.00	6.50	0	0	0	0	0	0	0	0	0	0.00	NaN
6.50	7.00	0	0	0	0	0	0	0	0	0	0.00	NaN
7.00	7.50	0	0	0	0	0	0	0	0	0	0.00	NaN
7.50	8.00	0	0	0	0	0	0	0	0	0	0.00	NaN
8.00	8.50	0	0	0	0	0	0	0	0	0	0.00	NaN
Total		439	1349	1846	1437	2260	1530	32	13	8906		
%		4.93	15.15	20.73	16.14	25.38	17.18	0.36	0.15			
Mean		1.82	1.61	1.54	1.81	2.01	2.43	2.21	1.64			

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5.5.3. WINTER (July, August, September)

Direction →		N	NE	E	SE	S	SW	W	NW	Total	%	Mean
Hs (m)												
0.00	0.50	0	0	0	0	0	0	0	0	0	0.00	NaN
0.50	1.00	9	53	59	41	33	24	0	0	219	2.48	105.8
1.00	1.50	68	349	463	245	261	95	7	0	1488	16.84	101.0
1.50	2.00	91	786	622	420	577	233	10	2	2741	31.01	106.7
2.00	2.50	118	546	432	361	546	311	2	0	2316	26.21	121.7
2.50	3.00	51	211	148	179	380	221	0	1	1191	13.48	150.3
3.00	3.50	9	38	25	69	177	200	0	0	518	5.86	183.8
3.50	4.00	0	5	5	23	65	98	0	0	196	2.22	193.2
4.00	4.50	0	0	0	11	37	39	0	0	87	0.98	195.0
4.50	5.00	0	0	0	3	21	20	0	0	44	0.50	197.1
5.00	5.50	0	0	0	2	8	9	0	0	19	0.21	194.7
5.50	6.00	0	0	0	3	7	5	0	0	15	0.17	189.7
6.00	6.50	0	0	0	0	2	2	0	0	4	0.05	202.8
6.50	7.00	0	0	0	0	0	0	0	0	0	0.00	NaN
7.00	7.50	0	0	0	0	0	0	0	0	0	0.00	NaN
7.50	8.00	0	0	0	0	0	0	0	0	0	0.00	NaN
8.00	8.50	0	0	0	0	0	0	0	0	0	0.00	NaN
Total		346	1988	1754	1357	2114	1257	19	3	8838		
%		3.91	22.49	19.85	15.35	23.92	14.22	0.21	0.03			
Mean		1.98	1.92	1.82	2.06	2.28	2.56	1.65	2.05			

5.5.4. SPRING (October, November, December)

Direction →		N	NE	E	SE	S	SW	W	NW	Total	%	Mean
Hs (m)												
0.00	0.50	0	0	0	0	0	0	0	0	0	0.00	NaN
0.50	1.00	8	63	38	30	51	11	0	0	201	2.23	104.9
1.00	1.50	78	785	469	243	333	102	1	4	2015	22.35	87.4
1.50	2.00	207	1250	659	411	587	170	4	3	3291	36.51	85.7
2.00	2.50	153	874	254	276	372	171	0	1	2101	23.31	85.5
2.50	3.00	69	419	77	136	190	71	0	0	962	10.67	81.5
3.00	3.50	38	132	14	30	56	41	0	0	311	3.45	71.5
3.50	4.00	7	47	5	5	18	22	0	0	104	1.15	79.5
4.00	4.50	0	1	0	0	7	13	0	0	21	0.23	203.3
4.50	5.00	0	0	0	0	1	6	0	0	7	0.08	216.2
5.00	5.50	0	0	0	1	0	0	0	0	1	0.01	150.0
5.50	6.00	0	0	0	0	0	0	0	0	0	0.00	NaN
6.00	6.50	0	0	0	0	0	0	0	0	0	0.00	NaN
6.50	7.00	0	0	0	0	0	0	0	0	0	0.00	NaN
7.00	7.50	0	0	0	0	0	0	0	0	0	0.00	NaN
7.50	8.00	0	0	0	0	0	0	0	0	0	0.00	NaN
8.00	8.50	0	0	0	0	0	0	0	0	0	0.00	NaN
Total		560	3571	1516	1132	1615	607	5	8	9014		
%		6.21	39.62	16.82	12.56	17.92	6.73	0.06	0.09			
Mean		2.05	1.95	1.72	1.91	1.94	2.16	1.56	1.53			

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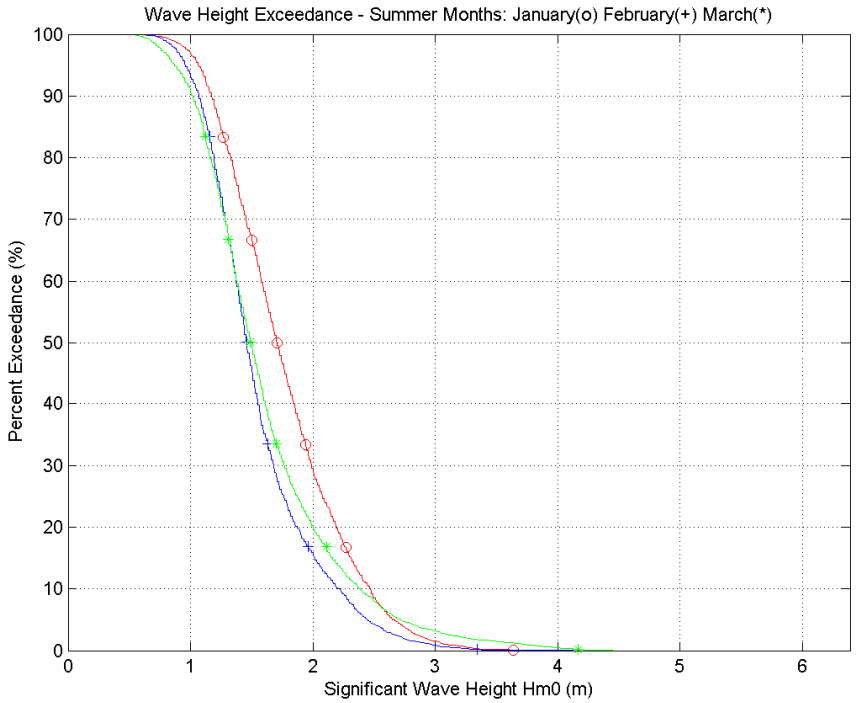
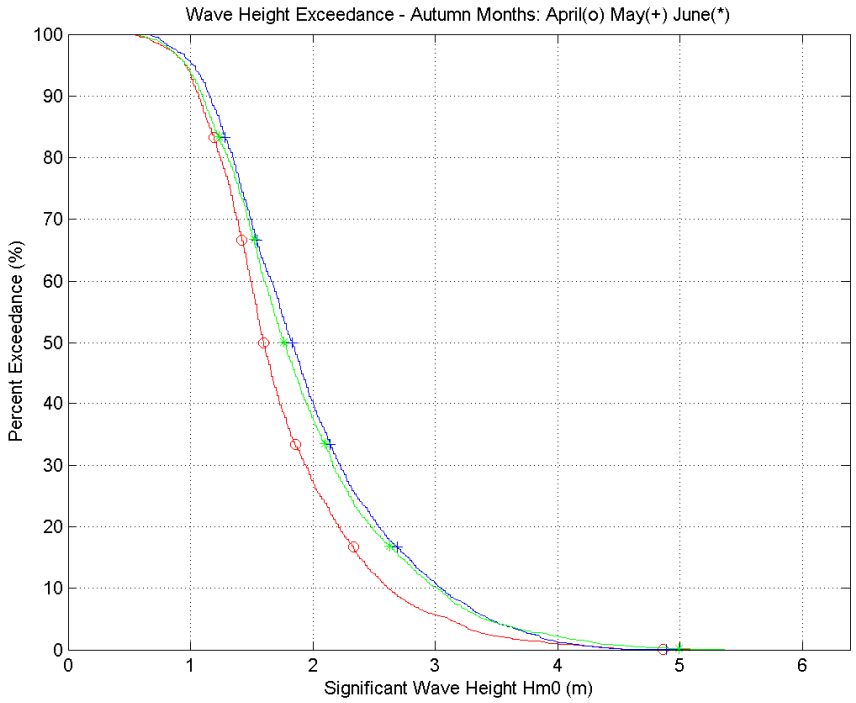
5.6. Campos's Basin Wave Exceedance Curves

5.6.1. SUMMER (January, February, March)



5.6.2. AUTUMN (April, May, June)



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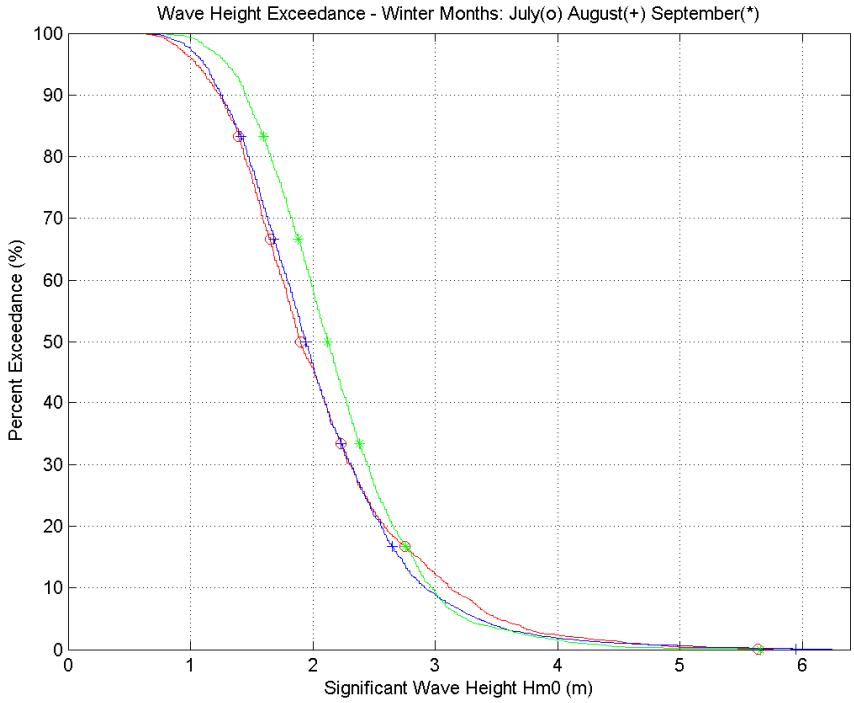
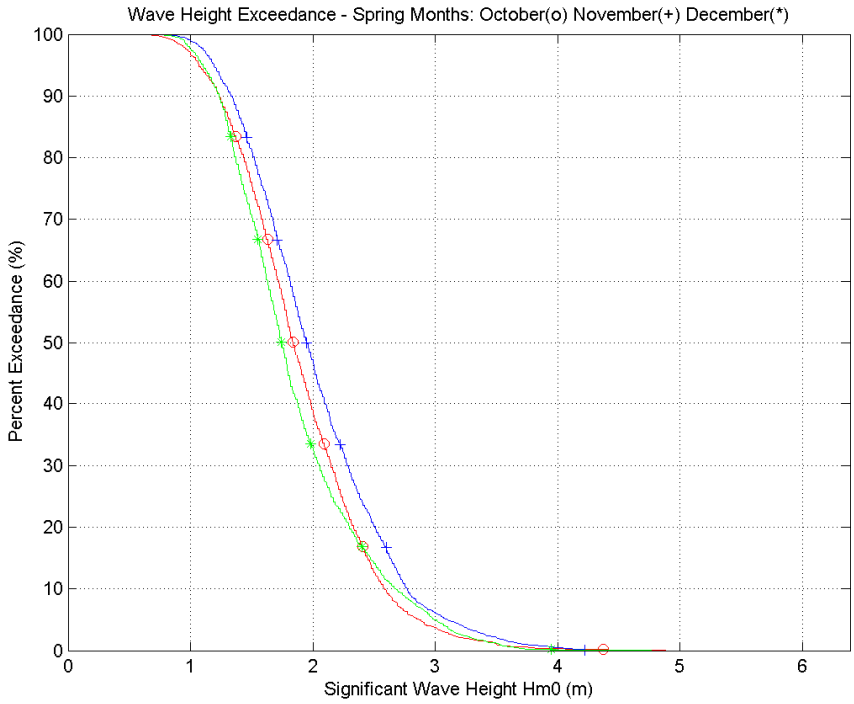
5.6.3. WINTER (July, August, September)



5.6.4. SPRING (October, November, December)



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INDEX OF REVISIONS

REV.	DESCRIPTION AND / OR AFFECTED SHEETS
0	ORIGINAL
A	UPDATED TABLES 3.1 (ATMOSPHERIC PRESSURE) AND 3.5.2 (JOINT DISTRIBUTION OF WIND SPEED AND WIND DIRECTION). TABLES 3.5.1 AND 3.5.2 TEXT UPDATED
B	UPDATED TABLE 3.4 (AIR TEMPERATURE)
C	UPDATED METEOROLOGICAL (TABLES 3) , TIDAL (TABLE 4), WAVE (TABLES 5), CURRENT (TABLES 6) AND SEA WATER (TABLES 7) DATA. TABLES WITH 16 DIRECTIONS AND 1000-YEAR RETURN PERIOD ARE INCLUDED.
D	UPDATED WIND (TABLE 3.5.1) AND WAVE (TABLES 5.1.1 TO 5.1.17) WITH ASSOCIATED EXTREME PARAMETERS. INCLUDED TABLE WITH ADJUSTED SPREADING FACTOR.
E	UPDATED SEA WATER CHARACTERISTICS (ITEM 7).
F	INCLUDED NOTICE ABOUT DOCUMENT PROPERTY
G	UPDATED TABLE 3.5.2 AND FIGURE 3.5.2.1 (WIND)
H	UPDATE AIR TEMPERATURE (TABLES 3.3.1-3); INCLUDED HVAC (TABLE 3.3.4); INCLUDED RAINFALL (TABLES 3.4.1-6)

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	ORIGINAL	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	29/08/2008	23/11/2008	26/10/2009	12/08/2011	30/11/2011	13/11/2014	11/07/2018	02/08/2022	08/04/2025
EXECUTION	ERIC / JAMLIMA	LCRA	LCRA	JAMLIMA/EOR	GGM/EOR/LMANOEL	JAMLIMA/GGM	JAMLIMA	BD2O/CTXJ	BXU2 / BZM7
VERIFICATION	LMANOEL	ERIC	ERIC	LMANOEL/GGM	JAMLIMA	LMANOEL	WCB	CTRC	CTXJ / FFV8
APPROVAL	LEVY	LEVY	LEVY	MAURO	MAURO	VINICIUS	ARTHUR	A7OQ	U3LG

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INDEX

1. OBJECTIVE 6

2. SYSTEM OF UNITS AND DIRECTION CONVENTION 7

3. METEOROLOGICAL DATA 8

3.1 ATMOSPHERIC PRESSURE 8
3.2 RELATIVE HUMIDITY 8
3.3 AIR TEMPERATURE (DRY BULB) 8
3.3.1 Characteristics Monthly Values of Air Temperature (°C) 8
3.3.2 Air Temperature (Dry Bulb) Exceedance - Monthly Values (°C) 9
3.3.3 Percentage of Air Temperature Occurrence in Monthly Basis 9
3.3.4 HVAC - Dry Bulb / Wet Bulb Temperatures 10
3.4 RAINFALL 11
3.4.1 Disaggregation Factor 11
3.4.2 Extreme IDF Curves 11
3.4.3 Rainfall Frequency (days) above 1mm/day 11
3.4.4 Monthly Accumulated Rainfall (mm) 11
3.4.5 Maximum Absolute Accumulated Rainfall (mm) 11
3.4.6 Rainfall Exceedance above 1mm/time frame 12
3.5 WIND 13
3.5.1 Wind Speed by Return Period (m/s) with associated Wave and Current Conditions 13
3.5.2 Joint Distribution of Wind Speed and Wind Direction (1 hour wind) 15

4. TIDAL DATA 16

5. WAVE DATA 17

5.1 EXTREME SINGLE PEAK WAVE CRITERIA 17
5.1.1 Extreme Single Peak Wave Parameters with associated Wind and Current Conditions by Return Periods (Years) 18
5.1.2 Single Peak Wave Extreme Hs x Tp curves for N Direction with associated Wind and Current Conditions by Return Periods 21
5.1.3 Single Peak Wave Extreme Hs x Tp curves for NNE Direction with associated Wind and Current Conditions by Return Periods 22
5.1.4 Single Peak Wave Extreme Hs x Tp curves for NE Direction with associated Wind and Current Conditions by Return Periods 23
5.1.5 Single Peak Wave Extreme Hs x Tp curves for ENE Direction with associated Wind and Current Conditions by Return Periods 24
5.1.6 Single Peak Wave Extreme Hs x Tp curves for E Direction with associated Wind and Current Conditions by Return Periods 25
5.1.7 Single Peak Wave Extreme Hs x Tp curves for ESE Direction with associated Wind and Current Conditions by Return Periods 26
5.1.8 Single Peak Wave Extreme Hs x Tp curves for SE Direction with associated Wind and Current Conditions by Return Periods 27
5.1.9 Single Peak Wave Extreme Hs x Tp curves for SSE Direction with associated Wind and Current Conditions by Return Periods 28
5.1.10 Single Peak Wave Extreme Hs x Tp curves for S Direction with associated Wind and Current Conditions by Return Periods 29
5.1.11 Single Peak Wave Extreme Hs x Tp curves for SSW Direction with associated Wind and Current Conditions by Return Periods 30
5.1.12 Single Peak Wave Extreme Hs x Tp curves for SW Direction with associated Wind and Current Conditions by Return Periods 31
5.1.13 Single Peak Wave Extreme Hs x Tp curves for WSW Direction with associated Wind and Current Conditions by Return Periods 32

5.1.14 Single Peak Wave Extreme Hs x Tp curves for W Direction with associated Wind and Current Conditions by Return Periods 33
5.1.15 Single Peak Wave Extreme Hs x Tp curves for WNW Direction with associated Wind and Current Conditions by Return Periods 34
5.1.16 Single Peak Wave Extreme Hs x Tp curves for NW Direction with associated Wind and Current Conditions by Return Periods 35
5.1.17 Single Peak Wave Extreme Hs x Tp curves for NNW Direction with associated Wind and Current Conditions by Return Periods 36
5.2 EXTREME DOUBLE PEAK WAVE CRITERIA 37
5.2.1 Double Peak Extreme Hs x Tp curves for Primary N Direction and Secondary E Direction 38
5.2.2 Double Peak Extreme Hs x Tp curves for Primary NE Direction and Secondary SE Direction 39
5.2.3 Double Peak Extreme Hs x Tp curves for Primary E Direction and Secondary S Direction 40
5.2.4 Double Peak Extreme Hs x Tp curves for Primary SE Direction and Secondary NE Direction 41
5.2.5 Double Peak Extreme Hs x Tp curves for Primary SE Direction and Secondary SW Direction 42
5.2.6 Double Peak Extreme Hs x Tp curves for Primary S Direction and Secondary E Direction 44
5.2.7 Double Peak Wave Extreme Hs x Tp curves for Primary SW Direction and Secondary SE Direction 45
5.3 JONSWAP WAVE SPECTRUM FOR SANTOS/CAMPOS BASINS AND RELATION TZ / TP 47
5.4 DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHTS AND WAVE POWER 48
5.4.1 Distribution of Total Significant Wave Heights and Primary Spectral Peak Directions ... 48*
5.4.2 Distribution of Total Significant Wave Heights and Primary Spectral Peak Periods 49*
5.4.3 Directional Distribution of Wave Power 50
5.5 DISTRIBUTION OF SINGLE AND DOUBLE-PEAK SEA STATES 51
5.5.1 Percentage of Single and Double-Peak Sea States 51
5.5.2 Distribution of Hs versus Tp for Primary Peak Waves approaching from N Direction 52
5.5.2.1 Primary Hs1 versus Tp1 for Unimodal sea states (N) 52
5.5.2.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (N) 53
5.5.3 Distribution of Hs versus Tp for Primary Peak Waves approaching from NNE Direction . 54
5.5.3.1 Primary Hs1 versus Tp1 for Unimodal sea states (NNE) 54
5.5.3.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (NNE) 55
5.5.4 Distribution of Hs versus Tp for Primary Peak Waves approaching from NE Direction ... 56
5.5.4.1 Primary Hs1 versus Tp1 for Unimodal sea-states (NE) 56
5.5.4.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (NE) 57
5.5.5 Distribution of Hs versus Tp for Primary Peak Waves approaching from ENE Direction . 58
5.5.5.1 Primary Hs1 versus Tp1 for Unimodal sea-states (ENE) 58
5.5.5.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (ENE) 59
5.5.6 Distribution of Hs versus Tp for Primary Peak Waves approaching from E Direction 60
5.5.6.1 Primary Hs1 versus Tp1 for Unimodal sea-states (E) 60
5.5.6.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (E) 61
5.5.7 Distribution of Hs versus Tp for Primary Peak Waves approaching from ESE Direction . 62
5.5.7.1 Primary Hs1 versus Tp1 for Unimodal sea-states (ESE) 62
5.5.7.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (ESE) 63
5.5.8 Distribution of Hs versus Tp for Primary Peak Waves approaching from SE Direction 64
5.5.8.1 Primary Hs1 versus Tp1 for Unimodal sea-states (SE) 64

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5.5.8.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (SE) 65
5.5.9 Distribution of Hs versus Tp for Primary Peak Waves approaching from SSE Direction . 66
5.5.9.1 Primary Hs1 versus Tp1 for Unimodal sea-states (SSE) 66
5.5.9.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (SSE) 67
5.5.10 Distribution of Hs versus Tp for Primary Peak Waves approaching from S Direction 68
5.5.10.1 Primary Hs1 versus Tp1 for Unimodal sea-states (S) 68
5.5.10.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (S) 69
5.5.11 Distribution of Hs versus Tp for Primary Peak Waves approaching from SSW Direction 70
5.5.11.1 Primary Hs1 versus Tp1 for Unimodal sea-states (SSW) 70
5.5.11.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (SSW) 71
5.5.12 Distribution of Hs versus Tp for Primary Peak Waves approaching from SW Direction... 72
5.5.12.1 Primary Hs1 versus Tp1 for Unimodal sea-states (SW) 72
5.5.12.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (SW) 73
5.5.13 Distribution of Hs versus Tp for Primary Peak Waves approaching from WSW Direction 74
5.5.13.1 Primary Hs1 versus Tp1 for Unimodal sea-states (WSW) 74
5.5.13.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (WSW) 75
5.5.14 Distribution of Hs versus Tp for Primary Peak Waves approaching from W Direction 76
5.5.14.1 Primary Hs1 versus Tp1 for Unimodal sea-states (W) 76
5.5.14.2 Primary Hs_1 versus Tp_1 and associated Secondary Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states (W) 77
5.5.15 Distribution of Hs versus Tp for Primary Peak Waves approaching from WNW Direction 78
5.5.15.1 Primary Hs1 versus Tp1 for Unimodal sea-states (WNW) 78
5.5.15.2 Primary Hs_1 versus Tp_1 and associated Secondary Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states (WNW) 79
5.5.16 Distribution of Hs versus Tp for Primary Peak Waves approaching from NW Direction .. 80
5.5.16.1 Primary Hs1 versus Tp1 for Unimodal sea-states (NW) 80
5.5.16.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (NW) 81
5.5.17 Distribution of Hs versus Tp for Primary Peak Waves approaching from NNW Direction 82
5.5.17.1 Primary Hs1 versus Tp1 for Unimodal sea-states (NNW) 82
5.5.17.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (NNW) 83
5.6 WAVE SPREADING FORMULATION FOR SANTOS BASIN 84

6. CURRENT DATA 85

6.1 REGIONAL CURRENT CIRCULATION 85
6.1.1 Joint Distribution of Surface Current Speed (m/s) and Direction 87
6.1.2 Joint Distribution of Current Speed (m/s) and Direction at Level 250 m 88
6.1.3 Joint Distribution of Current Speed (m/s) and Direction at Level 800 m 89
6.1.4 Joint Distribution of Bottom Current Speed (m/s) and Direction at level 2200 m (*) 90
6.2 EXTREME CURRENT PROFILE 91
6.2.1 Profile of Extreme Currents (m/s) With Surface N Direction 92
6.2.2 Profile of Extreme Currents (m/s) With Surface NNE Direction 92
6.2.3 Profile of Extreme Currents (m/s) With Surface NE Direction 93
6.2.4 Profile of Extreme Currents (m/s) With Surface ENE Direction 93
6.2.5 Profile of Extreme Currents (m/s) With Surface E Direction 94
6.2.6 Profile of Extreme Currents (m/s) With Surface ESE Direction 94
6.2.7 Profile of Extreme Currents (m/s) With Surface SE Direction 95
6.2.8 Profile of Extreme Currents (m/s) With Surface SSE Direction 95
6.2.9 Profile of Extreme Currents (m/s) With Surface S Direction 96
6.2.10 Profile of Extreme Currents (m/s) With Surface SSW Direction 96

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6.2.11 Profile of Extreme Currents (m/s) With Surface SW Direction 97
6.2.12 Profile of Extreme Currents (m/s) With Surface WSW Direction 97
6.2.13 Profile of Extreme Currents (m/s) With Surface W Direction 98
6.2.14 Profile of Extreme Currents (m/s) With Surface WNW Direction 98
6.2.15 Profile of Extreme Currents (m/s) With Surface NW Direction 99
6.2.16 Profile of Extreme Currents (m/s) With Surface NNW Direction 99
6.2.17 Profile of Extreme Currents (m/s) With N Direction at Reference Level 800 m 100
6.2.18 Profile of Extreme Currents (m/s) With NE Direction at Reference Level 800 m 100
6.2.19 Profile of Extreme Currents (m/s) With E Direction at Reference Level 800 m 101
6.2.20 Profile of Extreme Currents (m/s) With SE Direction at Reference Level 800 m 101
6.2.21 Profile of Extreme Currents (m/s) With S Direction at Reference Level 800 m 102
6.2.22 Profile of Extreme Currents (m/s) With SW Direction at Reference Level 800 m 102
6.2.23 Profile of Extreme Currents (m/s) With W Direction at Reference Level 800 m 103
6.2.24 Profile of Extreme Currents (m/s) With NW Direction at Reference Level 800 m 103
6.3 CURRENT PROFILES FOR FATIGUE ANALYSIS 104
6.3.1 Current Profile (m/s) for Fatigue Analysis with N Direction at surface 104
6.3.2 Current Profile (m/s) for Fatigue Analysis with NE Direction at surface 105
6.3.3 Current Profile (m/s) for Fatigue Analysis with E Direction at surface 106
6.3.4 Current Profile (m/s) for Fatigue Analysis with SE Direction at surface 107
6.3.5 Current Profile (m/s) for Fatigue Analysis with S Direction at surface 108
6.3.6 Current Profile (m/s) for Fatigue Analysis with SW Direction at surface 109
6.3.7 Current Profile (m/s) for Fatigue Analysis with W Direction at surface 110
6.3.8 Current Profile (m/s) for Fatigue Analysis with NW Direction at surface 111
6.3.9 Current Profile (m/s) for Fatigue Analysis with N Direction at 800m 112
6.3.10 Current Profile (m/s) for Fatigue Analysis with NE Direction at 800m 112
6.3.11 Current Profile (m/s) for Fatigue Analysis with E Direction at 800m 113
6.3.12 Current Profile (m/s) for Fatigue Analysis with SE Direction at 800m 113
6.3.13 Current Profile (m/s) for Fatigue Analysis with S Direction at 800m 114
6.3.14 Current Profile (m/s) for Fatigue Analysis with SW Direction at 800m 114
6.3.15 Current Profile (m/s) for Fatigue Analysis with W Direction at 800m 115
6.3.16 Current Profile (m/s) for Fatigue Analysis with NW Direction at 800m 115

7. SEA WATER CHARACTERISTICS 116

7.1 TABLE WITH VERTICAL DISTRIBUTION OF SEA WATER TEMPERATURE 116
7.2 HORIZONTAL SECTION OF SEA WATER TEMPERATURE 117
7.3 TABLE WITH VERTICAL DISTRIBUTION OF SEA WATER SALINITY 118
7.4 HORIZONTAL SECTION OF SEA WATER SALINITY 119
7.5 TABLE WITH VERTICAL DISTRIBUTION OF SEA WATER DENSITY 120
7.6 TABLE WITH VERTICAL DISTRIBUTION OF SEA WATER CONDUCTIVITY 121
7.7 VERTICAL PROFILE OF MARINE FOULING (MM) 122

8. REFERENCES 123

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1. OBJECTIVE

To present metocean data (meteorological and oceanographic parameters) to be used in the design of offshore units and production systems in fields at the Central Cluster of SANTOS BASIN, located at São Paulo Plateau, southern Brazilian oceanic region.

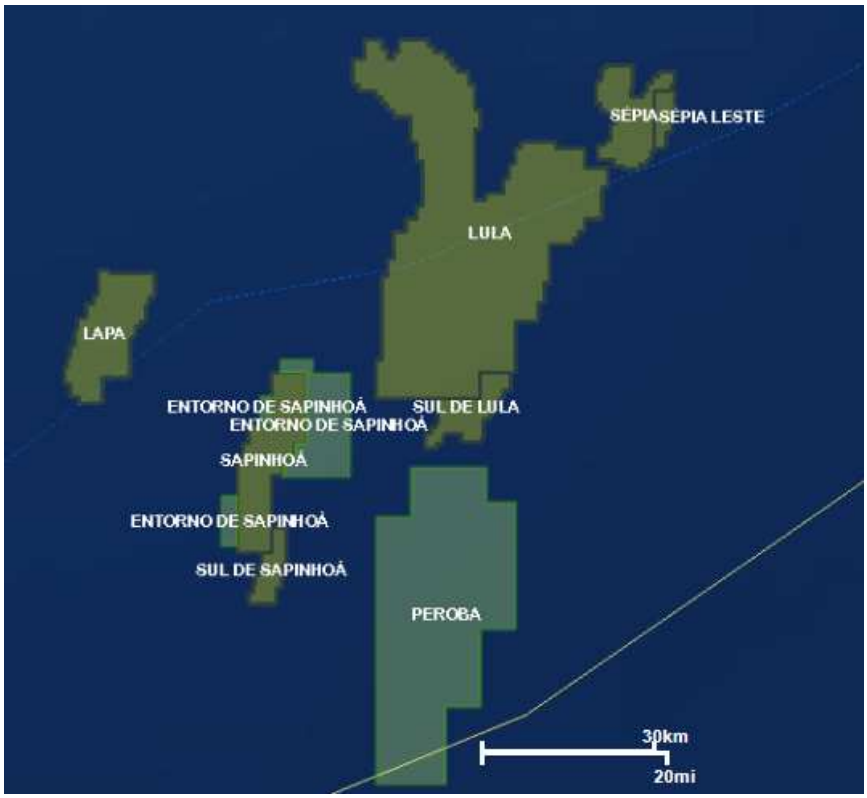

Figure 1 – Map of Central Pre-Salt Cluster, Santos Basin, Brazil

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2. SYSTEM OF UNITS AND DIRECTION CONVENTION

The International System of Units (S.I.), UNESCO-IOC (Intergovernmental Oceanographic Commission) and WMO (World Meteorological Organization) recommendations were adopted.

WIND and WAVES: direction indicates where the wind and waves comes from (origin at True North, clockwise sense).

CURRENT: direction indicates where the current goes to (origin at True North origin, clockwise sense).

Regarding the numeric values for cardinal directions: zero (0º) is associated with North direction, twenty two point five (22.5º) is associated with North-Northeast direction, forty five (45º) is associated with Northeast direction, sixty seven point five (67.5º) is associated with East-Northeast direction, ninety (90º) is associated with East direction, and so on, as used in a nautical chart compass rose (Figure 2 below).

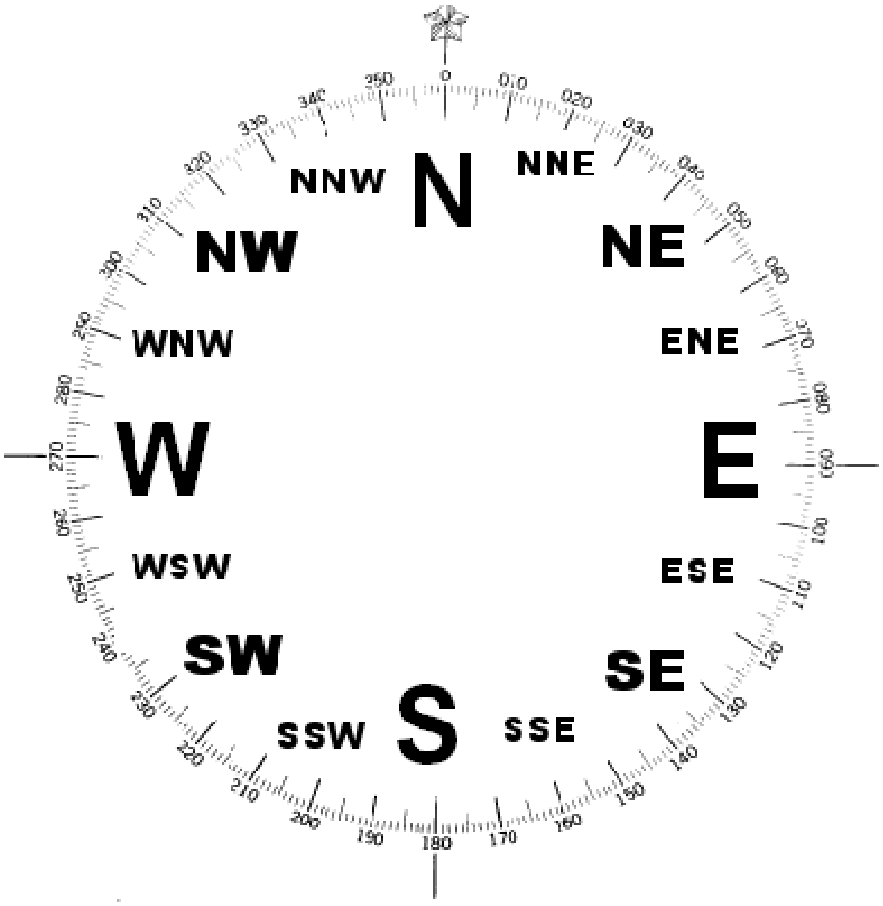

Figure 2 – Compass rose (numeric values associated with each direction)

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3. METEOROLOGICAL DATA

3.1 Atmospheric Pressure

Absolute minimum : 999.3 hPa
Mean : 1016.0 hPa
Absolute maximum : 1034.0 hPa

Mean monthly values

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1012.4	1012.8	1014.0	1015.8	1017.5	1019.1	1020.5	1020.1	1018.0	1015.4	1013.8	1012.1

Source: UCDs measurements in Santos Basin in the period from Jul/2010 to Jun/2024. Ref. [1].

3.2 Relative Humidity

Absolute minimum : 33.3 %
Mean : 79.7 %
Absolute maximum : 100.0 %

Mean Monthly Values

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
85.0	83.6	80.8	75.7	73.5	78.5	77.2	77.9	80.4	81.5	79.7	83.2

Source: UCDs measurements in Santos Basin in the period from Jul/2010 to Jun/2024. Ref. [1].

3.3 Air Temperature (Dry Bulb)

Absolute minimum : 13.5 °C
Mean : 23.4 °C
Absolute maximum : 33.6 °C

3.3.1 Characteristics Monthly Values of Air Temperature (°C)

MONTH	MINIMUM ABSOLUTE	MINIMUM	MEAN	MAXIMUM	MAXIMUM ABSOLUTE
JAN	19.1	24.5	25.5	26.7	31.0
FEB	20.7	24.7	25.9	27.4	33.6
MAR	20.9	24.8	26.0	27.4	33.4
APR	18.6	23.8	24.9	26.3	31.3
MAY	17.1	22.1	23.2	24.6	30.1
JUN	15.0	21.0	22.1	23.4	30.1
JUL	13.5	20.3	21.3	22.6	28.2
AUG	15.1	20.0	21.0	22.3	29.6
SEP	15.8	20.6	21.5	22.7	28.2
OCT	16.3	21.0	22.0	23.1	28.8
NOV	16.6	21.8	22.8	24.1	31.3
DEC	19.9	23.6	24.6	25.8	30.8
ANNUAL	13.5	22.3	23.4	24.7	33.6

Observation: MINIMUM is equal to the mean of minimum daily values
MAXIMUM is equal to the mean of maximum daily values

Source: UCDs measurements in Santos Basin in the period from Jul/2010 to Jun/2024. Ref. [1].

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3.3.2 Air Temperature (Dry Bulb) Exceedance - Monthly Values (°C)

Month → % Exc↓	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
100.00	19.1	20.7	20.9	18.6	17.1	15.0	13.5	15.1	15.8	16.3	16.6	19.9	13.5
99.99	19.1	20.8	21.0	18.6	17.1	15.2	13.8	15.1	16.0	16.3	16.8	19.9	14.8
99.90	19.9	21.9	21.7	19.6	17.8	16.2	14.5	15.4	16.6	17.2	17.8	20.5	16.1
99.80	20.5	22.2	22.0	19.9	18.1	16.5	15.2	15.8	16.9	17.6	18.5	20.7	16.6
99.70	20.9	22.3	22.1	20.3	18.4	16.8	15.5	15.9	17.2	17.8	18.8	20.8	17.0
99.60	21.2	22.4	22.3	20.6	18.6	17.2	15.8	16.1	17.4	18.1	19.0	20.9	17.2
99.50	21.4	22.4	22.4	20.9	18.8	17.5	16.0	16.2	17.5	18.2	19.1	21.0	17.5
91.00	21.9	22.7	22.7	21.5	19.3	18.0	16.4	16.7	17.9	18.7	19.4	21.4	18.2
92.00	22.5	23.0	23.1	21.9	19.9	18.4	17.2	17.4	18.7	19.1	19.7	21.7	18.9
93.00	22.8	23.2	23.3	22.2	20.3	18.8	17.7	17.9	18.8	19.3	20.0	21.9	19.2
94.00	23.0	23.4	23.5	22.4	20.5	19.1	18.1	18.2	19.0	19.5	20.2	22.1	19.5
95.00	23.2	23.5	23.7	22.5	20.7	19.4	18.4	18.4	19.2	19.7	20.4	22.3	19.7
90.00	23.8	24.0	24.2	23.1	21.3	20.1	19.2	19.1	19.6	20.2	21.0	22.8	20.5
80.00	24.4	24.7	24.8	23.8	21.9	20.9	20.1	19.9	20.3	20.9	21.7	23.4	21.4
75.00	24.6	24.9	25.0	24.1	22.1	21.1	20.4	20.2	20.5	21.1	22.0	23.6	21.7
70.00	24.8	25.1	25.2	24.3	22.4	21.4	20.7	20.4	20.7	21.3	22.2	23.8	22.0
60.00	25.1	25.5	25.6	24.6	22.8	21.8	21.2	20.9	21.1	21.7	22.6	24.2	22.6
50.00	25.5	25.9	26.0	24.9	23.2	22.1	21.6	21.2	21.5	22.0	22.9	24.5	23.3
40.00	25.8	26.3	26.3	25.2	23.6	22.5	21.9	21.5	22.0	22.3	23.2	24.9	24.0
30.00	26.2	26.7	26.7	25.6	24.0	22.9	22.2	21.7	22.3	22.6	23.6	25.3	24.7
25.00	26.4	26.9	26.9	25.8	24.2	23.1	22.4	21.9	22.5	22.8	23.8	25.5	25.1
20.00	26.5	27.1	27.1	26.1	24.5	23.3	22.6	22.1	22.8	23.0	24.0	25.7	25.5
15.00	26.8	27.4	27.4	26.4	24.8	23.5	22.8	22.3	23.0	23.2	24.2	26.0	26.0
10.00	27.2	27.8	27.7	26.8	25.2	23.9	23.2	22.6	23.2	23.5	24.6	26.4	26.5
5.00	27.8	28.3	28.2	27.4	26.0	24.4	23.7	23.1	23.6	24.1	25.1	27.0	27.2
4.00	28.0	28.6	28.4	27.6	26.2	24.6	23.8	23.2	23.7	24.3	25.3	27.2	27.4
3.00	28.3	28.9	28.7	27.8	26.4	24.8	24.0	23.5	23.9	24.5	25.6	27.4	27.6
2.00	28.6	29.3	29.1	28.1	26.6	25.1	24.4	23.8	24.2	24.8	25.9	27.8	27.9
1.00	29.2	30.0	29.7	28.7	27.0	25.8	24.9	24.4	24.9	25.4	26.6	28.4	28.6
0.50	29.6	30.6	30.1	29.2	27.6	26.3	25.4	24.9	25.8	25.9	27.1	28.9	29.2
0.40	29.7	30.7	30.3	29.3	27.7	26.5	25.6	25.2	26.0	26.1	27.3	29.1	29.3
0.30	29.8	30.8	30.6	29.5	28.0	26.8	25.8	25.5	26.1	26.4	27.5	29.3	29.6
0.20	30.0	31.0	30.8	29.7	28.3	27.3	26.0	26.0	26.4	26.7	27.9	29.5	29.8
0.10	30.4	31.5	31.2	30.1	28.5	27.7	27.1	27.0	26.7	27.3	28.7	29.9	30.3
0.01	31.0	33.0	33.2	31.2	29.8	29.5	28.0	29.4	28.1	28.6	30.6	30.6	31.5
0.00	31.0	33.6	33.4	31.3	30.1	30.1	28.2	29.6	28.2	28.8	31.3	30.8	33.6

Source: UCDs measurements in Santos Basin in the period from Jul/2010 to Jun/2024. Ref. [1].

3.3.3 Percentage of Air Temperature Occurrence in Monthly Basis

Range of Temperature (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
13 - 14							0.01						0.001
14 - 15							0.13						0.011
15 - 16						0.09	0.40	0.36	0.01				0.073
16 - 17						0.27	1.12	0.98	0.22	0.02	0.02		0.222
17 - 18					0.18	0.64	2.12	2.09	0.85	0.35	0.10		0.534
18 - 19				0.06	0.46	2.59	4.54	5.89	2.81	1.47	0.30		1.522
19 - 20	0.12			0.17	1.53	5.27	10.52	12.17	11.82	5.67	2.56	0.02	4.176
20 - 21	0.19	0.02	0.01	0.34	4.79	13.73	17.52	22.55	21.23	14.57	7.20	0.48	8.594
21 - 22	0.82	0.09	0.23	1.77	15.11	23.84	27.14	34.56	24.26	28.17	15.80	3.11	14.662
22 - 23	3.11	1.93	1.62	6.33	23.36	27.25	24.72	15.83	25.07	30.79	27.45	9.44	16.460
23 - 24	8.22	8.40	6.09	15.18	24.94	18.09	8.61	4.00	11.07	13.32	27.56	22.14	13.965
24 - 25	23.04	17.08	17.86	30.58	17.34	5.93	2.23	1.09	1.78	4.09	13.10	28.21	13.507
25 - 26	29.77	25.89	25.21	23.80	7.64	1.52	0.72	0.27	0.52	1.12	4.22	22.00	11.834
26 - 27	22.64	24.13	26.72	13.82	3.64	0.54	0.10	0.10	0.33	0.29	1.14	9.86	8.543
27 - 28	8.14	15.21	15.73	5.73	0.71	0.21	0.10	0.08	0.04	0.10	0.39	3.20	4.081
28 - 29	2.71	4.64	4.31	1.56	0.23	0.03	0.01		0.01	0.05	0.09	1.10	1.212
29 - 30	1.01	1.67	1.61	0.57	0.06			0.02			0.07	0.40	0.445
30 - 31	0.23	0.73	0.48	0.09	0.01	0.01						0.05	0.130
31 - 32		0.18	0.11	0.02							0.01		0.025
32 - 33		0.02	0.01										0.002
33 - 34		0.01	0.02										0.002

Source: UCDs measurements in Santos Basin in the period from Jul/2010 to Jun/2024. Ref. [1].

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3.3.4 HVAC - Dry Bulb / Wet Bulb Temperatures

Basin: Santos	Data Source: UCDs measurements					Height (m):		PR.atm:		Period:			
						42.5		101.60		Jul/10 to jun/24			
Month> Hot	Annual Freq	annual cooling / dehumidification				summer cooling / dehumidification				winter cooling / dehumidification				Month> Cold
February		**TBS**	TBUc	**TBU**	TBSc	**TBS**	TBUc	**TBU**	TBSc	**TBS**	TBUc	**TBU**	TBSc	August
	0.4%	29.3	25.2	26.5	28.0	30.2	25.6	27.0	28.6	16.2	13.3	12.1	17.3	
Δ AdT	1%	28.5	25.0	26.0	27.6	29.6	25.9	26.7	28.3	17.0	13.7	12.9	18.0	Δ AdT
2.7	2%	27.9	24.6	25.7	27.2	29.0	25.3	26.4	28.0	17.7	14.2	13.4	18.4	2.3

Source: ABNT NBR 16401-1/2008 – Central and unitary air conditioning systems. Part 1: Design of installations. Ref. [2].

PR atm – average local ATM pressure [kPa]
Period – meteorological measurements period
Month > Hot – month with the highest average of the max temperatures
Month > Cold – month with the smallest average of the min temperatures
Δ AdT – average diary air temperature range [ºC]
TBS, TBU – project temperatures (max / min) of dry/wet bulb [ºC]
TBSc, TBUc – coincidental temperatures of dry/wet bulb [ºC]

Source: UCDs measurements in Santos Basin in the period from Jul/2010 to Jun/2024. Ref. [1].

Note: Among the various scenarios studied in its 6th report of 2023, the IPCC concluded that there is more than a 50% chance of the global average air temperature reaching or exceeding the 1.5°C limit between 2021-2040 when compared to values between 1850-1900.
Source: https://www.ipcc.ch/report/sixth-assessment-report-cycle/. Ref. [3].

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3.4 Rainfall

3.4.1 Disaggregation Factor

Duration (minutes)	Disaggregation Factor	
	Acumulated	Intensity
1	0.057	3.420
5	0.274	3.290
10	0.438	2.628
30	0.766	1.532

3.4.2 Extreme IDF Curves

Duration	1h	2h	3h	4h	6h	9h	12h	18h	24h
1 year	30.0	48.2	61.0	70.8	85.2	100.2	111.1	126.8	138.2
5 years	47.4	76.1	96.2	111.6	134.4	158.0	175.1	199.9	217.9
10 years	54.8	88.1	111.4	129.2	155.6	182.9	202.7	231.4	252.3
15 years	59.2	95.1	120.3	139.5	168.0	197.4	218.9	249.8	272.4
20 years	62.3	100.0	126.6	146.8	176.8	207.8	230.3	262.8	286.6
30 years	66.6	107.1	135.4	157.1	189.1	222.3	246.5	281.3	306.7
50 years	72.1	115.9	146.6	170.1	204.7	240.7	266.8	304.5	332.0
100 years	79.6	127.9	161.8	187.7	225.9	265.6	294.4	336.0	366.3
1000 years	104.4	167.7	212.2	246.1	296.3	348.3	386.0	440.6	480.4

Source: GPM Level 3A Radiometer (GPROF) in the period from nov/2000 to oct/2024. Ref. [4].

Rainfall Equation - Intensity in mm/h

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i(mm/h) = (583.5799* ln(T) +1628.2223).*((t +121.6297).^-0.7676)

where T = Return Period in years and t = duration in minutes for T >= 1 year and t >= 60 minutes.

3.4.3 Rainfall Frequency (days) above 1mm/day

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
7	6	8	8	9	7	6	6	7	8	7	6	85

Source: GPM Level 3A Radiometer (GPROF) in the period from nov/2000 to oct/2024. Ref. [4].

3.4.4 Monthly Accumulated Rainfall (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
96.3	90.9	85.2	115.7	82.5	88.1	85.4	81.8	70.1	81.5	106.8	85.5	1069.7

Source: GPM Level 3A Radiometer (GPROF) in the period from nov/2000 to oct/2024. Ref. [4].

3.4.5 Maximum Absolute Accumulated Rainfall (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
90.3	94.0	115.3	150.4	82.5	102.4	138.3	124.8	86.8	107.5	138.1	365.9	365.9

Source: GPM Level 3A Radiometer (GPROF) in the period from nov/2000 to oct/2024. Ref. [4].

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3.4.6 Rainfall Exceedance above 1mm/time frame

Duration → % Exc ↓	1h	2h	3h	4 h	6h	9h	12h	18h	24h
100.00	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.99	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.90	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.80	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.70	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.60	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.50	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.00	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
98.00	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1
97.00	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
96.00	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
95.00	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.2
90.00	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4
80.00	1.3	1.5	1.5	1.6	1.7	1.8	1.8	1.9	2.0
75.00	1.4	1.6	1.7	1.8	1.9	2.1	2.2	2.3	2.4
70.00	1.5	1.8	1.9	2.0	2.2	2.4	2.5	2.7	2.8
60.00	1.8	2.2	2.4	2.6	2.9	3.2	3.4	3.8	4.0
50.00	2.1	2.6	3.0	3.3	3.8	4.3	4.7	5.4	5.8
40.00	2.6	3.3	3.9	4.4	5.1	5.9	6.6	7.6	8.4
30.00	3.3	4.3	5.2	5.8	7.0	8.2	9.2	10.9	12.3
25.00	3.7	5.0	6.0	6.9	8.2	9.9	11.3	13.4	15.1
20.00	4.4	6.0	7.2	8.3	10.0	12.1	13.8	16.2	18.3
15.00	5.3	7.3	8.9	10.3	12.5	15.1	17.3	20.8	23.3
10.00	6.7	9.6	11.8	13.6	16.4	20.0	23.0	27.7	30.5
5.00	9.6	14.2	17.4	20.3	25.1	29.9	33.9	40.3	45.1
4.00	10.6	15.8	19.5	23.1	28.0	33.7	38.3	44.9	49.6
3.00	12.2	18.0	22.9	26.8	32.2	38.8	43.6	50.1	55.6
2.00	14.9	21.8	27.3	31.8	39.1	46.5	51.5	59.6	65.0
1.00	20.4	28.9	35.7	41.0	49.7	58.0	64.9	74.2	82.7
0.50	24.8	38.9	48.2	54.2	64.2	74.1	81.1	88.8	102.5
0.40	26.7	42.0	51.2	58.9	69.0	77.5	86.7	99.6	110.2
0.30	29.3	45.3	55.0	65.2	75.6	85.7	94.6	107.5	115.3
0.20	32.4	49.3	64.1	72.0	86.0	96.8	110.5	116.3	130.5
0.10	36.8	56.0	72.4	85.9	104.8	121.6	129.6	136.5	143.2
0.01	52.2	78.9	106.4	127.7	179.7	236.1	280.2	337.9	363.8
0.00	52.5	79.5	111.0	135.7	192.7	245.7	292.5	359.7	365.9

Source: GPM Level 3A Radiometer (GPROF) in the period from nov/2000 to oct/2024. Ref. [4].

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3.5 Wind

The wind values are referenced to 10 meters above mean sea level and 10-minute or 1 hour duration.

Transformations to different heights and durations may be calculated as indicates in DNV Classification Notes 30.5 or any other codes.

3.5.1 Wind Speed by Return Period (m/s) with associated Wave and Current Conditions

		Return Period (Years)						
Dir	Parameter	1	10	20	30	50	100	1000
N	WS: Wind Speed (m/s)	17.30	23.07	24.79	25.81	27.09	28.81	34.55
	Hs: Associated wave in the same direction (m)	2.37	3.43	3.74	3.93	4.16	4.48	5.53
	CS: Associated current in the same direction (m/s)	0.30	0.35	0.37	0.38	0.39	0.40	0.46
NNE	WS: Wind Speed (m/s)	18.01	22.97	24.47	25.34	26.43	27.93	32.87
	Hs: Associated wave in the same direction (m)	3.14	4.19	4.50	4.69	4.92	5.23	6.27
	CS: Associated current in the same direction (m/s)	0.28	0.34	0.36	0.37	0.38	0.40	0.46
NE	WS: Wind Speed (m/s)	18.16	22.98	24.42	25.26	26.33	27.77	32.58
	Hs: Associated wave in the same direction (m)	3.34	4.35	4.66	4.83	5.06	5.36	6.37
	CS: Associated current in the same direction (m/s)	0.28	0.32	0.33	0.34	0.35	0.36	0.41
ENE	WS: Wind Speed (m/s)	17.94	22.84	24.3	25.16	26.24	27.71	32.59
	Hs: Associated wave in the same direction (m)	3.28	4.31	4.62	4.80	5.03	5.34	6.36
	CS: Associated current in the same direction (m/s)	0.26	0.33	0.35	0.36	0.37	0.39	0.45
E	WS: Wind Speed (m/s)	17.23	22.28	23.79	24.67	25.8	27.30	32.34
	Hs: Associated wave in the same direction (m)	3.14	4.20	4.52	4.71	4.94	5.26	6.32
	CS: Associated current in the same direction (m/s)	0.23	0.29	0.31	0.32	0.33	0.35	0.41
ESE	WS: Wind Speed (m/s)	16.53	21.74	23.30	24.21	25.37	26.93	32.13
	Hs: Associated wave in the same direction (m)	2.85	3.80	4.09	4.26	4.47	4.75	5.71
	CS: Associated current in the same direction (m/s)	0.24	0.29	0.30	0.31	0.32	0.34	0.38
SE	WS: Wind Speed (m/s)	16.56	21.89	23.49	24.42	25.6	27.19	32.50
	Hs: Associated wave in the same direction (m)	3.30	4.28	4.57	4.74	4.96	5.25	6.22
	CS: Associated current in the same direction (m/s)	0.26	0.32	0.34	0.35	0.36	0.38	0.44
SSE	WS: Wind Speed (m/s)	17.45	23.06	24.74	25.72	26.97	28.65	34.24
	Hs: Associated wave in the same direction (m)	3.51	4.43	4.71	4.87	5.08	5.35	6.27
	CS: Associated current in the same direction (m/s)	0.29	0.35	0.37	0.38	0.40	0.41	0.48

Continue …

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		Return Period (Years)						
Dir	Parameter	1	10	20	30	50	100	1000
S	WS: Wind Speed (m/s)	19.18	25.52	27.43	28.55	29.95	31.84	38.17
	Hs: Associated wave in the same direction (m)	4.06	5.33	5.72	5.94	6.22	6.61	7.88
	CS: Associated current in the same direction (m/s)	0.38	0.48	0.51	0.53	0.55	0.59	0.69
SSW	WS: Wind Speed (m/s)	20.43	27.42	29.53	30.75	32.30	34.40	41.38
	Hs: Associated wave in the same direction (m)	4.85	6.58	7.10	7.41	7.79	8.31	10.03
	CS: Associated current in the same direction (m/s)	0.28	0.36	0.38	0.40	0.42	0.44	0.51
SW	WS: Wind Speed (m/s)	20.13	27.34	29.49	30.75	32.35	34.51	41.68
	Hs: Associated wave in the same direction (m)	5.04	6.89	7.44	7.77	8.18	8.73	10.57
	CS: Associated current in the same direction (m/s)	0.27	0.36	0.39	0.41	0.43	0.45	0.54
WSW	WS: Wind Speed (m/s)	18.92	26.19	28.37	29.65	31.26	33.44	40.68
	Hs: Associated wave in the same direction (m)	3.65	5.25	5.73	6.01	6.36	6.84	8.43
	CS: Associated current in the same direction (m/s)	0.30	0.38	0.41	0.42	0.44	0.46	0.54
W	WS: Wind Speed (m/s)	18.09	25.14	27.26	28.49	30.05	32.16	39.18
	Hs: Associated wave in the same direction (m)	3.32	4.96	5.46	5.75	6.11	6.60	8.24
	CS: Associated current in the same direction (m/s)	0.33	0.43	0.45	0.47	0.49	0.52	0.62
WNW	WS: Wind Speed (m/s)	16.82	23.38	25.35	26.51	27.95	29.92	36.45
	Hs: Associated wave in the same direction (m)	2.63	3.77	4.11	4.31	4.57	4.91	6.04
	CS: Associated current in the same direction (m/s)	0.28	0.36	0.38	0.40	0.41	0.44	0.51
NW	WS: Wind Speed (m/s)	16.06	22.12	23.94	25.00	26.33	28.16	34.19
	Hs: Associated wave in the same direction (m)	2.50	3.64	3.99	4.19	4.44	4.78	5.92
	CS: Associated current in the same direction (m/s)	0.21	0.28	0.30	0.31	0.32	0.34	0.41
NNW	WS: Wind Speed (m/s)	16.30	22.09	23.82	24.84	26.12	27.85	33.61
	Hs: Associated wave in the same direction (m)	2.16	3.32	3.67	3.88	4.13	4.48	5.64
	CS: Associated current in the same direction (m/s)	0.23	0.28	0.30	0.31	0.32	0.34	0.39

Source: Measured wind data in Caravela, Tupi and Merluza fields in Santos Basin (1994-2011). Ref. [5]. The extreme wind speed was converted to 10-minute wind using the factor 1.092 from DNV Classification Notes 30.5.

Observation: The near surferce current associated value Cs was calculated using different measured data sets from Santos Basin. Ref. [5].

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3.5.2 Joint Distribution of Wind Speed and Wind Direction (1 hour wind)

Spd↓	Dir→	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	%
0	1	54	62	57	49	58	56	48	40	50	51	56	52	54	47	54	55	843	1.02
1	2	199	197	179	159	156	166	195	158	174	151	135	144	156	135	137	162	2603	3.15
2	3	313	377	351	314	339	407	349	296	257	286	243	199	192	186	198	250	4557	5.52
3	4	400	538	623	612	620	575	502	521	417	318	268	222	166	192	232	254	6460	7.83
4	5	416	745	859	867	884	797	688	601	534	368	281	248	209	178	186	246	8107	9.82
5	6	471	968	1127	1107	1094	949	681	566	533	391	295	216	144	128	94	166	8930	10.82
6	7	477	1156	1441	1400	1152	961	763	593	471	404	284	197	141	82	72	140	9734	11.79
7	8	381	1293	1680	1554	1060	758	632	485	390	316	267	201	115	56	52	97	9337	11.31
8	9	315	1454	1835	1508	830	535	440	365	370	292	245	184	115	38	34	77	8637	10.46
9	10	166	1500	2145	1350	695	415	305	266	262	242	209	149	86	40	22	44	7896	9.56
10	11	114	1373	1998	1015	375	259	186	199	149	145	169	106	82	25	14	14	6223	7.54
11	12	84	1076	1580	581	192	135	98	100	127	90	93	128	58	10	12	16	4380	5.31
12	13	39	738	1008	299	86	80	45	49	61	52	61	82	45	9	9	6	2669	3.23
13	14	12	424	594	97	27	28	16	16	22	36	33	42	33	5	5	2	1392	1.69
14	15	4	147	236	32	16	8	6	8	5	9	9	11	14	5	0	1	511	0.62
15	16	2	39	84	14	2	5	7	6	1	3	9	8	7	0	2	0	189	0.23
16	17	0	16	16	3	3	2	0	0	4	1	2	2	5	2	0	0	56	0.07
17	18	0	5	3	2	0	0	1	0	1	0	1	3	3	0	0	0	19	0.02
18	19	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4	0
19	20	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	3	0
20	21	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0
21	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		3447	12110	15816	10963	7589	6136	4962	4269	3828	3155	2662	2199	1625	1138	1123	1530	82552	
% Dir		4.18	14.67	19.16	13.28	9.19	7.43	6.01	5.17	4.64	3.82	3.22	2.66	1.97	1.38	1.36	1.85		
Mean Spd		5.83	8.3	8.61	7.55	6.62	6.26	6.08	6.1	6.17	6.19	6.38	6.47	5.91	4.56	4.22	4.5		

Source: Measured wind data at Santos Basin from metocean buoy, production and drilling platforms (10-year measurement period). The values should be considered representative of 1-hour wind speeds. Ref [6].

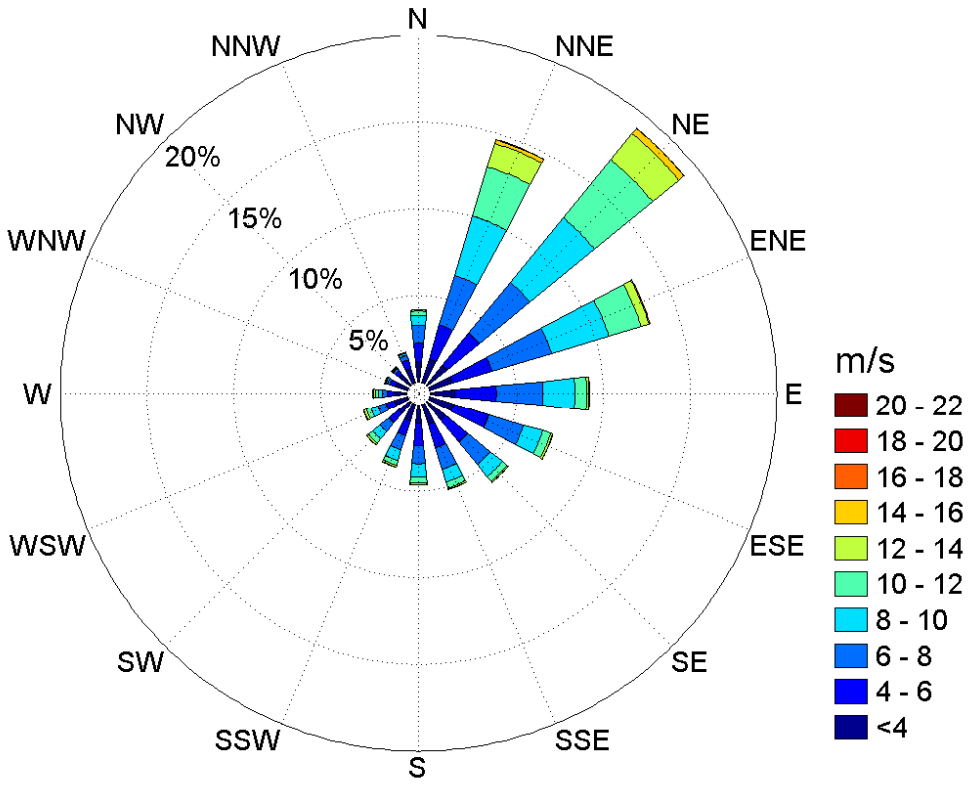

Figure 3.5.2.1 Directional percentage of surface winds (level 10 m)

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4. TIDAL DATA

The water levels are regarded to the Reduction Level of DHN

Tidal Astron. Max. + Tidal Atm. Max.	1.75 m
Tidal Astronomical Maximum	1.30 m
Mean Higher High Water (MHHW)	1.24 m
Mean Sea Level	0.68 m
Mean Low High Water (MLHW)	0.24 m
Tidal Astronomical Minimum	- 0.10 m
Tidal Astr. Min. + Tidal Atm. Min.	- 0.55 m
Band of Spring Variation (MHHW-MLHW)	1.00 m
Band of Maximum Astronomical Variation	1.40 m

Sources:

- PETROBRAS Metocean Database (Engineering measurement program – mooring P1). Ref. [7]. Central Cluster BS (mooring P1).
- *http://www.fundacaofemar.org.br* , São Sebastião Harbor (São Paulo). Ref. [8].
- Oliveira, M.M.F., Ebecken,N.F.F, “Previsão da Variação do Nível do Mar na Bacia de Santos”, COPPE/UFRJ, 2009. Ref. [9].
- *https://www.marinha.mil.br/chm/dados-do-segnav/dados-de-mare-mapa*, São Sebastião Harbor (São Paulo). Ref. [10].

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5. WAVE DATA

5.1 Extreme Single Peak Wave Criteria

The most extreme wave conditions at Santos Basin happen under single peak wave spectrum conditions. Strong winds are blowing with extensive wind fetch in the same direction of the dominant wave direction. Due to non-linear wave interactions, high frequency energy gradually feeds lower frequency and a single peak sea state is merged.

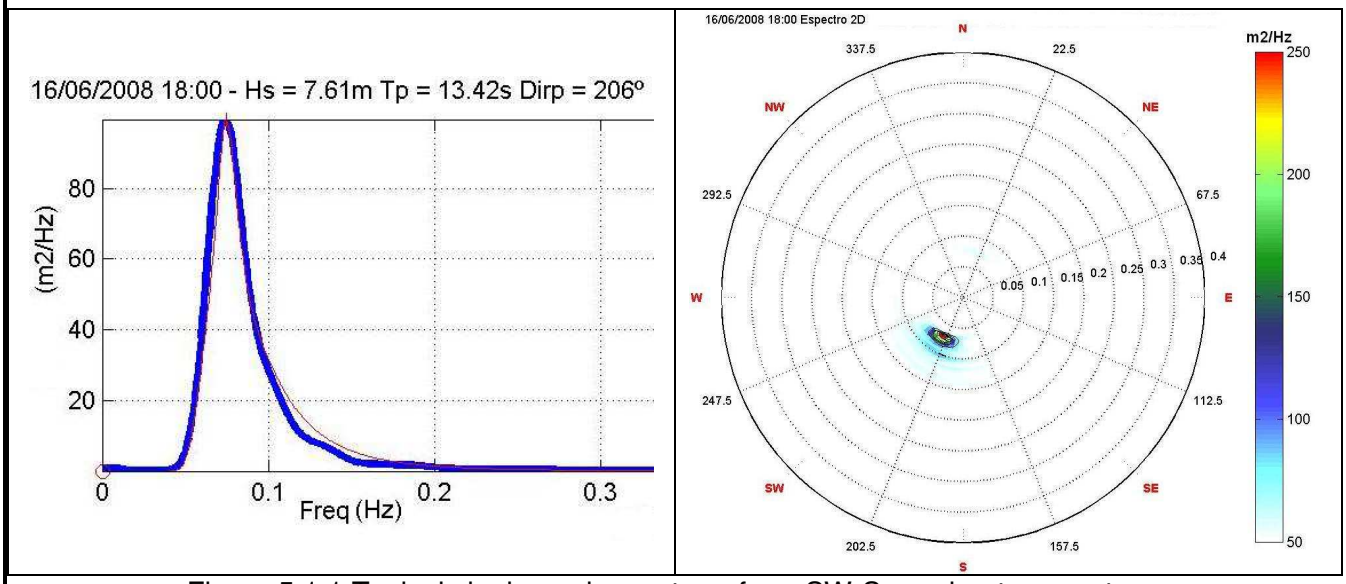

Figure 5.1.1 Typical single peak spectrum from SW-S quadrant wave storm

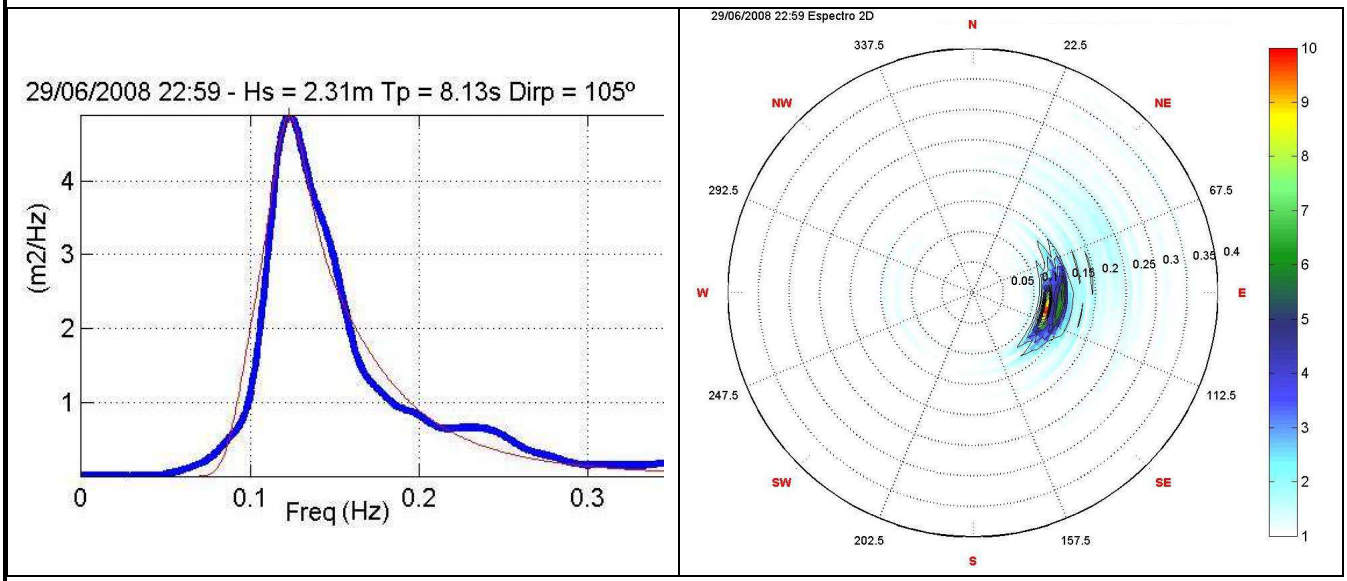

Figure 5.1.2 Typical single peak spectrum from E wave conditions

5.1.1 Extreme Single Peak Wave Parameters with associated Wind and Current Conditions by Return Periods (Years)

OBS: The table below present only the maximum significant wave height Hs (and associated parameters) from the extreme curves Hs x Tp presented on tables 5.1.2 to 5.1.17. For most design applications, it is recommended to used the full Hs x Tp curves.

		Return Period (Years)						
Dir	Parameter	1	10	20	30	50	100	1000
N	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.56	4.16	4.30	4.38	4.48	4.60	4.95
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	7.50	8.30	8.30	8.50	8.50	8.80	9.00
	TZ: ZERO UP-CROSSING PERIOD (s)	5.59	6.17	6.17	6.31	6.31	6.53	6.67
	HMAX: MAXIMUM WAVE HEIGHT (m)	6.92	8.04	8.31	8.45	8.64	8.86	9.51
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	9.99	10.30	10.37	10.40	10.45	10.50	10.65
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	15.76	18.26	18.85	19.18	19.58	20.08	21.55
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.20	0.32	0.35	0.37	0.39	0.41	0.48
NNE	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.03	5.25	5.61	5.82	6.09	6.45	7.65
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	8.00	9.50	9.80	10.00	10.50	10.80	12.00
	TZ: ZERO UP-CROSSING PERIOD (s)	5.95	7.03	7.24	7.39	7.74	7.96	8.81
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.81	10.06	10.72	11.11	11.59	12.25	14.43
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.24	10.76	10.89	10.97	11.05	11.17	11.51
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	14.48	17.64	18.58	19.13	19.83	20.77	23.90
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.09	0.26	0.32	0.34	0.38	0.43	0.60
NE	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.15	5.38	5.74	5.96	6.23	6.60	7.82
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	8.80	10.00	10.30	10.50	10.80	11.30	12.50
	TZ: ZERO UP-CROSSING PERIOD (s)	6.53	7.39	7.60	7.74	7.96	8.31	9.17
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.99	10.27	10.94	11.34	11.83	12.50	14.70
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.29	10.81	10.93	11.01	11.10	11.21	11.55
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	14.56	18.37	19.51	20.17	21.01	22.15	25.93
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.12	0.25	0.28	0.31	0.33	0.37	0.49
ENE	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.15	5.38	5.74	5.96	6.23	6.60	7.82
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	9.00	10.00	10.30	10.50	10.80	11.00	12.30
	TZ: ZERO UP-CROSSING PERIOD (s)	6.67	7.39	7.60	7.74	7.96	8.10	9.02
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.98	10.27	10.94	11.34	11.83	12.52	14.72
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.28	10.81	10.93	11.01	11.10	11.21	11.55
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	13.48	17.91	19.23	20.00	20.98	22.30	26.69
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.12	0.25	0.28	0.31	0.33	0.37	0.49
E	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.98	5.27	5.66	5.88	6.17	6.56	7.84
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	9.30	10.00	10.50	10.50	10.80	11.30	12.00
	TZ: ZERO UP-CROSSING PERIOD (s)	6.88	7.39	7.74	7.74	7.96	8.31	8.81
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.63	10.06	10.77	11.19	11.72	12.42	14.78
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.19	10.76	10.90	10.98	11.08	11.20	11.56
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	11.83	16.48	17.87	18.69	19.71	21.10	25.71
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.14	0.24	0.27	0.29	0.31	0.34	0.45

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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		Return Period (Years)						
Dir	Parameter	1	10	20	30	50	100	1000
ESE	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.92	5.22	5.61	5.83	6.12	6.50	7.79
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	10.30	11.30	11.50	11.80	12.00	12.00	13.00
	TZ: ZERO UP-CROSSING PERIOD (s)	7.60	8.31	8.45	8.67	8.81	8.81	9.52
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.47	9.88	10.61	11.01	11.54	12.26	14.61
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.15	10.73	10.87	10.95	11.05	11.17	11.53
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	11.73	16.26	17.62	18.41	19.41	20.76	25.25
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.13	0.24	0.27	0.29	0.31	0.34	0.44
SE	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.40	5.84	6.27	6.52	6.84	7.27	8.69
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	11.00	12.00	12.30	12.30	12.80	13.00	13.50
	TZ: ZERO UP-CROSSING PERIOD (s)	8.10	8.81	9.02	9.02	9.38	9.52	9.88
	HMAX: MAXIMUM WAVE HEIGHT (m)	8.35	11.01	11.80	12.27	12.84	13.63	16.25
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	12.02	13.30	13.68	13.91	14.18	14.56	15.82
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	12.39	16.97	18.33	19.13	20.14	21.51	26.04
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.17	0.27	0.30	0.32	0.34	0.37	0.48
SSE	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.68	6.19	6.65	6.91	7.24	7.69	9.19
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	11.80	13.00	13.50	13.50	13.80	14.00	15.00
	TZ: ZERO UP-CROSSING PERIOD (s)	8.67	9.52	9.88	9.88	10.09	10.23	10.94
	HMAX: MAXIMUM WAVE HEIGHT (m)	8.83	11.61	12.44	12.92	13.52	14.35	17.06
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	12.26	13.59	13.99	14.22	14.51	14.91	16.21
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	10.04	14.58	15.94	16.73	17.73	19.08	23.58
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.17	0.27	0.31	0.32	0.35	0.38	0.48
S	Hs: SIGNIFICANT WAVE HEIGHT (m)	5.29	7.03	7.55	7.86	8.24	8.76	10.49
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	13.00	14.50	14.80	15.00	15.30	15.80	17.30
	TZ: ZERO UP-CROSSING PERIOD (s)	9.52	10.59	10.80	10.94	11.15	11.51	12.57
	HMAX: MAXIMUM WAVE HEIGHT (m)	9.92	13.08	14.03	14.59	15.28	16.21	19.28
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	12.78	14.30	14.75	15.03	15.35	15.80	17.28
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	10.92	15.28	16.58	17.35	18.31	19.61	23.93
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.26	0.43	0.49	0.52	0.55	0.61	0.78
SSW	Hs: SIGNIFICANT WAVE HEIGHT (m)	6.75	9.30	10.01	10.42	10.93	11.60	13.74
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	12.50	14.50	15.00	15.30	16.00	16.30	17.80
	TZ: ZERO UP-CROSSING PERIOD (s)	9.17	10.59	10.94	11.15	11.65	11.86	12.92
	HMAX: MAXIMUM WAVE HEIGHT (m)	12.69	17.31	18.59	19.32	20.20	21.41	25.20
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	14.11	16.33	16.95	17.30	17.72	18.30	20.13
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	14.28	20.65	22.44	23.46	24.72	26.40	31.76
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.15	0.29	0.33	0.35	0.38	0.42	0.54
SW	Hs: SIGNIFICANT WAVE HEIGHT (m)	6.86	9.18	9.81	10.16	10.60	11.17	12.95
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	12.00	14.00	14.80	15.00	15.80	16.00	17.80
	TZ: ZERO UP-CROSSING PERIOD (s)	8.81	10.23	10.80	10.94	11.51	11.65	12.92
	HMAX: MAXIMUM WAVE HEIGHT (m)	12.94	17.13	18.23	18.86	19.61	20.65	23.75
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	14.23	16.24	16.78	17.08	17.44	17.94	19.43
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	16.06	20.01	21.07	21.67	22.41	23.39	26.42
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.21	0.34	0.37	0.39	0.41	0.44	0.54

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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		Return Period (Years)						
Dir	Parameter	1	10	20	30	50	100	1000
WSW	Hs: SIGNIFICANT WAVE HEIGHT (m)	5.52	6.85	7.19	7.37	7.60	7.89	8.76
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	10.00	11.50	12.00	12.30	12.50	12.80	13.80
	TZ: ZERO UP-CROSSING PERIOD (s)	7.39	8.45	8.81	9.02	9.17	9.38	10.09
	HMAX: MAXIMUM WAVE HEIGHT (m)	10.54	12.95	13.56	13.87	14.29	14.81	16.36
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.86	11.28	11.38	11.43	11.49	11.56	11.77
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	16.45	19.65	20.45	20.90	21.44	22.14	24.23
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.26	0.38	0.41	0.42	0.44	0.47	0.55
W	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.67	5.77	6.04	6.20	6.38	6.62	7.35
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	8.80	10.00	10.00	10.50	10.50	10.80	11.50
	TZ: ZERO UP-CROSSING PERIOD (s)	6.53	7.39	7.39	7.74	7.74	7.96	8.45
	HMAX: MAXIMUM WAVE HEIGHT (m)	8.99	11.01	11.53	11.80	12.14	12.57	13.90
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.53	10.95	11.04	11.09	11.15	11.22	11.43
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	16.15	19.49	20.33	20.80	21.37	22.10	24.31
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.25	0.37	0.40	0.42	0.44	0.47	0.55
WNW	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.82	4.46	4.61	4.70	4.80	4.92	5.30
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	7.80	8.30	8.30	8.50	8.50	8.50	9.00
	TZ: ZERO UP-CROSSING PERIOD (s)	5.81	6.17	6.17	6.31	6.31	6.31	6.67
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.41	8.62	8.91	9.07	9.26	9.49	10.19
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.13	10.44	10.51	10.55	10.59	10.64	10.79
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	14.75	18.09	18.89	19.32	19.84	20.51	22.45
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.30	0.38	0.40	0.41	0.43	0.45	0.49
NW	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.71	4.33	4.48	4.56	4.66	4.78	5.13
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	7.00	7.50	7.80	7.80	7.80	8.00	8.00
	TZ: ZERO UP-CROSSING PERIOD (s)	5.23	5.59	5.81	5.81	5.81	5.95	5.95
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.25	8.42	8.69	8.85	9.04	9.26	9.94
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.09	10.40	10.46	10.50	10.54	10.59	10.74
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	15.83	18.31	18.90	19.23	19.61	20.11	21.54
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.24	0.30	0.32	0.33	0.34	0.35	0.39
NNW	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.44	4.05	4.20	4.28	4.38	4.50	4.87
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	6.80	7.30	7.50	7.50	7.50	7.50	7.80
	TZ: ZERO UP-CROSSING PERIOD (s)	5.09	5.45	5.59	5.59	5.59	5.59	5.81
	HMAX: MAXIMUM WAVE HEIGHT (m)	6.73	7.89	8.17	8.32	8.52	8.75	9.45
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	9.93	10.26	10.33	10.37	10.42	10.48	10.63
	WS:ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	14.47	17.69	18.48	18.91	19.43	20.10	22.06
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.18	0.27	0.29	0.30	0.31	0.33	0.38

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.2 Single Peak Wave Extreme Hs x Tp curves for N Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5
1	Hs(m)	0.0	2.0	2.5	2.8	3.1	3.3	3.5	3.6	3.5	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	5.4	7.2	9.0	10.7	12.4	14.1	15.8	14.8	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	1.7	2.1	2.7	3.2	3.5	3.8	3.9	4.1	4.2	4.2	4.1	0.0	0.0	0.0
	Ws (m/s)	4.1	5.8	7.9	10.6	12.4	14.0	15.3	16.7	17.8	18.3	16.5	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.0	0.0	0.0
20	Hs(m)	1.7	2.1	2.7	3.2	3.6	3.9	4.0	4.2	4.3	4.3	4.3	3.8	0.0	0.0
	Ws (m/s)	4.0	5.8	7.9	10.6	12.8	14.3	15.6	16.8	18.1	18.7	17.9	14.1	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.1	0.0	0.0
30	Hs(m)	1.7	2.1	2.7	3.2	3.7	3.9	4.1	4.3	4.3	4.4	4.4	4.2	0.0	0.0
	Ws (m/s)	4.0	5.8	7.9	10.5	13.3	14.6	15.9	17.1	18.1	19.0	18.5	16.3	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.3	0.1	0.0	0.0
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.0	4.2	4.3	4.4	4.5	4.5	4.3	0.0	0.0
	Ws (m/s)	4.0	5.8	7.9	10.5	13.5	14.8	16.0	17.3	18.5	19.6	19.2	17.5	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.2	0.0	0.0
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.1	4.3	4.4	4.5	4.6	4.6	4.5	4.1	0.0
	Ws (m/s)	4.0	5.8	7.9	10.4	13.6	15.3	16.5	17.6	18.7	19.7	20.1	18.7	15.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.3	0.1	0.0
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.3	4.5	4.7	4.8	4.9	5.0	5.0	4.9	4.6
	Ws (m/s)	4.0	5.8	7.9	10.4	13.3	16.2	17.5	18.5	19.6	20.6	21.4	21.4	20.2	17.8
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.4	0.2

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.3 Single Peak Wave Extreme Hs x Tp curves for NNE Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5
1	Hs(m)	0.0	0.0	2.3	2.7	3.1	3.4	3.7	3.9	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	6.1	7.1	8.4	9.7	11.2	12.9	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	0.0	2.1	2.7	3.1	3.5	3.8	4.1	4.4	4.7	5.0	5.2	5.3	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	5.8	6.9	8.2	9.4	10.5	11.7	12.9	14.2	15.5	16.7	17.7	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	0.0	2.1	2.7	3.2	3.6	3.9	4.2	4.6	4.9	5.2	5.4	5.6	5.6	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	5.7	6.9	8.6	9.7	10.9	11.9	13.3	14.4	15.6	16.8	17.9	18.6	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.0	0.0	0.0	0.0	0.0
30	Hs(m)	1.7	2.1	2.7	3.2	3.6	3.9	4.3	4.6	4.9	5.2	5.5	5.7	5.8	5.7	0.0	0.0	0.0	0.0
	Ws (m/s)	5.4	5.7	6.9	8.5	9.8	10.8	12.2	13.3	14.4	15.6	16.8	17.9	19.1	18.1	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.0	0.0	0.0	0.0
50	Hs(m)	1.7	2.1	2.7	3.2	3.7	4.0	4.4	4.7	5.0	5.3	5.6	5.8	6.0	6.1	0.0	0.0	0.0	0.0
	Ws (m/s)	5.3	5.7	6.9	8.5	10.0	11.0	12.2	13.4	14.7	15.5	16.9	17.9	19.1	19.8	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.0	0.0	0.0	0.0
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.1	4.4	4.8	5.1	5.4	5.7	6.0	6.3	6.4	6.5	0.0	0.0	0.0
	Ws (m/s)	5.2	5.7	6.9	8.5	10.2	11.4	12.3	13.6	14.6	15.9	16.8	18.0	19.2	20.2	20.8	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.0	0.0	0.0
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.4	4.7	5.0	5.4	5.7	6.1	6.4	6.7	7.0	7.3	7.5	7.7	7.6
	Ws (m/s)	4.9	5.7	6.9	8.5	10.3	12.1	12.8	14.0	15.2	16.1	17.3	18.5	19.6	20.7	21.6	22.6	23.8	23.5
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.4 Single Peak Wave Extreme Hs x Tp curves for NE Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	0.0	0.0	2.8	3.2	3.5	3.8	4.0	4.1	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0	0.0	7.3	8.8	10.2	11.6	12.8	14.1	14.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	0.0	0.0	2.5	3.0	3.4	3.7	4.0	4.3	4.7	4.9	5.1	5.3	5.4	5.3	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	6.4	8.0	9.4	10.6	11.8	13.1	14.4	15.6	16.6	17.7	18.4	17.7	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	0.0	0.0	2.7	3.1	3.5	3.9	4.2	4.5	4.8	5.1	5.3	5.6	5.7	5.7	5.6	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	7.0	8.5	9.9	11.2	12.3	13.4	14.6	16.0	17.0	18.1	19.0	19.4	18.1	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.0	0.0	0.0	0.0
30	Hs(m)	0.0	2.1	2.7	3.2	3.6	4.0	4.3	4.6	4.9	5.2	5.5	5.7	5.9	6.0	5.9	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	5.5	7.0	8.8	10.0	11.4	12.6	13.8	15.0	16.2	17.3	18.3	19.3	20.2	19.8	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.0	0.0	0.0	0.0
50	Hs(m)	0.0	2.1	2.7	3.2	3.6	4.0	4.4	4.6	5.0	5.3	5.6	5.9	6.1	6.2	6.2	6.0	0.0	0.0	0.0
	Ws (m/s)	0.0	5.6	7.0	8.8	10.2	11.7	12.9	13.9	15.2	16.5	17.7	18.8	19.7	20.5	21.0	19.5	0.0	0.0	0.0
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.0	0.0	0.0
100	Hs(m)	0.0	2.1	2.7	3.2	3.8	4.2	4.5	4.8	5.1	5.5	5.7	6.1	6.2	6.5	6.6	6.6	0.0	0.0	0.0
	Ws (m/s)	0.0	5.5	7.0	8.8	10.7	12.0	13.4	14.5	15.6	17.0	18.0	19.2	20.1	21.2	22.0	22.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.0	0.0	0.0
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.4	7.6	7.8	7.8	7.7
	Ws (m/s)	4.5	5.5	7.0	8.8	10.8	13.1	14.5	15.9	16.8	18.2	19.1	20.4	21.6	22.7	23.7	24.6	25.4	25.9	25.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.4

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.5 Single Peak Wave Extreme Hs x Tp curves for ENE Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0		10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	0.0	2.8	3.2	3.4	3.7	3.8	4.0	4.1	4.2	4.1	3.9	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0	3.3	5.2	6.6	8.1	9.5	11.0	12.5	13.5	12.5	10.2	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.2	4.5	4.7	4.9	5.1	5.2	5.3	5.4	5.4	5.2	4.8	0.0	0.0	0.0
	Ws (m/s)	1.7	1.4	2.8	5.0	7.9	9.8	11.2	12.2	13.5	14.7	15.8	17.1	17.9	17.4	16.1	13.2	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.4	4.6	4.9	5.1	5.3	5.5	5.6	5.7	5.7	5.7	5.5	4.9	0.0	0.0
	Ws (m/s)	1.3	1.3	2.8	5.0	7.7	10.5	11.6	13.1	14.2	15.5	16.5	17.6	18.5	19.0	18.5	16.8	13.1	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.0	0.0
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.8	5.1	5.3	5.5	5.7	5.8	5.9	6.0	6.0	5.8	5.5	0.0	0.0
	Ws (m/s)	1.1	1.3	2.8	5.0	7.7	10.8	12.1	13.6	14.8	15.8	17.2	18.0	19.1	20.0	19.7	18.4	16.2	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.1	0.0	0.0
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.2	5.4	5.6	5.9	6.0	6.1	6.2	6.2	6.2	6.0	5.3	0.0
	Ws (m/s)	0.9	1.3	2.8	5.0	7.6	10.6	12.6	13.9	15.1	16.3	17.7	18.7	19.5	20.5	21.0	20.2	18.7	14.7	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.0
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.4	5.7	5.8	6.1	6.2	6.4	6.5	6.6	6.6	6.5	6.2	0.0
	Ws (m/s)	0.7	1.2	2.8	4.9	7.5	10.5	13.4	14.8	16.1	16.9	18.1	19.2	20.2	21.3	22.3	22.3	21.1	19.2	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.3	0.2	0.0
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.3	6.6	6.8	7.1	7.3	7.4	7.6	7.7	7.8	7.8	7.8
	Ws (m/s)	0.3	1.2	2.8	4.9	7.4	10.1	13.2	16.6	18.2	19.3	20.3	21.8	22.7	23.5	24.7	25.6	26.3	26.7	25.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.4

Return Period (Years)	Tp1(s)	13.5	14.0
1	Hs(m)	0.0	0.0
	Ws (m/s)	0.0	0.0
	Cs(m/s)	0.0	0.0
10	Hs(m)	0.0	0.0
	Ws (m/s)	0.0	0.0
	Cs(m/s)	0.0	0.0
20	Hs(m)	0.0	0.0
	Ws (m/s)	0.0	0.0
	Cs(m/s)	0.0	0.0
30	Hs(m)	0.0	0.0
	Ws (m/s)	0.0	0.0
	Cs(m/s)	0.0	0.0
50	Hs(m)	0.0	0.0
	Ws (m/s)	0.0	0.0
	Cs(m/s)	0.0	0.0
100	Hs(m)	0.0	0.0
	Ws (m/s)	0.0	0.0
	Cs(m/s)	0.0	0.0
1000	Hs(m)	7.5	6.8
	Ws (m/s)	24.4	20.3
	Cs(m/s)	0.4	0.2

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.6 Single Peak Wave Extreme Hs x Tp curves for E Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	2.6	2.9	3.2	3.4	3.6	3.7	3.8	3.9	4.0	4.0	4.0	3.9	3.8	3.6	3.2	0.0	0.0
	Ws (m/s)	0.0	0.0	0.1	1.3	2.9	4.2	5.9	7.0	8.4	9.7	11.1	11.8	11.1	9.7	8.2	5.9	2.9	0.0	0.0
	Cs(m/s)	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.6	4.8	4.9	5.1	5.2	5.2	5.3	5.3	5.3	5.2	5.1	4.9	4.6
	Ws (m/s)	0.1	0.1	0.1	2.3	5.4	9.1	10.2	11.4	12.4	13.5	14.4	15.3	16.3	16.3	15.9	14.8	13.5	12.1	9.8
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.1	5.2	5.4	5.5	5.6	5.6	5.7	5.7	5.6	5.5	5.4	5.2
	Ws (m/s)	0.1	0.1	0.1	2.2	5.2	8.7	11.2	12.5	13.3	14.4	15.5	16.4	17.0	17.9	17.4	16.7	15.8	14.4	12.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.1
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.3	5.4	5.6	5.7	5.8	5.9	5.9	5.9	5.9	5.8	5.7	5.5
	Ws (m/s)	0.1	0.1	0.1	2.2	5.1	8.5	11.9	13.2	13.9	15.2	15.9	16.9	17.7	18.4	18.4	17.7	16.9	15.9	14.4
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.1
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.5	5.7	5.8	5.9	6.0	6.1	6.2	6.2	6.2	6.1	6.0	5.8
	Ws (m/s)	0.1	0.1	0.1	2.1	5.0	8.3	12.1	14.0	14.8	15.7	16.8	17.5	18.5	19.1	19.7	19.3	18.5	17.2	16.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.7	6.0	6.1	6.2	6.3	6.5	6.5	6.6	6.6	6.5	6.5	6.3
	Ws (m/s)	0.1	0.1	0.1	2.1	4.8	8.0	11.6	14.6	16.0	16.8	17.7	18.5	19.5	20.1	20.8	20.8	20.1	19.5	18.1
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.2	7.2	7.4	7.5	7.7	7.8	7.8	7.8	7.8	7.8
	Ws (m/s)	0.1	0.1	0.1	2.0	4.6	7.5	10.7	14.3	18.5	20.4	20.9	21.9	22.8	23.6	24.4	24.9	25.7	25.4	24.7
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4

Return Period (Years)	Tp1(s)	13.5	14.0	14.5	15.0	15.5	16.0	16.5
1	Hs(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	4.2	3.4	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	7.5	3.1	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	4.9	4.3	3.4	0.0	0.0	0.0	0.0
	Ws (m/s)	10.9	7.8	3.1	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0
30	Hs(m)	5.2	4.8	4.1	0.0	0.0	0.0	0.0
	Ws (m/s)	12.3	10.1	6.5	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0
50	Hs(m)	5.6	5.2	4.7	3.9	0.0	0.0	0.0
	Ws (m/s)	14.4	12.2	9.3	5.2	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0
100	Hs(m)	6.1	5.8	5.4	4.8	3.7	0.0	0.0
	Ws (m/s)	16.8	15.1	12.6	9.6	4.2	0.0	0.0
	Cs(m/s)	0.2	0.1	0.1	0.1	0.1	0.0	0.0
1000	Hs(m)	7.7	7.5	7.3	7.1	6.6	6.0	5.1
	Ws (m/s)	24.0	22.8	21.4	19.9	17.6	14.5	10.0
	Cs(m/s)	0.4	0.3	0.3	0.2	0.2	0.1	0.1

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.7 Single Peak Wave Extreme Hs x Tp curves for ESE Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	0.0	2.5	2.8	3.1	3.3	3.4	3.6	3.7	3.8	3.9	3.9	3.9	3.9	3.9	3.8	3.7	3.5
	Ws (m/s)	0.0	0.0	0.0	0.6	2.2	3.5	4.9	5.8	7.1	8.1	9.0	10.0	10.7	11.4	11.4	10.3	9.2	8.1	6.6
	Cs(m/s)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.2	4.4	4.6	4.7	4.8	4.9	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.1
	Ws (m/s)	0.1	0.1	1.3	3.7	6.6	8.6	9.7	10.7	11.4	12.4	13.1	14.0	14.7	15.2	15.9	16.3	15.7	15.1	14.3
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.7	4.9	5.0	5.2	5.3	5.4	5.5	5.5	5.6	5.6	5.6	5.6	5.5
	Ws (m/s)	0.1	0.1	1.3	3.6	6.4	9.7	11.0	11.7	12.5	13.6	14.2	15.3	15.8	16.3	17.1	17.6	17.3	16.8	16.1
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.0	5.2	5.4	5.5	5.6	5.7	5.8	5.8	5.8	5.8	5.8	5.8
	Ws (m/s)	0.1	0.1	1.3	3.6	6.3	9.5	11.5	12.3	13.5	14.2	14.9	15.6	16.5	17.1	17.7	18.0	18.3	17.8	17.1
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.3	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.1	6.1	6.1	6.1
	Ws (m/s)	0.1	0.1	1.3	3.5	6.2	9.3	12.2	13.5	14.3	15.1	15.8	16.5	17.2	18.1	18.6	19.1	19.4	19.1	18.4
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.6	5.8	5.9	6.1	6.2	6.3	6.4	6.4	6.5	6.5	6.5	6.5
	Ws (m/s)	0.1	0.1	1.2	3.5	6.1	9.0	12.4	14.5	15.4	16.2	17.0	17.8	18.5	19.1	19.6	20.2	20.6	20.6	20.2
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.0	7.1	7.3	7.4	7.5	7.6	7.7	7.7	7.8	7.8
	Ws (m/s)	0.1	0.1	1.2	3.4	5.8	8.6	11.7	15.1	18.9	20.0	20.5	21.4	22.3	22.7	23.4	24.0	24.4	24.8	25.3
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4

Return Period (Years)	Tp1(s)	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0
1	Hs(m)	3.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	4.9	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	5.0	4.8	4.6	4.3	3.9	3.3	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	13.4	12.1	10.7	8.9	7.1	4.1	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	5.4	5.3	5.1	4.9	4.5	4.1	3.5	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	15.3	14.2	13.2	11.7	9.8	7.8	4.8	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
30	Hs(m)	5.7	5.5	5.4	5.2	4.9	4.5	4.0	3.2	0.0	0.0	0.0	0.0
	Ws (m/s)	16.3	15.3	14.2	13.1	11.5	9.4	6.9	3.3	0.0	0.0	0.0	0.0
	Cs(m/s)	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
50	Hs(m)	6.0	5.9	5.7	5.5	5.2	4.9	4.5	3.9	0.0	0.0	0.0	0.0
	Ws (m/s)	17.8	16.9	15.8	14.7	13.0	11.3	9.5	6.5	0.0	0.0	0.0	0.0
	Cs(m/s)	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
100	Hs(m)	6.4	6.3	6.2	6.0	5.8	5.5	5.1	4.6	4.0	0.0	0.0	0.0
	Ws (m/s)	19.4	18.8	17.8	16.6	15.4	14.1	12.2	9.8	7.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
1000	Hs(m)	7.8	7.7	7.7	7.6	7.4	7.2	7.0	6.7	6.3	5.8	5.1	4.3
	Ws (m/s)	25.6	25.7	25.8	25.8	25.7	25.4	25.0	24.4	23.6	22.3	20.5	18.3
	Cs(m/s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.8 Single Peak Wave Extreme Hs x Tp curves for SE Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	0.0	0.0	2.9	3.2	3.5	3.7	3.9	4.0	4.1	4.2	4.3	4.4	4.4	4.4	4.4	4.3	4.2
	Ws (m/s)	0.0	0.0	0.0	0.0	1.5	3.0	4.3	5.5	6.7	7.7	8.7	9.6	10.4	11.3	12.4	12.4	11.5	10.5	9.4
	Cs(m/s)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.7	4.9	5.1	5.3	5.4	5.5	5.7	5.7	5.8	5.8	5.8	5.8	5.8
	Ws (m/s)	0.1	0.1	0.7	2.6	5.1	8.1	9.2	10.3	11.4	12.1	13.1	13.7	14.7	15.2	15.9	16.4	17.0	16.6	16.2
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.2
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.3	5.4	5.7	5.8	5.9	6.0	6.1	6.2	6.2	6.3	6.3	6.3
	Ws (m/s)	0.1	0.1	0.7	2.6	5.0	7.8	10.8	11.6	12.4	13.5	14.2	14.9	15.6	16.5	17.1	17.5	18.0	18.3	17.8
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.5	5.6	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.5	6.5	6.5
	Ws (m/s)	0.1	0.1	0.7	2.6	5.0	7.7	10.9	12.2	12.9	14.2	14.9	15.6	16.3	16.9	17.5	18.3	18.8	19.1	18.8
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.8	5.9	6.1	6.3	6.4	6.5	6.6	6.7	6.8	6.8	6.8	6.8
	Ws (m/s)	0.1	0.1	0.7	2.6	4.9	7.6	10.7	13.3	14.1	15.0	15.8	16.5	17.2	17.9	18.5	19.1	19.5	19.9	19.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.3	6.5	6.6	6.8	6.9	7.0	7.1	7.2	7.2	7.3	7.3
	Ws (m/s)	0.1	0.1	0.7	2.6	4.8	7.5	10.4	13.8	15.2	16.0	16.9	17.7	18.5	18.8	19.5	20.1	20.7	21.1	21.5
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	7.8	7.9	8.1	8.2	8.4	8.5	8.6	8.6	8.7
	Ws (m/s)	0.1	0.1	0.7	2.5	4.7	7.2	9.9	12.9	16.2	19.0	20.7	21.2	22.2	22.6	23.5	24.0	24.6	25.2	25.4
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4

Return Period (Years)	Tp1(s)	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5
1	Hs(m)	4.1	3.9	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	8.2	6.7	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	5.7	5.7	5.5	5.3	5.1	4.8	4.3	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	15.4	14.7	13.7	12.4	11.0	9.6	7.4	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	6.2	6.1	6.0	5.8	5.7	5.4	5.0	4.6	4.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	17.3	16.5	15.6	14.6	13.5	12.0	10.4	8.4	5.8	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
30	Hs(m)	6.5	6.4	6.3	6.1	5.9	5.7	5.4	5.0	4.5	3.7	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	18.1	17.5	16.6	15.6	14.6	13.3	11.7	10.0	8.0	4.6	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
50	Hs(m)	6.8	6.7	6.7	6.5	6.3	6.1	5.9	5.5	5.1	4.5	3.5	0.0	0.0	0.0	0.0
	Ws (m/s)	19.3	18.8	18.2	17.2	16.1	15.0	13.7	11.9	10.1	7.5	3.7	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
100	Hs(m)	7.3	7.2	7.1	7.0	6.9	6.7	6.5	6.2	5.8	5.3	4.6	3.6	0.0	0.0	0.0
	Ws (m/s)	21.9	22.0	22.3	22.3	22.2	22.1	21.8	21.3	20.6	19.7	18.2	15.6	0.0	0.0	0.0
	Cs(m/s)	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.0	0.0	0.0
1000	Hs(m)	8.7	8.7	8.7	8.6	8.5	8.4	8.2	8.0	7.8	7.5	7.1	6.5	5.9	5.1	3.9
	Ws (m/s)	25.9	25.9	25.4	24.8	24.2	23.5	22.6	21.7	20.7	19.1	17.4	15.0	12.6	9.7	5.0
	Cs(m/s)	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.9 Single Peak Wave Extreme Hs x Tp curves for SSE Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	0.0	0.0	2.9	3.3	3.5	3.7	4.0	4.1	4.3	4.4	4.5	4.6	4.6	4.7	4.7	4.7	4.6
	Ws (m/s)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	1.5	2.9	4.1	5.4	6.8	7.8	9.1	10.0	8.7	7.6
	Cs(m/s)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.8	5.0	5.2	5.3	5.5	5.6	5.8	5.9	6.0	6.1	6.1	6.2	6.2
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	1.1	2.6	4.0	4.9	5.8	7.2	8.1	8.9	10.3	11.0	11.8	12.9	13.5	14.3
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.3	5.5	5.7	5.9	6.0	6.1	6.3	6.4	6.5	6.5	6.6	6.6
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.8	3.8	4.7	6.3	7.2	8.2	9.2	10.1	11.0	11.9	12.7	13.5	14.7	15.5
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.5	5.7	5.9	6.1	6.2	6.4	6.5	6.6	6.7	6.8	6.9	6.9
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.6	4.1	5.7	6.8	7.8	8.8	9.8	10.8	11.7	12.7	13.4	14.3	15.1	15.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.7	5.9	6.1	6.3	6.5	6.6	6.7	6.9	7.0	7.1	7.1	7.2
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.5	3.8	6.4	7.4	8.5	9.5	10.6	11.6	12.1	13.1	14.0	14.8	15.6	16.5
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.2	6.4	6.6	6.8	6.9	7.1	7.3	7.4	7.4	7.5	7.6
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.3	3.4	7.1	8.3	9.5	10.5	11.7	12.2	13.3	14.3	15.2	15.7	16.6	17.3
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	7.8	7.9	8.1	8.3	8.4	8.6	8.7	8.9	8.9
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.1	2.7	5.9	9.4	12.4	13.9	14.6	15.5	16.5	17.1	18.3	18.9	19.9	20.4
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4

Return Period (Years)	Tp1(s)	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	18.8	19.0	19.5	20.0	20.5	21.0
1	Hs(m)	4.5	4.4	4.2	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	6.1	4.1	1.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	6.2	6.2	6.1	6.0	5.8	5.6	5.3	4.9	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	15.3	15.7	16.4	16.9	17.5	17.7	18.0	18.0	17.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	6.7	6.6	6.6	6.5	6.4	6.2	6.0	5.7	5.3	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	16.0	15.5	14.4	13.1	12.3	10.6	9.2	7.2	4.7	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	Hs(m)	6.9	6.9	6.9	6.8	6.7	6.6	6.4	6.1	5.7	5.2	4.4	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	16.7	16.7	15.5	14.7	13.4	12.2	10.8	9.3	6.8	4.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
50	Hs(m)	7.2	7.2	7.2	7.2	7.1	7.0	6.8	6.6	6.3	5.8	5.3	4.9	4.2	0.0	0.0	0.0	0.0
	Ws (m/s)	17.1	17.5	17.1	16.0	15.2	14.0	12.6	11.1	9.5	6.9	4.2	2.2	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
100	Hs(m)	7.7	7.7	7.7	7.7	7.6	7.5	7.4	7.2	6.9	6.6	6.2	5.9	5.6	4.6	0.0	0.0	0.0
	Ws (m/s)	18.2	18.8	18.8	18.2	17.3	16.6	15.2	13.8	12.2	10.5	8.3	6.6	5.5	0.7	0.0	0.0	0.0
	Cs(m/s)	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
1000	Hs(m)	9.0	9.1	9.2	9.2	9.2	9.2	9.1	9.0	8.9	8.8	8.6	8.4	8.3	7.9	7.3	6.7	5.6
	Ws (m/s)	21.4	21.8	22.5	23.3	23.3	23.0	22.1	21.4	20.4	19.4	18.3	17.1	16.5	14.6	11.9	9.2	4.4
	Cs(m/s)	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.1

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.10 Single Peak Wave Extreme Hs x Tp curves for S Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.8	4.1	4.3	4.5	4.7	4.8	4.9	5.0	5.2	5.2	5.3	5.3
	Ws (m/s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.5	1.5	2.6	3.8	4.7	5.9	6.8	8.0	8.8	10.0	10.9
	Cs(m/s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3
10	Hs(m)	0.0	2.1	2.7	3.2	3.8	4.5	4.9	5.1	5.4	5.6	5.7	5.9	6.2	6.3	6.5	6.6	6.7	6.8	6.9
	Ws (m/s)	0.0	0.1	0.1	0.1	0.1	1.3	3.0	3.7	4.9	5.7	6.5	7.3	8.5	9.3	10.1	10.9	11.6	12.3	13.3
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.5	5.8	6.0	6.2	6.4	6.6	6.7	6.8	7.0	7.1	7.2	7.3
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	1.2	3.8	5.1	6.0	6.9	7.7	8.6	9.5	10.3	10.8	11.6	12.4	13.2	13.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.7	5.9	6.1	6.4	6.6	6.8	6.9	7.1	7.2	7.4	7.5	7.6
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	1.1	3.7	5.5	6.4	7.3	8.2	9.1	10.0	10.5	11.4	12.2	13.0	13.9	14.6
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.1	6.4	6.6	6.8	7.1	7.2	7.4	7.5	7.6	7.8	7.9
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	1.0	3.5	6.3	6.9	7.9	8.8	9.8	10.7	11.2	12.1	13.0	13.5	14.3	15.1
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.5	6.8	6.9	7.2	7.3	7.6	7.8	7.9	8.1	8.2	8.3
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	1.0	3.3	6.0	8.1	9.1	9.7	10.7	11.2	12.2	13.2	13.7	14.6	15.1	15.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	8.1	8.4	8.5	8.7	9.0	9.2	9.3	9.5	9.7
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.8	3.0	5.5	8.2	10.4	12.7	13.6	14.2	14.8	16.0	16.6	17.2	18.0	18.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6

Return Period (Years)	Tp1(s)	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0
1	Hs(m)	5.3	5.3	5.2	5.0	4.8	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	11.5	12.2	13.0	13.8	14.5	15.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.4	0.4	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	7.0	7.0	7.0	7.0	7.0	6.9	6.8	6.6	6.3	6.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	13.9	14.5	15.1	14.7	14.2	13.3	12.3	10.9	9.3	7.7	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	7.4	7.5	7.5	7.6	7.5	7.5	7.4	7.3	7.1	6.8	6.5	5.9	4.8	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	14.6	15.5	16.0	16.3	16.0	15.5	14.6	13.5	12.4	10.8	9.1	6.4	2.3	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0
30	Hs(m)	7.7	7.8	7.8	7.9	7.9	7.8	7.8	7.7	7.5	7.3	7.0	6.6	5.9	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	15.3	15.9	16.5	17.4	17.4	16.5	15.9	15.0	13.9	12.7	10.9	9.1	6.4	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
50	Hs(m)	8.0	8.1	8.2	8.2	8.2	8.2	8.2	8.1	8.0	7.9	7.5	7.3	6.7	6.0	0.0	0.0	0.0	0.0
	Ws (m/s)	15.9	16.6	17.2	17.8	18.1	18.1	17.2	16.6	15.5	14.7	13.0	11.7	9.3	6.4	0.0	0.0	0.0	0.0
	Cs(m/s)	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.1	0.0	0.0	0.0	0.0
100	Hs(m)	8.5	8.5	8.6	8.7	8.8	8.8	8.8	8.7	8.6	8.5	8.3	8.1	7.7	7.2	6.4	0.0	0.0	0.0
	Ws (m/s)	16.7	17.1	17.8	18.5	19.1	19.4	19.1	18.5	17.8	17.1	15.9	14.6	12.7	10.7	7.6	0.0	0.0	0.0
	Cs(m/s)	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.2	0.1	0.0	0.0	0.0
1000	Hs(m)	9.8	10.0	10.1	10.2	10.3	10.4	10.5	10.5	10.5	10.5	10.4	10.4	10.2	10.0	9.8	9.4	9.0	8.2
	Ws (m/s)	19.3	20.1	20.8	21.2	22.0	22.4	23.1	23.4	23.7	24.4	24.7	24.8	25.1	25.1	25.1	24.8	24.4	23.3
	Cs(m/s)	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.11 Single Peak Wave Extreme Hs x Tp curves for SSW Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	0.0	2.9	3.6	4.0	4.4	4.8	5.1	5.4	5.7	6.0	6.1	6.3	6.5	6.6	6.7	6.8	6.7
	Ws (m/s)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.7	2.2	3.7	4.9	6.5	7.7	8.8	10.3	11.8	12.8	14.3	13.6
	Cs(m/s)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.0	7.3	7.7	8.0	8.2	8.4	8.6	8.8	8.9	9.1
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.1	1.3	4.0	6.8	7.9	9.0	10.7	11.7	12.8	13.8	14.8	15.7	16.6	17.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	7.8	8.1	8.4	8.6	8.9	9.1	9.3	9.5	9.7
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.1	1.2	3.7	6.5	8.9	10.2	11.3	12.5	13.6	14.7	15.8	16.8	17.8	18.8
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	8.0	8.4	8.7	8.9	9.1	9.3	9.6	9.8	10.0
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.1	1.1	3.6	6.3	8.7	10.8	12.0	13.2	14.4	15.0	16.1	17.2	18.2	19.2
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	8.1	8.7	9.0	9.2	9.5	9.8	9.9	10.1	10.3
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.1	1.1	3.5	6.1	8.4	10.7	12.9	14.1	14.8	16.0	17.2	17.7	18.9	19.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	8.1	8.8	9.3	9.7	9.9	10.2	10.5	10.6	10.8
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.1	1.0	3.3	5.9	8.1	10.3	12.6	14.7	16.1	16.7	18.0	19.2	19.8	20.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	8.1	8.8	9.4	10.0	10.6	11.2	11.8	12.1	12.3
	Ws (m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.9	3.1	5.5	7.5	9.5	11.6	13.6	15.7	17.8	19.8	21.9	23.1	23.8
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3

Return Period (Years)	Tp1(s)	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5
1	Hs(m)	6.7	6.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	12.1	10.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	9.2	9.3	9.3	9.3	9.2	9.1	8.8	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	18.7	19.7	20.6	20.1	19.1	17.9	16.2	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	9.8	9.9	10.0	10.0	10.0	10.0	9.8	9.6	9.1	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	19.6	20.4	21.5	22.2	22.2	21.2	20.0	18.3	15.8	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	Hs(m)	10.1	10.2	10.3	10.4	10.4	10.4	10.3	10.2	9.9	9.3	8.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	20.2	21.0	21.8	22.9	23.3	22.9	21.8	20.6	18.8	16.1	10.8	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
50	Hs(m)	10.5	10.7	10.8	10.9	10.9	10.9	10.9	10.8	10.7	10.3	9.8	8.4	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	20.9	21.8	22.7	23.4	24.1	24.7	23.8	23.0	21.8	19.9	17.2	11.6	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
100	Hs(m)	11.1	11.1	11.3	11.4	11.5	11.6	11.6	11.6	11.5	11.3	11.1	10.6	9.5	0.0	0.0	0.0	0.0
	Ws (m/s)	22.0	22.5	23.5	24.3	25.1	25.8	26.3	25.8	24.7	23.5	22.0	19.8	15.4	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.1	0.0	0.0	0.0	0.0
1000	Hs(m)	12.5	12.8	12.9	13.2	13.3	13.5	13.5	13.7	13.7	13.7	13.7	13.7	13.5	13.4	13.0	12.5	11.3
	Ws (m/s)	24.7	25.7	26.3	27.5	28.0	29.1	29.5	30.4	31.2	31.6	31.6	30.8	29.5	28.6	26.9	24.4	20.1
	Cs(m/s)	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.2

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.12 Single Peak Wave Extreme Hs x Tp curves for SW Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.2	5.5	5.7	6.0	6.2	6.4	6.6	6.8	6.8	6.9	6.8	6.7
	Ws (m/s)	5.7	4.8	5.1	5.9	6.9	8.3	9.3	9.9	10.7	11.4	12.2	12.8	13.6	14.3	15.0	15.6	16.1	15.6	14.5
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.1	7.4	7.6	7.9	8.2	8.4	8.6	8.8	8.9	9.0
	Ws (m/s)	4.1	4.3	5.0	5.9	6.9	8.1	9.5	11.1	12.9	13.7	14.3	14.9	15.4	16.3	16.8	17.3	18.0	18.4	19.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	7.8	8.1	8.3	8.6	8.8	9.0	9.2	9.4	9.5
	Ws (m/s)	4.0	4.3	5.0	5.9	6.9	8.1	9.5	11.0	12.7	14.2	15.0	15.6	16.2	16.8	17.4	18.0	18.5	19.0	19.4
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	7.9	8.2	8.5	8.7	9.0	9.2	9.4	9.6	9.8
	Ws (m/s)	3.9	4.3	5.0	5.9	6.9	8.1	9.5	11.0	12.7	14.1	15.0	15.7	16.4	17.0	17.6	18.2	18.7	19.3	19.7
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	8.1	8.5	8.8	8.9	9.2	9.5	9.7	9.9	10.1
	Ws (m/s)	3.8	4.3	5.0	5.9	6.9	8.1	9.4	10.9	12.6	14.0	15.4	16.2	16.9	17.3	17.9	18.5	19.1	19.7	20.2
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	8.1	8.7	9.1	9.4	9.5	9.8	10.1	10.3	10.4
	Ws (m/s)	3.8	4.2	5.0	5.9	6.9	8.1	9.4	10.9	12.5	13.8	15.2	16.5	17.3	18.0	18.3	19.0	19.7	20.3	20.5
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	8.1	8.8	9.4	10.0	10.5	10.9	11.1	11.3	11.6
	Ws (m/s)	3.6	4.2	4.9	5.9	6.9	8.1	9.4	10.8	12.3	13.6	14.9	16.2	17.5	18.8	19.9	20.7	21.1	21.7	22.2
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3

Return Period (Years)	Tp1(s)	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0
1	Hs(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	9.1	9.2	9.2	9.1	9.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	19.5	19.9	19.9	19.3	18.6	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs(m)	9.7	9.7	9.8	9.8	9.8	9.7	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	20.0	20.4	20.8	21.1	20.6	20.0	18.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	Hs(m)	9.9	10.0	10.1	10.2	10.2	10.1	9.9	9.5	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	20.2	20.8	21.2	21.6	21.6	21.0	20.4	19.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0
50	Hs(m)	10.2	10.4	10.5	10.6	10.6	10.6	10.5	10.3	9.9	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	20.7	21.1	21.5	22.0	22.3	22.1	21.7	20.9	19.7	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.0	0.0	0.0	0.0	0.0
100	Hs(m)	10.6	10.8	10.9	11.0	11.1	11.2	11.2	11.1	10.9	10.6	0.0	0.0	0.0	0.0
	Ws (m/s)	21.1	21.6	22.1	22.5	23.0	23.4	23.4	22.8	22.1	21.1	0.0	0.0	0.0	0.0
	Cs(m/s)	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.0	0.0	0.0	0.0
1000	Hs(m)	11.7	12.0	12.1	12.4	12.6	12.6	12.8	12.9	12.9	13.0	12.9	12.8	12.6	12.3
	Ws (m/s)	22.6	23.3	23.6	24.2	24.7	25.0	25.5	25.8	26.1	26.3	26.1	25.6	25.0	23.9
	Cs(m/s)	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.13 Single Peak Wave Extreme Hs x Tp curves for WSW Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	0.0	2.2	2.8	3.2	3.6	4.0	4.3	4.7	5.0	5.2	5.4	5.5	5.5	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	3.6	4.5	5.6	6.7	7.9	9.0	10.3	11.7	13.1	14.5	16.3	15.9	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.2	4.6	4.9	5.3	5.6	5.8	6.1	6.4	6.6	6.8	6.9	6.9	0.0	0.0
	Ws (m/s)	2.5	3.2	4.2	5.5	7.0	8.2	9.4	10.3	11.5	12.7	13.6	14.7	15.8	17.1	18.2	19.4	19.4	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.0	0.0
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.4	4.8	5.1	5.5	5.7	6.0	6.3	6.6	6.8	7.0	7.1	7.2	7.2	0.0
	Ws (m/s)	2.4	3.2	4.2	5.5	7.1	8.7	9.7	10.7	12.0	12.9	13.9	15.1	16.3	17.3	18.3	19.4	20.5	19.8	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.0
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.8	5.2	5.5	5.8	6.1	6.4	6.7	6.9	7.1	7.3	7.4	7.4	7.2
	Ws (m/s)	2.3	3.1	4.2	5.5	7.1	8.9	9.9	10.9	11.9	12.9	14.2	15.1	16.3	17.2	18.3	19.4	20.4	20.6	18.7
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.3
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.3	5.6	5.9	6.2	6.5	6.8	7.0	7.2	7.4	7.6	7.6	7.6
	Ws (m/s)	2.3	3.1	4.2	5.5	7.1	8.9	10.1	11.1	12.2	13.2	14.2	15.2	16.5	17.4	18.5	19.5	20.5	21.4	20.5
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.4
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.0	5.4	5.8	6.1	6.4	6.6	7.0	7.2	7.4	7.6	7.8	7.9	7.9
	Ws (m/s)	2.2	3.1	4.2	5.5	7.1	8.8	10.4	11.5	12.6	13.7	14.7	15.4	16.8	17.7	18.6	19.7	20.6	21.6	22.2
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.8	6.1	6.4	6.8	7.0	7.4	7.7	7.9	8.1	8.3	8.5	8.7
	Ws (m/s)	2.1	3.1	4.2	5.5	7.0	8.8	10.7	12.5	13.4	14.2	15.4	16.2	17.4	18.5	19.1	20.1	21.1	21.9	22.9
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5

Return Period (Years)	Tp1(s)	13.5	14.0	14.5
1	Hs(m)	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0
10	Hs(m)	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0
20	Hs(m)	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0
30	Hs(m)	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0
50	Hs(m)	0.0	0.0	0.0
	Ws (m/s)	0.0	0.0	0.0
	Cs(m/s)	0.0	0.0	0.0
100	Hs(m)	7.8	0.0	0.0
	Ws (m/s)	23.0	0.0	0.0
	Cs(m/s)	0.5	0.0	0.0
1000	Hs(m)	8.7	8.8	8.7
	Ws (m/s)	23.7	24.0	23.1
	Cs(m/s)	0.5	0.5	0.5

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.14 Single Peak Wave Extreme Hs x Tp curves for W Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
1	Hs(m)	0.0	2.1	2.7	3.2	3.6	3.9	4.2	4.4	4.6	4.7	4.7	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	3.2	4.4	6.3	8.2	9.6	11.0	12.7	14.1	15.6	16.0	12.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.1	5.3	5.5	5.6	5.8	5.8	5.7	5.3	0.0	0.0	0.0	0.0
	Ws (m/s)	2.0	3.0	4.4	6.2	8.4	11.1	12.9	14.1	15.2	16.5	17.6	18.9	19.5	18.4	14.9	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.3	0.2	0.0	0.0	0.0	0.0
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.0	5.3	5.5	5.7	5.8	6.0	6.0	6.0	5.9	0.0	0.0	0.0	0.0
	Ws (m/s)	1.9	3.0	4.4	6.2	8.4	10.9	13.1	14.4	15.6	16.8	17.8	19.0	20.1	20.1	18.6	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.3	0.0	0.0	0.0	0.0
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.4	5.6	5.8	6.0	6.1	6.2	6.2	6.1	5.8	0.0	0.0	0.0
	Ws (m/s)	1.9	3.0	4.4	6.2	8.3	10.8	13.5	14.8	15.7	17.0	18.0	19.2	20.2	20.8	19.7	17.2	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.2	0.0	0.0	0.0
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.5	5.7	5.9	6.1	6.2	6.3	6.4	6.4	6.2	0.0	0.0	0.0
	Ws (m/s)	1.8	3.0	4.4	6.2	8.3	10.8	13.7	14.9	16.2	17.1	18.3	19.4	20.4	21.2	20.9	19.1	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.0	0.0	0.0
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.6	5.9	6.1	6.3	6.4	6.5	6.6	6.6	6.6	6.3	0.0	0.0
	Ws (m/s)	1.8	3.0	4.4	6.2	8.3	10.7	13.5	15.4	16.5	17.8	18.7	19.8	20.7	21.6	21.9	20.9	18.7	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.4	0.3	0.0	0.0
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.4	6.5	6.7	6.9	7.1	7.2	7.3	7.4	7.3	7.2	6.9
	Ws (m/s)	1.7	2.9	4.4	6.2	8.2	10.5	13.1	16.2	17.9	18.6	19.7	20.7	21.6	22.6	23.4	24.3	24.0	22.6	20.4
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.5	0.5	0.4

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.15 Single Peak Wave Extreme Hs x Tp curves for WNW Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
1	Hs(m)	0.0	2.1	2.7	3.1	3.4	3.6	3.7	3.8	3.8	3.7	0.0	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.0	0.6	3.2	6.4	8.7	10.7	12.4	14.1	14.8	12.1	0.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.2	4.3	4.4	4.5	4.5	4.4	4.3	3.7	0.0	0.0	0.0
	Ws (m/s)	0.1	0.6	3.2	6.4	10.6	13.6	15.0	16.4	17.5	18.1	16.7	14.6	9.6	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.3	0.2	0.1	0.0	0.0	0.0
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.3	4.4	4.5	4.6	4.6	4.6	4.5	4.3	0.0	0.0	0.0
	Ws (m/s)	0.1	0.5	3.2	6.3	10.3	14.3	15.7	17.0	17.9	18.6	17.9	16.4	14.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.2	0.0	0.0	0.0
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.4	4.5	4.6	4.7	4.7	4.7	4.6	4.4	0.0	0.0	0.0
	Ws (m/s)	0.1	0.5	3.2	6.3	10.2	14.7	16.1	17.1	18.5	19.3	18.5	17.4	15.3	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.2	0.0	0.0	0.0
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.6	4.7	4.8	4.8	4.8	4.7	4.6	4.2	0.0	0.0
	Ws (m/s)	0.1	0.5	3.2	6.3	10.1	15.2	16.2	17.7	18.8	19.9	19.4	18.3	16.2	12.9	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.1	0.0	0.0
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.7	4.8	4.9	4.9	4.9	4.9	4.8	4.5	0.0	0.0
	Ws (m/s)	0.1	0.5	3.1	6.3	10.0	14.9	16.9	18.3	19.1	20.1	20.1	19.3	17.8	15.4	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.2	0.0	0.0
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.1	5.2	5.3	5.3	5.3	5.3	5.2	5.0	4.5
	Ws (m/s)	0.1	0.5	3.1	6.2	9.8	14.1	18.7	19.6	20.7	21.5	22.5	22.0	21.1	19.9	17.8	14.1
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.3	0.2

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.16 Single Peak Wave Extreme Hs x Tp curves for NW Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	Hs(m)	1.7	2.1	2.7	3.2	3.6	3.7	3.7	3.7	3.6	3.2	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	4.4	5.8	7.9	10.8	13.3	14.6	15.8	15.4	14.1	11.0	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.2	4.3	4.3	4.3	4.3	4.2	3.8	0.0	0.0	0.0
	Ws (m/s)	4.1	5.8	7.8	10.3	13.6	16.7	17.4	18.3	18.3	17.1	15.9	13.6	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.0	0.0	0.0
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.4	4.4	4.5	4.5	4.4	4.4	4.2	3.5	0.0	0.0
	Ws (m/s)	4.1	5.8	7.8	10.3	13.4	17.2	18.0	18.6	18.9	18.0	17.0	15.5	11.6	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.0	0.0	0.0
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.5	4.6	4.6	4.5	4.5	4.3	3.9	0.0	0.0
	Ws (m/s)	4.1	5.8	7.8	10.3	13.3	17.5	18.2	18.9	19.2	18.5	17.5	16.2	13.9	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.0	0.0
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.6	4.7	4.7	4.6	4.6	4.5	4.2	0.0	0.0
	Ws (m/s)	4.1	5.8	7.8	10.2	13.2	17.4	18.5	19.4	19.4	18.9	18.2	17.1	15.2	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.0	0.0
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.7	4.8	4.8	4.8	4.7	4.6	4.4	3.9	0.0
	Ws (m/s)	4.1	5.8	7.8	10.2	13.1	17.0	19.0	19.6	20.1	19.8	19.0	17.9	16.5	13.7	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.3	0.3	0.2	0.1	0.1	0.0
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.1	5.1	5.1	5.1	5.1	5.0	4.8	4.5
	Ws (m/s)	4.0	5.8	7.8	10.2	12.9	16.3	20.3	20.7	21.3	21.3	20.9	20.3	19.3	18.2	16.1
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.1

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.1.17 Single Peak Wave Extreme Hs x Tp curves for NNW Direction with associated Wind and Current Conditions by Return Periods

Return Period (Years)	Tp1(s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
1	Hs(m)	1.7	2.1	2.7	3.1	3.3	3.4	3.4	0.0	0.0	0.0	0.0	0.0
	Ws (m/s)	0.1	1.7	4.7	8.2	11.0	13.8	14.5	0.0	0.0	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0
10	Hs(m)	1.7	2.1	2.7	3.2	3.8	3.9	4.0	4.1	4.0	0.0	0.0	0.0
	Ws (m/s)	0.1	1.7	4.5	8.2	13.0	14.9	17.1	17.7	15.2	0.0	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.0	0.0	0.0
20	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.1	4.2	4.2	4.2	3.8	0.0	0.0
	Ws (m/s)	0.1	1.7	4.5	8.0	12.9	15.4	17.3	18.5	16.9	12.4	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.1	0.0	0.0
30	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.1	4.2	4.3	4.3	4.0	0.0	0.0
	Ws (m/s)	0.1	1.7	4.5	8.0	12.6	15.8	17.5	18.9	17.7	14.4	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.1	0.0	0.0
50	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.2	4.3	4.4	4.4	4.2	0.0	0.0
	Ws (m/s)	0.1	1.7	4.4	7.9	12.4	15.9	17.7	19.4	18.6	15.9	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.0	0.0
100	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.3	4.4	4.5	4.5	4.4	0.0	0.0
	Ws (m/s)	0.1	1.7	4.4	7.8	12.1	16.6	18.2	19.8	19.8	17.7	0.0	0.0
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.0	0.0
1000	Hs(m)	1.7	2.1	2.7	3.2	3.8	4.5	4.7	4.8	4.9	4.9	4.7	4.2
	Ws (m/s)	0.1	1.7	4.4	7.7	11.6	16.8	19.3	20.9	21.7	21.3	19.3	14.2
	Cs(m/s)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.3	0.3	0.1

Observation: Significant wave heights Hs of sea states with low spectral peak periods Tp were limited using steepness criteria provided by Recommended Practice DNV-RP-C205, April 2007, pag. 33

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.2 Extreme Double Peak Wave Criteria

There are a high percentage of double peak wave spectra at Santos Basin due to sea conditions associated with local blowing winds and swell conditions associated with southern extra-tropical cyclones. These spectra are usually charactherized by a peak associated with sea component with frequency higher than 0.1 Hz and a peak associated with swell component with frequency lower than 0.1 Hz. Under some conditions, one of these peaks may be associated with a local storm generating an extreme double peak wave condition.

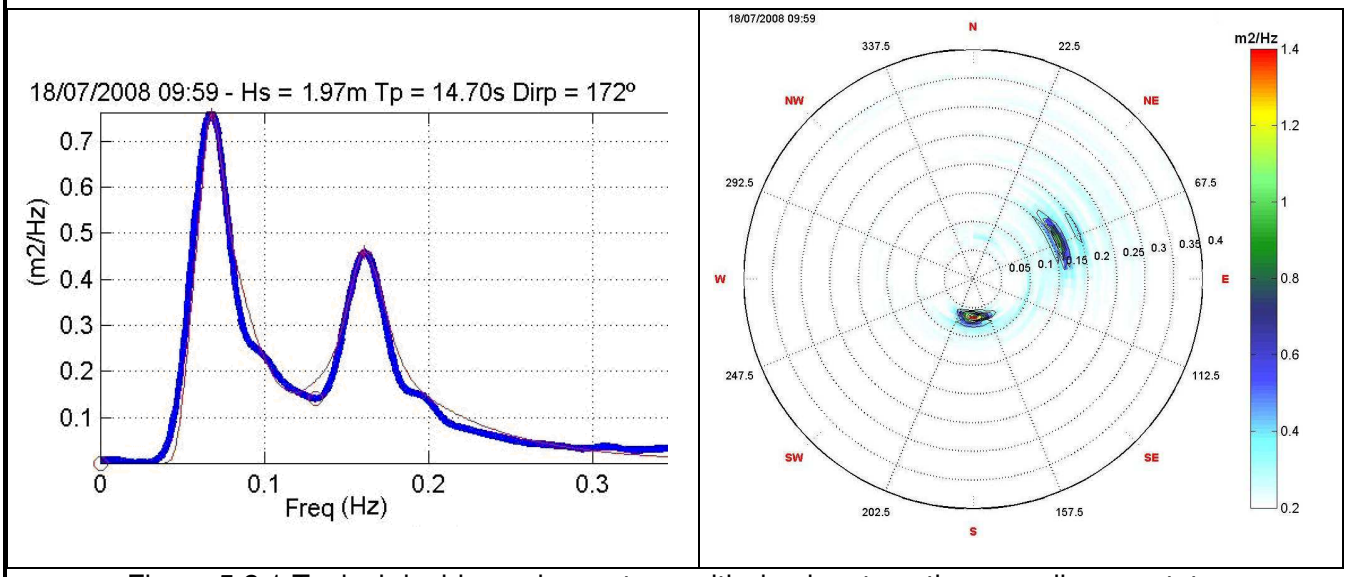

Figure 5.2.1 Typical double peak spectrum with dominant southern swell wave state.

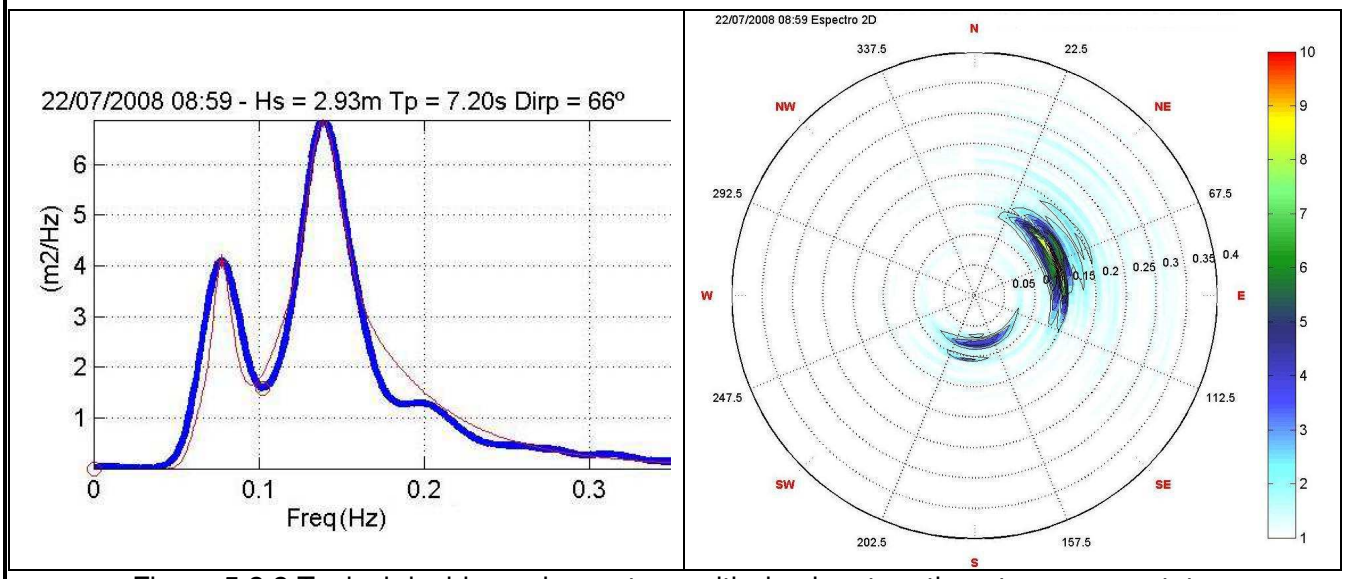

Figure 5.2.2 Typical double peak spectrum with dominant northeast sea wave state.

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It is presented below extreme curves of first spectral peak (Hs1, Tp1) and associated second spectral peak (Hs2, Tp2) for some double peak seastates where the directions of both primary and secondary components are separated by a right angle (90^0). These are situations that can affect motion of units that may be aligned with one of these directions. It is only possible to calculate double-peak curves that have directions associated with existing meteorological and oceanographic local conditions. Thus, it is not possible to calculate curves for sixteen directions as it is done for single peak extreme seastates.

5.2.1 Double Peak Extreme Hs x Tp curves for Primary N Direction and Secondary E Direction

Return Period (Years)	Tp1 (s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
1	Hs1 (m)	0.0	0.0	1.6	1.9	2.3	2.5	2.8	2.9	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	0.0	0.0	0.7	0.8	0.9	1.2	1.4	1.6	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	0.0	0.0	5.1	5.4	5.9	6.4	6.9	7.2	0.0	0.0	0.0	0.0	0.0
10	Hs1 (m)	0.0	1.4	1.7	2.1	2.4	2.7	3.0	3.2	3.4	0.0	0.0	0.0	0.0
	Hs2 (m)	0.0	0.6	0.7	0.8	1.0	1.2	1.3	1.6	1.8	0.0	0.0	0.0	0.0
	Tp2 (s)	0.0	4.9	5.2	5.6	6.0	6.4	6.7	7.1	7.5	0.0	0.0	0.0	0.0
20	Hs1 (m)	0.0	1.4	1.8	2.1	2.4	2.8	3.1	3.3	3.5	3.5	0.0	0.0	0.0
	Hs2 (m)	0.0	0.6	0.7	0.9	1.0	1.2	1.4	1.5	1.8	1.9	0.0	0.0	0.0
	Tp2 (s)	0.0	4.9	5.3	5.6	6.0	6.4	6.8	7.1	7.5	7.6	0.0	0.0	0.0
30	Hs1 (m)	0.0	1.4	1.8	2.1	2.5	2.8	3.1	3.3	3.5	3.6	0.0	0.0	0.0
	Hs2 (m)	0.0	0.6	0.7	0.9	1.0	1.2	1.3	1.5	1.7	1.9	0.0	0.0	0.0
	Tp2 (s)	0.0	4.9	5.3	5.7	6.0	6.4	6.8	7.1	7.4	7.6	0.0	0.0	0.0
50	Hs1 (m)	1.0	1.5	1.9	2.2	2.5	2.8	3.1	3.4	3.6	3.7	0.0	0.0	0.0
	Hs2 (m)	0.6	0.6	0.7	0.9	1.0	1.2	1.4	1.5	1.7	1.9	0.0	0.0	0.0
	Tp2 (s)	4.8	5.0	5.3	5.7	6.1	6.4	6.8	7.1	7.4	7.7	0.0	0.0	0.0
100	Hs1 (m)	1.1	1.5	1.9	2.2	2.6	2.9	3.1	3.4	3.6	3.8	3.8	0.0	0.0
	Hs2 (m)	0.6	0.6	0.7	0.9	1.0	1.2	1.3	1.5	1.7	1.9	2.0	0.0	0.0
	Tp2 (s)	4.7	5.0	5.3	5.7	6.1	6.4	6.8	7.1	7.4	7.6	7.7	0.0	0.0
1000	Hs1 (m)	1.3	1.6	2.0	2.3	2.6	2.9	3.3	3.5	3.8	4.0	4.2	4.2	0.0
	Hs2 (m)	0.6	0.7	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.9	2.1	2.1	0.0
	Tp2 (s)	4.8	5.1	5.5	5.8	6.2	6.5	6.8	7.1	7.3	7.6	7.8	7.8	0.0

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.2.2 Double Peak Extreme Hs x Tp curves for Primary NE Direction and Secondary SE Direction

Return Period (Years)	Tp1 (s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
1	Hs1 (m)	0.0	2.1	2.7	3.1	3.3	3.5	3.7	3.8	3.9	4.0	4.0	3.9	3.7
	Hs2 (m)	0.0	0.7	0.8	0.9	1.0	1.1	1.2	1.4	1.5	1.7	1.8	1.6	1.3
	Tp2 (s)	0.0	7.1	7.2	7.4	7.6	7.8	8.1	8.3	8.5	8.8	8.9	8.6	8.2
10	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.8
	Hs2 (m)	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	1.9
	Tp2 (s)	7.3	7.4	7.6	7.7	7.9	8.1	8.2	8.3	8.5	8.7	8.8	9.0	9.0
20	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.3	4.5	4.6	4.7	4.8	4.9	4.9	5.0
	Hs2 (m)	0.8	0.9	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
	Tp2 (s)	7.4	7.5	7.6	7.8	8.0	8.1	8.2	8.4	8.5	8.7	8.8	8.9	9.1
30	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.4	4.6	4.7	4.8	4.9	5.0	5.0	5.1
	Hs2 (m)	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.8	1.9
	Tp2 (s)	7.4	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.5	8.7	8.8	8.9	9.1
50	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	4.6	4.8	4.9	5.0	5.1	5.2	5.2
	Hs2 (m)	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.5	1.6	1.7	1.8	1.9
	Tp2 (s)	7.5	7.6	7.7	7.9	8.0	8.1	8.3	8.4	8.5	8.7	8.8	8.9	9.1
100	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	4.8	4.9	5.1	5.2	5.3	5.3	5.4
	Hs2 (m)	0.9	1.0	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9
	Tp2 (s)	7.5	7.7	7.8	7.9	8.0	8.2	8.3	8.4	8.6	8.7	8.8	8.9	9.1
1000	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.3	5.5	5.6	5.7	5.8	5.8
	Hs2 (m)	1.0	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.7	1.8	1.9
	Tp2 (s)	7.7	7.8	7.9	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	9.0	9.0

Return Period (Years)	Tp1 (s)	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5
1	Hs1 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs1 (m)	4.7	4.6	4.4	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.7	1.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	8.9	8.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs1 (m)	4.9	4.9	4.8	4.4	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.8	1.7	1.6	1.3	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	9.0	8.8	8.6	8.2	0.0	0.0	0.0	0.0	0.0
30	Hs1 (m)	5.1	5.0	4.9	4.7	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.9	1.8	1.6	1.4	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	9.1	8.9	8.7	8.4	0.0	0.0	0.0	0.0	0.0
50	Hs1 (m)	5.2	5.2	5.1	5.0	4.6	0.0	0.0	0.0	0.0
	Hs2 (m)	1.9	1.8	1.7	1.6	1.4	0.0	0.0	0.0	0.0
	Tp2 (s)	9.1	9.0	8.8	8.6	8.3	0.0	0.0	0.0	0.0
100	Hs1 (m)	5.4	5.4	5.3	5.2	5.0	4.5	0.0	0.0	0.0
	Hs2 (m)	2.0	1.9	1.8	1.7	1.5	1.2	0.0	0.0	0.0
	Tp2 (s)	9.2	9.1	8.9	8.7	8.5	8.1	0.0	0.0	0.0
1000	Hs1 (m)	5.9	5.9	5.9	5.9	5.8	5.7	5.4	4.9	0.0
	Hs2 (m)	2.0	2.0	2.0	1.9	1.8	1.7	1.6	1.3	0.0
	Tp2 (s)	9.1	9.2	9.2	9.1	9.0	8.8	8.6	8.2	0.0

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.2.3 Double Peak Extreme Hs x Tp curves for Primary E Direction and Secondary S Direction

Return Period (Years)	Tp1 (s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
1	Hs1 (m)	0.0	0.0	0.0	2.1	2.6	2.9	3.1	3.3	3.5	3.6	3.6	3.6	3.4
	Hs2 (m)	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.6	0.8	1.0	1.2	1.0	0.7
	Tp2 (s)	0.0	0.0	0.0	5.4	5.8	6.1	6.6	7.1	7.7	8.2	8.7	8.1	7.2
10	Hs1 (m)	0.0	2.1	2.7	3.0	3.3	3.6	3.9	4.1	4.3	4.4	4.5	4.6	4.6
	Hs2 (m)	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.1	1.3	1.3
	Tp2 (s)	0.0	5.5	5.8	6.0	6.3	6.7	7.1	7.4	7.8	8.2	8.6	9.0	9.0
20	Hs1 (m)	1.7	2.1	2.7	3.2	3.5	3.9	4.1	4.3	4.5	4.7	4.8	4.8	4.9
	Hs2 (m)	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.0	1.2	1.3	1.3
	Tp2 (s)	5.4	5.6	5.9	6.2	6.4	6.8	7.1	7.5	7.9	8.3	8.6	9.0	9.2
30	Hs1 (m)	1.7	2.1	2.7	3.2	3.7	4.0	4.2	4.5	4.6	4.8	4.9	5.0	5.0
	Hs2 (m)	0.1	0.1	0.2	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.4
	Tp2 (s)	5.5	5.7	6.0	6.3	6.5	6.9	7.2	7.6	7.8	8.2	8.6	9.0	9.3
50	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.1	4.4	4.5	4.8	4.9	5.1	5.1	5.2
	Hs2 (m)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.3	1.4
	Tp2 (s)	5.6	5.8	6.0	6.4	6.6	6.9	7.2	7.5	7.9	8.3	8.7	8.9	9.5
100	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.3	4.5	4.7	5.0	5.1	5.3	5.4	5.4
	Hs2 (m)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.0	1.2	1.3	1.4
	Tp2 (s)	5.7	5.9	6.2	6.4	6.7	7.1	7.3	7.6	8.0	8.3	8.7	9.0	9.4
1000	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.3	5.5	5.7	5.9	6.0	6.1
	Hs2 (m)	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
	Tp2 (s)	6.0	6.2	6.5	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.7	9.0	9.4

Return Period (Years)	Tp1 (s)	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0
1	Hs1 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs1 (m)	4.5	4.4	3.9	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.1	0.9	0.6	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	8.6	8.0	7.0	0.0	0.0	0.0	0.0	0.0
20	Hs1 (m)	4.8	4.7	4.5	3.5	0.0	0.0	0.0	0.0
	Hs2 (m)	1.3	1.1	0.9	0.4	0.0	0.0	0.0	0.0
	Tp2 (s)	9.0	8.4	7.8	6.4	0.0	0.0	0.0	0.0
30	Hs1 (m)	5.0	4.9	4.7	4.2	0.0	0.0	0.0	0.0
	Hs2 (m)	1.3	1.2	1.0	0.7	0.0	0.0	0.0	0.0
	Tp2 (s)	9.1	8.7	8.0	7.2	0.0	0.0	0.0	0.0
50	Hs1 (m)	5.2	5.1	5.0	4.7	0.0	0.0	0.0	0.0
	Hs2 (m)	1.4	1.3	1.1	0.9	0.0	0.0	0.0	0.0
	Tp2 (s)	9.5	8.9	8.4	7.7	0.0	0.0	0.0	0.0
100	Hs1 (m)	5.4	5.4	5.3	5.1	4.5	0.0	0.0	0.0
	Hs2 (m)	1.4	1.4	1.2	1.0	0.7	0.0	0.0	0.0
	Tp2 (s)	9.5	9.3	8.8	8.2	7.3	0.0	0.0	0.0
1000	Hs1 (m)	6.2	6.2	6.2	6.1	5.9	5.6	4.9	0.0
	Hs2 (m)	1.5	1.6	1.5	1.4	1.2	1.0	0.7	0.0
	Tp2 (s)	9.7	9.9	9.7	9.3	8.9	8.3	7.4	0.0

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.2.4 Double Peak Extreme Hs x Tp curves for Primary SE Direction and Secondary NE Direction

Return Period (Years)	Tp1 (s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5
1	Hs1 (m)	0.0	0.0	0.0	0.0	0.0	1.8	2.0	2.2	2.3	2.4	2.6	2.6	2.7	2.8
	Hs2 (m)	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2
	Tp2 (s)	0.0	0.0	0.0	0.0	0.0	6.2	6.4	6.7	6.9	7.2	7.4	7.6	7.9	8.1
10	Hs1 (m)	0.0	1.6	1.9	2.1	2.3	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.3	3.4
	Hs2 (m)	0.0	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.0	1.1	1.3	1.4	1.5
	Tp2 (s)	0.0	6.0	6.3	6.5	6.8	7.0	7.2	7.4	7.6	7.7	7.9	8.1	8.3	8.4
20	Hs1 (m)	1.6	1.9	2.1	2.3	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5
	Hs2 (m)	0.2	0.3	0.4	0.5	0.7	0.7	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.5
	Tp2 (s)	6.0	6.3	6.5	6.7	7.0	7.2	7.4	7.6	7.7	7.9	8.1	8.2	8.4	8.5
30	Hs1 (m)	1.7	2.0	2.2	2.4	2.6	2.7	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6
	Hs2 (m)	0.2	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.5
	Tp2 (s)	6.2	6.4	6.7	6.9	7.1	7.3	7.5	7.6	7.8	7.9	8.1	8.3	8.4	8.5
50	Hs1 (m)	1.7	2.1	2.3	2.5	2.7	2.8	2.9	3.1	3.2	3.3	3.4	3.5	3.6	3.7
	Hs2 (m)	0.3	0.4	0.5	0.7	0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6
	Tp2 (s)	6.3	6.5	6.8	7.0	7.2	7.4	7.5	7.7	7.9	8.1	8.2	8.3	8.5	8.6
100	Hs1 (m)	1.7	2.1	2.5	2.7	2.8	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8
	Hs2 (m)	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.6
	Tp2 (s)	6.5	6.8	7.0	7.2	7.3	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.5	8.7
1000	Hs1 (m)	1.7	2.1	2.7	3.0	3.2	3.3	3.4	3.6	3.7	3.8	3.9	4.0	4.1	4.2
	Hs2 (m)	0.7	0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.5	1.6	1.7	1.8
	Tp2 (s)	7.0	7.2	7.4	7.6	7.7	7.9	8.0	8.2	8.3	8.5	8.5	8.7	8.8	8.9

Return Period (Years)	Tp1 (s)	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5
1	Hs1 (m)	2.8	2.9	2.9	2.9	2.9	2.8	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.4	1.5	1.6	1.6	1.4	1.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	8.3	8.4	8.7	8.7	8.4	8.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs1 (m)	3.4	3.5	3.5	3.5	3.5	3.6	3.5	3.5	3.4	3.3	3.1	0.0	0.0	0.0
	Hs2 (m)	1.5	1.6	1.7	1.8	1.9	1.9	1.8	1.7	1.6	1.4	1.2	0.0	0.0	0.0
	Tp2 (s)	8.5	8.7	8.8	8.9	9.0	9.1	8.9	8.8	8.6	8.4	8.0	0.0	0.0	0.0
20	Hs1 (m)	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.5	3.3	0.0	0.0
	Hs2 (m)	1.6	1.7	1.8	1.8	1.9	2.0	2.0	1.9	1.8	1.7	1.5	1.3	0.0	0.0
	Tp2 (s)	8.6	8.7	8.9	9.0	9.1	9.2	9.2	9.0	8.9	8.7	8.5	8.1	0.0	0.0
30	Hs1 (m)	3.6	3.7	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.6	3.5	3.2	0.0
	Hs2 (m)	1.6	1.7	1.8	1.9	1.9	2.0	2.0	1.9	1.9	1.7	1.6	1.4	1.2	0.0
	Tp2 (s)	8.6	8.8	8.9	9.0	9.1	9.2	9.2	9.1	9.0	8.8	8.6	8.4	7.9	0.0
50	Hs1 (m)	3.7	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.7	3.5	3.1
	Hs2 (m)	1.6	1.7	1.8	1.9	2.0	2.0	2.0	2.0	2.0	1.8	1.7	1.6	1.4	1.1
	Tp2 (s)	8.7	8.8	9.0	9.0	9.1	9.3	9.3	9.3	9.1	9.0	8.8	8.7	8.3	7.8
100	Hs1 (m)	3.9	3.9	4.0	4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.0	3.9	3.8	3.6
	Hs2 (m)	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.2	2.1	2.0	1.9	1.8	1.6	1.4
	Tp2 (s)	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.4	9.3	9.2	9.1	8.9	8.7	8.4
1000	Hs1 (m)	4.2	4.3	4.4	4.4	4.5	4.5	4.5	4.6	4.6	4.6	4.5	4.5	4.5	4.4
	Hs2 (m)	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.1	2.0
	Tp2 (s)	9.0	9.1	9.2	9.3	9.3	9.4	9.5	9.6	9.6	9.6	9.5	9.5	9.3	9.2

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.2.5 Double Peak Extreme Hs x Tp curves for Primary SE Direction and Secondary SW Direction

Return Period (Years)	Tp1 (s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
1	Hs1 (m)	0.0	0.0	0.0	0.0	2.1	2.5	2.7	2.8	2.9	3.0	3.1	3.2	3.2
	Hs2 (m)	0.0	0.0	0.0	0.0	0.6	0.8	0.9	1.1	1.2	1.3	1.5	1.6	1.7
	Tp2 (s)	0.0	0.0	0.0	0.0	4.7	5.4	6.0	6.4	6.9	7.2	7.6	8.0	8.3
10	Hs1 (m)	1.7	2.1	2.7	3.1	3.3	3.4	3.6	3.7	3.7	3.8	3.9	3.9	4.0
	Hs2 (m)	0.7	0.9	1.0	1.1	1.2	1.4	1.5	1.6	1.6	1.7	1.8	1.9	2.0
	Tp2 (s)	5.1	5.7	6.1	6.6	6.9	7.3	7.6	7.8	8.0	8.3	8.5	8.7	8.8
20	Hs1 (m)	1.7	2.1	2.7	3.2	3.5	3.6	3.8	3.9	3.9	4.0	4.1	4.1	4.2
	Hs2 (m)	0.9	1.0	1.1	1.2	1.4	1.4	1.6	1.7	1.7	1.8	1.9	2.0	2.0
	Tp2 (s)	5.7	6.2	6.6	6.9	7.3	7.5	7.8	8.1	8.3	8.5	8.7	8.9	9.0
30	Hs1 (m)	1.7	2.1	2.7	3.2	3.7	3.8	3.9	4.0	4.1	4.1	4.2	4.2	4.3
	Hs2 (m)	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.9	2.0	2.1
	Tp2 (s)	6.1	6.4	6.9	7.2	7.5	7.7	8.0	8.2	8.4	8.6	8.7	8.9	9.1
50	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	3.9	4.0	4.1	4.2	4.2	4.3	4.4	4.4
	Hs2 (m)	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.1
	Tp2 (s)	6.4	6.7	7.1	7.4	7.7	7.9	8.2	8.4	8.5	8.7	8.9	9.0	9.1
100	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.1	4.2	4.3	4.4	4.4	4.5	4.5	4.6
	Hs2 (m)	1.2	1.3	1.4	1.5	1.6	1.7	1.7	1.9	1.9	2.0	2.1	2.1	2.2
	Tp2 (s)	6.7	7.1	7.4	7.6	7.9	8.1	8.3	8.6	8.7	8.9	9.0	9.1	9.3
1000	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	4.7	4.8	4.9	4.9	5.0	5.0	5.1
	Hs2 (m)	1.5	1.6	1.7	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4
	Tp2 (s)	7.6	8.0	8.2	8.4	8.6	8.7	8.8	9.0	9.1	9.3	9.4	9.5	9.6

Return Period (Years)	Tp1 (s)	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0
1	Hs1 (m)	3.3	3.3	3.3	3.2	3.2	3.1	3.0	2.8	2.6	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.8	1.9	1.8	1.7	1.6	1.4	1.3	1.1	0.9	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	8.5	8.7	8.5	8.2	7.9	7.5	7.1	6.5	5.8	0.0	0.0	0.0	0.0	0.0
10	Hs1 (m)	4.0	4.0	4.0	4.0	4.0	3.9	3.9	3.8	3.7	3.6	3.5	3.3	3.0	2.6
	Hs2 (m)	2.1	2.1	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.1	0.8
	Tp2 (s)	9.0	9.1	9.2	9.1	8.9	8.7	8.5	8.3	8.0	7.8	7.4	7.0	6.3	5.5
20	Hs1 (m)	4.2	4.2	4.2	4.2	4.2	4.2	4.1	4.0	4.0	3.9	3.8	3.6	3.4	3.1
	Hs2 (m)	2.1	2.2	2.2	2.2	2.1	2.0	2.0	1.9	1.8	1.7	1.6	1.4	1.3	1.1
	Tp2 (s)	9.1	9.4	9.4	9.4	9.1	9.0	8.8	8.6	8.3	8.1	7.8	7.4	7.0	6.5
30	Hs1 (m)	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.1	4.0	3.9	3.8	3.6	3.3
	Hs2 (m)	2.1	2.2	2.3	2.2	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.2
	Tp2 (s)	9.2	9.3	9.4	9.3	9.2	9.1	8.9	8.7	8.5	8.3	8.0	7.7	7.4	6.9
50	Hs1 (m)	4.4	4.4	4.5	4.4	4.4	4.4	4.4	4.3	4.2	4.2	4.1	3.9	3.8	3.6
	Hs2 (m)	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4
	Tp2 (s)	9.3	9.4	9.5	9.4	9.3	9.2	9.0	8.9	8.7	8.5	8.3	8.0	7.7	7.3
100	Hs1 (m)	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.4	4.3	4.2	4.0	3.9
	Hs2 (m)	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.7	1.6	1.5
	Tp2 (s)	9.4	9.5	9.6	9.6	9.5	9.4	9.2	9.1	8.9	8.7	8.6	8.3	8.0	7.7
1000	Hs1 (m)	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0	5.0	5.0	4.9	4.8	4.7	4.6
	Hs2 (m)	2.4	2.5	2.6	2.6	2.5	2.5	2.4	2.3	2.3	2.2	2.2	2.1	2.0	1.9
	Tp2 (s)	9.7	9.8	9.9	9.9	9.8	9.8	9.7	9.5	9.5	9.4	9.2	9.0	8.8	8.7

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Return Period (Years)	Tp1(s)	17.5	18.0	18.5	19.0	19.5	20.0
1	Hs1(m)	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2(m)	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2(s)	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs1(m)	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2(m)	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2(s)	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs1(m)	2.7	0.0	0.0	0.0	0.0	0.0
	Hs2(m)	0.9	0.0	0.0	0.0	0.0	0.0
	Tp2(s)	5.7	0.0	0.0	0.0	0.0	0.0
30	Hs1(m)	3.1	2.4	0.0	0.0	0.0	0.0
	Hs2(m)	1.0	0.7	0.0	0.0	0.0	0.0
	Tp2(s)	6.3	5.0	0.0	0.0	0.0	0.0
50	Hs1(m)	3.4	3.0	0.0	0.0	0.0	0.0
	Hs2(m)	1.2	1.0	0.0	0.0	0.0	0.0
	Tp2(s)	6.8	6.1	0.0	0.0	0.0	0.0
100	Hs1(m)	3.6	3.4	3.1	0.0	0.0	0.0
	Hs2(m)	1.4	1.2	1.0	0.0	0.0	0.0
	Tp2(s)	7.3	6.8	6.2	0.0	0.0	0.0
1000	Hs1(m)	4.5	4.3	4.1	3.9	3.6	3.2
	Hs2(m)	1.8	1.7	1.6	1.4	1.3	1.1
	Tp2(s)	8.5	8.2	7.9	7.5	7.0	6.4

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.2.6 Double Peak Extreme Hs x Tp curves for Primary S Direction and Secondary E Direction

Return Period (Years)	Tp1 (s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
1	Hs1 (m)	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.6	2.8	3.0	3.1	3.2	3.3
	Hs2 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.7	0.8	0.9	1.0	1.1	1.2
	Tp2 (s)	0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.2	5.4	5.7	5.9	6.1	6.4
10	Hs1 (m)	0.0	2.1	2.4	2.7	2.9	3.1	3.2	3.4	3.5	3.6	3.7	3.8	3.9
	Hs2 (m)	0.0	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3
	Tp2 (s)	0.0	4.7	5.0	5.2	5.4	5.7	5.8	6.0	6.2	6.3	6.5	6.6	6.7
20	Hs1 (m)	1.7	2.1	2.7	2.9	3.1	3.2	3.4	3.5	3.7	3.8	3.9	4.0	4.1
	Hs2 (m)	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4
	Tp2 (s)	4.7	5.0	5.2	5.4	5.6	5.8	6.0	6.1	6.3	6.4	6.6	6.7	6.9
30	Hs1 (m)	1.7	2.1	2.7	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.0	4.1	4.2
	Hs2 (m)	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.4	1.4
	Tp2 (s)	4.9	5.1	5.4	5.5	5.7	5.9	6.1	6.2	6.4	6.5	6.6	6.8	6.9
50	Hs1 (m)	1.7	2.1	2.7	3.2	3.3	3.5	3.6	3.7	3.8	4.0	4.1	4.2	4.3
	Hs2 (m)	0.7	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.4
	Tp2 (s)	5.1	5.3	5.5	5.7	5.9	6.0	6.2	6.3	6.4	6.6	6.7	6.8	6.9
100	Hs1 (m)	1.7	2.1	2.7	3.2	3.5	3.6	3.8	3.9	4.0	4.1	4.2	4.3	4.4
	Hs2 (m)	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.4	1.4	1.5
	Tp2 (s)	5.3	5.5	5.7	5.9	6.0	6.1	6.3	6.4	6.6	6.7	6.8	6.9	7.0
1000	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
	Hs2 (m)	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6
	Tp2 (s)	5.8	6.0	6.1	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2

Return Period (Years)	Tp1 (s)	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0
1	Hs1 (m)	3.4	3.5	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.4	0.0	0.0	0.0
	Hs2 (m)	1.3	1.3	1.4	1.5	1.6	1.7	1.7	1.9	2.0	2.1	2.2	0.0	0.0	0.0
	Tp2 (s)	6.6	6.7	6.9	7.1	7.2	7.4	7.4	7.6	7.7	7.8	7.9	0.0	0.0	0.0
10	Hs1 (m)	4.0	4.1	4.1	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.1
	Hs2 (m)	1.4	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.9	1.9	1.8	1.7	1.6	1.5
	Tp2 (s)	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.6	7.6	7.5	7.4	7.2	7.0
20	Hs1 (m)	4.2	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.3
	Hs2 (m)	1.5	1.5	1.6	1.6	1.7	1.8	1.8	1.9	2.0	2.0	1.9	1.8	1.7	1.6
	Tp2 (s)	7.0	7.1	7.2	7.3	7.3	7.5	7.5	7.6	7.7	7.7	7.6	7.5	7.4	7.3
30	Hs1 (m)	4.2	4.3	4.4	4.4	4.5	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5
	Hs2 (m)	1.5	1.5	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.0	1.9	1.9	1.8	1.7
	Tp2 (s)	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.6	7.7	7.7	7.6	7.6	7.5	7.3
50	Hs1 (m)	4.3	4.4	4.5	4.5	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.6
	Hs2 (m)	1.5	1.6	1.6	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.8
	Tp2 (s)	7.1	7.1	7.2	7.3	7.4	7.5	7.6	7.6	7.7	7.7	7.7	7.7	7.6	7.5
100	Hs1 (m)	4.5	4.5	4.6	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
	Hs2 (m)	1.5	1.6	1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.1	2.1	2.0	2.0	1.9
	Tp2 (s)	7.1	7.2	7.3	7.4	7.4	7.5	7.6	7.6	7.7	7.8	7.8	7.7	7.7	7.6
1000	Hs1 (m)	4.9	4.9	5.0	5.1	5.1	5.1	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.3
	Hs2 (m)	1.7	1.7	1.8	1.8	1.8	1.9	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.1
	Tp2 (s)	7.3	7.3	7.4	7.5	7.5	7.6	7.7	7.7	7.8	7.8	7.9	7.9	7.9	7.8

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Return Period (Years)	Tp1 (s)	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5
1	Hs1 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs1 (m)	3.9	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	6.8	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs1 (m)	4.2	4.1	3.8	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.5	1.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	7.1	6.9	6.5	0.0	0.0	0.0	0.0	0.0	0.0
30	Hs1 (m)	4.4	4.3	4.1	3.8	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.6	1.5	1.4	1.2	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	7.2	7.0	6.8	6.4	0.0	0.0	0.0	0.0	0.0
50	Hs1 (m)	4.5	4.5	4.3	4.1	3.7	0.0	0.0	0.0	0.0
	Hs2 (m)	1.7	1.6	1.5	1.4	1.1	0.0	0.0	0.0	0.0
	Tp2 (s)	7.4	7.2	7.1	6.8	6.3	0.0	0.0	0.0	0.0
100	Hs1 (m)	4.7	4.7	4.6	4.4	4.2	3.8	0.0	0.0	0.0
	Hs2 (m)	1.8	1.7	1.6	1.5	1.4	1.2	0.0	0.0	0.0
	Tp2 (s)	7.5	7.4	7.2	7.1	6.8	6.4	0.0	0.0	0.0
1000	Hs1 (m)	5.2	5.2	5.2	5.1	5.0	4.9	4.7	4.5	4.2
	Hs2 (m)	2.0	2.0	1.9	1.8	1.8	1.7	1.6	1.4	1.3
	Tp2 (s)	7.8	7.7	7.6	7.5	7.5	7.3	7.2	6.9	6.6

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

5.2.7 Double Peak Wave Extreme Hs x Tp curves for Primary SW Direction and Secondary SE Direction

Return Period (Years)	Tp1 (s)	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
1	Hs1 (m)	0.0	0.0	0.0	2.3	2.8	3.1	3.3	3.6	3.8	4.0	4.2	4.4	4.5
	Hs2 (m)	0.0	0.0	0.0	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6
	Tp2 (s)	0.0	0.0	0.0	7.1	7.3	7.5	7.6	7.8	8.0	8.1	8.3	8.4	8.6
10	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.4	4.6	4.8	5.1	5.3	5.5	5.7	5.8
	Hs2 (m)	0.8	0.9	1.0	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.8
	Tp2 (s)	7.4	7.5	7.7	7.8	7.9	8.1	8.2	8.3	8.5	8.6	8.7	8.8	8.9
20	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	5.0	5.2	5.4	5.6	5.8	6.0	6.2
	Hs2 (m)	0.9	1.0	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9
	Tp2 (s)	7.5	7.7	7.8	7.9	8.1	8.2	8.3	8.5	8.6	8.7	8.8	8.9	9.0
30	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	5.1	5.4	5.6	5.8	6.0	6.3	6.4
	Hs2 (m)	1.0	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.7	1.8	1.9
	Tp2 (s)	7.6	7.7	7.9	8.0	8.1	8.3	8.4	8.5	8.6	8.7	8.8	9.0	9.0
50	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.6	5.8	6.1	6.3	6.4	6.6
	Hs2 (m)	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.7	1.8	1.8	1.9
	Tp2 (s)	7.7	7.9	8.0	8.1	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1
100	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.1	6.4	6.6	6.8	7.0
	Hs2 (m)	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	1.9	2.0
	Tp2 (s)	7.9	8.0	8.1	8.2	8.4	8.4	8.6	8.7	8.8	8.9	9.0	9.1	9.2
1000	Hs1 (m)	1.7	2.1	2.7	3.2	3.8	4.5	5.2	6.0	6.8	7.4	7.5	7.8	8.0
	Hs2 (m)	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.8	1.9	2.0	2.0	2.1	2.2
	Tp2 (s)	8.2	8.4	8.4	8.6	8.7	8.8	8.9	8.9	9.0	9.1	9.2	9.3	9.4

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Return Period (Years)	Tp1 (s)	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0
1	Hs1 (m)	4.6	4.7	4.8	4.8	4.8	4.8	4.7	4.5	4.2	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.7	1.7	1.9	2.0	2.0	1.9	1.7	1.6	1.4	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	8.7	8.9	9.0	9.1	9.1	9.0	8.9	8.6	8.3	0.0	0.0	0.0	0.0	0.0
10	Hs1 (m)	6.0	6.2	6.3	6.4	6.5	6.6	6.6	6.6	6.6	6.6	6.5	6.3	6.0	5.6
	Hs2 (m)	1.8	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.3	2.2	2.1	2.0	1.9	1.7
	Tp2 (s)	9.0	9.1	9.2	9.3	9.4	9.5	9.5	9.6	9.5	9.5	9.4	9.2	9.0	8.7
20	Hs1 (m)	6.4	6.5	6.7	6.8	6.9	7.0	7.0	7.1	7.1	7.1	7.0	7.0	6.8	6.5
	Hs2 (m)	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.1	2.0
	Tp2 (s)	9.1	9.2	9.3	9.4	9.4	9.5	9.6	9.6	9.7	9.7	9.6	9.5	9.4	9.2
30	Hs1 (m)	6.5	6.7	6.9	7.0	7.1	7.2	7.3	7.4	7.4	7.4	7.4	7.3	7.2	7.0
	Hs2 (m)	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.4	2.3	2.3	2.1
	Tp2 (s)	9.1	9.2	9.3	9.4	9.5	9.5	9.6	9.7	9.7	9.8	9.7	9.6	9.5	9.4
50	Hs1 (m)	6.8	7.0	7.1	7.3	7.4	7.5	7.6	7.7	7.7	7.8	7.8	7.7	7.7	7.5
	Hs2 (m)	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.3
	Tp2 (s)	9.2	9.3	9.3	9.4	9.5	9.6	9.7	9.7	9.8	9.8	9.8	9.8	9.7	9.6
100	Hs1 (m)	7.1	7.3	7.5	7.6	7.8	7.9	8.0	8.1	8.2	8.2	8.2	8.2	8.2	8.1
	Hs2 (m)	2.0	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.5
	Tp2 (s)	9.2	9.3	9.4	9.5	9.6	9.6	9.7	9.7	9.8	9.9	9.9	9.9	9.9	9.8
1000	Hs1 (m)	8.2	8.4	8.6	8.7	9.0	9.1	9.2	9.3	9.4	9.6	9.6	9.7	9.8	9.8
	Hs2 (m)	2.2	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.7	2.8	2.8	2.9	2.9	2.9
	Tp2 (s)	9.5	9.5	9.6	9.7	9.8	9.8	9.9	9.9	10.0	10.0	10.1	10.1	10.2	10.2

Return Period (Years)	Tp1 (s)	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0
1	Hs1 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Hs1 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Hs1 (m)	6.1	5.3	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	1.8	1.5	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	8.9	8.5	0.0	0.0	0.0	0.0	0.0	0.0
30	Hs1 (m)	6.7	6.3	0.0	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	2.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	9.2	9.0	0.0	0.0	0.0	0.0	0.0	0.0
50	Hs1 (m)	7.3	7.0	6.5	0.0	0.0	0.0	0.0	0.0
	Hs2 (m)	2.2	2.1	1.9	0.0	0.0	0.0	0.0	0.0
	Tp2 (s)	9.5	9.3	9.0	0.0	0.0	0.0	0.0	0.0
100	Hs1 (m)	8.0	7.8	7.5	7.0	5.8	0.0	0.0	0.0
	Hs2 (m)	2.4	2.3	2.2	2.0	1.6	0.0	0.0	0.0
	Tp2 (s)	9.7	9.6	9.4	9.2	8.6	0.0	0.0	0.0
1000	Hs1 (m)	9.8	9.7	9.7	9.6	9.3	9.1	8.7	8.0
	Hs2 (m)	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1
	Tp2 (s)	10.3	10.3	10.3	10.3	10.4	10.4	10.4	10.3

Source: Modeled wave data – JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.3 JONSWAP Wave Spectrum for Santos/Campos Basins and Relation TZ / TP

The JONSWAP Wave Spectrum, adjusted for Santos/Campos Basins wave conditions, is:

$$S(f) = \frac{5}{16} * Hs^2 * Tp * \left(f_p / f\right)^5 * (1 - 0.287 * \ln\gamma) * \exp\left[-1{,}25 * \left(\frac{f}{f_p}\right)^{-4}\right] * \gamma^{\exp\left[-(f-f_p)^2 / (2*\sigma^2 * f_p^2)\right]}$$

$$\sigma = \begin{cases} \sigma a = 0{,}07, \text{ for } & f \le f_p \\ \sigma b = 0{,}09, \text{ for } & f > f_p \end{cases}$$

where: α - form parameter or Phillips constant

f - frequency (Hz)

f_p - peak frequency (Hz)

γ - peakedness parameter or peak enhancement factor

σ - shape parameter or peak width

The gamma parameter is adjusted by the expression below:

$$\gamma = 6.4 \times \mathrm{Tp}^{(-0.491)}$$

Relation between Tz and Tp.

Mean Zero-crossing period : $T_z = \frac{1}{f_p}\sqrt{\frac{5+\gamma}{10.89+\gamma}}$ or $T_z = T_p\sqrt{\frac{5+\gamma}{10.89+\gamma}}$

where: $f_p = \frac{1}{T_p}$ and T_p - peak period.

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5.4 Distribution of Total Significant Wave Heights and Wave Power

*5.4.1 Distribution of Total Significant Wave Heights and Primary Spectral Peak Directions**

Hs(m)		DIRECTION(º)																Freq	%	Mean Dir
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
0.0	0.5	0	0	0	1	1	1	0	2	3	0	0	0	0	0	0	0	8	0.01	145.6
0.5	1.0	19	51	266	342	146	135	93	104	138	143	49	6	5	4	3	8	1512	2	99.2
1.0	1.5	55	370	1622	2303	2314	1826	1303	784	577	505	105	26	8	11	9	24	11842	15.64	97
1.5	2.0	100	882	4137	4266	3161	3089	2799	2516	2291	1330	169	49	24	3	4	16	24836	32.8	103.3
2.0	2.5	68	840	3481	2557	1530	1404	1654	1965	2753	2367	348	85	27	15	8	19	19121	25.25	117.1
2.5	3.0	37	482	1722	1169	709	552	556	944	1519	1928	360	136	35	10	8	8	10175	13.44	131.9
3.0	3.5	22	170	721	428	288	212	211	365	651	1039	361	93	27	10	4	6	4608	6.09	149.2
3.5	4.0	3	41	222	134	101	108	90	115	229	555	199	53	10	4	3	0	1867	2.47	168.1
4.0	4.5	0	15	69	34	22	33	33	63	74	265	146	40	15	1	0	0	810	1.07	189.2
4.5	5.0	0	2	24	12	17	10	18	30	36	127	97	30	7	0	0	0	410	0.54	196.6
5.0	5.5	0	1	5	8	5	0	8	12	17	68	74	29	2	0	0	0	229	0.3	208.4
5.5	6.0	0	0	0	3	0	0	0	6	12	28	58	17	0	0	0	0	124	0.16	215
6.0	6.5	0	0	0	0	0	0	0	0	3	20	43	0	0	0	0	0	66	0.09	223.2
6.5	7.0	0	0	0	0	0	0	0	0	3	4	32	0	0	0	0	0	39	0.05	222.2
7.0	7.5	0	0	0	0	0	0	0	0	3	7	19	0	0	0	0	0	29	0.04	219
7.5	8.0	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	11	0.01	226.9
8.0	8.5	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	9	0.01	226.6
8.5	9.0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	10	0.01	231.4
9.0	9.5	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	4	0.01	227.2
9.5	10.0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	207.8
10.0	10.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
10.5	11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
Freq		304	2854	12269	11257	8294	7370	6765	6906	8309	8391	2091	564	160	58	39	81	75712		
%		0.4	3.77	16.2	14.87	10.95	9.73	8.94	9.12	10.97	11.08	2.76	0.74	0.21	0.08	0.05	0.11			
Mean Hs		1.98	2.12	2.1	1.94	1.86	1.87	1.95	2.12	2.28	2.58	3.28	3.13	2.8	2.33	2.19	1.85			

(*) The Total Significant Wave Height (Hst) is obtained as Hst=4*sqrt(m_0), where m_o is the integrated area of the total wave power spectrum (sea and swell partitions). The Primary Spectral Peak Direction is the approaching direction associated with the spectral peak period.

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11]. The wave data was tabulated at 3-hour intervals, providing information equivalent to 227136 hours (=75712 * 3 hours).

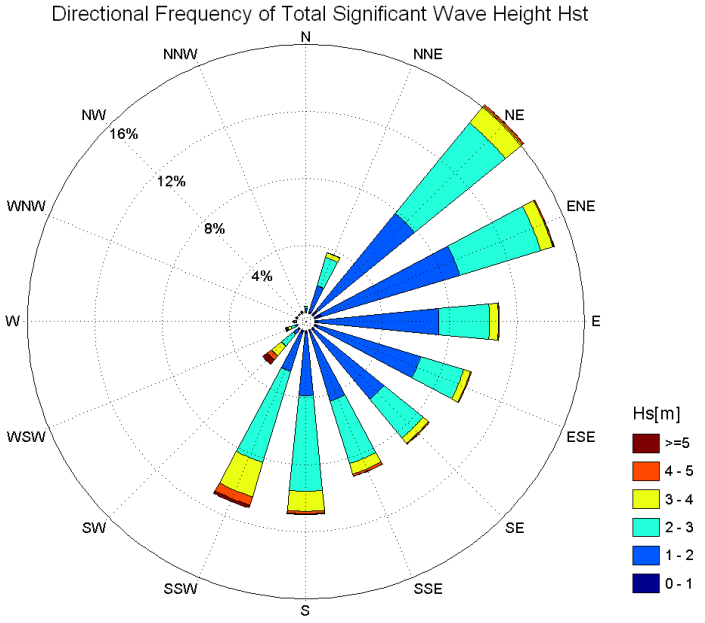

Figure 5.4.1.1 Directional percentage of Total Significant Wave Height

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5.4.2 Distribution of Total Significant Wave Heights and Primary Spectral Peak Periods*

Hs(m)		Tp(s) 3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	Freq	%	Mean Tp
0.0	0.5	1	0	0	1	2	2	1	0	0	0	0	1	0	0	0	0	0	0	8	0.01	8.24
0.5	1.0	107	113	205	256	273	159	112	74	68	50	41	38	12	4	0	0	0	0	1512	2	7.73
1.0	1.5	15	938	1115	1792	3608	2505	692	373	283	260	108	103	31	11	3	0	2	3	11842	15.64	7.7
1.5	2.0	1	349	3682	3524	4602	6028	2948	1626	993	534	251	174	69	26	18	8	1	2	24836	32.8	8.12
2.0	2.5	0	13	1265	4995	2430	2755	2041	1870	1806	982	523	284	105	32	10	8	2	0	19121	25.25	8.74
2.5	3.0	0	6	109	2114	2404	1040	858	798	879	1021	514	288	108	20	8	6	1	1	10175	13.44	9.27
3.0	3.5	0	1	4	403	1240	856	277	292	294	424	431	280	77	18	8	1	1	1	4608	6.09	9.82
3.5	4.0	0	0	0	43	268	550	189	91	140	141	139	209	75	16	5	1	0	0	1867	2.47	10.45
4.0	4.5	0	0	0	3	31	207	161	48	47	63	68	89	73	17	3	0	0	0	810	1.07	11.16
4.5	5.0	0	0	0	0	4	48	116	48	15	21	41	57	35	19	6	0	0	0	410	0.54	11.75
5.0	5.5	0	0	0	0	0	16	45	60	19	15	16	22	20	7	8	1	0	0	229	0.3	11.88
5.5	6.0	0	0	0	0	0	2	22	44	19	7	6	15	9	0	0	0	0	0	124	0.16	11.5
6.0	6.5	0	0	0	0	0	0	10	18	22	0	3	11	2	0	0	0	0	0	66	0.09	11.55
6.5	7.0	0	0	0	0	0	0	3	12	12	2	0	7	3	0	0	0	0	0	39	0.05	11.99
7.0	7.5	0	0	0	0	0	0	4	4	14	1	0	1	5	0	0	0	0	0	29	0.04	11.99
7.5	8.0	0	0	0	0	0	0	2	1	1	4	0	0	3	0	0	0	0	0	11	0.01	12.51
8.0	8.5	0	0	0	0	0	0	0	5	0	1	0	1	2	0	0	0	0	0	9	0.01	12.47
8.5	9.0	0	0	0	0	0	0	1	6	3	0	0	0	0	0	0	0	0	0	10	0.01	10.82
9.0	9.5	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	4	0.01	12.88
9.5	10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	16.95
10.0	10.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.5	11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		124	1420	6380	13131	14862	14168	7482	5371	4616	3527	2141	1580	629	173	69	25	7	7	75712		
%		0.16	1.88	8.43	17.34	19.63	18.71	9.88	7.09	6.1	4.66	2.83	2.09	0.83	0.23	0.09	0.03	0.01	0.01			
Mean Hs		0.86	1.35	1.75	2.07	2.03	2.04	2.2	2.31	2.38	2.49	2.69	2.9	3.14	3.12	3.05	2.43	2.07	1.96			

(*) The Total Significant Wave Height (Hst) is obtained as Hst=4*sqrt(m_0), where m_0 is the integrated area of the total wave power spectrum (sea and swell partitions). The Primary Spectral Peak is the period associated with maximum spectral energy.

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11]. The wave data was tabulated at 3-hour intervals, providing information equivalent to 227136 hours (=75712 * 3 hours).

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5.4.3 Directional Distribution of Wave Power

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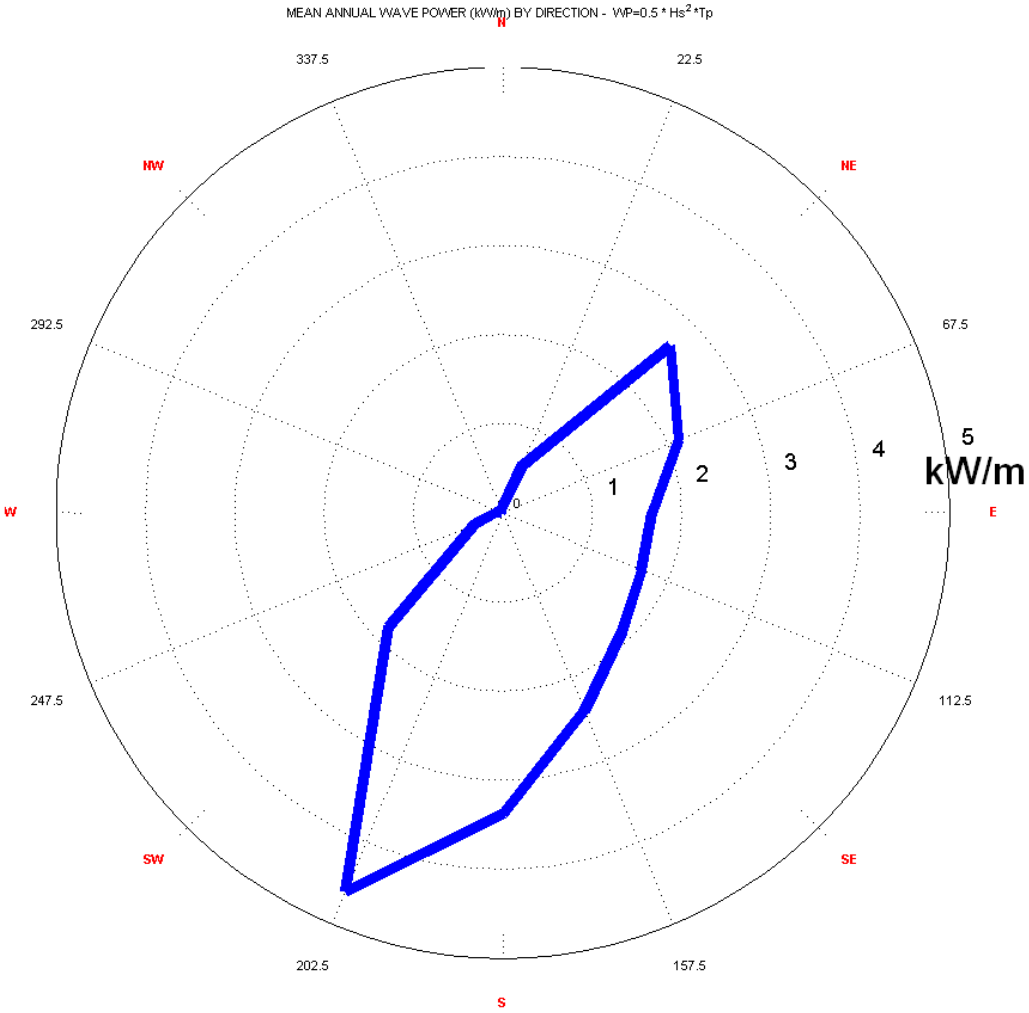

Figure 5.4.3.1 Directional distribution of mean annual wave power (Kw/m)

(*) The mean annual wave power was calculated using the equation 0.5xHs²xTp using 3-hour wave data adding the contribution of all waves for a particular direction.

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11].

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5.5 Distribution of Single and Double-Peak Sea States

5.5.1 Percentage of Single and Double-Peak Sea States

Direction of Primary Sea State	Number of Spectral Peaks	Occurrences of Unimodal / Bimodal	Percentage by Direction	Total by Direction	Percentage by Direction
N	*Unimodal*	24	0.03%	304	0.40%
	Bimodal	280	0.37%		
NNE	*Unimodal*	698	0.92%	2854	3.77%
	Bimodal	2156	2.85%		
NE	*Unimodal*	3947	5.21%	12269	16.20%
	Bimodal	8322	10.99%		
ENE	*Unimodal*	3889	5.14%	11257	14.87%
	Bimodal	7368	9.73%		
E	*Unimodal*	3257	4.30%	8294	10.95%
	Bimodal	5037	6.65%		
ESE	*Unimodal*	3202	4.23%	7370	9.73%
	Bimodal	4168	5.51%		
SE	*Unimodal*	2911	3.84%	6765	8.94%
	Bimodal	3854	5.09%		
SSE	*Unimodal*	2960	3.91%	6906	9.12%
	Bimodal	3946	5.21%		
S	*Unimodal*	3519	4.65%	8309	10.97%
	Bimodal	4790	6.33%		
SSW	*Unimodal*	4284	5.66%	8391	11.08%
	Bimodal	4107	5.42%		
SW	*Unimodal*	1354	1.79%	2091	2.76%
	Bimodal	737	0.97%		
WSW	*Unimodal*	164	0.22%	564	0.74%
	Bimodal	400	0.53%		
W	*Unimodal*	21	0.03%	160	0.21%
	Bimodal	139	0.18%		
WNW	*Unimodal*	6	0.01%	58	0.08%
	Bimodal	52	0.07%		
NW	*Unimodal*	1	0.00%	39	0.05%
	Bimodal	38	0.05%		
NNW	*Unimodal*	11	0.01%	81	0.11%
	Bimodal	70	0.09%		
Total	*Unimodal*	30248	39.95%	75712	100.00%
	Bimodal	45464	60.05%		

Percentage of Unimodal Sea States: 39.95%
Percentage of Bimodal Sea States: 60.05%

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. Ref [11]. The wave data was tabulated at 3-hour intervals, providing information equivalent to 227136 hours (=75712 * 3 hours).

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5.5.2 Distribution of Hs versus Tp for Primary Peak Waves approaching from N Direction

5.5.2.1 Primary Hs1 versus Tp1 for Unimodal sea states (N)

Hs(m)		Tp(s)							Freq	%	MTp
		3	4	5	6	7	8	9			
		4	5	6	7	8	9	10			
0.00	0.50	0	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	2	0	0	0	3	1	0	6	25.00	6.35
1.00	1.50	0	5	1	1	2	1	0	10	41.67	5.74
1.50	2.00	0	0	5	0	0	0	0	5	20.83	5.35
2.00	2.50	0	0	1	1	0	0	0	2	8.33	5.82
2.50	3.00	0	0	0	1	0	0	0	1	4.17	6.08
3.0	3.50	0	0	0	0	0	0	0	0	0.00	0.00
Freq		2	5	7	3	5	2	0	24		
%		8.33	20.83	29.17	12.50	20.83	8.33	0.00			
MHs		0.76	1.20	1.70	2.11	0.94	1.05	0.00			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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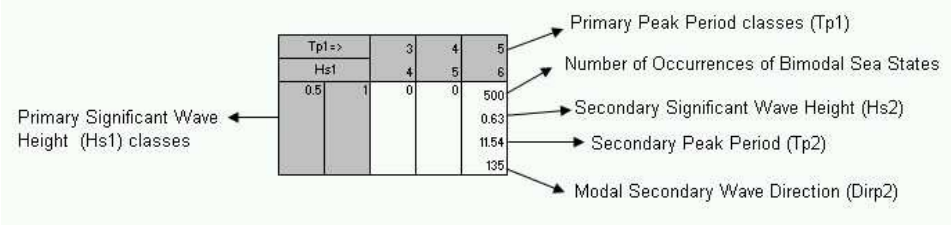
5.5.2.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (N)

Tp1 =>		3	4	5	6	7	8	9	Ocorr. HS1	% Hs1
Hs1		4	5	6	7	8	9	10		
0.00	**0.50**	0	0	0	0	0	0	0	**0**	**0.00**
0.50	**1.00**	4 0.51 12.00 90	24 0.84 8.40 90	0	0	1 0.47 3.77 276	1 0.46 3.59 228	0	**30**	**10.71**
1.00	**1.50**	0	44 0.96 7.36 68	59 1.11 7.78 68	1 0.93 6.88 58	1 0.40 3.49 309	0	1 0.49 3.45 261	**106**	**37.86**
1.50	**2.00**	0	0	55 1.39 7.45 68	21 1.34 7.63 68	4 1.06 8.71 180	2 1.39 6.66 225	3 0.44 3.45 270	**85**	**30.36**
2.00	**2.50**	0	0	1 1.62 7.43 71	34 1.69 8.52 68	4 1.11 4.77 248	2 0.85 4.63 225	0	**41**	**14.64**
2.50	**3.00**	0	0	0	9 1.58 8.24 68	8 1.91 8.57 68	0	0	**17**	**6.07**
3.00	**3.50**	0	0	0	0	1 1.46 8.24 52	0	0	**1**	**0.36**
Ocorr. Tp1		**4**	**68**	**115**	**65**	**19**	**5**	**4**	**280**	
% Tp1		**1.43**	**24.29**	**41.07**	**23.21**	**6.79**	**1.79**	**1.43**		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.3 Distribution of Hs versus Tp for Primary Peak Waves approaching from NNE Direction

5.5.3.1 Primary Hs1 versus Tp1 for Unimodal sea states (NNE)

Hs(m)		Tp(s)							Freq	%	MTp
		3	4	5	6	7	8	9			
		4	5	6	7	8	9	10			
0.00	0.50	0	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	3	5	1	3	1	1	0	14	2.01	5.39
1.00	1.50	2	70	42	21	4	7	0	146	20.92	5.31
1.50	2.00	0	7	122	47	21	13	0	210	30.09	6.02
2.00	2.50	0	0	36	120	16	2	2	176	25.21	6.41
2.50	3.00	0	0	0	54	41	5	0	100	14.33	7.05
3.00	3.50	0	0	0	9	18	11	0	38	5.44	7.46
3.50	4.00	0	0	0	1	6	1	4	12	1.72	8.10
4.00	4.50	0	0	0	0	0	2	0	2	0.29	8.59
Freq		5	82	201	255	107	42	6	698		
%		0.72	11.75	28.80	36.53	15.33	6.02	0.86			
MHs		0.88	1.25	1.73	2.22	2.54	2.38	3.41			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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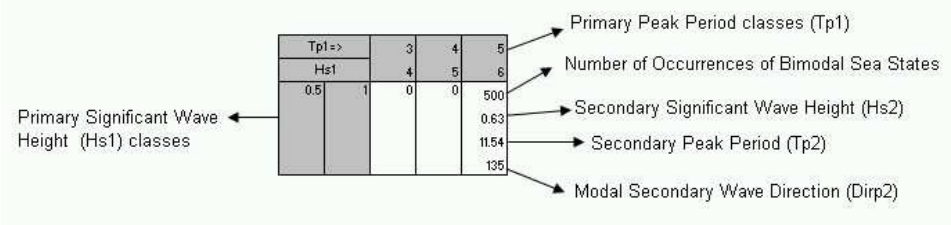
5.5.3.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (NNE)

Tp =>		3	4	5	6	7	8	9	Ocorr.	%
Hs1		4	5	6	7	8	9	10	Hs1	Hs1
0.00	**0.50**	1 0.44 10.57 173	0	0	0	0	0	0	**1**	**0.05**
0.50	**1.00**	16 0.37 5.18 68	60 0.70 8.33 90	8 0.47 3.48 315	7 0.42 3.43 338	3 0.42 9.73 225	7 0.61 3.88 225	0	**101**	**4.68**
1.00	**1.50**	0	103 0.92 8.39 90	429 1.04 7.85 90	47 1.07 7.88 90	27 0.81 4.22 225	9 0.44 3.45 203	0	**615**	**28.53**
1.50	**2.00**	0	1 1.41 8.68 161	310 1.22 9.03 113	391 1.14 7.86 90	31 0.52 3.58 338	30 0.95 4.65 248	1 1.04 4.57 301	**764**	**35.44**
2.00	**2.50**	0	0	2 1.65 10.62 135	377 1.19 8.16 90	58 1.09 8.31 90	19 1.01 4.35 270	3 0.79 5.15 225	**459**	**21.29**
2.50	**3.00**	0	0	0	34 1.72 11.77 180	122 1.11 8.24 90	9 1.70 5.79 293	3 2.14 7.28 225	**168**	**7.79**
3.00	**3.50**	0	0	0	0	15 2.18 12.67 180	13 1.61 9.65 158	1 1.84 5.48 283	**29**	**1.35**
3.50	**4.00**	0	0	0	0	4 3.33 14.72 180	11 1.25 9.03 90	2 0.58 7.51 113	**17**	**0.79**
4.00	**4.50**	0	0	0	0	0	2 0.99 9.06 113	0	**2**	**0.09**
Freq.		**17**	**164**	**749**	**856**	**260**	**100**	**10**	**2156**	
%		**0.79**	**7.61**	**34.74**	**39.70**	**12.06**	**4.64**	**0.46**		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.4 Distribution of Hs versus Tp for Primary Peak Waves approaching from NE Direction

5.5.4.1 Primary Hs1 versus Tp1 for Unimodal sea-states (NE)

Hs(m)		Tp(s)									Freq	%	MTp
		3	4	5	6	7	8	9	10	11			
		4	5	6	7	8	9	10	11	12			
0.00	0.50	0	0	0	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	7	17	31	68	28	14	0	0	0	165	4.18	6.31
1.00	1.50	2	148	180	267	231	53	2	0	2	885	22.42	6.33
1.50	2.00	0	10	289	350	565	255	12	1	0	1482	37.55	7.02
2.00	2.50	0	0	26	319	216	293	30	1	0	885	22.42	7.47
2.50	3.00	0	0	0	92	122	68	52	13	0	347	8.79	7.87
3.00	3.50	0	0	0	3	32	51	18	6	0	110	2.79	8.33
3.50	4.00	0	0	0	0	6	24	13	0	0	43	1.09	8.64
4.00	4.50	0	0	0	0	0	8	13	0	0	21	0.53	9.12
4.50	5.00	0	0	0	0	0	1	6	1	0	8	0.20	9.63
5.00	5.50	0	0	0	0	0	0	1	0	0	1	0.03	9.85
Freq		9	175	526	1099	1200	767	147	22	2	3947		
%		0.23	4.43	13.33	27.84	30.40	19.43	3.72	0.56	0.05			
MHs		0.93	1.23	1.56	1.81	1.88	2.17	2.93	2.90	1.25			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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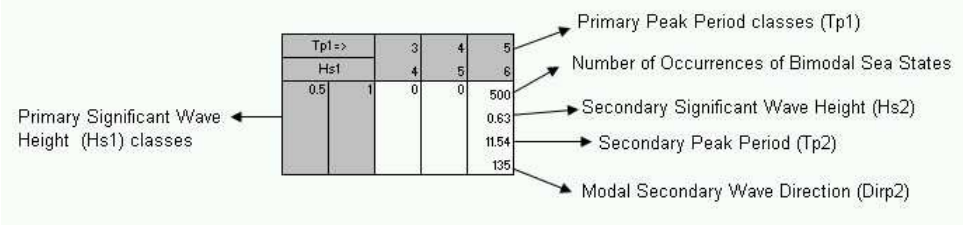
5.5.4.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (NE)

Tp =>		3	4	5	6	7	8	9	10	11	Ocorr.	% Hs1
Hs1		4	5	6	7	8	9	10	11	12		
0.00	0.50	3 0.39 4.71 113	0	0	0	2 0.40 3.44 225	0	0	0	0	5	0.06
0.50	1.00	17 0.47 10.87 180	69 0.66 9.22 113	20 0.88 9.40 113	37 0.61 3.73 338	34 0.45 4.00 225	18 0.39 3.45 203	0	0	0	195	2.34
1.00	1.50	0	136 0.95 8.92 113	779 0.90 8.28 113	336 0.87 7.91 113	281 0.67 3.89 0	167 0.83 4.44 203	18 0.59 4.03 203	0	1 0.36 3.27 352	1718	20.64
1.50	2.00	0	0	470 1.18 10.77 158	1642 0.99 8.44 113	486 0.72 10.32 203	406 0.86 4.58 225	46 1.15 5.96 203	2 1.88 6.17 203	0	3052	36.67
2.00	2.50	0	0	2 1.57 9.79 203	950 1.00 9.45 135	736 0.81 8.44 113	176 1.01 4.49 338	73 0.91 5.06 225	2 1.02 4.55 225	0	1939	23.30
2.50	3.00	0	0	0	55 1.62 11.69 158	667 0.95 10.74 158	141 0.76 8.94 113	37 1.15 4.82 338	4 1.02 4.99 338	0	904	10.86
3.00	3.50	0	0	0	0	140 1.30 10.16 135	217 0.81 9.39 135	8 0.53 10.56 180	1 1.57 5.51 351	0	366	4.40
3.50	4.00	0	0	0	0	1 1.58 8.39 127	77 0.75 10.07 158	22 0.35 8.77 135	0	0	100	1.20
4.00	4.50	0	0	0	0	0	12 2.05 12.11 135	18 1.21 9.41 90	1 0.18 15.91 209	0	31	0.37
4.50	5.00	0	0	0	0	0	0	10 0.91 11.30 135	1 0.18 15.82 181	0	11	0.13
5.00	5.50	0	0	0	0	0	0	1 1.96 9.89 126	0	0	1	0.01
Freq.		20	205	1271	3020	2347	1214	233	11	1	8322	
%		0.24	2.46	15.27	36.29	28.20	14.59	2.80	0.13	0.01		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.5 Distribution of Hs versus Tp for Primary Peak Waves approaching from ENE Direction

5.5.5.1 Primary Hs1 versus Tp1 for Unimodal sea-states (ENE)

Hs(m)		Tp(s)													Freq	%	MTp
		3	4	5	6	7	8	9	10	11	12	13	14	15			
		4	5	6	7	8	9	10	11	12	13	14	15	16			
0.00	0.50	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.03	7.74
0.50	1.00	9	10	65	80	62	13	4	0	1	0	3	0	0	247	6.35	6.58
1.00	1.50	2	89	161	367	510	142	8	9	7	2	2	1	0	1300	33.43	6.96
1.50	2.00	0	12	196	275	595	422	32	2	2	2	1	1	0	1540	39.60	7.38
2.00	2.50	0	0	17	141	134	244	57	5	0	0	0	0	0	598	15.38	7.83
2.50	3.00	0	0	0	29	24	66	20	0	0	0	0	0	1	140	3.60	8.18
3.00	3.50	0	0	0	2	14	12	10	1	0	0	0	0	0	39	1.00	8.26
3.50	4.00	0	0	0	0	1	4	2	0	0	0	0	0	0	7	0.18	8.63
4.00	4.50	0	0	0	0	0	2	5	0	0	0	0	0	0	7	0.18	9.16
4.50	5.00	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0.05	10.82
5.00	5.50	0	0	0	0	0	0	3	4	0	0	0	0	0	7	0.18	10.36
5.50	6.00	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.03	11.11
Freq		11	111	439	894	1341	905	141	22	12	4	6	2	1	3889		
%		0.28	2.85	11.29	22.99	34.48	23.27	3.63	0.57	0.31	0.10	0.15	0.05	0.03			
MHs		0.91	1.24	1.45	1.58	1.61	1.90	2.35	2.51	1.95	1.50	1.13	1.52	2.62			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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5.5.5.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (ENE)

Tp =>		3	4	5	6	7	8	9	10	11	12	13	14	15	Ocorr.	% Hs1
Hs1		4	5	6	7	8	9	10	11	12	13	14	15	16		
0.00	0.50	0	0	0	0	0	0	1 0.46 3.59 217	0	0	0	0	0	0	1	0.01
0.50	1.00	5 0.52 10.40 158	42 0.68 9.85 135	33 0.51 3.60 0	70 0.56 3.68 0	57 0.53 3.55 225	22 0.40 3.37 203	2 0.18 3.05 293	0	2 0.18 3.05 270	0	1 0.40 3.45 21	0	0	234	3.18
1.00	1.50	0	108 0.99 9.31 158	532 0.94 9.05 135	334 0.86 7.55 135	618 0.73 4.11 23	366 0.83 4.38 23	52 1.02 4.77 23	9 0.38 3.40 338	9 0.66 3.94 203	0	0	2 0.46 3.59 338	0	2030	27.55
1.50	2.00	0	1 0.62 6.38 173	563 1.16 10.55 180	1029 0.90 9.13 135	493 0.89 4.25 0	506 0.86 4.22 0	82 0.60 3.92 248	13 0.82 5.84 203	9 0.96 4.35 270	9 0.36 3.31 23	2 1.12 4.53 338	2 0.76 4.04 23	1 0.31 3.06 120	2710	36.78
2.00	2.50	0	0	13 1.34 10.03 180	846 1.06 10.36 158	377 0.72 10.59 158	183 1.18 4.84 0	62 1.05 4.82 0	6 1.24 8.93 203	2 0.76 7.32 270	0	0	1 1.05 4.49 300	2 1.78 5.55 270	1492	20.25
2.50	3.00	0	0	0	87 1.38 10.97 158	471 0.97 9.36 135	45 0.86 9.16 135	23 1.37 5.00 338	2 2.57 7.00 23	0	0	0	0	0	628	8.52
3.00	3.50	0	0	0	0	111 1.17 10.08 158	77 0.84 9.17 135	2 2.40 6.66 0	0	1 0.98 5.09 319	0	1 1.71 10.90 213	0	0	192	2.61
3.50	4.00	0	0	0	0	4 1.05 11.30 158	45 1.25 10.27 135	7 0.60 10.20 135	0	0	0	0	0	0	56	0.76
4.00	4.50	0	0	0	0	0	11 1.37 10.88 135	5 0.31 14.63 158	0	1 0.69 4.96 351	0	0	0	0	17	0.23
4.50	5.00	0	0	0	0	0	0	4 1.24 9.35 113	1 0.36 9.81 159	0	0	0	0	0	5	0.07
5.00	5.50	0	0	0	0	0	0	0	1 0.40 10.79 141	0	0	0	0	0	1	0.01
5.50	6.00	0	0	0	0	0	0	0	0	2 0.55 7.07 158	0	0	0	0	2	0.03
Freq.		5	151	1141	2366	2131	1255	240	32	26	9	4	5	3	7368	
%		0.07	2.05	15.49	32.11	28.92	17.03	3.26	0.43	0.35	0.12	0.05	0.07	0.04		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.

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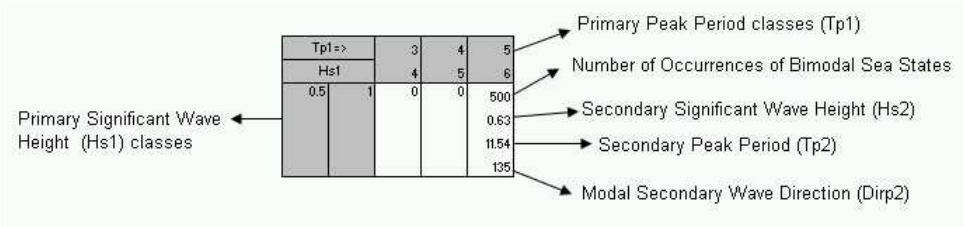

5.5.6 Distribution of Hs versus Tp for Primary Peak Waves approaching from E Direction

5.5.6.1 Primary Hs1 versus Tp1 for Unimodal sea-states (E)

Hs(m)		Tp(s)													Freq	%	MTp
		3	4	5	6	7	8	9	10	11	12	13	14	15			
		4	5	6	7	8	9	10	11	12	13	14	15	16			
0.00	0.50	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.03	8.77
0.50	1.00	0	7	25	20	18	11	13	2	3	1	2	1	0	103	3.16	7.36
1.00	1.50	2	46	74	230	520	262	54	25	12	14	2	3	4	1248	38.32	7.60
1.50	2.00	0	5	107	176	307	425	156	17	10	4	5	3	0	1215	37.30	7.92
2.00	2.50	0	0	9	121	64	100	39	25	9	3	11	3	0	384	11.79	8.14
2.50	3.00	0	0	1	42	54	50	22	11	6	0	5	1	0	192	5.89	8.29
3.00	3.50	0	0	0	7	14	25	16	6	0	0	0	0	0	68	2.09	8.51
3.50	4.00	0	0	0	0	5	13	3	2	0	0	0	0	0	23	0.71	8.48
4.00	4.50	0	0	0	0	0	5	2	0	0	0	0	0	0	7	0.21	8.75
4.50	5.00	0	0	0	0	0	4	2	6	0	0	0	0	0	12	0.37	9.86
5.00	5.50	0	0	0	0	0	0	2	2	0	0	0	0	0	4	0.12	10.17
Freq		2	58	216	596	982	896	309	96	40	22	25	11	4	3257		
%		0.06	1.78	6.63	18.30	30.15	27.51	9.49	2.95	1.23	0.68	0.77	0.34	0.12			
MHs		1.14	1.26	1.49	1.72	1.58	1.80	1.91	2.20	1.77	1.51	2.05	1.72	1.09			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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5.5.6.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (E)

Tp =>		3	4	5	6	7	8	9	10	11	12	13	14	15	16	Ocorr.	%
Hs1		4	5	6	7	8	9	10	11	12	13	14	15	16	17	Hs1	Hs1
0.00	0.50	0	0	0	0	0	0	1 0.44 3.59 222	0	0	0	0	0	0	0	1	0.02
0.50	1.00	1 0.91 8.80 165	16 0.76 10.14 180	18 0.42 4.13 158	39 0.72 4.19 23	59 0.63 3.84 23	29 0.62 3.79 23	7 0.80 4.52 45	7 0.46 3.47 45	4 0.62 4.09 248	5 0.61 3.85 45	3 0.52 3.36 270	1 0.54 3.36 154	1 0.33 3.21 43	0	190	3.77
1.00	1.50	0	62 1.06 9.58 180	207 1.05 9.42 158	220 0.79 4.22 23	581 0.77 4.24 23	599 0.75 4.12 23	154 0.84 4.24 23	22 0.80 4.35 225	23 0.60 3.71 23	14 0.72 3.93 23	8 0.75 3.95 0	2 0.87 4.22 23	0	0	1892	37.56
1.50	2.00	0	0	214 1.24 9.95 180	426 1.09 9.34 158	321 0.91 4.38 23	470 0.92 4.47 23	181 0.80 4.12 23	65 0.74 4.29 45	36 0.83 4.08 0	23 0.91 4.45 0	21 1.12 4.98 45	10 0.84 4.03 23	4 0.40 3.44 203	1 1.30 4.63 191	1772	35.18
2.00	2.50	0	0	0	279 1.44 9.96 158	204 1.06 9.15 158	95 1.21 4.84 23	74 0.97 4.53 23	24 0.73 3.83 23	14 1.05 4.21 248	15 0.99 4.50 23	23 0.74 3.96 338	12 1.21 4.63 23	3 0.96 4.13 338	0	743	14.75
2.50	3.00	0	0	0	27 1.63 13.19 180	206 1.30 10.31 158	59 0.83 9.54 158	11 1.53 5.18 0	1 0.74 8.07 161	5 0.28 3.05 248	0	1 1.25 4.95 339	6 0.79 4.06 45	1 1.10 5.02 42	0	317	6.29
3.00	3.50	0	0	0	2 2.53 13.79 203	27 1.23 11.57 180	44 1.58 12.22 180	5 0.78 9.67 135	0	0	0	1 0.77 3.72 10	1 1.57 5.47 23	0	0	80	1.59
3.50	4.00	0	0	0	0	1 1.35 13.89 142	24 1.30 9.64 180	6 0.89 9.33 135	0	0	0	0	0	0	0	31	0.62
4.00	4.50	0	0	0	0	0	3 0.70 9.55 180	4 0.77 9.43 135	0	0	0	0	0	0	0	7	0.14
4.50	5.00	0	0	0	0	0	0	2 0.83 8.96 158	1 0.44 11.85 144	0	0	0	0	0	0	3	0.06
5.00	5.50	0	0	0	0	0	0	0	1 0.36 10.74 175	0	0	0	0	0	0	1	0.02
Freq.		1	78	439	993	1399	1323	445	121	82	57	57	32	9	1	5037	
%		0.02	1.55	8.72	19.71	27.77	26.27	8.83	2.40	1.63	1.13	1.13	0.64	0.18	0.02		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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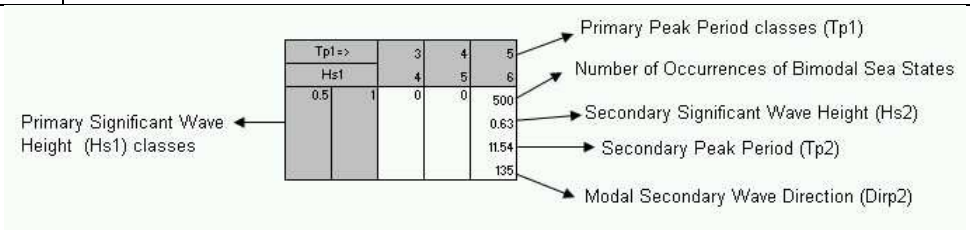

5.5.7 Distribution of Hs versus Tp for Primary Peak Waves approaching from ESE Direction

5.5.7.1 Primary Hs1 versus Tp1 for Unimodal sea-states (ESE)

Hs(m)		Tp(s) 3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	Freq	%	MTp
0.00	0.50	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.03	8.11
0.50	1.00	0	0	12	8	24	25	11	2	1	3	3	9	0	0	98	3.06	8.70
1.00	1.50	0	21	39	140	298	276	73	21	15	9	4	8	7	1	912	28.48	8.00
1.50	2.00	0	3	74	129	268	451	201	62	20	21	8	10	5	0	1252	39.10	8.41
2.00	2.50	0	0	14	81	78	147	97	54	14	5	4	8	0	0	502	15.68	8.60
2.50	3.00	0	0	0	25	49	44	52	49	2	2	0	7	0	0	230	7.18	9.02
3.00	3.50	0	0	0	7	26	24	11	27	7	0	0	0	0	0	102	3.19	9.00
3.50	4.00	0	0	0	1	6	30	14	12	9	0	0	0	0	0	72	2.25	9.23
4.00	4.50	0	0	0	0	1	7	11	3	2	0	0	0	0	0	24	0.75	9.42
4.50	5.00	0	0	0	0	0	3	6	0	0	0	0	0	0	0	9	0.28	9.21
Freq		0	24	139	391	750	1008	476	230	70	40	19	42	12	1	3202		
%		0.00	0.75	4.34	12.21	23.42	31.48	14.87	7.18	2.19	1.25	0.59	1.31	0.37	0.03			
MHs		0.00	1.33	1.56	1.75	1.71	1.83	2.06	2.33	2.23	1.70	1.62	1.71	1.39	1.32			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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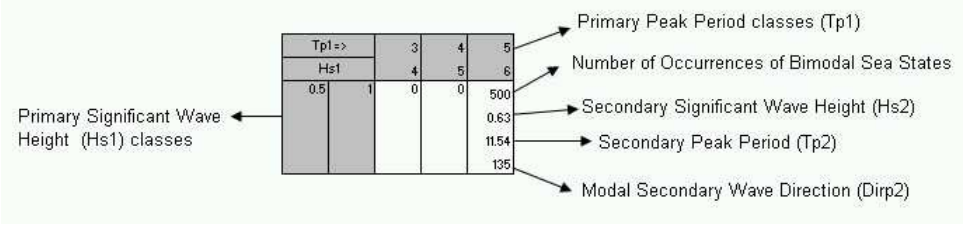
5.5.7.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (ESE)

Tp =>		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Ocorr Hs1	% Hs1
Hs1		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
0.00	0.50	0	1 0.40 3.52 53	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.02
0.50	1.00	0	4 0.61 7.46 158	3 0.46 3.56 68	15 0.65 3.91 45	48 0.68 4.38 45	21 0.77 4.28 45	14 0.59 3.84 45	7 0.63 4.36 45	7 0.50 3.41 23	7 0.39 3.44 0	3 0.40 3.46 248	0	0	0	0	129	3.10
1.00	1.50	0	7 1.08 9.85 203	68 1.11 9.21 180	115 0.79 4.30 45	449 0.72 4.29 45	649 0.84 4.48 45	232 0.81 4.36 45	88 0.73 4.19 45	51 0.74 3.96 23	44 0.78 4.13 23	18 0.79 4.07 338	10 0.81 4.26 45	5 0.83 4.32 45	1 0.47 3.59 11	1 0.92 5.40 168	1738	41.70
1.50	2.00	0	0	80 1.17 9.73 180	199 1.23 9.52 180	202 0.96 4.51 23	399 0.82 4.34 45	305 0.92 4.48 45	159 1.02 4.84 45	103 0.82 4.17 23	70 0.88 4.34 45	36 0.72 3.92 23	26 1.05 4.50 23	11 0.95 4.21 315	0	0	1590	38.15
2.00	2.50	0	0	2 1.94 12.98 203	127 1.36 10.91 180	98 1.24 10.02 180	71 0.97 7.90 180	76 1.22 5.11 68	47 1.17 5.10 68	39 0.78 3.97 23	24 0.69 3.89 23	23 0.75 3.84 23	15 1.41 5.12 23	6 1.54 5.31 0	0	1 1.06 4.49 335	529	12.69
2.50	3.00	0	0	0	8 2.07 11.47 180	60 1.59 11.47 180	23 1.29 9.82 180	13 1.76 5.90 45	5 2.17 7.29 225	2 0.95 4.16 203	7 1.65 5.53 23	1 1.39 5.01 40	10 1.53 5.34 23	0	0	0	129	3.10
3.00	3.50	0	0	0	0	12 2.00 11.39 180	24 1.46 11.18 180	2 1.68 12.18 158	0	0	0	2 0.40 3.29 315	8 1.08 4.08 338	0	0	0	48	1.15
3.50	4.00	0	0	0	0	0	3 1.68 12.59 203	0	0	0	0	0	1 0.70 3.31 342	0	0	0	4	0.10
Freq.		0	12	153	464	869	1190	642	306	202	152	83	70	22	1	2	4168	
%		0.00	0.29	3.67	11.13	20.85	28.55	15.40	7.34	4.85	3.65	1.99	1.68	0.53	0.02	0.05		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.8 Distribution of Hs versus Tp for Primary Peak Waves approaching from SE Direction

5.5.8.1 Primary Hs1 versus Tp1 for Unimodal sea-states (SE)

Hs(m)		Tp(s)																		Freq	%	MTp
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
0.5	1.0	1	0	4	1	13	8	20	3	3	1	2	3	0	0	0	0	0	0	59	2.03	9.16
1.0	1.5	0	7	20	42	193	183	67	26	18	9	4	6	2	1	0	0	0	1	579	19.89	8.39
1.5	2.0	0	2	58	70	210	392	217	130	51	31	13	7	7	0	1	0	0	0	1189	40.85	8.86
2.0	2.5	0	0	15	91	96	155	179	65	53	14	9	12	5	0	0	0	0	0	694	23.84	9.04
2.5	3.0	0	0	1	22	34	31	44	38	19	5	3	12	12	0	0	0	0	0	221	7.59	9.84
3.0	3.5	0	0	0	8	15	17	17	20	6	9	0	0	3	0	0	0	0	0	95	3.26	9.57
3.5	4.0	0	0	0	2	1	11	9	6	7	8	2	0	0	0	0	0	0	0	46	1.58	10.22
4.0	4.5	0	0	0	0	0	1	4	0	4	1	2	0	0	0	0	0	0	0	12	0.41	10.91
4.5	5.0	0	0	0	0	0	0	4	2	0	1	2	1	0	0	0	0	0	0	10	0.34	11.36
5.0	5.5	0	0	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	6	0.21	12.09
Freq		1	9	98	236	562	798	561	292	161	81	39	41	29	1	1	0	0	1	2911		
%		.03	.31	3.37	8.11	19.31	27.41	19.27	10.03	5.53	2.78	1.34	1.41	1.00	.03	.03	0	0	.03			
MHs		.82	1.33	1.70	2.00	1.77	1.84	2.01	2.12	2.18	2.38	2.42	2.12	2.38	1.44	1.98	0	0	1.34			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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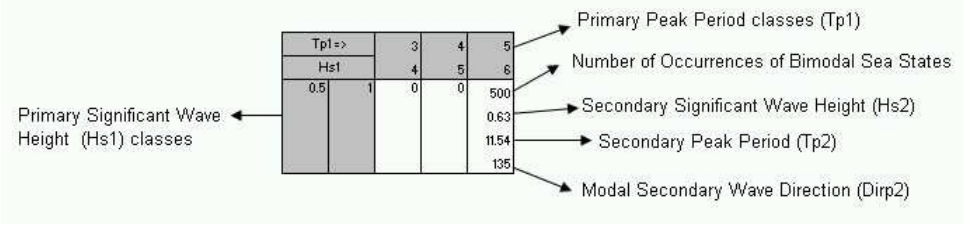
5.5.8.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (SE)

Tp =>		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Ocorr	%
Hs1		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Hs1	Hs1
0.0	0.5	0	0	0	0	0	0	0	1 0.42 3.59 33	0	0	0	0	0	0	0	0	0	0	1	0.03
0.5	1.0	0	2 0.86 8.21 90	0	8 0.45 3.51 68	48 0.64 4.32 68	18 0.88 4.28 45	8 0.58 3.80 338	7 0.45 3.40 45	4 0.45 3.37 45	11 0.74 4.08 45	2 0.57 5.44 23	1 0.40 3.50 78	0	0	0	0	0	0	109	2.83
1.0	1.5	0	2 1.01 8.66 68	40 1.20 8.83 203	51 0.83 5.14 90	307 0.76 4.57 45	473 0.80 4.74 68	204 0.89 4.74 68	117 0.80 4.49 68	54 1.01 4.77 45	45 0.92 4.67 45	26 0.87 4.53 45	28 0.80 4.11 0	6 1.00 4.66 45	2 0.38 3.40 23	1 0.64 3.82 7	0	1 0.94 5.02 101	0	1357	35.21
1.5	2.0	0	2 1.09 8.54 45	36 1.32 9.56 203	96 1.38 9.44 203	97 0.82 4.49 68	342 0.72 4.30 68	311 0.87 4.53 68	275 0.98 4.70 45	249 1.06 4.80 68	93 1.24 5.30 68	50 1.13 4.84 45	37 1.03 4.91 45	12 1.04 4.64 0	7 0.94 5.16 45	3 0.31 3.11 0	0	0	1 0.44 3.59 344	1611	41.80
2.0	2.5	0	0	1 1.75 11.98 195	47 1.59 10.17 203	42 1.40 10.29 203	47 1.11 4.77 68	75 1.12 4.84 68	45 1.04 4.47 68	115 1.01 4.59 45	83 1.16 4.86 45	37 1.16 4.86 45	32 1.20 4.72 23	13 1.71 5.85 45	0	0	0	0	0	0	537	13.93
2.5	3.0	0	0	0	4 1.74 11.01 203	37 1.47 10.42 203	15 0.97 10.14 203	5 2.00 6.49 45	7 0.76 5.07 293	23 1.04 4.61 90	31 0.74 4.07 68	17 0.71 3.90 45	19 2.24 6.90 45	1 2.93 7.39 47	3 1.32 5.29 248	0	0	0	0	162	4.20
3.0	3.5	0	0	0	1 3.01 14.88 200	12 1.77 11.98 203	10 1.54 11.36 203	3 0.90 15.38 180	0	1 0.40 3.62 73	1 1.62 5.97 93	1 1.28 4.93 4	10 0.88 4.08 315	8 2.67 6.72 23	2 1.27 5.09 248	2 1.42 5.65 248	0	0	0	51	1.32
3.5	4.0	0	0	0	0	0	6 2.47 13.51 203	2 1.30 10.84 203	0	3 0.37 3.61 68	0	0	5 2.59 7.07 203	3 2.56 6.63 45	1 2.48 6.32 48	0	0	0	0	20	0.52
4.0	4.5	0	0	0	0	0	0	2 0.28 9.78 203	0	0	2 0.34 3.34 68	0	0	0	0	0	0	0	0	4	0.10
4.5	5.0	0	0	0	0	0	0	1 1.42 11.57 184	0	0	1 0.18 3.05 80	0	0	0	0	0	0	0	0	2	0.05
Freq.		0	6	77	207	543	911	611	452	449	267	133	132	43	15	6	0	1	1	3854	
%		0	0.16	2.00	5.37	14.09	23.64	15.85	11.73	11.65	6.93	3.45	3.43	1.12	0.39	0.16	0	0.03	0.03		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.9 Distribution of Hs versus Tp for Primary Peak Waves approaching from SSE Direction

5.5.9.1 Primary Hs1 versus Tp1 for Unimodal sea-states (SSE)

Hs(m)		Tp(s)															Freq	%	MTp
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
0.00	0.50	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.03	3.33
0.50	1.00	4	2	12	1	7	9	10	3	6	3	0	10	0	0	0	67	2.26	8.91
1.00	1.50	0	16	16	32	112	74	35	19	17	8	9	10	3	0	0	351	11.86	8.53
1.50	2.00	0	3	53	52	164	281	204	112	64	30	12	4	2	2	1	984	33.24	8.95
2.00	2.50	0	0	33	105	73	151	151	96	94	57	44	13	5	1	0	823	27.80	9.51
2.50	3.00	0	0	4	46	38	55	104	63	38	35	12	10	0	0	1	406	13.72	9.71
3.00	3.50	0	0	0	4	37	26	27	26	20	18	9	5	0	0	0	172	5.81	9.96
3.50	4.00	0	0	0	1	7	12	6	10	3	12	3	9	1	1	0	65	2.20	10.93
4.00	4.50	0	0	0	0	0	4	4	7	6	12	10	2	4	2	0	51	1.72	12.32
4.50	5.00	0	0	0	0	0	2	2	0	1	6	8	0	0	3	0	22	0.74	12.83
5.00	5.50	0	0	0	0	0	0	0	2	1	2	5	0	0	2	0	12	0.41	13.23
5.50	6.00	0	0	0	0	0	0	0	1	4	0	1	0	0	0	0	6	0.20	11.48
Freq		5	21	118	241	438	614	543	339	254	183	113	63	15	11	2	2960		
%		0.17	0.71	3.99	8.14	14.80	20.74	18.34	11.45	8.58	6.18	3.82	2.13	0.51	0.37	0.07			
MHs		0.60	1.24	1.77	2.15	1.95	2.01	2.16	2.30	2.31	2.63	2.84	2.26	2.70	3.93	2.35			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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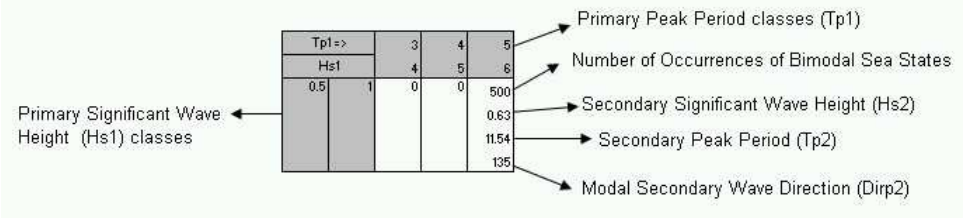
5.5.9.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (SSE)

Tp =>		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Ocorr	%
Hs1		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Hs1	Hs1
0.0	0.5	0	0	0	0	1 0.40 3.44 44	1 0.42 3.58 69	2 0.21 3.05 45	2 0.42 3.54 45	0	0	0	0	0	0	0	0	0	0	6	0.15
0.5	1.0	0	6 0.69 7.41 68	0	8 0.33 3.14 68	14 0.79 5.24 68	19 0.76 4.67 68	8 0.58 6.05 225	14 0.54 3.50 45	11 0.50 3.44 45	5 0.62 3.73 0	5 0.53 4.31 90	2 0.33 3.13 315	0	0	0	0	0	0	92	2.33
1.0	1.5	0	13 0.88 8.60 90	34 1.01 7.72 68	23 0.98 5.59 90	156 0.76 4.55 90	331 0.88 4.91 90	225 0.84 4.74 90	121 0.96 4.86 45	63 0.83 4.74 68	48 0.98 4.89 45	13 0.88 5.02 23	14 0.90 4.35 45	9 0.55 3.92 0	5 1.17 5.17 23	3 0.73 3.76 45	1 1.15 4.58 71	0	2 0.40 3.49 90	1061	26.89
1.5	2.0	0	3 1.31 9.50 90	24 1.17 8.16 68	62 1.40 8.89 203	80 0.94 4.62 90	244 0.90 4.80 113	299 0.78 4.63 90	393 0.97 4.66 68	291 1.09 4.90 68	134 1.10 4.81 45	51 1.07 4.68 23	33 1.50 5.68 45	17 1.26 4.99 45	4 0.87 4.12 45	0	1 0.38 3.39 105	1 0.42 3.56 345	0	1637	41.49
2.0	2.5	0	1 1.43 5.57 69	1 0.95 6.91 59	47 1.68 9.69 203	22 1.31 10.16 203	50 1.13 5.01 113	54 0.94 4.53 113	94 0.97 4.71 113	156 1.01 4.58 68	199 1.38 5.26 68	90 1.09 4.62 90	54 1.30 4.85 23	18 1.64 5.62 23	1 0.38 3.43 57	1 0.57 3.75 281	2 0.49 3.32 338	0	0	790	20.02
2.5	3.0	0	0	0	5 1.84 12.15 203	38 1.50 10.48 203	12 1.13 9.45 203	5 0.45 3.56 113	13 0.56 3.80 113	10 0.65 4.51 90	71 1.42 5.54 113	66 1.53 5.63 90	31 2.09 6.30 45	21 1.17 4.83 45	3 1.33 4.65 225	0	0	0	0	275	6.97
3.0	3.5	0	0	0	0	6 1.47 10.21 203	11 1.08 9.75 203	0	0	1 0.92 4.87 93	7 0.87 4.49 90	7 1.75 5.47 113	13 1.56 5.23 68	5 1.68 5.30 0	1 1.21 4.98 247	1 1.16 5.06 247	0	0	0	52	1.32
3.5	4.0	0	0	0	0	1 2.38 10.58 217	5 1.89 11.07 203	4 0.68 8.82 45	1 1.39 5.59 216	1 0.69 4.68 108	2 0.73 4.64 113	0	0	5 0.83 4.98 68	0	0	0	0	0	19	0.48
4.0	4.5	0	0	0	0	0	1 0.94 9.79 108	2 1.09 9.81 113	0	0	2 0.63 4.41 113	0	0	0	8 1.73 5.31 90	0	0	0	0	13	0.33
4.5	5.0	0	0	0	0	0	0	1 1.25 11.01 196	0	0	0	0	0	0	0	0	0	0	0	1	0.03
Freq.		0	23	59	145	318	674	600	638	533	468	232	147	75	22	5	4	1	2	3946	
%		0	0.58	1.50	3.67	8.06	17.08	15.21	16.17	13.51	11.86	5.88	3.73	1.90	0.56	0.13	0.10	0.03	0.05		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.10 Distribution of Hs versus Tp for Primary Peak Waves approaching from S Direction

5.5.10.1 Primary Hs1 versus Tp1 for Unimodal sea-states (S)

Hs(m)		Tp(s)																		Freq	%	MTp
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
0.0	0.5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.03	7.31
0.5	1.0	3	4	8	2	6	10	10	4	10	2	12	1	7	0	0	0	0	0	79	2.24	9.87
1.0	1.5	0	15	6	23	53	44	38	33	24	15	5	8	0	0	0	0	0	0	264	7.50	9.02
1.5	2.0	0	2	40	44	119	266	146	139	71	40	15	11	2	3	1	1	0	0	900	25.58	9.24
2.0	2.5	0	0	25	115	70	183	171	167	152	86	58	14	6	1	1	0	0	0	1049	29.81	9.81
2.5	3.0	0	0	0	87	78	64	100	105	60	56	28	26	6	6	1	1	0	0	618	17.56	9.94
3.0	3.5	0	0	0	11	47	42	31	40	43	38	44	36	11	3	0	0	1	1	348	9.89	11.08
3.5	4.0	0	0	0	2	10	23	8	13	26	10	15	24	11	1	2	1	0	0	146	4.15	11.73
4.0	4.5	0	0	0	0	6	13	1	4	7	8	3	8	2	0	0	0	0	0	52	1.48	10.98
4.5	5.0	0	0	0	0	0	1	2	2	2	2	6	6	5	1	0	0	0	0	27	0.77	13.24
5.0	5.5	0	0	0	0	0	2	4	0	1	2	3	2	0	1	0	0	0	0	15	0.43	11.85
5.5	6.0	0	0	0	0	0	1	2	2	2	1	0	3	0	0	0	0	0	0	11	0.31	11.58
6.0	6.5	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	3	0.09	11.80
6.5	7.0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	3	0.09	13.64
7.0	7.5	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	3	0.09	13.86
Freq		3	21	79	284	390	649	514	509	401	260	189	141	53	16	5	3	1	1	3519		
%		0.09	0.60	2.24	8.07	11.08	18.44	14.61	14.46	11.40	7.39	5.37	4.01	1.51	0.45	0.14	0.09	0.03	0.03			
MHs		0.87	1.19	1.80	2.28	2.23	2.19	2.24	2.32	2.45	2.55	2.68	3.15	3.20	2.96	2.93	2.74	3.32	3.06			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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5.5.10.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (S)

Tp =>		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Ocorr Hs1	% Hs1
Hs1		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		
0.0	0.5	0	0	0	1 0.13 3.05 65	0	0	0	0	0	0	1 0.42 3.58 48	2 0.42 3.52 45	0	0	0	0	0	0	4	0.08
0.5	1.0	2 0.62 8.36 90	9 0.76 8.32 90	0	5 0.42 4.21 113	15 0.70 4.60 68	12 0.41 4.08 90	16 0.60 3.74 68	4 0.60 3.88 23	12 0.36 5.56 293	13 0.60 3.58 0	4 0.65 3.96 0	15 0.43 3.54 90	5 0.38 3.42 45	1 0.79 3.86 356	0	0	0	0	113	2.36
1.0	1.5	1 1.06 6.96 63	25 1.04 7.78 68	59 1.02 9.03 113	15 0.74 5.32 113	57 0.77 4.49 113	164 0.78 4.74 113	214 1.01 5.12 90	105 1.03 4.95 90	59 0.93 4.63 45	46 0.96 4.75 45	18 0.96 4.84 113	11 0.64 4.05 90	7 0.49 3.62 90	4 1.21 4.80 68	6 0.92 4.86 90	2 0.77 3.77 45	2 0.52 3.56 68	0	795	16.60
1.5	2.0	0	2 1.40 7.55 45	53 1.07 7.74 68	57 1.09 8.04 68	56 0.84 4.63 113	219 0.82 4.59 113	301 0.81 4.57 113	446 1.01 4.82 90	440 1.18 5.17 90	195 1.23 5.06 68	87 1.18 4.88 68	44 0.95 4.39 68	20 0.89 4.25 90	12 1.26 5.24 23	5 1.12 4.55 68	6 1.07 4.52 113	1 0.51 3.59 28	1 0.72 3.89 37	1945	40.61
2.0	2.5	0	0	3 1.21 7.20 45	46 1.02 7.74 68	25 1.11 8.23 45	30 1.27 5.19 135	76 1.01 4.81 113	152 0.79 4.41 113	296 1.15 4.97 90	371 1.25 4.99 68	162 1.24 5.01 68	89 1.38 5.30 45	33 1.15 4.73 68	12 1.32 5.59 45	5 0.70 4.39 248	3 0.38 3.38 23	1 1.37 4.84 315	1 1.20 4.56 320	1305	27.24
2.5	3.0	0	0	0	13 1.16 8.07 68	31 0.84 8.17 68	7 0.71 7.33 135	5 0.62 4.66 113	21 1.03 5.05 135	46 0.69 4.05 113	108 0.81 4.66 113	122 0.96 4.61 113	76 1.92 5.95 45	17 1.58 5.30 68	4 1.36 5.45 90	0	0	0	0	450	9.39
3.0	3.5	0	0	0	0	4 0.89 7.55 45	9 1.71 9.78 225	2 1.21 5.71 113	4 0.51 3.92 135	2 0.86 4.51 113	19 0.52 4.52 113	46 0.80 4.46 113	39 1.62 5.95 113	10 1.23 4.76 68	0	1 0.70 3.40 113	0	0	0	136	2.84
3.5	4.0	0	0	0	0	0	6 0.71 8.87 113	1 0.22 10.44 128	0	0	2 0.38 5.20 113	2 2.93 7.81 270	12 1.35 5.28 113	7 1.88 5.43 68	1 0.68 3.78 85	1 0.61 3.36 91	0	0	0	32	0.67
4.0	4.5	0	0	0	0	0	3 1.02 8.82 68	3 0.82 8.89 113	0	0	0	0	0	2 2.06 6.42 113	0	0	0	0	0	8	0.17
4.5	5.0	0	0	0	0	0	0	0	1 1.29 10.54 146	0	0	0	0	0	0	0	0	0	0	1	0.02
5.0	5.5	0	0	0	0	0	0	0	0	1 1.39 11.34 135	0	0	0	0	0	0	0	0	0	1	0.02
Freq.		3	36	115	137	188	450	618	733	856	754	442	288	101	34	18	11	4	2	4790	
%		0.06	0.75	2.40	2.86	3.92	9.39	12.90	15.30	17.87	15.74	9.23	6.01	2.11	0.71	0.38	0.23	0.08	0.04		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.

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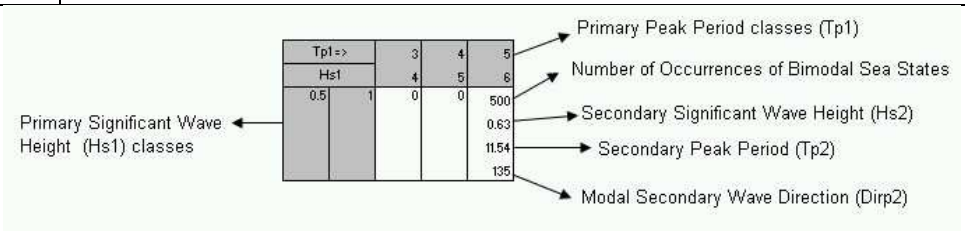

5.5.11 Distribution of Hs versus Tp for Primary Peak Waves approaching from SSW Direction

5.5.11.1 Primary Hs1 versus Tp1 for Unimodal sea-states (SSW)

Hs(m)		Tp(s)																Freq	%	MTp
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
0.00	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	1	6	8	7	3	6	4	20	11	8	8	2	0	1	0	0	85	1.98	9.63
1.00	1.50	1	19	13	19	29	35	27	20	27	26	19	6	0	0	0	0	241	5.63	9.32
1.50	2.00	0	0	28	36	82	151	94	72	70	28	18	14	0	1	0	0	594	13.87	9.39
2.00	2.50	0	0	3	78	66	185	251	213	129	71	31	21	2	4	1	1	1056	24.65	9.92
2.50	3.00	0	0	0	48	68	75	150	217	155	122	68	11	11	3	2	2	932	21.76	10.61
3.00	3.50	0	0	0	11	53	40	44	86	100	125	71	43	13	2	2	0	590	13.77	11.36
3.50	4.00	0	0	0	1	24	54	15	21	63	74	53	43	2	5	0	0	355	8.29	11.59
4.00	4.50	0	0	0	0	0	30	17	13	15	23	40	36	17	9	3	0	203	4.74	12.51
4.50	5.00	0	0	0	0	1	6	15	8	6	5	11	29	14	9	6	0	110	2.57	13.19
5.00	5.50	0	0	0	0	0	2	3	2	3	8	3	15	11	4	8	1	60	1.40	14.26
5.50	6.00	0	0	0	0	0	0	5	4	1	2	1	8	4	0	0	0	25	0.58	12.63
6.00	6.50	0	0	0	0	0	0	0	1	3	0	3	9	2	0	0	0	18	0.42	13.67
6.50	7.00	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	3	0.07	13.05
7.00	7.50	0	0	0	0	0	0	0	0	3	0	0	1	3	0	0	0	7	0.16	13.56
7.50	8.00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.02	15.52
8.00	8.50	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.02	14.70
8.50	9.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
9.00	9.50	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.02	16.90
9.50	10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0.05	16.95
Freq		2	25	52	200	326	584	625	678	586	492	326	241	80	41	22	4	4284		
%		0.05	0.58	1.21	4.67	7.61	13.63	14.59	15.83	13.68	11.48	7.61	5.63	1.87	0.96	0.51	0.09			
MHs		0.95	1.16	1.52	2.22	2.40	2.46	2.51	2.58	2.74	2.92	3.10	3.79	4.32	4.29	4.45	3.19			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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5.5.11.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (SSW)

Tp =>		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Ocorr	%
Hs1		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Hs1	Hs1
0.00	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
0.50	1.00	7 0.63 7.36 45	25 0.57 9.28 90	0 0.00 0.00 0	1 0.13 3.05 67	6 0.51 4.90 45	10 0.42 3.43 23	8 0.49 3.42 45	15 0.45 3.29 270	17 0.60 3.82 23	29 0.47 3.52 68	3 0.59 3.79 23	2 0.13 3.05 338	0	3 0.67 3.75 68	0	0	126	3.07
1.00	1.50	1 1.02 7.48 60	19 1.04 8.08 45	64 0.97 7.83 45	18 0.80 6.66 135	20 0.77 4.28 158	63 0.95 5.01 135	72 0.85 4.58 90	62 0.74 4.33 45	42 0.85 4.96 68	54 0.61 3.85 90	26 0.57 3.73 23	23 0.53 3.54 0	7 0.65 4.08 23	2 1.00 6.14 45	0	0	473	11.52
1.50	2.00	0	4 1.31 7.53 68	58 1.21 8.27 45	120 1.14 8.75 90	54 1.07 6.61 135	89 0.84 4.43 135	205 0.99 4.91 135	225 0.97 4.82 113	236 1.19 5.13 90	111 1.17 5.19 135	41 1.20 5.27 90	37 1.07 4.87 68	21 0.73 4.01 90	2 1.37 4.92 45	0	0	1203	29.29
2.00	2.50	0	0	9 1.48 7.44 45	70 1.33 8.27 45	70 1.02 8.73 90	30 0.96 4.96 135	81 1.04 4.91 135	221 1.00 4.80 135	318 0.96 4.93 113	265 1.14 5.14 90	91 1.18 5.07 90	54 1.15 4.96 45	20 1.38 4.91 68	4 1.29 6.09 68	2 0.76 5.03 68	1 0.61 3.92 333	1236	30.09
2.50	3.00	0	0	0	10 1.01 7.82 68	65 1.10 8.33 68	37 0.88 8.45 68	9 1.04 5.06 135	27 1.14 4.89 158	88 0.65 4.36 113	137 0.73 4.33 135	145 1.37 5.17 90	80 1.34 5.15 45	13 1.84 5.67 113	2 2.78 6.85 45	2 0.69 4.21 315	2 1.79 7.13 113	617	15.02
3.00	3.50	0	0	0	0	10 1.52 8.85 45	32 0.90 8.50 68	6 0.50 12.47 90	1 3.10 7.42 265	6 0.80 4.31 135	31 0.92 4.65 135	76 0.82 4.52 135	78 1.11 5.04 113	37 1.66 5.56 135	5 1.17 4.68 113	3 0.83 4.59 293	0	285	6.94
3.50	4.00	0	0	0	0	0	7 1.26 8.85 68	15 0.70 9.32 90	2 0.36 8.21 90	0	6 0.65 4.67 135	8 0.93 3.96 23	30 0.91 4.57 135	39 1.04 4.60 135	6 1.38 5.53 113	1 1.46 5.01 121	0	114	2.78
4.00	4.50	0	0	0	0	0	1 0.79 8.23 64	7 1.22 9.52 68	1 1.03 10.75 79	1 1.76 6.02 148	2 0.13 3.05 135	5 3.22 8.01 270	4 0.68 4.51 135	18 1.13 4.85 135	1 0.25 3.05 127	0	0	40	0.97
4.50	5.00	0	0	0	0	0	0	0	0	0	1 3.08 7.40 233	0	2 0.80 4.18 135	3 1.34 5.06 158	1 0.42 3.53 146	0	0	7	0.17
5.00	5.50	0	0	0	0	0	0	1 0.77 9.71 95	2 0.72 10.74 135	0	0	0	0	0	0	0	0	3	0.07
5.50	6.00	0	0	0	0	0	0	0	1 1.43 9.81 161	1 1.13 11.82 173	0	0	0	0	0	0	0	2	0.05
6.00	6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
6.50	7.00	0	0	0	0	0	0	0	1 1.14 11.91 139	0	0	0	0	0	0	0	0	1	0.02
Freq.		8	48	131	219	225	269	404	558	709	636	395	310	158	26	8	3	4107	
%		0.19	1.17	3.19	5.33	5.48	6.55	9.84	13.59	17.26	15.49	9.62	7.55	3.85	0.63	0.19	0.07		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

5.5.12 Distribution of Hs versus Tp for Primary Peak Waves approaching from SW Direction

5.5.12.1 Primary Hs1 versus Tp1 for Unimodal sea-states (SW)

Hs(m)		Tp(s)														Freq	%	MTp
		3	4	5	6	7	8	9	10	11	12	13	14	15	16			
		4	5	6	7	8	9	10	11	12	13	14	15	16	17			
0.00	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	0	1	7	1	3	3	2	5	8	1	1	0	0	2	34	2.51	9.38
1.00	1.50	1	9	8	10	19	5	3	2	1	3	3	0	0	2	66	4.87	7.76
1.50	2.00	0	1	6	22	28	18	6	4	2	4	1	2	0	0	94	6.94	8.08
2.00	2.50	0	0	2	34	21	33	35	14	3	7	12	0	0	0	161	11.89	8.97
2.50	3.00	0	0	0	23	33	22	36	49	27	6	8	0	0	0	204	15.07	9.51
3.00	3.50	0	0	0	4	37	48	19	39	64	22	12	0	0	0	245	18.09	10.14
3.50	4.00	0	0	0	1	5	52	20	13	22	17	7	5	2	0	144	10.64	10.19
4.00	4.50	0	0	0	0	1	23	25	11	12	13	9	8	3	0	105	7.75	10.82
4.50	5.00	0	0	0	0	0	10	24	15	4	6	11	14	3	0	87	6.43	11.39
5.00	5.50	0	0	0	0	0	6	15	23	8	0	2	5	4	0	63	4.65	10.92
5.50	6.00	0	0	0	0	0	0	7	22	8	1	3	4	5	0	50	3.69	11.56
6.00	6.50	0	0	0	0	0	0	6	10	13	0	0	1	0	0	30	2.22	10.79
6.50	7.00	0	0	0	0	0	0	2	5	10	2	0	4	2	0	25	1.85	12.07
7.00	7.50	0	0	0	0	0	0	4	4	6	1	0	0	0	0	15	1.11	10.94
7.50	8.00	0	0	0	0	0	0	2	1	1	4	0	0	2	0	10	0.74	12.21
8.00	8.50	0	0	0	0	0	0	0	5	0	1	0	0	2	0	8	0.59	12.19
8.50	9.00	0	0	0	0	0	0	1	6	3	0	0	0	0	0	10	0.74	10.82
9.00	9.50	0	0	0	0	0	0	0	1	1	1	0	0	0	0	3	0.22	11.53
Freq		1	11	23	95	147	220	207	229	193	89	69	43	23	4	1354		
%		0.07	0.81	1.70	7.02	10.8	16.2	15.2	16.9	14.2	6.57	5.10	3.18	1.70	0.30			
MHs		1.02	1.24	1.38	2.22	2.43	3.18	3.74	4.20	4.03	3.76	3.48	4.77	5.63	1.04			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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5.5.12.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (SW)

Tp =>		3	4	5	6	7	8	9	10	11	12	13	14	15	Ocorr. Hs1	% Hs1
Hs1		4	5	6	7	8	9	10	11	12	13	14	15	16		
0.00	0.50	1 0.44 9.28 98	0	0	0	0	0	0	0	0	0	0	0	0	1	0.14
0.50	1.00	6 0.58 7.71 45	10 0.65 8.23 45	3 0.72 6.05 0	3 0.22 3.05 45	0	1 0.90 8.55 44	1 0.38 3.36 262	0	1 0.38 3.42 316	1 0.38 3.34 341	0	1 0.96 4.58 319	0	27	3.66
1.00	1.50	0	8 0.83 7.90 90	47 1.09 8.06 68	10 0.79 7.91 68	3 0.79 4.07 270	6 1.07 4.75 158	2 1.32 6.92 68	4 1.17 5.09 158	0	2 0.40 3.45 270	0	0	0	82	11.13
1.50	2.00	0	2 1.66 11.08 113	37 1.34 8.08 45	75 1.20 8.28 68	18 1.50 8.55 68	9 1.26 7.70 135	2 0.28 3.05 135	8 1.63 5.14 45	0	1 1.77 6.62 23	1 1.57 5.96 22	0	0	153	20.76
2.00	2.50	0	1 1.49 8.63 48	6 1.16 7.37 45	71 1.29 8.06 68	50 1.16 8.47 90	14 1.20 9.23 90	2 1.88 13.02 135	13 1.06 6.92 158	6 1.05 5.63 68	1 1.68 5.50 41	0	1 1.39 5.62 167	0	165	22.39
2.50	3.00	0	0	0	6 1.89 8.79 45	45 1.30 9.52 90	43 1.30 9.52 90	3 0.69 8.21 68	8 1.01 4.38 158	11 0.93 4.58 293	4 1.20 3.77 45	2 0.98 6.68 68	1 1.77 6.22 238	0	123	16.69
3.00	3.50	0	0	0	0	8 1.14 7.91 45	28 0.81 9.44 68	13 1.05 8.97 68	1 1.74 10.97 132	2 0.28 3.05 293	2 0.28 4.11 135	6 0.70 6.29 68	6 2.45 6.57 270	0	66	8.96
3.50	4.00	0	0	0	0	1 1.43 8.85 126	17 0.95 12.94 113	24 1.23 9.00 45	3 0.28 8.52 23	1 0.40 3.76 281	0	0	3 1.93 5.99 270	1 1.48 5.19 159	50	6.78
4.00	4.50	0	0	0	0	0	4 1.00 9.05 45	13 1.25 8.98 68	6 0.86 10.29 180	0	0	0	0	0	23	3.12
4.50	5.00	0	0	0	0	0	1 1.25 9.09 140	6 1.60 10.69 180	3 0.63 10.62 90	1 0.78 10.74 95	0	0	0	0	11	1.49
5.00	5.50	0	0	0	0	0	0	3 2.27 9.99 135	9 0.78 10.33 68	2 0.72 9.18 45	1 0.33 10.14 39	0	0	0	15	2.04
5.50	6.00	0	0	0	0	0	0	1 4.02 14.09 218	4 1.05 10.72 90	0	1 0.18 10.29 38	0	0	0	6	0.81
6.00	6.50	0	0	0	0	0	0	0	6 2.22 14.20 135	4 0.64 8.82 0	0	0	0	0	10	1.36
6.50	7.00	0	0	0	0	0	0	0	0	4 2.26 13.18 158	0	0	0	0	4	0.54
7.00	7.50	0	0	0	0	0	0	0	0	1 1.28 11.89 194	0	0	0	0	1	0.14
Freq.		7	21	93	165	125	123	70	65	33	13	9	12	1	737	
%		0.95	2.85	12.62	22.39	16.96	16.69	9.50	8.82	4.48	1.76	1.22	1.63	0.14		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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5.5.13 Distribution of Hs versus Tp for Primary Peak Waves approaching from WSW Direction

5.5.13.1 Primary Hs1 versus Tp1 for Unimodal sea-states (WSW)

Hs(m)		Tp(s)									Freq	%	MTp
		3	4	5	6	7	8	9	10	11			
		4	5	6	7	8	9	10	11	12			
0.00	0.50	0	0	0	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	2	0	0	0	1	0	0	1	0	4	2.44	6.38
1.00	1.50	0	1	2	0	1	2	0	0	0	6	3.66	6.64
1.50	2.00	0	0	6	0	2	1	0	0	2	11	6.71	7.37
2.00	2.50	0	0	2	4	4	2	2	0	0	14	8.54	7.48
2.50	3.00	0	0	0	5	10	11	1	0	0	27	16.46	7.76
3.00	3.50	0	0	0	1	20	10	1	0	0	32	19.51	7.86
3.50	4.00	0	0	0	0	2	6	1	0	0	9	5.49	8.28
4.00	4.50	0	0	0	0	0	11	5	0	0	16	9.76	8.74
4.50	5.00	0	0	0	0	0	0	16	4	0	20	12.20	9.69
5.00	5.50	0	0	0	0	0	2	4	7	3	16	9.76	10.19
5.50	6.00	0	0	0	0	0	0	4	5	0	9	5.49	9.91
Freq		2	1	10	10	40	45	34	17	5	164		
%		1.22	0.61	6.10	6.10	24.39	27.44	20.73	10.37	3.05			
MHs		0.84	1.17	1.74	2.69	2.93	3.39	4.58	4.99	4.05			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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5.5.13.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (WSW)

Tp =>		3	4	5	6	7	8	9	10	11	Ocorr. Hs1	% Hs1
Hs1		4	5	6	7	8	9	10	11	12		
0.00	0.50	0	0	0	0	0	0	0	0	0	0	0.00
0.50	1.00	2 0.57 12.90 113	6 0.89 7.26 90	0	0	0	0	0	2 0.50 3.42 315	0	10	2.50
1.00	1.50	0	9 0.92 10.24 113	25 1.00 8.30 68	0	0	0	0	1 0.42 3.53 324	0	35	8.75
1.50	2.00	0	0	24 1.49 8.74 90	51 1.32 8.90 90	9 1.41 7.87 68	2 1.69 11.21 180	1 1.83 7.95 157	0	1 1.60 7.54 43	88	22.00
2.00	2.50	0	1 1.83 10.47 123	4 2.03 12.58 90	45 1.34 8.10 68	29 1.59 10.04 113	8 1.69 9.23 113	1 1.78 11.69 156	0	0	88	22.00
2.50	3.00	0	0	0	7 1.41 9.43 90	40 1.39 10.94 180	16 1.13 9.72 90	0	0	0	63	15.75
3.00	3.50	0	0	0	0	17 1.54 8.83 45	27 1.17 9.47 113	2 1.16 14.65 90	0	0	46	11.50
3.50	4.00	0	0	0	0	1 0.86 8.10 115	13 1.75 11.86 180	9 0.99 8.97 90	0	0	23	5.75
4.00	4.50	0	0	0	0	0	10 1.36 8.43 90	8 1.02 9.34 68	1 1.25 10.80 168	0	19	4.75
4.50	5.00	0	0	0	0	0	0	10 1.10 9.79 68	3 1.66 10.29 180	0	13	3.25
5.00	5.50	0	0	0	0	0	0	2 0.90 8.35 68	7 1.02 10.32 68	0	9	2.25
5.50	6.00	0	0	0	0	0	0	0	6 1.32 10.76 203	0	6	1.50
Freq.		2	16	53	103	96	76	33	20	1	400	
%		0.50	4.00	13.25	25.75	24.00	19.00	8.25	5.00	0.25		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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5.5.14 Distribution of Hs versus Tp for Primary Peak Waves approaching from W Direction

5.5.14.1 Primary Hs1 versus Tp1 for Unimodal sea-states (W)

Hs(m)		Tp(s)							Freq	%	MTp
		3	4	5	6	7	8	9			
		4	5	6	7	8	9	10			
0.00	0.50	0	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	3	0	0	0	0	0	0	3	14.29	3.69
1.00	1.50	0	1	0	0	0	1	0	2	9.52	6.90
1.50	2.00	0	0	1	4	1	1	0	7	33.33	6.63
2.00	2.50	0	0	0	0	2	0	0	2	9.52	7.86
2.50	3.00	0	0	0	0	1	1	0	2	9.52	7.77
3.00	3.50	0	0	0	1	1	0	0	2	9.52	7.11
3.50	4.00	0	0	0	0	0	0	0	0	0.00	0.00
4.00	4.50	0	0	0	0	0	2	1	3	14.29	8.58
Freq		3	1	1	5	5	5	1	21		
%		14.29	4.76	4.76	23.81	23.81	23.81	4.76			
MHs		0.68	1.28	1.96	2.09	2.46	2.82	4.46			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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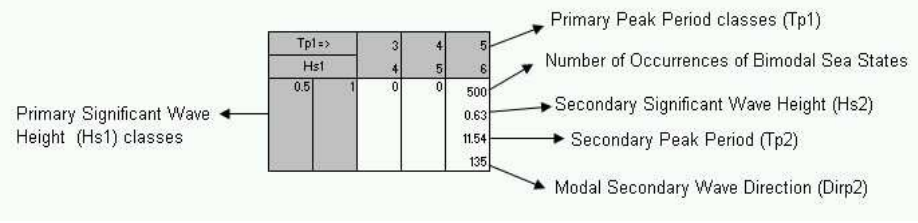
5.5.14.2 Primary Hs_1 versus Tp_1 and associated Secondary Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states (W)

Tp =>		3	4	5	6	7	8	9	10	Ocorr. Hs1	% Hs1
Hs1		4	5	6	7	8	9	10	11		
0.00	0.50	0	0	0	0	0	0	0	0	0	0.00
0.50	1.00	2 0.47 8.74 113	2 0.89 6.54 45	0	0	0	0	0	0	4	2.88
1.00	1.50	0	6 1.08 8.95 68	7 1.05 11.11 203	1 0.31 3.06 207	0	0	0	0	14	10.07
1.50	2.00	0	2 0.90 6.64 90	15 1.33 8.08 45	12 1.41 8.82 113	1 1.44 7.84 71	2 1.57 9.70 68	1 1.49 6.77 40	0	33	23.74
2.00	2.50	0	1 2.24 10.47 117	2 1.94 7.48 68	18 1.48 11.00 113	5 1.93 9.68 45	3 0.60 4.04 225	1 1.67 7.11 42	0	30	21.58
2.50	3.00	0	0	0	8 1.61 7.80 68	11 1.69 9.51 203	3 1.50 9.79 113	0	0	22	15.83
3.00	3.50	0	0	0	1 1.99 8.17 182	6 0.80 7.54 68	6 0.77 8.21 45	0	0	13	9.35
3.50	4.00	0	0	0	0	1 1.17 7.80 83	8 1.50 9.60 135	1 1.36 9.12 171	0	10	7.19
4.00	4.50	0	0	0	0	0	7 1.22 8.84 45	4 1.30 8.97 113	0	11	7.91
4.50	5.00	0	0	0	0	0	0	1 2.32 14.04 161	1 1.52 9.79 143	2	1.44
Freq.		2	11	24	40	24	29	8	1	139	
%		1.44	7.91	17.27	28.78	17.27	20.86	5.76	0.72		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.15 Distribution of Hs versus Tp for Primary Peak Waves approaching from WNW Direction

5.5.15.1 Primary Hs1 versus Tp1 for Unimodal sea-states (WNW)

Hs(m)		Tp(s)						Freq	%	MTp
		3	4	5	6	7	8			
		4	5	6	7	8	9			
0.00	0.50	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	1	0	0	0	0	0	1	16.67	3.38
1.00	1.50	0	0	0	1	0	1	2	33.33	7.46
1.50	2.00	0	0	0	0	0	1	1	16.67	8.56
2.00	2.50	0	0	0	0	1	0	1	16.67	7.62
2.50	3.00	0	0	0	1	0	0	1	16.67	6.75
3.00	3.50	0	0	0	0	0	0	0	0.00	0.00
3.50	4.00	0	0	0	0	0	0	0	0.00	0.00
4.00	4.50	0	0	0	0	0	0	0	0.00	0.00
4.50	5.00	0	0	0	0	0	0	0	0.00	0.00
Freq		1	0	0	2	1	2	6		
%		16.67	0.00	0.00	33.33	16.67	33.33			
MHs		0.78	0.00	0.00	1.96	2.32	1.52			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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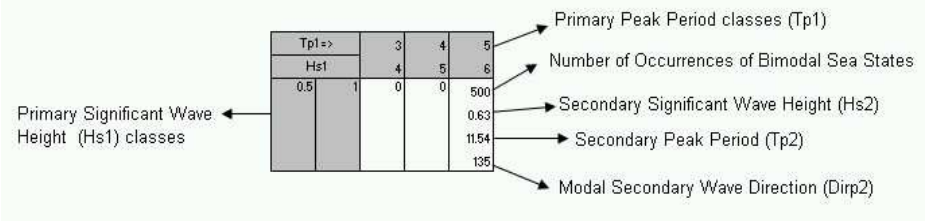
5.5.15.2 Primary Hs_1 versus Tp_1 and associated Secondary Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states (WNW)

Tp =>		3	4	5	6	7	8	Ocorr. Hs1	% Hs1
Hs1		4	5	6	7	8	9		
0.00	0.50	0	0	0	0	0	0	0	0.00
0.50	1.00	3 0.46 4.87 23	2 0.58 9.45 45	0	1 0.54 4.17 216	0	0	6	11.54
1.00	1.50	0	4 0.52 9.95 158	4 0.51 7.34 68	0	0	0	8	15.38
1.50	2.00	0	0	7 1.55 8.03 68	2 1.43 8.75 113	2 1.31 5.48 203	0	11	21.15
2.00	2.50	0	1 1.49 9.72 161	0	10 1.54 7.95 45	1 0.49 3.30 19	1 0.36 3.32 232	13	25.00
2.50	3.00	0	0	1 1.77 10.34 174	4 1.78 6.77 180	4 1.76 9.14 113	0	9	17.31
3.00	3.50	0	0	0	0	3 1.58 9.30 113	1 1.48 8.37 120	4	7.69
3.50	4.00	0	0	0	0	0	0	0	0.00
4.00	4.50	0	0	0	0	0	1 1.50 10.35 62	1	1.92
4.50	5.00	0	0	0	0	0	0	0	0.00
Freq.		3	7	12	17	10	3	52	
%		5.77	13.46	23.08	32.69	19.23	5.77		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.16 Distribution of Hs versus Tp for Primary Peak Waves approaching from NW Direction

5.5.16.1 Primary Hs1 versus Tp1 for Unimodal sea-states (NW)

Hs(m)		Tp(s)						Freq	%	MTp
		3	4	5	6	7	8			
		4	5	6	7	8	9			
0.00	0.50	0	0	0	0	0	0	0	0.00	0.00
0.50	1.00	0	0	0	0	0	0	0	0.00	0.00
1.00	1.50	0	1	0	0	0	0	1	100.00	4.22
1.50	2.00	0	0	0	0	0	0	0	0.00	0.00
2.00	2.50	0	0	0	0	0	0	0	0.00	0.00
2.50	3.00	0	0	0	0	0	0	0	0.00	0.00
3.00	3.50	0	0	0	0	0	0	0	0.00	0.00
3.50	4.00	0	0	0	0	0	0	0	0.00	0.00
Freq		0	1	0	0	0	0	1		
%		0.00	100.00	0.00	0.00	0.00	0.00			
MHs		0.00	1.10	0.00	0.00	0.00	0.00			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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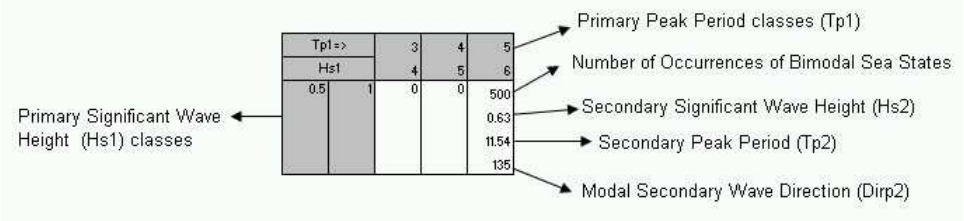
5.5.16.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (NW)

Tp =>		3	4	5	6	7	8	Ocorr. Hs1	% Hs1
Hs1		4	5	6	7	8	9		
0.00	0.50	0	0	0	0	0	0	0	0.00
0.50	1.00	1 0.55 5.22 28	4 0.89 7.30 90	0	0	1 0.13 3.05 258	0	6	15.79
1.00	1.50	0	6 0.75 5.63 68	2 0.96 7.63 45	0	0	0	8	21.05
1.50	2.00	0	1 1.56 9.83 99	5 1.70 7.79 45	1 1.80 7.64 54	2 1.33 5.50 203	2 0.83 4.46 180	11	28.95
2.00	2.50	0	0	0	6 1.98 8.43 45	0	2 2.04 9.29 90	8	21.05
2.50	3.00	0	0	0	2 1.63 6.93 90	1 2.27 9.32 86	0	3	7.89
3.00	3.50	0	0	0	0	1 1.83 7.59 114	0	1	2.63
3.50	4.00	0	0	0	0	1 1.65 8.21 77	0	1	2.63
Freq.		1	11	7	9	6	4	38	
%		2.63	28.95	18.42	23.68	15.79	10.53		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.5.17 Distribution of Hs versus Tp for Primary Peak Waves approaching from NNW Direction

5.5.17.1 Primary Hs1 versus Tp1 for Unimodal sea-states (NNW)

Hs(m)		Tp(s)						Freq	%	MTp
		3	4	5	6	7	8			
		4	5	6	7	8	9			
0.00	**0.50**	0	0	0	0	0	0	**0**	**0.00**	**0.00**
0.50	**1.00**	0	1	0	0	1	0	**2**	**18.18**	**5.91**
1.00	**1.50**	0	2	4	0	0	3	**9**	**81.82**	**6.15**
1.50	**2.00**	0	0	0	0	0	0	**0**	**0.00**	**0.00**
2.00	**2.50**	0	0	0	0	0	0	**0**	**0.00**	**0.00**
2.50	**3.00**	0	0	0	0	0	0	**0**	**0.00**	**0.00**
Freq		**0**	**3**	**4**	**0**	**1**	**3**	**11**		
%		**0.00**	**27.27**	**36.36**	**0.00**	**9.09**	**27.27**			
MHs		**0.00**	**1.20**	**1.36**	**0.00**	**0.90**	**1.26**			

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

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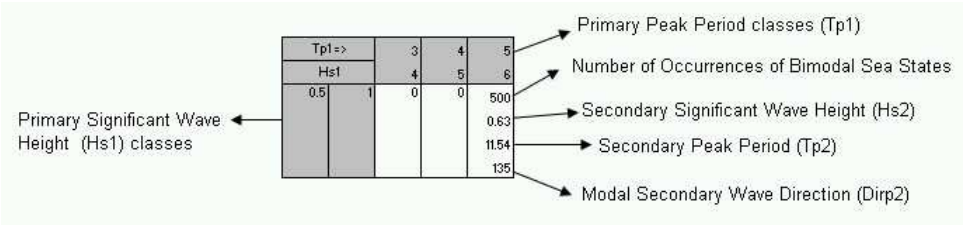
5.5.17.2 Primary Hs1 versus Tp1 and associated Secondary Hs2, Tp2, Dirp2 for Bimodal sea states (NNW)

Tp =>		3	4	5	6	7	8	Ocorr. Hs1	% Hs1
Hs1		4	5	6	7	8	9		
0.00	0.50	0	0	0	0	0	0	0	0.00
0.50	1.00	4 0.55 11.79 113	5 0.69 10.56 158	0	0	2 0.40 3.51 225	0	11	15.71
1.00	1.50	0	10 1.03 7.68 68	14 1.14 7.16 68	1 1.01 5.01 232	0	2 0.13 3.05 225	27	38.57
1.50	2.00	0	0	13 1.58 7.49 68	5 1.73 8.06 45	1 1.31 5.42 203	0	19	27.14
2.00	2.50	0	0	1 2.05 8.28 52	5 1.83 7.87 90	1 0.31 3.05 241	0	7	10.00
2.50	3.00	0	0	0	3 2.21 8.71 45	3 1.86 8.45 45	0	6	8.57
Freq.		4	15	28	14	7	2	70	
%		5.71	21.43	40.00	20.00	10.00	2.86		

Source: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals. Ref [11].

The legend below explains how to interpret the information on the cells of the table.



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5.6 Wave Spreading Formulation for Santos Basin

A random sea state can be described by the directional wave spectrum S(f,θ) that specifies the wave energy distribution over frequency and directions. As the directional characteristics are usually assumed to be independent of frequency, it permits that the general expression for the directional spectrum S(f, θ) = D(f, θ)*S(f) would be expressed as a product of wave directional spreading function D(θ) multiplied by the frequency spectrum:

S(f, θ) = D(θ)*S(f)

where the specified directional spreading function satisfies the constraint:

$$\int_{-\pi}^{\pi} D(\theta)^* d\theta = 1$$

The most used directionl spreading functions are:

$$D_1(\theta) = C_1(n)\cdot\left(\cos(\theta-\bar{\theta})\right)^n \qquad \text{for } -\tfrac{1}{2}\pi \leqslant (\theta-\bar{\theta}) \leqslant +\tfrac{1}{2}\pi$$

$$D_2(\theta) = C_2(s)\cdot\left[\cos\left(\frac{\theta-\bar{\theta}}{2}\right)\right]^{2s} \qquad \text{for } -\pi \leqslant (\theta-\bar{\theta}) \leqslant +\pi$$

$$D_1(\theta) = D_2(\theta) = 0 \qquad \text{for all other } (\theta-\bar{\theta})$$

where the factors $C_1(\theta)$ and $C_2(\theta)$ are calculated using the gamma function Γ:

$$C_1(n) = \frac{\Gamma(n/2+1)}{\sqrt{\pi}\Gamma(n/2+1/2)}$$

$$C_2(s) = \frac{\Gamma(s+1)}{2\sqrt{\pi}\Gamma(s+1/2)}$$

The adjusted wave spreading parameter "***s***" calculated for Santos Basin to be used in the formulation for $D_2(\theta)$ and $C_2(s)$ is provided below:

$$s = 20.3952*\tanh(0.128*tp-1.88) + 0.3058*(hs^{1.582}) + 24$$

If the designer prefers to use the wave spreading parameter "***n***" for $D_1(\theta)$ and $C_1(n)$, a formulation from Reference [1] to convert the above calculated "***s***" to "***n***" is provided below:

$$aux = 0.5 * (1 + s*(s-1) / ((s+1)*(s+2)))$$

$$n = (2*aux - 1) / (1 - aux)$$

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6. CURRENT DATA

6.1 Regional Current Circulation

The Central BS Cluster fields are located at the São Paulo Plateau, where the oceanic flow is very variable and sometimes affected by large scale eddies. The Brazil Current is mainly flowing further north (Figure 6.1.1) with its surface jet core between the isobath contours of 200 m and 1000 m, close to the upper continental slope, and its influence is not active at the region of Central BS Cluster. Under some perturbed conditions, mesoscale activity such as eddies and meanders can cause a southward displacement of the jet to a position further down the 2000 m isobath (Figure 6.1.2).

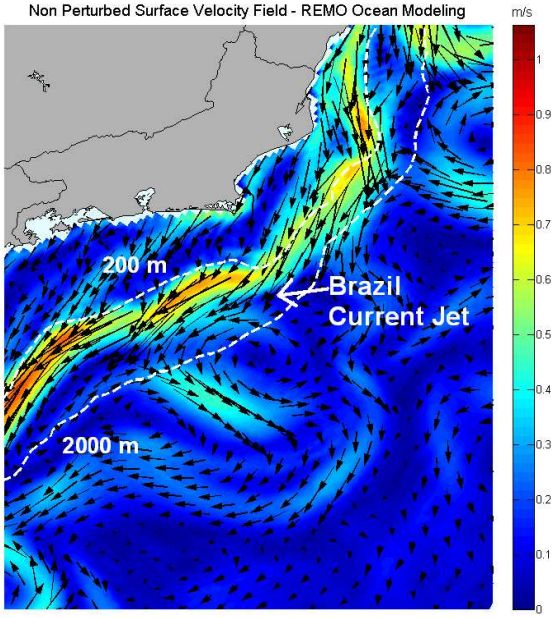

Figure 6.1.1 – Surface current field with the Brazil Current flowing into Santos Basin.

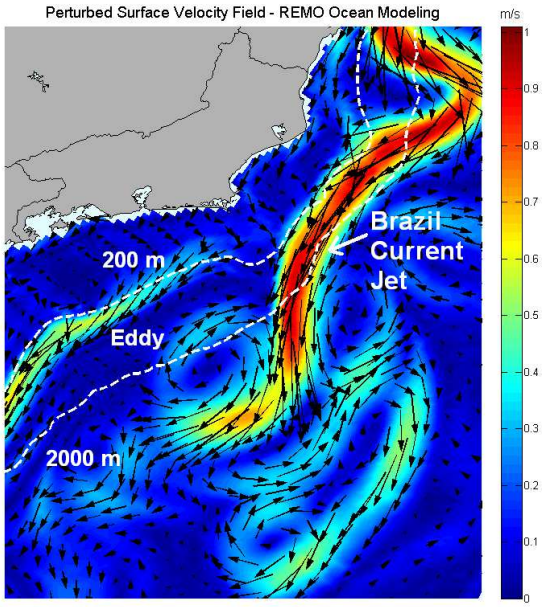

Figure 6.1.2 – Surface current field with a cyclonic eddy offshore Cabo

Source: Oceanographic Modeling and Observation Network (REMO)
PETROBRAS research project PT-128.01.11660. Ref [12].

The complex variability of the oceanic flow at the Central BS cluster region can be observed on Figures 6.1.3 and 6.1.4 below, where stick vectors indicate direction towards which surface currents are flowing. These maps were obtained from a PETROBRAS research project that funded transects made by an oceanographic vessel over Santos Basin to evaluate its current and termo-haline spatial structure.

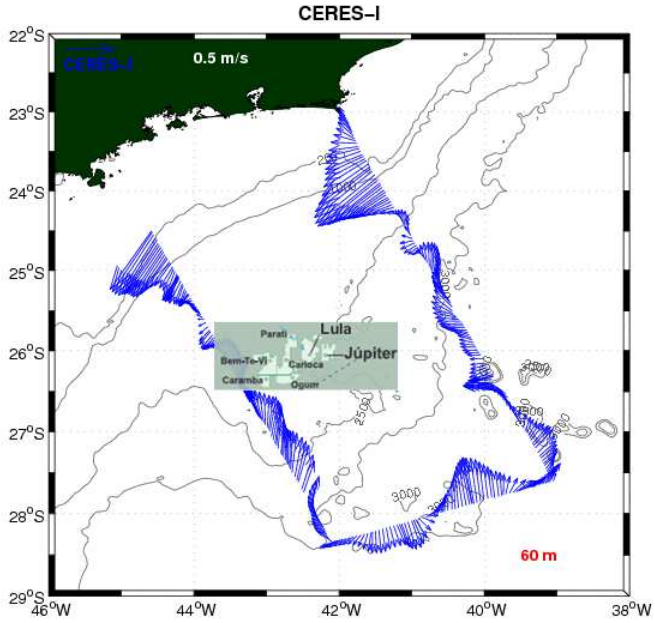

Figure 6.1.3 – Surface current transects made by research cruise CERES-I on January 2008

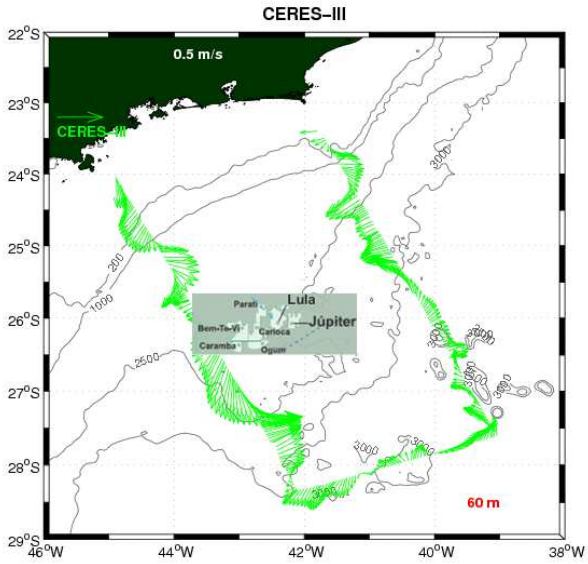

Figure 6.1.4 – Surface current transects made by research cruise CERES-III on May 2009

Source: Study of Extreme Metocean Conditions
PETROBRAS research project PT-128.01.11035. Ref [13].

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6.1.1 Joint Distribution of Surface Current Speed (m/s) and Direction

Spd	Dir>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	%
0.00	0.05	78	69	80	70	65	73	73	57	59	56	65	86	85	78	71	80	1145	4.6
0.05	0.10	174	198	202	196	181	189	178	194	209	175	187	209	249	251	235	169	3196	12.8
0.10	0.15	277	264	272	234	234	236	266	262	240	224	275	273	334	283	326	265	4265	17.1
0.15	0.20	314	327	278	230	267	273	294	300	287	283	250	274	303	298	318	290	4586	18.4
0.20	0.25	309	296	255	248	246	204	259	260	280	243	252	213	263	248	258	271	4105	16.4
0.25	0.30	219	227	245	165	161	185	227	152	175	187	168	174	168	176	149	172	2950	11.8
0.30	0.35	137	197	192	118	108	114	140	101	117	118	128	111	96	88	73	109	1947	7.8
0.35	0.40	70	101	107	61	41	59	103	45	78	66	80	95	77	50	44	38	1115	4.5
0.40	0.45	35	73	35	33	7	12	47	12	61	49	65	70	51	46	18	12	626	2.5
0.45	0.50	18	45	14	19	14	3	14	16	33	18	47	54	52	28	13	6	394	1.6
0.50	0.55	5	31	4	6	2	0	1	8	27	17	26	36	28	20	7	4	222	0.9
0.55	0.60	4	14	4	1	3	0	0	11	30	18	8	12	9	6	2	2	124	0.5
0.60	0.65	0	2	0	0	2	0	0	5	29	11	5	3	14	5	0	0	76	0.3
0.65	0.70	0	0	0	0	0	0	0	4	15	1	1	1	18	7	0	0	47	0.2
0.70	0.75	0	0	0	0	0	0	0	4	8	1	0	1	17	10	0	0	41	0.2
0.75	0.80	0	0	0	0	0	0	0	5	6	5	0	4	14	5	0	0	39	0.2
0.80	0.85	0	0	0	0	0	0	0	3	4	1	0	2	8	2	0	0	20	0.1
0.85	0.90	0	0	0	0	0	0	0	3	10	0	0	1	6	0	0	0	20	0.1
0.90	0.95	0	0	0	0	0	0	0	1	11	0	0	0	4	0	0	0	16	0.1
0.95	1.00	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	18	0.1
1.00	1.05	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	11	0.0
1.05	1.10	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	5	0.0
1.10	1.15	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	4	0.0
1.15	1.20	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0.0
1.20	1.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
1.25	1.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total		1640	1844	1688	1381	1331	1348	1602	1447	1715	1473	1557	1619	1796	1601	1514	1418	24974	
% Dir		6.57	7.38	6.76	5.53	5.33	5.4	6.41	5.79	6.87	5.9	6.23	6.48	7.19	6.41	6.06	5.68		
Max Spd		0.2	0.23	0.21	0.2	0.19	0.19	0.21	0.21	0.26	0.22	0.22	0.22	0.23	0.2	0.18	0.19		

Source: PETROBRAS Metocean Database (Engineering measurement program – mooring P1). Ref [7].

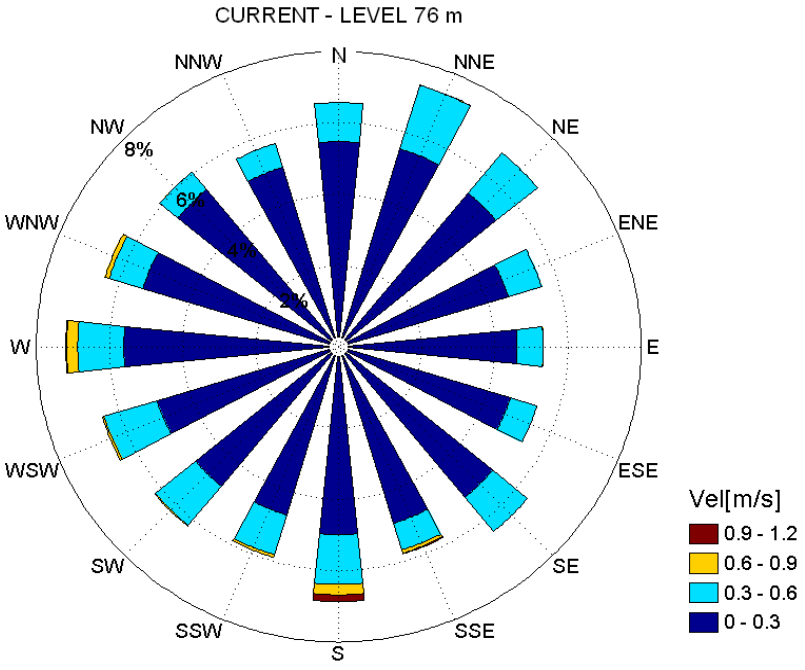

Figure 6.1.1.1 Directional percentage of currents at level 76 m (surface layer)

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6.1.2 Joint Distribution of Current Speed (m/s) and Direction at Level 250 m

Speed	Dir>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	% Speed
0.00	0.05	145	139	146	148	140	145	161	152	128	126	141	149	155	160	151	141	2327	9.32
0.05	0.10	380	333	405	363	372	327	396	360	345	319	353	351	417	451	386	381	5939	23.78
0.10	0.15	511	468	433	353	338	298	424	386	459	384	400	540	486	462	547	511	7000	28.03
0.15	0.20	484	416	261	175	136	178	233	233	296	313	400	403	368	302	342	394	4934	19.76
0.20	0.25	232	253	155	84	63	63	104	132	146	216	233	207	184	143	150	157	2522	10.10
0.25	0.30	98	122	45	38	36	42	24	70	105	105	132	98	97	89	56	51	1208	4.84
0.30	0.35	37	38	5	9	3	2	12	35	80	47	57	68	62	30	8	12	505	2.02
0.35	0.40	15	9	3	0	0	0	2	27	63	15	22	22	59	11	4	4	256	1.03
0.40	0.45	2	3	0	0	0	0	0	20	48	8	6	8	23	8	1	0	127	0.51
0.45	0.50	0	3	0	0	0	0	0	11	40	3	5	3	10	3	0	0	78	0.31
0.50	0.55	0	0	0	0	0	0	0	9	30	1	1	1	1	1	0	0	44	0.18
0.55	0.60	0	0	0	0	0	0	0	3	22	0	1	0	0	0	0	0	26	0.10
0.60	0.65	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	0	7	0.03
0.65	0.70	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.00
0.70	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
0.75	0.80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Total		1904	1784	1453	1170	1088	1055	1356	1440	1768	1537	1751	1850	1862	1660	1645	1651	24974	
% Dir		7.62	7.14	5.82	4.68	4.36	4.22	5.43	5.77	7.08	6.15	7.01	7.41	7.46	6.65	6.59	6.61		
Max Speed		0.15	0.15	0.13	0.12	0.11	0.12	0.12	0.15	0.18	0.15	0.16	0.15	0.15	0.14	0.13	0.13		

Source: PETROBRAS Metocean Database (Engineering measurement program – mooring P1). Ref [7].

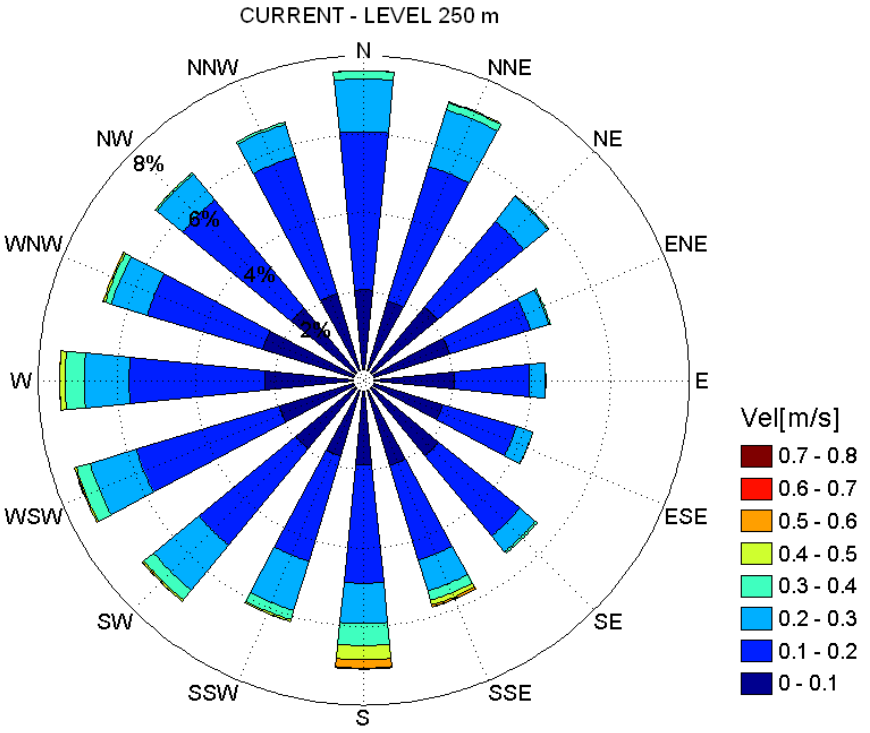

Figure 6.1.2.1 Directional percentage of currents at level 250 m

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6.1.3 Joint Distribution of Current Speed (m/s) and Direction at Level 800 m

Speed	Dir>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	% Speed
0.00	0.05	410	346	354	407	349	347	351	437	440	438	487	623	593	523	518	494	7117	28.49
0.05	0.10	654	514	399	337	369	352	398	487	602	703	841	962	1075	935	923	730	10281	41.17
0.10	0.15	268	201	151	110	130	89	146	258	343	338	514	526	511	437	372	290	4684	18.76
0.15	0.20	86	37	33	43	50	72	137	191	175	119	201	167	128	128	97	76	1740	6.97
0.20	0.25	26	25	24	22	40	95	156	95	66	53	36	54	22	56	39	31	840	3.36
0.25	0.30	4	9	5	3	20	57	46	28	22	15	14	6	5	4	25	8	271	1.09
0.30	0.35	3	0	2	0	3	11	2	0	0	0	0	0	0	5	11	4	41	0.16
0.35	0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
0.40	0.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
0.45	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
0.50	0.55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
0.55	0.60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Total		1451	1132	968	922	961	1023	1236	1496	1648	1666	2093	2338	2334	2088	1985	1633	24974	
% Dir		5.81	4.53	3.88	3.69	3.85	4.1	4.95	5.99	6.6	6.67	8.38	9.36	9.35	8.36	7.95	6.54		
Max Speed		0.08	0.08	0.07	0.07	0.08	0.1	0.11	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08		

Source: PETROBRAS Metocean Database (Engineering measurement program – mooring P1). Ref [7].

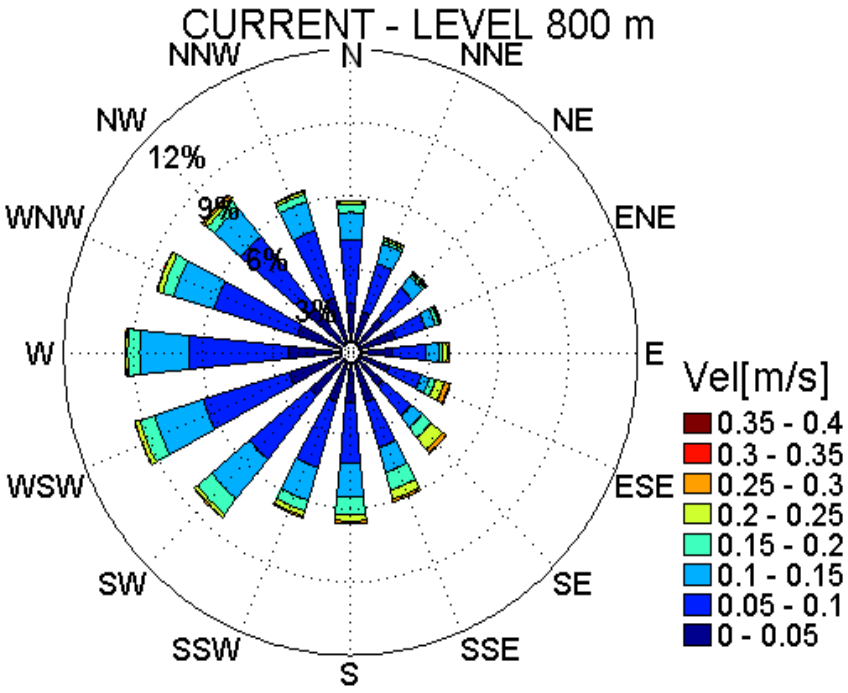

Figure 6.1.3.1 Directional percentage of currents at level 800 m

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6.1.4 Joint Distribution of Bottom Current Speed (m/s) and Direction at level 2200 m (*)

Speed	Dir>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	% Speed
0.00	0.05	428	567	878	1128	1080	869	860	663	501	366	302	264	212	196	203	306	8823	35.34
0.05	0.10	211	494	1319	2048	3045	1392	1031	773	587	350	152	59	39	36	21	75	11632	46.59
0.10	0.15	18	92	502	894	586	348	240	224	252	136	37	2	1	0	0	4	3336	13.36
0.15	0.20	1	8	114	289	239	52	25	16	26	34	11	2	0	0	0	0	817	3.27
0.20	0.25	0	0	15	107	159	12	0	1	0	2	0	0	0	0	0	0	296	1.19
0.25	0.30	0	0	0	3	58	1	0	0	0	0	0	0	0	0	0	0	62	0.25
0.30	0.35	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.00
0.35	0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Total		658	1161	2828	4469	5168	2674	2156	1677	1366	888	502	327	252	232	224	385	24967	
% Dir		2.64	4.65	11.33	17.90	20.70	10.71	8.64	6.72	5.47	3.56	2.01	1.31	1.01	0.93	0.90	1.54		
Max Speed		0.04	0.06	0.07	0.08	0.08	0.07	0.06	0.06	0.07	0.07	0.05	0.03	0.03	0.03	0.03	0.03		

Source: PETROBRAS Metocean Database (Engineering measurement program – mooring P1). Ref [7].

(*) measurements made 5 meters above the seafloor

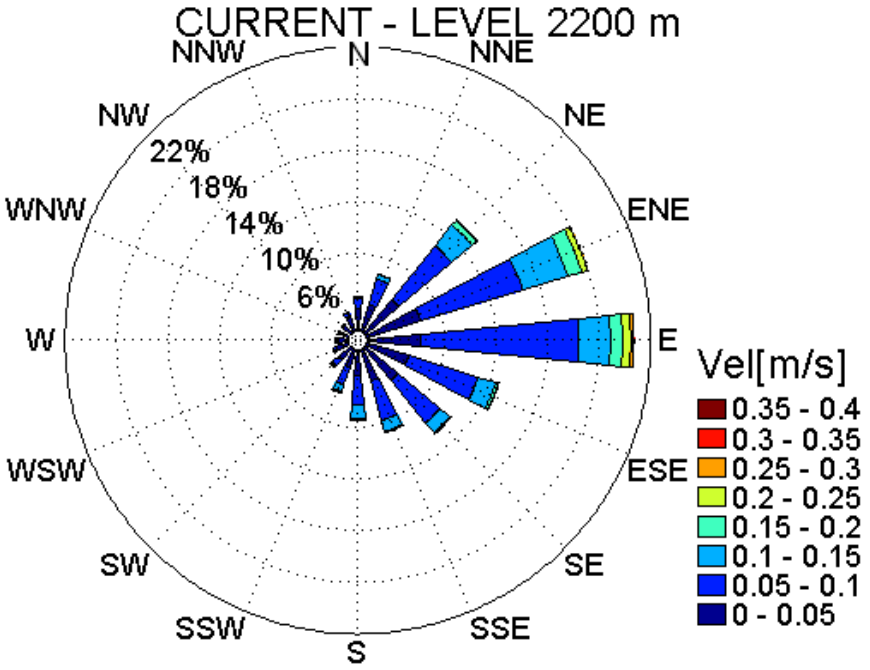

Figure 6.1.4.1 Directional percentage of currents at level 2200 m (bottom layer)

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6.2 Extreme Current Profile

Figure 6.2.1 below presents examples of two measured current profiles from an oceanographic mooring nearby the Central BS Cluster fields. It is observed that the profile with maximum currents on the surface layer is not correlated with the profile with maximum deep layer currents. Thus, it is presented two sets of extreme current tables in this metocean document. A first set is related to extreme surface currents (tables 6.2.1 to 6.2.16) and the second set is related with extreme mid-water currents (tables 6.2.17 to 6.2.24).

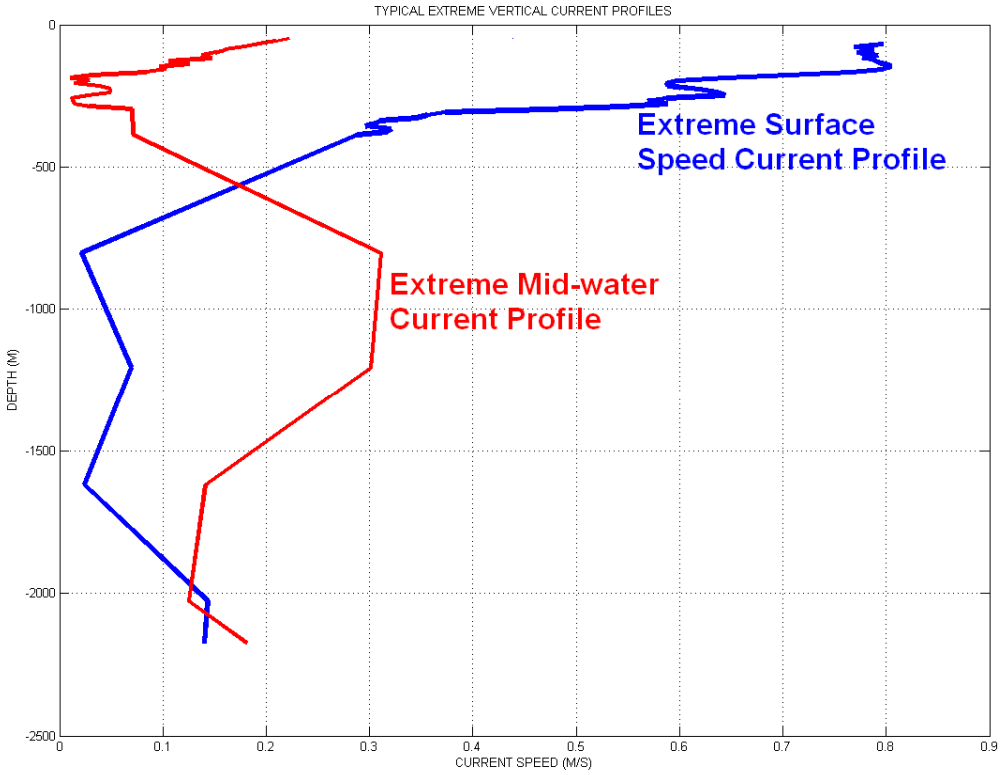

Figure 6.2.1 – Measured profiles with maximum surface (blue) and mid-water (red) currents.

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6.2.1 Profile of Extreme Currents (m/s) With Surface N Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.76	0.92	0.96	0.99	1.01	1.05	1.16	N
-50	0.74	0.90	0.94	0.97	1.00	1.03	1.14	N
-100	0.61	0.77	0.81	0.83	0.86	0.89	1.00	N
-150	0.61	0.77	0.81	0.83	0.86	0.89	0.99	N
-200	0.61	0.76	0.80	0.83	0.85	0.89	0.99	N
-250	0.54	0.69	0.73	0.75	0.78	0.81	0.91	N
-300	0.47	0.62	0.65	0.67	0.70	0.73	0.82	N
-350	0.41	0.55	0.58	0.60	0.63	0.65	0.74	N
-375	0.35	0.48	0.52	0.54	0.56	0.59	0.67	N
-800	0.26	0.36	0.38	0.39	0.41	0.43	0.49	N
-1200	0.21	0.27	0.29	0.30	0.31	0.32	0.36	N
-1600	0.20	0.25	0.26	0.27	0.28	0.29	0.32	NE
-2000	0.25	0.29	0.30	0.30	0.31	0.32	0.34	ENE
-2200	0.21	0.24	0.25	0.25	0.26	0.27	0.29	ENE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.2 Profile of Extreme Currents (m/s) With Surface NNE Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.86	1.03	1.07	1.09	1.11	1.15	1.26	NNE
-50	0.85	1.02	1.06	1.08	1.11	1.14	1.25	NNE
-100	0.66	0.82	0.86	0.88	0.90	0.94	1.04	NNE
-150	0.63	0.79	0.83	0.85	0.88	0.91	1.01	NNE
-200	0.60	0.75	0.79	0.82	0.84	0.88	0.97	NNE
-250	0.55	0.70	0.74	0.76	0.78	0.82	0.91	NNE
-300	0.47	0.62	0.65	0.67	0.70	0.73	0.82	NNE
-350	0.42	0.56	0.59	0.61	0.63	0.66	0.74	NNE
-375	0.38	0.51	0.54	0.56	0.58	0.61	0.69	NNE
-800	0.28	0.38	0.40	0.41	0.43	0.45	0.50	NNE
-1200	0.21	0.27	0.29	0.30	0.31	0.32	0.36	NNE
-1600	0.22	0.27	0.28	0.28	0.29	0.30	0.33	NE
-2000	0.26	0.29	0.30	0.31	0.31	0.32	0.34	ENE
-2200	0.22	0.24	0.25	0.25	0.26	0.27	0.28	ENE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.3 Profile of Extreme Currents (m/s) With Surface NE Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.96	1.13	1.17	1.19	1.21	1.25	1.35	NE
-50	0.96	1.13	1.17	1.19	1.21	1.25	1.35	NE
-100	0.70	0.86	0.90	0.92	0.94	0.98	1.07	NE
-150	0.64	0.80	0.84	0.86	0.89	0.92	1.02	NE
-200	0.58	0.74	0.78	0.80	0.82	0.86	0.95	NE
-250	0.55	0.70	0.74	0.76	0.78	0.82	0.91	NE
-300	0.47	0.61	0.65	0.67	0.69	0.72	0.81	NE
-350	0.42	0.56	0.59	0.61	0.63	0.66	0.74	NE
-375	0.40	0.53	0.56	0.58	0.60	0.62	0.70	NE
-800	0.30	0.39	0.41	0.42	0.44	0.46	0.51	NE
-1200	0.21	0.27	0.29	0.30	0.31	0.32	0.36	NE
-1600	0.23	0.28	0.29	0.29	0.30	0.31	0.34	ENE
-2000	0.26	0.29	0.30	0.31	0.31	0.32	0.34	ENE
-2200	0.22	0.24	0.25	0.25	0.26	0.26	0.27	ENE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.4 Profile of Extreme Currents (m/s) With Surface ENE Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.89	1.04	1.08	1.10	1.12	1.16	1.25	ENE
-50	0.88	1.03	1.07	1.09	1.11	1.14	1.24	ENE
-100	0.67	0.81	0.84	0.86	0.88	0.92	1.00	ENE
-150	0.59	0.73	0.77	0.79	0.81	0.84	0.93	ENE
-200	0.51	0.65	0.68	0.70	0.72	0.76	0.84	ENE
-250	0.45	0.58	0.62	0.64	0.66	0.69	0.77	ENE
-300	0.39	0.51	0.55	0.57	0.59	0.61	0.69	ENE
-350	0.35	0.47	0.50	0.52	0.54	0.56	0.64	ENE
-375	0.32	0.44	0.47	0.48	0.50	0.52	0.59	ENE
-800	0.25	0.32	0.34	0.35	0.36	0.38	0.42	ENE
-1200	0.21	0.25	0.26	0.27	0.28	0.29	0.32	ENE
-1600	0.22	0.26	0.26	0.27	0.27	0.28	0.30	ENE
-2000	0.24	0.27	0.27	0.28	0.28	0.29	0.31	ENE
-2200	0.23	0.25	0.25	0.25	0.26	0.26	0.27	ENE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.5 Profile of Extreme Currents (m/s) With Surface E Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.82	0.95	0.99	1.01	1.03	1.06	1.14	E
-50	0.80	0.93	0.96	0.98	1.01	1.03	1.12	E
-100	0.63	0.75	0.78	0.80	0.82	0.85	0.93	E
-150	0.53	0.66	0.69	0.71	0.73	0.76	0.84	E
-200	0.43	0.55	0.58	0.60	0.62	0.65	0.73	E
-250	0.34	0.46	0.49	0.51	0.53	0.55	0.63	E
-300	0.30	0.41	0.44	0.46	0.48	0.50	0.57	E
-350	0.27	0.38	0.40	0.42	0.44	0.46	0.53	E
-375	0.24	0.34	0.37	0.38	0.40	0.42	0.48	E
-800	0.20	0.25	0.26	0.27	0.28	0.29	0.33	NE
-1200	0.20	0.22	0.23	0.23	0.24	0.25	0.28	NE
-1600	0.20	0.23	0.23	0.24	0.24	0.24	0.26	NE
-2000	0.22	0.24	0.24	0.25	0.25	0.26	0.27	NE
-2200	0.24	0.25	0.25	0.25	0.25	0.25	0.26	NE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.6 Profile of Extreme Currents (m/s) With Surface ESE Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.81	0.93	0.96	0.98	1.00	1.03	1.10	ESE
-50	0.80	0.92	0.95	0.97	0.99	1.01	1.09	ESE
-100	0.64	0.75	0.78	0.80	0.81	0.84	0.91	ESE
-150	0.50	0.62	0.64	0.66	0.68	0.71	0.78	ESE
-200	0.41	0.52	0.55	0.57	0.58	0.61	0.68	ESE
-250	0.34	0.45	0.48	0.49	0.51	0.53	0.60	ESE
-300	0.31	0.41	0.44	0.45	0.47	0.49	0.56	ESE
-350	0.28	0.37	0.40	0.41	0.43	0.45	0.51	ESE
-375	0.25	0.35	0.37	0.38	0.40	0.42	0.47	ESE
-800	0.21	0.27	0.28	0.29	0.30	0.31	0.35	E
-1200	0.21	0.25	0.27	0.27	0.28	0.29	0.33	E
-1600	0.20	0.23	0.23	0.24	0.24	0.25	0.27	E
-2000	0.23	0.25	0.25	0.26	0.26	0.27	0.28	E
-2200	0.24	0.25	0.25	0.25	0.25	0.25	0.26	E

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.7 Profile of Extreme Currents (m/s) With Surface SE Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.89	1.01	1.04	1.06	1.08	1.10	1.18	SE
-50	0.89	1.01	1.04	1.06	1.08	1.10	1.18	SE
-100	0.78	0.90	0.92	0.94	0.96	0.98	1.06	SE
-150	0.52	0.63	0.66	0.68	0.70	0.72	0.79	SE
-200	0.43	0.54	0.57	0.59	0.61	0.63	0.70	SE
-250	0.38	0.49	0.51	0.53	0.55	0.57	0.64	SE
-300	0.35	0.45	0.48	0.49	0.51	0.53	0.60	SE
-350	0.31	0.41	0.43	0.44	0.46	0.48	0.54	SE
-375	0.29	0.39	0.41	0.42	0.44	0.46	0.51	SE
-800	0.25	0.32	0.33	0.34	0.35	0.37	0.41	SE
-1200	0.23	0.28	0.29	0.30	0.31	0.32	0.35	ESE
-1600	0.22	0.25	0.26	0.26	0.27	0.28	0.30	ESE
-2000	0.25	0.28	0.29	0.29	0.30	0.30	0.32	ESE
-2200	0.25	0.27	0.27	0.27	0.28	0.28	0.29	ESE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.8 Profile of Extreme Currents (m/s) With Surface SSE Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.96	1.24	1.33	1.37	1.43	1.51	1.76	SSE
-50	0.96	1.24	1.33	1.37	1.43	1.51	1.76	SSE
-100	0.86	1.14	1.22	1.27	1.33	1.40	1.65	SSE
-150	0.64	0.92	1.00	1.05	1.11	1.18	1.43	SSE
-200	0.50	0.78	0.86	0.91	0.96	1.04	1.29	SSE
-250	0.45	0.71	0.79	0.84	0.89	0.96	1.20	SSE
-300	0.37	0.63	0.70	0.74	0.79	0.86	1.09	SSE
-350	0.30	0.54	0.61	0.65	0.70	0.77	0.98	SSE
-375	0.27	0.51	0.58	0.61	0.66	0.73	0.94	SSE
-800	0.23	0.36	0.39	0.41	0.44	0.47	0.58	SSE
-1200	0.20	0.28	0.30	0.32	0.33	0.35	0.42	SSE
-1600	0.24	0.27	0.28	0.28	0.29	0.30	0.32	SSE
-2000	0.29	0.29	0.29	0.29	0.29	0.29	0.30	SSE
-2200	0.29	0.29	0.29	0.29	0.30	0.30	0.30	SSE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.9 Profile of Extreme Currents (m/s) With Surface S Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	1.04	1.36	1.46	1.51	1.58	1.67	1.98	S
-50	1.04	1.36	1.46	1.51	1.58	1.67	1.98	S
-100	0.86	1.19	1.28	1.33	1.40	1.49	1.79	S
-150	0.68	1.01	1.10	1.16	1.23	1.32	1.62	S
-200	0.54	0.86	0.95	1.00	1.07	1.16	1.45	S
-250	0.48	0.78	0.87	0.92	0.99	1.08	1.36	S
-300	0.39	0.69	0.77	0.82	0.88	0.97	1.24	S
-350	0.31	0.59	0.67	0.72	0.78	0.86	1.12	S
-375	0.29	0.56	0.64	0.68	0.74	0.82	1.07	S
-800	0.25	0.39	0.43	0.45	0.48	0.52	0.65	SSE
-1200	0.22	0.31	0.34	0.35	0.37	0.39	0.47	SSE
-1600	0.26	0.30	0.31	0.31	0.32	0.33	0.35	SSE
-2000	0.32	0.32	0.32	0.33	0.33	0.34	0.34	SSE
-2200	0.32	0.32	0.33	0.33	0.33	0.34	0.34	SSE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.10 Profile of Extreme Currents (m/s) With Surface SSW Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.95	1.24	1.32	1.37	1.42	1.50	1.75	SSW
-50	0.95	1.24	1.32	1.37	1.42	1.50	1.75	SSW
-100	0.83	1.12	1.20	1.24	1.30	1.37	1.62	SSW
-150	0.70	0.99	1.07	1.12	1.17	1.25	1.50	SSW
-200	0.60	0.88	0.95	0.99	1.06	1.13	1.37	SSW
-250	0.53	0.80	0.87	0.92	0.97	1.05	1.27	SSW
-300	0.40	0.66	0.73	0.77	0.82	0.89	1.11	SSW
-350	0.30	0.54	0.61	0.65	0.70	0.76	0.97	SSW
-375	0.29	0.52	0.58	0.62	0.67	0.73	0.93	SSW
-800	0.21	0.35	0.38	0.40	0.43	0.46	0.58	S
-1200	0.21	0.24	0.27	0.27	0.29	0.31	0.37	S
-1600	0.21	0.25	0.25	0.25	0.26	0.27	0.28	S
-2000	0.30	0.33	0.34	0.34	0.35	0.36	0.38	S
-2200	0.30	0.30	0.30	0.31	0.32	0.33	0.34	S

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.11 Profile of Extreme Currents (m/s) With Surface SW Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.86	1.11	1.18	1.22	1.27	1.33	1.52	SW
-50	0.86	1.11	1.18	1.22	1.27	1.33	1.52	SW
-100	0.80	1.04	1.11	1.15	1.20	1.26	1.45	SW
-150	0.72	0.96	1.03	1.08	1.12	1.18	1.37	SW
-200	0.65	0.89	0.95	0.99	1.04	1.10	1.28	SW
-250	0.58	0.82	0.88	0.91	0.95	1.02	1.19	SW
-300	0.41	0.63	0.69	0.72	0.76	0.82	0.99	SW
-350	0.30	0.49	0.55	0.57	0.62	0.66	0.82	SW
-375	0.30	0.48	0.53	0.56	0.59	0.64	0.79	SW
-800	0.25	0.30	0.34	0.36	0.38	0.41	0.50	SW
-1200	0.20	0.20	0.21	0.20	0.21	0.23	0.26	SSW
-1600	0.20	0.20	0.20	0.20	0.21	0.21	0.22	SSW
-2000	0.29	0.30	0.30	0.30	0.31	0.32	0.35	S
-2200	0.28	0.28	0.28	0.28	0.28	0.28	0.28	S

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.12 Profile of Extreme Currents (m/s) With Surface WSW Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.94	1.22	1.30	1.34	1.39	1.46	1.67	WSW
-50	0.94	1.21	1.29	1.33	1.38	1.45	1.67	WSW
-100	0.83	1.10	1.17	1.21	1.27	1.33	1.55	WSW
-150	0.72	0.99	1.06	1.10	1.15	1.22	1.44	WSW
-200	0.59	0.85	0.92	0.95	1.01	1.08	1.28	WSW
-250	0.53	0.78	0.85	0.89	0.93	1.00	1.19	WSW
-300	0.42	0.66	0.72	0.76	0.80	0.86	1.05	WSW
-350	0.34	0.55	0.61	0.64	0.69	0.74	0.92	WSW
-375	0.33	0.53	0.59	0.62	0.66	0.72	0.88	WSW
-800	0.21	0.33	0.36	0.37	0.40	0.42	0.52	SW
-1200	0.20	0.20	0.21	0.21	0.22	0.23	0.27	SW
-1600	0.20	0.20	0.21	0.21	0.23	0.24	0.27	SW
-2000	0.22	0.24	0.26	0.27	0.28	0.30	0.20	SSW
-2200	0.21	0.23	0.24	0.25	0.26	0.27	0.31	SSW

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.13 Profile of Extreme Currents (m/s) With Surface W Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	1.03	1.32	1.41	1.45	1.51	1.59	1.83	W
-50	1.02	1.31	1.40	1.44	1.50	1.58	1.82	W
-100	0.86	1.15	1.23	1.28	1.34	1.41	1.65	W
-150	0.72	1.01	1.09	1.13	1.19	1.26	1.50	W
-200	0.52	0.80	0.88	0.92	0.98	1.05	1.28	W
-250	0.48	0.75	0.82	0.86	0.91	0.98	1.20	W
-300	0.43	0.68	0.75	0.79	0.84	0.90	1.11	W
-350	0.38	0.61	0.68	0.71	0.76	0.82	1.01	W
-375	0.36	0.59	0.65	0.68	0.73	0.79	0.97	W
-800	0.25	0.35	0.38	0.39	0.41	0.44	0.53	WSW
-1200	0.21	0.22	0.22	0.23	0.23	0.24	0.27	WSW
-1600	0.20	0.21	0.22	0.23	0.25	0.27	0.32	SW
-2000	0.20	0.20	0.20	0.21	0.22	0.23	0.26	SSW
-2200	0.20	0.20	0.21	0.23	0.25	0.27	0.28	SSW

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.14 Profile of Extreme Currents (m/s) With Surface WNW Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.89	1.13	1.20	1.24	1.28	1.34	1.53	WNW
-50	0.88	1.12	1.19	1.22	1.27	1.33	1.51	WNW
-100	0.78	1.02	1.08	1.12	1.17	1.22	1.41	WNW
-150	0.68	0.92	0.98	1.01	1.06	1.12	1.30	WNW
-200	0.52	0.75	0.82	0.85	0.89	0.95	1.13	WNW
-250	0.46	0.68	0.74	0.77	0.81	0.86	1.03	WNW
-300	0.41	0.62	0.67	0.70	0.74	0.79	0.95	WNW
-350	0.36	0.55	0.61	0.63	0.67	0.72	0.87	WNW
-375	0.34	0.53	0.58	0.61	0.65	0.69	0.83	WNW
-800	0.23	0.32	0.34	0.35	0.37	0.40	0.47	WSW
-1200	0.19	0.23	0.23	0.24	0.25	0.26	0.29	WSW
-1600	0.17	0.19	0.21	0.21	0.22	0.24	0.27	SW
-2000	0.17	0.17	0.18	0.18	0.19	0.20	0.23	SSW
-2200	0.14	0.17	0.18	0.20	0.21	0.23	0.27	SSW

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.15 Profile of Extreme Currents (m/s) With Surface NW Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.75	0.94	0.99	1.02	1.05	1.09	1.22	NW
-50	0.74	0.92	0.97	1.00	1.03	1.07	1.20	NW
-100	0.70	0.88	0.93	0.96	0.99	1.03	1.16	NW
-150	0.64	0.82	0.87	0.89	0.93	0.97	1.09	NW
-200	0.52	0.70	0.75	0.77	0.80	0.84	0.97	NW
-250	0.43	0.60	0.65	0.67	0.70	0.74	0.86	NW
-300	0.38	0.55	0.59	0.61	0.64	0.68	0.79	NW
-350	0.34	0.49	0.53	0.55	0.58	0.62	0.72	NW
-375	0.32	0.47	0.51	0.53	0.56	0.59	0.69	NW
-800	0.20	0.28	0.30	0.31	0.33	0.35	0.40	WNW
-1200	0.20	0.23	0.24	0.25	0.26	0.27	0.30	WNW
-1600	0.20	0.20	0.20	0.21	0.21	0.22	0.22	WNW
-2000	0.20	0.20	0.20	0.21	0.21	0.22	0.22	WNW
-2200	0.20	0.20	0.20	0.21	0.21	0.22	0.22	WNW

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.16 Profile of Extreme Currents (m/s) With Surface NNW Direction

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.76	0.93	0.98	1.01	1.03	1.07	1.19	NNW
-50	0.74	0.91	0.96	0.99	1.02	1.05	1.17	NNW
-100	0.66	0.83	0.87	0.90	0.93	0.96	1.08	NNW
-150	0.63	0.80	0.84	0.86	0.90	0.93	1.04	NNW
-200	0.57	0.73	0.78	0.80	0.83	0.87	0.98	NNW
-250	0.49	0.65	0.69	0.71	0.74	0.78	0.89	NNW
-300	0.43	0.59	0.62	0.64	0.67	0.71	0.81	NNW
-350	0.38	0.52	0.56	0.58	0.61	0.64	0.73	NNW
-375	0.34	0.48	0.52	0.54	0.56	0.59	0.68	NNW
-800	0.23	0.32	0.34	0.35	0.37	0.39	0.45	NW
-1200	0.19	0.25	0.27	0.28	0.29	0.30	0.33	WNW
-1600	0.18	0.22	0.23	0.23	0.24	0.25	0.27	WNW
-2000	0.22	0.24	0.25	0.25	0.25	0.26	0.27	WNW
-2200	0.20	0.20	0.20	0.21	0.22	0.23	0.24	WNW

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.17 Profile of Extreme Currents (m/s) With N Direction at Reference Level 800 m

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.27	0.36	0.37	0.39	0.40	0.42	0.47	NNE
-100	0.34	0.42	0.44	0.45	0.46	0.48	0.53	NNE
-150	0.30	0.39	0.40	0.42	0.43	0.45	0.50	NNE
-200	0.29	0.37	0.40	0.41	0.42	0.44	0.50	NNE
-250	0.30	0.39	0.41	0.43	0.44	0.46	0.51	NNE
-300	0.30	0.39	0.41	0.43	0.44	0.46	0.51	NNE
-350	0.37	0.47	0.48	0.50	0.51	0.53	0.58	NNE
-375	0.39	0.47	0.49	0.51	0.52	0.54	0.59	NNE
-800	0.35	0.42	0.44	0.45	0.46	0.47	0.52	N
-1200	0.36	0.43	0.44	0.46	0.47	0.48	0.53	N
-1600	0.30	0.38	0.40	0.41	0.43	0.44	0.50	NE
-2000	0.25	0.33	0.34	0.36	0.37	0.38	0.44	NE
-2200	0.33	0.40	0.43	0.44	0.44	0.46	0.51	ENE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.18 Profile of Extreme Currents (m/s) With NE Direction at Reference Level 800 m

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.27	0.34	0.36	0.37	0.38	0.40	0.45	ENE
-100	0.29	0.36	0.38	0.39	0.40	0.42	0.47	ENE
-150	0.31	0.39	0.41	0.42	0.43	0.45	0.50	ENE
-200	0.35	0.42	0.45	0.46	0.48	0.49	0.55	ENE
-250	0.36	0.44	0.46	0.47	0.48	0.50	0.56	ENE
-300	0.33	0.40	0.42	0.44	0.45	0.47	0.53	ENE
-350	0.31	0.39	0.41	0.42	0.43	0.45	0.50	ENE
-375	0.30	0.37	0.40	0.40	0.42	0.43	0.49	ENE
-800	0.30	0.36	0.37	0.38	0.39	0.40	0.45	NE
-1200	0.24	0.29	0.31	0.32	0.33	0.34	0.39	NE
-1600	0.23	0.30	0.32	0.33	0.34	0.36	0.41	E
-2000	0.20	0.26	0.29	0.29	0.31	0.32	0.37	E
-2200	0.29	0.36	0.37	0.38	0.40	0.41	0.46	E

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.19 Profile of Extreme Currents (m/s) With E Direction at Reference Level 800 m

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.56	0.72	0.76	0.79	0.82	0.87	0.99	ESE
-100	0.53	0.69	0.74	0.76	0.80	0.84	0.97	ESE
-150	0.49	0.66	0.70	0.73	0.75	0.80	0.93	ESE
-200	0.44	0.60	0.64	0.67	0.69	0.74	0.87	ESE
-250	0.40	0.55	0.60	0.62	0.65	0.69	0.81	ESE
-300	0.39	0.53	0.58	0.60	0.63	0.67	0.78	ESE
-350	0.35	0.48	0.53	0.54	0.57	0.60	0.72	ESE
-375	0.32	0.46	0.49	0.51	0.53	0.57	0.67	ESE
-800	0.34	0.39	0.41	0.42	0.43	0.44	0.48	E
-1200	0.28	0.34	0.36	0.37	0.38	0.39	0.44	E
-1600	0.21	0.23	0.25	0.26	0.28	0.30	0.37	ENE
-2000	0.21	0.30	0.32	0.34	0.36	0.39	0.46	ENE
-2200	0.22	0.31	0.34	0.35	0.38	0.39	0.48	ENE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.20 Profile of Extreme Currents (m/s) With SE Direction at Reference Level 800 m

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.55	0.71	0.74	0.77	0.79	0.84	0.96	SSW
-100	0.55	0.69	0.73	0.76	0.79	0.83	0.95	S
-150	0.47	0.61	0.66	0.68	0.71	0.75	0.87	S
-200	0.40	0.54	0.58	0.61	0.63	0.67	0.79	S
-250	0.34	0.48	0.51	0.54	0.56	0.60	0.71	S
-300	0.34	0.47	0.51	0.53	0.55	0.59	0.69	SSE
-350	0.30	0.42	0.45	0.47	0.50	0.53	0.62	SSE
-375	0.28	0.40	0.43	0.44	0.47	0.50	0.59	SSE
-800	0.35	0.39	0.40	0.41	0.42	0.43	0.46	SE
-1200	0.26	0.32	0.33	0.34	0.36	0.37	0.42	E
-1600	0.20	0.21	0.23	0.25	0.26	0.28	0.35	E
-2000	0.20	0.29	0.32	0.33	0.35	0.38	0.45	E
-2200	0.21	0.30	0.33	0.34	0.36	0.38	0.47	E

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.21 Profile of Extreme Currents (m/s) With S Direction at Reference Level 800 m

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.34	0.45	0.48	0.50	0.52	0.54	0.63	SSW
-100	0.30	0.41	0.44	0.45	0.48	0.50	0.59	SSW
-150	0.33	0.44	0.47	0.49	0.51	0.54	0.63	SSW
-200	0.37	0.48	0.51	0.53	0.55	0.58	0.67	SSW
-250	0.38	0.50	0.53	0.55	0.57	0.60	0.70	SSW
-300	0.37	0.49	0.52	0.53	0.56	0.59	0.68	SSW
-350	0.36	0.47	0.50	0.52	0.54	0.57	0.67	SSW
-375	0.34	0.45	0.48	0.50	0.53	0.56	0.64	SSW
-800	0.30	0.39	0.41	0.42	0.44	0.46	0.53	S
-1200	0.27	0.36	0.38	0.40	0.42	0.44	0.51	S
-1600	0.27	0.36	0.38	0.40	0.42	0.44	0.51	S
-2000	0.29	0.39	0.42	0.43	0.45	0.48	0.56	SE
-2200	0.30	0.40	0.42	0.45	0.46	0.49	0.58	SE

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.22 Profile of Extreme Currents (m/s) With SW Direction at Reference Level 800 m

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.47	0.59	0.62	0.65	0.67	0.70	0.79	SSW
-100	0.41	0.53	0.56	0.58	0.60	0.63	0.72	SSW
-150	0.39	0.51	0.54	0.56	0.58	0.61	0.70	SSW
-200	0.37	0.49	0.52	0.53	0.56	0.59	0.67	SSW
-250	0.37	0.48	0.52	0.53	0.56	0.58	0.66	SSW
-300	0.34	0.45	0.48	0.50	0.52	0.54	0.62	SSW
-350	0.32	0.44	0.46	0.48	0.50	0.53	0.60	SSW
-375	0.31	0.41	0.44	0.46	0.48	0.50	0.58	SSW
-800	0.30	0.39	0.41	0.43	0.44	0.47	0.53	SW
-1200	0.23	0.31	0.32	0.34	0.35	0.37	0.42	SW
-1600	0.25	0.32	0.34	0.35	0.37	0.38	0.44	WSW
-2000	0.26	0.32	0.34	0.35	0.35	0.37	0.42	WSW
-2200	0.23	0.30	0.32	0.32	0.34	0.35	0.40	WSW

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.2.23 Profile of Extreme Currents (m/s) With W Direction at Reference Level 800 m

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.40	0.54	0.58	0.60	0.63	0.66	0.78	SSW
-100	0.36	0.50	0.54	0.56	0.58	0.62	0.73	SSW
-150	0.36	0.50	0.54	0.56	0.58	0.62	0.72	SSW
-200	0.38	0.51	0.55	0.57	0.59	0.62	0.73	SW
-250	0.35	0.48	0.51	0.53	0.55	0.58	0.68	SW
-300	0.35	0.46	0.49	0.51	0.54	0.57	0.66	SW
-350	0.31	0.41	0.45	0.46	0.48	0.51	0.59	SW
-375	0.31	0.41	0.44	0.45	0.48	0.50	0.58	SW
-800	0.30	0.39	0.41	0.42	0.44	0.46	0.53	W
-1200	0.27	0.33	0.35	0.36	0.36	0.38	0.43	W
-1600	0.20	0.24	0.25	0.27	0.28	0.30	0.36	NW
-2000	0.20	0.24	0.26	0.27	0.28	0.30	0.36	NNW
-2200	0.15	0.21	0.23	0.24	0.26	0.28	0.33	NNW

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.2.24 Profile of Extreme Currents (m/s) With NW Direction at Reference Level 800 m

Level	RETURN PERIOD (YEARS)							
	1	10	20	30	50	100	1000	DIRECTION
0	0.37	0.46	0.48	0.50	0.51	0.53	0.59	SW
-100	0.38	0.46	0.48	0.50	0.50	0.53	0.58	SW
-150	0.34	0.42	0.44	0.45	0.47	0.49	0.54	SW
-200	0.32	0.40	0.42	0.43	0.44	0.46	0.51	SW
-250	0.32	0.39	0.42	0.43	0.44	0.45	0.50	WSW
-300	0.32	0.39	0.41	0.43	0.44	0.45	0.50	WSW
-350	0.30	0.37	0.38	0.39	0.40	0.41	0.45	W
-375	0.29	0.36	0.37	0.38	0.39	0.40	0.44	W
-800	0.35	0.41	0.43	0.44	0.44	0.46	0.50	NW
-1200	0.26	0.32	0.32	0.33	0.34	0.35	0.38	NW
-1600	0.14	0.20	0.21	0.22	0.23	0.25	0.28	NW
-2000	0.15	0.20	0.21	0.22	0.24	0.25	0.29	N
-2200	0.15	0.20	0.21	0.22	0.23	0.25	0.28	N

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3 Current Profiles for Fatigue Analysis

The following tables present current data that can be used for fatigue design. The first eight tables are related with a near-surface reference level for the flow direction. They were mounted using simultaneous data from all the other levels when the surface flow was going to that specific surface direction. The last eight tables represent current profiles with strong mid-water events for which the currents measured at the 800-m level were greater 0.20 m/s or 1200 m level greater than 0.18 m/s or 1600 m level greater than 0.15 m/s when surface value was not exceeding 0.5 m/s. The complete data set covers 24974 hourly profiles.

6.3.1 Current Profile (m/s) for Fatigue Analysis with N Direction at surface

	0.00		0.10		0.20		0.30	
	0.10		0.20		0.30		0.40	
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.
0	0.06	360	0.15	0	0.24	1	0.34	1
50	0.06	359	0.15	360	0.23	0	0.32	1
100	0.05	355	0.13	357	0.20	1	0.26	2
150	0.05	344	0.12	355	0.17	1	0.21	4
200	0.04	341	0.10	354	0.16	359	0.19	2
250	0.04	346	0.09	350	0.14	354	0.17	1
300	0.03	330	0.08	349	0.12	352	0.14	359
350	0.03	316	0.07	348	0.11	351	0.13	359
375	0.03	320	0.06	347	0.10	350	0.12	358
800	0.02	277	0.02	324	0.04	334	0.05	339
1200	0.01	305	0.01	342	0.03	354	0.03	6
1600	0.00	352	0.01	296	0.01	352	0.03	2
2000	0.01	68	0.00	18	0.01	62	0.03	52
2200	0.04	88	0.03	77	0.05	72	0.06	67
Freq.	484		1122		943		359	

	0.40		0.50		0.60		
	0.50		0.60		0.70		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.44	9	0.53	13	0.60	18	
50	0.43	9	0.52	12	0.59	16	
100	0.36	10	0.42	16	0.45	9	
150	0.29	11	0.32	14	0.27	11	
200	0.25	9	0.26	9	0.26	15	
250	0.22	8	0.19	8	0.23	11	
300	0.17	8	0.16	9	0.20	22	
350	0.15	7	0.13	8	0.20	7	
375	0.13	7	0.11	5	0.23	1	
800	0.07	359	0.06	345	0.12	1	
1200	0.05	13	0.03	13	0.05	15	
1600	0.03	25	0.02	29	0.06	77	
2000	0.05	56	0.04	44	0.09	60	
2200	0.08	61	0.06	67	0.10	89	
Freq.	151		56		1		**3116**
							12.48%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.2 Current Profile (m/s) for Fatigue Analysis with NE Direction at surface

	0.00		0.10		0.20		0.30	
	0.10		0.20		0.30		0.40	
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.
0	0.07	45	0.15	45	0.24	45	0.34	44
50	0.07	42	0.15	41	0.24	42	0.32	42
100	0.06	38	0.13	37	0.21	39	0.26	38
150	0.05	29	0.12	33	0.17	33	0.22	37
200	0.03	23	0.09	29	0.14	31	0.17	34
250	0.03	28	0.07	26	0.12	31	0.15	32
300	0.02	16	0.06	24	0.10	29	0.12	32
350	0.02	354	0.06	19	0.09	30	0.10	33
375	0.02	349	0.05	15	0.08	27	0.09	32
800	0.02	264	0.01	315	0.03	7	0.03	25
1200	0.01	323	0.01	339	0.01	3	0.01	29
1600	0.00	36	0.00	120	0.01	7	0.02	43
2000	0.01	83	0.01	80	0.02	68	0.03	73
2200	0.04	87	0.04	88	0.04	78	0.05	78
Freq.	511		988		802		528	

	0.40		0.50		0.60		
	0.50		0.60		0.70		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.43	44	0.52	42	0.63	32	
50	0.41	42	0.48	39	0.49	31	
100	0.29	38	0.33	37	0.23	24	
150	0.23	37	0.26	36	0.16	22	
200	0.19	36	0.20	39	0.16	20	
250	0.16	33	0.17	37	0.22	34	
300	0.12	32	0.14	38	0.14	34	
350	0.10	30	0.11	26	0.12	41	
375	0.09	29	0.09	29	0.09	23	
800	0.04	37	0.06	44	0.10	60	
1200	0.01	94	0.02	65	0.06	139	
1600	0.02	40	0.03	27	0.06	354	
2000	0.04	69	0.05	54	0.02	17	
2200	0.06	81	0.08	71	0.10	52	
Freq.	247		57		1		**3134**
							12.55%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.3 Current Profile (m/s) for Fatigue Analysis with E Direction at surface

	0.00		0.10		0.20		0.30	
	0.10		0.20		0.30		0.40	
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.
0	0.06	91	0.15	91	0.24	90	0.33	90
50	0.06	88	0.14	90	0.23	89	0.31	88
100	0.06	85	0.11	91	0.17	90	0.20	88
150	0.05	81	0.09	87	0.14	90	0.15	91
200	0.04	86	0.07	88	0.11	90	0.11	96
250	0.03	92	0.06	85	0.10	93	0.09	92
300	0.02	76	0.04	91	0.09	96	0.06	93
350	0.01	66	0.03	91	0.07	94	0.06	90
375	0.01	44	0.03	86	0.06	93	0.05	91
800	0.02	252	0.01	212	0.02	135	0.02	144
1200	0.00	88	0.00	36	0.01	78	0.01	107
1600	0.01	94	0.01	121	0.02	100	0.02	79
2000	0.02	77	0.02	114	0.03	73	0.03	77
2200	0.04	95	0.04	101	0.05	93	0.05	91
Freq.	494		953		712		386	

	0.40		0.50		0.60		
	0.50		0.60		0.70		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.43	86	0.53	86	0.64	89	
50	0.39	83	0.48	85	0.56	89	
100	0.21	82	0.29	86	0.35	92	
150	0.15	80	0.21	82	0.27	85	
200	0.09	87	0.14	79	0.19	95	
250	0.08	95	0.09	81	0.17	88	
300	0.06	94	0.09	86	0.14	82	
350	0.06	83	0.06	84	0.11	84	
375	0.05	79	0.05	89	0.10	79	
800	0.02	128	0.02	121	0.02	26	
1200	0.01	161	0.01	74	0.01	20	
1600	0.03	70	0.03	56	0.04	20	
2000	0.04	59	0.04	44	0.04	40	
2200	0.06	83	0.06	71	0.07	61	
Freq.	145		59		13		**2762**
							11.06%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.4 Current Profile (m/s) for Fatigue Analysis with SE Direction at surface

	0.00		0.10		0.20		0.30	
	0.10		0.20		0.30		0.40	
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.
0	0.07	135	0.15	135	0.24	135	0.34	134
50	0.06	135	0.14	136	0.23	134	0.32	134
100	0.05	151	0.12	139	0.19	135	0.23	134
150	0.04	148	0.10	139	0.14	137	0.17	141
200	0.03	163	0.07	146	0.11	144	0.13	149
250	0.02	155	0.06	149	0.09	150	0.11	153
300	0.02	197	0.05	151	0.08	150	0.09	157
350	0.02	196	0.05	157	0.07	156	0.06	161
375	0.02	191	0.04	158	0.06	157	0.06	166
800	0.02	233	0.02	197	0.03	191	0.03	188
1200	0.01	183	0.01	199	0.01	179	0.02	192
1600	0.01	106	0.02	121	0.02	152	0.02	129
2000	0.03	84	0.04	101	0.04	110	0.03	101
2200	0.05	90	0.05	95	0.05	102	0.05	101
Freq.	485		1040		741		446	

	0.40		0.50		0.60		0.70		
	0.50		0.60		0.70		0.80		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.43	132	0.52	132	0.59	128	0.74	156	
50	0.40	131	0.47	132	0.50	133	0.71	156	
100	0.26	133	0.23	138	0.37	146	0.61	174	
150	0.18	137	0.17	146	0.27	150	0.50	174	
200	0.12	143	0.13	135	0.25	164	0.47	175	
250	0.10	147	0.11	141	0.23	153	0.44	174	
300	0.07	153	0.10	147	0.14	173	0.37	180	
350	0.06	155	0.08	149	0.16	170	0.28	179	
375	0.05	158	0.07	147	0.15	161	0.24	180	
800	0.04	179	0.06	206	0.04	157	0.10	200	
1200	0.03	190	0.03	192	0.03	130	0.10	168	
1600	0.02	149	0.00	250	0.05	90	0.07	164	
2000	0.02	103	0.01	174	0.03	90	0.02	193	
2200	0.04	114	0.04	123	0.05	76	0.05	181	
Freq.	197		24		3		4		**2940**
									11.78%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.5 Current Profile (m/s) for Fatigue Analysis with S Direction at surface

	0.00		0.10		0.20		0.30		0.40		0.50	
	0.10		0.20		0.30		0.40		0.50		0.60	
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.
0	0.06	180	0.15	180	0.24	180	0.33	181	0.43	182	0.54	182
50	0.06	177	0.14	180	0.24	180	0.32	181	0.42	183	0.53	182
100	0.06	188	0.12	183	0.18	181	0.25	182	0.30	183	0.49	181
150	0.06	194	0.10	191	0.14	184	0.21	187	0.25	186	0.42	181
200	0.05	203	0.09	194	0.13	192	0.18	190	0.23	193	0.36	179
250	0.04	205	0.07	200	0.12	194	0.16	190	0.22	195	0.30	179
300	0.03	214	0.07	201	0.11	192	0.14	192	0.20	195	0.27	174
350	0.03	215	0.06	203	0.09	195	0.12	194	0.17	195	0.24	175
375	0.03	218	0.05	204	0.08	196	0.11	195	0.16	196	0.23	174
800	0.02	231	0.03	229	0.05	207	0.07	191	0.09	203	0.13	154
1200	0.01	248	0.02	226	0.03	199	0.05	199	0.05	185	0.09	116
1600	0.01	127	0.01	134	0.01	168	0.02	185	0.03	156	0.07	120
2000	0.03	92	0.03	91	0.03	129	0.03	146	0.04	128	0.09	89
2200	0.05	87	0.05	93	0.05	112	0.05	122	0.06	108	0.15	97
Freq.	501		972		762		378		126		85	

	0.60		0.70		0.80		0.90		1.00		1.10		
	0.70		0.80		0.90		1.00		1.10		1.20		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.63	179	0.73	173	0.84	174	0.95	173	1.03	173	1.17	174	
50	0.62	178	0.70	173	0.84	173	0.96	174	1.02	173	1.04	171	
100	0.58	183	0.61	174	0.77	169	0.89	174	0.93	173	1.04	172	
150	0.52	181	0.56	175	0.66	173	0.71	172	0.74	174	0.80	177	
200	0.42	179	0.49	177	0.57	172	0.60	172	0.59	174	0.67	174	
250	0.37	174	0.45	173	0.50	172	0.50	173	0.53	171	0.55	173	
300	0.31	173	0.37	172	0.42	169	0.43	172	0.47	172	0.49	178	
350	0.29	178	0.32	174	0.37	172	0.37	172	0.41	175	0.37	174	
375	0.27	174	0.29	175	0.32	173	0.34	174	0.37	177	0.38	171	
800	0.12	164	0.13	187	0.15	192	0.17	188	0.15	175	0.22	170	
1200	0.08	139	0.09	164	0.07	182	0.08	158	0.08	181	0.09	174	
1600	0.06	112	0.04	128	0.05	172	0.04	167	0.04	143	0.10	164	
2000	0.07	104	0.04	89	0.04	112	0.04	112	0.04	160	0.05	13	
2200	0.13	107	0.09	109	0.06	120	0.07	109	0.08	127	0.03	100	
Freq.	38		40		24		38		15		3		**2982**
													11.94%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.6 Current Profile (m/s) for Fatigue Analysis with SW Direction at surface

	0.00		0.10		0.20		0.30	
	0.10		0.20		0.30		0.40	
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.
0	0.06	225	0.15	225	0.24	225	0.34	226
50	0.06	224	0.14	225	0.24	225	0.34	226
100	0.06	231	0.13	230	0.20	225	0.27	224
150	0.06	235	0.11	230	0.16	226	0.20	224
200	0.05	247	0.09	238	0.14	231	0.17	224
250	0.05	241	0.09	233	0.12	228	0.15	226
300	0.05	240	0.08	235	0.11	228	0.14	230
350	0.04	243	0.07	239	0.10	231	0.12	227
375	0.04	246	0.07	240	0.09	235	0.11	230
800	0.03	252	0.04	241	0.06	240	0.07	243
1200	0.01	248	0.02	243	0.04	236	0.04	238
1600	0.00	65	0.01	223	0.02	230	0.01	223
2000	0.02	92	0.01	85	0.02	145	0.02	75
2200	0.05	93	0.04	96	0.05	122	0.05	96
Freq.	477		894		743		383	

	0.40		0.50		0.60		
	0.50		0.60		0.70		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.43	227	0.53	227	0.61	225	
50	0.44	227	0.54	227	0.62	221	
100	0.31	229	0.39	225	0.43	213	
150	0.25	231	0.33	224	0.36	211	
200	0.22	234	0.30	232	0.30	219	
250	0.21	233	0.25	227	0.26	220	
300	0.17	235	0.21	227	0.18	214	
350	0.15	238	0.19	233	0.18	224	
375	0.15	238	0.18	233	0.17	229	
800	0.09	240	0.09	219	0.04	135	
1200	0.05	238	0.07	233	0.08	221	
1600	0.02	204	0.04	183	0.06	163	
2000	0.02	120	0.04	107	0.09	98	
2200	0.04	96	0.06	120	0.08	166	
Freq.	186		90		20		**2793**
							11.18%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.7 Current Profile (m/s) for Fatigue Analysis with W Direction at surface

	0.00		0.10		0.20		0.30		0.40	
	0.10		0.20		0.30		0.40		0.50	
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.
0	0.06	270	0.15	271	0.24	270	0.33	270	0.43	272
50	0.06	271	0.15	271	0.24	270	0.34	269	0.43	271
100	0.07	268	0.13	271	0.19	267	0.27	266	0.36	270
150	0.06	266	0.11	271	0.15	263	0.22	262	0.27	269
200	0.06	273	0.09	269	0.13	265	0.18	263	0.22	267
250	0.06	272	0.08	265	0.11	267	0.15	264	0.18	271
300	0.05	262	0.07	266	0.10	268	0.13	262	0.16	266
350	0.04	260	0.07	265	0.09	267	0.12	265	0.14	265
375	0.04	261	0.06	267	0.08	268	0.11	264	0.13	264
800	0.02	257	0.04	267	0.05	265	0.07	267	0.07	273
1200	0.01	234	0.02	266	0.03	268	0.04	272	0.06	289
1600	0.00	353	0.01	267	0.02	252	0.02	261	0.02	232
2000	0.02	110	0.01	104	0.01	153	0.01	131	0.01	208
2200	0.04	97	0.04	100	0.04	102	0.04	95	0.03	97
Freq.	476		997		810		384		168	

	0.50		0.60		0.70		0.80		0.90		
	0.60		0.70		0.80		0.90		1.00		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.52	273	0.64	274	0.74	274	0.82	273	0.92	271	
50	0.52	273	0.64	274	0.74	273	0.82	273	0.91	271	
100	0.43	272	0.59	273	0.66	273	0.69	271	0.72	269	
150	0.37	272	0.48	273	0.53	273	0.51	271	0.53	268	
200	0.29	272	0.37	275	0.43	273	0.41	269	0.39	266	
250	0.26	271	0.36	277	0.37	274	0.36	270	0.34	262	
300	0.23	271	0.31	269	0.33	272	0.32	274	0.30	265	
350	0.20	270	0.25	274	0.29	270	0.29	268	0.25	266	
375	0.18	273	0.24	274	0.26	268	0.26	269	0.23	268	
800	0.10	272	0.12	254	0.11	254	0.11	273	0.06	304	
1200	0.07	253	0.06	266	0.06	261	0.07	239	0.09	245	
1600	0.03	244	0.04	240	0.04	243	0.05	237	0.05	215	
2000	0.03	229	0.02	255	0.02	209	0.05	205	0.03	204	
2200	0.05	138	0.04	164	0.04	158	0.06	143	0.04	108	
Freq.	78		44		44		27		7		**3035**

12.15%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.8 Current Profile (m/s) for Fatigue Analysis with NW Direction at surface

	0.00		0.10		0.20		0.30		0.40	
	0.10		0.20		0.30		0.40		0.50	
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.
0	0.06	315	0.15	314	0.24	315	0.33	315	0.43	311
50	0.06	315	0.14	313	0.23	315	0.32	315	0.41	310
100	0.05	304	0.12	309	0.18	315	0.24	313	0.30	310
150	0.05	297	0.11	308	0.15	317	0.20	312	0.26	308
200	0.05	295	0.09	306	0.13	316	0.16	310	0.20	299
250	0.04	297	0.08	303	0.12	317	0.13	316	0.16	298
300	0.03	295	0.07	306	0.11	317	0.13	317	0.16	301
350	0.03	292	0.06	306	0.10	315	0.11	315	0.12	304
375	0.03	290	0.06	305	0.09	316	0.11	316	0.12	303
800	0.02	265	0.03	288	0.04	302	0.04	301	0.05	288
1200	0.01	253	0.02	295	0.03	316	0.03	341	0.03	334
1600	0.01	18	0.01	288	0.02	300	0.02	309	0.02	307
2000	0.01	70	0.00	139	0.01	231	0.00	177	0.01	251
2200	0.04	86	0.04	90	0.05	80	0.06	79	0.06	84
Freq.	540		1123		724		283		98	

	0.50		0.60		0.80		0.90		
	0.60		0.70		0.90		1.00		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.54	307	0.60	320	0.84	295	0.90	293	
50	0.52	307	0.57	318	0.85	295	0.92	294	
100	0.43	309	0.46	319	0.61	287	0.56	284	
150	0.39	307	0.32	322	0.49	288	0.50	291	
200	0.28	308	0.25	316	0.37	295	0.35	295	
250	0.24	302	0.18	318	0.33	288	0.33	280	
300	0.20	304	0.18	327	0.25	288	0.26	285	
350	0.18	305	0.11	318	0.28	294	0.21	311	
375	0.15	305	0.12	347	0.29	296	0.25	306	
800	0.04	309	0.05	343	0.16	296	0.15	314	
1200	0.03	330	0.09	6	0.07	236	0.06	264	
1600	0.02	337	0.07	23	0.08	233	0.06	270	
2000	0.02	28	0.05	26	0.07	210	0.07	234	
2200	0.05	80	0.07	43	0.06	179	0.01	159	
Freq.	34		4		3		1		**2810**
									11.25%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.9 Current Profile (m/s) for Fatigue Analysis with N Direction at 800m

	0.00		0.10		0.20		0.30		
	0.10		0.20		0.30		0.40		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.15	13	0.07	194	0.08	173	0.10	320	
50	0.16	16	0.06	194	0.08	172	0.08	330	
100	0.17	23	0.04	182	0.10	165	0.09	14	
150	0.16	23	0.05	194	0.09	166	0.08	339	
200	0.13	16	0.04	178	0.08	148	0.04	112	
250	0.10	356	0.03	177	0.03	152	0.09	336	
300	0.09	11	0.01	143	0.04	166	0.05	37	
350	0.08	17	0.03	93	0.03	160	0.15	37	
375	0.07	33	0.03	73	0.02	153	0.13	32	
800	0.06	360	0.15	360	0.22	2	0.31	354	
1200	0.13	62	0.08	64	0.02	63	0.19	88	
1600	0.06	67	0.06	46	0.06	87	0.11	28	
2000	0.06	92	0.10	78	0.13	83	0.09	42	
2200	0.10	87	0.11	86	0.08	93	0.19	83	
Freq.	10		35		68		4		**117**
									0.47%

6.3.10 Current Profile (m/s) for Fatigue Analysis with NE Direction at 800m

	0.00		0.10		0.20		0.30		
	0.10		0.20		0.30		0.40		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.04	193	0.09	240	0.04	240	0.08	194	
50	0.04	205	0.09	226	0.04	231	0.11	183	
100	0.09	215	0.10	197	0.08	206	0.05	153	
150	0.09	201	0.10	190	0.08	201	0.04	170	
200	0.08	221	0.10	176	0.07	184	0.04	215	
250	0.05	216	0.06	139	0.05	151	0.03	103	
300	0.02	204	0.03	144	0.05	161	0.07	221	
350	0.02	270	0.02	126	0.05	163	0.04	172	
375	0.01	252	0.01	98	0.04	163	0.04	103	
800	0.06	46	0.13	43	0.22	45	0.31	38	
1200	0.12	57	0.11	109	0.05	66	0.17	110	
1600	0.05	72	0.06	58	0.04	108	0.11	57	
2000	0.06	74	0.10	93	0.11	126	0.09	53	
2200	0.09	83	0.11	89	0.08	93	0.18	85	
Freq.	23		17		54		2		**96**
									0.38%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.11 Current Profile (m/s) for Fatigue Analysis with E Direction at 800m

	0.00		0.10		0.20		0.30		
	0.10		0.20		0.30		0.40		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.12	267	0.10	190	0.07	146	0.22	217	
50	0.11	257	0.10	185	0.07	152	0.18	206	
100	0.09	238	0.11	176	0.09	179	0.18	228	
150	0.09	225	0.08	186	0.09	184	0.12	192	
200	0.08	222	0.11	185	0.07	198	0.08	149	
250	0.03	247	0.10	187	0.07	173	0.08	172	
300	0.06	321	0.11	169	0.08	172	0.15	206	
350	0.03	312	0.08	175	0.08	167	0.13	196	
375	0.03	309	0.09	167	0.09	166	0.13	193	
800	0.06	91	0.15	96	0.23	95	0.30	85	
1200	0.09	43	0.10	99	0.06	84	0.06	160	
1600	0.08	43	0.07	47	0.04	97	0.13	86	
2000	0.06	354	0.05	76	0.05	86	0.09	52	
2200	0.14	76	0.13	94	0.09	94	0.14	107	
Freq.	23		19		110		3		**155**
									0.62%

6.3.12 Current Profile (m/s) for Fatigue Analysis with SE Direction at 800m

	0.00		0.10		0.20		0.30		
	0.10		0.20		0.30		0.40		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.10	241	0.18	203	0.09	173	0.33	189	
50	0.13	230	0.18	205	0.09	173	0.31	191	
100	0.09	230	0.21	199	0.09	182	0.29	190	
150	0.10	217	0.18	210	0.10	192	0.27	187	
200	0.07	221	0.18	196	0.09	191	0.23	171	
250	0.03	219	0.14	188	0.08	193	0.23	165	
300	0.04	306	0.12	192	0.07	190	0.20	178	
350	0.01	200	0.11	195	0.06	192	0.14	182	
375	0.01	190	0.11	193	0.06	191	0.15	176	
800	0.05	132	0.17	130	0.23	133	0.31	123	
1200	0.05	20	0.07	82	0.06	71	0.05	111	
1600	0.05	70	0.08	94	0.03	136	0.06	125	
2000	0.05	42	0.09	92	0.05	155	0.09	114	
2200	0.11	82	0.15	93	0.08	98	0.11	99	
Freq.	23		24		344		5		**396**
									1.59%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.13 Current Profile (m/s) for Fatigue Analysis with S Direction at 800m

	0.00		0.10		0.20		
	0.10		0.20		0.30		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.08	210	0.08	193	0.05	335	
50	0.08	211	0.07	197	0.06	335	
100	0.05	193	0.08	187	0.06	345	
150	0.07	194	0.06	176	0.08	327	
200	0.04	185	0.05	219	0.07	314	
250	0.05	268	0.05	176	0.06	331	
300	0.03	219	0.04	192	0.05	316	
350	0.02	197	0.04	202	0.05	307	
375	0.03	251	0.05	206	0.05	307	
800	0.06	179	0.16	179	0.23	177	
1200	0.10	43	0.02	156	0.08	61	
1600	0.05	87	0.02	138	0.03	266	
2000	0.04	92	0.05	181	0.12	234	
2200	0.12	89	0.05	100	0.05	100	
Freq.	10		17		159		**186**
							0.74%

6.3.14 Current Profile (m/s) for Fatigue Analysis with SW Direction at 800m

	0.00		0.10		0.20		
	0.10		0.20		0.30		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.11	174	0.16	187	0.07	256	
50	0.12	165	0.15	181	0.07	261	
100	0.10	183	0.13	192	0.05	275	
150	0.14	190	0.17	196	0.04	291	
200	0.10	194	0.16	212	0.04	310	
250	0.06	198	0.14	227	0.03	295	
300	0.04	176	0.11	225	0.03	303	
350	0.03	191	0.05	206	0.03	294	
375	0.04	192	0.04	224	0.03	297	
800	0.05	237	0.17	231	0.23	224	
1200	0.04	359	0.07	33	0.06	100	
1600	0.04	41	0.09	44	0.03	324	
2000	0.08	79	0.05	0	0.08	299	
2200	0.08	81	0.13	85	0.03	110	
Freq.	15		8		112		**135**
							0.54%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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6.3.15 Current Profile (m/s) for Fatigue Analysis with W Direction at 800m

	0.00		0.10		0.20		0.30		
	0.10		0.20		0.30		0.40		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.04	206	0.15	237	0.08	248	0.22	220	
50	0.06	195	0.17	232	0.08	242	0.25	219	
100	0.10	180	0.15	236	0.07	232	0.29	226	
150	0.12	190	0.18	224	0.07	225	0.34	233	
200	0.08	186	0.16	225	0.06	221	0.34	219	
250	0.08	155	0.14	225	0.05	230	0.20	261	
300	0.05	131	0.12	238	0.02	254	0.25	258	
350	0.02	101	0.12	250	0.04	301	0.17	267	
375	0.02	103	0.11	259	0.04	289	0.19	257	
800	0.05	267	0.16	282	0.22	271	0.31	291	
1200	0.13	48	0.13	328	0.03	22	0.18	298	
1600	0.06	51	0.09	336	0.05	5	0.11	308	
2000	0.13	83	0.10	355	0.08	5	0.13	340	
2200	0.12	78	0.12	52	0.07	74	0.12	334	
Freq.	14		21		68		1		**104**
									0.42%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

6.3.16 Current Profile (m/s) for Fatigue Analysis with NW Direction at 800m

	0.00		0.10		0.20		0.30		
	0.10		0.20		0.30		0.40		
Depth	Int.	Dir.	Int.	Dir.	Int.	Dir.	Int.	Dir.	
0	0.07	275	0.10	213	0.12	234	0.16	235	
50	0.06	273	0.09	220	0.12	237	0.17	236	
100	0.04	340	0.07	224	0.11	236	0.21	238	
150	0.04	329	0.09	218	0.12	228	0.16	250	
200	0.03	328	0.08	208	0.11	234	0.13	246	
250	0.04	265	0.06	222	0.10	246	0.16	254	
300	0.04	311	0.05	214	0.10	264	0.18	269	
350	0.06	7	0.01	286	0.09	283	0.18	280	
375	0.05	7	0.02	324	0.09	287	0.18	277	
800	0.07	313	0.15	312	0.23	313	0.31	312	
1200	0.07	23	0.10	42	0.09	340	0.18	314	
1600	0.03	54	0.06	16	0.07	5	0.09	349	
2000	0.05	86	0.06	36	0.10	28	0.10	27	
2200	0.11	90	0.13	77	0.12	65	0.13	49	
Freq.	16		59		120		18		**213**
									0.85%

Source: PETROBRAS Metocean Database (Engineering measurement program - mooring P1). Ref [7].

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7. SEA WATER CHARACTERISTICS

7.1 Table with Vertical Distribution of Sea Water Temperature

Depth (m)	Tmin	p5	Tavg	p95	Tmax
5	20.76	21.67	24.33	27.45	29.25
20	20.10	21.71	24.31	27.22	28.78
40	19.85	21.64	24.04	26.88	28.67
60	19.15	21.28	23.20	26.06	28.58
80	18.39	20.17	22.29	24.85	26.97
100	17.11	19.05	21.44	23.90	25.88
120	14.96	17.80	20.39	23.08	24.42
150	13.89	16.76	19.34	21.97	23.91
200	12.91	15.21	17.38	19.77	21.76
250	12.13	14.10	15.82	17.73	21.50
300	11.71	12.99	14.64	16.22	17.58
400	9.50	11.54	13.05	14.11	15.01
500	7.65	8.92	10.40	11.79	13.71
600	5.62	6.82	8.07	9.22	10.92
700	4.58	5.51	6.23	7.01	8.18
800	4.23	4.82	5.36	5.89	6.46
900	3.84	4.12	4.48	4.78	5.18
1000	3.46	3.69	3.92	4.15	4.24
1200	3.19	3.33	3.41	3.48	3.70
1400	3.19	3.47	3.60	3.72	3.79
1600	3.49	3.77	3.86	3.94	4.01
1800	3.78	3.84	3.91	3.97	4.07
2000	3.53	3.64	3.72	3.78	3.87
2100	2.91	3.12	3.34	3.56	3.72
2200	2.82	2.97	3.11	3.27	3.48

Unit: ºC (centigrade)

Where: Tmin = Temperature lowest value
P5 = Percentile 5% Temperature (5% available data is equal or less than this value)
Tavg = Average Temperature
P95 = Percentile 95% Temperature (95% available data is equal or less than this value)
Tmax = Temperature highest value

Source: PETROBRAS Metocean Database (Engineering measurement program – moorings and CTD profiles on Santos Basin Area) and Ocean Modeling Results. Ref [14].

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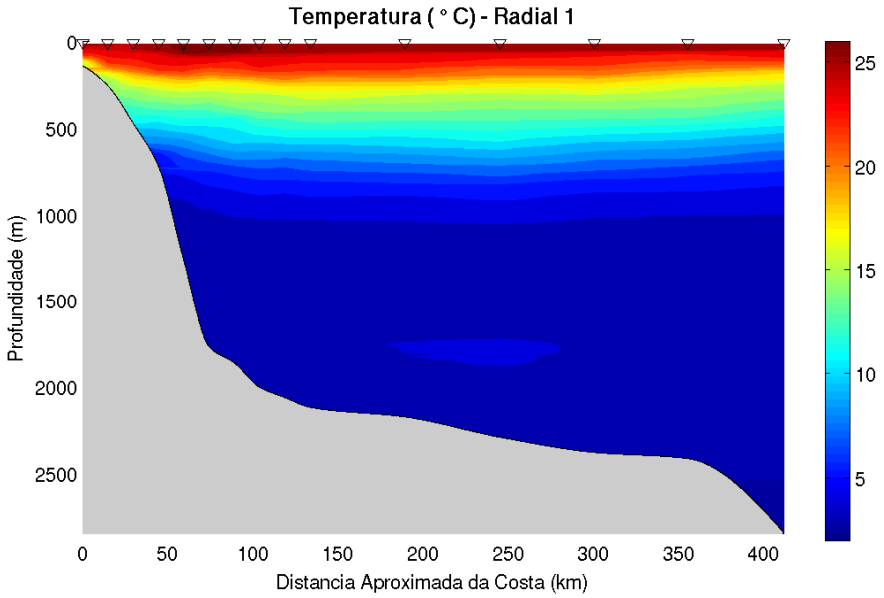
7.2 Horizontal Section of Sea Water Temperature



Source: PETROBRAS Research Project PT-128.01.11035 (CERES I Oceanographic Cruise). Ref [15].

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7.3 Table with Vertical Distribution of Sea Water Salinity

Depth (m)	Smin	p5	Savg	p95	Smax
5	35.30	36.19	36.82	37.24	37.29
20	35.56	36.43	36.87	37.18	37.29
40	36.13	36.61	36.90	37.19	37.29
60	36.31	36.64	36.92	37.19	37.29
80	35.99	36.45	36.86	37.17	37.26
100	35.75	36.24	36.78	37.08	37.24
120	35.63	36.00	36.65	36.97	37.15
150	35.49	35.72	36.39	36.84	36.94
200	35.34	35.52	35.94	36.34	36.82
250	35.24	35.37	35.64	35.84	36.16
300	35.10	35.25	35.44	35.59	35.78
400	34.83	35.00	35.18	35.32	35.40
500	34.59	34.72	34.91	35.04	35.32
600	34.31	34.48	34.64	34.75	34.95
700	34.26	34.35	34.43	34.53	34.64
800	34.23	34.26	34.33	34.39	34.45
900	34.19	34.25	34.32	34.36	34.40
1000	34.21	34.27	34.35	34.41	34.44
1200	34.34	34.38	34.47	34.54	34.58
1400	34.49	34.54	34.65	34.72	34.77
1600	34.65	34.71	34.80	34.86	34.90
1800	34.76	34.81	34.89	34.95	34.96
2000	34.79	34.85	34.93	34.98	34.99
2100	34.81	34.86	34.93	34.99	35.00
2200	34.85	34.85	34.92	34.99	34.99

Unit: psu (pratical salinity unity)

Where: Smin = Salinity lowest value
P5 = Percentile 5% Salinity (5% available data is equal or less than this value)
Savg = Average Salinity
P95 = Percentile 95% Salinity (95% available data is equal or less than this value)
Smax = Salinity highest value

Source: PETROBRAS Metocean Database (Engineering measurement program – moorings and CTD profiles on Santos Basin Area). Ref [16].

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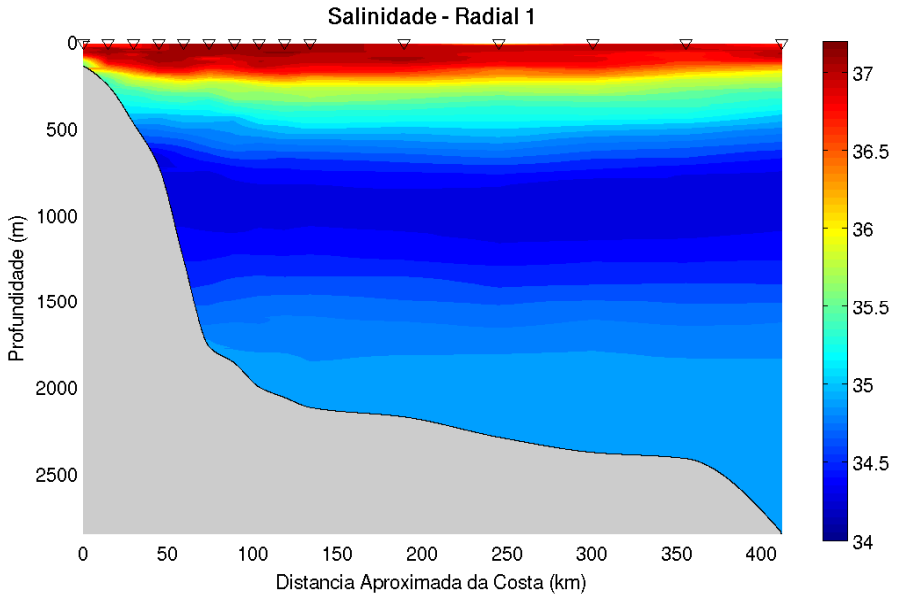
7.4 Horizontal Section of Sea Water Salinity



Source: PETROBRAS Research Project PT-128.01.11035 (CERES I Oceanographic Cruise). Ref [15].

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7.5 Table with Vertical Distribution of Sea Water Density

Depth (m)	Dmin	p5	Davg	p95	Dmax
5	1023.4	1024.1	1024.9	1025.5	1025.6
20	1023.9	1024.2	1025.0	1025.6	1025.7
40	1024.0	1024.4	1025.2	1025.7	1025.8
60	1024.1	1024.7	1025.4	1025.9	1026.0
80	1024.7	1025.2	1025.7	1026.0	1026.4
100	1025.1	1025.6	1025.9	1026.3	1026.7
120	1025.6	1025.8	1026.1	1026.6	1026.9
150	1025.9	1026.0	1026.4	1026.8	1027.1
200	1026.3	1026.6	1026.9	1027.2	1027.4
250	1026.9	1027.1	1027.3	1027.5	1027.7
300	1027.3	1027.5	1027.6	1027.9	1028.1
400	1028.0	1028.2	1028.3	1028.5	1028.6
500	1028.7	1028.8	1028.9	1029.1	1029.3
600	1029.3	1029.5	1029.6	1029.7	1029.9
700	1030.0	1030.1	1030.2	1030.3	1030.5
800	1030.6	1030.7	1030.8	1030.9	1031.0
900	1031.2	1031.3	1031.4	1031.5	1031.6
1000	1031.8	1031.8	1031.9	1032.0	1032.1
1200	1032.8	1032.9	1033.0	1033.1	1033.2
1400	1033.9	1034.0	1034.0	1034.1	1034.2
1600	1034.9	1035.0	1035.0	1035.1	1035.2
1800	1035.9	1035.9	1036.0	1036.1	1036.1
2000	1036.9	1036.9	1037.0	1037.1	1037.1
2100	1037.4	1037.4	1037.5	1037.6	1037.6
2200	1037.9	1037.9	1038.0	1038.1	1038.1

Unit: kg/m^3 (Density was calculated from T,S,P using UNESCO standards)

Where: Dmin = Density lowest value
P5 = Percentile 5% Density (5% available data is equal or less than this value)
Davg = Average Density
P95 = Percentile 95% Density (95% available data is equal or less than this value)
Dmax = Density highest value

Source: PETROBRAS Metocean Database (Engineering measurement program – moorings and CTD profiles on Santos Basin Area). Ref [16].

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7.6 Table with Vertical Distribution of Sea Water Conductivity

Depth (m)	Cmin	p5	Cavg	p95	Cmax
5	5.11	5.21	5.49	5.78	5.90
20	5.10	5.23	5.51	5.78	5.89
40	5.19	5.23	5.49	5.78	5.89
60	4.97	5.20	5.44	5.75	5.89
80	4.71	5.08	5.35	5.59	5.77
100	4.55	4.87	5.26	5.47	5.61
120	4.45	4.72	5.17	5.39	5.49
150	4.34	4.53	5.00	5.31	5.39
200	4.24	4.39	4.71	4.99	5.24
250	4.15	4.27	4.49	4.64	4.80
300	4.04	4.17	4.35	4.46	4.57
400	3.84	3.98	4.14	4.24	4.30
500	3.62	3.75	3.93	4.03	4.23
600	3.45	3.52	3.69	3.78	3.96
700	3.34	3.38	3.49	3.57	3.68
800	3.26	3.30	3.36	3.41	3.51
900	3.23	3.25	3.28	3.31	3.34
1000	3.20	3.22	3.24	3.26	3.26
1200	3.19	3.21	3.21	3.22	3.23
1400	3.21	3.24	3.25	3.27	3.28
1600	3.28	3.29	3.30	3.31	3.32
1800	3.30	3.31	3.32	3.32	3.33
2000	3.28	3.30	3.31	3.32	3.32
2100	3.25	3.26	3.28	3.30	3.31
2200	3.25	3.25	3.26	3.28	3.29

Unit: S/m (Siemens/metre)

Where: Cmin = Condutivity lowest value
P5 = Percentile 5% Condutivity (5% available data is equal or less than this value)
Cavg = Average Condutivity
P95 = Percentile 95% Condutivity (95% available data is equal or less than this value)
Cmax = Condutivity highest value

Source: PETROBRAS Metocean Database (Engineering measurement program – moorings and CTD profiles on Santos Basin Area). Ref [16].

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7.7 Vertical Profile of Marine Fouling (mm)

DEPTH (meter)	MARINE FOULING THICKNESS (mm)
+ 1.3	20
0.0	20
- 10	80
- 20	80
- 30	80
- 40	80
- 50	60
- 60	45
- 70	30
- 80	28
- 90	26
- 100	24
- 110	22
- 120	20
- 130	0
Bottom	0

Source: PETROBRAS – Vertical Profile of Marine Fouling (mm) for Campos Basin (RT/MC 113 /2003). Ref [17].

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[17] PETROBRAS – Vertical Profile of Marine Fouling (mm) for Campos Basin (RT/MC 113 /2003).

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CTD	Conductivity, Temperature and Depth
DHN	Directorate of Hydrography and Navigation of the Brazilian Navy
GPM	Global Precipitation Measurement
GPROF	GPM Profiling Algorithm
IDF	Intensity-duration-frequency
MC	Scientific Methods
REMO	Oceanographic Modeling and Observation Network

Data Processing and Contribuition to Document Execution

Original. Execution CENPES/PDP/MC (Alphabetical order)

Eric O Ribeiro	execution	(wave, current, data processing software)
Gilmara Duarte L. Furtado	execution	(meteorological, wind)
	revision	(edition)
Guisela S Grossmann Matheson	execution	(current profiles)
Jose A M Lima	execution	(current profiles, wave)
	revision	(tide, current, fatigue profile)
Leonardo Bacellar Mendes	execution	(Current ADCP, temperature)
Luis M P Nunes	execution	(tide, current, fatigue profile)
	revision	(wave, current ADCP, temperature,salinity, meteorological, wind)
Marcelo Andrioni	execution	(REMO ocean current modeling)
Wellington C Belo	execution	(current ADCP, temperature,salinity)

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Rev. A. Execution CENPES/PDP/MC (Alphabetical order)

Eric O Ribeiro	revision	(meteorological, wind)
Luiz Claudio R. Antunes	execution	(meteorological, wind)

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Rev. B. Execution CENPES/PDP/MC (Alphabetical order)

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Jose A M Lima	execution	(current profiles, wave, temperature)
	revision	(tide, wave, current profiles)
Karen S. Grossmann	revision	(meteorological)
Luis M P Nunes	execution	(tide, wave, current profiles)
	revision	(temperature, salinity)
Luiz Claudio R. Antunes	execution	(meteorological, wind)
Marcelo Andrioni	execution	(temperature mooring data)
Wellington C Belo	execution	(temperature, salinity CERES cruises)

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	revision	(edition)
Jose A M Lima	revision	(wind, wave, wave spreading formulation)
Luis M P Nunes	execution	(wave)
Ricardo M Campos	execution	(wave spreading formulation)

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Rev. E. Execution CENPES/PDP/TEO (Alphabetical order)

Guisela S G Matheson	execution	(Sea Water Characteristics)
	revision	(edition)
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Luis M P Nunes	execution	(Sea Water Characteristics)

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Luiz Claudio R. Antunes	execution	(Air temperature/ HVAC/ Rainfall)
Wellington Ceccopieri Belo	revision	(air temperature/ HVAC / rainfall / edition)

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INDEX OF REVISIONS

REV.	DESCRIPTION AND / OR AFFECTED SHEETS
0	ORIGINAL
A	Updated wave and wind tables
B	Included wave data for intermediate water depths (sec. 5) and wave operational persistance windows (sections 6&7).
C	Updated wind tables
D	Included notice about document property
E	Updated wind section 3

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	ORIGINAL	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	19/03/2010	30/11/2011	17/12/2013	11/12/2017	12/07/2018	13/10/2020			
EXECUTION	JAMLIMA	GGM / LCRA	EOR/JAMLIMA	GDLF/KSG	WCB	CTRC			
VERIFICATION	LMANOEL	JAMLIMA	LMANOEL	ERIC	JAMLIMA	BX23			
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INDEX

1. OBJECTIVE 3

2. SYSTEM OF UNITS AND DIRECTION CONVENTION 4

3. SEASONAL WIND DATA 5

3.1 DISTRIBUTION OF WIND SPEED AND DIRECTION 5
3.2 DISTRIBUTION OF WIND SPEED AND DIRECTION BY SEASON 6
3.3 BASIN WIND EXCEEDANCE CURVES 8

4. SEASONAL WAVE DATA FOR CLUSTER BM-S DEEP WATER REGION 11

4.1 DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND DIRECTION 11
4.2 DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND DIRECTION BY SEASON 12
4.3 DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD 14
4.4 DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD BY SEASON 15
4.5 WAVE EXCEEDANCE CURVES 17
4.6 WAVE NON-EXCEEDANCE CURVES FOR SPECIFIED PERCENTAGE LEVELS 19

5. SEASONAL WAVE DATA FOR INTERMEDIATE DEPTH REGION 20

5.1 DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND DIRECTION 20
5.2 DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND DIRECTION BY SEASON 21
5.3 DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD 23
5.4 DISTRIBUTION OF SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD BY SEASON 24
5.5 WAVE EXCEEDANCE CURVES 26
5.6 WAVE NON-EXCEEDANCE CURVES FOR SPECIFIED PERCENTAGE LEVELS 28

6. WAVE PERSISTANCE WINDOWS FOR CLUSTER BM-S DEEP WATER REGION 29

6.1 WAVE OPERATIONAL WINDOWS FOR Hs < 1.5 M – CLUSTER BM-S DEEP WATER 29
6.2 WAVE OPERATIONAL WINDOWS FOR Hs < 2.0 M – CLUSTER BM-S DEEP WATER 29
6.3 WAVE OPERATIONAL WINDOWS FOR Hs < 3 M – CLUSTER BM-S DEEP WATER 30
6.4 WAVE OPERATIONAL WINDOWS FOR Hs < 4 M – CLUSTER BM-S DEEP WATER 30

7. WAVE PERSISTANCE WINDOWS FOR INTERMEDIATE DEPTH REGION 31

7.1 WAVE OPERATIONAL WINDOWS FOR Hs < 1.5 M – INTERMEDIATE DEPTH REGION 31
7.2 WAVE OPERATIONAL WINDOWS FOR Hs < 2.0 M – INTERMEDIATE DEPTH REGION 31
7.3 WAVE OPERATIONAL WINDOWS FOR Hs < 3 M – INTERMEDIATE DEPTH REGION 32
7.4 WAVE OPERATIONAL WINDOWS FOR Hs < 4 M – INTERMEDIATE DEPTH REGION 32

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1. OBJECTIVE

To present operational metocean data (meteorological and oceanographic parameters) to be used as subsidiary information for planning of operations at the vicinity of BM-S cluster region, SANTOS BASIN, southern Brazilian continental slope.

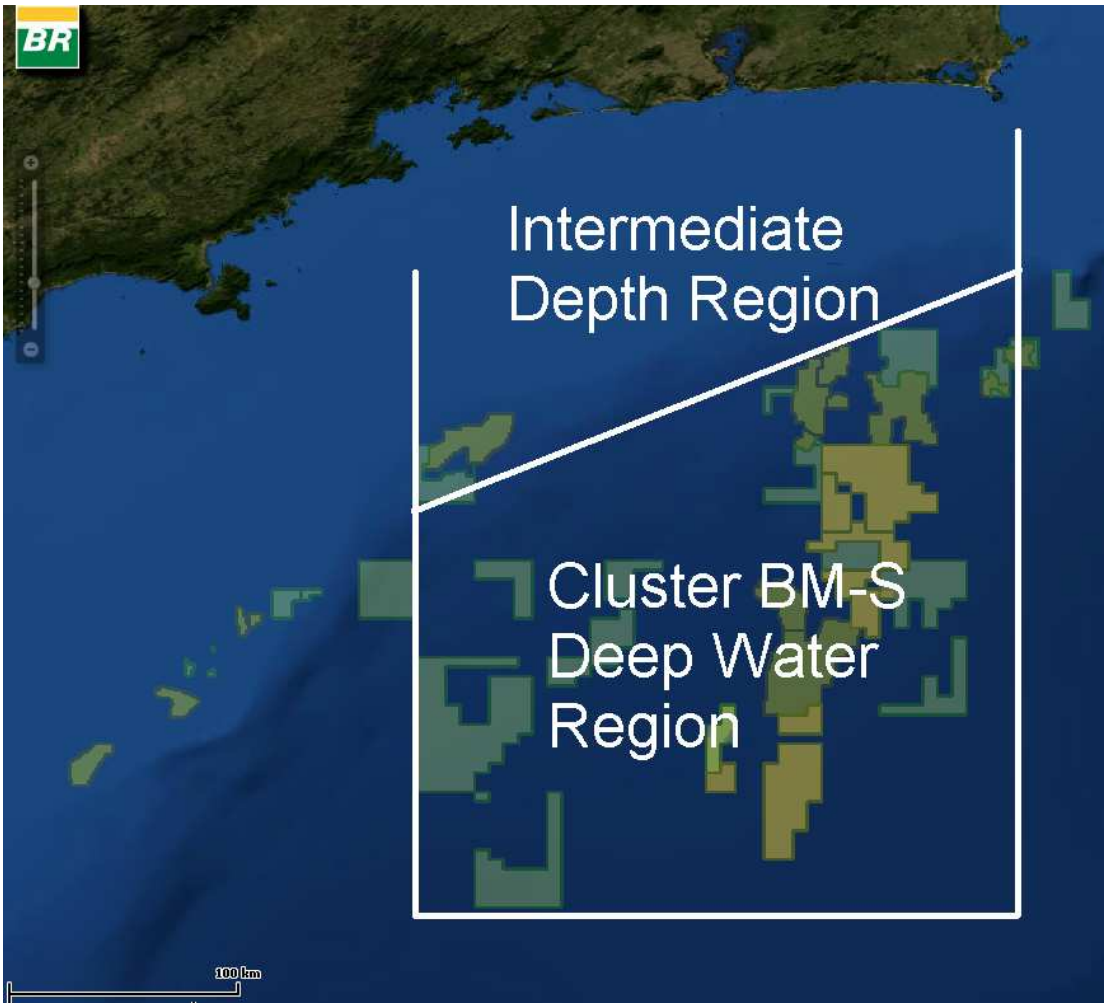

Figure 1 – Map of BM-S cluster region, Santos Basin, Brazil with regions for wave data (deep water and intermediate depth regions) Map: GIS-SUB from E&P-SERV/US-SUB/GDS

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2. SYSTEM OF UNITS AND DIRECTION CONVENTION

The International System of Units (S.I.), UNESCO-IOC (Intergovernmental Oceanographic Commission) and WMO (World Meteorological Organization) recommendations were adopted.

WIND and WAVES: direction indicates where the wind and waves comes from (True North origin, clockwise sense).

CURRENT: direction indicates where the current goes to (True North origin, clockwise sense).

Regarding the numeric values for cardinal directions, zero (0º) is associated with North direction, ninety (90º) is associated with East direction, and so on, as used in a nautical chart compass rose (Figure 2 below).

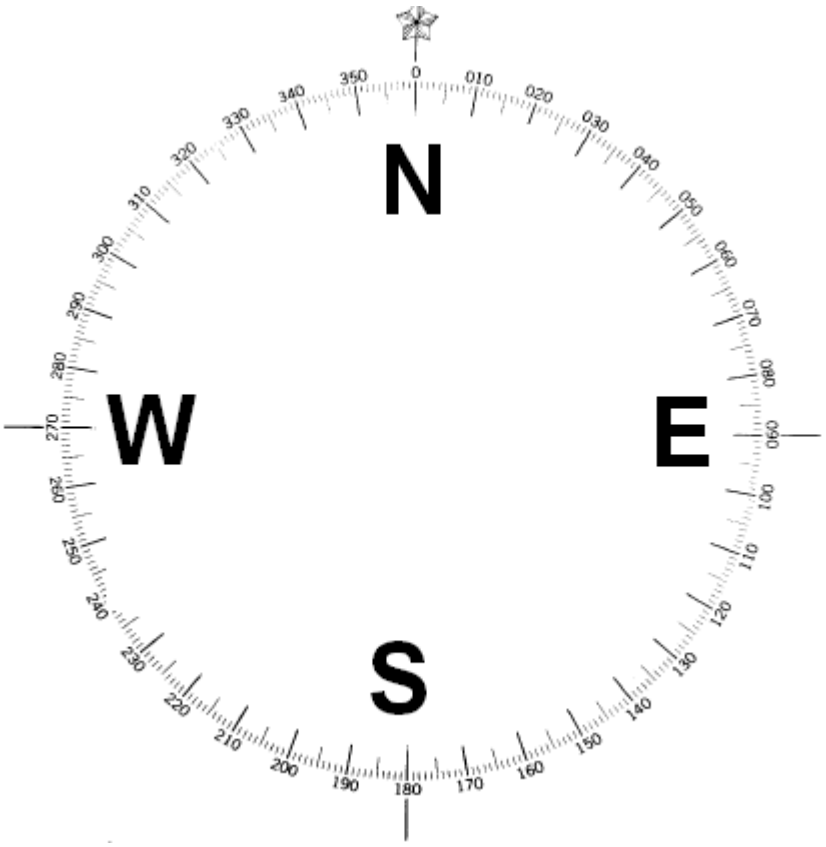

Figure 2 – Compass rose (numeric values associated with each direction)

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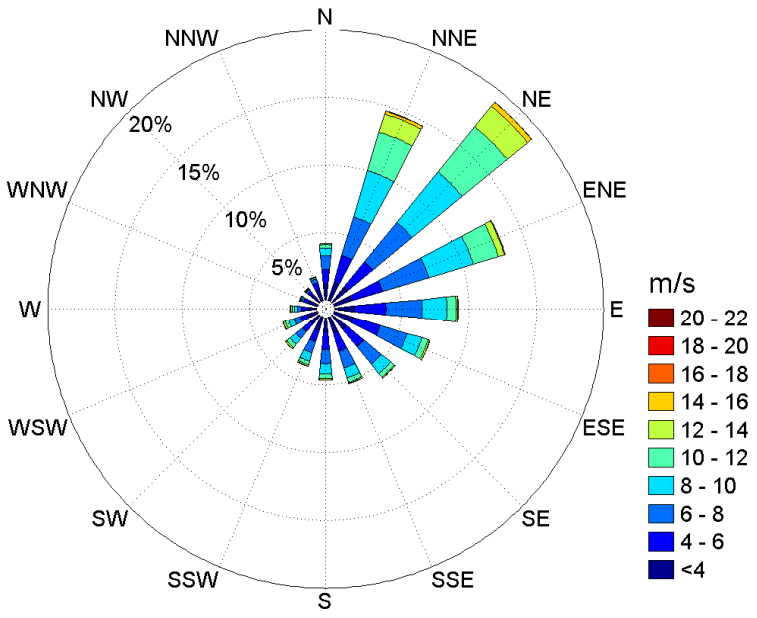
3. SEASONAL WIND DATA

3.1 Distribution of Wind Speed and Direction

Vel	m/s	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%
0	1	54	62	57	49	58	56	48	40	50	51	56	52	54	47	54	55	843	1.02
1	2	199	197	179	159	156	166	195	158	174	151	135	144	156	135	137	162	2603	3.15
2	3	313	377	351	314	339	407	349	296	257	286	243	199	192	186	198	250	4557	5.52
3	4	400	538	623	612	620	575	502	521	417	318	268	222	166	192	232	254	6460	7.83
4	5	416	745	859	867	884	797	688	601	534	368	281	248	209	178	186	246	8107	9.82
5	6	471	968	1127	1107	1094	949	681	566	533	391	295	216	144	128	94	166	8930	10.82
6	7	477	1156	1441	1400	1152	961	763	593	471	404	284	197	141	82	72	140	9734	11.79
7	8	381	1293	1680	1554	1060	758	632	485	390	316	267	201	115	56	52	97	9337	11.31
8	9	315	1454	1835	1508	830	535	440	365	370	292	245	184	115	38	34	77	8637	10.46
9	10	166	1500	2145	1350	695	415	305	266	262	242	209	149	86	40	22	44	7896	9.56
10	11	114	1373	1998	1015	375	259	186	199	149	145	169	106	82	25	14	14	6223	7.54
11	12	84	1076	1580	581	192	135	98	100	127	90	93	128	58	10	12	16	4380	5.31
12	13	39	738	1008	299	86	80	45	49	61	52	61	82	45	9	9	6	2669	3.23
13	14	12	424	594	97	27	28	16	16	22	36	33	42	33	5	5	2	1392	1.69
14	15	4	147	236	32	16	8	6	8	5	9	9	11	14	5	0	1	511	0.62
15	16	2	39	84	14	2	5	7	6	1	3	9	8	7	0	2	0	189	0.23
16	17	0	16	16	3	3	2	0	0	4	1	2	2	5	2	0	0	56	0.07
17	18	0	5	3	2	0	0	1	0	1	0	1	3	3	0	0	0	19	0.02
18	19	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4	0.00
19	20	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	3	0.00
20	21	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0.00
21	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		3447	12110	15816	10963	7589	6136	4962	4269	3828	3155	2662	2199	1625	1138	1123	1530	82552	
%		4.18	14.67	19.16	13.28	9.19	7.43	6.01	5.17	4.64	3.82	3.22	2.66	1.97	1.38	1.36	1.85		
Avg		5.83	8.30	8.61	7.55	6.62	6.26	6.08	6.10	6.17	6.19	6.38	6.47	5.91	4.56	4.22	4.55		

SOURCE Measured wind data at Santos Basin from metocean buoy, production and drilling platforms (10-year measurement period). The values should be considered representative of 1-hour wind speeds.



3.2 Distribution of Wind Speed and Direction by Season

3.2.1 SUMMER (January, February, March)

Vel	m/s	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%
0	1	16	28	18	19	19	20	13	13	14	25	18	16	18	22	19	20	298	1.44
1	2	61	65	65	51	47	48	74	50	43	42	31	41	42	43	41	58	802	3.87
2	3	91	113	104	93	96	104	95	79	92	66	43	42	51	41	53	67	1230	5.94
3	4	114	173	191	170	163	134	118	133	103	62	52	42	28	48	44	66	1641	7.92
4	5	130	239	252	206	158	178	184	137	89	55	40	28	25	26	31	65	1843	8.90
5	6	148	296	330	274	258	259	209	118	103	40	35	32	22	23	26	40	2213	10.68
6	7	148	342	416	365	295	264	242	137	51	39	15	29	29	17	14	26	2429	11.73
7	8	109	383	553	440	203	189	207	97	59	36	26	17	17	9	6	18	2369	11.44
8	9	72	420	629	420	143	135	128	59	44	36	13	5	10	6	8	8	2136	10.31
9	10	43	485	810	321	126	78	96	46	23	21	14	4	2	1	5	6	2081	10.05
10	11	19	471	686	221	67	52	50	46	16	8	6	2	4	1	2	2	1653	7.98
11	12	18	307	485	104	36	33	20	26	8	3	1	0	4	0	2	2	1049	5.06
12	13	6	207	253	49	18	18	14	19	8	2	1	1	1	1	1	2	601	2.90
13	14	2	77	129	9	0	8	8	5	3	3	1	0	0	0	0	0	245	1.18
14	15	0	15	52	5	2	2	0	2	1	0	0	1	0	1	0	0	81	0.39
15	16	0	10	20	2	0	1	0	0	0	0	0	0	0	0	1	0	34	0.16
16	17	0	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0.04
17	18	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00
18	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Freq	----	977	3632	5002	2749	1631	1523	1458	967	657	438	296	260	253	239	253	380	20715	
%	----	4.72	17.53	24.15	13.27	7.87	7.35	7.04	4.67	3.17	2.11	1.43	1.26	1.22	1.15	1.22	1.83		
Avg	----	5.57	8.12	8.55	7.28	6.28	6.13	6.10	5.87	5.20	4.89	4.57	4.10	4.15	3.63	3.83	3.95		

3.2.2 AUTUMN (April, May, June)

Vel	**m/s**	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**Freq**	**%**
0	**1**	19	13	18	13	22	17	15	15	15	9	19	14	16	13	13	20	251	1.21
1	**2**	69	67	60	52	57	65	65	64	65	31	42	45	52	49	46	47	876	4.24
2	**3**	97	125	118	90	109	137	118	123	59	87	75	66	65	61	62	82	1474	7.13
3	**4**	106	137	214	192	207	199	160	171	116	92	85	73	45	54	76	82	2009	9.71
4	**5**	113	205	262	297	324	260	223	202	149	108	77	73	63	65	65	67	2553	12.35
5	**6**	151	286	322	365	316	244	179	190	158	104	96	76	55	40	24	44	2650	12.81
6	**7**	137	306	415	381	258	206	178	172	169	121	126	69	55	27	32	46	2698	13.05
7	**8**	105	279	400	336	235	166	119	111	114	83	101	90	47	19	24	27	2256	10.91
8	**9**	93	311	343	245	214	152	66	67	125	73	84	75	58	17	9	18	1950	9.43
9	**10**	39	304	288	207	145	135	45	54	88	56	69	58	47	16	8	13	1572	7.60
10	**11**	37	244	226	133	70	57	23	32	49	37	41	48	37	13	0	4	1051	5.08
11	**12**	19	150	148	68	49	35	8	19	49	22	16	62	19	6	2	5	677	3.27
12	**13**	10	63	60	25	27	30	2	13	30	14	18	45	20	2	1	2	362	1.75
13	**14**	2	36	33	7	8	6	0	4	10	18	8	22	12	1	1	2	170	0.82
14	**15**	3	22	14	11	6	1	2	2	3	1	0	5	5	2	0	1	78	0.38
15	**16**	1	4	2	6	1	0	1	2	1	2	3	6	2	0	1	0	32	0.15
16	**17**	0	2	0	1	0	0	0	0	2	1	1	0	4	1	0	0	12	0.06
17	**18**	0	1	0	0	0	0	0	0	0	0	0	2	3	0	0	0	6	0.03
18	**19**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
19	**20**	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0.01
20	**21**	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.00
21	**22**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Freq	**----**	1001	2555	2923	2429	2048	1710	1204	1241	1202	859	861	832	605	386	364	460	20680	
%	**----**	4.84	12.35	14.13	11.75	9.90	8.27	5.82	6.00	5.81	4.15	4.16	4.02	2.93	1.87	1.76	2.22		
Avg	**----**	5.71	7.43	7.16	6.68	6.23	6.01	5.30	5.50	6.43	6.19	6.25	7.08	6.40	4.76	4.18	4.50		

SOURCE Measured wind data at Santos Basin from metocean buoy, production and drilling platforms (10-year measurement period). The values should be considered representative of 1-hour wind speeds.

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3.2.3 WINTER (July, August, September)

Vel	m/s	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%
0	1	13	9	10	10	10	8	10	6	9	8	6	8	7	4	8	4	130	0.63
1	2	31	26	23	24	22	32	28	25	26	29	22	26	28	22	30	24	418	2.01
2	3	56	56	59	57	55	74	61	52	48	46	53	45	35	39	47	52	835	4.02
3	4	99	103	109	108	96	94	81	84	94	60	61	55	54	54	53	62	1267	6.10
4	5	97	145	171	144	179	133	100	91	108	77	69	79	69	48	51	57	1618	7.79
5	6	91	182	253	239	254	179	134	115	104	96	79	62	38	36	22	47	1931	9.30
6	7	128	290	304	349	263	213	159	122	120	120	77	61	35	21	12	35	2309	11.11
7	8	113	390	405	367	291	207	155	135	107	107	94	58	31	11	17	40	2528	12.17
8	9	96	470	460	391	241	122	116	107	104	105	87	71	34	6	10	44	2464	11.86
9	10	48	440	543	349	229	115	69	86	65	95	77	68	26	9	6	19	2244	10.80
10	11	36	408	548	287	120	62	51	75	32	61	86	39	24	1	8	4	1842	8.87
11	12	30	390	480	173	34	25	31	28	34	47	53	57	27	2	5	5	1421	6.84
12	13	8	289	340	94	11	7	16	11	13	30	33	28	20	2	3	1	906	4.36
13	14	2	213	245	32	4	5	5	3	5	12	19	17	21	4	1	0	588	2.83
14	15	1	74	72	6	3	0	3	1	1	7	7	5	9	2	0	0	191	0.92
15	16	0	16	30	2	0	0	1	4	0	1	4	1	5	0	0	0	64	0.31
16	17	0	9	3	0	0	0	0	0	0	0	0	1	1	1	0	0	15	0.07
17	18	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0.01
18	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Freq		849	3511	4056	2632	1812	1276	1020	945	870	901	827	682	464	262	273	394	20774	
%		4.09	16.90	19.52	12.67	8.72	6.14	4.91	4.55	4.19	4.34	3.98	3.28	2.23	1.26	1.31	1.90		
Avg		6.23	9.09	9.17	7.95	7.02	6.51	6.59	6.76	6.45	7.16	7.43	7.18	6.80	4.79	4.54	5.31		

3.2.4 SPRING (October, November, December)

Vel	m/s	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%
0	1	6	12	11	7	7	11	10	6	12	9	13	14	13	8	14	11	164	0.80
1	2	38	39	31	32	30	21	28	19	40	49	40	32	34	21	20	33	507	2.49
2	3	69	83	70	74	79	92	75	42	58	87	72	46	41	45	36	49	1018	4.99
3	4	81	125	109	142	154	148	143	133	104	104	70	52	39	36	59	44	1543	7.57
4	5	76	156	174	220	223	226	181	171	188	128	95	68	52	39	39	57	2093	10.27
5	6	81	204	222	229	266	267	159	143	168	151	85	46	29	29	22	35	2136	10.48
6	7	64	218	306	305	336	278	184	162	131	124	66	38	22	17	14	33	2298	11.27
7	8	54	241	322	411	331	196	151	142	110	90	46	36	20	17	5	12	2184	10.71
8	9	54	253	403	452	232	126	130	132	97	78	61	33	13	9	7	7	2087	10.24
9	10	36	271	504	473	195	87	95	80	86	70	49	19	11	14	3	6	1999	9.81
10	11	22	250	538	374	118	88	62	46	52	39	36	17	17	10	4	4	1677	8.23
11	12	17	229	467	236	73	42	39	27	36	18	23	9	8	2	3	4	1233	6.05
12	13	15	179	355	131	30	25	13	6	10	6	9	8	4	4	4	1	800	3.92
13	14	6	98	187	49	15	9	3	4	4	3	5	3	0	0	3	0	389	1.91
14	15	0	36	98	10	5	5	1	3	0	1	2	0	0	0	0	0	161	0.79
15	16	1	9	32	4	1	4	5	0	0	0	2	1	0	0	0	0	59	0.29
16	17	0	4	5	2	3	2	0	0	2	0	1	1	0	0	0	0	20	0.10
17	18	0	3	1	2	0	0	1	0	1	0	1	0	0	0	0	0	9	0.04
18	19	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4	0.02
19	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.00
20	21	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.00
21	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Freq		620	2412	3835	3153	2098	1627	1280	1116	1099	957	678	425	303	251	233	296	20383	
%		3.04	11.83	18.81	15.47	10.29	7.98	6.28	5.48	5.39	4.70	3.33	2.09	1.49	1.23	1.14	1.45		
Avg		5.86	8.34	9.18	8.11	6.92	6.43	6.40	6.39	6.25	5.86	6.03	5.61	5.01	4.91	4.35	4.41		

SOURCE Measured wind data at Santos Basin from metocean buoy, production and drilling platforms (10-year measurement period). The values should be considered representative of 1-hour wind speeds.

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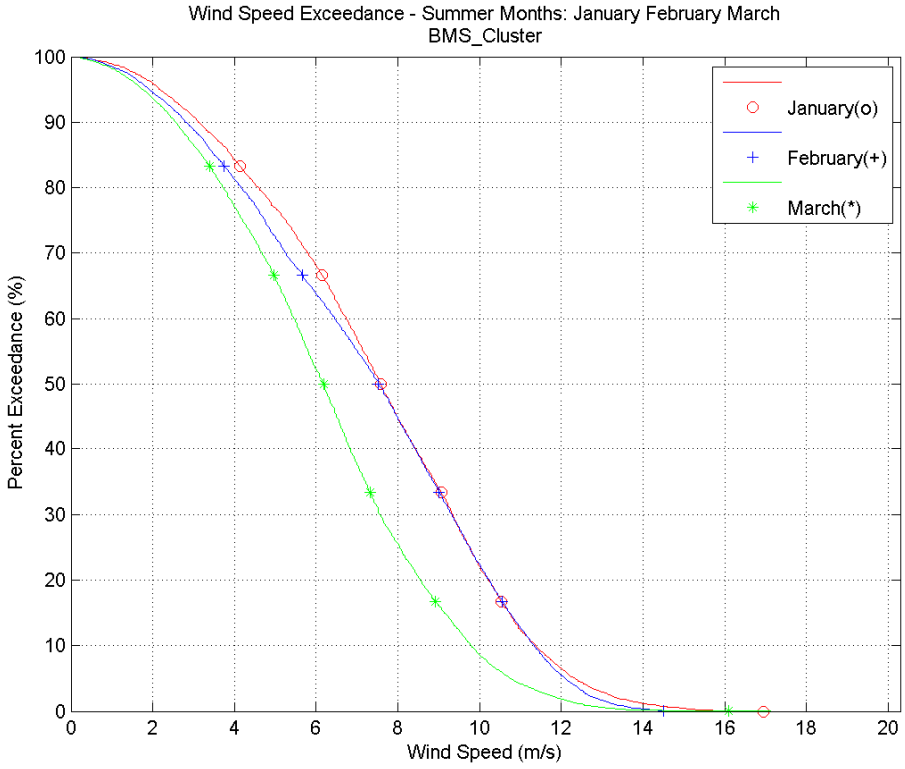
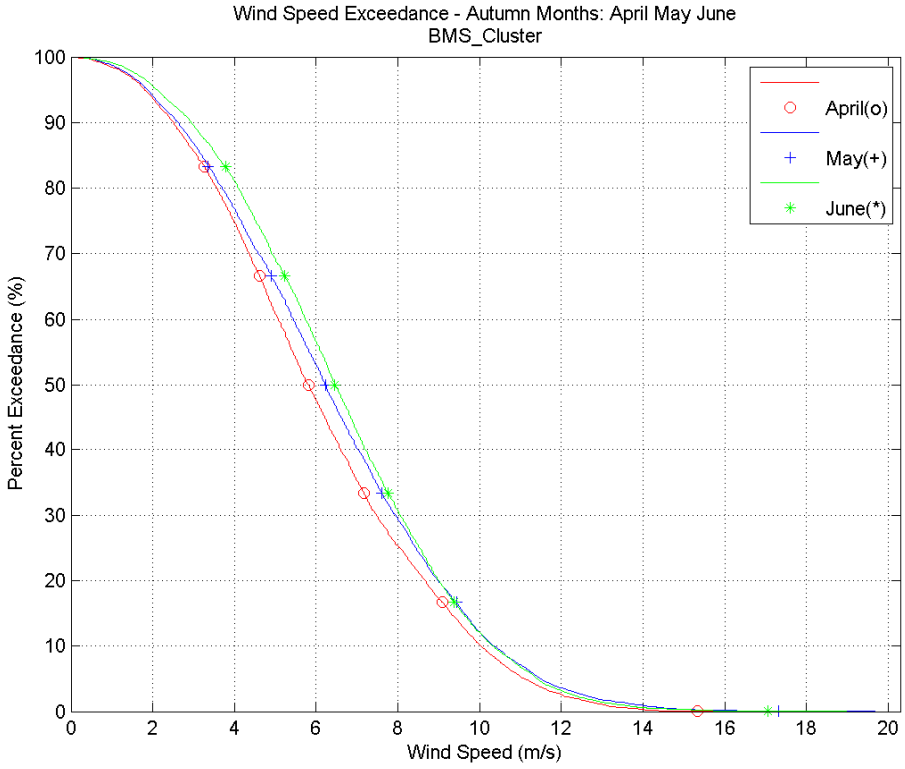
3.3 Basin Wind Exceedance Curves

3.3.1 SUMMER (January, February, March)

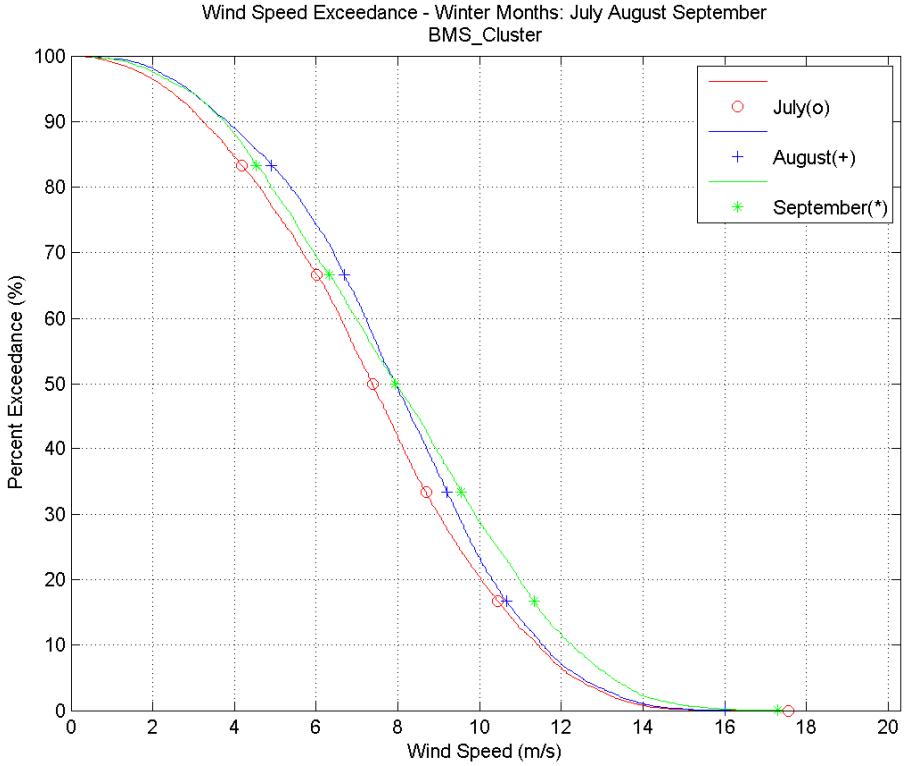


3.3.2 AUTUMN (April, May, June)

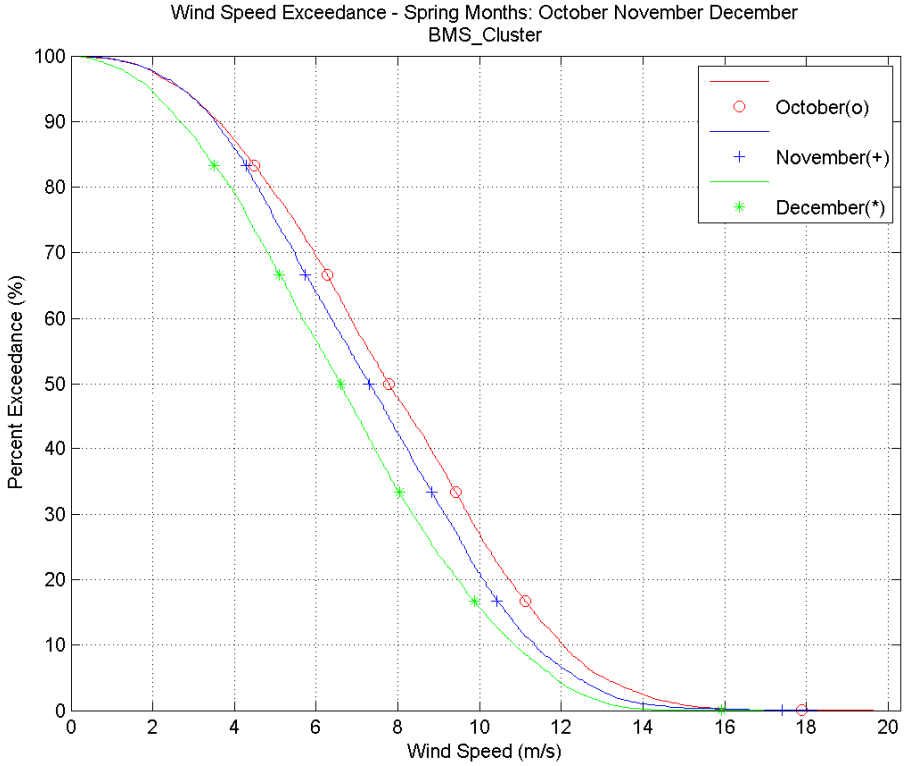


SOURCE Measured wind data at Santos Basin from metocean buoy, production and drilling platforms (10-year measurement period). The values should be considered representative of 1-hour wind speeds.

3.3.3 WINTER (July, August, September)



3.3.4 SPRING (October, November, December)



SOURCE Measured wind data at Santos Basin from metocean buoy, production and drilling platforms (10-year measurement period). The values should be considered representative of 1-hour wind speeds.

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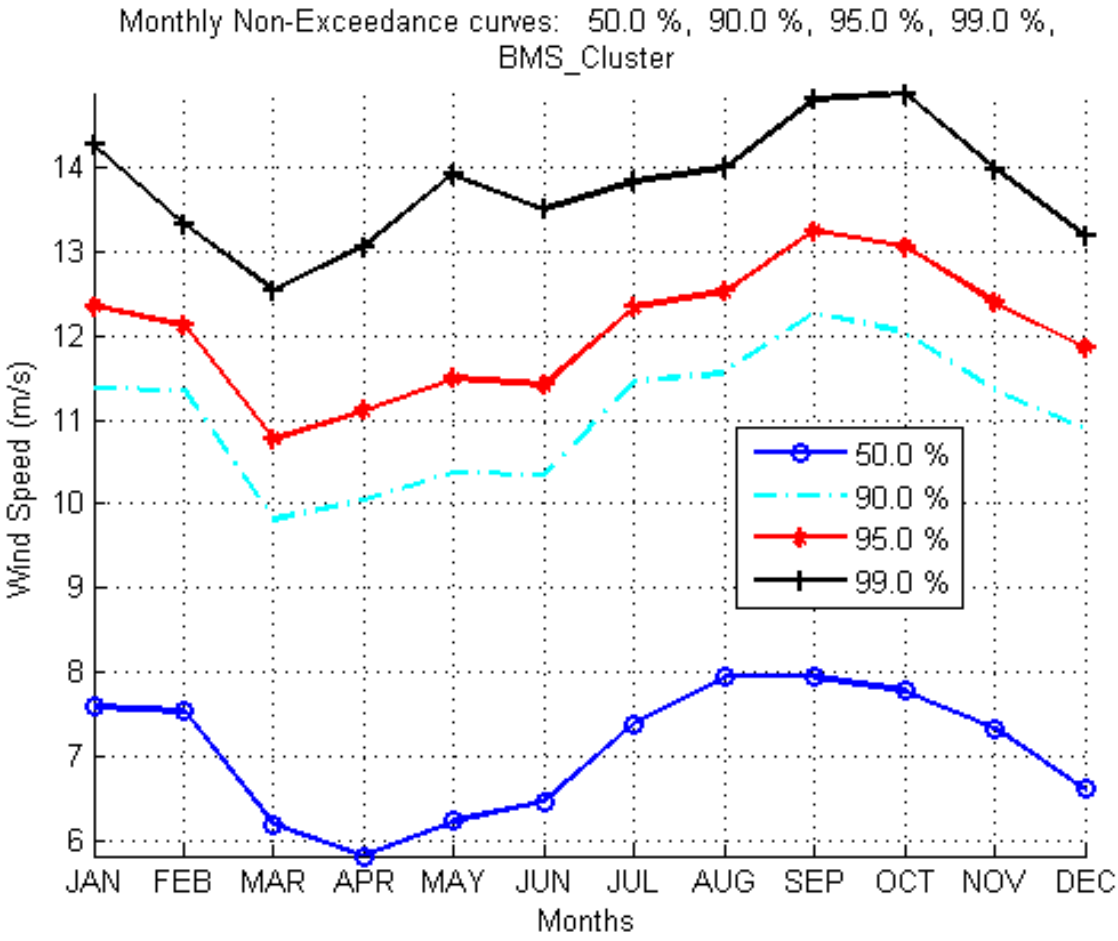
3.3.5 Wind Non-Exceedance Curves for Specified Percentage Levels



SOURCE Measured wind data at Santos Basin from metocean buoy, production and drilling platforms (10-year measurement period). The values should be considered representative of 1-hour wind speeds.

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4. SEASONAL WAVE DATA FOR CLUSTER BM-S DEEP WATER REGION

4.1 Distribution of Significant Wave Height and Direction

Hs(m)		DIRECTION(º)																Freq	%	Mean Dir
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
0.0	0.5	0	0	0	1	1	1	0	2	3	0	0	0	0	0	0	0	8	0.01	145.6
0.5	1.0	19	51	266	342	146	135	93	104	138	143	49	6	5	4	3	8	1512	2.0	99.2
1.0	1.5	55	370	1622	2303	2314	1826	1303	784	577	505	105	26	8	11	9	24	11842	15.64	97
1.5	2.0	100	882	4137	4266	3161	3089	2799	2516	2291	1330	169	49	24	3	4	16	24836	32.8	103.3
2.0	2.5	68	840	3481	2557	1530	1404	1654	1965	2753	2367	348	85	27	15	8	19	19121	25.25	117.1
2.5	3.0	37	482	1722	1169	709	552	556	944	1519	1928	360	136	35	10	8	8	10175	13.44	131.9
3.0	3.5	22	170	721	428	288	212	211	365	651	1039	361	93	27	10	4	6	4608	6.09	149.2
3.5	4.0	3	41	222	134	101	108	90	115	229	555	199	53	10	4	3	0	1867	2.47	168.1
4.0	4.5	0	15	69	34	22	33	33	63	74	265	146	40	15	1	0	0	810	1.07	189.2
4.5	5.0	0	2	24	12	17	10	18	30	36	127	97	30	7	0	0	0	410	0.54	196.6
5.0	5.5	0	1	5	8	5	0	8	12	17	68	74	29	2	0	0	0	229	0.3	208.4
5.5	6.0	0	0	0	3	0	0	0	6	12	28	58	17	0	0	0	0	124	0.16	215
6.0	6.5	0	0	0	0	0	0	0	0	3	20	43	0	0	0	0	0	66	0.09	223.2
6.5	7.0	0	0	0	0	0	0	0	0	3	4	32	0	0	0	0	0	39	0.05	222.2
7.0	7.5	0	0	0	0	0	0	0	0	3	7	19	0	0	0	0	0	29	0.04	219
7.5	8.0	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	11	0.01	226.9
8.0	8.5	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	9	0.01	226.6
8.5	9.0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	10	0.01	231.4
9.0	9.5	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	4	0.01	227.2
9.5	10.0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	207.8
Freq		304	2854	12269	11257	8294	7370	6765	6906	8309	8391	2091	564	160	58	39	81	75712		
%		0.4	3.77	16.2	14.87	10.95	9.73	8.94	9.12	10.97	11.08	2.76	0.74	0.21	0.08	0.05	0.11			
Mean Hs		1.98	2.12	2.1	1.94	1.86	1.87	1.95	2.12	2.28	2.58	3.28	3.13	2.8	2.33	2.19	1.85			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals, providing information equivalent to 227136 hours (=75712 * 3 hours).

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4.2 Distribution of Significant Wave Height and Direction by Season

4.2.1 SUMMER (January, February, March)

Hs(m)		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%	MDir
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	NaN
0.5	1.0	3	4	135	135	46	36	30	27	24	16	3	1	0	1	0	2	463	2.56	80.9
1.0	1.5	6	130	848	1047	923	872	516	278	94	78	17	8	2	1	4	6	4830	26.65	90.0
1.5	2.0	18	277	1654	1331	782	934	822	707	418	206	24	3	1	0	2	2	7181	39.63	93.2
2.0	2.5	4	222	854	549	223	332	349	485	473	279	25	9	3	0	2	3	3812	21.04	105.0
2.5	3.0	2	72	236	130	81	117	63	131	162	180	11	4	3	1	1	1	1195	6.59	116.9
3.0	3.5	1	25	60	41	34	41	38	46	64	88	9	0	0	0	0	0	447	2.47	133.7
3.5	4.0	0	3	23	9	13	11	4	9	17	35	0	0	0	0	0	0	124	0.68	134.8
4.0	4.5	0	0	7	0	3	10	2	2	6	13	2	0	0	0	0	0	45	0.25	150.5
4.5	5.0	0	0	3	0	0	0	4	1	3	8	0	0	0	0	0	0	19	0.10	166.0
5.0	5.5	0	0	1	0	0	0	0	0	0	4	0	0	0	0	0	0	5	0.03	195.9
Freq		34	733	3821	3242	2105	2353	1828	1686	1261	907	91	25	9	3	9	14	18121		
%		0.19	4.05	21.09	17.89	11.62	12.98	10.09	9.30	6.96	5.01	0.50	0.14	0.05	0.02	0.05	0.08			
MHs		1.74	1.98	1.83	1.7	1.64	1.72	1.77	1.94	2.14	2.35	2.1	1.94	2.14	1.54	1.74	1.63			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals, providing information equivalent to 227136 hours (=75712 * 3 hours).

4.2.2 AUTUMN (April, May, June)

Hs(m)		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%	MDir
0.0	0.5	0	0	0	0	1	0	0	2	2	0	0	0	0	0	0	0	5	0.03	157.6
0.5	1.0	7	24	46	118	62	56	30	37	60	74	33	1	3	2	3	2	558	2.96	115.7
1.0	1.5	37	130	247	380	507	399	359	255	225	244	43	7	4	8	4	13	2862	15.21	110.7
1.5	2.0	44	246	547	651	692	800	610	670	742	476	59	26	11	3	1	13	5591	29.70	119.6
2.0	2.5	32	234	470	347	293	284	434	599	938	802	125	41	14	4	0	11	4628	24.59	145.8
2.5	3.0	21	123	166	105	132	101	163	296	550	676	154	71	19	4	5	6	2592	13.77	170.3
3.0	3.5	11	38	76	42	27	27	47	129	247	376	177	51	15	9	0	3	1275	6.77	187.6
3.5	4.0	1	10	20	16	20	10	9	39	67	196	97	27	8	2	3	0	525	2.79	196.6
4.0	4.5	0	3	1	3	5	4	8	25	23	115	76	28	13	1	0	0	305	1.62	207.1
4.5	5.0	0	0	0	0	2	5	6	18	10	63	68	23	5	0	0	0	200	1.06	209.4
5.0	5.5	0	0	0	0	0	0	1	7	8	42	33	22	1	0	0	0	114	0.61	215.4
5.5	6.0	0	0	0	0	0	0	0	6	5	11	36	15	0	0	0	0	73	0.39	218.6
6.0	6.5	0	0	0	0	0	0	0	0	0	5	27	0	0	0	0	0	32	0.17	229.3
6.5	7.0	0	0	0	0	0	0	0	0	0	1	20	0	0	0	0	0	21	0.11	229.4
7.0	7.5	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	17	0.09	230.9
7.5	8.0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	9	0.05	228.9
8.0	8.5	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	6	0.03	227.4
8.5	9.0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	9	0.05	231.3
Freq		153	808	1573	1662	1741	1686	1667	2083	2877	3081	989	312	93	33	16	48	18822		
%		0.81	4.29	8.36	8.83	9.25	8.96	8.86	11.07	15.29	16.37	5.25	1.66	0.49	0.18	0.09	0.26			
MHs		1.96	2.04	2	1.8	1.78	1.8	1.95	2.17	2.28	2.57	3.52	3.35	2.96	2.36	2.19	1.91			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals, providing information equivalent to 227136 hours (=75712 * 3 hours).

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4.2.3 WINTER (July, August, September)

Hs(m)		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%	MDir
0.0	0.5	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	2	0.01	126.8
0.5	1.0	7	17	27	39	11	9	8	16	33	31	9	2	2	1	0	3	215	1.10	116.1
1.0	1.5	8	79	188	323	288	179	127	96	142	118	17	8	1	1	1	4	1580	8.07	100.2
1.5	2.0	25	214	772	867	722	637	544	508	543	330	50	13	10	0	0	0	5235	26.73	105.6
2.0	2.5	22	253	1011	742	477	361	371	447	773	792	128	28	6	7	3	3	5424	27.70	116.5
2.5	3.0	9	179	701	507	248	154	176	313	515	728	151	46	7	1	0	0	3735	19.07	127.1
3.0	3.5	4	63	362	230	123	63	73	116	207	425	151	33	6	1	2	0	1859	9.49	137.0
3.5	4.0	2	15	125	78	32	36	50	45	85	266	90	18	2	2	0	0	846	4.32	165.0
4.0	4.5	0	10	43	19	3	7	23	24	26	103	57	10	2	0	0	0	327	1.67	181.8
4.5	5.0	0	2	12	3	11	1	8	10	16	45	27	5	2	0	0	0	142	0.73	187.3
5.0	5.5	0	1	2	6	2	0	7	5	9	20	34	7	1	0	0	0	94	0.48	199.9
5.5	6.0	0	0	0	3	0	0	0	0	7	17	19	2	0	0	0	0	48	0.25	208.5
6.0	6.5	0	0	0	0	0	0	0	0	3	15	16	0	0	0	0	0	34	0.17	217.4
6.5	7.0	0	0	0	0	0	0	0	0	3	3	12	0	0	0	0	0	18	0.09	213.5
7.0	7.5	0	0	0	0	0	0	0	0	3	7	2	0	0	0	0	0	12	0.06	201.6
7.5	8.0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	0.01	217.6
8.0	8.5	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	3	0.02	225.0
8.5	9.0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.01	232.2
9.0	9.5	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	4	0.02	227.2
9.5	10.0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0.01	207.8
Freq		77	833	3243	2818	1917	1447	1387	1580	2366	2905	770	172	39	13	6	10	19583		
%		0.39	4.25	16.56	14.39	9.79	7.39	7.08	8.07	12.08	14.83	3.93	0.88	0.20	0.07	0.03	0.05			
MHs		2.01	2.24	2.38	2.2	2.07	2.03	2.19	2.29	2.39	2.75	3.33	3.01	2.67	2.37	2.46	1.42			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals, providing information equivalent to 227136 hours (=75712 * 3 hours).

4.2.4 SPRING (October, November, December)

Hs(m)		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%	MDir
0.0	0.5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.01	111.0
0.5	1.0	2	6	58	50	27	34	25	24	21	22	4	2	0	0	0	1	276	1.44	100.9
1.0	1.5	4	31	339	553	596	376	301	155	116	65	28	3	1	1	0	1	2570	13.40	96.6
1.5	2.0	13	145	1164	1417	965	718	823	631	588	318	36	7	2	0	1	1	6829	35.59	100.5
2.0	2.5	10	131	1146	919	537	427	500	434	569	494	70	7	4	4	3	2	5257	27.40	103.4
2.5	3.0	5	108	619	427	248	180	154	204	292	344	44	15	6	4	2	1	2653	13.83	103.2
3.0	3.5	6	44	223	115	104	81	53	74	133	150	24	9	6	0	2	3	1027	5.35	111.6
3.5	4.0	0	13	54	31	36	51	27	22	60	58	12	8	0	0	0	0	372	1.94	130.3
4.0	4.5	0	2	18	12	11	12	0	12	19	34	11	2	0	0	0	0	133	0.69	152.4
4.5	5.0	0	0	9	9	4	4	0	1	7	11	2	2	0	0	0	0	49	0.26	130.3
5.0	5.5	0	0	2	2	3	0	0	0	0	2	7	0	0	0	0	0	16	0.08	172.6
5.5	6.0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0.02	223.4
Freq		40	480	3632	3535	2531	1884	1883	1557	1805	1498	241	55	19	9	8	9	19186		
%		0.21	2.50	18.93	18.42	13.19	9.82	9.81	8.12	9.41	7.81	1.26	0.29	0.10	0.05	0.04	0.05			
MHs		2.17	2.27	2.17	2.0	1.95	1.98	1.95	2.08	2.25	2.43	2.53	2.78	2.6	2.41	2.49	2.38			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals, providing information equivalent to 227136 hours (=75712 * 3 hours).

4.3 Distribution of Significant Wave Height and Spectral Peak Period

Hs(m)		Tp(s)																		Freq	%	MTp
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
0.0	0.5	1	0	0	1	2	2	1	0	0	0	0	1	0	0	0	0	0	0	8	0	8.24
0.5	1.0	107	113	205	256	273	159	112	74	68	50	41	38	12	4	0	0	0	0	1512	2.0	7.73
1.0	1.5	15	938	1115	1792	3608	2505	692	373	283	260	108	103	31	11	3	0	2	3	11842	16	7.70
1.5	2.0	1	349	3682	3524	4602	6028	2948	1626	993	534	251	174	69	26	18	8	1	2	24836	33	8.12
2.0	2.5	0	13	1265	4995	2430	2755	2041	1870	1806	982	523	284	105	32	10	8	2	0	19121	25	8.74
2.5	3.0	0	6	109	2114	2404	1040	858	798	879	1021	514	288	108	20	8	6	1	1	10175	13	9.27
3.0	3.5	0	1	4	403	1240	856	277	292	294	424	431	280	77	18	8	1	1	1	4608	6.1	9.82
3.5	4.0	0	0	0	43	268	550	189	91	140	141	139	209	75	16	5	1	0	0	1867	2.5	10.45
4.0	4.5	0	0	0	3	31	207	161	48	47	63	68	89	73	17	3	0	0	0	810	1.1	11.16
4.5	5.0	0	0	0	0	4	48	116	48	15	21	41	57	35	19	6	0	0	0	410	0.5	11.75
5.0	5.5	0	0	0	0	0	16	45	60	19	15	16	22	20	7	8	1	0	0	229	0.3	11.88
5.5	6.0	0	0	0	0	0	2	22	44	19	7	6	15	9	0	0	0	0	0	124	0.2	11.50
6.0	6.5	0	0	0	0	0	0	10	18	22	0	3	11	2	0	0	0	0	0	66	0.1	11.55
6.5	7.0	0	0	0	0	0	0	3	12	12	2	0	7	3	0	0	0	0	0	39	0.1	11.99
7.0	7.5	0	0	0	0	0	0	4	4	14	1	0	1	5	0	0	0	0	0	29	0	11.99
7.5	8.0	0	0	0	0	0	0	2	1	1	4	0	0	3	0	0	0	0	0	11	0	12.51
8.0	8.5	0	0	0	0	0	0	0	5	0	1	0	1	2	0	0	0	0	0	9	0	12.47
8.5	9.0	0	0	0	0	0	0	1	6	3	0	0	0	0	0	0	0	0	0	10	0	10.82
9.0	9.5	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	4	0	12.88
9.5	10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0.0	16.95
Freq		124	1420	6380	13131	14862	14168	7482	5371	4616	3527	2141	1580	629	173	69	25	7	7	75712		
%		0.16	1.88	8.43	17.34	19.6	18.7	9.88	7.09	6.1	4.66	2.83	2.09	0.83	0.23	0.09	0	0	0			
MHs		0.86	1.35	1.75	2.07	2.03	2.04	2.20	2.31	2.38	2.49	2.69	2.90	3.14	3.12	3.05	2.4	2.1	2			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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4.4 Distribution of Significant Wave Height and Spectral Peak Period by Season

4.4.1 SUMMER (January, February, March)

Hs(m)		Tp(s) 3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	16	34	108	104	92	38	36	2	9	6	10	8	0	0	0	0	0	0	463	2.6	7.09
1.0	1.5	3	371	537	951	1715	773	226	59	101	51	18	13	8	1	1	0	1	1	4830	26.65	7.34
1.5	2.0	0	94	1184	1364	1545	1459	660	457	186	115	57	29	13	11	6	1	0	0	7181	39.63	7.82
2.0	2.5	0	0	197	1202	615	436	323	337	370	185	92	36	15	2	0	2	0	0	3812	21.04	8.53
2.5	3.0	0	0	10	265	320	116	73	105	87	100	76	36	4	1	2	0	0	0	1195	6.59	9.13
3.0	3.5	0	0	0	41	130	82	24	34	9	36	51	28	8	2	2	0	0	0	447	2.47	9.79
3.5	4.0	0	0	0	0	12	46	21	4	4	9	6	7	12	3	0	0	0	0	124	0.68	10.43
4.0	4.5	0	0	0	0	1	4	18	1	1	3	2	5	7	3	0	0	0	0	45	0.25	11.76
4.5	5.0	0	0	0	0	0	1	6	1	0	0	3	0	4	4	0	0	0	0	19	0.1	12.85
5.0	5.5	0	0	0	0	0	0	1	0	0	0	0	0	3	1	0	0	0	0	5	0.03	14.64
Freq		19	499	2036	3927	4430	2955	1388	1000	767	505	315	162	74	28	11	3	1	1	18121		
%		0.1	2.75	11.24	21.67	24.45	16.31	7.66	5.52	4.23	2.79	1.74	0.89	0.41	0.15	0.06	0.02	0.01	0.01			
MHs		0.91	1.31	1.62	1.85	1.73	1.8	1.92	2.05	2.06	2.24	2.41	2.42	2.84	2.94	2.13	2.07	1.4	1.34			

4.4.2 AUTUMN (April, May, June)

Hs(m)		Tp(s) 3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Freq	%	MTp
0.0	0.5	1	0	0	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	5	0.03	8.55
0.5	1.0	47	53	61	62	98	54	22	40	24	37	21	23	12	4	0	0	0	0	558	3.0	8.19
1.0	1.5	3	252	254	326	553	750	219	169	88	123	50	52	12	6	2	0	1	2	2862	15.21	8.18
1.5	2.0	0	95	808	560	764	1293	857	510	339	150	95	65	30	9	9	5	1	1	5591	29.7	8.53
2.0	2.5	0	2	355	891	359	500	512	547	647	404	221	110	55	15	6	3	1	0	4628	24.59	9.45
2.5	3.0	0	1	42	464	320	163	190	246	293	440	227	141	50	11	1	3	0	0	2592	13.77	10.23
3.0	3.5	0	0	2	105	249	144	56	98	121	150	160	141	36	7	6	0	0	0	1275	6.77	10.69
3.5	4.0	0	0	0	15	67	121	47	39	50	50	34	72	25	4	1	0	0	0	525	2.79	10.74
4.0	4.5	0	0	0	1	8	83	47	17	18	13	32	37	40	8	1	0	0	0	305	1.62	11.50
4.5	5.0	0	0	0	0	0	18	63	26	5	14	21	30	12	7	4	0	0	0	200	1.06	11.75
5.0	5.5	0	0	0	0	0	7	20	29	10	3	6	13	14	3	8	1	0	0	114	0.61	12.25
5.5	6.0	0	0	0	0	0	1	12	27	13	3	3	7	7	0	0	0	0	0	73	0.39	11.49
6.0	6.5	0	0	0	0	0	0	6	11	10	0	0	3	2	0	0	0	0	0	32	0.2	11.22
6.5	7.0	0	0	0	0	0	0	2	9	6	0	0	2	2	0	0	0	0	0	21	0.11	11.61
7.0	7.5	0	0	0	0	0	0	4	3	9	1	0	0	0	0	0	0	0	0	17	0.09	11.13
7.5	8.0	0	0	0	0	0	0	2	1	1	3	0	0	2	0	0	0	0	0	9	0.05	12.22
8.0	8.5	0	0	0	0	0	0	0	4	0	0	0	0	2	0	0	0	0	0	6	0.03	12.4
8.5	9.0	0	0	0	0	0	0	1	5	3	0	0	0	0	0	0	0	0	0	9	0.05	10.82
Freq		51	403	1522	2425	2418	3135	2061	1781	1637	1391	870	697	301	74	38	12	3	3	18822		
%		0.27	2.14	8.09	12.88	12.85	16.66	10.95	9.46	8.7	7.39	4.62	3.7	1.6	0.39	0.2	0.06	0.02	0.02			
MHs		0.83	1.32	1.78	2.12	2.03	1.98	2.24	2.39	2.45	2.45	2.66	2.88	3.15	2.89	3.27	2.43	1.68	1.61			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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4.4.3 WINTER (July, August, September)

Hs(m)		Tp(s) 3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Freq	%	MTp
0.0	0.5	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.01	7.53
0.5	1.0	37	20	8	31	21	17	19	23	25	6	2	6	0	0	0	0	0	0	215	1.1	7.81
1.0	1.5	5	124	142	193	296	395	144	78	75	56	33	29	9	1	0	0	0	0	1580	8.07	8.22
1.5	2.0	0	94	723	608	805	1330	805	344	241	140	65	57	12	6	3	2	0	0	5235	26.73	8.34
2.0	2.5	0	6	375	1344	674	785	669	593	494	229	127	88	25	13	1	1	0	0	5424	27.7	8.73
2.5	3.0	0	3	36	798	888	434	345	282	384	315	135	65	39	5	2	2	1	1	3735	19.07	9.11
3.0	3.5	0	0	2	177	534	385	114	105	140	169	145	70	14	4	0	0	0	0	1859	9.49	9.47
3.5	4.0	0	0	0	14	153	240	80	24	75	65	78	82	30	5	0	0	0	0	846	4.32	10.35
4.0	4.5	0	0	0	1	17	76	75	21	15	33	28	36	18	5	2	0	0	0	327	1.67	10.97
4.5	5.0	0	0	0	0	3	16	29	16	8	6	17	24	13	8	2	0	0	0	142	0.73	12.05
5.0	5.5	0	0	0	0	0	6	15	30	9	10	10	9	2	3	0	0	0	0	94	0.48	11.56
5.5	6.0	0	0	0	0	0	1	9	16	6	3	3	8	2	0	0	0	0	0	48	0.25	11.56
6.0	6.5	0	0	0	0	0	0	4	7	12	0	3	8	0	0	0	0	0	0	34	0.2	11.86
6.5	7.0	0	0	0	0	0	0	1	3	6	2	0	5	1	0	0	0	0	0	18	0.09	12.44
7.0	7.5	0	0	0	0	0	0	0	1	5	0	0	1	5	0	0	0	0	0	12	0.06	13.21
7.5	8.0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	0.01	13.82
8.0	8.5	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	3	0.02	12.6
8.5	9.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.01	10.74
9.0	9.5	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	4	0.02	12.88
9.5	10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0.0	16.95
Freq		42	247	1286	3166	3393	3685	2309	1546	1496	1037	646	489	171	53	10	5	1	1	19583		
%		0.21	1.26	6.57	16.17	17.33	18.82	11.79	7.89	7.64	5.3	3.3	2.5	0.87	0.27	0.05	0.03	0.01	0.01			
MHs		0.81	1.44	1.87	2.27	2.41	2.28	2.32	2.44	2.53	2.68	2.88	3.09	3.32	3.6	3.19	2.24	2.7	2.56			

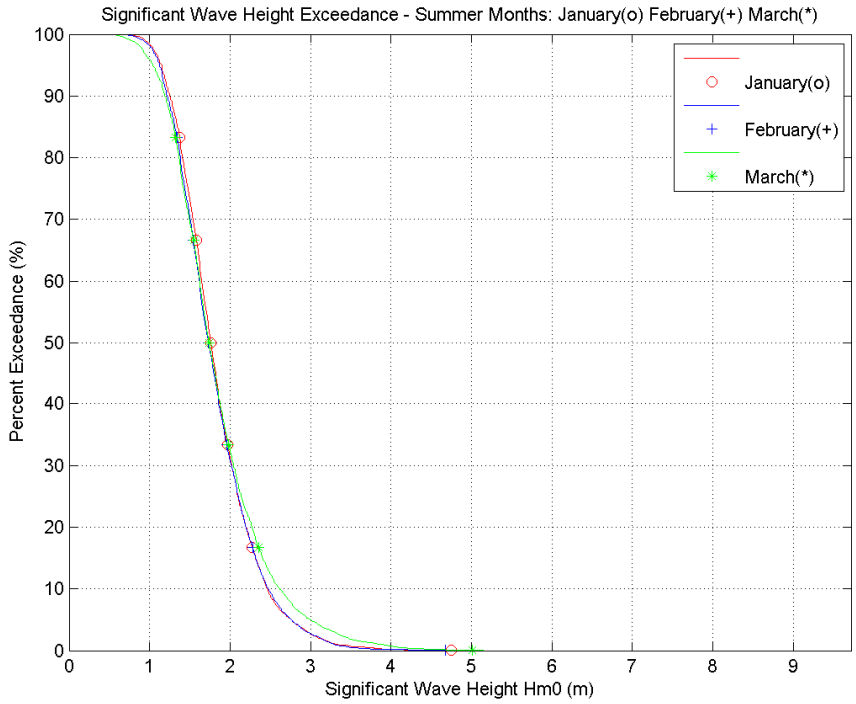
4.4.4 SPRING (October, November, December)

Hs(m)		Tp(s) 3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Freq	%	MTp
0.0	0.5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.01	8.11
0.5	1.0	7	6	28	59	62	50	35	9	10	1	8	1	0	0	0	0	0	0	276	1.44	7.79
1.0	1.5	4	191	182	322	1044	587	103	67	19	30	7	9	2	3	0	0	0	0	2570	13.4	7.54
1.5	2.0	1	66	967	992	1488	1946	626	315	227	129	34	23	14	0	0	0	0	1	6829	35.59	7.95
2.0	2.5	0	5	338	1558	782	1034	537	393	295	164	83	50	10	2	3	2	1	0	5257	27.4	8.29
2.5	3.0	0	2	21	587	876	327	250	165	115	166	76	46	15	3	3	1	0	0	2653	13.83	8.64
3.0	3.5	0	1	0	80	327	245	83	55	24	69	75	41	19	5	0	1	1	1	1027	5.35	9.36
3.5	4.0	0	0	0	14	36	143	41	24	11	17	21	48	8	4	4	1	0	0	372	1.94	10.26
4.0	4.5	0	0	0	1	5	44	21	9	13	14	6	11	8	1	0	0	0	0	133	0.69	10.63
4.5	5.0	0	0	0	0	1	13	18	5	2	1	0	3	6	0	0	0	0	0	49	0.26	10.47
5.0	5.5	0	0	0	0	0	3	9	1	0	2	0	0	1	0	0	0	0	0	16	0.08	10.16
5.5	6.0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	3	0.02	10.82
Freq		12	271	1536	3613	4621	4393	1724	1044	716	594	310	232	83	18	10	5	2	2	19186		
%		0.06	1.41	8.01	18.83	24.09	22.9	8.99	5.44	3.73	3.1	1.62	1.21	0.43	0.09	0.05	0.03	0.01	0.01			
MHs		1.01	1.39	1.81	2.11	2.03	2.05	2.21	2.23	2.24	2.46	2.66	2.87	3.02	2.94	3.09	2.82	2.69	2.51			

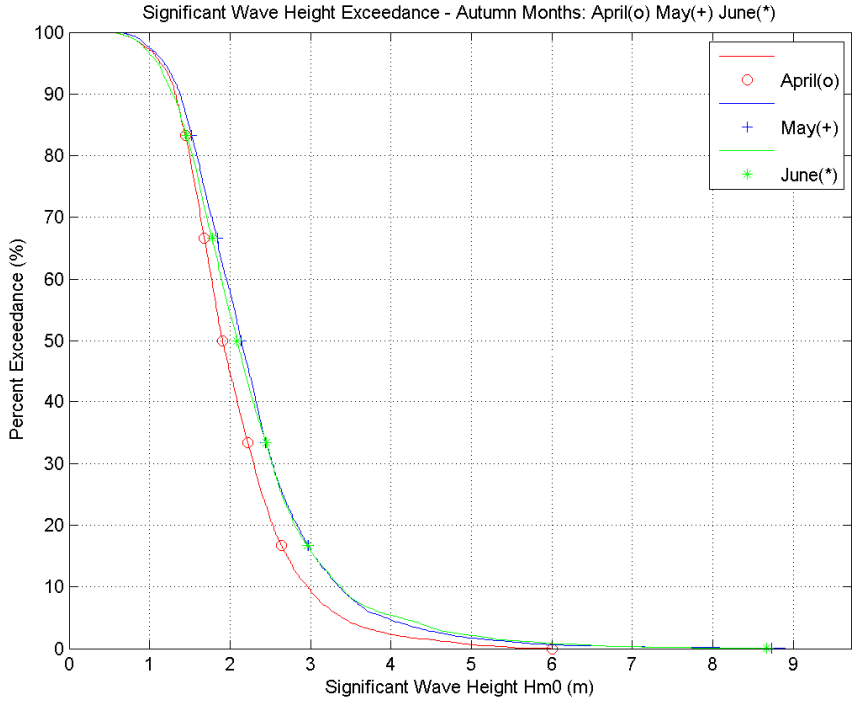
SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

4.5 Wave Exceedance Curves

4.5.1 SUMMER (January, February, March)



4.5.2 AUTUMN (April, May, June)



SOURCE: Modeled wave data - BOMOSHU (Brazilian Offshore Meteorological and Oceanographic Study), OceanWeather Inc.

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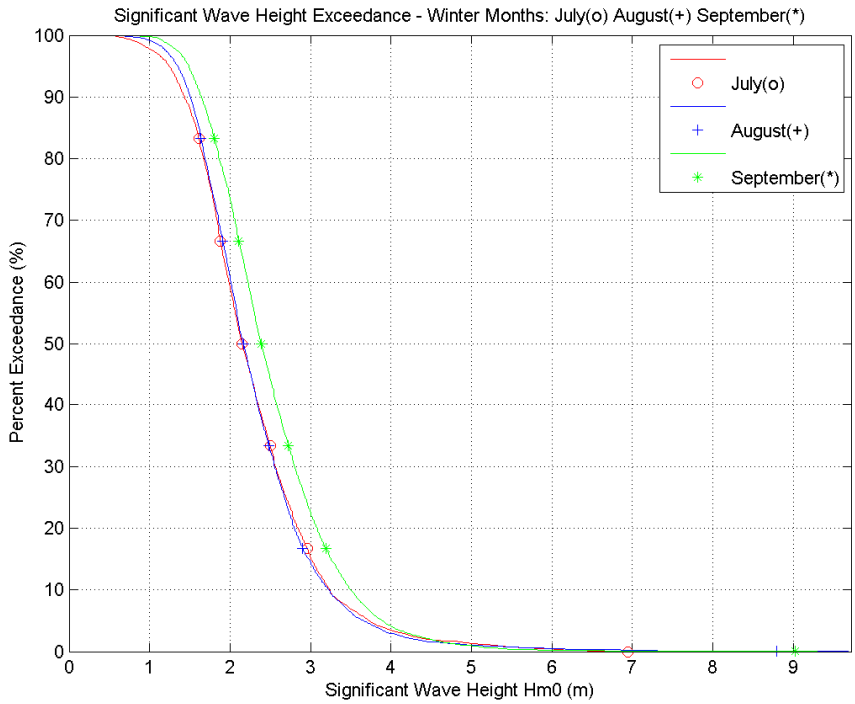
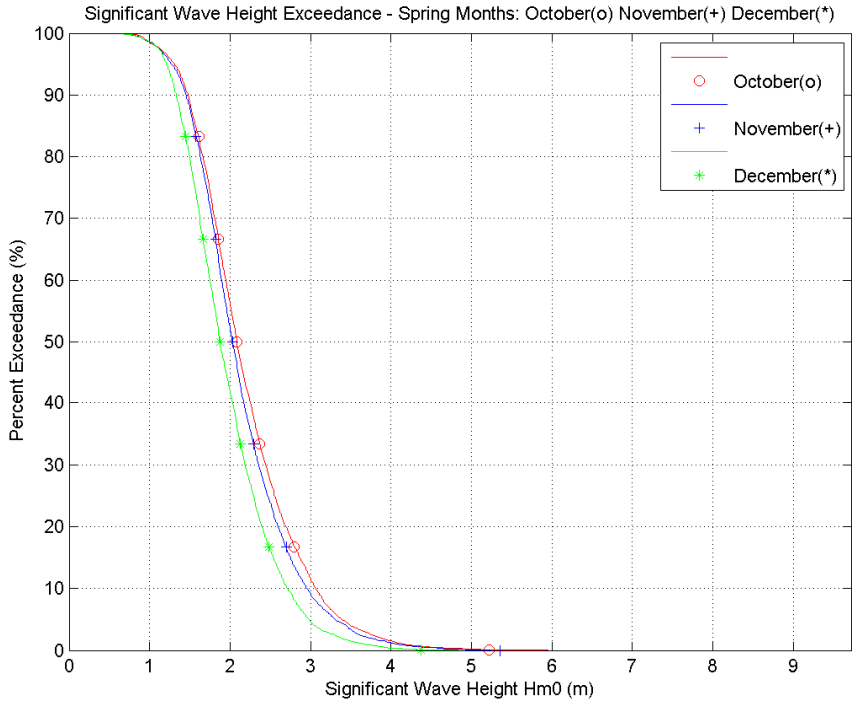
4.5.3 WINTER (July, August, September)



4.5.4 SPRING (October, November, December)



SOURCE: Modeled wave data - BOMOSHU (Brazilian Offshore Meteorological and Oceanographic Study), OceanWeather Inc.

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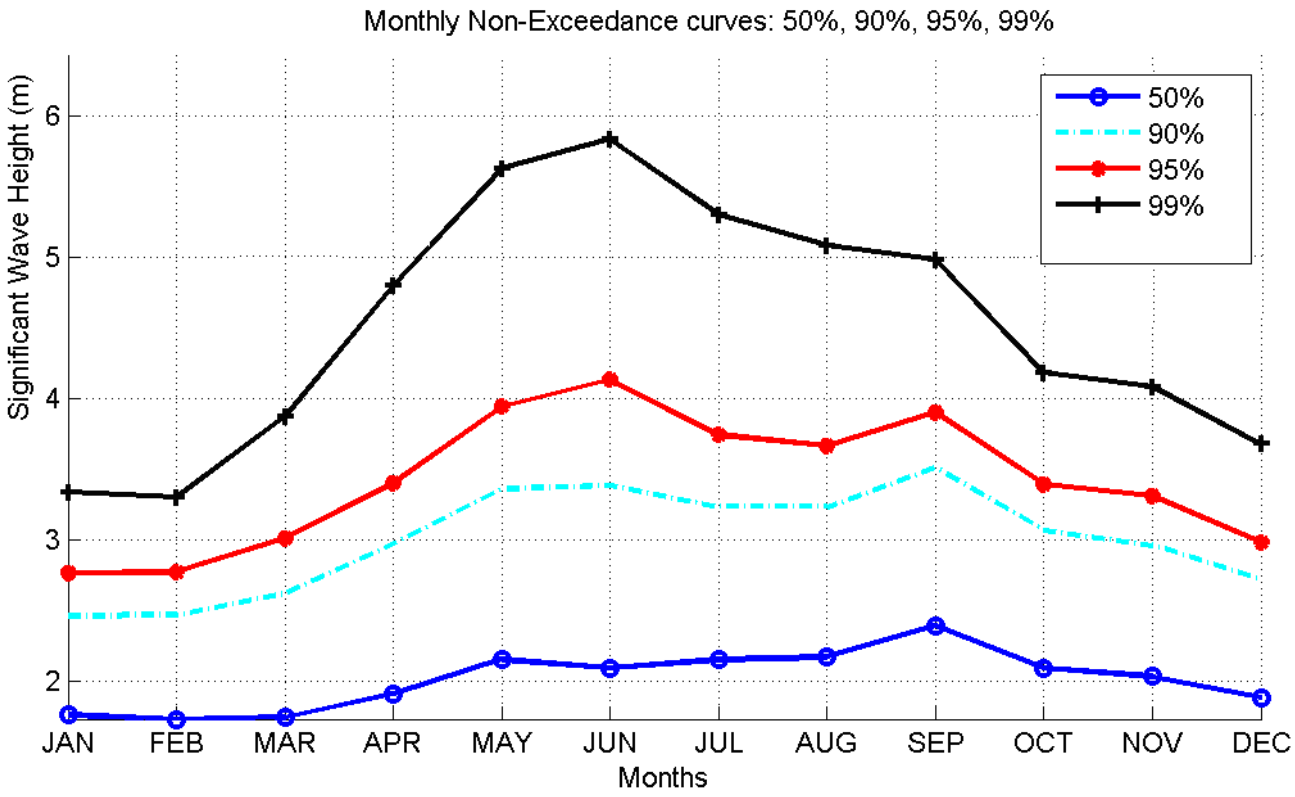
4.6 Wave Non-Exceedance Curves for Specified Percentage Levels



SOURCE: Modeled wave data - BOMOSHU (Brazilian Offshore Meteorological and Oceanographic Study), OceanWeather Inc.

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5. SEASONAL WAVE DATA FOR INTERMEDIATE DEPTH REGION

5.1 Distribution of Significant Wave Height and Direction

HS(m)		DIRECTION(º)																Freq	%	MDir
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
0.5	1.0	0	0	1	49	177	117	43	24	2	0	0	0	0	0	0	0	413	0.68	101.8
1.0	1.5	8	52	420	1824	3110	2931	2217	1152	477	64	13	3	2	3	3	1	12280	20.35	108.6
1.5	2.0	59	273	1783	3962	3099	3348	3529	3084	2429	697	129	40	9	8	3	7	22459	37.21	114.9
2.0	2.5	34	214	1314	2448	1276	1177	1450	2098	2742	1558	221	55	16	8	7	11	14629	24.24	130.4
2.5	3.0	19	84	584	982	463	390	398	670	1359	1265	188	38	14	4	4	9	6471	10.72	143.9
3.0	3.5	2	11	135	304	153	112	100	228	527	665	111	29	4	3	1	0	2385	3.95	162.2
3.5	4.0	2	4	22	62	49	43	34	90	123	346	84	35	5	2	1	0	902	1.49	180
4.0	4.5	1	0	4	8	20	15	15	61	39	166	67	25	2	0	0	1	424	0.7	189.9
4.5	5.0	0	0	0	1	5	1	2	15	18	66	33	25	3	0	0	0	169	0.28	205.1
5.0	5.5	0	0	0	0	3	0	0	3	5	50	26	20	1	0	0	0	108	0.18	215.4
5.5	6.0	0	0	0	0	0	0	0	0	2	15	19	21	3	0	0	0	60	0.1	228.1
6.0	6.5	0	0	0	0	0	0	0	0	1	12	10	8	0	0	0	0	31	0.05	221.3
6.5	7.0	0	0	0	0	0	0	0	0	0	5	6	5	0	0	0	0	16	0.03	226.2
7.0	7.5	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	6	0.01	219.4
7.5	8.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
Freq		125	638	4263	9640	8355	8134	7788	7425	7724	4911	911	304	59	28	19	29	60353		
%		0.21	1.06	7.06	15.97	13.84	13.48	12.9	12.3	12.8	8.14	1.51	0.5	0.1	0.05	0.03	0.05			
MHs		2.08	2.05	2.06	1.95	1.73	1.71	1.79	2	2.24	2.7	3.02	3.5	2.88	2.28	2.24	2.31			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals, providing information equivalent to 181059 hours (=60353 * 3 hours).

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5.2 Distribution of Significant Wave Height and Direction by Season

5.2.1 SUMMER (January, February, March)

HS(m)		DIRECTION(º)																Freq	%	MDir
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
0.5	1.0	0	0	1	31	109	79	32	9	0	0	0	0	0	0	0	0	261	1.8	101.1
1.0	1.5	4	29	234	809	1152	1154	948	442	130	26	3	0	0	0	2	1	4934	34	106.7
1.5	2.0	20	116	757	1452	584	755	949	890	502	92	26	5	4	2	0	1	6155	42.41	105.9
2.0	2.5	2	49	324	434	95	174	239	409	407	172	15	6	4	0	0	2	2332	16.07	123
2.5	3.0	0	11	67	73	28	59	54	71	135	94	7	1	0	0	0	0	600	4.13	139
3.0	3.5	0	3	6	25	10	9	2	24	36	35	5	2	0	0	0	0	157	1.08	154
3.5	4.0	0	0	2	5	10	9	2	9	8	1	0	0	0	0	0	0	46	0.32	124.1
4.0	4.5	0	0	0	3	0	9	2	4	3	6	0	0	0	0	0	0	27	0.19	142.1
4.5	5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
Freq		26	208	1391	2832	1988	2248	2228	1858	1221	426	56	14	8	2	2	4	14512		
%		0.18	1.43	9.59	19.51	13.7	15.49	15.35	12.8	8.41	2.94	0.39	0.1	0.06	0.01	0.01	0.03			
MHs		1.65	1.88	1.84	1.72	1.47	1.55	1.61	1.8	2.04	2.3	2.1	2.19	2.04	1.6	1.39	1.84			

5.2.2 AUTUMN (April, May, June)

HS(m)		DIRECTION(º)																Freq	%	MDir
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
0.5	1.0	0	0	0	5	32	21	3	0	0	0	0	0	0	0	0	0	61	0.4	98
1.0	1.5	2	13	72	225	620	759	607	368	190	20	6	3	1	2	1	0	2889	18.94	118
1.5	2.0	19	51	265	494	616	898	951	863	753	256	46	21	2	4	1	3	5243	34.36	129.1
2.0	2.5	16	76	156	239	200	292	432	733	1021	603	84	29	9	5	6	6	3907	25.61	156
2.5	3.0	8	25	68	60	39	71	103	247	534	459	96	19	12	3	3	7	1754	11.5	175
3.0	3.5	1	2	12	18	10	13	10	71	209	251	60	18	2	2	1	0	680	4.46	188.6
3.5	4.0	0	0	0	1	5	3	5	25	31	147	45	29	4	2	0	0	297	1.95	202.6
4.0	4.5	0	0	0	0	0	4	7	35	13	89	49	20	1	0	0	0	218	1.43	201.1
4.5	5.0	0	0	0	0	0	1	2	6	11	31	19	17	3	0	0	0	90	0.59	209.9
5.0	5.5	0	0	0	0	0	0	0	2	0	22	12	16	1	0	0	0	53	0.35	222.6
5.5	6.0	0	0	0	0	0	0	0	0	0	10	6	17	3	0	0	0	36	0.24	234.4
6.0	6.5	0	0	0	0	0	0	0	0	0	5	4	8	0	0	0	0	17	0.11	231.1
6.5	7.0	0	0	0	0	0	0	0	0	0	3	4	5	0	0	0	0	12	0.08	230.2
7.0	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
7.5	8.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
Freq		46	167	573	1042	1522	2062	2120	2350	2762	1896	431	202	38	18	12	16	15257		
%		0.3	1.09	3.76	6.83	9.98	13.52	13.9	15.4	18.1	12.43	2.82	1.32	0.25	0.12	0.08	0.1			
MHs		2.14	2.11	1.99	1.84	1.63	1.68	1.79	2.06	2.26	2.76	3.13	3.76	3.14	2.39	2.3	2.4			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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5.2.3 WINTER (July, August, September)

HS(m)		DIRECTION(º)																Freq	%	MDir
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
0.5	1.0	0	0	0	4	6	1	0	0	0	0	0	0	0	0	0	0	11	0.07	84
1.0	1.5	0	5	35	227	521	344	198	85	59	9	3	0	0	0	0	0	1486	9.5	103.5
1.5	2.0	8	52	333	808	946	882	745	642	562	150	21	3	1	1	1	1	5156	32.96	114.3
2.0	2.5	10	42	408	916	500	410	402	546	808	509	58	9	2	0	0	1	4621	29.54	124.6
2.5	3.0	4	28	256	520	232	155	129	224	465	533	65	6	2	1	1	0	2621	16.75	134.3
3.0	3.5	0	4	71	179	78	56	53	94	177	306	42	6	1	0	0	0	1067	6.82	152.4
3.5	4.0	1	3	15	42	11	12	17	40	42	152	28	4	1	0	0	0	368	2.35	173.9
4.0	4.5	1	0	3	2	11	0	6	22	16	54	16	2	1	0	0	0	134	0.86	182.4
4.5	5.0	0	0	0	0	5	0	0	9	7	35	14	8	0	0	0	0	78	0.5	199.8
5.0	5.5	0	0	0	0	3	0	0	1	5	28	14	4	0	0	0	0	55	0.35	208
5.5	6.0	0	0	0	0	0	0	0	0	2	5	13	4	0	0	0	0	24	0.15	218.8
6.0	6.5	0	0	0	0	0	0	0	0	1	7	6	0	0	0	0	0	14	0.09	209.7
6.5	7.0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	4	0.03	214.2
7.0	7.5	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	6	0.04	219.4
7.5	8.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
Freq		24	134	1121	2698	2313	1860	1550	1663	2144	1792	286	46	8	2	2	2	15645		
%		0.15	0.86	7.17	17.25	14.78	11.89	9.91	10.63	13.7	11.45	1.83	0.29	0.05	0.01	0.01	0.01			
MHs		2.28	2.19	2.28	2.21	1.93	1.92	1.99	2.21	2.35	2.85	3.34	3.61	2.94	2.35	2.15	1.92			

5.2.4 SPRING (October, November, December)

HS(m)		DIRECTION(º)																Freq	%	MDir
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
0.5	1.0	0	0	0	9	30	16	8	15	2	0	0	0	0	0	0	0	80	0.54	110.3
1.0	1.5	2	5	79	563	817	674	464	257	98	9	1	0	1	1	0	0	2971	19.89	105.2
1.5	2.0	12	54	428	1208	953	813	884	689	612	199	36	11	2	1	1	2	5905	39.53	111.8
2.0	2.5	6	47	426	859	481	301	377	410	506	274	64	11	1	3	1	2	3769	25.23	112.7
2.5	3.0	7	20	193	329	164	105	112	128	225	179	20	12	0	0	0	2	1496	10.01	115.9
3.0	3.5	1	2	46	82	55	34	35	39	105	73	4	3	1	1	0	0	481	3.22	132.8
3.5	4.0	1	1	5	14	23	19	10	16	42	46	11	2	0	0	1	0	191	1.28	157.7
4.0	4.5	0	0	1	3	9	2	0	0	7	17	2	3	0	0	0	1	45	0.3	168.8
4.5	5.0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.01	62.7
5.0	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
5.5	6.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN
Freq		29	129	1178	3068	2532	1964	1890	1554	1597	797	138	42	5	6	3	7	14939		
%		0.19	0.86	7.89	20.54	16.95	13.15	12.65	10.4	10.69	5.34	0.92	0.28	0.03	0.04	0.02	0.05			
MHs		2.22	2.1	2.14	1.96	1.8	1.76	1.81	1.93	2.19	2.45	2.37	2.54	2.17	2.17	2.61	2.46			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals

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5.3 Distribution of Significant Wave Height and Spectral Peak Period

Hs(m)		Tp(s) 3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
0.5	1.0	1	0	9	71	290	36	1	3	1	0	0	0	0	1	0	0	0	0	413	0.7	7.4
1.0	1.5	20	533	652	805	3971	4377	1066	412	185	120	54	28	34	9	8	4	2	0	12280	20.4	8.0
1.5	2.0	7	635	3547	2321	2671	5321	3454	1948	1293	634	310	181	83	29	14	7	3	1	22459	37.2	8.4
2.0	2.5	2	12	1551	3315	1153	1573	1543	1550	1749	1152	545	325	117	26	12	2	2	0	14629	24.2	9.1
2.5	3.0	0	4	141	1434	1138	356	483	531	602	791	581	274	101	28	3	4	0	0	6471	10.7	9.7
3.0	3.5	0	1	6	269	479	300	90	131	187	216	295	305	74	19	11	1	1	0	2385	4.0	10.5
3.5	4.0	0	0	2	25	139	190	73	24	48	59	90	153	86	10	3	0	0	0	902	1.5	11.1
4.0	4.5	0	0	0	4	15	68	80	15	11	26	43	70	54	25	13	0	0	0	424	0.7	12.1
4.5	5.0	0	0	0	0	1	21	53	11	2	11	18	29	16	6	1	0	0	0	169	0.3	11.8
5.0	5.5	0	0	0	0	1	6	26	32	3	1	7	20	12	0	0	0	0	0	108	0.2	11.6
5.5	6.0	0	0	0	0	0	4	10	23	5	1	2	5	10	0	0	0	0	0	60	0.1	11.6
6.0	6.5	0	0	0	0	0	1	9	7	1	0	0	4	9	0	0	0	0	0	31	0.1	12.3
6.5	7.0	0	0	0	0	0	0	5	4	2	0	0	0	4	1	0	0	0	0	16	0.0	12.1
7.0	7.5	0	0	0	0	0	0	0	0	4	0	0	0	0	2	0	0	0	0	6	0.0	12.8
7.5	8.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Freq		30	1185	5908	8244	9858	12253	6893	4691	4093	3011	1945	1394	600	156	65	18	8	1	60353		
%		0.05	1.96	9.79	13.66	16.33	20.3	11.42	7.77	6.78	4.99	3.22	2.31	0.99	0.26	0.11	0.03	0.01	0			
MHs		1.4	1.54	1.86	2.13	1.8	1.76	1.98	2.11	2.21	2.37	2.6	2.87	3.01	2.91	2.74	2.03	1.98	1.68			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals, providing information equivalent to 181059 hours (=60353 * 3 hours)..

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5.4 Distribution of Significant Wave Height and Spectral Peak Period by Season

5.4.1 SUMMER (January, February, March)

Hs(m)		Tp(s) 3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	7	50	192	9	1	1	1	0	0	0	0	0	0	0	261	1.8	7.29
1.0	1.5	11	274	346	404	1753	1429	421	154	65	30	19	12	12	1	2	1	4934	34	7.82
1.5	2.0	0	219	1304	910	768	1033	683	573	349	180	83	28	12	8	5	0	6155	42.41	8.02
2.0	2.5	0	2	252	654	148	199	197	240	300	199	89	35	13	3	1	0	2332	16.07	8.91
2.5	3.0	0	0	11	128	92	27	57	80	35	56	59	43	10	2	0	0	600	4.13	9.84
3.0	3.5	0	0	0	21	21	38	4	7	4	8	17	15	19	3	0	0	157	1.08	10.54
3.5	4.0	0	0	0	0	8	16	5	1	4	6	0	3	2	1	0	0	46	0.32	10.09
4.0	4.5	0	0	0	0	0	1	12	2	1	4	1	0	3	3	0	0	27	0.19	11.56
4.5	5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		11	495	1920	2167	2982	2752	1380	1058	759	483	268	136	71	21	8	1	14512		
%		0.08	3.41	13.23	14.93	20.55	18.96	9.51	7.29	5.23	3.33	1.85	0.94	0.49	0.14	0.06	0.01			
MHs		1.21	1.48	1.72	1.86	1.46	1.57	1.75	1.88	1.98	2.12	2.19	2.36	2.46	2.55	1.65	1.5			

5.4.2 AUTUMN (April, May, June)

Hs(m)		Tp(s) 3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
0.5	1.0	0	0	0	16	31	12	0	2	0	0	0	0	0	0	0	0	0	0	61	0.4	7.6
1.0	1.5	4	98	94	140	674	1256	284	168	68	44	20	10	16	4	5	2	2	0	2889	18.9	8.4
1.5	2.0	1	138	602	262	426	1271	1108	591	434	196	103	63	20	13	7	5	2	1	5243	34.4	9.0
2.0	2.5	0	2	360	435	169	307	445	516	680	502	258	143	69	14	5	2	0	0	3907	25.6	10.1
2.5	3.0	0	2	46	237	141	55	118	151	218	341	252	129	49	11	2	2	0	0	1754	11.5	10.9
3.0	3.5	0	0	2	43	81	70	15	48	85	72	98	144	13	7	2	0	0	0	680	4.5	11.5
3.5	4.0	0	0	0	2	46	49	15	5	27	18	30	56	43	5	1	0	0	0	297	2.0	11.7
4.0	4.5	0	0	0	0	4	43	37	4	5	10	24	40	25	14	12	0	0	0	218	1.4	12.4
4.5	5.0	0	0	0	0	1	11	34	5	2	8	8	15	3	2	1	0	0	0	90	0.6	11.4
5.0	5.5	0	0	0	0	1	6	12	17	1	0	2	6	8	0	0	0	0	0	53	0.4	11.3
5.5	6.0	0	0	0	0	0	4	5	12	4	0	2	2	7	0	0	0	0	0	36	0.2	11.5
6.0	6.5	0	0	0	0	0	1	4	6	1	0	0	0	5	0	0	0	0	0	17	0.1	11.7
6.5	7.0	0	0	0	0	0	0	5	2	2	0	0	0	3	0	0	0	0	0	12	0.1	11.8
7.0	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
7.5	8.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Freq		5	240	1104	1135	1574	3085	2082	1527	1527	1191	797	608	261	70	35	11	4	1	15257		
%		0.03	1.57	7.24	7.44	10.32	20.22	13.65	10.01	10.01	7.81	5.22	3.99	1.71	0.46	0.23	0.07	0.03	0.01			
MHs		1.34	1.57	1.92	2.13	1.8	1.74	2.02	2.13	2.26	2.39	2.61	2.9	3.09	2.87	2.95	1.93	1.57	1.68			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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5.4.3 WINTER (July, August, September)

Hs(m)		Tp(s) 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Freq	%	MTp
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
0.5	1.0	0	0	2	3	1	5	0	0	0	0	0	0	0	0	0	0	0	11	0.07	7.3
1.0	1.5	4	56	63	93	358	609	200	43	21	28	5	1	2	1	1	1	0	1486	9.5	8.2
1.5	2.0	3	153	673	433	593	1306	1028	404	260	126	80	52	35	8	2	0	0	5156	32.96	8.5
2.0	2.5	0	3	535	1005	414	593	549	523	491	263	121	87	24	8	4	0	1	4621	29.54	8.8
2.5	3.0	0	1	49	667	508	187	181	189	271	279	190	65	24	9	0	1	0	2621	16.75	9.3
3.0	3.5	0	1	3	148	238	126	47	59	83	102	123	100	28	4	5	0	0	1067	6.82	10.2
3.5	4.0	0	0	2	15	41	90	39	7	16	25	46	56	25	4	2	0	0	368	2.35	11.0
4.0	4.5	0	0	0	0	7	15	21	9	4	11	14	26	18	8	1	0	0	134	0.86	12.3
4.5	5.0	0	0	0	0	0	9	19	6	0	3	10	14	13	4	0	0	0	78	0.5	12.3
5.0	5.5	0	0	0	0	0	0	14	15	2	1	5	14	4	0	0	0	0	55	0.35	11.9
5.5	6.0	0	0	0	0	0	0	5	11	1	1	0	3	3	0	0	0	0	24	0.15	11.6
6.0	6.5	0	0	0	0	0	0	5	1	0	0	0	4	4	0	0	0	0	14	0.09	12.9
6.5	7.0	0	0	0	0	0	0	0	2	0	0	0	0	1	1	0	0	0	4	0.03	13.2
7.0	7.5	0	0	0	0	0	0	0	0	4	0	0	0	0	2	0	0	0	6	0.04	12.8
7.5	8.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Freq		7	214	1327	2364	2160	2940	2108	1269	1153	839	594	422	181	49	15	2	1	15645		
%		0.04	1.37	8.48	15.11	13.81	18.79	13.47	8.11	7.37	5.36	3.8	2.7	1.16	0.31	0.1	0.01	0.01			
MHs		1.5	1.62	1.99	2.34	2.21	1.96	2.09	2.29	2.37	2.53	2.78	3.08	3.21	3.26	2.78	2.06	2.34			

5.4.4 SPRING (October, November, December)

Hs(m)		Tp(s) 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Freq	%	MTp
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
0.5	1.0	1	0	0	2	66	10	0	0	0	0	0	0	0	1	0	0	0	80	0.54	7.6
1.0	1.5	1	105	149	168	1186	1083	161	47	31	18	10	5	4	3	0	0	0	2971	19.89	7.9
1.5	2.0	3	125	968	716	884	1711	635	380	250	132	44	38	16	0	0	2	1	5905	39.53	8.1
2.0	2.5	2	5	404	1221	422	474	352	271	278	188	77	60	11	1	2	0	1	3769	25.23	8.3
2.5	3.0	0	1	35	402	397	87	127	111	78	115	80	37	18	6	1	1	0	1496	10.01	8.9
3.0	3.5	0	0	1	57	139	66	24	17	15	34	57	46	14	5	4	1	1	481	3.22	10.1
3.5	4.0	0	0	0	8	44	35	14	11	1	10	14	38	16	0	0	0	0	191	1.28	10.7
4.0	4.5	0	0	0	4	4	9	10	0	1	1	4	4	8	0	0	0	0	45	0.3	10.8
4.5	5.0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.01	8.4
5.0	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
5.5	6.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Freq		7	236	1557	2578	3142	3476	1323	837	654	498	286	228	87	16	7	4	3	14939		
%		0.05	1.58	10.42	17.26	21.03	23.27	8.86	5.6	4.38	3.33	1.91	1.53	0.58	0.11	0.05	0.03	0.02			
MHs		1.64	1.56	1.87	2.16	1.84	1.74	1.98	2.07	2.11	2.3	2.58	2.7	2.84	2.51	2.85	2.44	2.42			

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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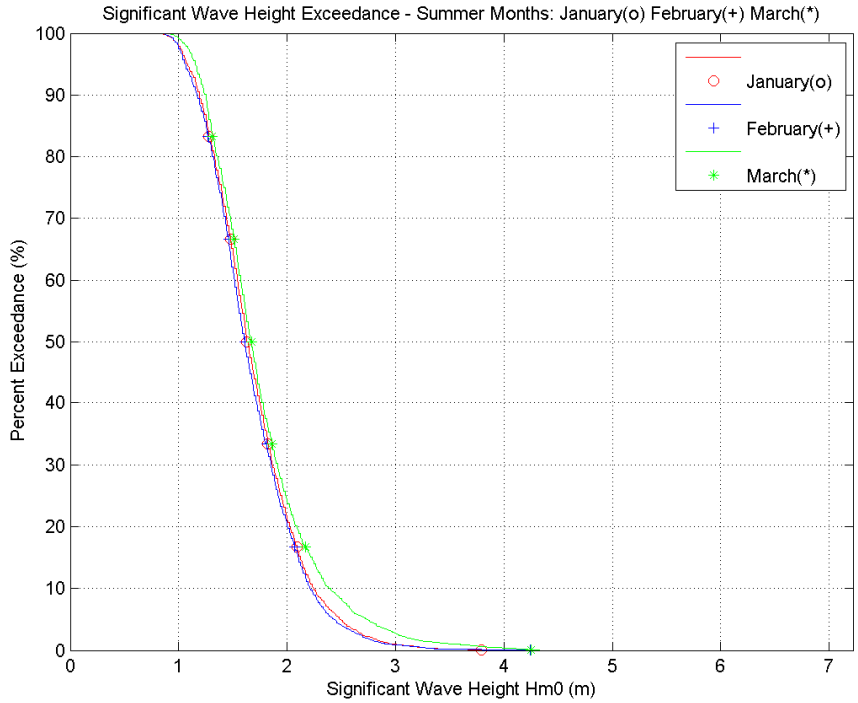
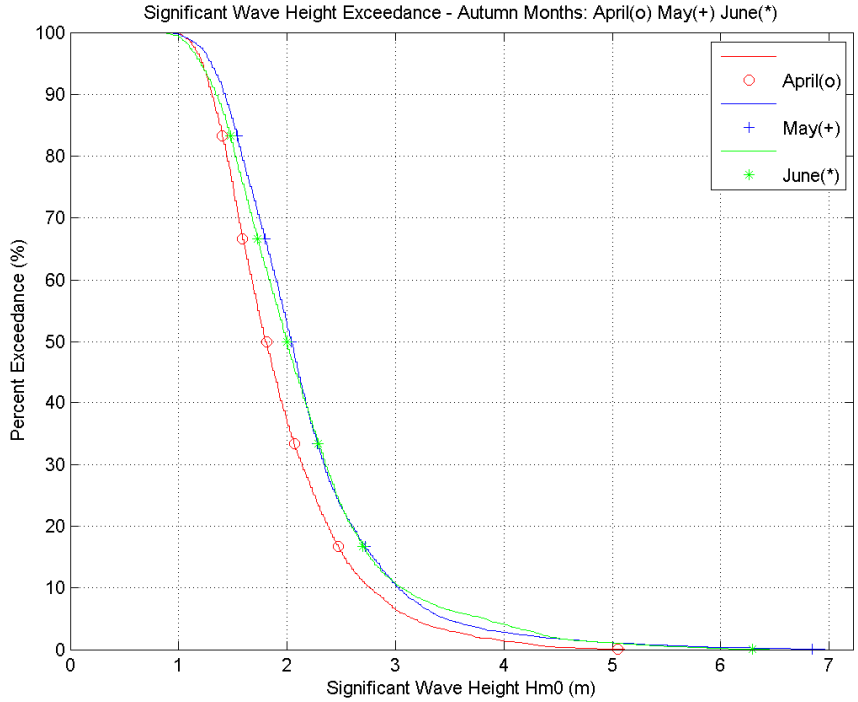
5.5 Wave Exceedance Curves

5.5.1 SUMMER (January, February, March)



5.5.2 AUTUMN (April, May, June)



SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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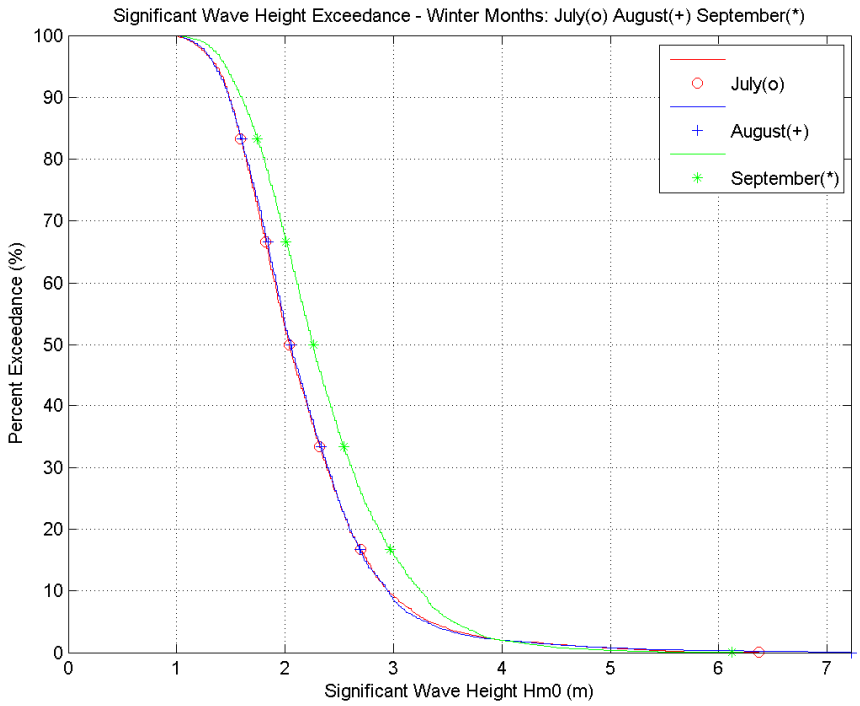
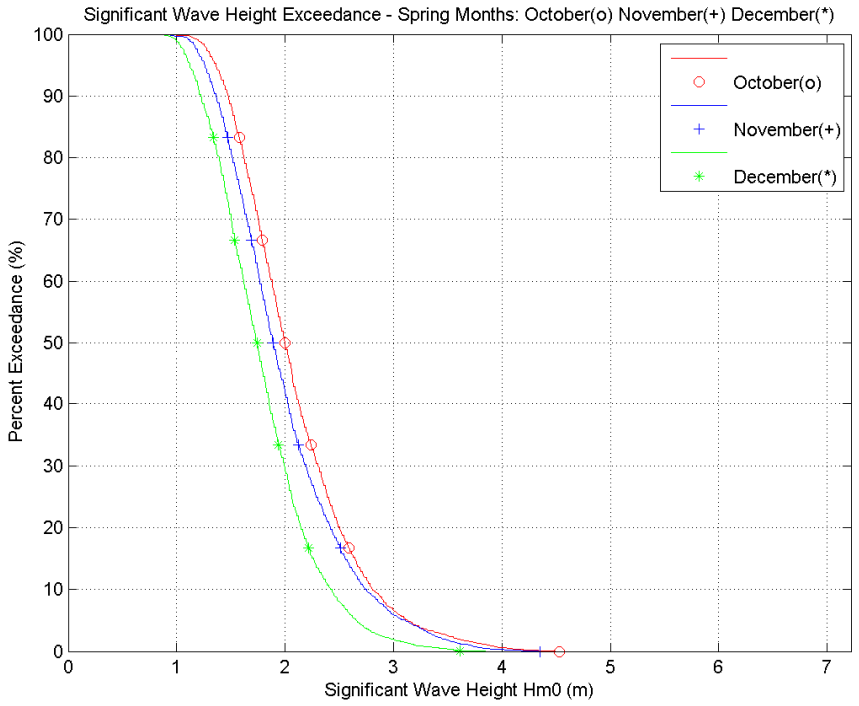
5.5.3 WINTER (July, August, September)



5.5.4 SPRING (October, November, December)



SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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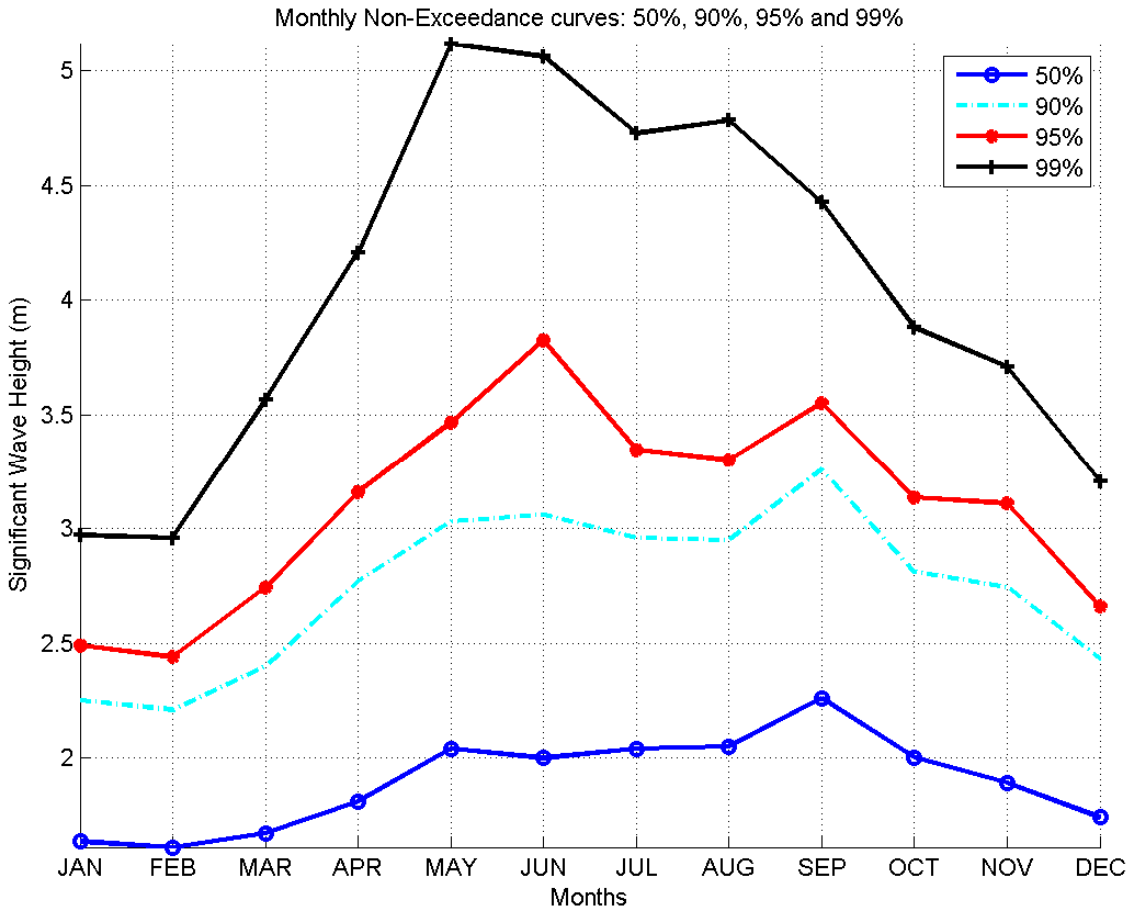
5.6 Wave Non-Exceedance Curves for Specified Percentage Levels



SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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6. WAVE PERSISTANCE WINDOWS FOR CLUSTER BM-S DEEP WATER REGION

6.1 WAVE OPERATIONAL WINDOWS FOR Hs ≤ 1.5 M – Cluster BM-S Deep water

Hs(m) 1.50	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24-hour Window (1 day)												
Mean number of available days to start operation	3.4	3.7	3.5	1.8	1.1	1.7	0.5	0.6	0.3	0.4	0.8	2.6
% percentage of available days to start operation	10.9	13.1	11.2	6.0	3.5	5.7	1.5	2.0	1.0	1.3	2.8	8.4
48-hour Window (2 days)												
Mean number of available days to start operation	1.6	2.3	1.7	0.6	0.4	0.8	0.0	0.2	0.1	0.1	0.2	1.1
% percentage of available days to start operation	5.2	8.2	5.5	2.1	1.3	2.6	0.1	0.6	0.3	0.2	0.7	3.6
72-hour Window (3 days)												
Mean number of available days to start operation	0.8	1.5	0.8	0.3	0.2	0.4	0.0	0.0	0.0	0.0	0.1	0.3
% percentage of available days to start operation	2.4	5.5	2.7	0.9	0.5	1.2	0.0	0.0	0.2	0.0	0.2	1.1

6.2 WAVE OPERATIONAL WINDOWS FOR Hs ≤ 2.0 M – Cluster BM-S Deep water

Hs(m) 2.00	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24-hour Window (1 day)												
Mean number of available days to start operation	15.1	14.1	14.6	11.3	7.5	8.5	6.8	6.6	3.6	6.5	9.0	12.4
% percentage of available days to start operation	48.7	50.5	47.2	37.8	24.3	28.3	21.9	21.3	12.1	20.9	30.0	39.9
48-hour Window (2 days)												
Mean number of available days to start operation	11.5	10.8	10.8	8.0	4.8	5.7	4.0	3.3	1.9	3.1	5.8	8.4
% percentage of available days to start operation	37.1	38.6	34.8	26.5	15.6	19.1	12.9	10.8	6.4	9.9	19.4	27.1
72-hour Window (3 days)												
Mean number of available days to start operation	9.2	8.4	8.3	5.4	3.3	3.8	2.4	1.5	1.1	1.3	3.8	5.9
% percentage of available days to start operation	29.7	30.0	26.7	18.1	10.5	12.8	7.8	4.8	3.8	4.2	12.6	18.9

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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6.3 WAVE OPERATIONAL WINDOWS FOR Hs ≤ 3 M – Cluster BM-S Deep water

Hs(m) 3.00	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24-hour Window (1 day)												
Mean number of available days to start operation	28.9	26.2	28.0	24.7	23.3	22.7	22.6	23.0	18.9	23.7	24.9	28.2
% percentage of available days to start operation	93.2	93.7	90.4	82.5	75.2	75.7	72.9	74.1	63.0	76.5	83.1	90.8
48-hour Window (2 days)												
Mean number of available days to start operation	27.8	25.2	26.6	22.6	20.7	20.1	19.4	19.7	15.2	20.7	22.8	26.7
% percentage of available days to start operation	89.6	90.1	85.9	75.4	66.6	67.0	62.5	63.6	50.7	66.7	76.1	86.0
72-hour Window (3 days)												
Mean number of available days to start operation	26.7	24.4	25.3	20.8	18.4	17.8	16.5	16.9	12.3	17.9	21.0	25.2
% percentage of available days to start operation	86.2	87.0	81.8	69.3	59.5	59.3	53.4	54.4	41.1	57.9	70.0	81.4

6.4 WAVE OPERATIONAL WINDOWS FOR Hs ≤ 4 M – Cluster BM-S Deep water

Hs(m) 4.00	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24-hour Window (1 day)												
Mean number of available days to start operation	30.8	27.8	30.6	28.7	28.8	27.8	29.0	29.5	27.6	30.0	29.3	30.8
% percentage of available days to start operation	99.5	99.4	98.8	95.5	93.0	92.6	93.5	95.3	92.1	96.8	97.7	99.4
48-hour Window (2 days)												
Mean number of available days to start operation	30.7	27.7	30.4	27.9	27.8	26.8	27.9	28.7	26.3	29.4	28.8	30.7
% percentage of available days to start operation	99.1	99.1	98.0	92.9	89.8	89.4	89.9	92.5	87.6	94.9	96.0	99.1
72-hour Window (3 days)												
Mean number of available days to start operation	30.6	27.7	30.1	27.0	26.9	26.0	26.9	27.9	25.1	28.9	28.3	30.6
% percentage of available days to start operation	98.8	99.0	97.2	90.1	86.9	86.5	86.6	89.9	83.6	93.2	94.4	98.7

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 8139) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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7. WAVE PERSISTANCE WINDOWS FOR INTERMEDIATE DEPTH REGION

7.1 WAVE OPERATIONAL WINDOWS FOR Hs ≤ 1.5 M – Intermediate depth region

Hs(m) 1.50	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24-hour Window (1 day)												
Mean number of available days to start operation	5.7	5.8	5.7	3.6	1.8	2.6	1.0	0.9	0.6	1.0	2.3	4.6
% percentage of available days to start operation	18.5	20.9	18.4	12.1	5.9	8.6	3.1	2.9	2.0	3.3	7.7	14.8
48-hour Window (2 days)												
Mean number of available days to start operation	3.1	3.7	3.6	1.6	0.6	1.1	0.2	0.2	0.2	0.1	0.8	2.1
% percentage of available days to start operation	9.9	13.2	11.6	5.4	1.9	3.8	0.7	0.8	0.7	0.3	2.7	6.8
72-hour Window (3 days)												
Mean number of available days to start operation	1.6	2.6	2.4	0.8	0.2	0.6	0.0	0.1	0.1	0.0	0.3	0.8
% percentage of available days to start operation	5.3	9.2	7.8	2.7	0.7	1.9	0.1	0.3	0.4	0.0	0.9	2.7

7.2 WAVE OPERATIONAL WINDOWS FOR Hs ≤ 2.0 M – Intermediate depth region

Hs(m) 2.00	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24-hour Window (1 day)												
Mean number of available days to start operation	19.7	18.2	19.4	14.9	9.9	11.0	9.2	9.2	5.7	9.5	12.5	16.2
% percentage of available days to start operation	63.5	65.1	62.4	49.6	32.1	36.8	29.8	29.5	19.0	30.6	41.6	52.3
48-hour Window (2 days)												
Mean number of available days to start operation	16.2	15.1	15.9	11.3	6.8	8.0	5.8	5.3	3.1	5.6	9.0	12.1
% percentage of available days to start operation	52.4	53.8	51.3	37.6	21.9	26.7	18.7	17.1	10.2	18.1	30.0	39.0
72-hour Window (3 days)												
Mean number of available days to start operation	13.4	12.8	12.9	8.6	4.7	6.0	3.8	2.9	1.8	3.3	6.7	9.3
% percentage of available days to start operation	43.4	45.6	41.8	28.6	15.2	20.1	12.4	9.4	6.0	10.6	22.2	30.0

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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7.3 WAVE OPERATIONAL WINDOWS FOR Hs ≤ 3 M – Intermediate depth region

Hs(m) 3.00	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24-hour Window (1 day)												
Mean number of available days to start operation	27.6	25.0	26.8	24.7	24.1	24.3	24.5	25.2	20.5	24.6	24.4	27.1
% percentage of available days to start operation	89.1	89.3	86.6	82.3	77.9	80.9	79.2	81.2	68.2	79.2	81.5	87.5
48-hour Window (2 days)												
Mean number of available days to start operation	27.3	24.8	26.2	23.0	22.1	22.3	22.3	22.7	17.9	22.8	23.2	26.5
% percentage of available days to start operation	88.0	88.5	84.4	76.7	71.2	74.2	71.9	73.4	59.7	73.4	77.2	85.5
72-hour Window (3 days)												
Mean number of available days to start operation	27.0	24.6	25.5	21.8	20.2	20.6	20.2	20.6	15.7	21.2	22.0	25.9
% percentage of available days to start operation	87.0	87.8	82.4	72.5	65.1	68.6	65.1	66.4	52.4	68.5	73.3	83.5

7.4 WAVE OPERATIONAL WINDOWS FOR Hs ≤ 4 M – Intermediate depth region

Hs(m) 4.00	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24-hour Window (1 day)												
Mean number of available days to start operation	28.1	25.4	28.0	27.5	27.9	28.0	28.3	29.8	26.4	27.7	27.1	28.2
% percentage of available days to start operation	90.7	90.6	90.2	91.5	89.9	93.3	91.3	96.0	88.2	89.5	90.2	90.9
48-hour Window (2 days)												
Mean number of available days to start operation	28.1	25.3	27.9	26.8	27.1	27.0	27.7	29.1	25.9	27.5	26.9	28.2
% percentage of available days to start operation	90.6	90.5	89.9	89.2	87.4	89.9	89.4	93.7	86.2	88.7	89.7	90.9
72-hour Window (3 days)												
Mean number of available days to start operation	28.0	25.3	27.7	26.0	26.5	25.9	27.1	28.4	25.3	27.3	26.8	28.2
% percentage of available days to start operation	90.4	90.4	89.5	86.5	85.4	86.5	87.3	91.5	84.5	88.0	89.2	90.9

SOURCE: Modeled wave data - JIP BOMOSHU (Brazil Offshore Metocean Storm Hindcast Update - Grid Point 13318) and GROW Fine SAB, OceanWeather Inc., evaluated with in-situ wave measured data. The wave data was tabulated at 3-hour intervals.

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INDEX OF REVISIONS

REV	DESCRIPTION AND / OR AFFECTED SHEETS
0	ORIGINAL
A	UPDATE DATA FOR SANTOS AND CAMPOS BASINS
B	DIRECTIONAL INFORMATION
C	UPDATE DATA FOR SANTOS BASIN, CAMPOS BASIN, ESPIRITO SANTO BASIN, SERGIPE ALAGOAS BASIN AND POTIGUAR BASIN. INCLUDED DATA FOR FOZ DO AMAZONAS BASIN, PARA-MARANHAO BASIN, PERNAMBUCO-PARAIBA BASIN, AND PELOTAS BASIN. INCLUDED TABLE AND MAP WITH MAXIMUM ANNUAL EXTREME VALUE.
D	UPDATE DATA FOR POTIGUAR, SERGIPE ALAGOAS, ESPÍRITO SANTO, CAMPOS AND SANTOS BASINS. UPDATE TABLE AND MAP WITH MAXIMUM ANNUAL EXTREME VALUE.
E	INCLUSION OF SHALLOW WATER DATA SECTION 3: CAMORIM, DOURADO, GUARICEMA, ROBALO, AND CAIOBA FIELDS IN THE SERGIPE BASIN. AGULHA, DENTÃO, PESCADA, ARABAIANA AND SIRI FIELD IN THE POTIGUAR BASIN. ATUM, XARÉU, CURIMÃ, AND ESPADA FIELDS IN THE CEARÁ BASIN. MANATI FIELD IN THE CAMAMU BASIN.
F	UPDATE DATA FOR SECTIONS 3.1, 3.2, 4.1 AND 4.2.

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
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INTERNA

INDEX

1. OBJECTIVE 3

2. SYSTEM OF UNITS AND DIRECTION CONVENTION 3

3. SHALLOW-WATER AREA 4

3.1. 1 YEAR MAXIMUM EXTREME WIND, WAVE AND CURRENT 4
3.2. EXTREME VALUES FOR BRAZILIAN SHALLOW-WATER OFFSHORE AREAS 5
3.2.1. Atum, Xaréu, Curimã e Espada – CEARÁ Basin 5
3.2.2. Agulha, Dentão, Pescada, Arabaiana and Siri – POTIGUAR Basin 6
3.2.3. Camorim, Dourado, Guaricema, Robalo and Caioba – SERGIPE Basin 7
3.2.4. Manati – CAMAMU Basin 8

4. DEEP-WATER AREA 9

4.1. 1 YEAR MAXIMUM EXTREME WIND, WAVE AND CURRENT 9
4.2. EXTREME VALUES FOR BRAZILIAN DEEP-WATER OFFSHORE AREAS 11
4.2.1. FOZ DO AMAZONAS REGION 11
4.2.2. PARÁ-MARANHÃO AND BARREIRINHAS REGION 11
4.2.3. RIO GRANDE DO NORTE AND CEARA REGION 12
4.2.4. PERNAMBUCO-PARAIBA REGION 12
4.2.5. SERGIPE-ALAGOAS AND BAHIA REGION 13
4.2.6. ESPÍRITO SANTO REGION 13
4.2.7. CAMPOS REGION 14
4.2.8. SANTOS REGION 14
4.2.9. PELOTAS REGION 15

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1. OBJECTIVE

The objective of this report is to provide meteorological and oceanographic data for use in contracts of drilling platforms in Brazilian deep and shallow water oil production areas.

2. SYSTEM OF UNITS AND DIRECTION CONVENTION

The International System of Units (S.I.), UNESCO-IOC (Intergovernmental Oceanographic Commission) and WMO (World Meteorological Organization) recommendations were adopted.

WIND and WAVES: direction indicates where the wind and waves come from (origin at True North, clockwise sense).
CURRENT: direction indicates where the current goes to (origin at True North, clockwise sense).

Regarding the numeric values for cardinal directions: zero (0º) is associated with North direction, twenty two point five (22.5º) is associated with North-Northeast direction, forty five (45º) is associated with Northeast direction, sixty seven point five (67.5º) is associated with East-Northeast direction, ninety (90º) is associated with East direction, and so on, as used in a nautical chart compass rose (Figure 1 below).

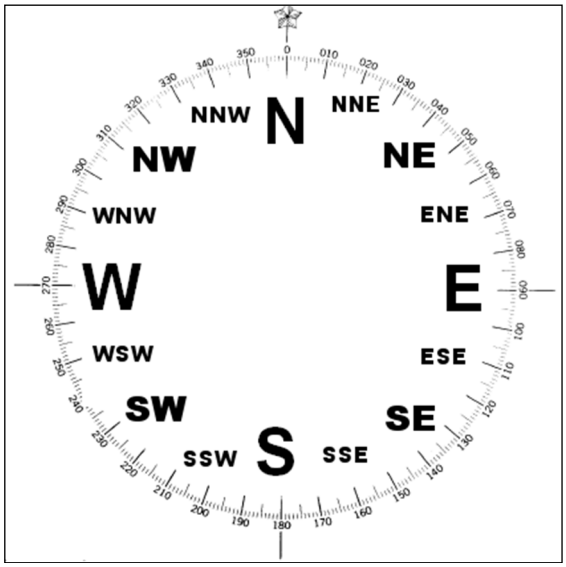

Figure 1 – Compass rose (numeric values associated with each direction)

STATEMENT

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3. SHALLOW-WATER AREA

3.1. 1 YEAR MAXIMUM EXTREME WIND, WAVE AND CURRENT

Table 3.1.1 – Wind, Wave and Current maximum annual extreme values calculated for principal offshore Brazilian deep-water basins.

		Maximum Annual Values		
Basin	REGION	Wind (m/s)	Wave Hs(m)	Surf. Current (m/s)
CE	Atum, Xaréu, Curimã e Espada	15.70	2.63	0.74
PO	Agulha, Dentão, Pescada, Arabaiana e Siri	17.04	2.70	0.60
SE	Camorim, Dourado, Guaricema, Robalo e Caioba	14.62	3.40	0.72
CA	Manati	19.87	3.19	0.73

Legend - CE: Ceará, PO: Potiguar, SE :Sergipe, CA: Camamu.

Reference: Maximum one year return period from Metocean Technical Specifications for Brazilian offshore basins.

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3.2. EXTREME VALUES FOR BRAZILIAN SHALLOW-WATER OFFSHORE AREAS

3.2.1. Atum, Xaréu, Curimã e Espada – CEARÁ Basin

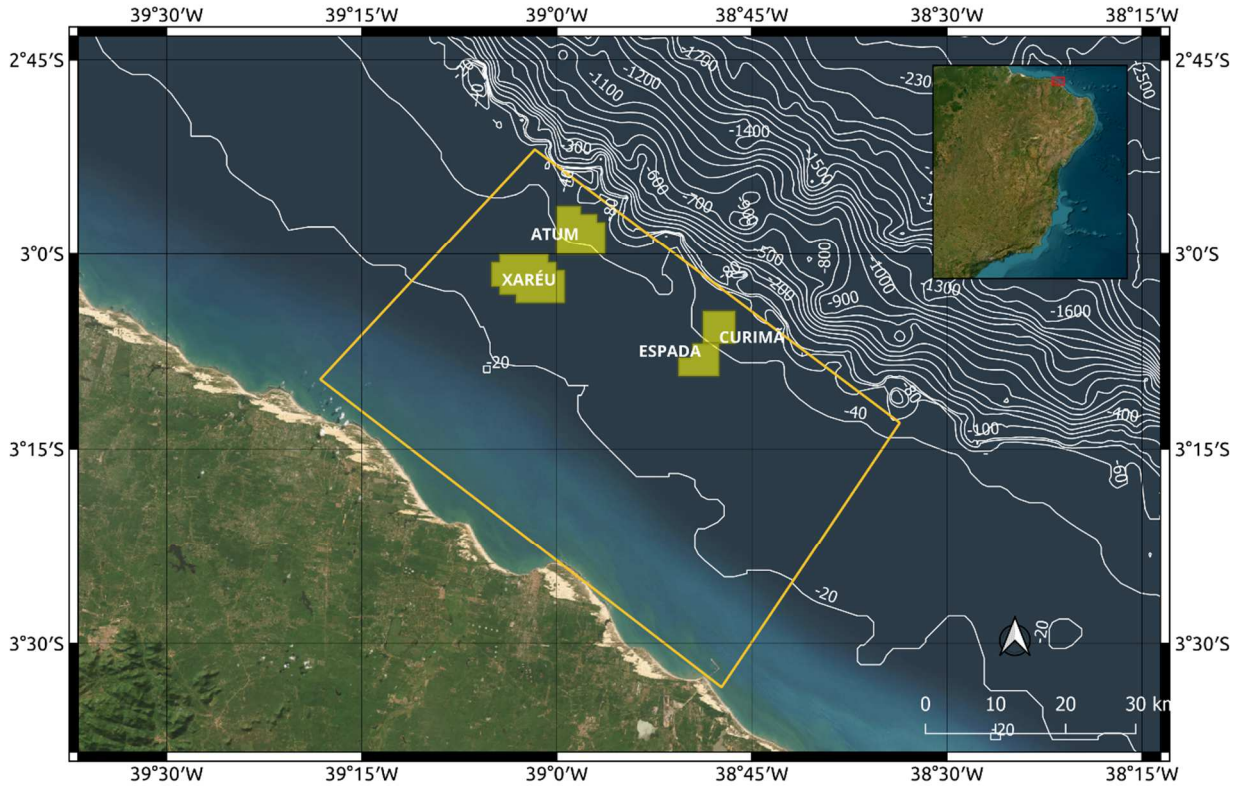

Figure 1: Spatial coverage for wind, wave and current data from shallow-water Ceará basin.

Metocean parameter	Return period (y)	N	NE	E	SE	S	SW	W	NW	Reference depth (m)
Wind (m/s)	1	10.77	12.42	15.69	15.40	11.21	9.86	8.21	8.1	
Wave (Hs/Tp)	1	2.33/11.2	2.33/11	2.63/7.4	2.63/7.4	2.33/11.2	2.33/11.2	2.33/11.2	2.33/11.2	
Surf. current (m/s)	1	0.55	0.55	0.2	0.2	0.2	0.36	0.71	0.74	
Wind (m/s)	10	12.62	16.57	19.17	19.31	14.61	10.60	10.12	10.89	
Wave (Hs/Tp)	10	3.16/12.3	3.12/13.7	3.33/8.2	3.33/8.2	3.16/12.3	3.16/12.3	3.16/12.3	3.16/12.3	< 100 m
Surf. current (m/s)	10	0.82	0.77	0.37	0.37	0.29	0.59	1.07	1.12	
Wind (m/s)	100	17.26	20.64	22.61	23.18	19.42	15.17	15.18	16.11	
Wave (Hs/Tp)	100	4.00./13.4	4.00/16.5	4.00/9.1	4.00/9.1	4.00/9.1	4.00/9.1	4.00/9.1	4.00/13.4	
Surf. current (m/s)	100	1.09	0.98	0.53	0.56	0.46	0.82	1.4	1.45	

Obs.: Hs – Significant wave height (m) Tp - Spectral peak period (s)

References:
I-ET-3404.00-1200-941-PPC-001 revC — Production Fields of Ceará Basin
I-ET-4451.28-6611-941-PPC-001 revB — LNG Terminal of Pecém (Ceará)

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3.2.2. Agulha, Dentão, Pescada, Arabaiana and Siri – POTIGUAR Basin

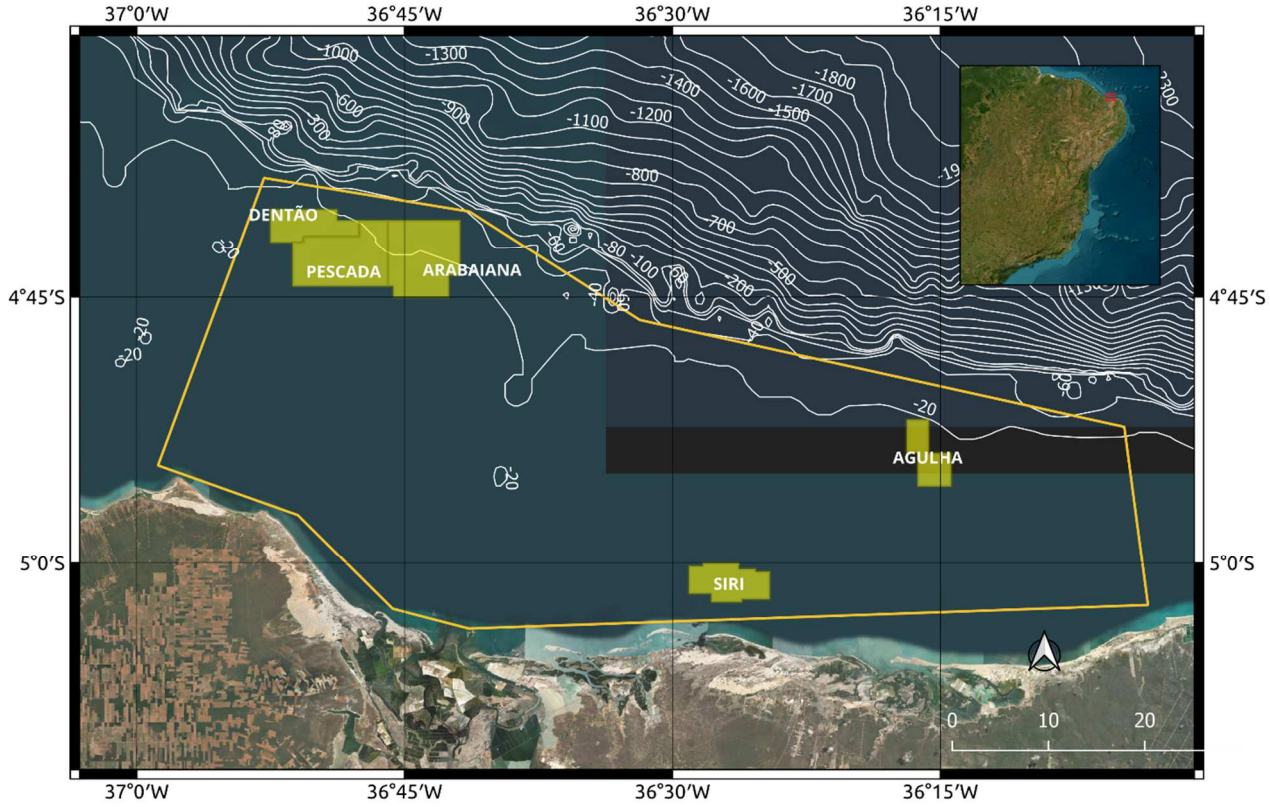

Figure 2: Spatial coverage for wind, wave and current data from shallow-water Potiguar basin.

Metocean parameter	Return period (y)	N	NE	E	SE	S	SW	W	NW	Reference depth (m)
Wind (m/s)	1	10.6	12.5	17.0	16.5	12.5	9.4	7.7	8.9	
Wave (Hs/Tp)	1	2.76/14.5	2.24/12.3	2.10/7.75	1.27/7.5	1.27/7.5	1.27/7.5	1.27/7.5	2.08/13.8	
Surface current (m/s)	1	0.49	0.43	0.25	0.2	0.41	0.6	0.51	0.45	
Wind (m/s)	10	11.7	16.8	20.3	20.3	14.5	11.9	9.9	9.3	
Wave (Hs/Tp)	10	3.84/15.75	2.91/13.0	2.65/8.0	1.67/7.5	1.67/7.5	1.67/7.5	1.67/7.5	2.77/14.8	< 100 m
Surface current (m/s)	10	0.61	0.55	0.38	0.3	0.58	0.71	0.6	0.58	
Wind (m/s)	100	17.1	20.9	23.4	24.0	18.6	15.9	14.9	13.9	
Wave (Hs/Tp)	100	4.9/16.3	3.57/13.8	3.2/8.5	2.05/8.0	2.05/8.0	2.05/8.0	2.05/8.0	3.42/15.5	
Surface current (m/s)	100	0.72	0.66	0.5	0.41	0.72	0.8	0.66	0.71	

Obs.: Hs – Significant wave height (m), Tp - Spectral peak period (s)

References:

Wind and wave data from I-ET-4450.15-6500-941-PPC-001 revD and
Current from ET-3477.02-1200-941-PPC-001 revB.

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3.2.3. Camorim, Dourado, Guaricema, Robalo and Caioba – SERGIPE Basin

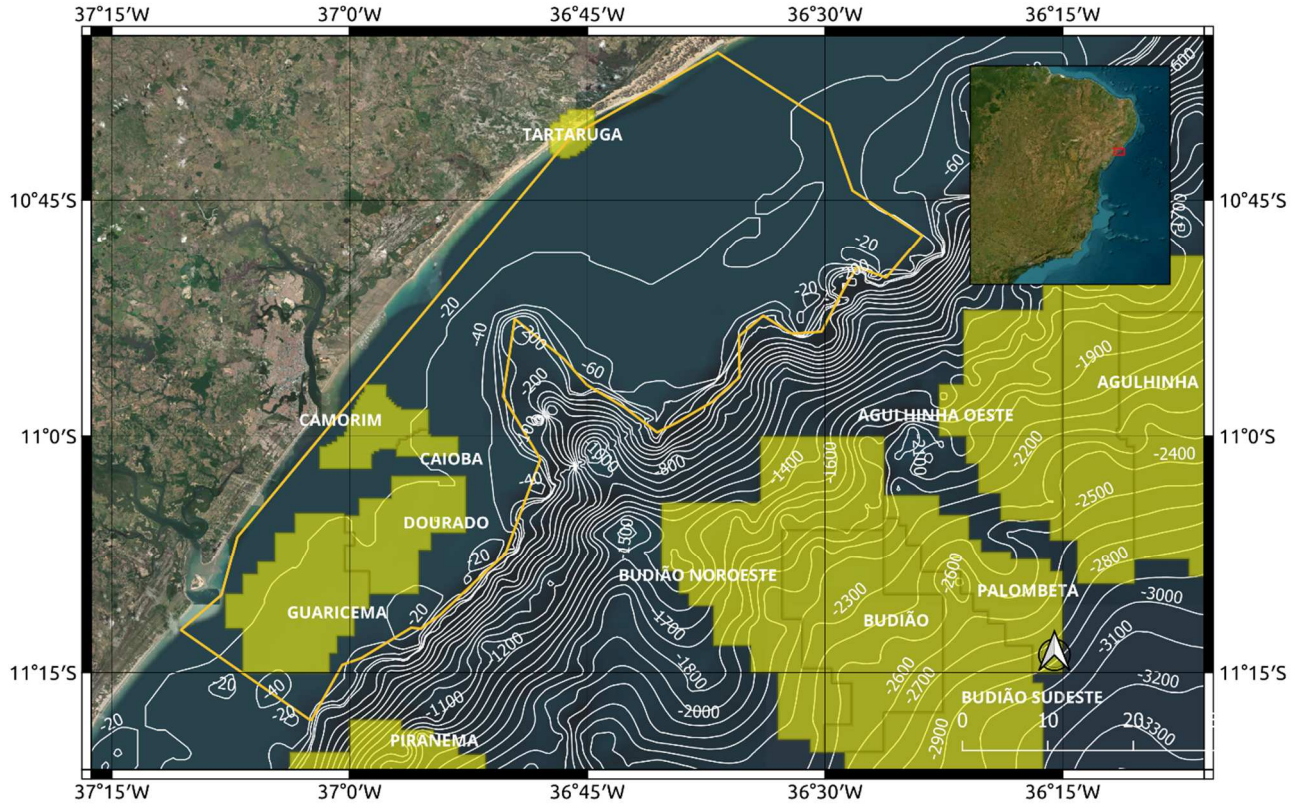

Figure 3: Spatial coverage for wind, wave and current data from shallow-water Sergipe basin.

Metocean parameter	return period (y)	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	6.9	11.7	12.9	14.6	13.0	8.0	6.1	5.3	lower than 50 m
Wave (Hs/Tp)	1	1.56/6.5	1.56/6.5	1.56/6.5	2.61/10.7	2.89/12.7	2.36/9.0	1.56/6.5	1.56/6.5	
Surface current (m/s)	1	0.52	0.63	0.28	0.24	0.42	0.73	0.4	0.19	
Wind (m/s)	10	9.8	14.7	15.6	18.4	19.4	13.4	10.5	8.3	
Wave (Hs/Tp)	10	2.06/7.0	2.06/7.0	2.06/7.0	3.67/11.0	3.06/13.2	3.08/9.5	2.06/7.0	2.06/7.0	
Surface current (m/s)	10	0.67	0.91	0.37	0.33	0.45	0.99	0.57	0.23	
Wind (m/s)	100	12.7	17.5	18.3	22.4	25.8	18.8	14.6	11.1	
Wave (Hs/Tp)	100	2.53/7.5	2.53/7.5	2.53/7.5	4.72/11.5	4.4/15.5	3.78/10.2	2.53/7.5	2.53/7.5	
Surface current (m/s)	100	0.80	1.15	0.44	0.42	0.49	1.26	0.73	0.27	

Obs.: Hs – Significant wave height (m), Tp - Spectral peak period (s)

References: Wind data from I-ET-3240.01-1310-931-PPC-001 revA, wave and current from I-ET-3203.0Y-1000-941-PMC-001.

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3.2.4. Manati – CAMAMU Basin

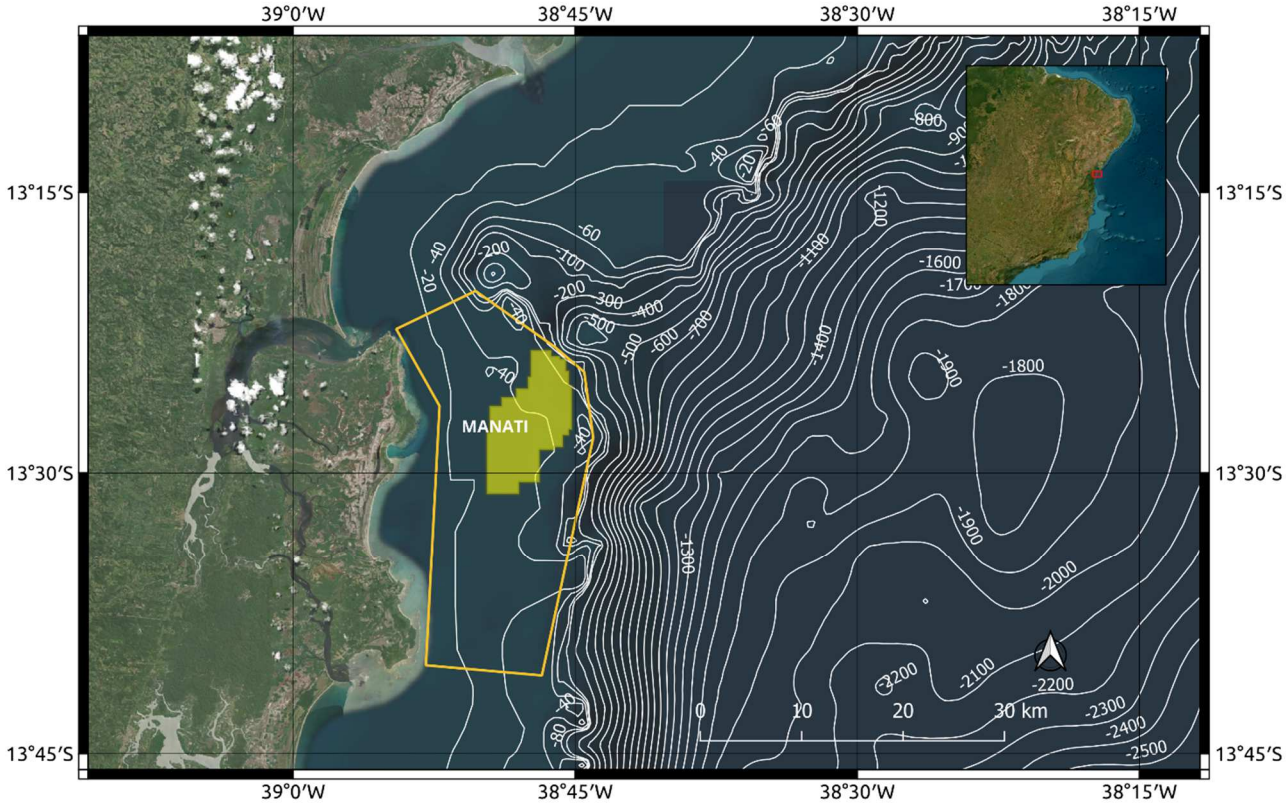

Figure 4: Spatial coverage for wind, wave and current data from shallow-water Camamu basin.

Metocean parameter	return period (y)	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	16.2	19.4	19.9	15.3	15.5	9.6	7.9	10.2	lower than 50 m
Wave (Hs/Tp)	1	3.19/8.7	3.19/8.7	3.19/8.7	3.19/8.7	3.19/8.7	3.19/8.7	3.19/8.7	3.19/8.7	
Surface current (m/s)	1	0.60	0.73	0.59	0.52	0.55	0.56	0.52	0.48	
Wind (m/s)	10	21.3	23.9	24.	17.0	17.7	11.8	10.4	13.8	
Wave (Hs/Tp)	10	3.97/8.9	3.97/8.9	3.97/8.9	3.97/8.9	3.97/8.9	3.97/8.9	3.97/8.9	3.97/8.9	
Surface current (m/s)	10	0.75	0.91	0.74	0.66	0.68	0.72	0.63	0.58	
Wind (m/s)	100	26.4	28.4	28.1	18.6	19.5	13.6	13.0	17.4	
Wave (Hs/Tp)	100	4.76/9.1	4.76/9.1	4.76/9.1	4.76/9.1	4.76/9.1	4.76/9.1	4.76/9.1	4.76/9.1	
Surface current (m/s)	100	0.90	1.08	0.89	0.80	0.80	0.88	0.72	0.66	

Obs.: Hs – Significant wave height (m), Tp - Spectral peak period (s)

References: Wind, wave and current data from ET-3192.01-1320-960-PPC-201 revA.

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4. DEEP-WATER AREA

4.1. 1 YEAR MAXIMUM EXTREME WIND, WAVE AND CURRENT



Figure 5: Maximum annual extreme values for wind, wave and current for principal Brazilian Deep-Water basins.

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Table 4.1.1 – Wind, Wave and Current maximum annual extreme values calculated for principal offshore Brazilian deep-water basins.

	Maximum Annual Values		
BASIN	Wind (m/s)	Wave Hs(m)	Surface Current (m/s)
FOZ DO AMAZONAS	16.9	3.5	2.67
PARA-MARANHAO AND BARREIRINHAS	14.6	3.5	2.03
RIO GRANDE DO NORTE AND CEARA	17.0	3.4	0.74
PERNAMBUCO-PARAIBA	13.7	3.6	1.4
SERGIPE-ALAGOAS AND BAHIA	20.8	3.8	1.0
ESPÍRITO SANTO	18.6	6.4	1.1
CAMPOS	18.6	6.4	1.5
SANTOS	20.4	6.9	1.4
PELOTAS	23.6	8.7	2.0

Reference: Maximum one year return period from Metocean Technical Specifications for Brazilian offshore basins.

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4.2. EXTREME VALUES FOR BRAZILIAN DEEP-WATER OFFSHORE AREAS

4.2.1. FOZ DO AMAZONAS REGION

Metocean parameter	return period (y)	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	14.1	15.4	16.9	15.6	14.2	14.0	12.7	14.3	greater than 100 m
Wave (Hs/Tp)	1	3.4/13.1	3.5/8.7	2.8/8.3	2.6/8.7	1.5/6.1	1.4/6.0	1.4/6.0	2.7/13.7	
Surface current (m/s)	1	2.28	1.35	1.35	1.35	1.35	1.35	1.9	2.67	
Wind (m/s)	10	18.4	19.8	21.2	20.3	18.4	17.9	15.7	17.0	
Wave (Hs/Tp)	10	4.4/14.1	4.6/9.0	3.4/8.7	3.1/8.7	1.8/6.5	1.7/6.3	1.6/6.3	3.2/14.0	
Surface current (m/s)	10	2.69	1.37	1.37	1.37	1.37	1.58	2.24	2.88	
Wind (m/s)	100	22.5	24.0	25.5	24.9	22.6	21.8	18.6	19.7	
Wave (Hs/Tp)	100	5.4/15.1	5.7/9.4	4.0/9.1	3.7/8.6	2.1/6.8	1.9/6.6	1.8/6.5	3.7/14.3	
Surface current (m/s)	100	3.01	1.45	1.45	1.45	1.45	1.77	2.51	3.05	

Obs: Hs – Significant wave height (m) Tp - Spectral peak period (s)

References:

I-ET-2015.00-1110-941-PMC-003 rev.A Metocean Data for Planning of Offshore Operations
I-ET-2016.00-1000-941-PPC-002 rev.C Metocean Data

4.2.2. PARÁ-MARANHÃO AND BARREIRINHAS REGION

Metocean parameter	return period (y)	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	12.3	12.9	14.6	12.5	8.7	6.9	8.6	9.7	greater than 1000 m
Wave (Hs/Tp)	1	3.5/13.0	3.4/10.0	3.1/8.5	2.5/8.3	1.9/6.9	1.9/6.6	1.3/5.8	2.6/13.8	
Surface current (m/s)	1	1.22	0.34	0.11	0.22	0.28	1.12	2.03	2.01	
Wind (m/s)	10	13.4	16.0	17.4	16.5	13.1	10.5	9.9	11.2	
Wave (Hs/Tp)	10	4.4/13.8	4.3/10.8	3.7/9.3	3.3/9.3	2.5/7.2	2.5/7.2	2.2/6.9	3.4/14.0	
Surface current (m/s)	10	1.34	0.39	0.13	0.25	0.33	1.30	2.33	2.26	
Wind (m/s)	100	18.3	19.2	20.1	20.6	17.5	14.0	13.4	15.3	
Wave (Hs/Tp)	100	5.1/15.0	4.9/11.8	4.2/9.8	4.0/9.8	3.0/7.7	3.0/7.7	3.1/7.7	3.9/14.0	
Surface current (m/s)	100	1.44	0.45	0.15	0.29	0.38	1.50	2.60	2.50	

Obs.: Hs – Significant wave height (m), Tp - Spectral peak period (s)

Reference: I-ET-2016.00-1000-941-PPC-001 rev.A Production Fields of Pará-Maranhão Basin

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4.2.3. RIO GRANDE DO NORTE AND CEARA REGION

Metocean parameter	return period (y)	Direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	10.8	12.5	17.0	16.5	13.6	9.9	8.2	8.85	greater than 100 m
Wave (Hs/Tp)	1	2.9/14.7	2.4/9.3	2.7/7.6	2.6/7.4	2.6/7.4	2.6/7.4	2.7/14.6	2.7/14.6	
Surface current (m/s)	1	0.55	0.55	0.20	0.20	0.20	0.36	0.71	0.74	
Wind (m/s)	10	12.6	16.8	20.3	20.3	14.6	11.9	10.1	10.9	
Wave (Hs/Tp)	10	3.6/16.4	3.2/13.7	3.3/8.2	3.3/8.2	3.3/8.2	3.3/8.2	3.2/15.7	3.2/15.7	
Surface current (m/s)	10	0.82	0.77	0.37	0.37	0.29	0.59	1.07	1.12	
Wind (m/s)	100	17.3	20.9	23.44	24.0	19.4	15.9	15.2	16.1	
Wave (Hs/Tp)	100	4.2/18.0	4.0/16.5	4.0/9.0	4.0/9.0	4.0/9.0	4.0/9.0	3.8/16.9	3.8/16.9	
Surface current (m/s)	100	1.09	0.98	0.53	0.56	0.46	0.82	1.40	1.45	

Obs: Hs – Significant wave height (m) Tp - Spectral peak period (s)

Reference: I-ET-3404.00-1200-941-PPC-001 rev.C Production Fields of Ceará Basin
I-ET-3400.05-1100-941-PPC-001 rev.E Deep Water Potiguar Basin

4.2.4. PERNAMBUCO-PARAIBA REGION

Metocean parameter	return period (y)	Direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	12.1	10.1	12.0	13.7	11.9	12.1	12.1	12.1	greater than 1600 m Obs: current reference level: 131m
Wave (Hs/Tp)	1	2.5/13.8	2.2/11.3	3.1/10.5	3.6/10.8	3.6/12.3	2.0/11.5	1.7/5.7	1.7/5.7	
Surface current (m/s)	1	1.41	1.39	0.4	0.2	0.2	0.2	0.2	0.3	
Wind (m/s)	10	15.0	13.9	14.4	17.1	16.5	15.0	15.0	15.0	
Wave (Hs/Tp)	10	3.5/15.5	3.2/12.5	4.1/11.3	4.8/11.3	4.8/12.8	2.5/11.5	2.3/6.2	2.3/6.2	
Surface current (m/s)	10	1.69	1.64	0.48	0.24	0.24	0.24	0.24	0.36	
Wind (m/s)	100	17.7	17.7	16.8	20.3	21.0	17.7	17.7	17.7	
Wave (Hs/Tp)	100	4.5/17.8	4.2/14.3	5.1/12.5	5.9/11.8	6.0/13.0	3.0/11.8	2.8/6.7	2.8/6.7	
Surface current (m/s)	100	1.94	1.87	0.55	0.28	0.28	0.28	0.28	0.41	

Obs: Hs – Significant wave height (m) Tp - Spectral peak period (s)

Reference: I-ET-2012.00-1000-941-PPC-001 Production Fields of PEPB Basin

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4.2.5. SERGIPE-ALAGOAS AND BAHIA REGION

Metocean parameter	return period (y)	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	14.9	20.8	20.5	19.7	17.1	14.4	14.4	14.4	greater than 50 m
Wave (Hs/Tp)	1	1.8/12.0	2.2/6.3	3.4/9.5	3.8/9.0	3.8/12.0	3.5/13.0	1.8/12.0	1.8/12.0	
Surface current (m/s)	1	0.99	1.00	0.61	0.48	0.85	0.91	0.21	0.15	
Wind (m/s)	10	20.0	25.5	24.7	23.9	21.9	19.1	19.1	19.1	
Wave (Hs/Tp)	10	2.1/12.0	2.6/7.0	4.3/11.0	4.9/9.8	4.7/12.0	4.0/13.0	2.1/12.0	2.1/12.0	
Surface current (m/s)	10	1.22	1.22	0.69	0.54	0.94	1.05	0.25	0.18	
Wind (m/s)	100	25.2	30.0	28.8	28.2	26.8	23.8	23.8	23.8	
Wave (Hs/Tp)	100	2.3/12.0	3.1/7.8	5.2/12.5	5.9/10.0	5.6/12.5	4.5/13.5	2.3/12.0	2.3/12.0	
Surface current (m/s)	100	1.42	1.41	0.76	0.58	1.02	1.18	0.28	0.20	

Obs: Hs – Significant wave height Tp - Spectral peak period

References:
- I-ET-3200.00-1200-931-PPC-001 revC — Piranema area
- ET-4450.09-6413-931-PMC-002 revB — Terminal de SUAPE
- I-ET_1400.00-1000-941-PPC-001 revB — Sergipe Deep Water Fields

4.2.6. ESPÍRITO SANTO REGION

Metocean parameter	return period (y)	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	17.8	18.6	15.2	15.8	17.5	17.3	16.2	13.5	greater than 1200 m
Wave (Hs/Tp)	1	2.9/6.8	3.3/8.0	3.0/9.3	3.7/11.3	4.0/11.8	2.94/7.5	2.6/6.0	2.6/6.0	
Surface current (m/s)	1	0.79	0.97	0.64	0.77	0.82	1.11	0.82	0.81	
Wind (m/s)	10	23.2	23.9	20.4	22.0	24.4	24.5	24.1	19.3	
Wave (Hs/Tp)	10	3.9/8.0	4.3/8.8	4.0/10.3	5.0/12.3	5.5/12.8	4.5/9.3	2.9/6.3	2.9/6.3	
Surface current (m/s)	10	0.97	1.13	0.77	0.95	1.10	1.33	0.98	1.00	
Wind (m/s)	100	28.5	29.1	25.6	28.1	31.2	31.6	31.9	25.0	
Wave (Hs/Tp)	100	4.7/9.5	5.2/9.8	4.9/11.3	6.4/13.3	7.0/14.0	5.9/11.0	3.4/6.8	3.4/6.8	
Surface current (m/s)	100	1.29	1.27	0.91	1.15	1.40	1.53	1.22	1.18	

Obs: Hs – Significant wave height (m) Tp - Spectral peak period (s)

References:
- I-ET-3673.00-1000-941-PPC-001 revC — Parque das Baleias
- I-ET-3681.00-1000-941-PPC-001 revB — Canapu and Golfinho Fields
- I-ET-3698.00-1000-941-PPC-001 revA — Parque dos Doces/Deuses Field

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4.2.7. CAMPOS REGION

Metocean parameter	return period (y)	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	17.8	18.6	15.2	15.8	17.5	17.3	16.2	13.5	greater than 120 m
Wave (Hs/Tp)	1	4.4/8.8	4.6/9.0	3.8/9.7	4.8/10.8	5.3/12.5	6.4/13.8	4.1/8.0	3.2/8.0	
Surface current (m/s)	1	1.26	1.26	0.81	1.41	1.47	1.47	1.12	0.97	
Wind (m/s)	10	23.2	23.9	20.4	22.0	24.4	24.5	24.1	19.3	
Wave (Hs/Tp)	10	4.7/9.0	5.1/10.0	5.1/10.0	5.8/11.5	7.0/13.5	7.8/13.5	4.9/9.0	3.6/8.0	
Surface current (m/s)	10	1.46	1.46	0.98	1.62	1.76	1.70	1.26	1.13	
Wind (m/s)	100	28.5	29.1	25.6	28.1	31.2	31.6	31.9	25.0	
Wave (Hs/Tp)	100	5.0/10.0	6.2/10.5	6.3/10.0	7.3/12.0	8.7/14.5	9.2/14.2	5.8/10.0	4.0/8.0	
Surface current (m/s)	100	1.62	1.62	1.15	1.79	2.06	1.89	1.41	1.26	

Obs: Hs – Significant wave height (m) Tp - Spectral peak period (s)

References:
- I-ET-3000.00-1000-941-PPC-001 revG — Campos Basin
- I-ET-3555.00-1000-941-PPC-001 — Carataí and Carapicu Fields
- I-ET-3554.00-1000-941-PPC-001 revA — Maromba Field

4.2.8. SANTOS REGION

Metocean parameter	return period (y)	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	17.9	18.5	17.2	17.4	19.8	20.4	18.1	17.5	greater than 120 m
Wave (Hs/Tp)	1	3.6/7.5	4.2/8.8	4.0/9.3	4.4/11.0	5.3/13.0	6.9/12.0	4.7/8.8	3.7/7.0	
Surface current (m/s)	1	1.01	1.14	0.91	0.89	1.10	1.36	1.39	1.11	
Wind (m/s)	10	25.4	25.3	23.0	23.8	26.7	27.9	26.5	24.6	
Wave (Hs/Tp)	10	4.2/8.3	5.4/10.0	5.3/10.0	6.2/11.9	7.2/14.5	9.2/14.0	5.8/10.0	4.3/7.5	
Surface current (m/s)	10	1.16	1.27	1.02	1.01	1.36	1.53	1.57	1.23	
Wind (m/s)	100	32.9	32.1	29.1	29.1	33.1	34.5	33.8	30.5	
Wave (Hs/Tp)	100	4.6/8.8	6.6/11.3	6.6/11.3	7.9/13.0	9.2/16.6	11.2/16.0	6.6/10.8	4.8/8.0	
Surface current (m/s)	100	1.27	1.38	1.10	1.10	1.67	1.67	1.72	1.32	

Obs: Hs – Significant wave height Tp - Spectral peak period

References:
- I-ET-3A26.00-1000-941-PPC-001 revG — BM-S Cluster Region
- I-ET-3926.01-1000-941-PPC-001 revC — Mexilhão Field Development
- I-ET-3A20.00-1000-941-PPC-001 revD — Uruguá and Tambaú Field Development

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4.2.9. PELOTAS REGION

Metocean parameter	return period	direction								reference depth (m)
		N	NE	E	SE	S	SW	W	NW	
Wind (m/s)	1	21.2	21.5	20.0	19.9	21.1	23.6	23.0	20.1	greater than 1500 m
Wave (Hs/Tp)	1	3.4/6.8	6.4/9.3	6.3/10.3	6.7/11.3	8.7/13.3	8.3/11.8	5.6/7.3	3.9/6.3	
Surface current (m/s)	1	1.00	0.7	0.9	1.3	2.0	1.7	1.6	1.0	
Wind (m/s)	10	26.8	26.9	26.0	26.5	27.8	30.9	29.3	27.4	
Wave (Hs/Tp)	10	3.9/7.5	7.8/10.3	8.0/11.0	8.7/12.8	10.8/14.5	10.9/14.0	7.0/8.3	4.7/6.8	
Surface current (m/s)	10	1.3	0.9	1.0	1.5	2.3	1.9	1.9	1.3	
Wind (m/s)	100	32.2	32.3	31.8	32.9	34.3	38.0	35.5	34.4	
Wave (Hs/Tp)	100	4.3/8.0	9.0/11.0	9.5/11.5	10.5/14.3	12.5/15.5	13.1/15.8	8.1/9.0	5.2/7.3	
Surface current (m/s)	100	1.5	1.1	1.1	1.7	2.5	2.1	2.6	1.6	

Obs: Hs – Significant wave height (m) Tp - Spectral peak period (s)

Reference: I-ET-3B00.00-1000.941-PPC-001 revA Pelotas Basin

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INDEX OF REVISIONS

REV.	DESCRIPTION AND / OR AFFECTED SHEETS
0	ORIGINAL
A	Excluded item 5.18 and updated item 5.1
B	Updated items 3.4, 3.5, 5.1 to 5.15, 9. Excluded items 13.2 ,13.3
C	Updated items 3.5.1, 4.0, 5.1.1, 11.1.1 to 11.1.22, 12.1.1 to 12.1.12. Included items 9.1.10 to 9.1.17; 12.2 to 12.5, and 13.1 to 13.9. Modified Figure 6.6, and items 10.1.2 to 10.1.9, 14.
D	Included 16 directional sectors in items 3.5, 5.1, 5.5 to 5.7
E	Included notice about document property
F	Tp suppression correction from NE and ENE items 5.14 and 5.15
G	E, SE, S and SW Extreme Hs x Tp table correction items 5.1.6, 5.1.8, 5.1.10 and 5.1.12
H	Inclusion of Rain section 3.4 with Disaggregation factor and Extreme IDF curves
I	Update air temperature tables; included HVAC table; included rainfall exceedance tables

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	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H	REV. I
DATE	15/08/2003	17/03/2005	29/10/2010	26/03/2018	20/07/2018	03/08/2020	24/01/2024	28/06/2024	31/10/2024
EXECUTION	LMANOEL	JLIMA	EOR/JAMLIMA	EOR	EOR	EOR	CTRC	BZM7	BXU2 / CTRC
VERIFICATION	JLIMA	LMANOEL	LMANOEL/GGM	WCB	WCB	WCB	CTXJ/EANI	CTRC	BZM7 / CTXJ
APPROVAL	AMAIA	AMAIA	LEVY	ARTHUR	ARTHUR	ARTHUR	A7OQ	A7OQ	A7OQ

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INDEX

1 OBJECTIVE 6

2 SYSTEM OF UNITS AND DIRECTION CONVENTION 6

3 METEOROLOGICAL DATA 7

3.1 ATMOSPHERIC PRESSURE 7
3.2 RELATIVE HUMIDITY 7
3.3 AIR TEMPERATURE (DRY BULB) 7
3.3.1 Characteristics Monthly Values of Air Temperature (°C) 8
3.3.2 Air Temperature (Dry Bulb) Exceedance - Monthly Values (°C) 8
3.3.3 Percentage of Air Temperature Occurrence in Monthly Basis 9
3.3.4 HVAC - Dry Bulb / Wet Bulb Temperatures 9
3.4 RAINFALL DATA 10
3.4.1 Disaggregation Factor 10
3.4.2 Extreme IDF Curves 10
3.4.3 Rainfall Frequency (days) above 1mm/day 10
3.4.4 Monthly Accumulated Rainfall (mm) 10
3.4.5 Maximum Absolute Accumulated Rainfall (mm) 10
3.4.6 Rainfall Exceedance above 1 mm/time frame 11
3.5 WIND 12
3.5.1 Wind Speed by Return Period (m/s) with Associated Wave and Current Conditions 12
3.5.2 Joint Distribution of Wind Speed and Wind Direction 14

4 TIDE 15

5 WAVE 16

5.1 CHARACTERISTIC WAVE PARAMETERS BY RETURN PERIODS (YEARS) 16
5.1.1 Extreme wave parameters with Associated Wind and Current Conditions 16
5.1.2 Extreme Hs x Tp table and curves with waves approaching from N 19
5.1.3 Extreme Hs x Tp table and curves with waves approaching from NNE 19
5.1.4 Extreme Hs x Tp table and curves with waves approaching from NE 19
5.1.5 Extreme Hs x Tp table and curve with waves approaching from ENE 20
5.1.6 Extreme Hs x Tp table and curve with waves approaching from E 20
5.1.7 Extreme Hs x Tp table and curve with waves approaching from ESE 21
5.1.8 Extreme Hs x Tp table and curve with waves approaching from SE 21
5.1.9 Extreme Hs x Tp table and curve with waves approaching from SSE 22
5.1.10 Extreme Hs x Tp table and curve with waves approaching from S 22
5.1.11 Extreme Hs x Tp table and curve with waves approaching from SSW 23
5.1.12 Extreme Hs x Tp table and curve with waves approaching from SW 23
5.1.13 Extreme Hs x Tp table and curve with waves approaching from WSW 24
5.1.14 Extreme Hs x Tp table and curve with waves approaching from W,WNW e NW 24
5.1.15 Extreme Hs x Tp table and curve with waves approaching from NNW 24
5.2 JONSWAP WAVE SPECTRUM FOR CAMPOS BASIN AND RELATION TZ / TP 25
5.3 DISTRIBUTION OF INDIVIDUAL WAVE HEIGHTS AND ASSOCIATED PERIODS 26
5.4 DISTRIBUTION OF INDIVIDUAL WAVE HEIGHTS AND ASSOCIATED DIRECTIONS 27
5.5 TOTAL SIGNIFICANT WAVE HEIGHTS X PRIMARY SPECTRAL PEAK DIRECTIONS * 28
5.6 TOTAL SIGNIFICANT WAVE HEIGHTS X PRIMARY SPECTRAL PEAK PERIODS * 28
5.7 DISTRIBUTION OF UNIMODAL AND BIMODAL SEA STATES 29
*5.7.1 Hs_1 x Tp_1 from N Direction for Unimodal sea states * 30*
5.7.2 Hs_1 x Tp_1 from N and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states 31
*5.7.3 Hs_1 x Tp_1 from NNE Direction for Unimodal sea states * 32*
5.7.4 Hs_1 x Tp_1 from NNE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states 33
*5.7.5 Hs_1 x Tp_1 from NE Direction for Unimodal sea states * 34*
5.7.6 Hs_1 x Tp_1 from NE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states 35

*5.7.7 Hs1 x Tp1 from ENE Direction for Unimodal sea states * 36*
5.7.8 Hs1 x Tp1 from ENE and associated Hs2, Tp2, Dirp2 for Bimodal sea states 37
*5.7.9 Hs1 x Tp1 from E for Unimodal sea states * 38*
5.7.10 Hs1 x Tp1 from E and associated Hs2, Tp2, Dirp2 for Bimodal sea states 39
*5.7.11 Hs1 x Tp1 from ESE for Unimodal sea states * 40*
5.7.12 Hs1 x Tp1 from ESE and associated Hs2, Tp2, Dirp2 for Bimodal sea states 41
*5.7.13 Hs1 x Tp1 from SE for Unimodal sea states * 42*
5.7.14 Hs1 x Tp1 from SE and associated Hs2, Tp2, Dirp2 for Bimodal sea states 43
*5.7.15 Hs1 x Tp1 from SSE for Unimodal sea states * 44*
5.7.16 Hs1 x Tp1 from SSE and associated Hs2, Tp2, Dirp2 for Bimodal sea states 45
*5.7.17 Hs1 x Tp1 from S for Unimodal sea states * 46*
5.7.18 Hs1 x Tp1 from S and associated Hs2, Tp2, Dirp2 for Bimodal sea states 47
*5.7.19 Hs1 x Tp1 from SSW for Unimodal sea states * 48*
5.7.20 Hs1 x Tp1 from SSW and associated Hs2, Tp2, Dirp2 for Bimodal sea states 49
*5.7.21 Hs1 x Tp1 from SW for Unimodal sea states * 50*
5.7.22 Hs1 x Tp1 from SW and associated Hs2, Tp2, Dirp2 for Bimodal sea states 51
*5.7.23 Hs1 x Tp1 from WSW for Unimodal sea states * 52*
5.7.24 Hs1 x Tp1 from WSW and associated Hs2, Tp2, Dirp2 for Bimodal sea states 53
*5.7.25 Hs1 x Tp1 from W for Unimodal sea states * 54*
5.7.26 Hs1 x Tp1 from W and associated Hs2, Tp2, Dirp2 for Bimodal sea states 55
*5.7.27 Hs1 x Tp1 from WNW for Unimodal sea states * 56*
5.7.28 Hs1 x Tp1 from WNW and associated Hs2, Tp2, Dirp2 for Bimodal sea states 57
*5.7.29 Hs1 x Tp1 from NW for Unimodal sea states * 58*
5.7.30 Hs1 x Tp1 from NW and associated Hs2, Tp2, Dirp2 for Bimodal sea states 59
*5.7.31 Hs1 x Tp1 from NNW Direction for Unimodal sea states * 60*
5.7.32 Hs1 x Tp1 from NNW and associated Hs2, Tp2, Dirp2 for Bimodal sea states 61

6 REGIONAL OCEANOGRAPHIC CONDITIONS 62

6.1 VERTICAL PROFILE OF MARINE FOULING (MM) 62
6.2 CROSS-SECTION OF SEA WATER TEMPERATURE, SALINITY AND DENSITY 62
6.3 CROSS-SECTION OF GEOSTROPHIC VELOCITY OF THE BRAZIL CURRENT 70

7 OCEANOGRAPHIC DATA FOR THE SHALLOW NORTH REGION (SN) 72

8 OCEANOGRAPHIC DATA FOR THE INTERMEDIATE NORTH REGION (IN) 72

8.1 CURRENT 72
8.1.1 Frequency of Surface Current by Directions 72
8.1.2 Surface Extreme Current Profile (m/s) With N Direction 73
8.1.3 Surface Extreme Current Profile (m/s) With NE Direction 73
8.1.4 Surface Extreme Current Profile (m/s) With E Direction 74
8.1.5 Surface Extreme Current Profile (m/s) With SE Direction 74
8.1.6 Surface Extreme Current Profile (m/s) With S Direction 75
8.1.7 Surface Extreme Current Profile (m/s) With SW Direction 75
8.1.8 Surface Extreme Current Profile (m/s) With W Direction 76
8.1.9 Surface Extreme Current Profile (m/s) With NW Direction 76
8.2 VERTICAL PROFILE OF SEA WATER TEMPERATURE (OC) 77
8.3 VERTICAL PROFILE OF SEA WATER SALINITY [PSU] 77
8.4 VERTICAL PROFILE OF SEA WATER DENSITY (KG/M3) 78

9 OCEANOGRAPHIC DATA FOR THE DEEP NORTH REGION (DN) 79

9.1 CURRENT 79
9.1.1 Frequency of Surface Current by Directions 79
9.1.2 Surface Extreme Current Profile (m/s) With N Direction 80
9.1.3 Surface Extreme Current Profile (m/s) With NE Direction 80
9.1.4 Surface Extreme Current Profile (m/s) With E Direction 81
9.1.5 Surface Extreme Current Profile (m/s) With SE Direction 81
9.1.6 Surface Extreme Current Profile (m/s) With S Direction 82

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9.1.7 Surface Extreme Current Profile (m/s) With SW Direction 82
9.1.8 Surface Extreme Current Profile (m/s) With W Direction 83
9.1.9 Surface Extreme Current Profile (m/s) With NW Direction 83
9.1.10 Mid-water level Extreme Current Profile (m/s) With N Direction at 1000m 84
9.1.11 Mid-water level Extreme Current Profile (m/s) With NE Direction at 1000m 84
9.1.12 Mid-water level Extreme Current Profile (m/s) With E Direction at 1000m 85
9.1.13 Mid-water level Extreme Current Profile (m/s) With SE Direction at 1000m 85
9.1.14 Mid-water level Extreme Current Profile (m/s) With S Direction at 1000m 86
9.1.15 Mid-water level Extreme Current Profile (m/s) With SW Direction at 1000m 86
9.1.16 Mid-water level Extreme Current Profile (m/s) With W Direction at 1000m 87
9.1.17 Mid-water level Extreme Current Profile (m/s) With NW Direction at 1000m 87
9.2 VERTICAL PROFILE OF SEA WATER TEMPERATURE (^{O}C) 88
9.3 VERTICAL PROFILE OF SEA WATER SALINITY [PSU] 88
9.4 VERTICAL PROFILE OF SEA WATER DENSITY (KG/M^3) 89

10 OCEANOGRAPHIC DATA FOR THE SHALLOW CENTRAL REGION (SC) 90

10.1 CURRENT 90
10.1.1 Frequency of Surface Current by Directions 90
10.1.2 Surface Extreme Current Profile (m/s) With N Direction 91
10.1.3 Surface Extreme Current Profile (m/s) With NE Direction 91
10.1.4 Surface Extreme Current Profile (m/s) With E Direction 91
10.1.5 Surface Extreme Current Profile (m/s) With SE Direction 92
10.1.6 Surface Extreme Current Profile (m/s) With S Direction 92
10.1.7 Surface Extreme Current Profile (m/s) With SW Direction 92
10.1.8 Surface Extreme Current Profile (m/s) With W Direction 93
10.1.9 Surface Extreme Current Profile (m/s) With NW Direction 93
10.2 VERTICAL PROFILE OF SEA WATER TEMPERATURE (^{O}C) 94
10.3 VERTICAL PROFILE OF SEA WATER SALINITY [PSU] 94
10.4 VERTICAL PROFILE OF SEA WATER DENSITY (KG/M^3) 95

11 OCEANOGRAPHIC DATA FOR THE INTERMEDIATE CENTRAL REGION (IC) 96

11.1 CURRENT 96
11.1.1 Frequency of Surface Current by Directions 96
11.1.2 Surface Extreme Current Profile (m/s) With N Direction 97
11.1.3 Surface Extreme Current Profile (m/s) With NNE Direction 97
11.1.4 Surface Extreme Current Profile (m/s) With NE Direction 98
11.1.5 Surface Extreme Current Profile (m/s) With ENE Direction 98
11.1.6 Surface Extreme Current Profile (m/s) With E Direction 98
11.1.7 Surface Extreme Current Profile (m/s) With ESE Direction 99
11.1.8 Surface Extreme Current Profile (m/s) With SE Direction 99
11.1.9 Surface Extreme Current Profile (m/s) With SSE Direction 99
11.1.10 Surface Extreme Current Profile (m/s) With S Direction 100
11.1.11 Surface Extreme Current Profile (m/s) With SSW Direction 100
11.1.12 Surface Extreme Current Profile (m/s) With SW Direction 101
11.1.13 Surface Extreme Current Profile (m/s) With WSW Direction 101
11.1.14 Surface Extreme Current Profile (m/s) With W Direction 101
11.1.15 Surface Extreme Current Profile (m/s) With WNW Direction 102
11.1.16 Surface Extreme Current Profile (m/s) With NW Direction 102
11.1.17 Surface Extreme Current Profile (m/s) With NNW Direction 102
11.1.18 Mid-water level Extreme Current Profile (m/s) With N Direction at 950m 103
11.1.19 Mid-water levelExtreme Current Profile (m/s) With NNE Direction at 950m 103
11.1.20 Mid-water level Extreme Current Profile (m/s) With NE Direction at 950m 103
11.1.21 Mid-water level Extreme Current Profile (m/s) With ENE Direction at 950m 104
11.1.22 Mid-water level Extreme Current Profile (m/s) With E Direction at 950m 104
11.2 VERTICAL PROFILE OF SEA WATER TEMPERATURE (^{O}C) 105
11.3 VERTICAL PROFILE OF SEA WATER SALINITY [PSU] 106
11.4 VERTICAL PROFILE OF SEA WATER DENSITY (KG/M^3) 107

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12 OCEANOGRAPHIC DATA FOR THE DEEP CENTRAL REGION (DC) 108

12.1 CURRENT 108
12.1.1 Frequency of Surface Current by Directions 108
12.1.2 Surface Extreme Current Profile (m/s) With N Direction 108
12.1.3 Surface Extreme Current Profile (m/s) With NE Direction 109
12.1.4 Surface Extreme Current Profile (m/s) With E Direction 109
12.1.5 Surface Extreme Current Profile (m/s) With SE Direction 109
12.1.6 Surface Extreme Current Profile (m/s) With S Direction 110
12.1.7 Surface Extreme Current Profile (m/s) With SW Direction 110
12.1.8 Surface Extreme Current Profile (m/s) With W Direction 110
12.1.9 Surface Extreme Current Profile (m/s) With NW Direction 111
12.1.10 Mid-water level Extreme Current Profile (m/s) With SW Direction at 1800 m 111
12.1.11 Mid-water level Extreme Current Profile (m/s) With W Direction at 1800 m 111
12.1.12 Mid-water level Extreme Current Profile (m/s) With NW Direction at 1800 m 112
12.2 VERTICAL PROFILE OF SEA WATER TEMPERATURE (^{O}C) 112
12.3 VERTICAL PROFILE OF SEA WATER SALINITY [PSU] 113
12.4 VERTICAL PROFILE OF SEA WATER DENSITY (KG/M^3) 113

13 OCEANOGRAPHIC DATA FOR THE SHALLOW SOUTH REGION (SS) 114

13.1 CURRENT 114
13.1.1 Frequency of Surface Current by Directions 114
13.1.2 Surface Extreme Current Profile (m/s) With N Direction 115
13.1.3 Surface Extreme Current Profile (m/s) With NE Direction 115
13.1.4 Surface Extreme Current Profile (m/s) With E Direction 115
13.1.5 Surface Extreme Current Profile (m/s) With SE Direction 115
13.1.6 Surface Extreme Current Profile (m/s) With S Direction 116
13.1.7 Surface Extreme Current Profile (m/s) With SW Direction 116
13.1.8 Surface Extreme Current Profile (m/s) With W Direction 116
13.1.9 Surface Extreme Current Profile (m/s) With NW Direction 116

14 SIMULTANEOUS ENVIROMENTAL CONDITIONS 117

14.1 BEAM SEA CONDITIONS 117
14.1.1 Scatter diagram of wind speed against the angle between wind and wave 118
14.1.2 Scatter diagram of wind speed against wave height for beam sea conditions 119
14.1.3 Extreme Wave Values for Beam Sea Conditions 120

15 REFERENCES 121

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1 OBJECTIVE

To present metocean data (meteorological and oceanographic parameters) to be used in the design of offshore units and production systems in CAMPOS BASIN, state of Rio de Janeiro, southeast Brazilian coast.

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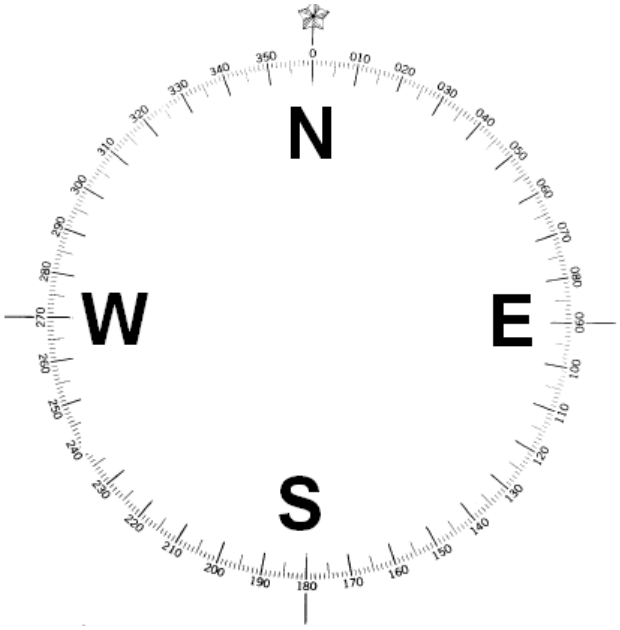
2 SYSTEM OF UNITS AND DIRECTION CONVENTION

The International System of Units (S.I.), UNESCO-IOC (Intergovernmental Oceanographic Commission) and WMO (World Meteorological Organization) recommendations were adopted.

For all chapters (except chapter 13.2 and 13.3):

- WIND and WAVE: direction indicates where the wind and wave comes from (clockwise sense with origin at True North 0º)
- CURRENT: the direction indicates where the current goes to (clockwise sense with origin at True North 0º)



3 METEOROLOGICAL DATA

3.1 Atmospheric Pressure

Absolute maximum : 1032.1 hPa
Mean : 1016.5 hPa
Absolute minimum : 1000.4 hPa

Mean monthly values

JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ
1013.6	1013.8	1014.0	1015.4	1017.4	1019.7	1020.9	1020.6	1018.9	1016.1	1014.1	1013.0

Source: UCDs measurements in Campos Basin in the period from Jul/2002 to Jun/2024. Ref. [1].

3.2 Relative Humidity

Absolute maximum : 100.0 %
Mean : 77.2 %
Absolute Minimum : 35.0 %

Mean monthly values

JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ
82.4	79.9	77.8	72.8	71.1	73.2	73.3	74.7	76.6	80.1	81.3	83.7

Source: UCDs measurements in Campos Basin in the period from Jul/2002 to Jun/2024. Ref. [1]

3.3 Air Temperature (Dry Bulb)

Absolute maximum : 33.7 oC
Mean : 24.8 oC
Absolute minimum : 16.7 oC

Source: UCDs measurements in Campos Basin in the period from Jul/2002 to Jun/2024. Ref. [1].

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3.3.1 Characteristics Monthly Values of Air Temperature (°C)

MOUNTH	MINIMUM ABSOLUTE	MINIMUM	MEAN	MAXIMUM	MAXIMUM ABSOLUTE
JAN	20.5	25.4	26.2	26.9	31.3
FEB	21.1	26.1	27.0	27.9	32.7
MAR	21.6	26.1	27.2	28.3	33.2
APR	20.3	25.3	26.5	27.9	33.7
MAY	19.3	23.7	24.9	26.2	30.6
JUN	18.9	23.0	24.0	25.1	30.0
JUL	17.7	22.1	23.1	24.2	29.0
AUG	16.7	21.8	22.8	23.8	28.6
SEP	17.7	22.1	22.9	23.8	27.3
OCT	18.2	22.8	23.7	24.5	29.2
NOV	18.2	23.3	24.3	25.2	29.2
DEC	20.8	24.6	25.5	26.3	30.5
ANNUAL	16.7	23.8	24.8	25.8	33.7

Observation: MINIMUM is equal to the mean of minimum daily values
MAXIMUM is equal to the mean of maximum daily values

Source: UCDs measurements in Campos Basin in the period from Jul/2002 to Jun/2024. Ref. [1].

3.3.2 Air Temperature (Dry Bulb) Exceedance - Monthly Values (°C)

Mounth → % Exc↓	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
100.00	20.5	21.1	21.6	20.3	19.3	18.9	17.7	16.7	17.7	18.2	18.2	20.8	16.7
99.99	21.3	21.4	21.7	20.9	19.5	19.1	17.7	17.9	17.9	18.6	18.3	20.8	18.2
99.90	21.8	22.5	22.6	22.1	20.1	19.7	18.4	18.7	18.7	19.2	19.4	21.4	19.2
99.80	22.0	22.9	22.9	22.4	20.4	20.1	18.8	19.1	19.0	19.6	20.0	21.6	19.6
99.70	22.2	23.2	23.2	22.6	20.6	20.3	18.9	19.2	19.2	19.9	20.4	21.8	19.8
99.60	22.4	23.3	23.4	22.8	20.8	20.4	19.1	19.4	19.3	20.0	20.6	22.0	20.0
99.50	22.5	23.4	23.5	22.8	21.0	20.5	19.2	19.5	19.4	20.2	20.7	22.1	20.1
90.00	24.9	25.6	25.8	25.0	23.2	22.4	21.5	21.2	21.3	22.0	22.6	23.9	22.3
80.00	25.4	26.2	26.4	25.5	23.8	22.9	22.1	21.9	21.9	22.6	23.2	24.5	23.1
75.00	25.6	26.4	26.6	25.7	24.0	23.1	22.3	22.1	22.1	22.9	23.5	24.8	23.4
70.00	25.7	26.6	26.7	25.9	24.2	23.3	22.5	22.3	22.3	23.1	23.7	24.9	23.7
60.00	26.0	26.8	27.0	26.3	24.6	23.7	22.9	22.6	22.6	23.5	24.0	25.2	24.2
50.00	26.2	27.1	27.2	26.5	24.9	24.0	23.3	22.9	22.9	23.8	24.3	25.5	24.8
40.00	26.5	27.4	27.5	26.8	25.2	24.3	23.6	23.2	23.3	24.1	24.7	25.7	25.4
30.00	26.8	27.6	27.7	27.1	25.5	24.6	23.8	23.5	23.6	24.3	25.0	26.1	26.0
25.00	26.9	27.7	27.9	27.2	25.7	24.8	24.0	23.6	23.8	24.5	25.2	26.2	26.4
20.00	27.1	27.8	28.0	27.4	25.9	25.0	24.1	23.7	24.0	24.6	25.3	26.4	26.7
15.00	27.3	28.0	28.2	27.7	26.2	25.3	24.3	23.9	24.2	24.8	25.5	26.6	27.0
10.00	27.5	28.2	28.5	27.9	26.6	25.6	24.5	24.2	24.5	25.0	25.8	26.9	27.4
5.00	27.7	28.6	28.9	28.4	27.3	26.1	24.9	24.6	24.9	25.5	26.2	27.4	27.9
4.00	27.8	28.7	29.0	28.5	27.5	26.3	25.0	24.7	25.0	25.7	26.3	27.5	28.0
3.00	27.9	28.8	29.1	28.8	27.8	26.5	25.1	24.9	25.2	25.9	26.4	27.6	28.2
2.00	28.0	29.0	29.3	29.1	28.0	26.7	25.2	25.1	25.3	26.1	26.5	27.7	28.4
1.00	28.2	29.2	29.7	29.6	28.4	27.0	25.7	25.4	25.5	26.5	26.8	28.0	28.8
0.50	28.5	29.8	30.2	30.2	28.7	27.4	26.1	25.7	25.8	26.7	27.0	28.2	29.2
0.40	28.6	30.0	30.4	30.4	28.8	27.5	26.3	25.9	25.8	26.8	27.1	28.3	29.3
0.30	28.7	30.3	30.6	30.5	29.0	27.7	26.5	26.1	25.9	26.9	27.2	28.3	29.4
0.20	28.8	30.6	31.0	30.8	29.2	28.0	26.7	26.4	26.0	27.0	27.3	28.5	29.8
0.10	29.2	31.1	31.4	31.3	29.5	28.6	27.0	27.0	26.2	27.2	27.8	28.7	30.3
0.01	30.6	32.4	32.2	33.3	30.5	29.9	28.7	28.3	27.0	28.1	29.0	29.8	31.9
0.00	31.3	32.7	33.2	33.7	30.6	30.0	29.0	28.6	27.3	29.2	29.2	30.5	33.7

Source: UCDs measurements in Campos Basin in the period from Jul/2002 to Jun/2024. Ref. [1]

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3.3.3 Percentage of Air Temperature Occurrence in Monthly Basis

Range of Temperature (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
16 - 17								0.01					0.00
17 - 18							0.02	0.01	0.03				0.00
18 - 19						0.01	0.30	0.16	0.18	0.06	0.06		0.06
19 - 20					0.09	0.17	1.09	1.32	1.26	0.34	0.15		0.37
20 - 21	0.01			0.01	0.45	1.30	3.55	5.93	5.03	2.08	0.66	0.01	1.60
21 - 22	0.20	0.06	0.01	0.07	2.05	5.01	13.58	15.51	15.68	7.72	3.46	0.42	5.34
22 - 23	0.79	0.19	0.23	0.55	6.12	16.06	23.99	31.38	29.82	17.08	11.49	1.96	11.69
23 - 24	2.34	1.38	0.73	1.85	16.16	29.04	32.79	32.28	28.00	29.78	23.50	8.47	17.27
24 - 25	8.01	4.07	2.77	8.11	28.49	28.24	21.06	11.17	15.82	32.59	31.63	21.73	17.88
25 - 26	29.23	10.68	8.52	21.84	28.37	14.51	3.03	1.92	3.99	7.93	22.13	36.11	15.73
26 - 27	36.69	30.27	29.06	35.88	11.63	4.65	0.47	0.21	0.19	2.25	6.41	22.36	14.93
27 - 28	20.82	38.93	38.40	22.70	4.56	0.83	0.10	0.09	0.01	0.15	0.45	8.07	11.11
28 - 29	1.79	12.57	16.54	6.84	1.78	0.13	0.01	0.01		0.02	0.04	0.80	3.33
29 - 30	0.12	1.45	3.09	1.50	0.25	0.06	0.01			0.01	0.02	0.06	0.54
30 - 31	0.01	0.26	0.46	0.50	0.05							0.01	0.11
31 - 32	0.01	0.09	0.17	0.10									0.03
32 - 33		0.03	0.02	0.03									0.01
33 - 34			0.01	0.02									0.00

Source: UCDs measurements in Campos Basin in the period from Jul/2002 to Jun/2024. Ref. [1]

3.3.4 HVAC - Dry Bulb / Wet Bulb Temperatures

Basin: Campos	Data Source: UCDs measurements					Height (m):		PR.atm:		Period:			
						23.7		101.65		Jul/02 a Jun/24			
Month> Hot	Annual Freq	annual cooling / dehumidification				summer cooling / dehumidification				winter cooling / dehumidification				Month> Cold
February		**TBS**	TBUc	**TBU**	TBSc	**TBS**	TBUc	**TBU**	TBSc	**TBS**	TBUc	**TBU**	TBSc	August
	0.4%	29.2	25.2	26.5	28.2	30.2	24.9	27.1	28.9	19.3	16.3	14.6	20.6	
ΔAdT	1%	28.8	25.2	26.1	27.9	29.5	25.0	26.7	28.5	19.8	16.6	15.0	20.8	ΔAdT
1.8	2%	28.4	24.9	25.8	27.7	29.1	25.3	26.3	28.2	20.2	16.5	15.4	20.9	2.0

Source: ABNT NBR 16401-1/2008 – Central and unitary air conditioning systems. Part 1: Design of installations.

PR atm – average local ATM pressure [kPa]
Period – meteorological measurements period
Month > Hot – month with the highest average of the max temperatures
Month > Cold – month with the smallest average of the min temperatures
ΔAdT – Average diary air temperature range
TBS, TBU – project temperatures (max / min) of dry/wet bulb
TBSc, TBUc – coincidental temperatures of dry/wet bulb

Source: UCDs measurements in Campos Basin in the period from Jul/2002 to Jun/2024. Ref. [1].

Note: Among the various scenarios studied in its 6th report of 2023, the IPCC concluded that there is more than a 50% chance of the global average air temperature reaching or exceeding the 1.5°C limit between 2021 -2040 when compared to values between 1850-1900.
Source: *https://www.ipcc.ch/report/sixth-assessment-report-cycle/*

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3.4 Rainfall Data

3.4.1 Disaggregation Factor

Duration (minutes)	Disaggregation Factor	
	Acumulated	Intensity
1	0.057	3.420
5	0.274	3.290
10	0.438	2.628
30	0.766	1.532

3.4.2 Extreme IDF Curves

duration	1h	2h	3h	4h	6h	9h	12h	18h	24h
1 year	15.9	26.6	34.0	39.4	46.4	52.1	54.8	56.9	57.1
5 years	38.2	63.7	81.5	94.4	111.3	124.8	131.5	136.4	137.0
10 years	47.8	79.7	102.0	118.1	139.3	156.1	164.5	170.7	171.4
15 years	53.4	89.0	114.0	132.0	155.6	174.5	183.8	190.7	191.5
20 years	57.4	95.7	122.5	141.9	167.2	187.5	197.5	205.0	205.8
30 years	63.0	105.0	134.4	155.7	183.6	205.8	216.8	225.0	225.9
50 years	70.1	116.8	149.5	173.2	204.2	228.9	241.1	250.2	251.3
100 years	79.7	132.8	170.0	196.9	232.1	260.2	274.1	284.5	285.7
1000 years	111.5	185.9	238.0	275.7	325.0	364.3	383.8	398.3	399.9

Source: GPM Level 3A Radiometer (GPROF) gridpoint (lat,lon = -22.1077,-39.9183). Period from jun/2000 to sep/2021. Ref. [2].

Rainfall Equation - Intensity in mm/h

---

i(mm/h) = (21589.5456* ln(T) +24862.9876).*((t +318.9297).^-1.2384)
where T = Return Period in years and t = duration in minutes for T >= 1 year and t >= 60 minutes.

3.4.3 Rainfall Frequency (days) above 1mm/day

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6	6	8	8	7	5	5	3	5	6	9	8	75

Source: GPM Level 3A Radiometer (GPROF) in the period from jul/2000 to jun/2021. Ref. [2].

3.4.4 Monthly Accumulated Rainfall (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
74.9	63.3	77.4	61.2	65.5	26.4	33.2	21.7	32.8	80.2	74.0	83.0	693.7

Source: GPM Level 3A Radiometer (GPROF) in the period from jul/2000 to jun/2021. Ref. [2].

3.4.5 Maximum Absolute Accumulated Rainfall (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
73.9	245.7	126.2	123.0	153.9	35.3	51.0	49.5	64.1	208.0	76.5	114.0	245.7

Source: GPM Level 3A Radiometer (GPROF) in the period from jul/2000 to jun/2021. Ref. [2].

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3.4.6 Rainfall Exceedance above 1 mm/time frame

Mounth → % Exc↓	1 hour	2 Hours	3 Hours	4 Hours	6 Hours	9 Hours	12 Hours	18 Hours	24 Hours
100.00	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.99	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.90	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.80	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.70	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.60	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
99.50	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
90.00	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.3
80.00	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.7
75.00	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.9
70.00	1.4	1.5	1.6	1.7	1.7	1.9	1.9	2.0	2.1
60.00	1.6	1.8	1.9	2.0	2.1	2.3	2.4	2.7	2.8
50.00	1.9	2.1	2.3	2.5	2.7	3.0	3.2	3.5	3.8
40.00	2.3	2.6	2.9	3.1	3.5	3.9	4.2	4.9	5.3
30.00	2.8	3.4	3.8	4.1	4.7	5.4	6.0	6.9	7.7
25.00	3.2	4.0	4.5	4.9	5.6	6.6	7.3	8.4	9.4
20.00	3.9	4.8	5.5	6.1	6.9	8.1	9.0	10.6	11.8
15.00	4.8	6.0	6.9	7.8	8.9	10.4	11.5	13.4	14.9
10.00	6.3	8.0	9.2	10.5	12.2	14.3	15.7	18.0	20.5
5.00	10.4	13.1	15.3	16.7	19.5	23.7	26.1	30.1	34.2
4.00	11.8	15.1	17.7	20.0	23.6	26.9	29.7	34.9	38.2
3.00	14.1	18.0	21.8	24.3	28.0	33.0	35.4	41.1	44.8
2.00	17.4	23.8	27.5	30.6	35.1	41.3	43.7	48.1	53.0
1.00	22.5	32.6	40.3	43.4	49.0	57.1	61.2	70.0	75.5
0.50	31.5	44.9	53.5	63.1	73.9	86.1	95.5	103.5	113.1
0.40	33.1	49.5	59.6	67.2	79.8	93.8	101.4	111.9	119.9
0.30	37.2	54.2	64.2	77.9	88.3	103.5	109.8	125.1	143.3
0.20	38.8	61.1	78.3	86.8	104.7	118.8	132.8	150.8	153.9
0.10	40.5	72.3	90.0	109.5	130.4	149.9	164.0	182.2	203.1
0.01	48.8	90.1	126.6	154.5	189.5	203.4	209.1	236.7	243.8
0.00	48.8	90.4	128.6	160.4	193.9	205.8	217.4	237.4	245.7

Source: GPM Level 3A Radiometer (GPROF) in the period from Jun/2000 to Sep/2021. Ref. [2].

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3.5 Wind

The wind values are referenced to 10 meters above mean sea level and 10-minute duration. Change to different heights and durations may be done as indicates in DNV classification notes 30.5 or any other codes.

3.5.1 Wind Speed by Return Period (m/s) with Associated Wave and Current Conditions

		Return Period (Years)					
Dir	Parameter	1	10	20	30	50	100
N	WS : ASSOCIATED WIND SPEED (m/s)	17.76	23.22	24.83	25.76	26.94	28.54
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.10	3.83	4.05	4.18	4.34	4.55
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.69	0.83	0.87	0.89	0.92	0.96
NNE	WS : ASSOCIATED WIND SPEED (m/s)	18.07	23.25	24.79	25.69	26.83	28.37
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.13	3.85	4.07	4.20	4.36	4.57
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.67	0.75	0.77	0.79	0.80	0.83
NE	WS : ASSOCIATED WIND SPEED (m/s)	18.64	23.91	25.48	26.39	27.55	29.11
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.00	3.79	4.02	4.16	4.33	4.57
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.62	0.75	0.79	0.81	0.84	0.88
ENE	WS : ASSOCIATED WIND SPEED (m/s)	16.03	21.85	23.59	24.60	25.88	27.62
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	2.88	3.64	3.87	4.00	4.16	4.39
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.62	0.74	0.77	0.79	0.82	0.85
E	WS : ASSOCIATED WIND SPEED (m/s)	15.18	20.42	21.97	22.88	24.02	25.58
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	2.16	3.13	3.42	3.58	3.80	4.08
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.52	0.69	0.74	0.77	0.81	0.86
ESE	WS : ASSOCIATED WIND SPEED (m/s)	14.97	21.62	23.61	24.77	26.23	28.21
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.00	3.79	4.03	4.17	4.35	4.59
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.55	0.68	0.72	0.75	0.77	0.81
SE	WS : ASSOCIATED WIND SPEED (m/s)	15.76	21.95	23.79	24.86	26.21	28.05
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.26	4.25	4.54	4.72	4.93	5.23
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.42	0.61	0.66	0.70	0.74	0.79
SSE	WS : ASSOCIATED WIND SPEED (m/s)	15.56	22.22	24.21	25.37	26.83	28.81
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.43	4.43	4.73	4.91	5.12	5.42
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.53	0.63	0.66	0.68	0.70	0.73

Continue …

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		Return Period (Years)					
Dir	Parameter	1	10	20	30	50	100
S	WS : ASSOCIATED WIND SPEED (m/s)	17.52	24.43	26.48	27.68	29.19	31.24
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.87	4.80	5.08	5.24	5.44	5.72
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.32	0.51	0.57	0.61	0.65	0.70
SSW	WS : ASSOCIATED WIND SPEED (m/s)	16.46	23.97	26.21	27.52	29.17	31.41
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.53	4.74	5.09	5.30	5.57	5.93
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.43	0.58	0.62	0.65	0.68	0.73
SW	WS : ASSOCIATED WIND SPEED (m/s)	17.31	24.50	26.63	27.88	29.45	31.58
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.89	5.32	5.74	5.99	6.30	6.72
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.40	0.61	0.68	0.72	0.76	0.83
WSW	WS : ASSOCIATED WIND SPEED (m/s)	16.46	23.97	26.21	27.52	29.17	31.41
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	3.53	4.74	5.09	5.30	5.57	5.93
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.43	0.58	0.62	0.65	0.68	0.73
W	WS : ASSOCIATED WIND SPEED (m/s)	16.17	24.08	26.43	27.81	29.54	31.88
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	2.00	2.79	3.02	3.16	3.33	3.57
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.40	0.62	0.69	0.73	0.78	0.84
WNW	WS : ASSOCIATED WIND SPEED (m/s)	12.57	19.24	21.23	22.39	23.85	25.83
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	2.33	2.66	2.76	2.82	2.89	2.99
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.30	0.49	0.54	0.58	0.62	0.67
NW	WS : ASSOCIATED WIND SPEED (m/s)	13.50	19.29	21.02	22.02	23.29	25.00
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	1.46	2.01	2.17	2.27	2.39	2.55
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.43	0.64	0.70	0.73	0.78	0.84
NNW	WS : ASSOCIATED WIND SPEED (m/s)	15.41	21.71	23.58	24.68	26.06	27.94
	Hs: SIGNIFICANT WAVE HEIGHT (m) IN THE SAME DIRECTION	2.38	2.82	2.95	3.03	3.12	3.26
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.61	0.72	0.75	0.77	0.79	0.82

Source: Measured data in Campos Basin in the period from 1991 to 1995 (PROCAP1, PROCAP2) and 2004 to 2009 (OCEANOP). Ref. [3].

Observation: The current associated value Cs was calculated using measured data from Intermediate Central Region

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3.5.2 Joint Distribution of Wind Speed and Wind Direction

Speed ↓	Dir →	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%
0.0	1.0	130	154	165	122	144	116	122	137	151	137	97	116	98	88	91	106	1974	1.66
1.0	2.0	263	298	287	343	318	322	233	258	246	177	162	185	176	137	138	160	3703	3.11
2.0	3.0	518	610	625	819	790	563	385	487	431	351	319	253	267	194	214	289	7115	5.98
3.0	4.0	647	958	1082	1245	1147	790	582	710	626	451	389	319	277	184	180	299	9886	8.31
4.0	5.0	1022	1621	1600	1789	1553	1085	751	878	756	556	508	336	255	155	211	384	13460	11.32
5.0	6.0	987	2044	1869	1719	1381	894	753	931	734	515	455	288	177	94	159	316	13316	11.2
6.0	7.0	1247	2771	2437	1884	1330	904	815	904	805	523	454	306	141	67	105	312	15005	12.62
7.0	8.0	1311	3061	2265	1506	930	590	593	648	638	399	393	208	96	43	73	272	13026	10.95
8.0	9.0	1557	3531	2168	1120	650	525	397	510	540	389	327	262	113	26	60	237	12412	10.44
9.0	10.0	1187	2985	1696	664	332	232	222	304	319	236	238	161	48	23	29	179	8855	7.45
10.0	11.0	1039	2546	1305	458	197	156	131	177	238	180	209	140	52	18	19	125	6990	5.88
11.0	12.0	771	1654	754	224	95	99	62	127	127	124	144	87	30	14	7	87	4406	3.71
12.0	13.0	607	1077	467	95	66	43	38	75	75	96	90	64	15	4	2	54	2868	2.41
13.0	14.0	497	1408	448	123	61	41	30	50	101	90	127	96	35	4	1	48	3160	2.66
14.0	15.0	214	427	164	27	20	10	8	19	17	25	47	47	10	2	2	22	1061	0.89
15.0	16.0	127	499	117	18	5	8	3	8	7	25	46	63	23	1	0	20	970	0.82
16.0	17.0	57	120	31	9	1	2	2	4	3	8	22	17	7	0	1	9	293	0.25
17.0	18.0	24	136	30	3	0	1	1	3	2	6	15	11	8	0	0	10	250	0.21
18.0	19.0	8	63	6	1	0	0	1	5	1	2	4	4	13	0	0	1	109	0.09
19.0	20.0	1	25	6	0	0	0	0	2	1	0	1	0	4	0	0	0	40	0.03
20.0	21.0	0	6	0	0	0	0	0	1	0	0	0	1	1	0	0	0	9	0.01
21.0	22.0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	4	0
22.0	23.0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0
23.0	24.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq	----	12214	25997	17522	12170	9020	6381	5129	6239	5819	4290	4047	2964	1846	1054	1292	2930	118914	
%	----	10.27	21.86	14.74	10.23	7.59	5.37	4.31	5.25	4.89	3.61	3.4	2.49	1.55	0.89	1.09	2.46		
MHs	----	7.49	8.53	7.46	6.17	5.63	5.6	5.74	5.91	6.12	6.27	6.67	6.52	5.3	4.06	4.36	6.13		

Source: Measured data in Campos Basin in the period from 10/1986 to 05/2003. Ref. [4].

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4 TIDE

The water levels are regarded to the Reduction Level of DHN

Tidal Astron. Max. + Tidal Atm. Max.	1.75 m
Tidal Astronomical Maximum	1.30 m
Mean High Water Spring	1.10 m
Mean High Water	0.90 m
Mean Sea Level	0.50 m
Mean Low Water	0.20 m
Mean Low Water Spring	0.0 m
Tidal Astronomical Minimum	- 0.20 m
Tidal Astr. Min. + Tidal Atm. Min.	- 0.65 m
Band of Mean Variation	0.70 m
Band of Spring Variation	1.10 m
Band of maximum Variation	2.40 m

Sources: Tidal Tables for 1988 - DHN/DG-16-24
- PETROBRAS Technical Communication CT_038/1996 ("Análise da Variação do Nível do Mar da Bacia de Campos e do Porto de Macaé"). Ref. [5].

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5 WAVE

5.1 Characteristic Wave Parameters by Return Periods (Years)

5.1.1 Extreme wave parameters with Associated Wind and Current Conditions

		Return Period (Years)					
Dir	Parameter	1	10	20	30	50	100
N	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.44	4.74	4.82	4.87	4.93	5.01
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	8.80	9.00	9.30	9.30	9.30	9.50
	TZ: ZERO UP-CROSSING PERIOD (s)	6.53	6.67	6.88	6.88	6.88	7.03
	HMAX: MAXIMUM WAVE HEIGHT (m)	8.55	9.11	9.25	9.34	9.46	9.60
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.43	10.56	10.59	10.61	10.63	10.67
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	17.21	18.17	18.42	18.58	18.78	19.03
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.89	0.95	0.96	0.97	0.99	1.00
NNE	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.86	4.61	4.79	4.88	5.00	5.15
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	8.30	9.00	9.30	9.30	9.30	9.50
	TZ: ZERO UP-CROSSING PERIOD (s)	6.17	6.67	6.88	6.88	6.88	7.03
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.46	8.86	9.19	9.36	9.59	9.86
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.15	10.50	10.58	10.61	10.66	10.72
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	15.15	17.55	18.13	18.42	18.80	19.28
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.62	0.79	0.83	0.85	0.88	0.91
NE	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.56	4.89	4.98	5.04	5.10	5.18
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	9.00	9.30	9.50	9.50	9.80	9.80
	TZ: ZERO UP-CROSSING PERIOD (s)	6.67	6.88	7.03	7.03	7.24	7.24
	HMAX: MAXIMUM WAVE HEIGHT (m)	8.77	9.38	9.54	9.65	9.75	9.90
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.48	10.62	10.65	10.68	10.70	10.73
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	18.24	19.56	19.92	20.16	20.40	20.72
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.76	0.83	0.85	0.86	0.87	0.89
ENE	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.58	4.37	4.58	4.70	4.84	5.03
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	8.80	9.50	9.50	9.80	9.80	9.80
	TZ: ZERO UP-CROSSING PERIOD (s)	6.53	7.03	7.03	7.24	7.24	7.24
	HMAX: MAXIMUM WAVE HEIGHT (m)	6.89	8.37	8.77	8.98	9.25	9.61
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	9.98	10.38	10.48	10.53	10.59	10.67
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	18.24	19.56	19.92	20.16	20.40	20.72
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.76	0.83	0.85	0.86	0.87	0.89
E	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.72	4.34	4.51	4.60	4.72	4.87
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	9.50	10.00	10.00	10.25	10.25	10.50
	TZ: ZERO UP-CROSSING PERIOD (s)	7.03	7.39	7.39	7.56	7.56	7.74
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.12	8.28	8.60	8.77	8.99	9.27
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.05	10.36	10.44	10.48	10.53	10.59
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	12.72	15.52	16.28	16.71	17.24	17.93
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.64	0.77	0.80	0.82	0.84	0.87

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		Return Period (Years)					
Dir	Parameter	1	10	20	30	50	100
ESE	Hs: SIGNIFICANT WAVE HEIGHT (m)	3.56	4.67	5.00	5.20	5.44	5.77
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	9.50	9.80	9.80	10.30	10.30	10.30
	TZ: ZERO UP-CROSSING PERIOD (s)	7.03	7.24	7.24	7.60	7.60	7.60
	HMAX: MAXIMUM WAVE HEIGHT (m)	6.82	8.93	9.56	9.91	10.36	10.99
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	9.96	10.52	10.66	10.73	10.82	10.95
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	11.67	15.28	16.35	17.00	17.78	18.85
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.29	0.57	0.65	0.70	0.76	0.84
SE	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.81	5.72	5.97	6.12	6.29	6.53
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	10.80	11.00	11.30	11.50	11.30	11.50
	TZ: ZERO UP-CROSSING PERIOD (s)	7.96	8.10	8.31	8.45	8.31	8.45
	HMAX: MAXIMUM WAVE HEIGHT (m)	9.13	10.85	11.30	11.57	11.91	12.35
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	12.40	13.22	13.44	13.57	13.73	13.95
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	12.60	15.96	16.89	17.44	18.07	18.96
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.46	0.64	0.69	0.72	0.76	0.81
SSE	Hs: SIGNIFICANT WAVE HEIGHT (m)	4.84	5.92	6.18	6.32	6.49	6.70
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	12.30	13.00	13.50	13.50	13.80	13.50
	TZ: ZERO UP-CROSSING PERIOD (s)	9.02	9.52	9.88	9.88	10.09	9.88
	HMAX: MAXIMUM WAVE HEIGHT (m)	9.11	11.10	11.56	11.82	12.12	12.53
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	12.39	13.35	13.57	13.69	13.84	14.03
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	12.36	16.68	17.72	18.28	18.96	19.80
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.47	0.65	0.69	0.71	0.74	0.77
S	Hs: SIGNIFICANT WAVE HEIGHT (m)	5.14	6.19	6.48	6.64	6.84	7.10
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	12.80	13.30	13.50	13.80	14.00	14.30
	TZ: ZERO UP-CROSSING PERIOD (s)	9.38	9.73	9.88	10.09	10.23	10.44
	HMAX: MAXIMUM WAVE HEIGHT (m)	9.65	11.59	12.12	12.40	12.76	13.23
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	12.65	13.58	13.84	13.97	14.14	14.37
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	12.56	16.76	17.92	18.56	19.36	20.40
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.33	0.54	0.60	0.63	0.67	0.72
SSW	Hs: SIGNIFICANT WAVE HEIGHT (m)	5.60	6.88	7.19	7.37	7.58	7.85
	TP: PEAK PERIOD ASSOCIATED TO Hs (s)	13.30	13.50	13.50	13.80	14.00	14.00
	TZ: ZERO UP-CROSSING PERIOD (s)	9.73	9.88	9.88	10.09	10.23	10.23
	HMAX: MAXIMUM WAVE HEIGHT (m)	10.49	12.87	13.45	13.76	14.14	14.65
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	13.05	14.20	14.47	14.63	14.81	15.05
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	11.40	16.52	17.76	18.48	19.32	20.40
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.47	0.63	0.66	0.68	0.71	0.74

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Dir	Parameter		Return Period (Years) 1	10	20	30	50	100
SW	Hs:	SIGNIFICANT WAVE HEIGHT (m)	6.37	7.16	7.37	7.49	7.64	7.84
	TP:	PEAK PERIOD ASSOCIATED TO Hs (s)	13.80	14.80	14.80	15.00	15.00	15.50
	TZ:	ZERO UP-CROSSING PERIOD (s)	10.09	10.80	10.80	10.94	10.94	11.29
	HMAX:	MAXIMUM WAVE HEIGHT (m)	11.90	13.31	13.70	13.91	14.19	14.52
	THMAX:	PERIOD ASSOCIATED TO HMAX (s)	13.73	14.41	14.59	14.69	14.83	14.99
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION		15.52	18.13	18.82	19.22	19.71	20.37
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION		0.52	0.68	0.72	0.75	0.78	0.82
WSW	Hs:	SIGNIFICANT WAVE HEIGHT (m)	4.09	5.60	5.98	6.20	6.46	6.80
	TP:	PEAK PERIOD ASSOCIATED TO Hs (s)	10.80	12.50	12.80	13.30	13.50	14.00
	TZ:	ZERO UP-CROSSING PERIOD (s)	7.96	9.17	9.38	9.73	9.88	10.23
	HMAX:	MAXIMUM WAVE HEIGHT (m)	7.77	10.53	11.23	11.61	12.08	12.69
	THMAX:	PERIOD ASSOCIATED TO HMAX (s)	10.23	10.86	10.99	11.06	11.14	11.24
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION		7.43	14.60	16.41	17.45	18.69	20.30
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION		0.41	0.64	0.70	0.73	0.77	0.82
W	Hs:	SIGNIFICANT WAVE HEIGHT (m)	3.21	3.57	3.67	3.72	3.79	3.89
	TP:	PEAK PERIOD ASSOCIATED TO Hs (s)	8.00	8.00	8.00	8.00	8.00	8.50
	TZ:	ZERO UP-CROSSING PERIOD (s)	5.95	5.95	5.95	5.95	5.95	6.31
	HMAX:	MAXIMUM WAVE HEIGHT (m)	6.22	6.91	7.11	7.21	7.34	7.51
	THMAX:	PERIOD ASSOCIATED TO HMAX (s)	9.77	9.99	10.05	10.07	10.11	10.16
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION		13.45	15.07	15.52	15.74	16.06	16.51
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION		0.59	0.71	0.75	0.76	0.79	0.82
WNW	Hs:	SIGNIFICANT WAVE HEIGHT (m)	3.21	3.57	3.67	3.72	3.79	3.89
	TP:	PEAK PERIOD ASSOCIATED TO Hs (s)	8.00	8.00	8.00	8.00	8.00	8.50
	TZ:	ZERO UP-CROSSING PERIOD (s)	5.95	5.95	5.95	5.95	5.95	6.31
	HMAX:	MAXIMUM WAVE HEIGHT (m)	6.22	6.91	7.11	7.21	7.34	7.51
	THMAX:	PERIOD ASSOCIATED TO HMAX (s)	9.77	9.99	10.05	10.07	10.11	10.16
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION		13.45	15.07	15.52	15.74	16.06	16.51
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION		0.59	0.71	0.75	0.76	0.79	0.82
NW	Hs:	SIGNIFICANT WAVE HEIGHT (m)	3.21	3.57	3.67	3.72	3.79	3.89
	TP:	PEAK PERIOD ASSOCIATED TO Hs (s)	8.00	8.00	8.00	8.00	8.00	8.50
	TZ:	ZERO UP-CROSSING PERIOD (s)	5.95	5.95	5.95	5.95	5.95	6.31
	HMAX:	MAXIMUM WAVE HEIGHT (m)	6.22	6.91	7.11	7.21	7.34	7.51
	THMAX:	PERIOD ASSOCIATED TO HMAX (s)	9.77	9.99	10.05	10.07	10.11	10.16
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION		13.45	15.07	15.52	15.74	16.06	16.51
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION		0.59	0.71	0.75	0.76	0.79	0.82
NNW	Hs:	SIGNIFICANT WAVE HEIGHT (m)	3.20	3.86	4.01	4.09	4.18	4.31
	TP:	PEAK PERIOD ASSOCIATED TO Hs (s)	7.25	7.75	8.00	8.00	8.25	8.25
	TZ:	ZERO UP-CROSSING PERIOD (s)	5.41	5.77	5.95	5.95	6.13	6.13
	HMAX:	MAXIMUM WAVE HEIGHT (m)	6.25	7.49	7.76	7.92	8.09	8.32
	THMAX:	PERIOD ASSOCIATED TO HMAX (s)	9.78	10.15	10.23	10.27	10.31	10.37
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION		13.45	15.07	15.52	15.74	16.06	16.51
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION		0.59	0.71	0.75	0.76	0.79	0.82

Source: Measured data in Campos Basin (PROCAP1, PROCAP2, P18, P25 and OCEANOP) and BOMOS model data (Brazil Offshore Meteorological and Oceanographic Study), OceanWeather Inc. Ref. [6].

Observation: The current associated value Cs was calculated using measured data from Intermediate Central Region

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5.1.2 Extreme Hs x Tp table and curves with waves approaching from N

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.5	3.8	4.0	4.2	4.3	4.4	4.4	4.3	0.0	0.0	0.0
10	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.7	3.9	4.2	4.4	4.5	4.7	4.7	4.7	4.5	3.3	0.0
20	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.8	4.0	4.2	4.4	4.6	4.7	4.8	4.8	4.7	4.0	0.0
30	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.8	4.0	4.2	4.4	4.6	4.8	4.9	4.9	4.8	4.2	0.0
50	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.1	4.3	4.5	4.6	4.8	4.9	4.9	4.9	4.4	0.0
100	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.1	4.3	4.5	4.7	4.8	5.0	5.0	5.0	4.6	0.0

5.1.3 Extreme Hs x Tp table and curves with waves approaching from NNE

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.7	3.2	3.4	3.7	3.8	3.9	0.0	0.0	0.0	0.0	0.0
10	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	1.8	2.4	2.9	3.3	3.7	4.0	4.2	4.4	4.6	4.6	4.6	0.0	0.0	0.0
20	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	2.0	2.6	3.1	3.5	3.8	4.1	4.3	4.6	4.7	4.8	4.8	4.7	0.0	0.0
30	HsTotal(m)	0.0	0.0	0.0	0.0	1.3	2.1	2.7	3.1	3.6	3.9	4.1	4.4	4.6	4.8	4.9	4.9	4.8	0.0	0.0
50	HsTotal(m)	0.0	0.0	0.0	0.0	1.6	2.1	2.7	3.2	3.6	4.0	4.2	4.5	4.7	4.9	5.0	5.0	5.0	4.6	0.0
100	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.7	4.1	4.3	4.6	4.8	5.0	5.1	5.2	5.1	5.0	0.0

5.1.4 Extreme Hs x Tp table and curves with waves approaching from NE

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.5	3.8	4.0	4.2	4.3	4.5	4.6	4.5	4.3	3.9	3.5
10	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.7	3.9	4.1	4.3	4.5	4.7	4.8	4.9	4.8	4.5	4.0
20	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.7	4.0	4.2	4.4	4.6	4.8	4.9	5.0	4.9	4.6	4.2
30	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.0	5.0	4.7	4.2
50	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.0	4.2	4.5	4.6	4.8	5.0	5.1	5.1	4.8	4.3
100	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.0	4.3	4.5	4.7	4.9	5.0	5.2	5.2	4.9	4.4

11.5	12.0	12.5	13.0	13.5	14.0	14.5
2.9	0.0	0.0	0.0	0.0	0.0	0.0
3.6	3.2	2.7	2.1	0.0	0.0	0.0
3.8	3.4	2.9	2.4	0.0	0.0	0.0
3.8	3.5	3.1	2.6	2.0	0.0	0.0
3.9	3.6	3.2	2.8	2.3	0.0	0.0
4.0	3.7	3.3	3.0	2.5	2.0	0.0

Source: Measured data in Campos Basin (PROCAP1, PROCAP2, P18 and P25) and BOMOS model data (Brazil Offshore Meteorological and Oceanographic Study), OceanWeather Inc. Ref. [6].

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5.1.5 Extreme Hs x Tp table and curve with waves approaching from ENE

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	3.1	3.2	3.4	3.5	3.5	3.6	3.6	3.6	3.5	3.4	3.3
10	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.8	4.0	4.1	4.2	4.3	4.3	4.4	4.4	4.4	4.4	4.3
20	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.2	4.3	4.4	4.5	4.5	4.6	4.6	4.6	4.6	4.5
30	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.3	4.4	4.5	4.6	4.6	4.7	4.7	4.7	4.7	4.7
50	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.4	4.5	4.6	4.7	4.8	4.8	4.8	4.8	4.8	4.8
100	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	4.7	4.8	4.9	4.9	5.0	5.0	5.0	5.0	5.0

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.2	4.1	4.0	3.7	0.0	0.0	0.0	0.0	0.0
4.5	4.4	4.3	4.1	3.8	0.0	0.0	0.0	0.0
4.6	4.5	4.4	4.2	4.0	3.6	0.0	0.0	0.0
4.8	4.7	4.6	4.5	4.3	4.0	3.4	0.0	0.0
5.0	4.9	4.8	4.7	4.5	4.3	4.0	3.2	0.0

5.1.6 Extreme Hs x Tp table and curve with waves approaching from E

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.3	3.4	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.6
10	HsTotal(m)	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.7	4.0	4.1	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3
20	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.1	3.8	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.5	4.5	4.5
30	HsTotal(m)	0.4	0.7	1.0	1.3	1.6	2.1	2.6	3.2	3.8	4.2	4.4	4.4	4.5	4.5	4.6	4.6	4.6	4.6	4.6
50	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.7	4.4	4.5	4.5	4.6	4.6	4.7	4.7	4.7	4.7	4.7
100	HsTotal(m)	0.4	0.7	0.9	1.3	1.7	2.1	2.5	3.2	3.8	4.5	4.6	4.7	4.7	4.8	4.8	4.9	4.9	4.9	4.9

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0
3.6	3.4	3.3	3.1	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.3	4.2	4.1	4.0	3.9	3.7	3.4	3.0	0.0	0.0	0.0	0.0
4.4	4.4	4.3	4.2	4.1	3.9	3.7	3.4	3.0	0.0	0.0	0.0
4.6	4.5	4.4	4.4	4.2	4.1	3.9	3.7	3.3	0.0	0.0	0.0
4.7	4.6	4.6	4.5	4.4	4.3	4.1	3.9	3.6	3.1	0.0	0.0
4.8	4.8	4.8	4.7	4.6	4.5	4.3	4.1	3.9	3.5	2.9	0.0

Source: Measured data in Campos Basin (PROCAP1, PROCAP2, P18 and P25) and BOMOS model data (Brazil Offshore Meteorological and Oceanographic Study), OceanWeather Inc. Ref. [6].

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5.1.7 Extreme Hs x Tp table and curve with waves approaching from ESE

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	3.0	3.2	3.3	3.4	3.5	3.5	3.6	3.6	3.5	3.5
10	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.8	4.1	4.3	4.4	4.5	4.6	4.6	4.7	4.7	4.7	4.6
20	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	4.6	4.7	4.8	4.9	5.0	5.0	5.0	5.0	5.0
30	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	4.8	4.9	5.0	5.1	5.1	5.2	5.2	5.2	5.2
50	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	5.0	5.1	5.2	5.3	5.4	5.4	5.4	5.4	5.4
100	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.4	5.5	5.6	5.7	5.7	5.8	5.8	5.8

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0
3.4	3.3	3.2	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.6	4.5	4.4	4.3	4.1	4.0	3.8	3.5	3.1	0.0	0.0	0.0	0.0	0.0
5.0	4.9	4.8	4.7	4.5	4.4	4.2	3.9	3.6	3.2	0.0	0.0	0.0	0.0
5.1	5.1	5.0	4.9	4.7	4.6	4.4	4.2	3.9	3.6	3.1	0.0	0.0	0.0
5.4	5.3	5.3	5.1	5.0	4.9	4.7	4.4	4.2	3.9	3.5	3.0	0.0	0.0
5.7	5.7	5.6	5.5	5.4	5.2	5.1	4.9	4.5	4.3	4.0	3.6	3.0	0.0

5.1.8 Extreme Hs x Tp table and curve with waves approaching from SE

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.1	4.3	4.4	4.5	4.6	4.7	4.7	4.8	4.8	4.8
10	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.7	4.5	5.1	5.3	5.4	5.5	5.5	5.6	5.7	5.7	5.7
20	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.4	5.1	5.5	5.6	5.7	5.8	5.8	5.9	5.9	6.0
30	HsTotal(m)	0.4	0.7	1.0	1.2	1.7	2.1	2.6	3.1	3.7	4.3	5.0	5.6	5.7	5.8	5.9	6.0	6.0	6.1	6.1
50	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.7	5.9	6.0	6.1	6.2	6.2	6.3	6.3
100	HsTotal(m)	0.4	0.7	0.9	1.2	1.6	2.0	2.5	3.1	3.7	4.4	5.2	6.0	6.1	6.2	6.3	6.4	6.4	6.5	6.5

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5
4.8	4.8	4.7	4.6	4.5	4.3	4.1	3.9	3.5	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.7	5.7	5.7	5.6	5.6	5.5	5.3	5.2	5.0	4.7	4.5	4.1	3.4	0.0	0.0	0.0	0.0
6.0	6.0	5.9	5.9	5.8	5.7	5.6	5.5	5.4	5.1	4.8	4.6	4.1	3.4	0.0	0.0	0.0
6.1	6.1	6.1	6.0	6.0	5.9	5.8	5.7	5.5	5.3	5.1	4.8	4.4	3.9	0.0	0.0	0.0
6.3	6.3	6.3	6.2	6.2	6.1	6.0	5.9	5.8	5.6	5.3	5.1	4.8	4.4	3.7	0.0	0.0
6.5	6.5	6.5	6.5	6.4	6.4	6.3	6.2	6.0	5.9	5.7	5.4	5.1	4.8	4.3	3.6	0.0

Source: Measured data in Campos Basin (PROCAP1, PROCAP2, P18 and P25) and BOMOS model data (Brazil Offshore Meteorological and Oceanographic Study), OceanWeather Inc. Ref. [6].

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5.1.9 Extreme Hs x Tp table and curve with waves approaching from SSE

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	3.6	3.9	4.1	4.3	4.5	4.6	4.7
10	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	2.7	3.2	3.8	4.3	4.5	4.8	5.0	5.2	5.3	5.5	5.6	5.7	5.7
20	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	2.1	2.7	3.2	3.8	4.5	4.9	5.1	5.3	5.4	5.6	5.7	5.8	5.9	6.0
30	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.8	4.5	5.0	5.3	5.5	5.6	5.7	5.8	5.9	6.0	6.1
50	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.4	5.6	5.8	5.9	6.0	6.1	6.2	6.3
100	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.7	5.8	6.0	6.1	6.2	6.3	6.4	6.5

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5
4.8	4.8	4.8	4.8	4.8	4.7	4.6	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.7	5.5	5.3	5.0	4.3	0.0	0.0	0.0
6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.1	6.1	6.0	5.9	5.7	5.5	5.2	4.7	0.0	0.0
6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.2	6.1	6.0	5.9	5.7	5.5	5.2	4.3	0.0
6.3	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.3	6.2	6.0	5.8	5.6	5.2	0.0
6.5	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.6	6.5	6.4	6.3	6.2	6.0	5.7	5.4

5.1.10 Extreme Hs x Tp table and curve with waves approaching from S

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	2.6	3.0	3.3	3.6	3.8	4.1	4.3	4.4	4.6	4.7	4.8	4.9	5.0
10	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	4.8	5.0	5.2	5.3	5.5	5.7	5.8	5.9	6.0
20	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.7	4.5	5.0	5.2	5.4	5.5	5.8	5.9	6.0	6.1	6.2
30	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.6	3.2	3.8	4.3	5.0	5.4	5.6	5.7	5.9	6.0	6.2	6.3	6.4
50	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.6	3.2	3.8	4.5	5.2	5.6	5.7	5.9	6.1	6.2	6.3	6.5	6.5
100	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.5	3.2	3.8	4.5	5.0	5.7	5.9	6.1	6.3	6.4	6.6	6.6	6.7

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0
5.1	5.1	5.1	5.1	5.1	5.0	4.9	4.8	4.5	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0	6.1	6.2	6.2	6.2	6.2	6.2	6.1	6.0	5.9	5.7	5.5	5.0	4.1	0.0	0.0	0.0	0.0
6.3	6.4	6.4	6.5	6.5	6.5	6.5	6.4	6.4	6.3	6.1	5.9	5.6	5.2	4.4	0.0	0.0	0.0
6.5	6.5	6.6	6.6	6.6	6.7	6.6	6.6	6.6	6.5	6.3	6.2	5.9	5.6	5.0	0.0	0.0	0.0
6.6	6.7	6.7	6.8	6.8	6.9	6.8	6.8	6.8	6.7	6.6	6.5	6.3	6.0	5.6	5.0	0.0	0.0
6.9	6.9	7.0	7.1	7.1	7.1	7.1	7.1	7.1	7.0	6.9	6.8	6.6	6.4	6.1	5.7	5.0	0.0

Source: Measured data in Campos Basin (PROCAP1, PROCAP2, P18 and P25) and BOMOS model data (Brazil Offshore Meteorological and Oceanographic Study), OceanWeather Inc. Ref. [6].

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5.1.11 Extreme Hs x Tp table and curve with waves approaching from SSW

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.5	4.9	5.1
10	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	4.6	5.1	5.5	5.8	6.0	6.3	6.4
20	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	4.6	5.1	5.5	5.8	6.1	6.4	6.6	6.7
30	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	4.3	4.9	5.4	5.7	6.1	6.3	6.5	6.8	6.9
50	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.8	5.2	5.7	6.0	6.3	6.5	6.8	7.0	7.1
100	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	4.5	5.2	5.6	6.0	6.3	6.6	6.8	7.0	7.2	7.4

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0
5.3	5.5	5.6	5.6	5.6	5.5	5.4	5.2	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.6	6.7	6.8	6.9	6.9	6.9	6.9	6.8	6.7	6.5	6.3	5.9	5.3	0.0	0.0	0.0
6.9	7.0	7.1	7.2	7.2	7.2	7.2	7.1	7.0	6.9	6.7	6.5	6.0	5.4	0.0	0.0
7.1	7.2	7.3	7.3	7.4	7.4	7.4	7.3	7.2	7.1	6.9	6.7	6.4	5.9	0.0	0.0
7.3	7.4	7.5	7.5	7.6	7.6	7.6	7.5	7.5	7.4	7.2	7.0	6.8	6.3	5.7	0.0
7.5	7.6	7.7	7.8	7.8	7.9	7.8	7.8	7.8	7.7	7.5	7.4	7.1	6.8	6.4	5.7

5.1.12 Extreme Hs x Tp table and curve with waves approaching from SW

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	2.1	2.7	3.2	3.6	4.0	4.3	4.6	4.9	5.0	5.3	5.5	5.6	5.8	6.0
10	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	5.0	5.3	5.5	5.7	5.9	6.1	6.3	6.5	6.6
20	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.5	5.7	5.9	6.2	6.4	6.5	6.7	6.8
30	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.1	3.8	4.5	5.1	5.5	5.9	6.1	6.3	6.5	6.6	6.8	6.9
50	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.7	4.3	5.2	5.8	6.0	6.2	6.4	6.6	6.7	6.9	7.0
100	HsTotal(m)	0.4	0.7	0.9	1.3	1.7	2.1	2.7	3.2	3.8	4.4	5.1	5.8	6.1	6.3	6.5	6.7	6.9	7.1	7.2

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0
6.1	6.2	6.2	6.3	6.4	6.4	6.4	6.3	6.2	6.1	5.9	5.5	0.0	0.0	0.0	0.0	0.0	0.0
6.7	6.8	7.0	7.0	7.1	7.1	7.2	7.2	7.1	7.1	7.0	6.8	6.7	6.3	5.8	0.0	0.0	0.0
6.9	7.0	7.1	7.2	7.3	7.3	7.4	7.4	7.4	7.3	7.2	7.1	7.0	6.7	6.4	5.7	0.0	0.0
7.0	7.2	7.2	7.3	7.4	7.4	7.5	7.5	7.5	7.5	7.4	7.3	7.2	7.0	6.6	6.2	0.0	0.0
7.2	7.3	7.4	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.3	7.2	6.9	6.6	5.8	0.0
7.3	7.4	7.5	7.6	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.6	7.5	7.3	7.0	6.5	0.0

Source: Measured data in Campos Basin (PROCAP1, PROCAP2, P18 and P25) and BOMOS model data (Brazil Offshore Meteorological and Oceanographic Study), OceanWeather Inc. Ref. [6].

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5.1.13 Extreme Hs x Tp table and curve with waves approaching from WSW

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.4	2.7	2.9	3.2	3.4	3.6	3.7	3.9	4.0	4.0	4.1	4.1
10	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.1	4.3	4.5	4.7	4.8	5.0	5.1	5.3	5.3	5.5
20	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.4	4.6	4.7	5.0	5.1	5.3	5.4	5.6	5.7	5.7
30	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	4.7	4.9	5.1	5.3	5.4	5.6	5.7	5.8	5.9
50	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.0	5.2	5.5	5.6	5.8	5.9	6.0	6.1
100	HsTotal(m)	0.4	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	5.2	5.4	5.5	5.7	5.8	6.0	6.1	6.3	6.4

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0
4.1	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.5	5.6	5.6	5.6	5.6	5.5	5.3	4.9	0.0	0.0	0.0	0.0
5.8	5.9	6.0	6.0	6.0	5.9	5.9	5.7	5.4	0.0	0.0	0.0
6.0	6.1	6.2	6.2	6.2	6.2	6.1	6.0	5.9	5.5	0.0	0.0
6.2	6.3	6.4	6.4	6.5	6.5	6.4	6.4	6.3	6.0	5.6	0.0
6.5	6.6	6.7	6.7	6.8	6.8	6.8	6.8	6.7	6.6	6.4	6.0

5.1.14 Extreme Hs x Tp table and curve with waves approaching from W,WNW e NW

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.3	10.5	11.0
1	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.0	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.0	3.0	2.9
10	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.4	3.5	3.5	3.6	3.6	3.6	3.6	3.5	3.5	3.5	3.4	3.4
20	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.5
30	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6
50	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.6	3.7	3.7	3.8	3.8	3.8	3.8	3.8	3.7	3.7	3.7	3.7
100	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.7	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8

11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5
2.8	2.7	2.5	2.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.3	3.2	3.1	3.0	2.9	2.8	2.6	2.4	2.0	0.0	0.0	0.0	0.0
3.4	3.4	3.3	3.2	3.1	2.9	2.8	2.6	2.4	2.1	0.0	0.0	0.0
3.5	3.5	3.3	3.3	3.1	3.1	2.9	2.8	2.5	2.3	1.8	0.0	0.0
3.6	3.5	3.4	3.4	3.2	3.2	3.0	2.9	2.7	2.5	2.3	0.0	0.0
3.7	3.6	3.6	3.5	3.4	3.3	3.2	3.1	2.9	2.8	2.5	2.3	1.9

5.1.15 Extreme Hs x Tp table and curve with waves approaching from NNW

Return_Period	Tp(s)	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
1	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.8	3.1	3.2	3.2	0.0	0.0	0.0
10	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	2.0	2.5	2.9	3.2	3.5	3.7	3.8	3.9	3.7	0.0
20	HsTotal(m)	0.0	0.0	0.0	0.0	1.3	2.1	2.6	3.0	3.4	3.6	3.8	4.0	4.0	3.9	0.0
30	HsTotal(m)	0.0	0.0	0.0	0.0	1.6	2.1	2.7	3.1	3.4	3.7	3.9	4.0	4.1	4.1	0.0
50	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.5	3.7	4.0	4.1	4.2	4.2	3.9
100	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.6	3.8	4.1	4.2	4.3	4.3	4.2

Source: Measured data in Campos Basin (PROCAP1, PROCAP2, P18 and P25) and BOMOS model data (Brazil Offshore Meteorological and Oceanographic Study), OceanWeather Inc. Ref. [6].

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5.2 JONSWAP Wave Spectrum for Campos Basin and Relation Tz / Tp

The JONSWAP Wave Spectrum, adjusted for Campos Basin wave conditions, is:

$$S(f) = \frac{5}{16} * Hs^2 * Tp * \left(f_p / f\right)^5 * (1 - 0.287 * \ln\gamma) * \exp\left[-1{,}25 * \left(\frac{f}{f_p}\right)^{-4}\right] * \gamma^{\exp\left[-(f-f_p)^2/(2*\sigma^2*f_p^2)\right]}$$

$$\sigma = \begin{cases} \sigma_a = 0{,}07, \text{ for } & f \le f_p \\ \sigma_b = 0{,}09, \text{ for } & f > f_p \end{cases}$$

where: f f - frequency (Hz)

f_p f_p - peak frequency (Hz)

γ - peakedness parameter or peak enhancement factor

σ - shape parameter or peak width

The gamma parameter for Campos Basin wave data is adjusted by the expression below:

$$\gamma = 6.4 \times \mathrm{Tp}^{(-0.491)}$$

Obs: The formulation above does not have the α (form parameter or Phillips constant) explicitly written in the formula. It is written in such way that the parameter α is included in the JONSWAP formulation above.

Relation between T_z and T_p.

Mean Zero-crossing period : $T_z = \frac{1}{f_p}\sqrt{\frac{5+\gamma}{10.89+\gamma}}$ or $T_z = T_p\sqrt{\frac{5+\gamma}{10.89+\gamma}}$

where: $f_p = \frac{1}{T_p}$ and T_p - peak period.

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5.3 Distribution of Individual Wave Heights and Associated Periods

Period → Height ↓	0 – 2	2 – 4	4 - 6	6 - 8	8 - 10	10-12	12-14	14-16	16-18	18-20	20-22	22-24	Total	%	Tmed
0.0-0.5	85171	166779	50632	10991	2167	425	110	25	13	7	5	0	316325	17.27	3.31
0.5-1.0	11867	208032	229458	111698	40289	11835	2862	547	132	49	17	0	616786	33.70	5.38
1.0-1.5	322	47777	164356	145537	73169	27184	7458	1481	271	55	32	0	467642	25.53	6.91
1.5-2.0	6	6545	64094	85930	53460	23925	7570	1592	266	41	25	0	243454	13.30	7.77
2.0-2.5	0	742	19753	38224	27785	14938	5669	1263	190	37	13	2	108616	5.93	8.41
2.5-3.0	0	82	5311	14769	12522	8057	3290	798	149	11	3	0	44992	2.46	8.96
3.0-3.5	0	6	1277	5433	5522	4149	1907	510	90	10	3	0	18907	1.03	9.50
3.5-4.0	0	1	309	2006	2350	1963	987	265	51	3	0	0	7935	.43	9.90
4.0-4.5	0	0	69	733	1117	973	535	168	33	1	0	0	3629	.20	10.32
4.5-5.0	0	0	12	234	513	507	321	60	11	0	0	0	1658	.09	10.68
5.0-5.5	0	0	4	83	230	271	165	52	6	0	0	0	811	.04	11.31
5.5-6.0	0	0	1	30	115	123	86	23	1	0	0	0	379	.02	10.98
6.0-6.5	0	0	0	8	39	69	35	12	0	0	0	0	163	.00	12.14
6.5-7.0	0	0	0	3	21	26	16	2	0	0	0	0	68	.00	11.16
7.0-7.5	0	0	0	0	5	18	15	2	0	0	0	0	40	.00	11.93
7.5-8.0	0	0	0	2	3	3	7	0	0	0	0	0	15	.00	11.60
8.0-8.5	0	0	0	0	2	3	1	0	0	1	0	0	7	.00	10.34
8.5-9.0	0	0	0	0	0	2	2	0	0	0	0	0	4	.00	12.00
9.0-9.5	0	0	0	0	1	2	1	0	0	0	0	0	4	.00	11.25
9.5-10.0	0	0	0	0	1	1	2	0	0	0	0	0	4	.00	11.50
10.0-10.5	0	0	0	0	0	2	0	0	0	0	0	0	2	.00	13.00
10.5-11.0	0	0	0	0	0	0	0	0	0	0	0	0	.00	-	-
11.0-11.5	0	0	0	0	0	0	0	0	0	0	0	0	.00	-	-
11.5-12.0	0	0	0	0	0	1	0	0	0	0	0	0	1	.00	12.00
Total	97366	429964	535276	415681	219311	94475	31041	6800	1213	215	98	2	1831442	100.00	
%	5.32	23.48	29.23	22.70	11.97	5.16	1.69	.37	.07	.01	.00	.00			
Mean Height	.31	.64	1.06	1.39	1.60	1.81	2.01	2.10	2.02	1.62	1.49	2.17			

Source: Measured data in Campos Basin (GAROUPA, PROCAP1, and PROCAP2)
2295 wave staff time series of 1539 sec plus 7531 buoy time series of 1024 sec = 11243749 sec.
Ref. [7].

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5.4 Distribution of Individual Wave Heights and Associated Directions

Direction→ Height ↓		N	NE	5.4.1.1.1	SE	S	SW	W	NW	Total	%	Mean DIR
0,0	0,5	30998	122454	66303	43479	32341	14994	4201	1556	316325	17.27	74.41
0,5	1,0	51271	211720	122424	90844	96854	34707	6619	2347	616786	33.70	87.22
1,0	1,5	29444	138187	89299	73613	95646	35540	4388	1525	467642	25.53	104.50
1,5	2,0	13001	64527	46014	38787	53424	24578	2396	727	243454	13.30	115.20
2,0	2,5	4926	25973	19828	17504	23839	15105	1185	256	108616	5.93	125.47
2,5	3,0	1795	9334	7207	7365	10186	8476	547	82	44992	2.46	138.48
3,0	3,5	653	3063	2534	3290	4331	4769	245	22	18907	1.03	151.93
3,5	4,0	212	1043	833	1396	1811	2537	101	2	7935	.43	163.64
4,0	4,5	76	354	280	587	850	1430	51	1	3629	.20	176.94
4,5	5,0	35	102	78	256	381	775	31	0	1658	.09	189.39
5,0	5,5	11	36	23	95	199	438	9	0	811	.04	196.53
5,5	6,0	2	12	8	33	88	229	7	0	379	.02	203.28
6,0	6,5	0	4	1	10	41	104	3	0	163	.00	206.60
6,5	7,0	0	0	1	4	14	49	0	0	68	.00	104.76
7,0	7,5	0	2	1	2	5	28	2	0	40	.00	211.91
7,5	8,0	0	0	0	1	4	10	0	0	15	.00	205.70
8,0	8,5	0	0	0	1	2	4	0	0	7	.00	199.21
8,5	9,0	0	0	0	0	1	3	0	0	4	.00	202.52
9,0	9,5	0	0	0	2	0	2	0	0	4	.00	175.00
9,5	10,0	0	0	1	1	0	2	0	0	4	.00	162.15
10,0	10,5	0	0	0	0	0	2	0	0	2	.00	212.60
10,5	11,0	0	0	0	0	0	0	0	0	0	.00	-
11,0	11,5	0	0	0	0	0	0	0	0	0	.00	-
11,5	12,0	0	0	0	0	0	1	0	0	1	.00	212.00
Total		132424	576811	354835	277270	320017	143783	19785	6518	1831442	100.00	
%		7.23	31.50	19.37	15.14	17.47	7.85	1.08	.36			
Mean Hs		.94	1.00	0.63	1.15	1.27	1.49	1.09	.96			

Source: Measured data in Campos Basin (GAROUPA, PROCAP1, and PROCAP2)
2295 wave staff time series of 1539 sec plus 7531 buoy time series of 1024 sec = 11243749 sec.
Ref. [7].

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5.5 Total Significant Wave Heights x Primary Spectral Peak Directions *

Hs↓	Dir→	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%	MDir	MHs
0.0	0.5	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	3	0.02	139	0.24
0.5	1.0	10	18	40	54	39	25	32	21	31	12	7	1	1	1	0	1	293	2.15	98.3	0.9
1.0	1.5	133	326	479	490	319	227	272	281	321	168	71	15	7	3	6	7	3125	23	93.5	1.31
1.5	2.0	259	535	720	636	441	236	324	438	532	329	167	48	13	5	2	11	4696	34.5	95.2	1.75
2.0	2.5	241	291	358	281	246	159	226	240	393	343	207	30	2	1	2	3	3023	22.2	115	2.23
2.5	3.0	98	132	112	79	121	92	149	142	180	222	148	9	0	0	0	1	1485	10.9	139	2.72
3.0	3.5	34	35	24	29	20	33	66	61	64	137	91	9	0	0	0	1	604	4.44	169	3.21
3.5	4.0	4	7	5	4	3	9	22	28	27	60	52	3	0	0	0	0	224	1.65	186	3.72
4.0	4.5	0	0	1	0	0	2	4	13	13	37	28	1	0	0	0	0	99	0.73	198	4.23
4.5	5.0	0	0	0	0	0	0	2	1	4	18	12	2	0	0	0	0	39	0.29	205	4.71
5.0	5.5	0	0	0	0	0	0	0	1	1	8	2	1	0	0	0	0	13	0.1	203	5.22
5.5	6.0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0.01	206	5.67
6.0	6.5	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0.01	211	6.24
6.5	7.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NaN	0
----	Total	779	1345	1739	1573	1189	783	1097	1227	1567	1338	785	119	23	10	10	24	13608			
----	%	5.72	9.88	12.8	11.6	8.74	5.75	8.06	9.02	11.5	9.83	5.77	0.87	0.17	0.07	0.07	0.18				
----	MHs	2.02	1.87	1.79	1.74	1.82	1.89	1.99	1.98	2	2.36	2.47	2.16	1.64	1.58	1.5	1.71				

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25) . The wave data was tabulated at 3-hour intervals, providing information equivalent to 40824 hours (=13608 * 3 hours). Ref. [8].

(*) The Total Significant Wave Height (Hst) was obtained as Hst=4*sqrt(m_0), where m_0 was the integrated area of the total wave power spectrum. The Primary Spectral Peak Direction was the approaching direction associated with the spectral peak period.

5.6 Total Significant Wave Heights x Primary Spectral Peak Periods *

	Tp→	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	Freq	%	MTp
Hs↓		4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	Freq	%	MTp
0.0	0.5	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	3	0.02	8.8
0.5	1.0	0	20	25	59	87	41	18	13	14	7	3	5	1	0	0	0	293	2.15	7.85
1.0	1.5	1	157	431	541	726	469	247	224	197	83	18	13	12	3	3	0	3125	23	7.93
1.5	2.0	0	62	681	964	811	678	460	377	317	189	83	36	16	8	14	0	4696	34.5	8.26
2.0	2.5	0	1	169	565	565	431	343	282	300	209	89	33	16	13	6	1	3023	22.2	8.95
2.5	3.0	0	0	12	167	293	201	165	180	186	148	73	32	14	6	8	0	1485	10.9	9.69
3.0	3.5	0	0	1	28	88	87	71	73	102	73	35	22	15	3	5	1	604	4.44	10.4
3.5	4.0	0	0	0	0	14	22	26	32	41	44	20	12	9	2	2	0	224	1.65	11.3
4.0	4.5	0	0	0	0	0	4	12	17	13	22	14	10	5	1	1	0	99	0.73	12.1
4.5	5.0	0	0	0	0	0	0	2	7	4	9	8	4	5	0	0	0	39	0.29	12.6
5.0	5.5	0	0	0	0	0	0	1	1	3	1	4	2	1	0	0	0	13	0.1	12.7
5.5	6.0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0.01	12.5
6.0	6.5	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0.01	13.5
6.5	7.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq	----	1	240	1320	2324	2584	1934	1345	1206	1178	786	350	169	94	36	39	2	13608		
%	----	0.01	1.76	9.7	17.1	19	14.2	9.88	8.86	8.66	5.78	2.57	1.24	0.69	0.26	0.29	0.01			
MHs	----	1.13	1.35	1.65	1.83	1.86	1.92	2.05	2.12	2.19	2.37	2.55	2.58	2.7	2.36	2.34	2.72			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25) . The wave data was tabulated at 3-hour intervals, providing information equivalent to 40824 hours (=13608 * 3 hours). Ref. [8].

(*) The Total Significant Wave Height (Hst) was obtained as Hst = 4*sqrt(m_0), where m_0 was the integrated area of the whole wave power spectrum. The Primary Spectral Peak was the spectral peak period of the whole wave spectrum.

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5.7 Distribution of Unimodal and Bimodal Sea States

Direction of Primary Sea State	Number of Spectral Peaks	Occurrences	Modal Percentage	Percentage by Direction	Total by Direction
N	Unimodal	245	1.80%	31.45%	779
	Bimodal	534	3.92%	68.55%	
NNE	Unimodal	380	2.79%	28.25%	1345
	Bimodal	965	7.09%	71.75%	
NE	Unimodal	571	4.20%	32.83%	1739
	Bimodal	1168	8.58%	67.17%	
ENE	Unimodal	628	4.61%	39.92%	1573
	Bimodal	945	6.94%	60.08%	
E	Unimodal	502	3.69%	42.22%	1189
	Bimodal	687	5.05%	57.78%	
ESE	Unimodal	371	2.73%	47.38%	783
	Bimodal	412	3.03%	52.62%	
SE	Unimodal	560	4.12%	51.05%	1097
	Bimodal	537	3.95%	48.95%	
SSE	Unimodal	620	4.56%	50.53%	1227
	Bimodal	607	4.46%	49.47%	
S	Unimodal	801	5.89%	51.12%	1567
	Bimodal	766	5.63%	48.88%	
SSW	Unimodal	769	5.65%	57.47%	1338
	Bimodal	569	4.18%	42.53%	
SW	Unimodal	480	3.53%	61.15%	785
	Bimodal	305	2.24%	38.85%	
WSW	Unimodal	54	0.40%	45.38%	119
	Bimodal	65	0.48%	54.62%	
W	Unimodal	1	0.01%	4.35%	23
	Bimodal	22	0.16%	95.65%	
WNW	Unimodal	0	0.00%	0.00%	10
	Bimodal	10	0.07%	100.00%	
NW	Unimodal	2	0.01%	20.00%	10
	Bimodal	8	0.06%	80.00%	
NNW	Unimodal	3	0.02%	12.50%	24
	Bimodal	21	0.15%	87.50%	
Total		13608	100.00%		13608

Percentage of Unimodal Sea States: 44%
Percentage of Bimodal Sea States: 56 %

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25) . The wave data was tabulated at 3-hour intervals, providing information equivalent to 40824 hours (=13608 * 3 hours). Ref. [8].

(*) For unimodal sea states, the power spectrum has only one significative peak. For bimodal sea states, the power spectrum has two significative peaks. The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum.

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5.7.1 Hs_1 x Tp_1 from N Direction for Unimodal sea states *

		Tp(s)										
Hs(m)		3	4	5	6	7	8	9	10	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	0	0	0	0	0	0	0	0
1.0	1.5	0	0	6	7	8	0	0	1	22	9	6.7
1.5	2.0	0	0	30	29	16	1	0	0	76	31	6.4
2.0	2.5	0	0	9	44	26	2	3	0	84	34	6.9
2.5	3.0	0	0	0	17	22	1	2	1	43	18	7.3
3.0	3.5	0	0	0	5	12	2	0	0	19	7.8	7.5
3.5	4.0	0	0	0	0	0	1	0	0	1	0.4	8.3
Freq		0	0	45	102	84	7	5	2	245		
%		0	0	18	42	34	2.9	2	0.8			
MHs		0	0	1.8	2.2	2.3	2.7	2.6	2.1			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25) . The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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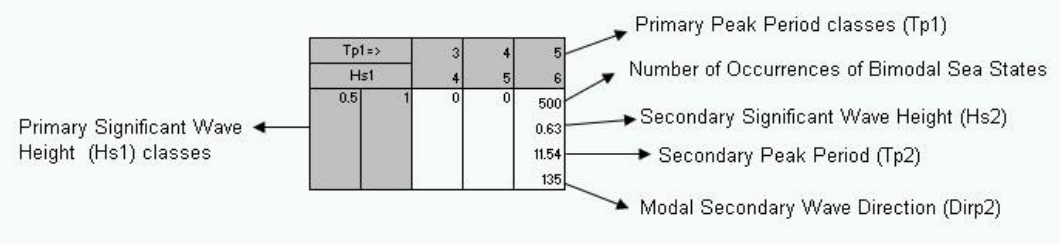
5.7.2 Hs_1 x Tp_1 from N and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	12 0.58 10.14 158	11 0.81 8 45	11 0.68 10.43 180	1 0.88 11.77 184	0 0 0 0	0 0 0 0	1 0.78 6.97 120	36	6.74
1.0	1.5	0 0 0 0	24 0.93 10.63 180	105 0.79 12.07 158	35 0.8 11.99 180	9 0.99 11.67 180	0 0 0 0	0 0 0 0	0 0 0 0	173	32.4
1.5	2.0	0 0 0 0	2 1.19 11.51 158	90 1 12.47 158	84 1 13.87 180	19 0.86 11.35 202	0 0 0 0	0 0 0 0	0 0 0 0	195	36.52
2.0	2.5	0 0 0 0	0 0 0 0	10 1.02 16.15 180	66 0.92 15.11 180	18 0.73 15.26 180	1 0.84 16.52 190	0 0 0 0	0 0 0 0	95	17.79
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	12 1.08 15.87 180	13 0.96 16.79 158	0 0 0 0	0 0 0 0	0 0 0 0	25	4.68
3.0	3.5	0 0 0 0	0 0 0 0	0 0 0 0	2 1.31 15.33 180	7 1.24 15.96 180	1 0.98 15.52 170	0 0 0 0	0 0 0 0	10	1.87
3.5	4.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
	Freq. %	0 0	38 7.12	216 40.45	210 39.33	67 12.55	2 0.37	0 0	1 0.19	534	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. . The legend below explains how to interpret the information on the cells of the table.



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5.7.3 Hs_1 x Tp_1 from NNE Direction for Unimodal sea states *

		Tp(s)													
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	1	1	0	0	0	0	0	0	2	0.5	7
1.0	1.5	1	2	20	11	13	1	0	0	0	0	0	48	13	6.3
1.5	2.0	0	0	37	61	36	6	0	0	0	0	0	140	37	6.6
2.0	2.5	0	0	5	40	49	6	0	0	0	0	0	100	26	7.1
2.5	3.0	0	0	3	19	39	5	2	0	0	0	0	68	18	7.4
3.0	3.5	0	0	0	4	7	8	0	0	0	0	0	19	5	7.8
3.5	4.0	0	0	0	0	2	1	0	0	0	0	0	3	0.8	8
Freq		1	2	65	136	147	27	2	0	0	0	0	380		
%		0.3	0.5	17	36	39	7.1	0.5	0	0	0	0			
MHs		1.1	1.3	1.7	2	2.2	2.5	2.9	0	0	0	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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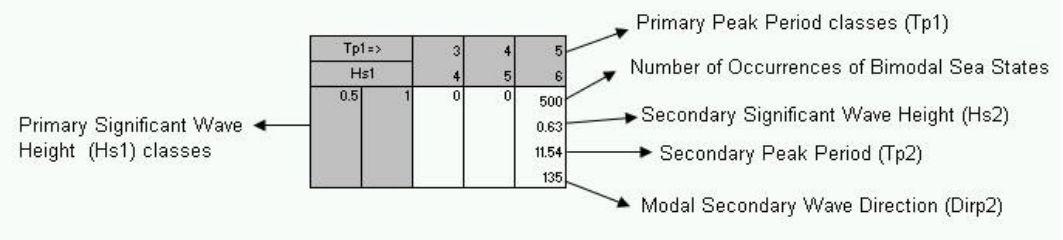
5.7.4 Hs_1 x Tp_1 from NNE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	1 0.22 10.04 147	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1	0.1
0.5	1.0	0 0 0 0	37 0.71 10.46 158	28 0.68 10.59 180	19 0.63 11.24 158	5 0.65 11.85 180	0 0 0 0	0 0 0 0	0 0 0 0	1 0.78 4.2 15	0 0 0 0	0 0 0 0	90	9.33
1.0	1.5	0 0 0 0	54 0.82 10.88 158	197 0.76 11.38 158	115 0.75 11.96 180	46 0.86 12.61 158	4 1.05 5.63 270	1 1.27 5.89 36	0 0 0 0	0 0 0 0	0 0 0 0	1 1.09 5.39 353	418	43.32
1.5	2.0	0 0 0 0	5 0.61 10.68 158	99 0.78 12.94 180	142 0.85 12.96 180	48 0.88 13.24 180	7 1.11 11.54 180	2 1.37 5.59 45	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	303	31.4
2.0	2.5	0 0 0 0	0 0 0 0	12 1.3 11.56 135	71 0.77 14.51 180	32 1.02 14.41 180	5 1.69 5.95 23	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	120	12.44
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	12 1.37 15.92 158	10 1.07 17.66 158	2 1.73 5.88 23	1 1.4 5.36 173	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	25	2.59
3.0	3.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	3 0.93 13.31 158	2 1.05 17.96 158	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	5	0.52
3.5	4.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	3 1.08 14.93 180	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	3	0.31
	Freq. %	0 0	96 9.95	337 34.92	359 37.2	147 15.23	20 2.07	4 0.41	0 0	1 0.1	0 0	1 0.1	965	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. . The legend below explains how to interpret the information on the cells of the table.



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5.7.5 Hs_1 x Tp_1 from NE Direction for Unimodal sea states *

		Tp(s)												
Hs(m)		3	4	5	6	7	8	9	10	11	12	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	2	5	0	0	0	0	0	7	1.2	7.2
1.0	1.5	0	2	18	31	58	7	0	1	0	0	117	20	7
1.5	2.0	0	0	35	69	68	31	13	0	0	0	216	38	7.1
2.0	2.5	0	0	9	44	85	23	3	0	0	0	164	29	7.3
2.5	3.0	0	0	0	4	34	14	1	0	0	0	53	9.3	7.8
3.0	3.5	0	0	0	0	4	6	1	0	0	0	11	1.9	8
3.5	4.0	0	0	0	0	0	2	0	0	0	0	2	0.4	8.4
4.0	4.5	0	0	0	0	0	1	0	0	0	0	1	0.2	8.6
4.5	5.0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		0	2	62	150	254	84	18	1	0	0	571		
%		0	0.4	11	26	44	15	3.2	0.2	0	0			
MHs		0	1.3	1.7	1.8	1.9	2.2	2	1.1	0	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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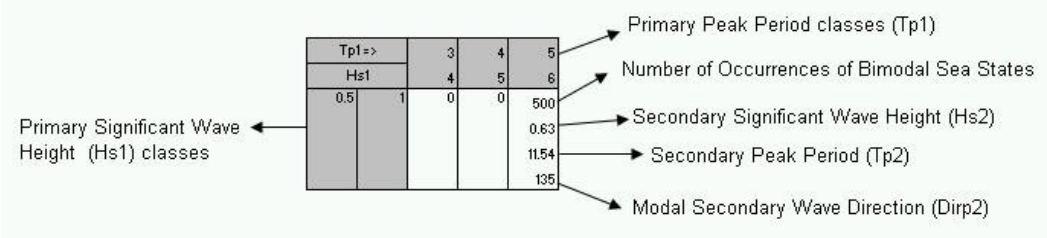
5.7.6 Hs_1 x Tp_1 from NE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 0.22 14.22 167	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1	0.09
0.5	1.0	0 0 0 0	24 0.73 8.44 90	30 0.65 8.01 90	38 0.61 11.94 180	26 0.53 11.7 180	7 0.72 11.38 158	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	125	10.7
1.0	1.5	0 0 0 0	33 0.69 11.82 180	167 0.78 11.45 180	217 0.72 12.45 180	99 0.69 12.52 180	27 0.86 4.88 45	6 1.04 6.65 0	0 0 0 0	1 0.86 7.47 40	1 1.04 7.94 93	551	47.17
1.5	2.0	0 0 0 0	2 1.24 14.63 158	82 0.84 13.03 180	153 0.84 13.37 180	75 0.73 13.47 180	29 1.32 5.54 45	9 1.37 5.34 23	0 0 0 0	0 0 0 0	1 0.96 5.12 38	351	30.05
2.0	2.5	0 0 0 0	0 0 0 0	7 1.11 14.42 158	54 1.12 14.35 158	34 1.08 14.21 180	12 1.31 4.84 23	1 1.05 4.83 67	0 0 0 0	0 0 0 0	0 0 0 0	108	9.25
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	4 1.45 14.96 158	18 1.03 14.12 158	2 1.13 12.19 158	1 1.8 5.92 0	0 0 0 0	0 0 0 0	0 0 0 0	25	2.14
3.0	3.5	0 0 0 0	0 0 0 0	0 0 0 0	1 1.43 17.36 170	5 1.23 16.7 158	1 0.95 17.07 188	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	7	0.6
	Freq. %	0 0	59 5.05	286 24.49	467 39.98	257 22	79 6.76	17 1.46	0 0	1 0.09	2 0.17	1168	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25) . The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2.. The legend below explains how to interpret the information on the cells of the table.



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5.7.7 Hs_1 x Tp_1 from ENE Direction for Unimodal sea states *

		Tp(s)															
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	15	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	16	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	5	5	1	0	0	0	0	0	0	0	11	1.8	7.2
1.0	1.5	0	2	15	42	71	41	7	0	0	0	0	0	0	178	28	7.4
1.5	2.0	0	0	16	49	93	63	27	2	0	0	0	0	0	250	40	7.7
2.0	2.5	0	0	1	19	46	44	24	1	1	0	0	1	0	137	22	8.1
2.5	3.0	0	0	0	0	14	12	7	0	0	2	0	0	0	35	5.6	8.5
3.0	3.5	0	0	0	0	4	9	2	0	0	1	0	0	0	16	2.6	8.6
3.5	4.0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.2	9.5
Freq		0	2	32	115	233	170	68	3	1	3	0	1	0	628		
%		0	0.3	5.1	18	37	27	11	0.5	0.2	0.5	0	0.2	0			
MHs		0	1.3	1.5	1.6	1.8	1.9	2	1.9	2.4	2.9	0	2.4	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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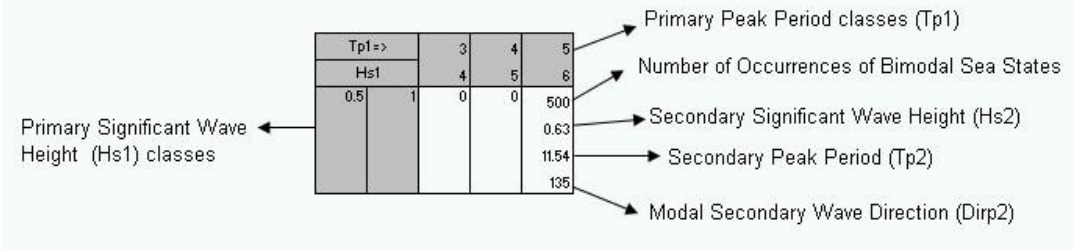
5.7.8 Hs_1 x Tp_1 from ENE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	6 0.47 6.74 23	15 0.67 7.88 90	27 0.7 10.23 158	65 0.59 12.84 180	15 0.63 12.54 180	1 0.44 5.72 67	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	129	13.65
1.0	1.5	0 0 0 0	7 1.02 9.09 135	67 0.89 12.72 180	132 0.8 12.15 180	139 0.7 12.56 180	93 0.94 5.65 68	17 1.07 5.92 45	5 0.8 5.12 45	0 0 0 0	0 0 0 0	0 0 0 0	1 1.32 5 18	0 0 0 0	461	48.78
1.5	2.0	0 0 0 0	0 0 0 0	32 0.97 12.68 158	76 0.8 13.84 180	68 0.82 14 158	56 1.13 5.32 68	20 1.4 5.69 45	3 1.34 5.85 0	1 1.63 5.99 38	1 1.56 7.31 110	1 1.56 7.64 138	0 0 0 0	2 1.47 5.39 0	260	27.51
2.0	2.5	0 0 0 0	0 0 0 0	2 2 9.75 68	18 1.19 14.51 158	27 0.86 15.11 158	19 1.22 14.17 180	5 1.5 5.72 68	2 1.44 5.4 0	0 0 0 0	1 1.83 7.42 63	0 0 0 0	0 0 0 0	1 1.78 5.33 160	75	7.94
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	2 1.62 8.83 90	8 1.23 17.38 158	5 1.33 14.77 180	1 1.66 6.78 90	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 2.05 7.31 113	17	1.8
3.0	3.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 0.98 16.79 168	2 1.1 17.54 158	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	3	0.32
3.5	4.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
	Freq. %	0 0	13 1.38	116 12.28	255 26.98	308 32.59	190 20.11	44 4.66	10 1.06	1 0.11	2 0.21	1 0.11	1 0.11	4 0.42	945	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.9 Hs_1 x Tp_1 from E for Unimodal sea states *

		Tp(s)															
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	15	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	16	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	4	3	1	0	0	0	0	0	0	0	8	1.6	7.2
1.0	1.5	0	0	3	16	48	32	6	4	0	0	0	0	0	109	22	7.9
1.5	2.0	0	0	6	31	60	64	19	1	2	0	0	1	0	184	37	8
2.0	2.5	0	0	0	3	37	48	23	6	2	0	0	1	0	120	24	8.6
2.5	3.0	0	0	0	3	16	28	16	1	1	0	1	0	0	66	13	8.6
3.0	3.5	0	0	0	1	3	2	3	1	0	2	2	0	0	14	2.8	9.8
3.5	4.0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.2	8.5
Freq		0	0	9	58	167	176	67	13	5	2	3	2	0	502		
%		0	0	1.8	12	33	35	13	2.6	1	0.4	0.6	0.4	0			
MHs		0	0	1.6	1.7	1.8	2	2.2	2	2.1	3.1	3	2.1	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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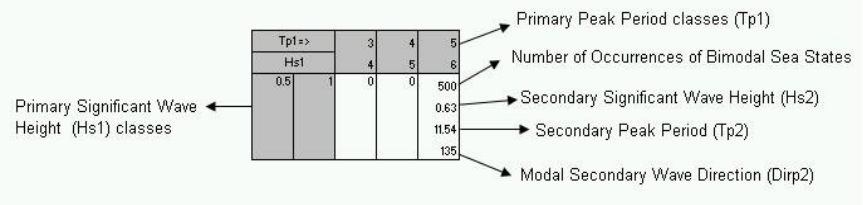
5.7.10 Hs_1 x Tp_1 from E and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	Freq.	%
0.0	0.5	0	0	0	0	1	2	0	0	0	0	0	0	0	3	0.44
		0	0	0	0	0.45	0.47	0	0	0	0	0	0	0		
		0	0	0	0	10.89	12.8	0	0	0	0	0	0	0		
		0	0	0	0	168	113	0	0	0	0	0	0	0		
0.5	1.0	0	3	7	16	38	25	4	0	0	0	0	0	0	93	13.54
		0	0.56	0.6	0.59	0.63	0.65	0.48	0	0	0	0	0	0		
		0	6.61	10.8	10.81	12.31	13.16	5.37	0	0	0	0	0	0		
		0	45	158	158	180	180	68	0	0	0	0	0	0		
1.0	1.5	0	1	28	58	91	96	15	2	1	0	0	0	2	294	42.79
		0	0.99	0.8	0.79	0.73	0.81	1.05	1.02	1.29	0	0	0	0.94		
		0	9.48	13.34	13.38	11.98	13.94	5.55	6.56	5.39	0	0	0	4.5		
		0	158	180	180	158	180	45	45	251	0	0	0	0		
1.5	2.0	0	1	4	36	67	73	30	1	0	0	0	0	0	212	30.86
		0	1.03	1.44	0.94	1.03	1.27	1.39	1.58	0	0	0	0	0		
		0	13.47	8.33	13.4	14.09	5.97	6.12	6.92	0	0	0	0	0		
		0	194	68	180	180	90	45	95	0	0	0	0	0		
2.0	2.5	0	0	1	8	26	24	8	2	0	1	0	0	2	72	10.48
		0	0	0.9	1.4	0.98	1.37	1.53	1.36	0	2.24	0	0	1.26		
		0	0	10.56	9.7	16.77	7.01	5.62	6.28	0	6.56	0	0	4.49		
		0	0	180	90	158	113	23	90	0	3	0	0	90		
2.5	3.0	0	0	0	0	6	3	0	0	0	0	0	1	0	10	1.46
		0	0	0	0	1.11	1.55	0	0	0	0	0	1.7	0		
		0	0	0	0	16.19	15.85	0	0	0	0	0	5.63	0		
		0	0	0	0	158	158	0	0	0	0	0	273	0		
3.0	3.5	0	0	0	0	0	1	1	0	0	1	0	0	0	3	0.44
		0	0	0	0	0	0.94	1.97	0	0	1.87	0	0	0		
		0	0	0	0	0	17.36	13.3	0	0	6.61	0	0	0		
		0	0	0	0	0	218	190	0	0	73	0	0	0		
3.5	4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0		
	Freq.	0	5	40	118	229	224	58	5	1	2	0	1	4	687	
	%	0	0.73	5.82	17.18	33.33	32.61	8.44	0.73	0.15	0.29	0	0.15	0.58		

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.11 Hs_1 x Tp_1 from ESE for Unimodal sea states *

		Tp(s)																
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	15	16	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	16	17	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	1	3	0	0	2	0	0	0	0	0	0	6	1.6	8.2
1.0	1.5	0	0	1	9	31	40	8	2	4	0	0	0	0	0	95	26	8.3
1.5	2.0	0	0	0	3	27	26	22	12	3	1	0	0	0	0	94	25	8.8
2.0	2.5	0	0	0	5	20	29	27	5	3	0	0	0	0	0	89	24	8.7
2.5	3.0	0	0	0	1	7	15	20	9	2	0	0	2	0	0	56	15	9.3
3.0	3.5	0	0	0	0	3	8	5	4	0	0	1	1	0	0	22	5.9	9.5
3.5	4.0	0	0	0	0	0	1	1	1	0	0	0	2	2	0	7	1.9	13
4.0	4.5	0	0	0	0	0	0	1	0	0	0	0	1	0	0	2	0.5	12
4.5	5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		0	0	1	19	91	119	84	35	12	1	1	6	2	0	371		
%		0	0	0.3	5.1	25	32	23	9.4	3.2	0.3	0.3	1.6	0.5	0			
MHs		0	0	1.1	1.7	1.8	1.9	2.2	2.3	1.9	1.5	3.1	3.4	3.7	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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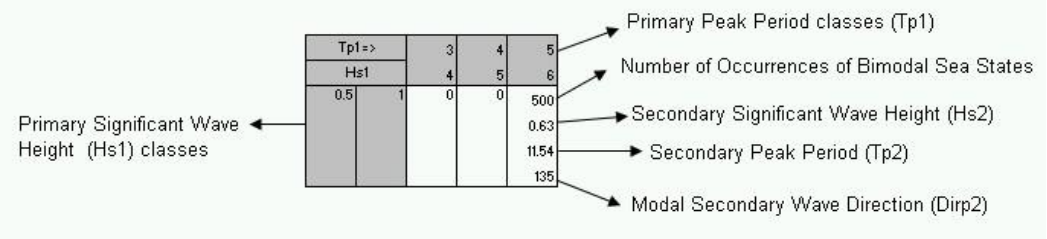
5.7.12 Hs_1 x Tp_1 from ESE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	1 0.71 7.7 159	6 0.64 8.5 135	7 0.64 8.83 113	25 0.68 11.83 158	16 0.54 12.41 180	11 0.85 6.24 90	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 0.71 5.69 48	0 0 0 0	0 0 0 0	67	16.26
1.0	1.5	0 0 0 0	0 0 0 0	4 0.94 6.88 45	39 0.87 11.66 180	55 0.91 11.63 180	46 0.82 11.52 158	22 0.93 5.27 23	7 0.96 5.74 90	5 1.03 6.48 0	0 0 0 0	0 0 0 0	4 1.07 7.3 68	1 1.23 8.19 71	0 0 0 0	183	44.42
1.5	2.0	0 0 0 0	0 0 0 0	4 0.77 11.39 225	15 0.81 14.58 158	23 1.01 12.68 180	33 0.85 15.29 158	9 1.47 6.61 90	5 1.13 5.7 45	1 1.49 7.21 100	3 1.5 7.76 23	2 1.56 5.92 23	1 1.31 5.28 38	1 1.48 9.48 280	1 1.58 9.75 3	98	23.79
2.0	2.5	0 0 0 0	0 0 0 0	0 0 0 0	5 0.99 13.51 180	19 1.22 12.72 158	17 1.34 11.5 158	7 1.02 5.5 113	0 0 0 0	0 0 0 0	1 0.97 6.4 141	0 0 0 0	1 1.6 6.06 3	0 0 0 0	0 0 0 0	50	12.14
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	3 1.71 11.32 158	1 1.18 5.25 96	5 1.43 10.05 135	1 1.14 4.65 11	1 2.21 6.97 70	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	11	2.67
3.0	3.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	3 2.03 12.05 135	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	3	0.73
4.5	5.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
	Freq. %	0 0	1 0.24	14 3.4	66 16.02	128 31.07	113 27.43	54 13.11	13 3.16	7 1.7	4 0.97	2 0.49	7 1.7	2 0.49	1 0.24	412	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.13 Hs_1 x Tp_1 from SE for Unimodal sea states *

		Tp(s)																		
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	1	3	4	1	0	1	0	0	0	0	0	0	0	0	10	1.8	7.4
1.0	1.5	0	0	0	5	32	28	26	12	16	1	0	0	0	0	0	0	120	21	9
1.5	2.0	0	1	0	7	12	32	42	14	17	7	4	0	0	0	0	0	136	24	9.5
2.0	2.5	0	0	0	4	20	25	38	27	16	1	2	2	0	0	0	0	135	24	9.5
2.5	3.0	0	0	0	0	6	19	18	28	14	4	4	0	1	0	0	0	94	17	10
3.0	3.5	0	0	0	0	1	5	9	17	5	1	0	2	1	0	1	0	42	7.5	11
3.5	4.0	0	0	0	0	1	1	4	4	2	3	1	2	0	0	0	0	18	3.2	11
4.0	4.5	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	3	0.5	11
4.5	5.0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0.4	13
Freq		0	1	1	19	76	112	137	103	70	19	13	6	2	0	1	0	560		
%		0	0.2	0.2	3.4	14	20	24	18	13	3.4	2.3	1.1	0.4	0	0.2	0			
MHs		0	1.6	0.9	1.6	1.7	2	2.1	2.4	2.1	2.7	2.7	3.1	3	0	3.5	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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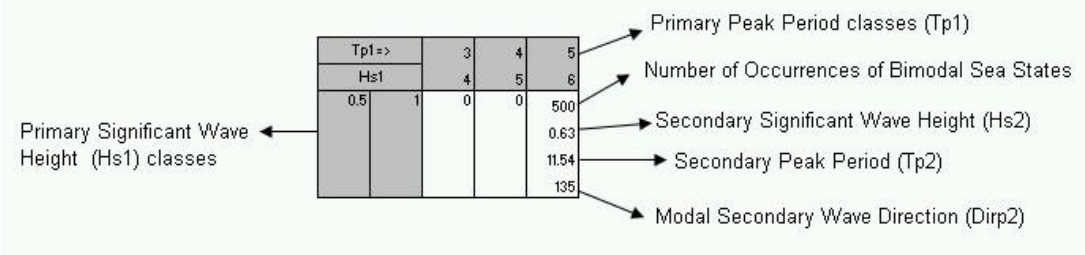
5.7.14 Hs_1 x Tp_1 from SE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Freq.	%
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0.5	1.0	0	0	1	5	18	18	10	14	5	4	0	1	1	0	0	0	77	14.34
		0	0	0.9	0.44	0.62	0.6	0.58	0.67	0.72	0.7	0	0.46	0.81	0	0	0		
		0	0	10.67	16.4	11.54	5.45	4.58	4.83	7.38	6.25	0	8.68	4.41	0	0	0		
		0	0	193	135	158	135	68	23	68	45	0	132	8	0	0	0		
1.0	1.5	0	1	4	25	42	40	31	29	31	18	7	3	5	4	4	0	244	45.44
		0	1.11	0.65	1.08	0.79	0.67	1.02	0.94	1.14	1.13	1.18	0.94	0.98	1.03	0.89	0		
		0	10.24	10.34	10.48	11.53	12.77	5.35	5.56	5.92	5.54	7.11	6.09	7.21	6.65	5.04	0		
		0	139	158	180	180	158	23	45	45	45	90	23	45	45	23	0		
1.5	2.0	0	0	2	21	15	26	17	7	8	12	9	2	3	0	1	1	124	23.09
		0	0	0.83	1.13	0.92	0.99	1.2	1.39	1.56	1.27	1.04	1.22	1.27	0	1.26	1.2		
		0	0	16.79	11.43	12.79	14.49	5.61	6.88	5.59	5.13	8.26	4.2	6.32	0	8.98	5.66		
		0	0	158	135	180	180	135	135	45	0	68	135	45	0	130	65		
2.0	2.5	0	0	0	5	17	8	7	4	6	2	5	1	1	1	3	1	61	11.36
		0	0	0	1.56	1.51	0.78	1.36	1.12	1.83	1.97	1.64	1.48	1.82	1.83	1.3	2.18		
		0	0	0	11.47	13.61	11.7	11.68	6.12	7.54	7.76	5.72	7.21	6.69	5.12	4.51	7.94		
		0	0	0	202	158	135	180	113	135	68	23	68	40	168	45	133		
2.5	3.0	0	0	0	0	1	5	6	3	1	4	0	1	0	1	1	0	23	4.28
		0	0	0	0	1.92	1.12	1.35	2	1.22	1.74	0	2.21	0	1.81	1.55	0		
		0	0	0	0	10.45	14.47	5.51	6.97	6.06	6.87	0	5.51	0	7.37	4.72	0		
		0	0	0	0	183	158	68	113	162	45	0	190	0	220	103	0		
3.0	3.5	0	0	0	0	1	1	3	0	1	0	0	0	0	1	0	0	7	1.3
		0	0	0	0	0.99	1.92	1.03	0	2.5	0	0	0	0	2.24	0	0		
		0	0	0	0	16.79	12.34	15.75	0	7.76	0	0	0	0	5.2	0	0		
		0	0	0	0	115	194	180	0	143	0	0	0	0	0	0	0		
3.5	4.0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.19
		0	0	0	0	1.87	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	11.91	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	110	0	0	0	0	0	0	0	0	0	0	0		
	Freq.	0	1	7	56	95	98	74	57	52	40	21	8	10	7	9	2	537	
	%	0	0.19	1.3	10.43	17.69	18.25	13.78	10.61	9.68	7.45	3.91	1.49	1.86	1.3	1.68	0.37		

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.15 Hs_1 x Tp_1 from SSE for Unimodal sea states *

		Tp(s)																	
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Freq	%	MTp
0.0	0.5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.2	8.9
0.5	1.0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0	4	0.7	8.8
1.0	1.5	0	0	0	1	17	30	21	28	11	10	1	0	1	0	0	120	19	9.7
1.5	2.0	0	0	0	3	13	40	51	48	32	10	7	1	0	0	1	206	33	10
2.0	2.5	0	0	0	0	7	15	30	33	30	10	8	3	0	0	0	136	22	11
2.5	3.0	0	0	0	0	0	11	12	18	20	7	6	6	1	0	0	81	13	11
3.0	3.5	0	0	0	0	0	6	8	7	11	9	0	2	2	0	0	45	7.3	11
3.5	4.0	0	0	0	0	0	6	1	3	4	3	0	1	0	0	0	18	2.9	11
4.0	4.5	0	0	0	0	0	0	0	6	1	1	0	0	0	0	0	8	1.3	11
4.5	5.0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.2	13
Freq		0	0	0	4	39	110	123	143	110	51	22	13	4	0	1	620		
%		0	0	0	0.7	6.3	18	20	23	18	8.2	3.6	2.1	0.7	0	0.2			
MHs		0	0	0	1.6	1.6	1.9	2	2.1	2.3	2.4	2.1	2.7	2.6	0	1.6			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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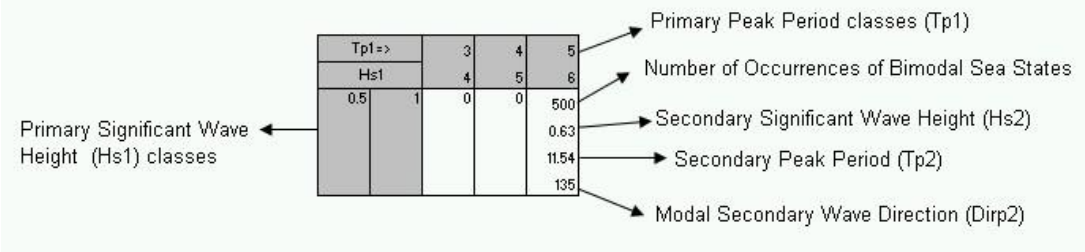
5.7.16 Hs_1 x Tp_1 from SSE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Freq.	%
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0.5	1.0	0	1	0	2	7	11	7	14	20	7	0	3	1	0	0	73	12.03
		0	0.86	0	0.58	0.4	0.82	0.66	0.84	0.72	0.85	0	0.75	0.72	0	0		
		0	8.19	0	13.65	10.96	5.89	5.75	5.37	6.45	6.75	0	7.76	5.42	0	0		
		0	115	0	135	158	90	45	68	45	45	0	90	310	0	0		
1.0	1.5	0	1	8	10	21	38	49	42	53	31	10	15	9	4	6	297	48.93
		0	0.96	0.89	1.11	0.89	0.69	0.97	1.05	1.03	1	1.01	1.28	1.16	1.17	1.04		
		0	11.51	9.13	7.95	11.67	11.78	5.88	5.74	5.53	6.8	7.13	5.47	6.15	6.64	8.62		
		0	165	68	202	158	158	45	23	45	90	90	23	0	45	158		
1.5	2.0	0	1	1	8	12	19	11	12	27	24	13	8	5	3	2	146	24.05
		0	1.02	1.02	0.9	0.99	1.24	1.08	1.4	1.45	1.44	1.38	1.2	1.3	1.25	1.7		
		0	9.23	10.14	10.4	13.28	10.71	11.65	4.76	7.14	6.93	5.92	8.04	7.82	5.48	8.46		
		0	112	174	158	180	180	158	23	158	90	23	68	45	23	23		
2.0	2.5	0	0	1	3	11	6	8	6	5	9	2	4	5	1	2	63	10.38
		0	0	2.11	1.63	1.38	0.94	1.69	1.62	1.96	1.5	1.66	1.78	1.63	1.89	1.42		
		0	0	12.34	10.14	11.91	4.59	6.02	6.52	6.74	6.03	5.75	7.82	6.46	5.72	4.81		
		0	0	208	202	202	0	23	180	23	0	68	113	23	35	45		
2.5	3.0	0	0	0	0	1	3	0	0	5	5	0	3	2	0	1	20	3.29
		0	0	0	0	0.92	1.36	0	0	1.94	2.45	0	2.08	2.61	0	1.57		
		0	0	0	0	16	8.55	0	0	6.98	7.65	0	6.83	10.04	0	5.85		
		0	0	0	0	120	225	0	0	135	158	0	23	90	0	243		
3.0	3.5	0	0	0	0	0	1	1	0	0	0	0	0	1	0	1	4	0.66
		0	0	0	0	0	1.86	1.64	0	0	0	0	0	2.16	0	2.76		
		0	0	0	0	0	12.34	6.32	0	0	0	0	0	9.75	0	6.24		
		0	0	0	0	0	196	98	0	0	0	0	0	93	0	338		
3.5	4.0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	3	0.49
		0	0	0	0	0	0	0	2.4	0	2.32	0	0	0	0	0		
		0	0	0	0	0	0	0	6.48	0	7.7	0	0	0	0	0		
		0	0	0	0	0	0	0	90	0	154	0	0	0	0	0		
4.0	4.5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.16
		0	0	0	0	0	0	0	0	0	0	0	2.27	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	8.46	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	98	0	0	0		
	Freq.	0	3	10	23	52	78	76	76	110	77	25	34	23	8	12	607	
	%	0	0.49	1.65	3.79	8.57	12.85	12.52	12.52	18.12	12.69	4.12	5.6	3.79	1.32	1.98		

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.17 Hs_1 x Tp_1 from S for Unimodal sea states *

		Tp(s)																	
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	0	1	2	1	4	2	0	0	0	0	0	0	10	1.3	9.9
1.0	1.5	0	0	0	2	15	26	35	30	19	2	1	0	1	0	0	131	16	9.7
1.5	2.0	0	0	0	3	11	26	67	55	39	33	2	3	0	0	1	240	30	10
2.0	2.5	0	0	0	4	10	14	29	61	64	43	7	3	3	1	0	239	30	11
2.5	3.0	0	0	0	1	4	5	9	21	33	18	13	4	1	1	0	110	14	11
3.0	3.5	0	0	0	0	2	4	4	6	15	7	4	0	1	0	0	43	5.4	11
3.5	4.0	0	0	0	0	0	2	0	3	9	3	0	1	0	0	0	18	2.3	11
4.0	4.5	0	0	0	0	0	1	0	1	3	2	0	0	1	0	0	8	1	12
4.5	5.0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0.3	12
Freq		0	0	0	10	43	80	145	182	184	109	27	11	7	2	1	801		
%		0	0	0	1.3	5.4	10	18	23	23	14	3.4	1.4	0.9	0.3	0.1			
MHs		0	0	0	2	1.8	1.9	1.8	2.1	2.3	2.3	2.6	2.5	2.5	2.4	1.9			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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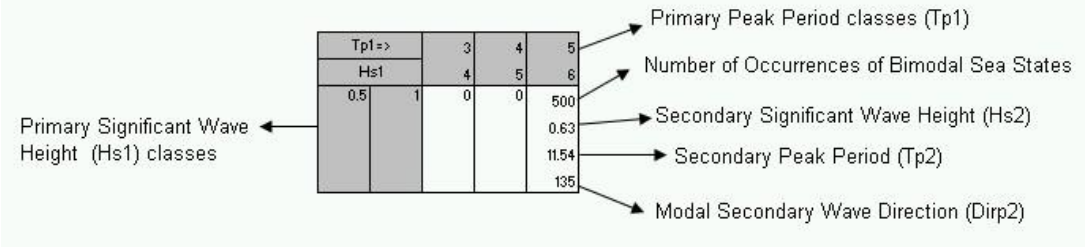
5.7.18 Hs_1 x Tp_1 from S and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	Freq.	%
0.0	0.5	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	3	0.39
		0	0	0	0	0.29	0	0	0	0	0.12	0	0	0	0	0		
		0	0	0	0	13.65	0	0	0	0	7.76	0	0	0	0	0		
		0	0	0	0	164	0	0	0	0	68	0	0	0	0	0		
0.5	1.0	0	0	1	3	2	12	9	24	17	18	5	2	2	1	0	96	12.53
		0	0	0.49	0.52	0.85	0.75	0.87	0.78	0.81	0.81	0.78	0.94	0.7	0.74	0		
		0	0	7.7	11.7	9.14	5.7	6.28	6.73	7.12	7.24	7.01	5.04	8.41	5.25	0		
		0	0	71	158	180	68	135	68	68	68	45	23	135	75	0		
1.0	1.5	0	1	3	12	14	19	42	77	73	51	30	11	2	0	1	336	43.86
		0	0.37	0.86	0.82	0.87	0.85	1.01	0.96	1.02	1.02	1.11	1	1.1	0	0.47		
		0	10.67	10.32	11.48	11.19	11.48	5.12	5.66	6.15	6.43	7.82	7.14	4.79	0	7.01		
		0	112	158	180	135	180	23	45	45	45	68	68	23	0	3		
1.5	2.0	0	1	3	13	18	13	14	26	45	38	19	8	4	2	5	209	27.28
		0	1.02	0.54	0.85	0.69	1.16	0.97	1.32	1.27	1.4	1.2	1.57	1.35	1.23	1.52		
		0	9.23	12.64	9.61	13.8	12	14	7.17	6.84	7.34	4.73	7.41	5.22	7.47	5.63		
		0	89	135	158	180	180	135	135	135	68	23	45	23	0	23		
2.0	2.5	0	0	1	1	7	8	6	9	14	20	16	2	2	2	1	89	11.62
		0	0	0.44	0.49	1.21	1.24	1.18	1.37	1.41	1.57	1.33	1.94	1.77	1.81	1.98		
		0	0	11.01	15.06	13.52	11.38	4.68	6.35	7.05	7.23	6.58	7.13	6.83	6.24	8.53		
		0	0	166	121	158	158	23	158	180	113	23	23	23	113	0		
2.5	3.0	0	0	0	0	2	1	1	2	5	5	1	3	1	0	2	23	3
		0	0	0	0	1.56	1.07	1.38	1.83	0.95	1.95	1.19	2.52	2.78	0	1.72		
		0	0	0	0	13.22	13.47	5.89	7.37	4.85	7.94	6.1	8.13	10.14	0	6.92		
		0	0	0	0	180	181	114	113	0	135	154	158	93	0	0		
3.0	3.5	0	0	0	0	0	0	0	0	1	2	0	0	0	1	0	4	0.52
		0	0	0	0	0	0	0	0	2.54	2.66	0	0	0	2.22	0		
		0	0	0	0	0	0	0	0	7.53	7.64	0	0	0	6.74	0		
		0	0	0	0	0	0	0	0	73	158	0	0	0	130	0		
3.5	4.0	0	0	0	0	0	0	2	0	0	0	1	0	1	1	0	5	0.65
		0	0	0	0	0	0	3.16	0	0	0	2.83	0	2.5	2.27	0		
		0	0	0	0	0	0	5.48	0	0	0	6.24	0	8.33	5.48	0		
		0	0	0	0	0	0	135	0	0	0	3	0	127	278	0		
4.0	4.5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.13
		0	0	0	0	0	0	1.53	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	17.66	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	125	0	0	0	0	0	0	0	0		
	Freq.	0	2	8	29	44	53	75	138	155	136	72	26	12	7	9	766	
	%	0	0.26	1.04	3.79	5.74	6.92	9.79	18.02	20.23	17.75	9.4	3.39	1.57	0.91	1.17		

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.19 Hs_1 x Tp_1 from SSW for Unimodal sea states *

		Tp(s)																	
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	0.4	8.7
1.0	1.5	0	0	2	0	4	10	19	17	16	2	0	0	0	0	0	70	9.1	9.9
1.5	2.0	0	0	0	2	7	16	28	41	31	9	3	0	0	0	0	137	18	10
2.0	2.5	0	0	0	4	5	12	36	49	43	32	12	1	0	0	0	194	25	11
2.5	3.0	0	0	0	1	2	10	13	35	49	41	7	3	0	0	0	161	21	11
3.0	3.5	0	0	0	0	1	14	9	12	18	20	13	8	5	0	0	100	13	12
3.5	4.0	0	0	0	0	0	0	4	7	12	15	7	2	3	0	0	50	6.5	12
4.0	4.5	0	0	0	0	0	0	2	3	4	6	6	6	2	0	0	29	3.8	13
4.5	5.0	0	0	0	0	0	0	1	1	1	4	2	1	4	0	0	14	1.8	13
5.0	5.5	0	0	0	0	0	0	0	0	2	0	3	1	1	0	0	7	0.9	13
5.5	6.0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2	0.3	12
6.0	6.5	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0.3	13
6.5	7.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		0	0	2	7	19	65	112	165	177	129	56	22	15	0	0	769		
%		0	0	0.3	0.9	2.5	8.5	15	21	23	17	7.3	2.9	2	0	0			
MHs		0	0	1.4	2.1	2	2.2	2.2	2.3	2.5	2.9	3.4	3.6	4.1	0	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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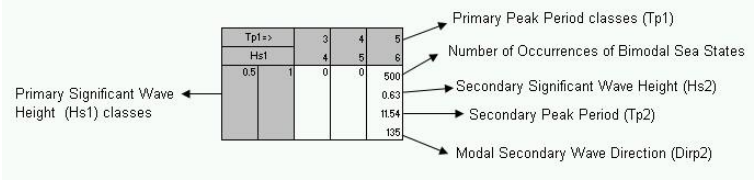
5.7.20 Hs_1 x Tp_1 from SSW and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Freq.	%
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0.5	1	0	1	0	2	3	0	4	12	7	4	3	0	0	0	0	36	6.33
		0	0.81	0	0.39	0.79	0	0.71	0.6	0.9	0.91	0.61	0	0	0	0		
		0	6.78	0	12.64	11.58	0	5.39	6.73	5.76	5.79	6.62	0	0	0	0		
		0	16	0	135	135	0	45	113	23	23	68	0	0	0	0		
1	1.5	0	0	5	20	10	18	16	39	58	37	9	6	1	1	0	220	38.66
		0	0	0.81	0.93	0.74	0.83	0.96	0.98	0.94	1.13	1.31	0.93	1.27	1.01	0		
		0	0	11.68	10.98	12.85	9.04	5.52	5.7	5.36	5.92	7.38	7.67	7.06	7.16	0		
		0	0	135	180	113	135	23	23	23	23	23	68	73	93	0		
1.5	2	0	0	4	9	11	7	17	14	33	43	28	7	0	3	0	176	30.93
		0	0	0.77	0.56	1.21	1.45	1.21	1.03	1.24	1.36	1.46	1.65	0	1.66	0		
		0	0	8.16	10.8	9.34	9.94	8.52	5.76	5.71	6.47	7.77	5.98	0	6.52	0		
		0	0	135	113	180	202	158	45	23	45	90	0	0	23	0		
2	2.5	0	0	0	6	8	6	2	17	13	18	10	5	1	1	0	87	15.29
		0	0	0	0.63	1.33	0.85	1.29	1.52	1.52	1.16	1.79	1.79	1.54	2.25	0		
		0	0	0	10.17	12.22	14.49	5.75	6.57	6.59	6.59	6.93	8.23	8.26	7.31	0		
		0	0	0	202	180	158	202	202	180	90	23	68	100	10	0		
2.5	3	0	0	0	0	1	2	3	1	7	6	6	2	0	1	1	30	5.27
		0	0	0	0	1.05	2.01	1.63	1.54	1.52	1.39	1.65	1.57	0	2.03	2.33		
		0	0	0	0	13.13	12.05	6.42	5.99	6.3	7.64	6.8	7.7	0	5.66	5.36		
		0	0	0	0	244	202	202	171	180	90	158	45	0	250	0		
3	3.5	0	0	0	0	0	0	1	1	3	2	2	1	1	0	0	11	1.93
		0	0	0	0	0	0	2.64	1.49	1.36	1.62	2.08	2.34	2.32	0	0		
		0	0	0	0	0	0	14.42	6.92	6.65	6.56	6.74	8.61	7.47	0	0		
		0	0	0	0	0	0	196	210	0	135	90	116	131	0	0		
3.5	4	0	0	0	0	0	0	2	1	0	1	0	1	1	0	0	6	1.05
		0	0	0	0	0	0	0.86	2.19	0	2.46	0	2.35	2.53	0	0		
		0	0	0	0	0	0	16.79	6.74	0	6.17	0	8.83	9.75	0	0		
		0	0	0	0	0	0	158	233	0	187	0	126	209	0	0		
4	4.5	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2	0.35
		0	0	0	0	0	0	0	0	1.81	0	0	2.25	0	0	0		
		0	0	0	0	0	0	0	0	5.89	0	0	7.82	0	0	0		
		0	0	0	0	0	0	0	0	234	0	0	208	0	0	0		
4.5	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.18
		0	0	0	0	0	0	0	0	2.75	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	7.7	0	0	0	0	0	0		
		0	0	0	0	0	0	0	0	216	0	0	0	0	0	0		
	Freq.	0	1	9	37	33	33	45	85	123	111	58	23	4	6	1	569	
	%	0	0.18	1.58	6.5	5.8	5.8	7.91	14.94	21.62	19.51	10.19	4.04	0.7	1.05	0.18		

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.21 Hs_1 x Tp_1 from SW for Unimodal sea states *

		Tp(s)																	
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	3	0.6	7.8
1.0	1.5	0	0	1	0	3	3	9	3	8	1	1	0	1	0	0	30	6.3	10
1.5	2.0	0	0	0	5	10	11	15	19	6	3	1	0	0	0	0	70	15	9.5
2.0	2.5	0	0	0	2	8	16	17	33	23	10	2	0	0	0	0	111	23	10
2.5	3.0	0	0	0	1	2	6	22	32	22	14	6	0	0	0	0	105	22	11
3.0	3.5	0	0	0	0	2	6	12	13	26	13	4	0	1	0	0	77	16	11
3.5	4.0	0	0	0	0	1	0	7	10	6	11	10	1	0	0	1	47	9.8	12
4.0	4.5	0	0	0	0	0	0	5	2	3	5	7	2	0	0	0	24	5	12
4.5	5.0	0	0	0	0	0	0	0	4	1	3	2	1	0	0	0	11	2.3	12
5.0	5.5	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0.4	12
5.5	6.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		0	0	1	10	26	42	87	118	95	60	34	4	2	0	1	480		
%		0	0	0.2	2.1	5.4	8.8	18	25	20	13	7.1	0.8	0.4	0	0.2			
MHs		0	0	1.2	1.8	2.1	2.3	2.6	2.6	2.7	3.1	3.5	4.3	2.3	0	3.8			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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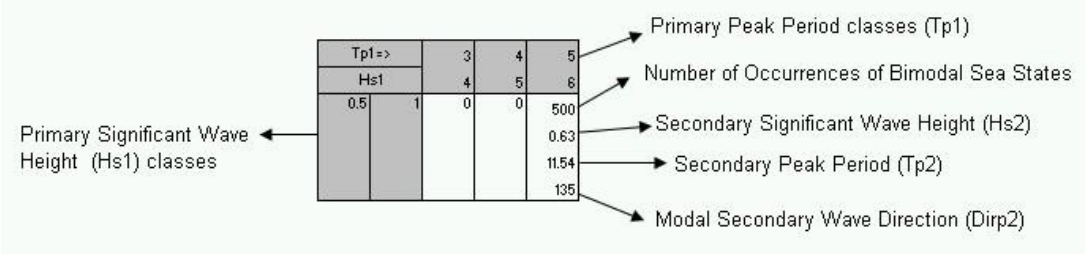
5.7.22 Hs_1 x Tp_1 from SW and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	5 0.61 7.06 45	0 0 0 0	2 0.27 13.3 180	1 0.94 4.74 355	1 0.82 12.34 193	0 0 0 0	2 0.64 6.61 68	2 0.95 5.17 23	0 0 0 0	1 0.92 6.48 18	1 0.66 7.42 45	0 0 0 0	0 0 0 0	0 0 0 0	15	4.92
1.0	1.5	0 0 0 0	2 0.68 8 68	9 1.13 8.2 45	8 1 7.86 158	10 0.81 12.28 180	12 0.87 11.51 180	9 1.25 6.12 202	15 0.96 5.79 68	20 1.02 6.16 68	9 0.85 6.22 45	4 1.25 5.97 45	0 0 0 0	1 1.38 7.26 80	2 0.96 7.82 158	3 1.08 10.24 135	104	34.1
1.5	2.0	0 0 0 0	0 0 0 0	4 1.18 8.61 68	19 0.91 12.11 180	10 1.18 9.63 180	6 1.1 9.51 113	9 1.31 6.5 202	12 1.4 7.39 202	26 1.38 6.32 68	10 1.4 6.67 45	5 1.25 7.79 45	2 1.79 6.52 0	1 0.69 5.25 111	2 1.13 8.98 135	0 0 0 0	106	34.75
2.0	2.5	0 0 0 0	0 0 0 0	0 0 0 0	3 1.26 9.57 113	6 0.87 15.65 135	7 0.9 4.62 113	5 1.09 5.36 113	7 1.56 7.02 0	11 1.8 6.43 113	12 1.59 7.16 45	3 1.75 7.31 68	0 0 0 0	0 0 0 0	1 2.03 9.94 217	1 2.06 5.82 188	56	18.36
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1.98 13.3 128	0 0 0 0	3 0.59 17.07 135	3 1.51 6.16 225	6 1.48 6.2 180	1 2.19 7.88 214	0 0 0 0	0 0 0 0	1 2.56 9.57 73	0 0 0 0	0 0 0 0	15	4.92
3.0	3.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	2 1.65 6.24 180	2 1.54 6.28 202	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	4	1.31
3.5	4.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1.76 15.52 186	2 0.92 17.36 135	2 2.94 7.21 225	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	5	1.64
	Freq. %	0 0	7 2.3	13 4.26	32 10.49	28 9.18	27 8.85	28 9.18	43 14.1	67 21.97	32 10.49	13 4.26	3 0.98	3 0.98	5 1.64	4 1.31	305	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.23 Hs_1 x Tp_1 from WSW for Unimodal sea states *

		Tp(s)														
Hs(m)		3	4	5	6	7	8	9	10	11	12	13	14	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	11	12	13	14	15	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.0	1.5	0	0	0	0	0	2	1	0	0	0	0	0	3	5.6	8.9
1.5	2.0	0	0	0	0	1	6	5	3	0	0	0	0	15	28	9
2.0	2.5	0	0	0	1	2	3	4	2	3	1	0	0	16	30	9.5
2.5	3.0	0	0	0	0	0	2	1	3	0	0	0	0	6	11	9.7
3.0	3.5	0	0	0	0	1	0	1	3	2	0	0	0	7	13	10
3.5	4.0	0	0	0	0	0	0	3	0	0	0	0	0	3	5.6	9.5
4.0	4.5	0	0	0	0	0	0	0	0	0	1	0	0	1	1.9	12
4.5	5.0	0	0	0	0	0	0	0	0	0	0	1	1	2	3.7	14
5.0	5.5	0	0	0	0	0	0	0	0	0	1	0	0	1	1.9	13
5.5	6.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		0	0	0	1	4	13	15	11	5	3	1	1	54		
%		0	0	0	1.9	7.4	24	28	20	9.3	5.6	1.9	1.9			
MHs		0	0	0	2.3	2.4	2	2.5	2.6	2.6	3.8	4.6	4.8			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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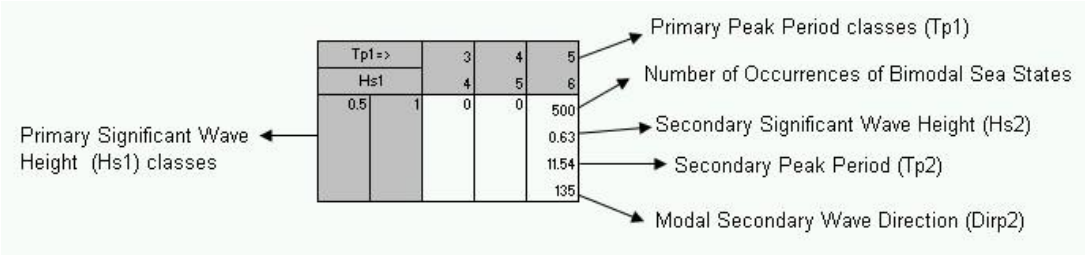
5.7.24 Hs_1 x Tp_1 from WSW and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	0 0 0 0	2 0.52 7.21 90	0 0 0 0	0 0 0 0	1 0.63 4.03 67	1 0.73 4.41 23	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	4	6.15
1.0	1.5	0 0 0 0	0 0 0 0	9 1 11.87 180	9 0.65 11.33 202	2 0.78 5 113	8 0.85 5.01 270	0 0 0 0	0 0 0 0	0 0 0 0	1 1.24 6.74 13	0 0 0 0	0 0 0 0	29	44.62
1.5	2.0	0 0 0 0	1 1.07 8.46 72	2 1.73 12.8 158	10 1.06 13.25 180	5 1.04 13.73 158	0 0 0 0	4 0.9 16 248	1 0.98 5.28 185	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	23	35.38
2.0	2.5	0 0 0 0	0 0 0 0	0 0 0 0	1 1.21 12.64 196	0 0 0 0	2 0.9 4.63 68	0 0 0 0	1 1.38 5.66 253	1 1.25 6.97 173	2 2.21 7.88 135	0 0 0 0	0 0 0 0	7	10.77
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1.04 13.47 165	0 0 0 0	1 0.68 16.79 130	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	2	3.08
	Freq. %	0 0	1 1.54	13 20	20 30.77	8 12.31	11 16.92	6 9.23	2 3.08	1 1.54	3 4.62	0 0	0 0	65	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.25 Hs_1 x Tp_1 from W for Unimodal sea states *

		Tp(s)									
Hs(m)		3	4	5	6	7	8	9	Freq	%	MTp
Hs(m)		4	5	6	7	8	9	10	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	0	0	0	0	0	0	0
1.0	1.5	0	0	0	0	0	0	0	0	0	0
1.5	2.0	0	0	0	0	1	0	0	1	100	7.5
Freq		0	0	0	0	1	0	0	1		
%		0	0	0	0	100	0	0			
MHs		0	0	0	0	1.8	0	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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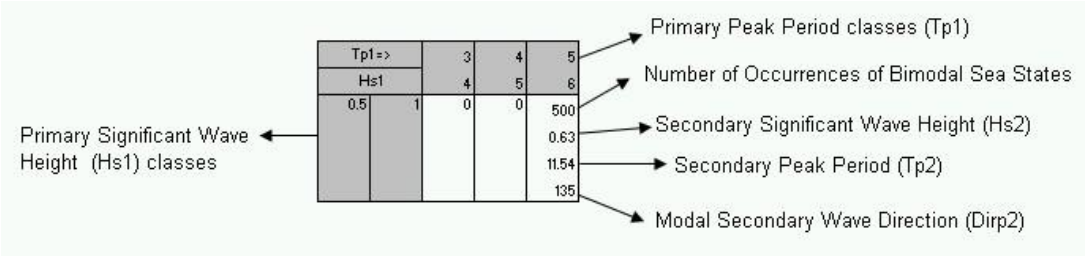
5.7.26 Hs_1 x Tp_1 from W and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	8 9	9 10	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	0 0 0 0	1 0.53 6.61 129	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1	4.55
1.0	1.5	0 0 0 0	3 1.16 11.25 113	9 0.94 12.34 135	5 0.76 12.7 158	0 0 0 0	0 0 0 0	1 1.22 5.12 27	18	81.82
1.5	2.0	0 0 0 0	0 0 0 0	1 0.9 12.96 171	1 1.57 9.39 37	0 0 0 0	1 1.33 5.54 53	0 0 0 0	3	13.64
	Freq. %	0 0	3 13.64	11 50	6 27.27	0 0	1 4.55	1 4.55	22	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.27 Hs_1 x Tp_1 from WNW for Unimodal sea states *

		Tp(s)						
Hs(m)		3	4	5	6	Freq	%	MTp
Hs(m)		4	5	6	7	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0
0.5	1.0	0	0	0	0	0	0	0
1.0	1.5	0	0	0	0	0	0	0
1.5	2.0	0	0	0	0	0	0	0
Freq		0	0	0	0	0		
%		0	0	0	0	0		
MHs		0	0	0	0			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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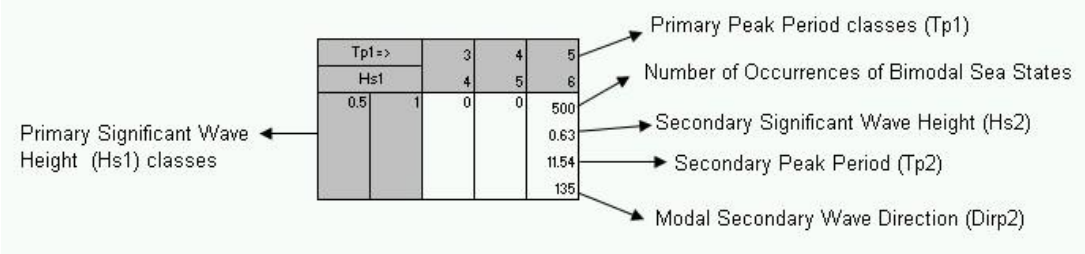
5.7.28 Hs_1 x Tp_1 from WNW and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	0 0 0 0	1 0.42 7.37 97	0 0 0 0	1	10
1.0	1.5	0 0 0 0	0 0 0 0	3 0.91 13.91 180	4 0.57 10.45 113	7	70
1.5	2.0	0 0 0 0	0 0 0 0	2 1.06 8.75 113	0 0 0 0	2	20
	Freq. %	0 0	0 0	6 60	4 40	10	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.29 Hs_1 x Tp_1 from NW for Unimodal sea states *

		Tp(s)							
Hs(m)		3	4	5	6	7	Freq	%	MTp
Hs(m)		4	5	6	7	8	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	0	0	0	0	0
1.0	1.5	0	0	0	0	1	1	50	7.7
1.5	2.0	0	0	0	0	0	0	0	0
2.0	2.5	0	0	0	1	0	1	50	6.1
2.5	3.0	0	0	0	0	0	0	0	0
Freq		0	0	0	1	1	2		
%		0	0	0	50	50			
MHs		0	0	0	2.2	1.3			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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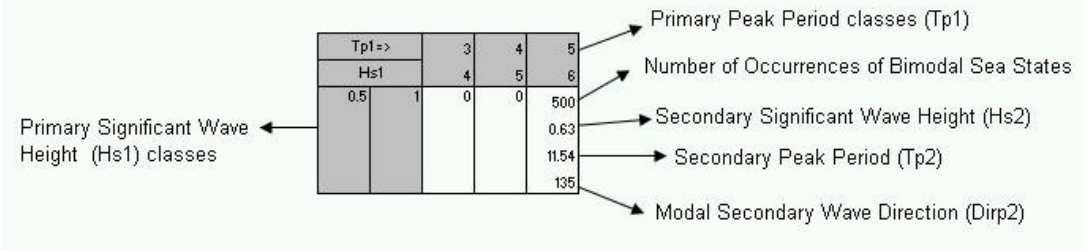
5.7.30 Hs_1 x Tp_1 from NW and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	0 0 0 0	2 0.66 12.34 135	1 0.76 9.75 192	0 0 0 0	3	37.5
1.0	1.5	0 0 0 0	0 0 0 0	3 0.79 7.94 68	1 0.7 13.13 171	0 0 0 0	4	50
1.5	2.0	0 0 0 0	0 0 0 0	0 0 0 0	1 1.39 8.83 240	0 0 0 0	1	12.5
2.0	2.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
	Freq. %	0 0	0 0	5 62.5	3 37.5	0 0	8	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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5.7.31 Hs_1 x Tp_1 from NNW Direction for Unimodal sea states *

		Tp(s)							
Hs(m)		3	4	5	6	7	Freq	%	MTp
Hs(m)		4	5	6	7	8	Freq	%	MTp
0.0	0.5	0	0	0	0	0	0	0	0
0.5	1.0	0	0	0	0	0	0	0	0
1.0	1.5	0	0	1	0	0	1	33	5.1
1.5	2.0	0	0	1	0	0	1	33	6
2.0	2.5	0	0	0	0	0	0	0	0
2.5	3.0	0	0	0	0	1	1	33	8
Freq		0	0	2	0	1	3		
%		0	0	67	0	33			
MHs		0	0	1.4	0	2.7			

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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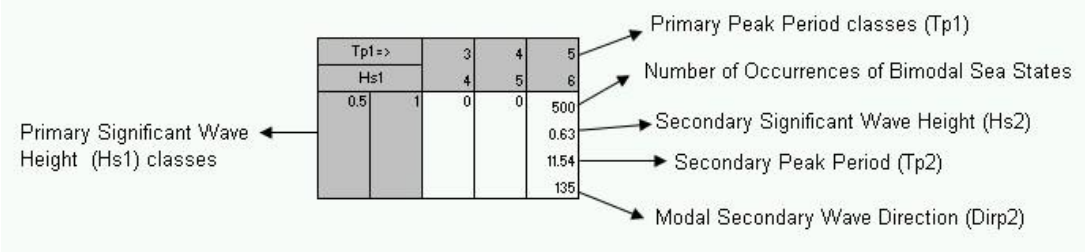
5.7.32 Hs_1 x Tp_1 from NNW and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

Hs↓	Tp→	3 4	4 5	5 6	6 7	7 8	Freq.	%
0.0	0.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0	0
0.5	1.0	0 0 0 0	1 0.59 7.64 109	1 0.51 10.67 118	1 0.64 9.48 190	1 0.66 10.56 138	4	19.05
1.0	1.5	0 0 0 0	1 1.09 11.01 161	6 0.68 10.32 158	2 0.89 11.64 158	0 0 0 0	9	42.86
1.5	2.0	0 0 0 0	1 1.02 9.23 6	2 0.75 11.29 180	2 0.88 9.32 135	0 0 0 0	5	23.81
2.0	2.5	0 0 0 0	0 0 0 0	0 0 0 0	2 0.75 11.91 158	0 0 0 0	2	9.52
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 0.8 13.13 160	1	4.76
	Freq. %	0 0	3 14.29	9 42.86	7 33.33	2 9.52	21	

Source: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals. Ref. [8].

(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For bimodal sea states, the power spectrum has two significative peaks. The tabulated secondary Hs_2 is related to the more frequent secondary direction $Dirp_2$ associated with the secondary spectral peak period Tp_2. The legend below explains how to interpret the information on the cells of the table.



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6 REGIONAL OCEANOGRAPHIC CONDITIONS

6.1 Vertical Profile of Marine Fouling (mm)

DEPTH (meter)	MARINE FOULING THICKNESS (mm)
+ 1,3	20
0,0	20
-10	80
-20	80
-30	80
-40	80
-50	60
-60	45
-70	30
-80	28
-90	26
-100	24
-110	22
-120	20
-130	0
Bottom	0

Source: PETROBRAS – Vertical Profile of Marine Fouling (mm) for Campos Basin (RT/MC 113/2003). Ref [9].

6.2 Cross-section of sea water temperature, salinity and density

Campos Basin is situated on the southeast Brazilian continental shelf and slope in a very stratified water column where different layers of water masses with their typical signatures of temperature, salinity and density are present. The figure 6.1 indicates the position of three cross-sections (called Rn, Tr and Rs) , where profiles of sea water physical properties were measured. Figures 6.2 to 6.4 present cross-sections of temperature (^{o}C), salinity [PSU] and density (kg/m^{3}) for transects Rn, Tr and Rs respectively.

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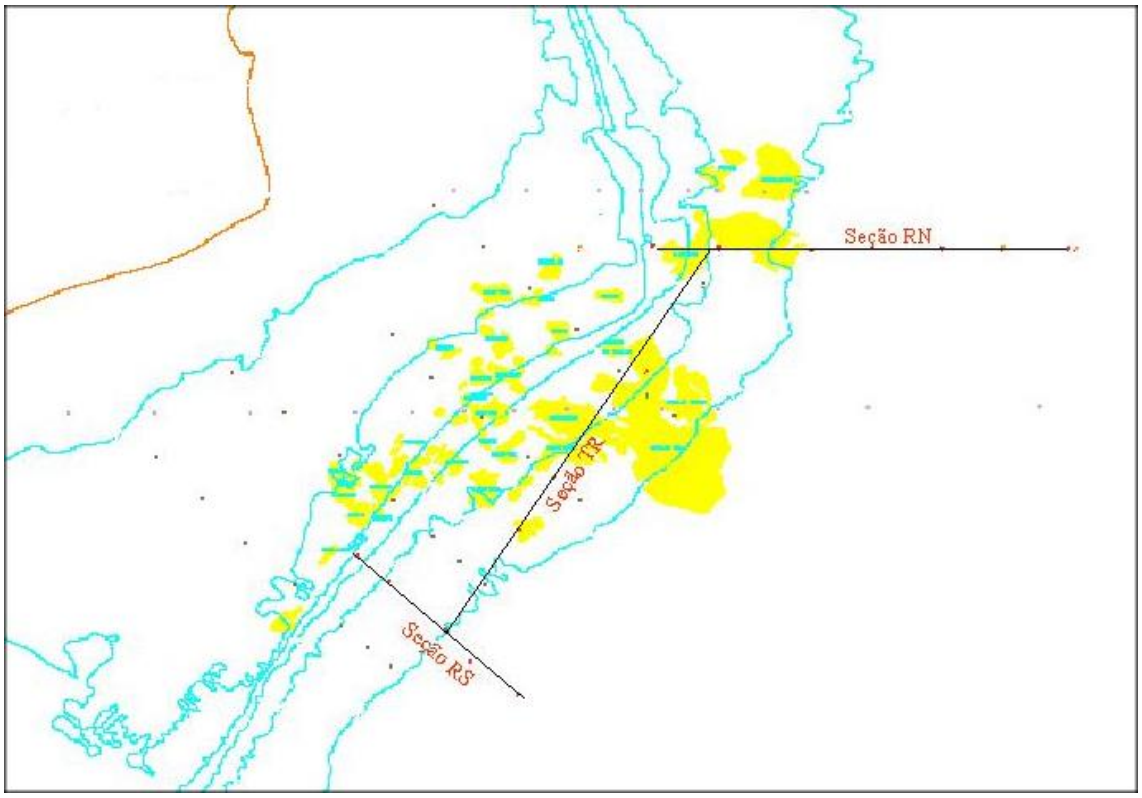

Figure 6.1 – Map of Campos Basin with position of three transects Rn, Tr and Rs.

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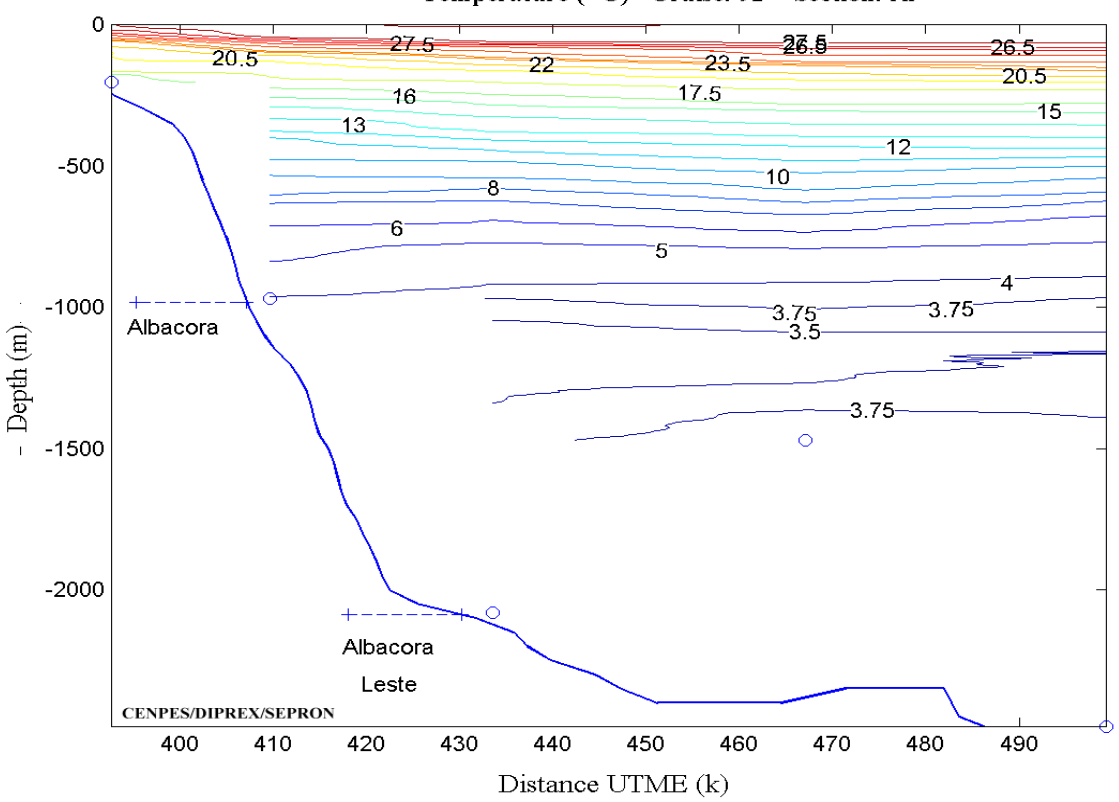
(A)



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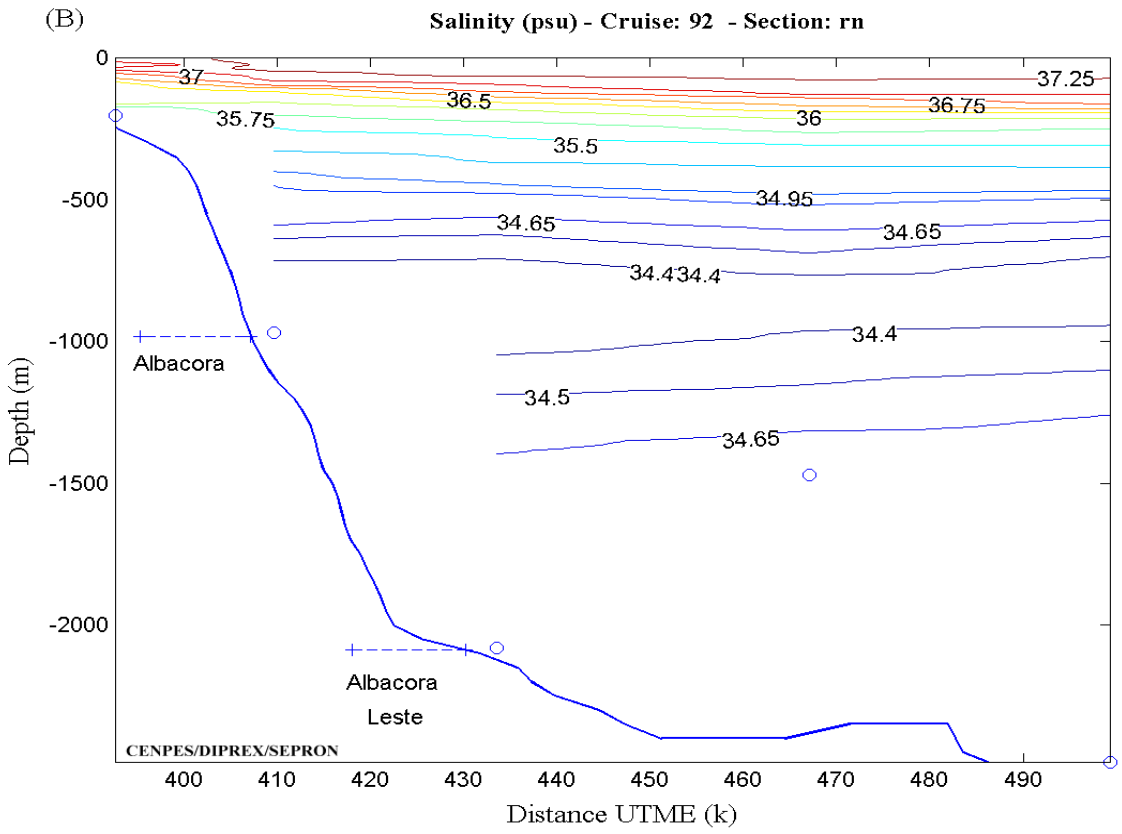

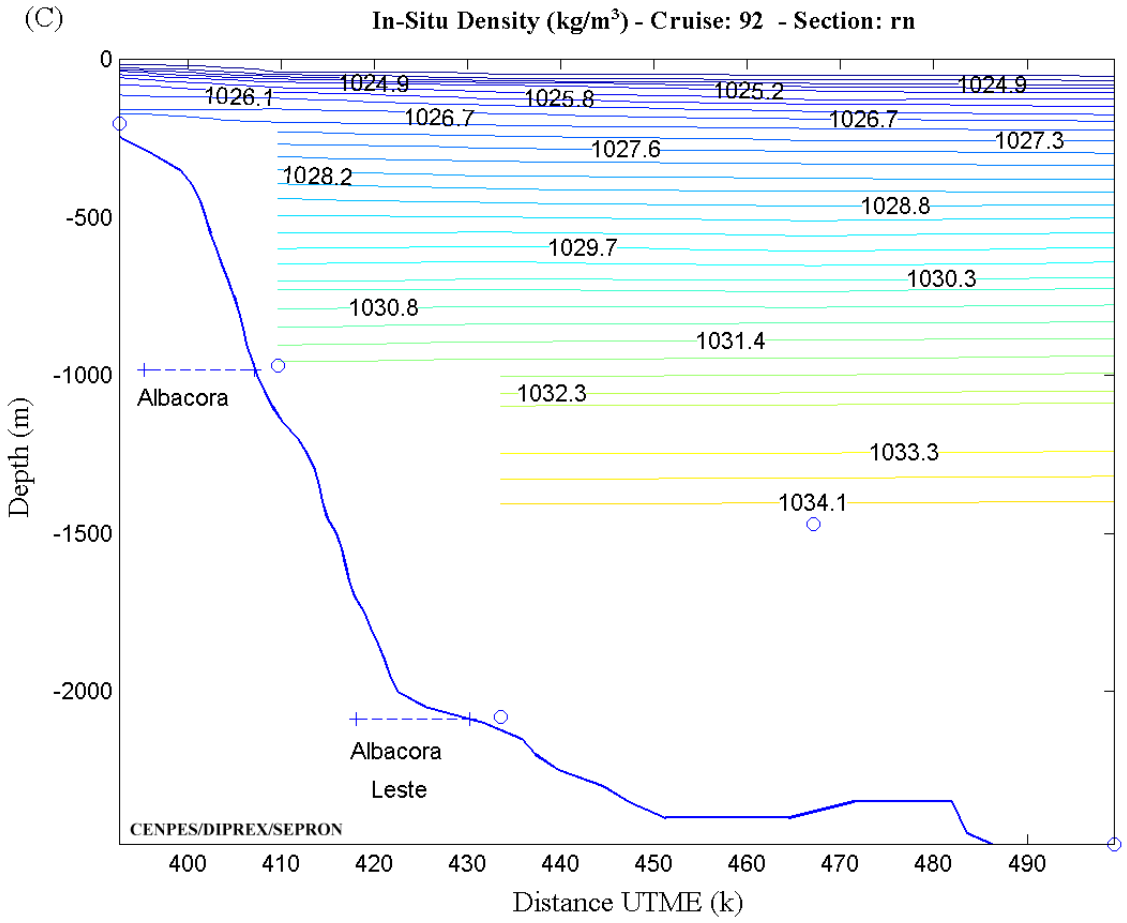

Figure 6.2 - (A) Temperature section for Transect RN
(B) Salinity section for Transect RN
(C) In-Situ Density Section for Transect RN

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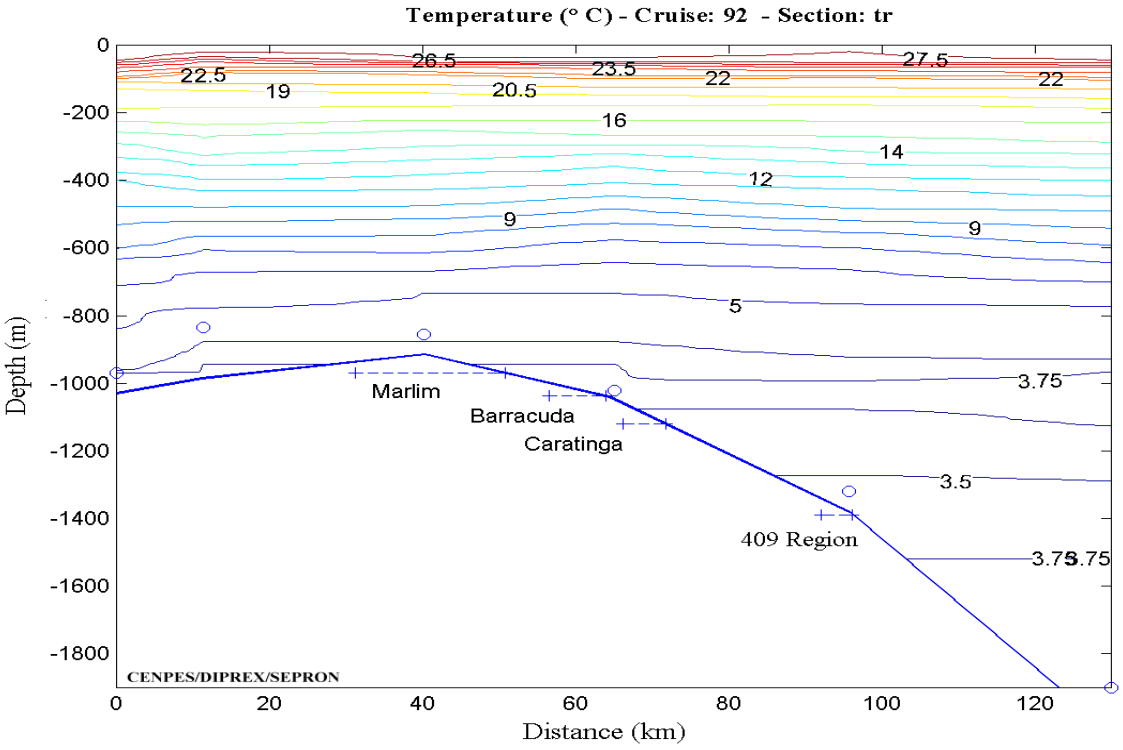

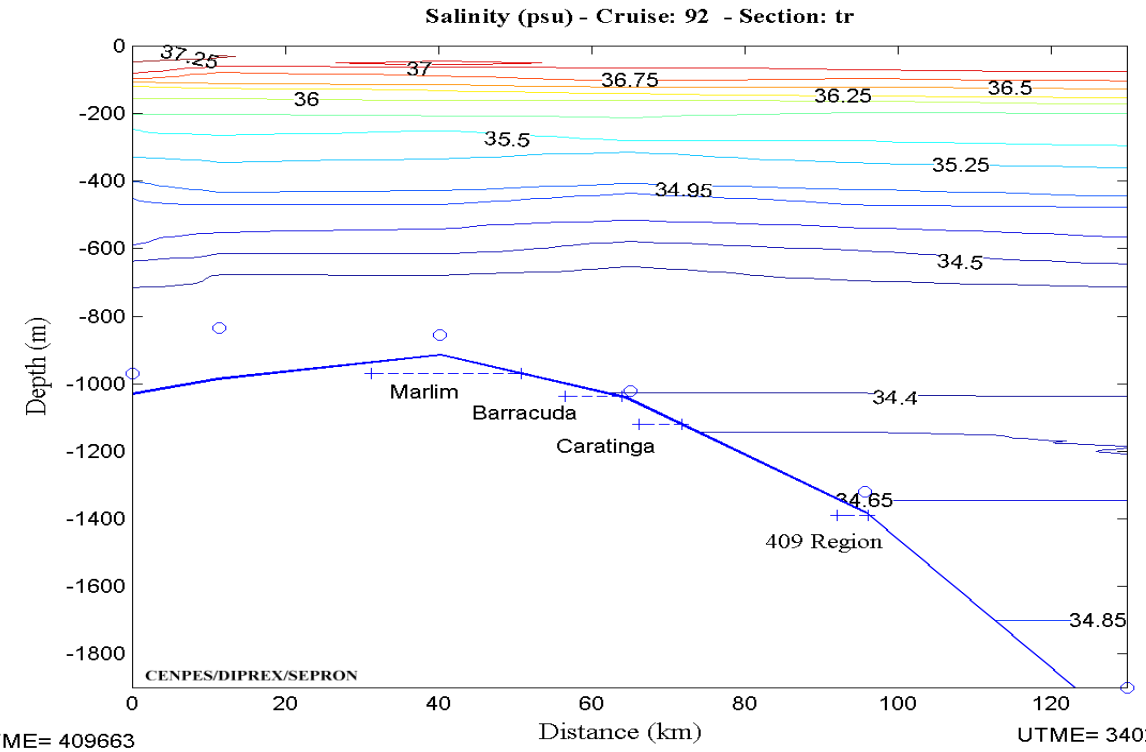

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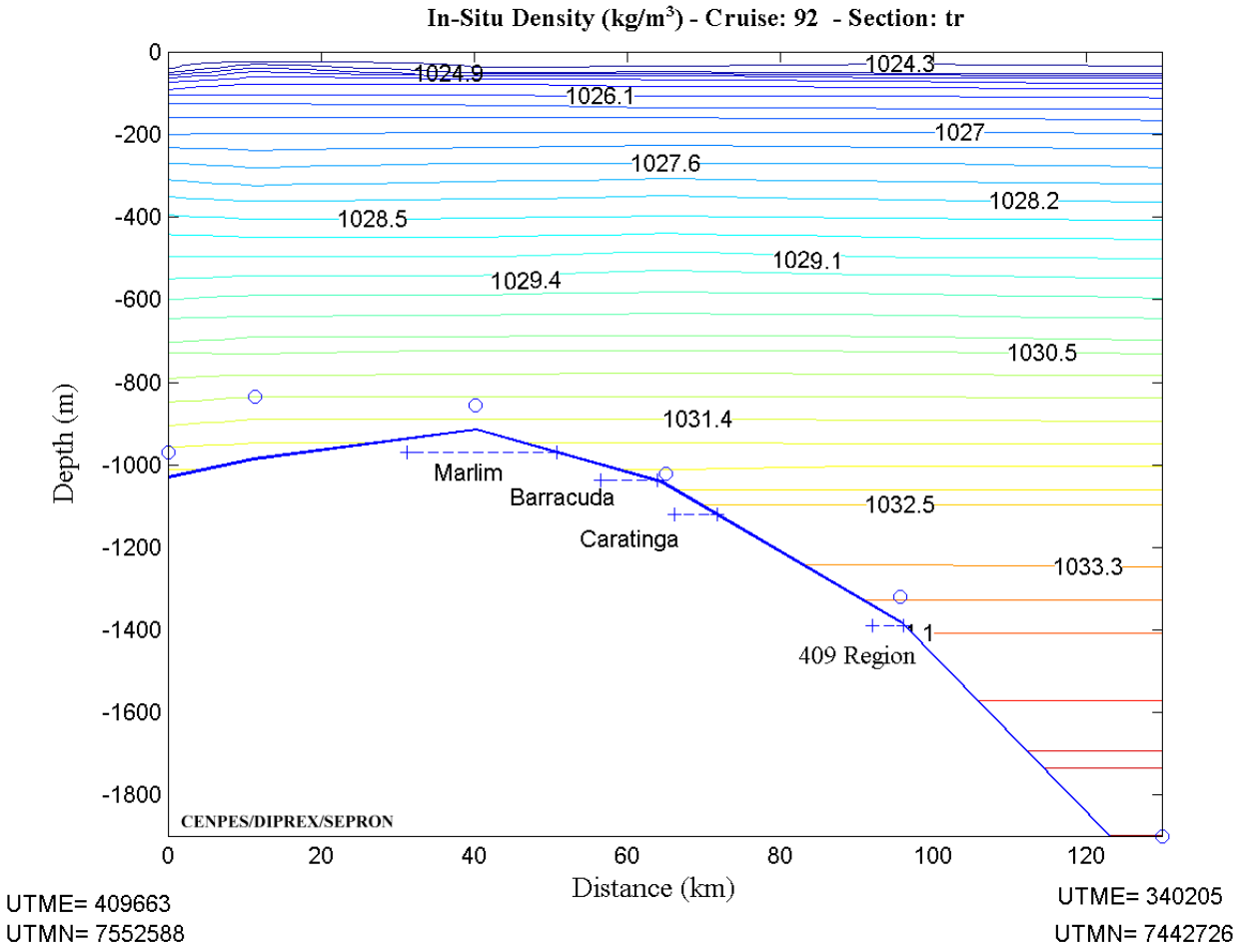

Figure 6. 3 (A) Temperature Section for Transect TR
(B) Salinity Section for Transect TR
(C) In-Situ Density Section for Transect TR

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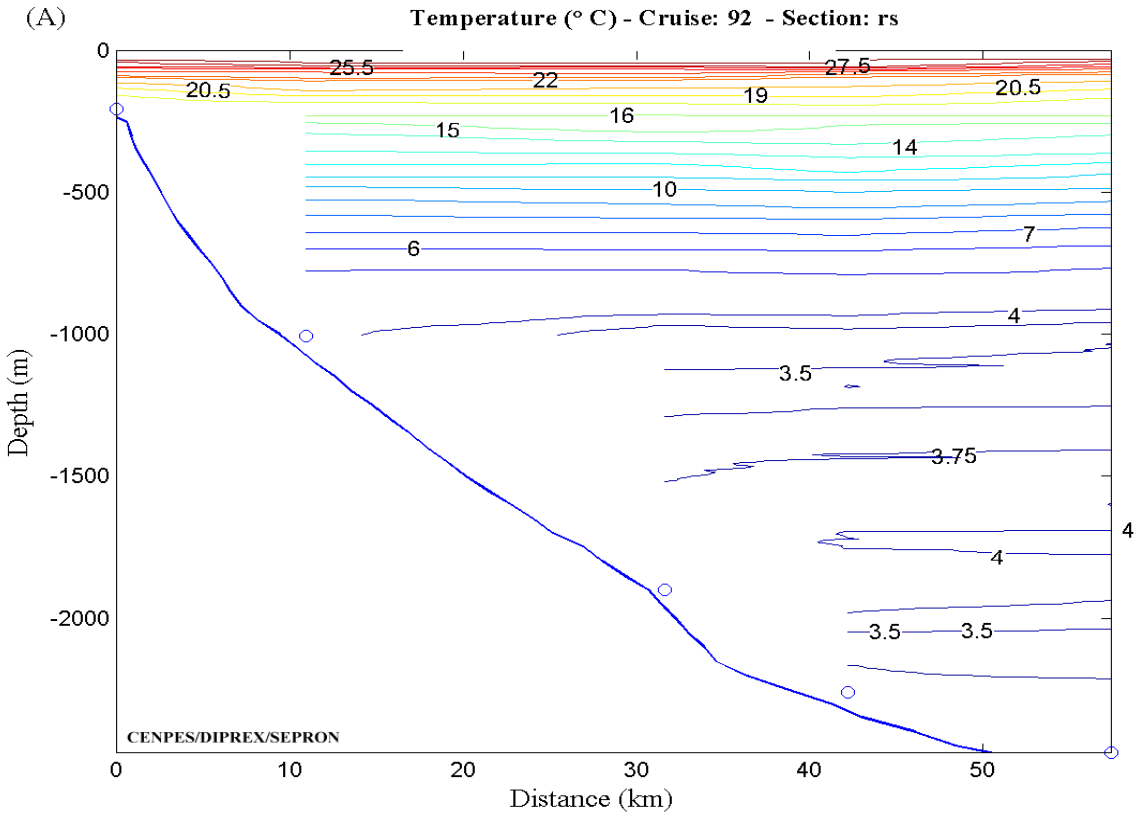
(A)



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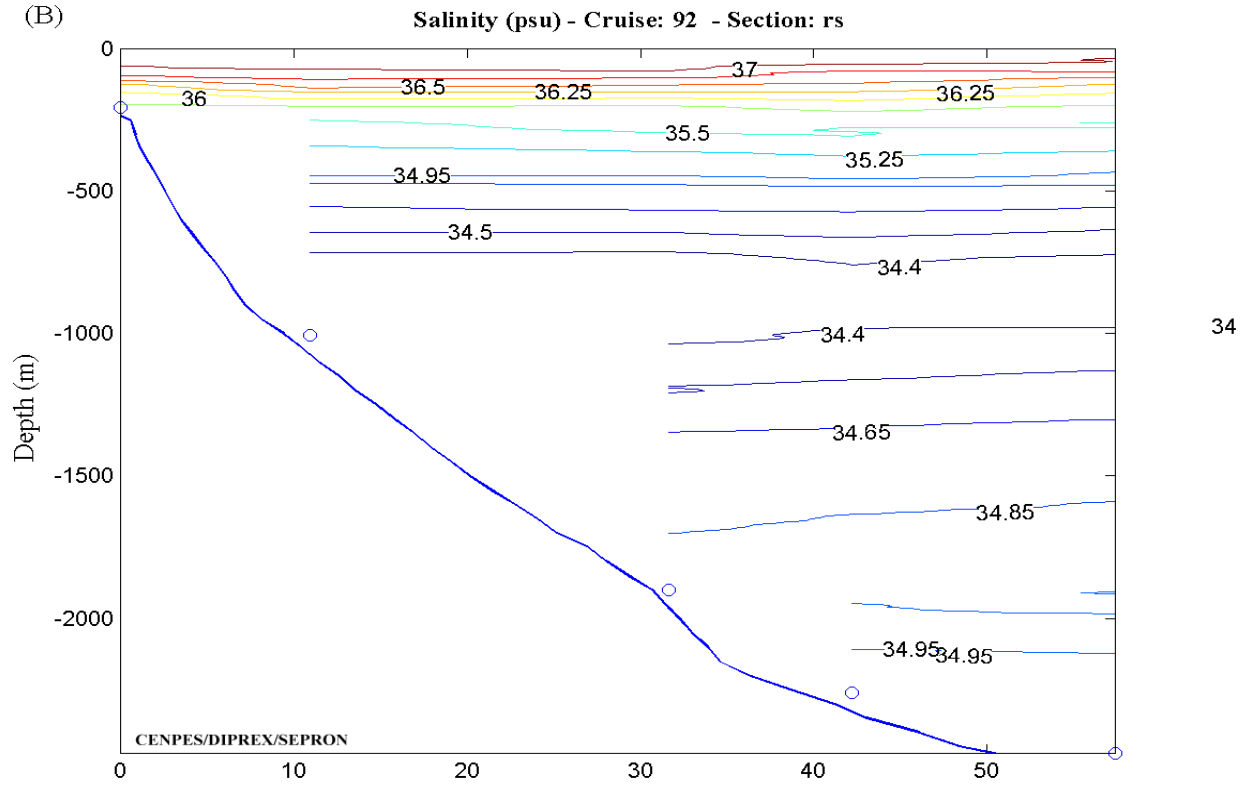

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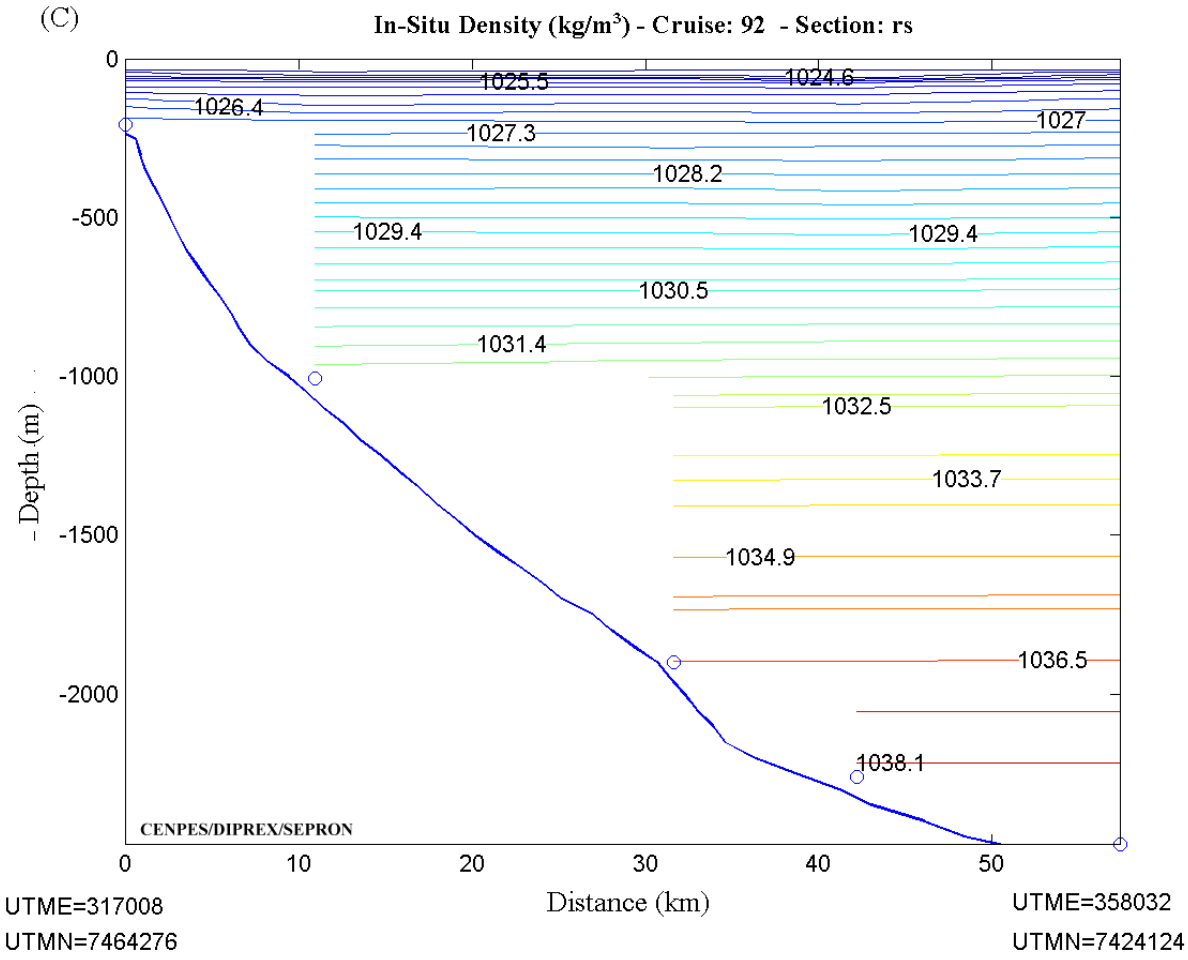

Figure 6. 4 (A) Temperature Section for Transect RS
(B) Salinity Section for Transect RS
(C) In-Situ Density Section for Transect RS

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6.3 Cross-section of Geostrophic Velocity of the Brazil Current

The Brazil Current is the western boundary current of the South Atlantic Ocean wind-driven gyre and it has significant influence in the current field of Campos Basin for water depths greater than 200 meters. The Brazil Current is in geostrophic balance in the region, that is, both the Coriolis force and the baroclinic pressure gradient force balance themselves keeping a southward Brazil Current jet in the first 400 meters and a northward counter-current below. Figure 6.5 presents a typical Campos Basin temperature cross-section field in the upper window and its associated geostrophic current section in the lower window. Negative current values indicate soutward flow.

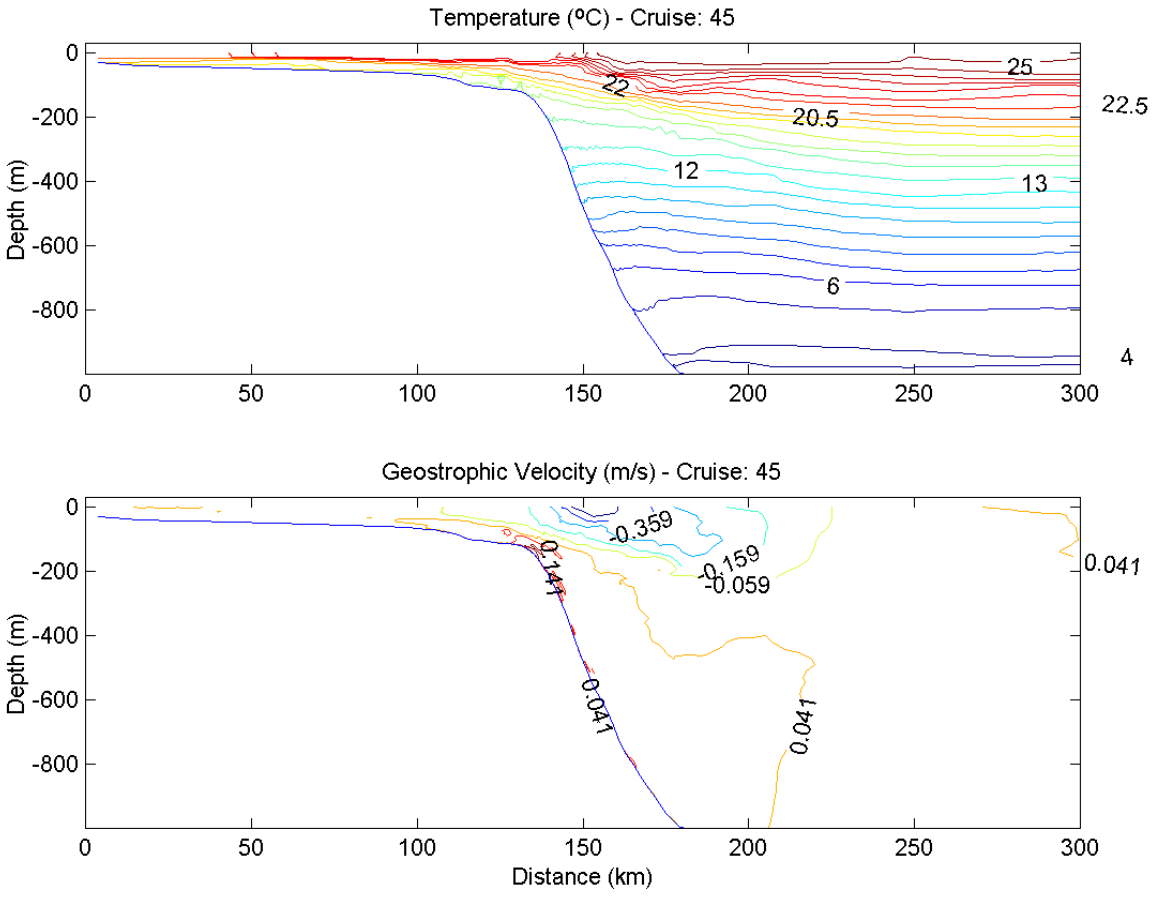

Figure 6.5 - (A) Temperature section crossing Marlim Field.
(B) Geostrophic Current section calculated using the density gradients estimated by the temperature section above.

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The design current profiles are given for six different regions in Campos Basin. The map below shows their positions.

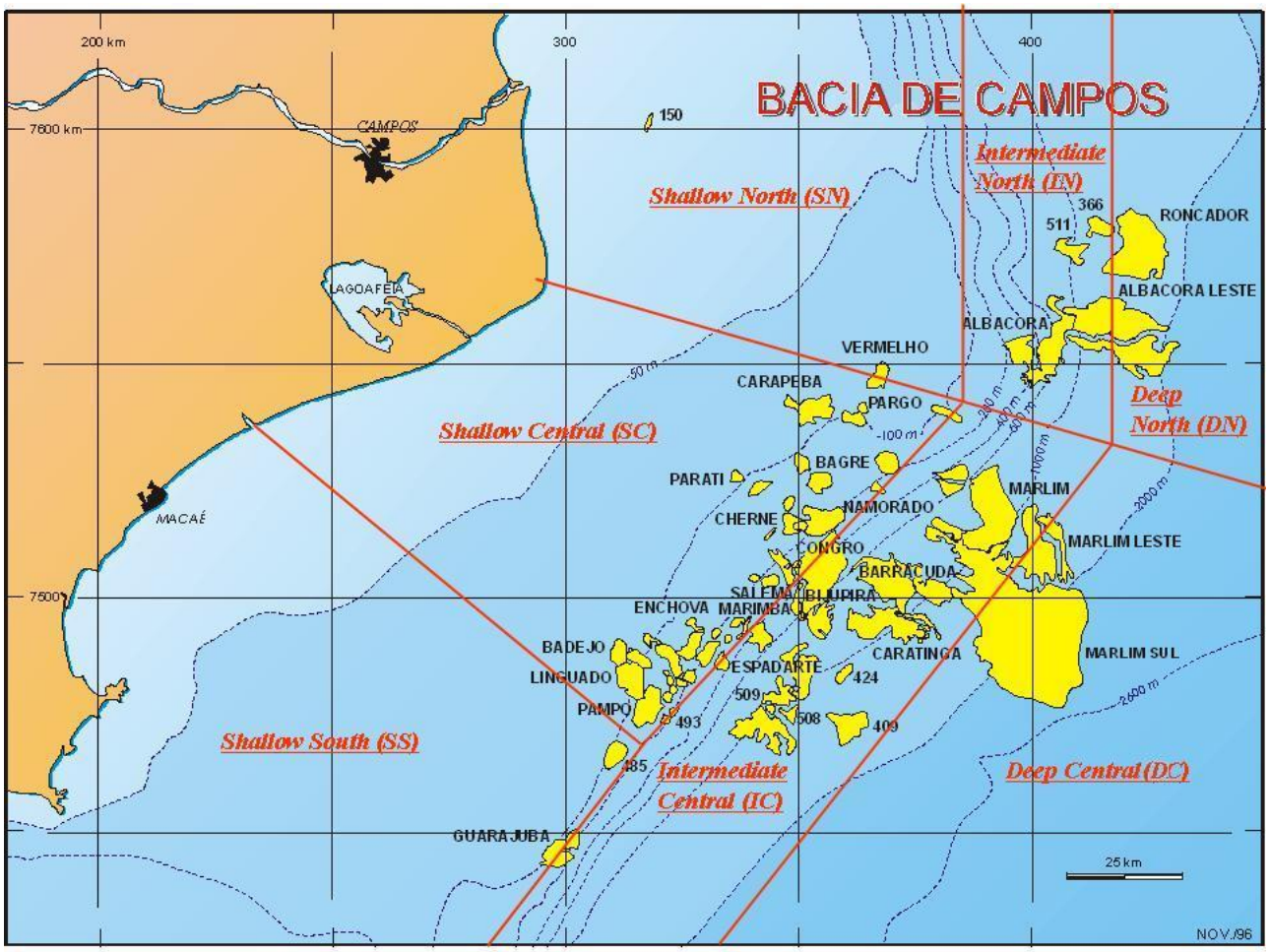

Figure 6.6 – The seven different regions: Shallow North (SN), Intermediate North (IN), Deep North (DN), Shallow Central (SC), Intermediate Central (IC), Shallow South (SS) and Deep Central (DC).

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7 OCEANOGRAPHIC DATA FOR THE SHALLOW NORTH REGION (SN)

There is a lack of long term current data in this region. The current measurement program is underway. It shoud be used the current profiles of Shallow Central Region (SC) until enough data is acquired in the Shallow North Region (SN) for reliable long-term statistics.

8 OCEANOGRAPHIC DATA FOR THE INTERMEDIATE NORTH REGION (IN)

8.1 Current

8.1.1 Frequency of Surface Current by Directions

	DIRECTION										
Current (m/s)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Total**	**%**	**VMean**
0.0 / 0.1	102	125	108	134	112	81	82	83	827	2.31	100.04
0.1 / 0.2	327	293	291	289	272	138	160	111	1881	5.26	82.65
0.2 / 0.3	301	293	259	544	359	151	203	228	2338	6.54	115.51
0.3 / 0.4	250	192	107	533	601	91	52	129	1955	5.47	143.05
0.4 / 0.5	278	85	33	591	1036	46	16	43	2128	5.95	155.50
0.5 / 0.6	177	41	26	769	1872	40	9	38	2972	8.31	163.49
0.6 / 0.7	146	43	23	724	2889	22	0	27	3874	10.83	166.83
0.7 / 0.8	74	6	9	764	2983	63	0	9	3908	10.93	168.23
0.8 / 0.9	28	0	0	794	3393	105	0	7	4327	12.10	169.25
0.9 / 1.0	20	0	0	681	3168	107	0	11	3987	11.15	171.45
1.0 / 1.1	3	0	0	682	2068	83	0	4	2840	7.94	170.92
1.1 / 1.2	0	0	0	657	1289	101	0	0	2047	5.72	170.49
1.2 / 1.3	0	0	0	211	1133	66	0	0	1410	3.94	177.08
1.3 / 1.4	0	0	0	60	776	33	0	0	869	2.43	177.91
1.4 / 1.5	0	0	0	0	306	0	0	0	306	0.86	182.84
1.5 / 1.6	0	0	0	0	73	0	0	0	73	0.20	185.30
1.6 / 1.7	0	0	0	0	27	0	0	0	27	0.08	188.46
1.7 / 1.8	0	0	0	0	0	0	0	0	0	0.00	999.90
Total	1706	1078	856	7433	22357	1127	522	690	35769		
%	4.77	3.01	2.39	20.78	62.50	3.15	1.46	1.93			
Dir Mean	0.38	0.27	0.24	0.71	0.84	0.64	0.21	0.31			

Source: Measured data PROCAP2. Ref. [10].

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8.1.2 Surface Extreme Current Profile (m/s) With N Direction

	RETURN PERIOD (YEARS)				
DEPTH	**1**	**10**	**50**	**100**	**DIRECTION**
Surface	1.12	1.34	1.48	1.54	N
100 m	0.96	1.10	1.19	1.22	N
150 m	0.83	1.04	1.16	1.21	N
200 m	0.79	0.99	1.10	1.15	NE
250 m	0.76	0.95	1.06	1.10	NE
300 m	0.74	0.92	1.01	1.06	NE
400 m	0.68	0.84	0.93	0.97	NE
500 m	0.63	0.77	0.84	0.87	NE
600 m	0.57	0.69	0.75	0.78	NE

Sources: SIMO (ALBACORA-Orion, FUNDESPA and PROCAP2). Ref. [11].

8.1.3 Surface Extreme Current Profile (m/s) With NE Direction

	RETURN PERIOD (YEARS)				
DEPTH	**1**	**10**	**50**	**100**	**DIRECTION**
Surface	0.81	0.93	1.00	1.03	NE
100 m	0.82	0.93	1.00	1.03	NE
150 m	0.94	1.17	1.29	1.34	NE
200 m	0.98	1.23	1.36	1.42	NE
250 m	0.95	1.21	1.35	1.41	NE
300 m	0.91	1.18	1.34	1.40	NE
400 m	0.87	1.14	1.28	1.34	NE
500 m	0.75	0.94	1.05	1.09	NE
600 m	0.72	0.90	0.99	1.03	NE

Sources: Measured Data (ALBACORA-Orion, FUNDESPA and PROCAP2). Ref. [11].

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8.1.4 Surface Extreme Current Profile (m/s) With E Direction

	RETURN PERIOD (YEARS)				
DEPTH	**1**	**10**	**50**	**100**	**DIRECTION**
Surface	0.80	0.97	1.08	1.13	E
100 m	0.59	0.73	0.83	0.87	N
150 m	0.26	0.34	0.39	0.41	SE
200 m	0.20	0.26	0.31	0.32	E
250 m	0.31	0.54	0.68	0.74	NE
300 m	0.70	0.95	1.05	1.11	NE
400 m	0.51	0.67	0.74	0.78	NE
500 m	0.40	0.53	0.59	0.62	N
600 m	0.35	0.43	0.48	0.50	N

Sources: Measured data (ALBACORA-Orion, FUNDESPA and PROCAP2). Ref. [11]

8.1.5 Surface Extreme Current Profile (m/s) With SE Direction

	RETURN PERIOD (YEARS)				
DEPTH	**1**	**10**	**50**	**100**	**DIRECTION**
Surface	1.41	1.62	1.74	1.79	SE
100 m	0.82	1.07	1.22	1.29	S
150 m	0.52	0.61	0.67	0.69	SE
200 m	0.37	0.42	0.46	0.47	SE
250 m	0.30	0.35	0.38	0.39	SE
300 m	0.40	0.49	0.56	0.58	N
400 m	0.49	0.63	0.72	0.76	N
500 m	0.59	0.71	0.78	0.81	N
600 m	0.51	0.58	0.63	0.64	N

Sources: Measured data (ALBACORA-Orion, FUNDESPA and PROCAP2). Ref. [11].

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8.1.6 Surface Extreme Current Profile (m/s) With S Direction

	RETURN PERIOD (YEARS)				
DEPTH	**1**	**10**	**50**	**100**	**DIRECTION**
Surface	1.47	1.76	1.97	2.06	S
100 m	1.13	1.39	1.57	1.65	S
150 m	0.84	1.05	1.19	1.25	S
200 m	0.66	0.83	0.94	0.99	S
250 m	0.56	0.71	0.81	0.86	S
300 m	0.46	0.59	0.68	0.72	S
400 m	0.55	0.69	0.80	0.84	NE
500 m	0.58	0.72	0.82	0.86	NE
600 m	0.52	0.64	0.73	0.77	NE

Sources: Measured data (ALBACORA-Orion, FUNDESPA and PROCAP2). Ref. [11].

8.1.7 Surface Extreme Current Profile (m/s) With SW Direction

	RETURN PERIOD (YEARS)				
DEPTH	**1**	**10**	**50**	**100**	**DIRECTION**
Surface	1.47	1.70	1.84	1.89	SW
100 m	1.09	1.28	1.40	1.44	S
150 m	0.73	1.02	1.21	1.30	S
200 m	0.53	0.73	0.87	0.93	S
250 m	0.40	0.57	0.68	0.73	S
300 m	0.29	0.42	0.51	0.55	NE
400 m	0.46	0.63	0.75	0.80	NE
500 m	0.49	0.67	0.79	0.84	NE
600 m	0.42	0.57	0.68	0.73	NE

Sources: Measured data (ALBACORA-Orion, FUNDESPA and PROCAP2). Ref. [11].

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8.1.8 Surface Extreme Current Profile (m/s) With W Direction

	RETURN PERIOD (YEARS)				
DEPTH	1	10	50	100	DIRECTION
Surface	0.81	0.94	1.01	1.04	W
100 m	0.54	0.64	0.70	0.72	NW
150 m	0.41	0.64	0.80	0.86	N
200 m	0.41	0.72	0.97	1.03	N
250 m	0.42	0.68	0.87	0.92	N
300 m	0.43	0.67	0.83	0.89	N
400 m	0.46	0.66	0.77	0.82	NE
500 m	0.49	0.64	0.72	0.76	NE
600 m	0.40	0.56	0.66	0.70	NE

Sources: Measured data (ALBACORA-Orion, FUNDESPA and PROCAP2). Ref. [11].

8.1.9 Surface Extreme Current Profile (m/s) With NW Direction

	RETURN PERIOD (YEARS)				
DEPTH	1	10	50	100	DIRECTION
Surface	0.97	1.13	1.22	1.26	NW
100 m	0.75	0.87	0.93	0.96	NE
150 m	0.32	0.61	0.80	0.89	N
200 m	0.36	0.69	0.92	1.02	N
250 m	0.42	0.74	0.96	1.06	N
300 m	0.41	0.71	0.91	1.00	NE
400 m	0.39	0.64	0.81	0.89	NE
500 m	0.37	0.57	0.71	0.77	NE
600 m	0.37	0.51	0.60	0.64	NE

Sources: Measured data (ALBACORA-Orion, FUNDESPA and PROCAP2). Ref. [11].

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8.2 Vertical Profile of Sea Water Temperature (OC)

DEPTH (m)	TEMPERATURE (°C)		
	MAX	MED	MIN
5	29.52	25.80	21.25
50	28.04	24.37	17.25
100	23.85	20.77	15.67
150	20.97	17.58	14.00
200	18.06	15.39	12.48
250	16.98	14.14	10.76
300	16.79	12.98	9.39
400	13.39	10.65	7.43
500	11.96	8.71	5.12
600	10.17	6.94	4.83
900	6.36	4.67	3.57

Sources: Measured data (ORION – ALBACORA. 1987/1988). Ref. [12].

8.3 Vertical Profile of Sea Water Salinity [PSU]

DEPTH (m)	SALINITY		
	MAX	MED	MIN
5	37.69	36.64	33.91
50	37.47	36.69	34.79
100	37.33	36.40	34.82
150	36.68	35.90	34.83
200	36.19	35.61	34.77
250	36.06	35.48	34.87
300	35.81	35.35	34.77
400	35.78	35.11	34.22
500	35.64	34.53	34.28
600	35.49	34.80	34.20
700	34.81	34.57	34.32
900	34.78	34.38	34.22

Sources: Measured data (ORION – ALBACORA. 1987/1988). Ref. [12].

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8.4 Vertical Profile of Sea Water Density (kg/m³)

DEPTH (m)	DENSITY (kg/m³)		
	MAX	MED	MIN
5	1025.77	1024.72	1022.13
50	1026.26	1025.19	1022.81
100	1026.97	1026.00	1024.72
150	1027.43	1026.72	1025.64
200	1027.85	1027.24	1026.37
250	1028.18	1027.64	1027.06
300	1028.59	1027.91	1027.02
400	1029.32	1028.71	1027.98
500	1030.05	1029.36	1028.67
600	1030.58	1029.97	1028.98
900	-	1031.40	-

Sources: Measured data (ORION – ALBACORA. 1987/1988). Ref. [12].

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9 OCEANOGRAPHIC DATA FOR THE DEEP NORTH REGION (DN)

9.1 Current

9.1.1 Frequency of Surface Current by Directions

Speed (m/s)		N	NE	E	SE	S	SW	W	NW	Freq	%	Mean Dir
0.0	0.1	521	469	705	1059	1290	1103	583	530	6260	12.22	178.91
0.1	0.2	437	469	799	1841	4042	2704	963	381	11636	22.72	186.81
0.2	0.3	227	215	310	1882	5100	2656	383	249	11022	21.52	184.39
0.3	0.4	118	172	171	1532	3825	1089	162	91	7160	13.98	176.34
0.4	0.5	144	84	235	1947	2476	295	58	23	5262	10.27	161.03
0.5	0.6	113	80	316	1871	1382	174	29	17	3982	7.78	150.42
0.6	0.7	78	49	336	1593	407	66	11	6	2546	4.97	135.33
0.7	0.8	7	39	209	1026	139	1	4	1	1426	2.78	131.35
0.8	0.9	12	19	127	420	36	0	4	0	618	1.21	126.05
0.9	1.0	1	29	163	480	7	0	0	0	680	1.33	118.91
1.0	1.1	0	36	172	202	0	0	0	0	410	0.8	106.18
1.1	1.2	0	57	31	18	0	0	0	0	106	0.21	79.18
1.2	1.3	0	56	6	2	0	0	0	0	64	0.12	63.18
1.3	1.4	0	35	4	0	0	0	0	0	39	0.08	60.51
1.4	1.5	0	1	0	0	0	0	0	0	1	0	56
1.5	1.6	0	0	0	0	0	0	0	0	0	0	999.9
Freq		1658	1810	3584	13873	18704	8088	2197	1298	51212		
%		3.24	3.53	7.00	27.09	36.52	15.79	4.29	2.53			
Mean Speed		0.24	0.35	0.41	0.44	0.3	0.22	0.18	0.16	0.33		

Source: Measured data PROCAP-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

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9.1.2 Surface Extreme Current Profile (m/s) With N Direction

	RETURN PERIOD (YEARS)						
	1	10	20	30	50	100	DIRECTION
Surface	0.85	1.05	1.11	1.14	1.18	1.23	N
100m	0.85	1.05	1.11	1.14	1.18	1.23	N
350m	0.82	1.0	1.05	1.08	1.11	1.16	N
500m	0.61	0.69	0.72	0.73	0.75	0.77	N
1000m	0.59	0.65	0.66	0.67	0.68	0.69	N
1250m	0.43	0.48	0.49	0.50	0.51	0.52	N
1500m	0.26	0.31	0.33	0.33	0.34	0.36	N-NE
2000m	0.23	0.32	0.35	0.36	0.38	0.39	N
2500m	0.21	0.26	0.28	0.28	0.30	0.31	N

Source: Measured data PROCAP-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

9.1.3 Surface Extreme Current Profile (m/s) With NE Direction

	RETURN PERIOD (YEARS)						
	1	10	20	30	50	100	DIRECTION
Surface	1.11	1.26	1.31	1.33	1.36	1.41	NE
100m	1.06	1.18	1.22	1.24	1.25	1.29	NE
350m	0.82	1.02	1.07	1.10	1.14	1.20	NE
500m	0.52	0.59	0.61	0.62	0.63	0.65	N
1000m	0.57	0.64	0.65	0.66	0.68	0.69	N
1250m	0.42	0.48	0.49	0.50	0.51	0.53	N
1500m	0.22	0.27	0.28	0.29	0.29	0.30	N-NE
2000m	0.30	0.36	0.37	0.38	0.39	0.40	N
2500m	0.26	0.34	0.37	0.38	0.40	0.42	N

Source: Measured Data Procap-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

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9.1.4 Surface Extreme Current Profile (m/s) With E Direction

	RETURN PERIOD (YEARS)						
	1	10	20	30	50	100	DIRECTION
Surface	0.72	0.94	1.00	1.04	1.08	1.14	E
100m	0.61	0.80	0.86	0.89	0.93	0.99	E
350m	0.62	0.82	0.88	0.91	0.96	1.02	N
500m	0.72	0.93	0.99	1.03	1.08	1.14	N
1000m	0.55	0.60	0.62	0.62	0.63	0.65	N
1250m	0.41	0.47	0.49	0.49	0.50	0.52	N
1500m	0.27	0.32	0.34	0.35	0.36	0.38	N-NE
2000m	0.33	0.42	0.44	0.46	0.48	0.51	NE
2500m	0.22	0.30	0.33	0.34	0.36	0.38	NE

Source: Measured Data Procap-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

9.1.5 Surface Extreme Current Profile (m/s) With SE Direction

	RETURN PERIOD (YEARS)						
	1	10	20	30	50	100	DIRECTION
Surface	1.14	1.29	1.34	1.36	1.39	1.44	SE
100m	0.72	0.78	0.79	0.80	0.81	0.83	SE
350m	0.52	0.58	0.60	0.61	0.62	0.63	N
500m	0.68	0.79	0.81	0.83	0.85	0.88	N
1000m	0.39	0.46	0.48	0.49	0.50	0.52	N
1250m	0.39	0.46	0.48	0.49	0.50	0.52	N
1500m	0.30	0.35	0.37	0.38	0.39	0.40	N-NE
2000m	0.28	0.36	0.38	0.40	0.41	0.44	NE
2500m	0.28	0.36	0.38	0.40	0.41	0.44	NE

Source: Measured Data Procap-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

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9.1.6 Surface Extreme Current Profile (m/s) With S Direction

	RETURN PERIOD (YEARS)						
	1	10	20	30	50	100	DIRECTION
Surface	1.05	1.19	1.23	1.26	1.28	1.33	S
100m	1.05	1.19	1.23	1.26	1.28	1.33	S
350m	0.61	0.73	0.76	0.78	0.81	0.84	N
500m	0.60	0.68	0.70	0.72	0.74	0.76	N
1000m	0.59	0.65	0.67	0.68	0.69	0.71	N
1250m	0.48	0.53	0.55	0.55	0.56	0.58	N
1500m	0.38	0.44	0.46	0.47	0.48	0.50	N
2000m	0.30	0.34	0.35	0.36	0.37	0.38	N
2500m	0.29	0.35	0.36	0.37	0.38	0.40	N

Source: Measured Data Procap-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

9.1.7 Surface Extreme Current Profile (m/s) With SW Direction

	RETURN PERIOD (YEARS)						
	1	10	20	30	50	100	DIRECTION
Surface	0.79	0.98	1.04	1.07	1.12	1.18	SW
100m	0.72	0.90	0.96	0.99	1.03	1.09	SW
350m	0.54	0.68	0.72	0.74	0.78	0.82	NW
500m	0.57	0.65	0.67	0.68	0.70	0.72	N
1000m	0.54	0.59	0.61	0.62	0.63	0.64	N
1250m	0.42	0.46	0.48	0.48	0.49	0.50	N
1500m	0.38	0.45	0.47	0.49	0.50	0.52	N
2000m	0.27	0.35	0.37	0.39	0.40	0.42	N
2500m	0.27	0.34	0.36	0.37	0.39	0.41	N

Source: Measured Data Procap-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

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9.1.8 Surface Extreme Current Profile (m/s) With W Direction

	RETURN PERIOD (YEARS)						
	1	10	20	30	50	100	DIRECTION
Surface	0.69	0.89	0.95	0.99	1.03	1.09	W
100m	0.49	0.57	0.59	0.61	0.62	0.64	W
350m	0.45	0.51	0.53	0.53	0.55	0.56	N
500m	0.60	0.69	0.72	0.73	0.75	0.77	N
1000m	0.60	0.67	0.69	0.70	0.71	0.73	N
1250m	0.45	0.51	0.53	0.53	0.55	0.56	N
1500m	0.35	0.42	0.44	0.45	0.46	0.48	N
2000m	0.31	0.40	0.43	0.45	0.47	0.50	N
2500m	0.26	0.33	0.35	0.36	0.37	0.39	N

Source: Measured Data Procap-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

9.1.9 Surface Extreme Current Profile (m/s) With NW Direction

	RETURN PERIOD (YEARS)						
	1	10	20	30	50	100	DIRECTION
Surface	0.69	0.88	0.91	0.94	0.97	1.02	NW
100m	0.52	0.62	0.65	0.66	0.68	0.71	NW
350m	0.48	0.53	0.55	0.56	0.57	0.58	N
500m	0.67	0.76	0.79	0.80	0.82	0.85	N
1000m	0.58	0.64	0.66	0.66	0.67	0.69	N
1250m	0.42	0.47	0.48	0.49	0.50	0.51	N
1500m	0.26	0.31	0.32	0.33	0.33	0.34	N
2000m	0.26	0.33	0.34	0.35	0.37	0.38	N
2500m	0.25	0.31	0.33	0.34	0.35	0.37	N

Source: Measured Data Procap-2000 (1994-95), Roncador Measurement Program (1998-2000). Ref. [13].

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9.1.10 Mid-water level Extreme Current Profile (m/s) With N Direction at 1000m

Return Period (years)	1		10		20		30		50		100	
Depth (m)	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire
0	0.38	S	0.39	S	0.39	S	0.40	S	0.40	S	0.40	S
30	0.38	S	0.39	S	0.39	S	0.40	S	0.40	S	0.40	S
100	0.27	SW	0.27	SW	0.27	SW	0.27	SW	0.27	SW	0.27	SW
350	0.47	N	0.50	N	0.51	N	0.51	N	0.52	N	0.52	N
500	0.49	N	0.53	N	0.54	N	0.54	N	0.55	N	0.56	N
1000	0.76	N	0.79	N	0.80	N	0.81	N	0.81	N	0.82	N
1250	0.43	NE	0.45	N	0.46	N	0.46	N	0.47	N	0.48	N
1500	0.25	N	0.29	NW	0.30	NW	0.31	NW	0.32	NW	0.33	NW
1650	0.13	NW	0.18	NW	0.19	NW	0.19	NW	0.20	NW	0.21	W
1694	0.21	W	0.25	W	0.26	W	0.27	W	0.28	W	0.29	W

Source: Roncador field current data. Ref. [14].

9.1.11 Mid-water level Extreme Current Profile (m/s) With NE Direction at 1000m

Return Period (years)	1		10		20		30		50		100	
Depth (m)	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire
0	0.46	NW	0.57	NW	0.60	NW	0.62	NW	0.64	NW	0.67	NW
30	0.46	NW	0.57	NW	0.60	NW	0.62	NW	0.64	NW	0.67	NW
100	0.46	NW	0.57	NW	0.59	NW	0.61	NW	0.63	NW	0.66	NW
350	0.43	NW	0.44	NW	0.45	NW	0.45	NW	0.45	NW	0.45	NW
500	0.46	SW	0.51	SW	0.52	SW	0.53	SW	0.54	SW	0.56	SW
1000	0.71	NE	0.75	NE	0.76	NE	0.77	NE	0.78	NE	0.78	NE
1250	0.42	N	0.48	N	0.49	NE	0.50	NE	0.51	NE	0.53	NE
1500	0.29	N	0.34	NE	0.36	NE	0.37	NE	0.38	NE	0.40	NE
1650	0.29	NE	0.39	NE	0.42	NE	0.44	NE	0.46	NE	0.49	NE
1694	0.20	E	0.29	E	0.32	E	0.34	E	0.36	E	0.39	E

Source: Roncador field current data . Ref. [14].

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9.1.12 Mid-water level Extreme Current Profile (m/s) With E Direction at 1000m

Return Period (years)	1		10		20		30		50		100	
Depth (m)	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire
0	0.43	SW	0.47	SW	0.48	SW	0.48	SW	0.49	SW	0.50	SW
30	0.43	SW	0.47	SW	0.48	SW	0.48	SW	0.49	SW	0.50	SW
100	0.41	SW	0.44	SW	0.45	SW	0.45	SW	0.46	SW	0.46	SW
350	0.21	SE	0.28	SE	0.30	SE	0.31	SE	0.33	SE	0.35	SE
500	0.29	SE	0.36	SE	0.39	SE	0.40	SE	0.41	SE	0.43	SE
1000	0.37	SE	0.44	SE	0.46	SE	0.47	SE	0.48	SE	0.50	E-SE
1250	0.19	S	0.25	S	0.27	S	0.28	S	0.29	S	0.31	S
1500	0.30	S	0.36	S	0.38	SE	0.39	SE	0.41	SE	0.42	SE
1650	0.08	E	0.12	E	0.13	E	0.14	E	0.15	E	0.16	E
1694	0.14	NE	0.21	NE	0.23	NE	0.24	NE	0.26	NE	0.28	NE

Source: Roncador field current data. Ref. [14].

9.1.13 Mid-water level Extreme Current Profile (m/s) With SE Direction at 1000m

Return Period (years)	1		10		20		30		50		100	
Depth (m)	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire
0	0.30	S	0.32	S	0.32	S	0.33	S	0.33	S	0.33	S
30	0.30	S	0.32	S	0.32	S	0.33	S	0.33	S	0.33	S
100	0.52	SE	0.54	SE	0.54	SE	0.54	SE	0.55	SE	0.55	SE
350	0.23	S	0.26	S	0.26	S	0.27	S	0.27	S	0.28	S
500	0.19	SW	0.21	SW	0.22	SW	0.22	S	0.23	S	0.23	S
1000	0.30	SE	0.33	SE	0.34	SE	0.34	SE	0.35	SE	0.35	SE
1250	0.15	S	0.18	S	0.19	S	0.19	S	0.20	S	0.21	S
1500	0.19	S	0.22	S	0.23	S	0.23	S	0.24	S	0.25	S
1650	0.13	S	0.15	S	0.15	S	0.16	S	0.16	S	0.16	S
1694	0.08	SE	0.09	SE	0.09	SE	0.09	SE	0.09	SE	0.10	SE

Source: Roncador field current data . Ref. [14].

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9.1.14 Mid-water level Extreme Current Profile (m/s) With S Direction at 1000m

Return Period (years)	1		10		20		30		50		100	
Depth (m)	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire
0	0.15	NW	0.15	NW	0.16	NW	0.16	NW	0.16	NW	0.16	NW
30	0.15	NW	0.15	NW	0.16	NW	0.16	NW	0.16	NW	0.16	NW
100	0.13	SE	0.12	SE	0.12	SE	0.12	SE	0.12	SE	0.12	SE
350	0.15	W	0.16	W	0.16	W	0.17	W	0.17	W	0.17	W
500	0.20	NW	0.21	NW	0.21	NW	0.21	NW	0.21	NW	0.21	W
1000	0.70	S	0.71	S	0.72	S	0.72	S	0.72	S	0.73	S
1250	0.23	NW	0.23	NW	0.23	NW	0.23	NW	0.23	NW	0.23	NW
1500	0.23	W	0.23	W	0.23	W	0.24	W	0.24	W	0.24	W
1650	0.04	SE	0.06	SE	0.07	SE	0.07	SE	0.07	SE	0.08	SE
1694	0.08	SE	0.11	SE	0.11	SE	0.12	SE	0.12	SE	0.12	SE

Source: Roncador field current data. Ref. [14].

9.1.15 Mid-water level Extreme Current Profile (m/s) With SW Direction at 1000m

Return Period (years)	1		10		20		30		50		100	
Depth (m)	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire
0	0.16	NW	0.17	NW	0.17	NW	0.17	NW	0.18	NW	0.18	NW
30	0.16	NW	0.17	NW	0.17	NW	0.17	NW	0.18	NW	0.18	NW
100	0.10	S	0.09	S	0.09	S	0.09	S	0.09	S	0.09	S
350	0.17	W	0.18	W	0.18	W	0.18	W	0.19	W	0.19	W
500	0.22	NW	0.22	W	0.23	W	0.23	W	0.23	W	0.23	W
1000	0.60	SW	0.61	SW	0.62	SW	0.62	SW	0.62	SW	0.62	SW
1250	0.15	NW	0.15	NW	0.15	NW	0.15	NW	0.15	NW	0.15	NW
1500	0.16	W	0.17	W	0.17	W	0.18	SW	0.18	SW	0.18	SW
1650	0.13	N	0.13	NE	0.13	NE	0.13	NE	0.13	NE	0.13	NE
1694	0.08	SE	0.10	SE	0.11	SE	0.11	SE	0.11	SE	0.12	SE

Source: Roncador field current data . Ref. [14].

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9.1.16 Mid-water level Extreme Current Profile (m/s) With W Direction at 1000m

Return Period (years)	1		10		20		30		50		100	
Depth (m)	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire
0	0.13	NE	0.13	NE	0.13	NE	0.13	NE	0.13	NE	0.13	NE
30	0.13	NE	0.13	NE	0.13	NE	0.13	NE	0.13	NE	0.13	NE
100	0.15	NW	0.17	NW	0.18	NW	0.18	NW	0.18	NW	0.19	NW
350	0.30	W	0.33	W	0.34	W	0.34	W	0.35	W	0.35	W
500	0.43	NW	0.45	NW	0.46	NW	0.46	NW	0.46	NW	0.47	NW
1000	0.58	W	0.61	W	0.61	W	0.62	W	0.62	W	0.63	W
1250	0.28	N	0.30	NW	0.30	NW	0.31	NW	0.31	NW	0.32	NW
1500	0.22	NW	0.24	NW	0.25	NW	0.25	NW	0.25	NW	0.26	NW
1650	0.19	N	0.19	N	0.18	N	0.18	N	0.18	N	0.18	N
1694	0.16	SE	0.17	SE	0.18	SE	0.18	SE	0.19	SE	0.19	SE

Source: Roncador field current data. Ref. [14].

9.1.17 Mid-water level Extreme Current Profile (m/s) With NW Direction at 1000m

Return Period (years)	1		10		20		30		50		100	
Depth (m)	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire	Int.	Dire
0	0.25	NW	0.32	NW	0.34	NW	0.36	NW	0.37	NW	0.39	NW
30	0.25	NW	0.32	NW	0.34	NW	0.36	NW	0.37	NW	0.39	NW
100	0.09	NW	0.16	NW	0.18	NW	0.19	NW	0.21	NW	0.23	NW
350	0.14	W	0.20	W	0.22	W	0.23	W	0.24	W	0.26	W
500	0.40	N	0.46	N	0.47	N	0.48	N	0.49	N	0.51	NW
1000	0.55	NW	0.61	NW	0.63	NW	0.64	NW	0.65	NW	0.67	NW
1250	0.32	N	0.37	N	0.39	N	0.40	N	0.41	N	0.43	N
1500	0.07	N	0.09	N	0.10	N	0.11	N	0.11	N	0.12	N
1650	0.15	E	0.18	E	0.19	E	0.19	E	0.20	E	0.21	E
1694	0.12	SE	0.17	SE	0.18	SE	0.19	SE	0.20	SE	0.21	SE

Source: Roncador field current data. Ref. [14].

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9.2 Vertical Profile of Sea Water Temperature (°C)

DEPTH (m)	TEMPERATURE (°C)		
	MAX	MED	MIN
Surface	28.07	25.23	21.64
50	27.67	24.96	18.13
100	26.83	22.89	14.35
350	14.69	13.37	11.32
500	11.67	9.87	6.76
1000	4.22	3.71	3.35
2000	3.82	3.49	3.04

Source: MARLIM (PROCAP2 -1991/1993). Ref. [15].

9.3 Vertical Profile of Sea Water Salinity [PSU]

DEPTH (m)	SALINITY		
	MAX	MED	MIN
Surface	37.98	37.05	34.71
50	37.92	37.10	35.51
100	37.46	36.76	35.32
350	37.39	36.75	35.17
500	37.38	36.28	35.09
1000	35.65	34.39	33.78
2000	35.02	34.98	34.89

Source: MARLIM (PROCAP2 -1991/1993). Ref. [15].

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9.4 Vertical Profile of Sea Water Density (kg/m³)

DEPTH (m)	DENSITY(kg/m³)		
	MAX	MED	MIN
Surface	1026.12	1024.82	1023.31
50	1027.07	1025.18	1023.81
100	1027.39	1025.83	1024.51
350	1028.51	1028.09	1027.54
500	1030.05	1029.36	1028.67
1000	1032.49	1031.92	1030.75
2000	1037.27	1037.06	1036.93

Source: MARLIM (PROCAP2 -1991/1993). Ref. [15].

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10 OCEANOGRAPHIC DATA FOR THE SHALLOW CENTRAL REGION (SC)

10.1 Current

10.1.1 Frequency of Surface Current by Directions

	DIRECTION								
Current (m/s)	N	NE	E	SE	S	SW	W	NW	TOTAL
0.0 / 0.1	31	15	15	14	36	32	37	45	225
0.1 / 0.2	72	34	8	25	66	148	133	80	566
0.2 / 0.3	97	50	1	5	71	388	164	126	902
0.3 / 0.4	81	18	0	4	65	465	162	95	890
0.4 / 0.5	41	36	1	1	47	328	134	16	604
0.5 / 0.6	17	12	0	0	9	260	120	3	421
0.6 / 0.7	11	1	0	0	6	263	72	0	353
0.7 / 0.8	12	0	0	0	9	172	42	0	235
0.8 / 0.9	14	0	0	0	1	102	17	0	134
0.9 / 1.0	2	0	0	0	0	32	4	0	38
1.0 / 1.1	0	0	0	0	0	25	1	0	26
1.1 / 1.2	0	0	0	0	0	2	0	0	2
1.2 / 1.3	0	0	0	0	0	0	0	0	0
1.3 / 1.4	0	0	0	0	0	0	0	0	0
1.4 / 1.5	0	0	0	0	0	0	0	0	0
1.5 / 1.6	0	0	0	0	0	0	0	0	0
1.6 / 1.7	0	0	0	0	0	0	0	0	0
1.7 / 1.8	0	0	0	0	0	0	0	0	0
1.8 / 1.9	0	0	0	0	0	0	0	0	0
1.9 / 2.0	0	0	0	0	0	0	0	0	0
TOTAL	378	166	25	49	310	2217	886	365	4396

Source: Measured data (Garoupa – 1980 /1981). Ref. [16].

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10.1.2 Surface Extreme Current Profile (m/s) With N Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
Surface	1.02	1.26	1.33	1.37	1.42	1.48	-
20 m	1.02	1.26	1.33	1.37	1.42	1.48	-
80 m	0.45	0.52	0.53	0.54	0.55	0.57	-
120 m	0.39	0.45	0.46	0.47	0.48	0.50	-

Source: Measured data (Garoupa– 1980 /1981). Ref. [16].

10.1.3 Surface Extreme Current Profile (m/s) With NE Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
Surface	0.70	0.82	0.85	0.87	0.89	0.92	-
20 m	0.70	0.82	0.85	0.87	0.89	0.92	-
80 m	0.35	0.42	0.44	0.45	0.47	0.48	-
120 m	0.31	0.37	0.38	0.39	0.41	0.42	-

Source: Measured data (Garoupa – 1980 / 1981). Ref. [16].

10.1.4 Surface Extreme Current Profile (m/s) With E Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
Surface	0.70	0.82	0.85	0.87	0.89	0.92	-
20 m	0.70	0.82	0.85	0.87	0.89	0.92	-
80 m	0.50	0.58	0.61	0.62	0.63	0.65	-
120 m	0.44	0.51	0.53	0.54	0.55	0.57	-

Source: Measured data (Garoupa – 1980 /1981). Ref. [16].

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10.1.5 Surface Extreme Current Profile (m/s) With SE Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
Surface	0.36	0.49	0.53	0.55	0.58	0.61	-
20 m	0.36	0.49	0.53	0.55	0.58	0.61	-
80 m	0.34	0.47	0.51	0.53	0.55	0.59	-
120 m	0.30	0.41	0.45	0.46	0.48	0.52	-

Source: Measured data (Garoupa – 1980 /1981). Ref. [16].

10.1.6 Surface Extreme Current Profile (m/s) With S Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
Surface	0.86	1.04	1.09	1.12	1.15	1.20	-
20 m	0.86	1.04	1.09	1.12	1.15	1.20	-
80 m	0.48	0.60	0.64	0.66	0.68	0.72	-
120 m	0.42	0.52	0.56	0.58	0.59	0.63	-

Source: Measured data (Garoupa – 1980 /1981). Ref. [16].

10.1.7 Surface Extreme Current Profile (m/s) With SW Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
Surface	1.28	1.44	1.49	1.51	1.54	1.59	-
20 m	1.28	1.44	1.49	1.51	1.54	1.59	-
80 m	0.64	0.72	0.75	0.76	0.78	0.80	-
120 m	0.56	0.63	0.65	0.66	0.68	0.70	-

Source: Measured data (Garoupa – 1980 /1981). Ref. [16].

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10.1.8 Surface Extreme Current Profile (m/s) With W Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
Surface	1.05	1.19	1.24	1.26	1.29	1.32	-
20 m	1.05	1.19	1.24	1.26	1.29	1.32	-
80 m	0.55	0.62	0.64	0.65	0.67	0.68	-
120 m	0.48	0.54	0.56	0.57	0.58	0.59	-

Source: Measured data (Garoupa – 1980 /1981). Ref. [16].

10.1.9 Surface Extreme Current Profile (m/s) With NW Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
Surface	1.05	1.19	1.24	1.26	1.29	1.32	-
20 m	1.05	1.19	1.24	1.26	1.29	1.32	-
80 m	0.53	0.60	0.62	0.64	0.65	0.67	-
120 m	0.46	0.52	0.54	0.56	0.57	0.59	-

Source: Measured data (Garoupa – 1980 /1981). Ref. [16].

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10.2 Vertical Profile of Sea Water Temperature (°C)

DEPTH (m)	TEMPERATURE (°C)		
	MAX	MED	MIN
5	27.50	24.22	22.50
15	27.50	23.69	21.10
30	27.60	21.50	17.50
45	24.40	19.49	15.70
50	24.30	19.02	15.70
55	23.90	18.54	15.00
60	23.80	17.99	14.90
65	23.50	17.93	14.70
70	23.40	17.49	14.60
75	23.20	17.02	14.50
80	23.00	16.66	14.00
120	21.00	16.27	13.70

Source: CENPES/PDP/MC (SIDAM report N° 92). Ref. [17].

10.3 Vertical Profile of Sea Water Salinity [PSU]

DEPTH (m)	SALINITY		
	MAX	MED	MIN
Surface	-	37.28	-
15	-	-	-
30	-	-	-
45	-	-	-
50	-	-	-
55	-	-	-
60	-	-	-
65	-	-	-
70	-	-	-
75	-	-	-
80	-	-	-
120	-	36.25	-

Source: CENPES/PDP/MC (SIDAM report N° 92). Ref. [17].

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10.4 Vertical Profile of Sea Water Density (kg/m³)

DEPTH (m)	DENSITY (kg/m³)		
	MAX	MED	MIN
Surface	1026.4	1025.5	1023.6
15	-	-	-
30	-	-	-
45	-	-	-
50	-	-	-
55	-	-	-
60	-	-	-
65	-	-	-
70	-	-	-
75	-	-	-
80	-	-	-
120	1028.1	1026.5	1025.6

Source: CENPES/PDP/MC (SIDAM report N° 92). Ref. [17].

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11 OCEANOGRAPHIC DATA FOR THE INTERMEDIATE CENTRAL REGION (IC)

11.1 Current

11.1.1 Frequency of Surface Current by Directions

		DIRECTION(º)																		
(m/s)		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Freq	%	MDir
0.0	0.1	16	11	21	24	18	30	31	44	67	42	40	26	23	16	21	13	443	1.99	180
0.1	0.2	39	39	57	46	29	43	40	74	177	279	172	131	67	44	30	26	1293	5.81	207
0.2	0.3	37	42	33	25	45	50	29	57	189	534	572	229	66	43	22	17	1990	8.95	214
0.3	0.4	13	32	37	62	52	70	63	56	202	1070	1071	322	186	61	13	20	3330	15	215
0.4	0.5	10	7	21	52	55	97	47	74	169	1363	1810	288	84	156	24	24	4281	19.3	217
0.5	0.6	39	18	34	60	85	45	34	56	261	1620	1775	298	38	39	70	15	4487	20.2	214
0.6	0.7	9	9	41	39	12	5	12	34	327	1417	1302	150	52	24	25	26	3484	15.7	212
0.7	0.8	0	0	52	11	0	0	0	10	183	804	645	80	57	35	15	3	1895	8.52	214
0.8	0.9	0	0	13	1	0	0	0	0	104	297	241	25	12	17	4	0	714	3.21	212
0.9	1.0	0	0	0	0	0	0	0	0	59	91	102	8	3	1	0	0	264	1.19	208
1.0	1.1	0	0	0	0	0	0	0	0	6	29	10	4	0	0	0	0	49	0.22	207
1.1	1.2	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	5	0.02	192
1.2	1.3	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	6	0.03	178
1.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq		163	158	309	320	296	340	256	405	1752	7549	7740	1561	588	436	224	144	22241		
%		0.7	0.7	1.39	1.4	1.3	1.5	1.15	1.8	7.88	33.9	34.8	7.02	2.6	1.96	1.01	0.65			
MHs		0.3	0.3	0.44	0.4	0.4	0.3	0.33	0.4	0.5	0.52	0.51	0.43	0.4	0.43	0.42	0.37			

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program and Papa-Terra Mooring Line. (Water level: 50 m below the surface). Ref. [18].

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11.1.2 Surface Extreme Current Profile (m/s) With N Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.97	1.02	1.04	1.04	1.05	1.06	N
-100.00	0.97	1.02	1.04	1.04	1.05	1.06	N
-250.00	0.42	0.44	0.45	0.45	0.46	0.46	N
-350.00	0.46	0.48	0.49	0.50	0.50	0.51	N
-450.00	0.44	0.47	0.48	0.48	0.49	0.49	N
-550.00	0.35	0.38	0.38	0.39	0.39	0.40	N
-650.00	0.35	0.37	0.38	0.38	0.38	0.39	NE
-750.00	0.40	0.42	0.43	0.43	0.44	0.44	NE
-950.00	0.42	0.44	0.44	0.45	0.45	0.46	NE
-1050.00	0.36	0.39	0.39	0.39	0.40	0.40	NE
-1200.00	0.26	0.29	0.30	0.30	0.31	0.32	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.3 Surface Extreme Current Profile (m/s) With NNE Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.96	1.08	1.11	1.13	1.15	1.17	NNE
-100.00	0.81	0.91	0.94	0.96	0.98	1.00	NNE
-250.00	0.72	0.76	0.78	0.78	0.79	0.80	NNE
-350.00	0.51	0.55	0.57	0.57	0.58	0.59	NNE
-450.00	0.48	0.53	0.54	0.55	0.56	0.57	NE
-550.00	0.38	0.41	0.42	0.42	0.43	0.44	NE
-650.00	0.30	0.34	0.34	0.35	0.35	0.36	NE
-750.00	0.34	0.38	0.39	0.40	0.40	0.41	NE
-950.00	0.26	0.30	0.30	0.31	0.32	0.32	NEE
-1050.00	0.27	0.29	0.29	0.30	0.30	0.31	NEE
-1200.00	0.10	0.10	0.10	0.10	0.10	0.10	E

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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11.1.4 Surface Extreme Current Profile (m/s) With NE Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.96	1.07	1.10	1.11	1.13	1.16	NE
-100.00	0.81	0.91	0.94	0.95	0.97	0.99	NE
-250.00	0.72	0.77	0.78	0.78	0.79	0.80	NE
-350.00	0.52	0.56	0.57	0.58	0.58	0.59	NE
-450.00	0.48	0.52	0.54	0.54	0.55	0.56	NE
-550.00	0.38	0.41	0.42	0.42	0.43	0.43	NE
-650.00	0.30	0.33	0.33	0.34	0.34	0.35	NE
-750.00	0.33	0.37	0.37	0.38	0.38	0.39	NE
-950.00	0.23	0.24	0.25	0.25	0.25	0.26	NE
-1050.00	0.23	0.25	0.26	0.26	0.26	0.27	NE
-1200.00	0.08	0.08	0.08	0.08	0.08	0.09	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.5 Surface Extreme Current Profile (m/s) With ENE Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.88	1.04	1.09	1.11	1.14	1.18	ENE
-100.00	0.88	1.04	1.09	1.11	1.14	1.18	ENE
-250.00	0.63	0.76	0.79	0.81	0.83	0.87	ENE
-350.00	0.41	0.51	0.54	0.55	0.57	0.60	ENE
-450.00	0.43	0.48	0.49	0.50	0.51	0.52	ENE
-550.00	0.46	0.54	0.57	0.58	0.60	0.62	ENE
-650.00	0.32	0.40	0.42	0.43	0.45	0.47	ENE
-750.00	0.41	0.51	0.53	0.55	0.57	0.59	ENE
-950.00	0.35	0.43	0.45	0.46	0.47	0.49	ENE
-1050.00	0.23	0.27	0.28	0.29	0.30	0.31	ENE
-1200.00	0.14	0.16	0.16	0.17	0.17	0.18	ENE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.6 Surface Extreme Current Profile (m/s) With E Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.81	0.98	1.03	1.06	1.10	1.15	E
-100.00	0.79	0.97	1.02	1.05	1.09	1.14	E
-250.00	0.64	0.77	0.81	0.83	0.86	0.90	E
-350.00	0.60	0.73	0.77	0.79	0.81	0.85	E
-450.00	0.64	0.79	0.83	0.85	0.88	0.92	E
-550.00	0.55	0.67	0.70	0.72	0.74	0.78	E
-650.00	0.55	0.66	0.70	0.72	0.74	0.77	E
-750.00	0.52	0.57	0.59	0.60	0.61	0.62	E
-950.00	0.42	0.50	0.53	0.54	0.56	0.59	E
-1050.00	0.33	0.39	0.40	0.41	0.43	0.44	E
-1200.00	0.18	0.22	0.23	0.24	0.24	0.25	E

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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11.1.7 Surface Extreme Current Profile (m/s) With ESE Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.91	1.15	1.22	1.26	1.31	1.38	ESE
-100.00	0.81	1.04	1.11	1.14	1.19	1.26	ESE
-250.00	0.70	0.80	0.82	0.84	0.86	0.88	ESE
-350.00	0.70	0.80	0.83	0.84	0.86	0.88	ESE
-450.00	0.63	0.74	0.77	0.79	0.81	0.84	ESE
-550.00	0.49	0.57	0.59	0.60	0.61	0.63	E
-650.00	0.47	0.55	0.57	0.58	0.60	0.62	E
-750.00	0.55	0.65	0.67	0.69	0.71	0.73	E
-950.00	0.34	0.40	0.42	0.43	0.44	0.46	E
-1050.00	0.26	0.32	0.34	0.35	0.36	0.38	E
-1200.00	0.14	0.16	0.16	0.17	0.17	0.17	E

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.8 Surface Extreme Current Profile (m/s) With SE Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.02	1.25	1.32	1.36	1.41	1.47	SE
-100.00	1.00	1.23	1.30	1.34	1.39	1.46	SE
-250.00	0.62	0.78	0.82	0.85	0.89	0.93	SE
-350.00	0.57	0.72	0.76	0.79	0.82	0.86	SE
-450.00	0.63	0.80	0.85	0.87	0.91	0.96	SE
-550.00	0.34	0.39	0.40	0.41	0.42	0.43	SE
-650.00	0.49	0.61	0.65	0.67	0.70	0.74	E
-750.00	0.46	0.52	0.54	0.55	0.56	0.58	E
-950.00	0.32	0.40	0.42	0.44	0.45	0.48	E
-1050.00	0.36	0.42	0.44	0.46	0.47	0.49	E
-1200.00	0.29	0.34	0.36	0.37	0.38	0.39	E

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.9 Surface Extreme Current Profile (m/s) With SSE Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.40	1.49	1.51	1.53	1.54	1.57	SSE
-100.00	1.17	1.27	1.29	1.31	1.32	1.35	SSE
-250.00	0.50	0.57	0.58	0.59	0.60	0.62	SSE
-350.00	0.43	0.50	0.52	0.53	0.54	0.56	SSE
-450.00	0.40	0.47	0.49	0.50	0.52	0.53	SSE
-550.00	0.19	0.25	0.26	0.27	0.28	0.29	SE
-650.00	0.28	0.32	0.34	0.34	0.35	0.37	SE
-750.00	0.16	0.23	0.25	0.26	0.27	0.29	NE
-950.00	0.24	0.25	0.25	0.25	0.26	0.26	NE
-1050.00	0.29	0.29	0.30	0.30	0.30	0.30	NE
-1200.00	0.30	0.34	0.35	0.35	0.36	0.37	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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11.1.10 Surface Extreme Current Profile (m/s) With S Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.30	1.59	1.67	1.72	1.77	1.84	S
-100.00	1.01	1.26	1.33	1.37	1.42	1.49	S
-250.00	0.42	0.55	0.59	0.61	0.63	0.67	S
-350.00	0.38	0.50	0.53	0.55	0.57	0.60	SE
-450.00	0.33	0.38	0.39	0.40	0.41	0.42	SE
-550.00	0.25	0.33	0.36	0.37	0.39	0.41	SE
-650.00	0.29	0.36	0.37	0.39	0.40	0.42	NE
-750.00	0.29	0.36	0.37	0.38	0.39	0.41	NE
-950.00	0.31	0.37	0.39	0.40	0.41	0.42	NE
-1050.00	0.22	0.28	0.29	0.30	0.31	0.33	NE
-1200.00	0.25	0.30	0.31	0.32	0.33	0.34	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.11 Surface Extreme Current Profile (m/s) With SSW Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.23	1.56	1.65	1.71	1.77	1.87	SSW
-100.00	1.13	1.28	1.32	1.34	1.37	1.41	SSW
-250.00	0.61	0.71	0.74	0.76	0.78	0.80	S
-350.00	0.48	0.60	0.63	0.65	0.67	0.70	S
-450.00	0.37	0.50	0.53	0.55	0.58	0.61	S
-550.00	0.21	0.30	0.33	0.34	0.36	0.38	SES
-650.00	0.20	0.28	0.31	0.32	0.34	0.37	SES
-750.00	0.18	0.29	0.32	0.34	0.36	0.39	E
-950.00	0.17	0.15	0.16	0.17	0.18	0.20	NE
-1050.00	0.23	0.24	0.25	0.25	0.25	0.26	NE
-1200.00	0.29	0.32	0.33	0.34	0.35	0.36	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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11.1.12 Surface Extreme Current Profile (m/s) With SW Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.11	1.43	1.51	1.56	1.63	1.71	SW
-100.00	1.11	1.43	1.51	1.56	1.63	1.71	SW
-250.00	0.40	0.53	0.57	0.59	0.62	0.65	S
-350.00	0.34	0.47	0.51	0.53	0.56	0.59	S
-450.00	0.29	0.41	0.44	0.46	0.49	0.52	S
-550.00	0.14	0.20	0.22	0.23	0.24	0.26	E
-650.00	0.23	0.32	0.34	0.36	0.38	0.40	E
-750.00	0.18	0.22	0.24	0.24	0.25	0.26	NE
-950.00	0.31	0.41	0.44	0.45	0.47	0.50	NE
-1050.00	0.35	0.47	0.50	0.52	0.55	0.58	NE
-1200.00	0.26	0.31	0.33	0.33	0.34	0.36	NE

11.1.13 Surface Extreme Current Profile (m/s) With WSW Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.16	1.41	1.48	1.52	1.57	1.64	WSW
-100.00	1.16	1.41	1.48	1.52	1.57	1.64	WSW
-250.00	0.63	0.71	0.73	0.74	0.75	0.77	WSW
-350.00	0.43	0.51	0.53	0.54	0.55	0.57	WSW
-450.00	0.36	0.45	0.47	0.48	0.50	0.52	W
-550.00	0.29	0.35	0.36	0.37	0.38	0.40	NW
-650.00	0.16	0.17	0.19	0.19	0.20	0.21	NW
-750.00	0.22	0.27	0.29	0.30	0.31	0.32	NNE
-950.00	0.34	0.41	0.43	0.44	0.46	0.48	NE
-1050.00	0.37	0.43	0.45	0.46	0.48	0.49	NE
-1200.00	0.39	0.48	0.50	0.52	0.53	0.56	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.14 Surface Extreme Current Profile (m/s) With W Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.12	1.25	1.28	1.30	1.33	1.36	W
-100.00	0.88	0.93	0.95	0.96	0.97	0.98	W
-250.00	0.33	0.36	0.37	0.38	0.38	0.39	NW
-350.00	0.26	0.28	0.29	0.29	0.30	0.31	N
-450.00	0.27	0.29	0.30	0.30	0.31	0.31	N
-550.00	0.29	0.32	0.33	0.34	0.34	0.35	N
-650.00	0.28	0.32	0.33	0.33	0.34	0.35	N
-750.00	0.32	0.35	0.35	0.36	0.36	0.37	N
-950.00	0.33	0.35	0.36	0.36	0.36	0.37	NE
-1050.00	0.32	0.34	0.35	0.35	0.36	0.36	NE
-1200.00	0.32	0.35	0.36	0.36	0.37	0.37	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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11.1.15 Surface Extreme Current Profile (m/s) With WNW Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.14	1.19	1.21	1.21	1.22	1.23	WNW
-100.00	0.90	0.95	0.97	0.98	0.99	1.00	WNW
-250.00	0.34	0.38	0.39	0.39	0.40	0.41	NW
-350.00	0.26	0.29	0.30	0.30	0.30	0.31	N
-450.00	0.28	0.30	0.31	0.32	0.32	0.33	NNE
-550.00	0.31	0.34	0.35	0.35	0.36	0.36	NNE
-650.00	0.29	0.31	0.31	0.31	0.32	0.32	NNE
-750.00	0.35	0.38	0.38	0.39	0.39	0.40	NNE
-950.00	0.35	0.38	0.38	0.39	0.39	0.40	NE
-1050.00	0.35	0.37	0.38	0.38	0.39	0.39	NE
-1200.00	0.33	0.36	0.37	0.37	0.38	0.38	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.16 Surface Extreme Current Profile (m/s) With NW Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.96	1.02	1.04	1.04	1.05	1.07	NW
-100.00	0.96	1.02	1.04	1.04	1.05	1.07	NW
-250.00	0.35	0.37	0.37	0.37	0.38	0.38	N
-350.00	0.44	0.47	0.48	0.48	0.49	0.49	N
-450.00	0.47	0.51	0.52	0.52	0.53	0.54	N
-550.00	0.36	0.39	0.39	0.40	0.40	0.41	N
-650.00	0.35	0.38	0.38	0.39	0.39	0.40	N
-750.00	0.41	0.44	0.45	0.45	0.46	0.46	N
-950.00	0.43	0.46	0.47	0.47	0.47	0.48	NE
-1050.00	0.35	0.38	0.38	0.39	0.39	0.40	NE
-1200.00	0.27	0.30	0.31	0.31	0.32	0.32	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.17 Surface Extreme Current Profile (m/s) With NNW Direction

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	1.00	1.05	1.07	1.07	1.08	1.09	NNW
-100.00	0.79	0.85	0.86	0.87	0.88	0.89	NNW
-250.00	0.31	0.34	0.35	0.35	0.36	0.37	NNW
-350.00	0.16	0.19	0.20	0.20	0.21	0.21	N
-450.00	0.22	0.24	0.25	0.26	0.26	0.27	N
-550.00	0.23	0.26	0.27	0.27	0.28	0.28	N
-650.00	0.28	0.29	0.30	0.30	0.30	0.31	NNE
-750.00	0.32	0.34	0.35	0.35	0.36	0.36	NNE
-950.00	0.31	0.33	0.34	0.34	0.35	0.35	NE
-1050.00	0.32	0.35	0.35	0.36	0.36	0.37	NE
-1200.00	0.29	0.32	0.32	0.33	0.33	0.34	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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11.1.18 Mid-water level Extreme Current Profile (m/s) With N Direction at 950m

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.31	0.34	0.35	0.35	0.36	0.36	NE
-100.00	0.33	0.36	0.37	0.37	0.38	0.38	NE
-250.00	0.45	0.49	0.50	0.50	0.51	0.52	NE
-350.00	0.33	0.36	0.37	0.38	0.38	0.39	NE
-450.00	0.38	0.41	0.42	0.42	0.43	0.44	NE
-550.00	0.35	0.37	0.38	0.38	0.38	0.39	NE
-650.00	0.44	0.49	0.50	0.50	0.51	0.52	N
-750.00	0.42	0.46	0.47	0.47	0.48	0.49	N
-950.00	0.68	0.73	0.74	0.75	0.76	0.77	N
-1050.00	0.56	0.63	0.64	0.65	0.66	0.68	N
-1200.00	0.32	0.37	0.38	0.39	0.40	0.41	N

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.19 Mid-water levelExtreme Current Profile (m/s) With NNE Direction at 950m

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.25	0.26	0.26	0.26	0.27	0.27	N
-100.00	0.25	0.26	0.26	0.26	0.26	0.26	N
-250.00	0.21	0.20	0.19	0.19	0.19	0.19	N
-350.00	0.09	0.07	0.07	0.07	0.07	0.06	N
-450.00	0.29	0.29	0.29	0.29	0.29	0.28	NNE
-550.00	0.29	0.29	0.29	0.29	0.29	0.29	NNE
-650.00	0.39	0.41	0.41	0.41	0.42	0.42	NNE
-750.00	0.43	0.45	0.45	0.46	0.46	0.46	NNE
-950.00	0.64	0.70	0.71	0.72	0.73	0.74	NNE
-1050.00	0.56	0.62	0.64	0.65	0.66	0.67	NE
-1200.00	0.40	0.45	0.47	0.47	0.48	0.49	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.20 Mid-water level Extreme Current Profile (m/s) With NE Direction at 950m

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.26	0.29	0.29	0.29	0.30	0.30	NW
-100.00	0.23	0.24	0.24	0.24	0.24	0.24	NW
-250.00	0.17	0.17	0.17	0.18	0.18	0.19	N
-350.00	0.04	0.04	0.04	0.05	0.05	0.06	N
-450.00	0.26	0.26	0.26	0.26	0.26	0.26	N
-550.00	0.27	0.27	0.27	0.28	0.28	0.28	NE
-650.00	0.41	0.44	0.45	0.46	0.46	0.47	NE
-750.00	0.42	0.45	0.46	0.46	0.47	0.47	NE
-950.00	0.69	0.72	0.73	0.74	0.74	0.75	NE
-1050.00	0.62	0.66	0.67	0.68	0.69	0.69	NE
-1200.00	0.46	0.50	0.51	0.51	0.52	0.52	NE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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11.1.21 Mid-water level Extreme Current Profile (m/s) With ENE Direction at 950m

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.32	0.36	0.37	0.37	0.38	0.39	N
-100.00	0.39	0.43	0.44	0.45	0.45	0.46	N
-250.00	0.28	0.32	0.33	0.34	0.34	0.35	N
-350.00	0.19	0.22	0.23	0.24	0.24	0.25	N
-450.00	0.30	0.34	0.35	0.35	0.36	0.37	ENE
-550.00	0.41	0.44	0.45	0.45	0.46	0.46	ENE
-650.00	0.38	0.40	0.41	0.41	0.42	0.42	ENE
-750.00	0.56	0.61	0.62	0.63	0.64	0.64	ENE
-950.00	0.70	0.75	0.76	0.76	0.77	0.78	ENE
-1050.00	0.63	0.67	0.68	0.68	0.69	0.69	ENE
-1200.00	0.36	0.38	0.38	0.38	0.38	0.39	ENE

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

11.1.22 Mid-water level Extreme Current Profile (m/s) With E Direction at 950m

	RETURN PERIOD (YEARS)						
Level	1	10	20	30	50	100	DIRECTION
-50.00	0.71	0.77	0.78	0.79	0.80	0.82	E
-100.00	0.71	0.78	0.80	0.81	0.82	0.84	E
-250.00	0.58	0.63	0.64	0.64	0.65	0.66	E
-350.00	0.50	0.55	0.56	0.57	0.58	0.59	E
-450.00	0.51	0.55	0.56	0.57	0.58	0.59	E
-550.00	0.46	0.49	0.50	0.51	0.52	0.53	E
-650.00	0.43	0.47	0.47	0.48	0.49	0.49	E
-750.00	0.40	0.43	0.44	0.44	0.45	0.45	E
-950.00	0.37	0.39	0.39	0.39	0.40	0.40	E
-1050.00	0.32	0.34	0.34	0.35	0.35	0.36	E
-1200.00	0.24	0.29	0.30	0.31	0.31	0.32	E

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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11.2 Vertical Profile Of Sea Water Temperature (°C)

DEPTH (m)	TEMPERATURE (°C)		
	MAX	MED	MIN
0-20	28.07	25.25	21.64
21-40	27.71	24.56	20.63
41-60	27.55	23.35	17.04
61-80	25.45	22.77	16.65
81-100	26.70	22.92	16.51
101-150	24.18	19.81	13.44
151-200	22.72	18.23	13.58
201-300	20.35	15.00	11.62
301-400	15.03	12.18	9.91
401-500	12.29	10.05	7.70
501-600	9.93	7.83	6.09
601-700	8.21	6.17	4.72
701-800	6.08	4.82	3.57
801-980	6.08	4.82	3.57
981-1090	4.48	3.66	3.26
1091-1280	4.23	3.34	3.20

Source: Measured data (PROCAP1 - 1991/1992). Ref. [20].

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11.3 Vertical Profile of Sea Water Salinity [PSU]

DEPTH (m)	SALINITY		
	MAX	MED	MIN
0-20	37.98	37.05	34.71
21-40	37.45	37.02	36.15
41-60	37.41	36.87	35.81
61-80	37.29	36.81	35.54
81-100	37.39	36.87	35.42
101-150	37.31	36.39	35.09
151-200	37.38	36.07	35.22
201-300	36.53	35.46	34.85
301-400	35.53	35.09	34.61
401-500	35.20	34.87	34.42
501-600	34.94	34.59	34.20
601-700	34.85	34.48	34.10
701-800	35.29	34.40	33.94
801-980	35.15	34.39	33.40
981-1090	34.81	34.27	33.46
1091-1280	36.51	34.58	33.69

Source: Measured data (PROCAP1 - 1991/1992). Ref. [20].

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11.4 Vertical Profile of Sea Water Density (kg/m³)

DEPTH (m)	DENSITY (kg/m³)		
	MAX	MED	MIN
0-20	1026.12	1024.81	1021.06
21-40	1025.75	1025.13	1024.16
41-60	1026.38	1025.46	1024.10
61-80	1026.45	1025.68	1024.80
81-100	1026.92	1025.75	1024.50
101-150	1027.76	1026.42	1024.96
151-200	1027.46	1026.82	1026.10
201-300	1028.30	1027.38	1026.13
301-400	1029.03	1028.21	1027.54
401-500	1030.17	1028.84	1028.01
501-600	1029.96	1029.52	1028.96
601-700	1031.11	1030.07	1029.61
701-800	1031.56	1030.68	1030.00
801-980	1032.19	1031.55	1030.43
981-1090	1032.62	1032.07	1030.72
1091-1280	1034.76	1033.24	1031.80

Source: Measured data (PROCAP1 - 1991/1992). Ref. [20].

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12 OCEANOGRAPHIC DATA FOR THE DEEP CENTRAL REGION (DC)

12.1 Current

12.1.1 Frequency of Surface Current by Directions

		DIRECTION										
m/s		N	NE	E	SE	S	SW	W	NW	Freq	%	MDir (º)
0.00	0.10	245	204	187	139	204	282	318	297	1876	21.50	289.9
0.10	0.20	388	310	278	248	360	669	922	844	4019	46.07	278.6
0.20	0.30	235	153	198	91	151	378	570	605	2381	27.29	287.3
0.30	0.40	29	23	51	29	24	54	105	113	428	4.91	289.6
0.40	0.50	0	3	3	1	0	2	4	5	18	0.21	319.9
0.50	0.60	0	0	0	1	0	0	1	0	2	0.02	208.2
0.60	0.70	0	0	0	0	0	0	0	0	0	0.00	-
Freq		897	693	717	509	739	1385	1920	1864	8724		
%		10.28	7.94	8.22	5.83	8.47	15.88	22.01	21.37			
Avg		0.15	0.15	0.17	0.15	0.15	0.16	0.18	0.18	0.17		

Source: PETROBRAS – Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

12.1.2 Surface Extreme Current Profile (m/s) With N Direction

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.53	0.73	0.78	0.82	0.86	0.91	N
-84	0.52	0.71	0.76	0.79	0.83	0.88	N
-500	0.22	0.26	0.27	0.28	0.29	0.30	NW
-800	0.27	0.37	0.40	0.42	0.44	0.47	W
-1200	0.23	0.31	0.33	0.34	0.36	0.38	SW
-1800	0.30	0.41	0.44	0.46	0.48	0.51	SW
-2200	0.29	0.39	0.42	0.44	0.46	0.49	SW
-2600	0.23	0.31	0.34	0.35	0.37	0.39	SW
-2900	0.17	0.25	0.27	0.28	0.30	0.32	W

Source: PETROBRAS – Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

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12.1.3 Surface Extreme Current Profile (m/s) With NE Direction

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.50	0.73	0.79	0.83	0.87	0.94	NE
-84	0.43	0.62	0.68	0.71	0.75	0.81	E
-500	0.19	0.31	0.34	0.36	0.39	0.42	E
-800	0.16	0.23	0.25	0.26	0.27	0.29	SE
-1200	0.24	0.38	0.41	0.44	0.46	0.50	SW
-1800	0.22	0.33	0.37	0.39	0.41	0.44	W
-2200	0.17	0.26	0.29	0.31	0.33	0.36	NW
-2600	0.12	0.16	0.17	0.17	0.18	0.18	W
-2900	0.11	0.17	0.19	0.20	0.21	0.23	N

Source: PETROBRAS, Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

12.1.4 Surface Extreme Current Profile (m/s) With E Direction

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.52	0.83	0.92	0.97	1.04	1.13	E
-84	0.47	0.75	0.83	0.88	0.94	1.02	E
-500	0.20	0.35	0.40	0.42	0.46	0.50	SE
-800	0.16	0.25	0.28	0.30	0.32	0.35	SE
-1200	0.23	0.39	0.44	0.47	0.51	0.56	SW
-1800	0.22	0.37	0.41	0.44	0.47	0.52	W
-2200	0.15	0.27	0.31	0.33	0.36	0.39	NW
-2600	0.12	0.21	0.24	0.26	0.28	0.31	W
-2900	0.08	0.12	0.13	0.13	0.14	0.14	NW

Source: PETROBRAS, Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

12.1.5 Surface Extreme Current Profile (m/s) With SE Direction

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.41	0.58	0.63	0.66	0.69	0.73	SE
-84	0.35	0.49	0.54	0.56	0.59	0.63	E
-500	0.14	0.18	0.19	0.19	0.20	0.21	E
-800	0.16	0.23	0.26	0.27	0.28	0.30	NW
-1200	0.23	0.33	0.36	0.38	0.40	0.43	SW
-1800	0.23	0.32	0.35	0.36	0.38	0.41	SW
-2200	0.16	0.23	0.25	0.26	0.27	0.29	SW
-2600	0.13	0.17	0.18	0.19	0.20	0.21	S
-2900	0.15	0.19	0.21	0.21	0.22	0.24	S

Source: PETROBRAS, Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

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12.1.6 Surface Extreme Current Profile (m/s) With S Direction

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.49	0.68	0.73	0.76	0.80	0.86	S
-84	0.36	0.51	0.55	0.58	0.61	0.65	S
-500	0.20	0.24	0.25	0.26	0.27	0.28	SW
-800	0.20	0.29	0.32	0.33	0.36	0.38	SW
-1200	0.22	0.31	0.34	0.35	0.37	0.39	SW
-1800	0.30	0.43	0.47	0.49	0.52	0.56	S
-2200	0.23	0.34	0.37	0.39	0.41	0.44	S
-2600	0.25	0.35	0.38	0.39	0.41	0.44	S
-2900	0.26	0.37	0.40	0.42	0.44	0.48	S

Source: PETROBRAS, Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

12.1.7 Surface Extreme Current Profile (m/s) With SW Direction

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.47	0.68	0.75	0.78	0.83	0.89	SW
-84	0.46	0.66	0.72	0.75	0.80	0.85	SW
-500	0.27	0.40	0.44	0.46	0.49	0.53	W
-800	0.25	0.36	0.40	0.42	0.44	0.48	W
-1200	0.25	0.36	0.39	0.41	0.44	0.47	W
-1800	0.27	0.41	0.46	0.48	0.51	0.56	SW
-2200	0.33	0.49	0.53	0.56	0.59	0.63	SW
-2600	0.24	0.36	0.40	0.42	0.44	0.48	SW
-2900	0.19	0.24	0.25	0.26	0.27	0.28	SW

Source: PETROBRAS, Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

12.1.8 Surface Extreme Current Profile (m/s) With W Direction

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.49	0.77	0.86	0.91	0.98	1.08	W
-84	0.47	0.73	0.82	0.87	0.94	1.03	W
-500	0.25	0.44	0.50	0.54	0.59	0.66	W
-800	0.29	0.47	0.53	0.57	0.62	0.68	W
-1200	0.21	0.37	0.42	0.45	0.49	0.55	NW
-1800	0.33	0.55	0.62	0.66	0.72	0.80	NW
-2200	0.28	0.47	0.53	0.57	0.61	0.68	W
-2600	0.25	0.42	0.48	0.51	0.56	0.62	W
-2900	0.22	0.30	0.32	0.33	0.35	0.37	W

Source: PETROBRAS, Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

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12.1.9 Surface Extreme Current Profile (m/s) With NW Direction

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.50	0.76	0.83	0.88	0.94	1.01	NW
-84	0.50	0.75	0.82	0.87	0.92	1.00	NW
-500	0.25	0.41	0.46	0.48	0.52	0.57	NW
-800	0.28	0.44	0.49	0.51	0.55	0.60	W
-1200	0.25	0.37	0.41	0.43	0.46	0.50	W
-1800	0.31	0.49	0.54	0.58	0.62	0.67	W
-2200	0.25	0.38	0.42	0.45	0.48	0.53	W
-2600	0.20	0.32	0.36	0.38	0.41	0.45	W
-2900	0.18	0.24	0.25	0.26	0.27	0.29	NW

Source: PETROBRAS, Mooring Line FBC DEPROAS (Water level: 54 m below the surface). Ref. [21].

12.1.10 Mid-water level Extreme Current Profile (m/s) With SW Direction at 1800 m

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.22	0.27	0.28	0.29	0.30	0.31	SW
-84	0.20	0.24	0.26	0.26	0.27	0.28	S
-500	0.21	0.30	0.32	0.34	0.36	0.38	SW
-800	0.20	0.28	0.30	0.31	0.33	0.35	W
-1200	0.22	0.30	0.32	0.33	0.35	0.37	W
-1800	0.39	0.54	0.58	0.60	0.63	0.67	SW
-2200	0.41	0.55	0.59	0.61	0.64	0.68	S
-2600	0.43	0.57	0.61	0.63	0.66	0.70	S
-2900	0.35	0.48	0.51	0.53	0.56	0.59	S

Source: PETROBRAS – Mooring Line FBC DEPROAS. Ref. [21].

12.1.11 Mid-water level Extreme Current Profile (m/s) With W Direction at 1800 m

	RETURN PERIOD (YEARS)						
Level (m)	1	10	20	30	50	100	DIRECTION
-54	0.26	0.32	0.34	0.35	0.36	0.38	W
-84	0.25	0.38	0.42	0.44	0.47	0.52	W
-500	0.25	0.38	0.41	0.44	0.47	0.50	W
-800	0.27	0.40	0.43	0.46	0.48	0.52	SW
-1200	0.24	0.35	0.38	0.40	0.42	0.46	SW
-1800	0.39	0.56	0.61	0.64	0.68	0.73	W
-2200	0.35	0.50	0.54	0.57	0.60	0.65	SW
-2600	0.31	0.45	0.49	0.51	0.54	0.58	SW
-2900	0.28	0.40	0.44	0.47	0.49	0.53	SW

Source: PETROBRAS – Mooring Line FBC DEPROAS. Ref. [21].

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12.1.12 Mid-water level Extreme Current Profile (m/s) With NW Direction at 1800 m

	RETURN PERIOD (YEARS)						
Level (m)	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
-54	0.43	0.60	0.64	0.67	0.71	0.75	W
-84	0.42	0.58	0.63	0.65	0.69	0.73	W
-500	0.21	0.30	0.33	0.35	0.37	0.39	W
-800	0.24	0.34	0.37	0.38	0.40	0.43	W
-1200	0.26	0.37	0.40	0.42	0.44	0.47	NW
-1800	0.36	0.50	0.54	0.56	0.59	0.63	NW
-2200	0.25	0.36	0.39	0.41	0.44	0.47	NW
-2600	0.19	0.27	0.30	0.32	0.33	0.36	NW
-2900	0.17	0.20	0.21	0.22	0.22	0.23	NW

Source: PETROBRAS – Mooring Line FBC DEPROAS. Ref. [21].

12.2 Vertical Profile of Sea Water Temperature (°C)

DEPTH (m)	TEMPERATURE (°C)		
	MAX	**MED**	**MIN**
0-20	28.07	25.25	21.64
21-40	27.71	24.56	20.63
41-60	27.55	23.35	17.04
61-80	25.45	22.77	16.65
81-100	26.70	22.92	16.51
101-150	24.18	19.81	13.44
151-200	22.72	18.23	13.58
201-300	20.35	15.00	11.62
301-400	15.03	12.18	9.91
401-500	12.29	10.05	7.70
501-600	9.93	7.83	6.09
601-700	8.21	6.17	4.72
701-800	6.08	4.82	3.57
801-980	6.08	4.82	3.57
981-1090	4.48	3.66	3.26
1091-1280	4.23	3.34	3.20

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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12.3 Vertical Profile of Sea Water Salinity [PSU]

DEPTH (m)	SALINITY		
	MAX	MED	MIN
0-20	37.98	37.05	34.71
21-40	37.45	37.02	36.15
41-60	37.41	36.87	35.81
61-80	37.29	36.81	35.54
81-100	37.39	36.87	35.42
101-150	37.31	36.39	35.09
151-200	37.38	36.07	35.22
201-300	36.53	35.46	34.85
301-400	35.53	35.09	34.61
401-500	35.20	34.87	34.42
501-600	34.94	34.59	34.20
601-700	34.85	34.48	34.10
701-800	35.29	34.40	33.94
801-980	35.15	34.39	33.40
981-1090	34.81	34.27	33.46
1091-1280	36.51	34.58	33.69

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

12.4 Vertical Profile of Sea Water Density (kg/m^3)

DEPTH (m)	DENSITY (kg/m^3)		
	MAX	MED	MIN
0-20	1026.12	1024.81	1021.06
21-40	1025.75	1025.13	1024.16
41-60	1026.38	1025.46	1024.10
61-80	1026.45	1025.68	1024.80
81-100	1026.92	1025.75	1024.50
101-150	1027.76	1026.42	1024.96
151-200	1027.46	1026.82	1026.10
201-300	1028.30	1027.38	1026.13
301-400	1029.03	1028.21	1027.54
401-500	1030.17	1028.84	1028.01
501-600	1029.96	1029.52	1028.96
601-700	1031.11	1030.07	1029.61
701-800	1031.56	1030.68	1030.00
801-980	1032.19	1031.55	1030.43
981-1090	1032.62	1032.07	1030.72
1091-1280	1034.76	1033.24	1031.80

Source: PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program. Ref. [19].

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13 OCEANOGRAPHIC DATA FOR THE SHALLOW SOUTH REGION (SS)

13.1 Current

13.1.1 Frequency of Surface Current by Directions

M/S		DIRECTION(º)								Freq	%	MDir
		N	NE	E	SE	S	SW	W	NW			
0.00	0.10	158	143	149	172	147	233	240	201	1443	3.20	257.8
0.10	0.20	260	306	229	261	464	733	636	462	3351	7.44	245.4
0.20	0.30	400	404	182	179	637	1297	669	410	4178	9.28	239.8
0.30	0.40	471	235	53	73	720	2467	729	338	5086	11.29	236.1
0.40	0.50	385	192	19	13	715	3854	774	288	6240	13.85	231.6
0.50	0.60	293	150	4	1	867	4927	987	339	7568	16.80	229.8
0.60	0.70	241	109	2	0	985	4834	837	122	7130	15.83	225.3
0.70	0.80	96	113	0	0	599	3643	308	51	4810	10.68	221.6
0.80	0.90	39	64	0	0	255	2319	197	0	2874	6.38	221.4
0.90	1.00	22	36	0	0	66	1340	68	0	1532	3.40	221.2
1.00	1.10	32	23	0	0	25	539	1	0	620	1.38	224.3
1.10	1.20	53	22	0	0	6	86	0	0	167	0.37	260.3
1.20	1.30	25	16	0	0	0	0	0	0	41	0.09	19.9
1.30	1.40	0	0	0	0	0	0	0	0	0	0.00	-
Freq		2475	1813	638	699	5486	26272	5446	2211	45040		
%		5.49	4.03	1.42	1.55	12.18	58.33	12.09	4.91			
Avg		0.43	0.40	0.19	0.18	0.49	0.60	0.45	0.34			

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22]

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13.1.2 Surface Extreme Current Profile (m/s) With N Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
50 m	1.26	1.46	1.52	1.54	1.58	1.62	N
100 m	0.99	1.15	1.20	1.21	1.25	1.28	N
200 m	0.43	0.50	0.52	0.53	0.54	0.55	N

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22].

13.1.3 Surface Extreme Current Profile (m/s) With NE Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
50 m	1.26	1.46	1.52	1.54	1.58	1.62	NE
100 m	1.11	1.28	1.34	1.35	1.39	1.43	NE
200 m	0.66	0.76	0.79	0.80	0.82	0.84	NE

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22].

13.1.4 Surface Extreme Current Profile (m/s) With E Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
50 m	0.67	0.76	0.78	0.79	0.80	0.82	E
100 m	0.51	0.58	0.59	0.60	0.61	0.62	E
200 m	0.48	0.54	0.56	0.57	0.57	0.59	E

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22].

13.1.5 Surface Extreme Current Profile (m/s) With SE Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
50 m	0.53	0.60	0.62	0.63	0.64	0.65	SE
100 m	0.25	0.28	0.29	0.29	0.30	0.30	SE
200 m	0.25	0.29	0.30	0.30	0.31	0.31	SE

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22].

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13.1.6 Surface Extreme Current Profile (m/s) With S Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
50 m	1.13	1.29	1.33	1.35	1.38	1.42	S
100 m	0.62	0.70	0.72	0.74	0.75	0.77	S
200 m	0.19	0.21	0.22	0.22	0.23	0.23	S

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22].

13.1.7 Surface Extreme Current Profile (m/s) With SW Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
50 m	1.24	1.41	1.45	1.47	1.50	1.54	SW
100 m	0.82	0.94	0.96	0.98	1.00	1.02	SW
200 m	0.34	0.39	0.40	0.41	0.41	0.42	SW

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22].

13.1.8 Surface Extreme Current Profile (m/s) With W Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
50 m	1.08	1.26	1.31	1.34	1.37	1.41	W
100 m	0.39	0.46	0.48	0.49	0.50	0.51	W
200 m	0.09	0.10	0.11	0.11	0.11	0.12	W

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22].

13.1.9 Surface Extreme Current Profile (m/s) With NW Direction

	RETURN PERIOD (YEARS)						
DEPTH	**1**	**10**	**20**	**30**	**50**	**100**	**DIRECTION**
50 m	0.85	0.98	1.01	1.03	1.05	1.08	NW
100 m	0.46	0.54	0.55	0.56	0.57	0.59	NW
200 m	0.12	0.14	0.15	0.15	0.15	0.16	NW

Source: Measured data (F1S – 1994/1995 and Maromba – 2008/2009). Ref. [22].

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14 SIMULTANEOUS ENVIROMENTAL CONDITIONS

14.1 Beam Sea Conditions

A critical condition for drilling or floating production vessels operating in Campos Basin happens when the wind and wave fields are about 90º apart, such as in the following cases:

- Wind from NE and swell from SE;
- Wind from E and swell from S;
- Wind from SE and swell from SW.

For the above cases, when the wind speed is high enough to adjust the vessel´s heading, the swell will approach her as a beam sea state and increase the amplitude of roll motion.

Table 14.1.1 presents a scatter diagram of wind speed (m/s) in the horizontal axis versus the angle between wind and waves in the vertical axis. Negative angles indicate wave ahead of the wind in clockwise sense, and positive angles indicate wind ahead of the wave in clockwise sense. For instance, an angle of –45º means that the wave direction is 45 degrees ahead of the wind direction: as an example, if the wind is coming from E (90º) the wave would be coming from SE (135º).

Table 14.1.2 presents a scatter diagram of wind speed (m/s) in the horizontal axis versus significant wave height Hs (m) in the vertical axis for beam sea conditions, that is, cases for which the angle between wind and wave is in the vicinity of 90º (it was adopted ±22.5º around 90º, in such way that wind and wave would be between 68.5º and 112.5º apart).

Table 14.1.3 presents extreme wave analysis for beam sea conditions. The analysis was performed using sea states for which the wind speed would be above 5 m/s in order to simulate the conditions for which the vessel's heading starts to be affected by the wind.

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14.1.1 Scatter diagram of wind speed against the angle between wind and wave

Velocity (m/s)		1,0	2,0	3,0	4,0	5,0	6,0	7,0	8,0	9,0	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0	18,0	19,0	20,0	21,0	22,0	23,0	24,0	TOTAL	%	X Mean
Angle		2,0	3,0	4,0	5,0	6,0	7,0	8,0	9,0	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0	18,0	19,0	20,0	21,0	22,0	23,0	24,0				
-180	-170	9	7	10	15	15	15	29	28	33	38	22	18	19	12	11	7	4	0	0	0	1	0	0		293	2.17	8.49
-170	-160	7	8	11	10	14	25	25	45	24	40	38	30	11	14	6	4	1	2	3	1	0	0	0		319	2.36	8.52
-160	-150	2	9	16	22	19	18	28	31	46	50	32	23	19	11	6	9	3	1	0	1	0	0	0		346	2.56	8.42
-150	-140	5	15	9	15	26	20	33	34	46	27	41	26	14	15	4	2	3	2	0	0	2	0	0		339	2.51	8.21
-140	-130	7	12	12	21	22	27	28	39	40	30	36	15	14	4	3	1	1	2	3	0	0	1	0		318	2.35	7.76
-130	-120	6	11	11	20	25	29	26	50	26	27	32	12	12	10	4	6	4	1	3	1	0	0	0		316	2.34	7.87
-120	-110	4	13	15	29	42	36	23	37	34	26	18	12	13	7	10	4	1	1	0	1	0	0	0		326	2.41	7.27
-110	-100	8	2	14	28	40	39	31	32	31	25	19	27	14	9	5	1	2	1	2	0	0	0	0		330	2.44	7.50
-100	-90	1	14	21	29	39	51	42	37	21	24	18	22	8	4	5	0	0	1	1	0	0	0	0		338	2.50	6.83
-90	-80	3	8	13	22	36	39	42	52	30	26	20	21	16	0	3	2	2	0	0	0	0	0	0		335	2.48	7.28
-80	-70	8	13	29	44	62	77	44	42	32	42	23	20	11	2	2	6	0	0	0	0	0	0	0		457	3.38	6.59
-70	-60	4	8	14	37	52	51	65	50	42	36	27	11	15	10	3	2	3	0	0	0	0	0	0		430	3.18	7.13
-60	-50	8	17	17	32	61	69	84	85	76	71	59	34	22	9	9	3	3	3	2	0	0	0	0		664	4.92	7.67
-50	-40	7	7	17	35	64	52	83	90	88	77	70	42	28	15	8	7	4	1	1	0	0	0	0		696	5.15	8.03
-40	-30	7	16	17	39	50	66	83	89	99	118	82	48	38	29	17	15	7	1	3	1	2	0	0		827	6.12	8.47
-30	-20	8	10	19	41	43	63	88	124	107	129	103	61	85	32	19	13	5	6	5	5	3	0	1		970	7.18	8.92
-20	-10	5	10	20	26	48	59	71	90	98	122	92	71	67	36	20	12	9	2	6	3	3	1	0		871	6.45	9.05
-10	0	8	10	19	43	40	65	90	120	126	116	114	99	73	46	36	18	6	3	7	4	4	2	1		1050	7.78	9.20
0	10	10	11	19	38	46	65	52	97	120	89	95	71	60	26	23	21	12	6	8	3	3	0	0		875	6.48	9.02
10	20	7	8	18	23	24	49	59	74	82	83	68	61	57	26	28	18	5	2	5	7	2	0	0		706	5.23	9.24
20	30	11	11	11	17	26	37	44	53	56	53	48	28	24	18	7	4	7	1	2	1	0	0	0		459	3.40	8.35
30	40	5	7	9	21	32	22	28	39	36	21	14	16	11	6	0	3	4	0	0	0	1	0	0		275	2.04	7.43
40	50	9	11	9	19	27	28	27	35	19	24	11	2	10	1	1	1	1	0	0	0	0	0	0		235	1.74	6.60
50	60	7	11	12	13	21	19	19	17	13	11	9	6	2	3	2	1	0	0	0	0	0	0	0		166	1.23	6.25
60	70	6	8	10	16	26	20	21	13	7	5	4	1	1	0	0	1	1	0	0	0	0	0	0		140	1.04	5.46
70	80	4	9	9	12	15	12	12	5	3	1	0	3	3	1	0	1	0	1	0	0	0	0	0		91	.67	5.37
80	90	3	12	9	17	15	10	8	5	5	5	2	2	2	0	0	0	0	0	0	0	0	0	0		95	.70	5.04
90	100	3	8	12	11	8	10	6	10	5	5	1	3	1	0	0	0	0	0	0	0	0	0	0		83	.61	5.23
100	110	2	8	9	11	12	9	7	5	6	7	1	3	0	0	1	0	0	0	0	0	0	0	0		81	.60	5.44
110	120	4	11	9	15	9	9	3	8	6	6	5	2	2	0	0	0	0	0	0	0	0	0	0		89	.66	5.38
120	130	7	5	8	19	5	6	11	10	4	7	4	7	1	1	1	0	0	0	0	0	0	0	0		96	.71	5.92
130	140	8	8	8	10	8	9	21	14	10	10	11	7	2	3	1	1	0	0	0	0	0	0	0		131	.97	6.62
140	150	9	2	6	8	9	11	7	15	14	11	14	14	6	9	2	1	0	1	0	0	0	0	0		139	1.03	7.95
150	160	5	6	5	10	14	9	12	20	16	18	18	20	10	7	5	2	0	0	0	0	0	0	0		177	1.31	8.20
160	170	12	10	7	9	15	20	20	20	21	19	10	16	14	4	8	3	0	0	0	1	1	0	0		210	1.56	7.68
170	180	5	8	7	11	13	21	20	25	23	27	16	18	18	7	5	5	2	0	0	0	0	0	0		231	1.71	8.20
TOTAL		224	344	461	788	1023	1167	1292	1540	1445	1426	1177	872	703	377	255	174	90	38	51	29	22	4	2		13504		
%		1.66	2.55	3.41	5.84	7.58	8.64	9.57	11.40	10.70	10.56	8.72	6.46	5.21	2.79	1.89	1.29	.67	.28	.38	.21	.16	.03	.01		100.0		
Y Mean		4.39	-10.27	-20.45	-21.99	-28.48	-28.31	-28.55	-29.25	-29.08	-29.22	-31.95	-23.42	-22.34	-27.47	-23.03	-26.41	-33.57	-42.08	-37.47	-17.07	-19.73	-40.50	-14.00				

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14.1.2 Scatter diagram of wind speed against wave height for beam sea conditions

Intensity (m/s)		0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	TOTAL	%	X Mean
Hs (m)		1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0				
.00	.25	0	0	2	1	2	4	1	3	5	1	1	1	0	0	0	0	0	1	0	0		22	1.08	7.22
.25	.50	3	11	8	15	15	15	10	9	7	4	11	9	7	3	4	1	0	0	0	0		132	6.50	6.75
.50	.75	6	11	15	27	31	27	21	23	15	16	7	12	9	2	0	1	1	1	0	0		225	11.08	6.38
.75	1.00	5	10	23	31	38	30	31	43	29	30	17	18	12	4	6	4	1	2	3	0		337	16.60	7.16
1.00	1.25	7	10	13	22	38	34	32	41	23	26	14	26	5	4	6	0	1	0	0	0		302	14.88	7.01
1.25	1.50	4	18	17	26	30	41	25	34	25	16	10	22	8	1	2	3	0	0	0	1		283	13.94	6.63
1.50	1.75	1	7	14	19	28	34	24	31	18	27	9	11	6	3	1	2	0	0	0	0		235	11.58	6.83
1.75	2.00	4	8	5	17	25	19	20	19	19	6	6	7	4	1	0	0	0	0	0	0		160	7.88	6.22
2.00	2.25	0	1	6	11	12	22	6	11	3	7	4	9	1	0	0	1	1	0	0	0		95	4.68	6.63
2.25	2.50	2	1	4	7	13	21	7	2	2	5	2	1	1	1	0	0	0	0	0	0		69	3.40	5.71
2.50	2.75	1	2	2	10	10	13	12	4	2	1	4	1	3	0	0	0	0	0	0	0		65	3.20	5.90
2.75	3.00	0	1	0	3	2	8	5	3	0	2	1	1	0	0	0	0	0	0	0	0		26	1.28	6.21
3.00	3.25	0	1	0	1	1	9	5	0	2	1	2	0	1	0	0	1	0	0	0	0		24	1.18	6.91
3.25	3.50	0	2	0	0	2	4	0	3	1	0	0	0	1	0	0	1	0	0	0	0		14	.69	6.63
3.50	3.75	0	0	0	2	2	1	2	1	1	1	0	1	1	0	0	0	0	0	0	0		12	.59	7.02
3.75	4.00	0	2	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0		8	.39	5.36
4.00	4.25	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		5	.25	3.88
4.25	4.50	0	0	0	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		4	.20	6.21
4.50	4.75	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1	.05	3.99
4.75	5.00	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3	.15	3.50
5.00	5.25	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		4	.20	3.05
5.25	5.50	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2	.10	3.22
5.50	5.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	.00	.00
5.75	6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	.00	.00
6.00	6.25	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1	.05	3.45
6.25	6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	.00	.00
6.50	6.75	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1	.05	3.46
TOTAL		34	87	113	201	254	282	202	228	153	145	88	119	59	20	19	14	4	4	3	1		2030		
%		1.67	4.29	5.57	9.90	12.5	13.9	9.95	11.2	7.54	7.14	4.33	5.86	2.91	.99	.94	.69	.20	.20	.15	.05				
Y Mean		1.28	1.42	1.33	1.51	1.44	1.55	1.45	1.32	1.29	1.34	1.27	1.26	1.27	1.27	.95	1.47	1.18	.68	.92	1.44				

14.1.3 Extreme Wave Values for Beam Sea Conditions

The analysis was performed using sea states for which the wind speed were above 5 m/s in order to simulate the conditions for which the vessel's heading starts to be affected by the wind. Beam sea states are defined as conditions for which the angle between wind and wave is in the vicinity of 90º (it was adopted ±22.5º around 90º, in such way that wind and wave would be between 68.5º and 112.5º apart).

Return Period	Hs (m)	Tp (sec)
1 month	3.17	10.86
3 months	3.63	11.59
1 year	4.78	13.04
10 years	5.58	13.61
20 years	5.80	13.77
30 years	5.93	13.87
50 years	6.09	13.99
100 years	6.31	14.16

Sources: Measured data (PROCAP1/PROCAP2 Wind and Wave data). Ref. [23].

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15 REFERENCES

[1] UCDs measurements in Campos Basin in the period from Jul/2002 to Jun/2024.

[2] GPM Level 3A Radiometer (GPROF) gridpoint (lat,lon = -22.1077,-39.9183). Period from jun/2000 to sep/2021.

[3] Measured data in Campos Basin in the period from 1991 to 1995 (PROCAP1, PROCAP2) and 2004 to 2009 (OCEANOP).

[4] Measured data in Campos Basin in the period from 10/1986 to 05/2003.

[5] Tidal Tables for 1988 - DHN/DG-16-24 - PETROBRAS Technical Communication CT_038/1996 ("Análise da Variação do Nível do Mar da Bacia de Campos e do Porto de Macaé").

[6] Measured data in Campos Basin (PROCAP1, PROCAP2, P18 and P25) and BOMOS model data (Brazil Offshore Meteorological and Oceanographic Study), OceanWeather Inc.

[7] Measured data in Campos Basin (GAROUPA, PROCAP1, and PROCAP2) 2295 wave staff time series of 1539 sec plus 7531 buoy time series of 1024 sec = 11243749 sec.

[8] Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals.

[9] PETROBRAS – Vertical Profile of Marine Fouling (mm) for Campos Basin (RT/MC 113/2003).

[10] Measured data PROCAP2.

[11] SIMO (ALBACORA-Orion, FUNDESPA and PROCAP2).

[12] Measured data (ORION – ALBACORA. 1987/1988).

[13] Measured data PROCAP-2000 (1994-95), Roncador Measurement Program (1998-2000).

[14] Roncador field current data.

[15] MARLIM (PROCAP2 -1991/1993).

[16] Measured data (Garoupa – 1980 /1981).

[17] CENPES/PDP/MC (SIDAM report N° 92).

[18] PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program and PapaTerra mooring Line. (Water level: 50 m below the surface).

[19] PETROBRAS – Mooring Marlim PROCAP1 Current Data Measurement Program

[20] Measured data (PROCAP1 - 1991/1992).

[21] PETROBRAS – Mooring Line FBC DEPROAS

[22] Measured data (F1S – 1994/1995 and Maromba – 2008/2009).

[23] Measured data (PROCAP1/PROCAP2 Wind and Wave data).

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CENPES	PETROBRAS Research and Development Center
PDP	Research and Development of Production Systems
MC	Scientific Methods
SEGEN	Previous name of PETROBRAS ENGINEERING Department
OCEANOP	PETROBRAS's operational oceanography system managed by E&P-SERV
DEPROAS	DEPROAS PROJECT - Dinâmica do Ecossistema de Plataforma da Região Oeste do Atlântico Sul
DHN	Directorate of Hydrography and Navigation of the Brazilian Navy
PROCAP1	PETROBRAS Technological Development Program on Deep Water Production Systems (1000 meters)
PROCAP2	PETROBRAS Technological Development Program on Deep Water Production Systems (2000 meters)
SIDAM	Environmental Data Indexation System of PETROBRAS
GPM	Global Precipitation Measurement
IDF	Intensity-duration-frequency

Rev. C. Execution CENPES/PDP/MC (Alphabetical order) :

Belo,W.C.	*(current)*
Guerra, L.A.A.	(current)
Lima,J.A.M.	(*wind,wave,current,CTD*)
Matheson, G.S.G.	(*wind,wave,current*)
Mendes, A.L.T	(current)
Nunes,L.M.P.	(*wind,wave,current,beam conditions*)
Ribeiro,E.O.	*(wind, wave,current)*

Rev. G. Execution CENPES/PDIDP/ESUP/TEO

Eric Oliveira Ribeiro	execution	*(wave)*
Marcelo Andrioni	revision	*(wave)*
Wellington C. Belo	revision	*(wave)*

Rev. H. Execution CENPES/PDIDP/ESUP/TEO

Gilmara Duarte Lima Furtado	execution	*(rainfall)*
Eric Oliveira Ribeiro	revision	*(rainfall)*

Rev. I. Execution CENPES/PDIDP/ESUP/TEO

Luiz Claudio R. Antunes	execution	*(air temperature / HVAC / rainfall)*
Eric O Ribeiro	execution	*(air temperature / HVAC / rainfall)*
Gilmara Duarte Lima Furtado	revision	*(air temperature/ HVAC / rainfall / edition)*
Wellington C. Belo	revision	*(air temperature/ HVAC / rainfall / edition)*

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INDEX OF REVISIONS

REV	DESCRIPTION AND / OR AFFECTED SHEETS
0	ORIGINAL
A	UPDATED DEEPWATER SEASONAL WAVE DATA (SECTION 5.3) AND INCLUSION OF WAVE DATA FOR CONTINENTAL SHELF POSITION (SECTIONS 5.5-5.8)

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	14/JUL/2006	16/JUL/2010							
EXECUTION	PDP/MC	PDP/MC							
AUTHORS	GGM	EOR							
VERIFICATION	JLIMA	JAMLIMA							
APPROVAL	AMAIA	LEVY							

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1. OBJECTIVE 4

2. SYSTEM OF UNITS AND DIRECTION CONVENTION 4

3. METEOROLOGICAL DATA 5

3.1. AIR TEMPERATURE 5
3.2. ATMOSPHERIC PRESSURE 6
3.2 RELATIVE HUMIDITY 6

4. WIND DATA 7

4.1. ANNUAL DISTRIBUTION OF SPEED AND DIRECTION 7
4.2. SEASONAL DISTRIBUTION OF SPEED AND DIRECTION 7
4.2.1. SUMMER 7
4.2.2. AUTUMN 8
4.2.3. WINTER 8
4.2.4. SPRING 9
4.3. SEASONAL EXCEEDANCE CURVES FOR WIND SPEED 9
4.3.1. SUMMER 9
4.3.2. AUTUMN 10
4.3.3. WINTER 10
4.3.4. SPRING 11

5. WAVE DATA 12

5.1. DEEPWATER ANNUAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD 12
5.2. DEEPWATER ANNUAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK DIRECTION 12
5.3. DEEPWATER SEASONAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT, SPECTRAL PEAK PERIOD AND SPECTRAL PEAK DIRECTION 13
5.3.1. SUMMER 13
5.3.2. AUTUMN 14
5.3.3. WINTER 15
5.3.4. SPRING 16
5.4. DEEPWATER SEASONAL EXCEEDANCE CURVES FOR TOTAL SIGNIFICANT WAVE HEIGHT 17
5.4.1. SUMMER 17
5.4.2. AUTUMN 18
5.4.3. WINTER 18
5.4.4. SPRING 19
5.5. CONTINENTAL SHELF ANNUAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD 20
5.6. CONTINENTAL SHELF ANNUAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK DIRECTION 20
5.7. CONTINENTAL SHELF SEASONAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT, SPECTRAL PEAK PERIOD AND SPECTRAL PEAK DIRECTION 21
5.7.1. SUMMER 21
5.7.2. AUTUMN 22
5.7.3. WINTER 23
5.7.4. SPRING 24
5.8. CONTINENTAL SHELF SEASONAL EXCEEDANCE CURVES FOR TOTAL SIGNIFICANT WAVE HEIGHT 25
5.8.1. SUMMER 25
5.8.2. AUTUMN 26
5.8.3. WINTER 27
5.8.4. SPRING 28

6. CURRENT DATA 29

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6.1. ANNUAL DISTRIBUTION OF SURFACE SPEED AND DIRECTION FOR GOLFINHO REGION 29
6.2. ANNUAL DISTRIBUTION OF SURFACE SPEED AND DIRECTION FOR JUBARTE REGION 29

7. REFERENCES 30

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1. OBJECTIVE

To provide operational metocean information (meteorological and oceanographic parameters) to be used in the planning of operations for offshore units and production systems in Espirito Santo Basin, east Brazilian coast. This document does not have any data fitting to extreme probability distributions in order to generate parameters with long term periods of recurrence. It provides seasonal information.

STATEMENT

PETROBRAS and the authors make no warranties, expressed or implied, as to any matter whatsoever, concerning the use of this metocean document for any particular design purpose. PETROBRAS and the authors shall not be liable for any direct or indirect, consequential or non-consequential, or other damages and failures resulting from the inappropriate use of this metocean document.

2. SYSTEM OF UNITS AND DIRECTION CONVENTION

The International System of Units (S.I.), UNESCO-IOC (Intergovernmental Oceanographic Commission) and WMO (World Meteorological Organization) recommendations were adopted.

It is used the following convention for the directions:

- WIND and WAVE: direction indicates where the wind comes from (clockwise sense with origin at True North 0°);
- CURRENT: the direction indicates where the current goes to (clockwise sense with origin at True North 0°).

Wave Parameters:

- Significant Wave Height: Hs (m) calculated in the frequency domain;
- Spectral Peak Period: Tp (sec) calculated as the period associated with the maximum value of the wave spectrum.

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3. METEOROLOGICAL DATA

3.1. AIR TEMPERATURE

MONTH	AIR TEMPERATURE (°C)*		
	MINIMUM MEAN	MEAN	MAXIMUM MEAN
JAN	23.1	26.3	30.9
FEB	23.7	26.9	31.6
MAR	23.4	26.5	31.1
APR	22.3	25.2	29.4
MAY	20.8	23.7	27.9
JUN	19.5	22.5	26.7
JUL	18.8	21.7	25.9
AUG	19.2	22.2	26.6
SEP	19.8	22.6	26.5
OCT	20.8	23.5	27.3
NOV	21.6	24.4	28.2
DEC	22.4	25.4	29.6

*(Dry Bulb)

Data Source: CLIMATOLOGICAL NORMAL (INMET), Station: Vitoria/ES – [ref. 1]

MONTH	ABSOLUTE AIR TEMPERATURE (°C)	
	MINIMUM	MAXIMUM
JAN	17.4	39.0
FEB	19.9	37.9
MAR	18.1	36.8
APR	18.2	36.2
MAY	16.0	36.0
JUN	14.9	33.3
JUL	14.3	33.2
AUG	14.5	34.9
SEP	14.2	34.6
OCT	15.8	37.4
NOV	16.0	36.8
DEC	17.2	37.2

Data Source: CLIMATOLOGICAL NORMAL (INMET), Station: Vitoria/ES – [ref. 1]

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3.2. ATMOSPHERIC PRESSURE

MONTH	MEAN ATMOSPHERIC PRESSURE (hPa) *
JAN	1008.7
FEB	1009.2
MAR	1009.3
APR	1010.9
MAY	1012.9
JUN	1015.1
JUL	1016.3
AUG	1015.1
SEP	1014.1
OCT	1011.5
NOV	1009.5
DEC	1008.8

* (on the station level)

Data Source: CLIMATOLOGICAL NORMAL (INMET), Station: Vitoria/ES – [ref. 1]

3.2 RELATIVE HUMIDITY

MONTH	MEAN RELATIVE HUMIDITY (%)
JAN	76.0
FEB	75.0
MAR	76.0
APR	76.0
MAY	76.0
JUN	77.0
JUL	77.0
AUG	76.0
SEP	77.0
OCT	78.0
NOV	78.0
DEC	78.0

Data Source: CLIMATOLOGICAL NORMAL (INMET), Station: Vitoria/ES – [ref. 1]

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4. WIND DATA

4.1. ANNUAL DISTRIBUTION OF SPEED AND DIRECTION

Direction →		N	NE	E	SE	S	SW	W	NW			
Speed	(m/s)									Total	%	Mean
0.00	1.00	4	6	2	1	5	5	2	3	28	0.09	337.2
1.00	2.00	32	48	61	38	20	12	17	24	252	0.78	71.3
2.00	3.00	153	298	276	183	70	39	41	49	1109	3.43	71.6
3.00	4.00	298	792	847	405	157	63	33	79	2674	8.26	74.0
4.00	5.00	632	1645	1272	707	259	82	38	72	4707	14.55	69.9
5.00	6.00	813	2416	1472	886	348	64	21	48	6068	18.75	67.7
6.00	7.00	862	2383	1092	841	366	79	15	36	5674	17.53	64.2
7.00	8.00	849	2046	660	700	375	63	9	34	4736	14.64	60.3
8.00	9.00	752	1386	244	364	355	76	5	22	3204	9.90	51.8
9.00	10.00	495	785	89	206	223	54	5	12	1869	5.78	48.0
10.00	11.00	330	674	48	86	125	37	2	8	1310	4.05	42.1
11.00	12.00	143	208	14	20	68	20	1	1	475	1.47	39.3
12.00	13.00	39	46	2	6	32	9	0	2	136	0.42	42.9
13.00	14.00	19	27	1	2	30	14	0	1	94	0.29	96.0
14.00	15.00	2	1	0	0	10	2	0	0	15	0.05	188.5
15.00	16.00	0	0	0	0	4	1	0	0	5	0.02	192.9
16.00	17.00	0	0	0	0	1	3	0	0	4	0.01	214.2
Total		5423	12761	6080	4445	2448	623	189	391	32360		
%		16.76	39.43	18.79	13.74	7.56	1.93	0.58	1.21			
Mean		6.97	6.65	5.47	6.08	7.07	6.77	4.33	4.97			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

4.2. SEASONAL DISTRIBUTION OF SPEED AND DIRECTION

4.2.1. SUMMER

Direction →		N	NE	E	SE	S	SW	W	NW			
Speed	(m/s)									Total	%	Mean
0.00	1.00	1	1	1	0	2	0	0	0	5	0.06	101.9
1.00	2.00	4	11	13	12	7	0	1	3	51	0.65	94.5
2.00	3.00	42	99	79	42	12	4	11	10	299	3.79	66.3
3.00	4.00	76	240	252	95	23	6	5	16	713	9.03	69.4
4.00	5.00	183	576	344	127	32	12	5	11	1290	16.34	60.1
5.00	6.00	279	823	312	114	24	8	2	8	1570	19.88	51.6
6.00	7.00	289	794	152	44	31	6	5	7	1328	16.82	42.3
7.00	8.00	317	616	66	26	21	6	1	7	1060	13.42	34.5
8.00	9.00	283	422	13	13	17	8	1	4	761	9.64	28.6
9.00	10.00	190	178	8	4	4	3	0	0	387	4.90	25.2
10.00	11.00	110	179	3	4	0	2	0	1	299	3.79	27.8
11.00	12.00	40	58	0	2	3	0	0	0	103	1.30	27.7
12.00	13.00	10	6	1	1	0	0	0	1	19	0.24	24.4
13.00	14.00	5	3	1	0	0	0	0	0	9	0.11	27.3
14.00	15.00	2	1	0	0	0	0	0	0	3	0.04	27.8
Total		1831	4007	1245	484	176	55	31	68	7897		
%		23.19	50.74	15.77	6.13	2.23	0.70	0.39	0.86			
Mean		7.13	6.49	4.90	4.88	5.56	5.99	4.10	4.89			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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4.2.2. AUTUMN

Direction →		N	NE	E	SE	S	SW	W	NW			
Speed (m/s)										Total	%	Mean
0.00	1.00	1	3	1	0	2	2	2	1	12	0.15	359.0
1.00	2.00	20	23	27	15	6	5	12	15	123	1.52	43.1
2.00	3.00	75	107	106	71	24	21	16	22	442	5.46	66.7
3.00	4.00	114	268	280	135	65	35	15	38	950	11.74	73.4
4.00	5.00	221	434	438	266	94	37	17	32	1539	19.01	74.3
5.00	6.00	228	513	463	310	148	26	8	19	1715	21.19	77.7
6.00	7.00	188	351	271	302	143	30	2	15	1302	16.08	84.0
7.00	8.00	143	223	122	260	155	26	3	15	947	11.70	96.9
8.00	9.00	96	97	34	121	150	34	3	5	540	6.67	119.1
9.00	10.00	51	33	12	49	79	27	1	6	258	3.19	142.1
10.00	11.00	45	40	3	5	34	17	1	1	146	1.80	44.9
11.00	12.00	14	15	1	2	16	9	1	1	59	0.73	71.4
12.00	13.00	5	2	0	0	15	2	0	1	25	0.31	186.6
13.00	14.00	2	1	0	0	14	7	0	1	25	0.31	199.8
14.00	15.00	0	0	0	0	4	1	0	0	5	0.06	193.4
15.00	16.00	0	0	0	0	2	1	0	0	3	0.04	195.1
16.00	17.00	0	0	0	0	1	3	0	0	4	0.05	214.2
Total		1203	2110	1758	1536	952	283	81	172	8095		
%		14.86	26.07	21.72	18.97	11.76	3.50	1.00	2.12			
Mean		5.98	5.57	5.08	5.92	7.01	6.75	3.99	4.74			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

4.2.3. WINTER

Direction →		N	NE	E	SE	S	SW	W	NW			
Speed (m/s)										Total	%	Mean
0.00	1.00	2	2	0	0	1	2	0	0	7	0.08	348.8
1.00	2.00	7	7	10	11	6	3	2	6	52	0.63	95.1
2.00	3.00	21	48	41	38	23	5	7	13	196	2.36	81.7
3.00	4.00	46	139	135	109	48	9	4	8	498	6.00	86.9
4.00	5.00	103	303	262	172	78	14	8	14	954	11.49	78.9
5.00	6.00	151	500	410	272	100	15	5	10	1463	17.62	77.8
6.00	7.00	159	571	417	311	133	22	3	9	1625	19.57	78.9
7.00	8.00	151	495	288	288	145	21	2	7	1397	16.82	79.9
8.00	9.00	148	332	110	167	128	28	1	9	923	11.11	73.8
9.00	10.00	71	213	37	124	116	21	4	2	588	7.08	88.5
10.00	11.00	63	164	26	58	74	16	1	4	406	4.89	72.6
11.00	12.00	19	46	10	14	37	8	0	0	134	1.61	91.4
12.00	13.00	6	9	1	3	8	3	0	0	30	0.36	80.6
13.00	14.00	4	4	0	1	10	7	0	0	26	0.31	190.6
14.00	15.00	0	0	0	0	3	1	0	0	4	0.05	198.2
15.00	16.00	0	0	0	0	2	0	0	0	2	0.02	189.7
Total		951	2833	1747	1568	912	175	37	82	8305		
%		11.45	34.11	21.04	18.88	10.98	2.11	0.45	0.99			
Mean		6.97	6.86	6.06	6.61	7.46	7.62	5.16	5.29			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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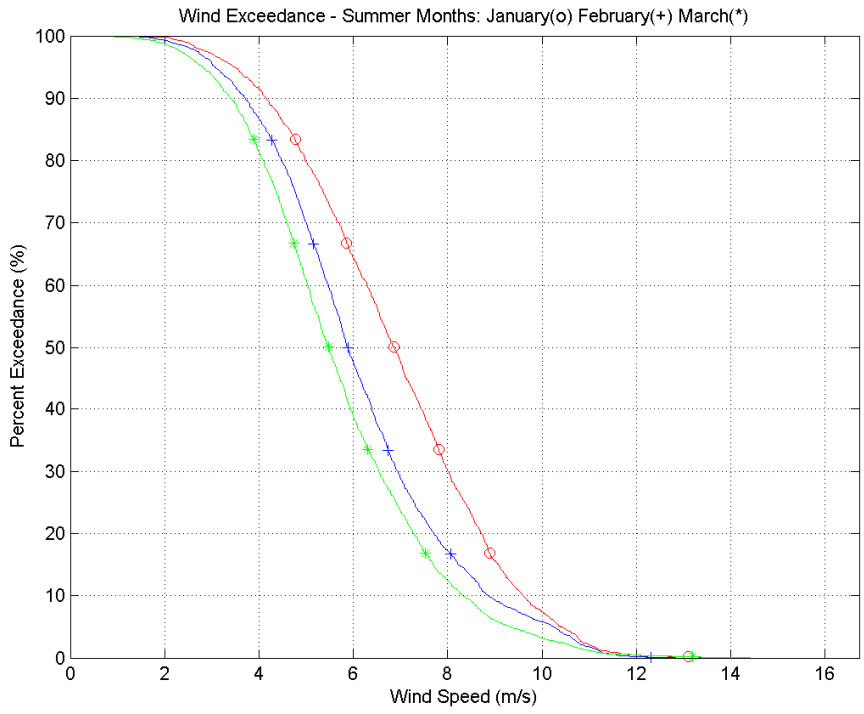
4.2.4. SPRING

Direction →		N	NE	E	SE	S	SW	W	NW			
Speed (m/s)										Total	%	Mean
0.00	1.00	0	0	0	1	0	1	0	2	4	0.05	257.0
1.00	2.00	1	7	11	0	1	4	2	0	26	0.32	80.3
2.00	3.00	15	44	50	32	11	9	7	4	172	2.13	83.7
3.00	4.00	62	145	180	66	21	13	9	17	513	6.36	70.5
4.00	5.00	125	332	228	142	55	19	8	15	924	11.46	69.6
5.00	6.00	155	580	287	190	76	15	6	11	1320	16.37	67.1
6.00	7.00	226	667	252	184	59	21	5	5	1419	17.60	58.7
7.00	8.00	238	712	184	126	54	10	3	5	1332	16.52	51.2
8.00	9.00	225	535	87	63	60	6	0	4	980	12.15	44.3
9.00	10.00	183	361	32	29	24	3	0	4	636	7.89	35.8
10.00	11.00	112	291	16	19	17	2	0	2	459	5.69	37.7
11.00	12.00	70	89	3	2	12	3	0	0	179	2.22	29.7
12.00	13.00	18	29	0	2	9	4	0	0	62	0.77	35.2
13.00	14.00	8	19	0	1	6	0	0	0	34	0.42	37.0
14.00	15.00	0	0	0	0	3	0	0	0	3	0.04	186.8
Total		1438	3811	1330	857	408	110	40	69	8063		
%		17.83	47.27	16.50	10.63	5.06	1.36	0.50	0.86			
Mean		7.59	7.27	5.75	6.10	6.99	5.84	4.41	5.25			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

4.3. SEASONAL EXCEEDANCE CURVES FOR WIND SPEED

4.3.1. SUMMER



Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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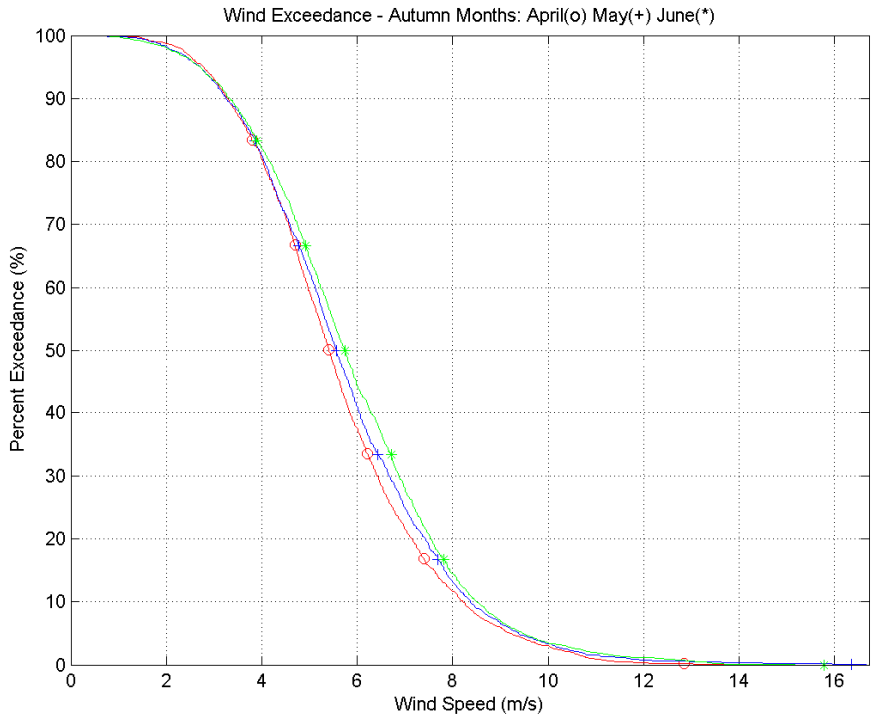
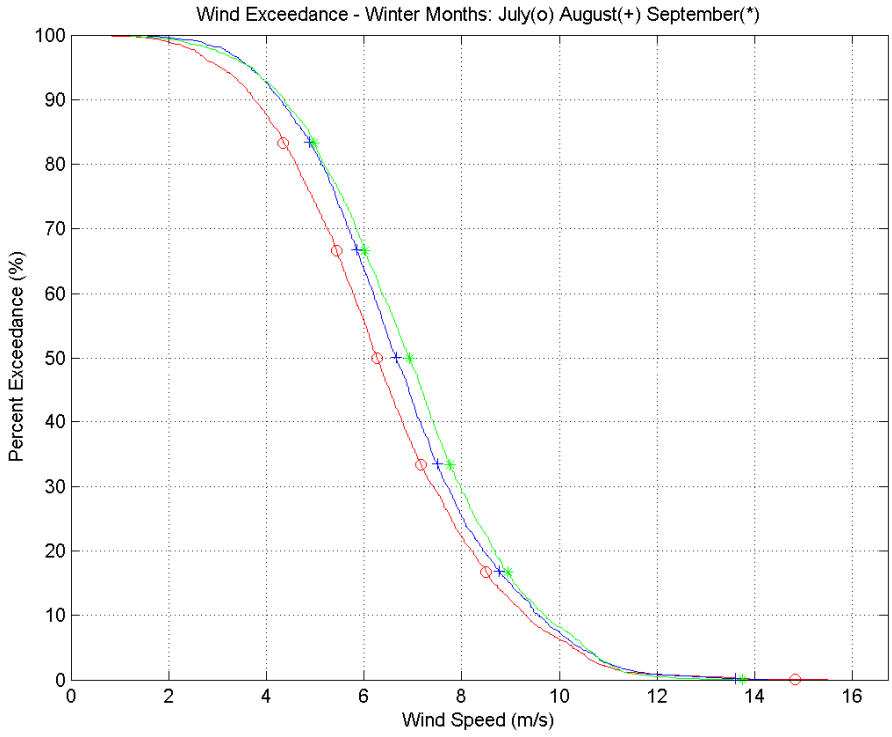
4.3.2. AUTUMN



Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

4.3.3. WINTER



Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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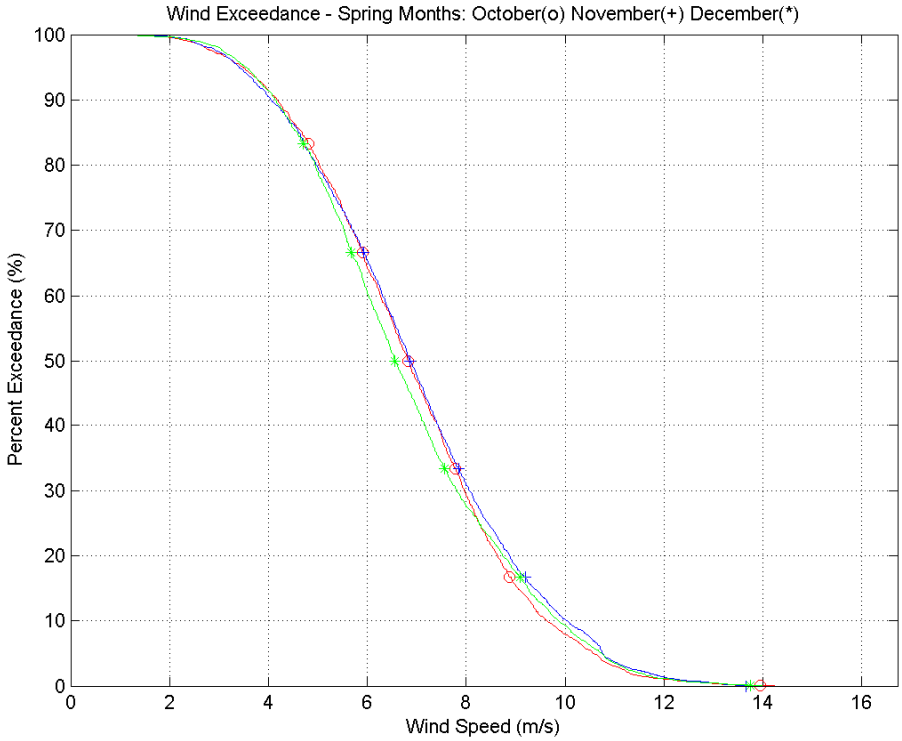
4.3.4. SPRING



Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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5. WAVE DATA

5.1. DEEPWATER ANNUAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD

		Tp(s)																			
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**Freq**	**%**	**MTp**
0.0	**0.5**	3	0	0	1	2	2	2	5	7	3	2	0	0	0	0	0	0	27	0.08	9.88
0.5	**1.0**	165	152	355	358	283	137	105	81	96	101	32	13	6	0	1	0	0	1885	5.83	7.32
1.0	**1.5**	22	1678	1976	4190	2117	495	267	353	416	293	117	46	17	7	3	1	0	11998	37.08	6.93
1.5	**2.0**	0	176	2582	1938	3723	831	354	514	421	348	224	93	70	9	7	2	1	11293	34.90	7.64
2.0	**2.5**	0	0	263	1385	1040	985	294	291	221	182	114	64	64	10	4	5	0	4922	15.21	8.33
2.5	**3.0**	0	0	0	282	380	225	164	149	129	102	38	26	27	8	1	1	0	1532	4.73	9.15
3.0	**3.5**	0	0	0	13	62	82	67	92	67	53	21	5	6	3	0	0	0	471	1.46	10.17
3.5	**4.0**	0	0	0	0	15	27	20	21	38	26	13	1	4	0	0	0	0	165	0.51	10.69
4.0	**4.5**	0	0	0	0	0	0	13	5	2	8	8	2	5	0	0	0	0	43	0.13	11.89
4.5	**5.0**	0	0	0	0	0	1	0	6	1	0	3	3	4	0	0	0	0	18	0.06	12.64
5.0	**5.5**	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	6	0.02	14.17
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Freq	**----**	190	2006	5176	8167	7622	2785	1286	1517	1398	1116	574	257	203	37	16	9	1	32360		
%	**----**	0.59	6.20	16.00	25.24	23.55	8.61	3.97	4.69	4.32	3.45	1.77	0.79	0.63	0.11	0.05	0.03	0.00			
MHs	**----**	0.83	1.26	1.51	1.58	1.71	1.94	1.95	1.91	1.83	1.85	1.93	1.99	2.15	2.14	1.74	1.95	1.57			

5.2. DEEPWATER ANNUAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK DIRECTION

		DIRECTION(º)										
Hs(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	1	4	6	10	6	0	0	0	27	0.08	121.70
0.5	**1.0**	84	550	749	263	219	17	1	2	1885	5.83	86.60
1.0	**1.5**	391	3441	5944	1209	902	106	1	4	11998	37.08	82.20
1.5	**2.0**	468	3160	4313	1674	1485	185	2	6	11293	34.90	90.30
2.0	**2.5**	158	1365	1055	997	1217	129	1	0	4922	15.21	109.10
2.5	**3.0**	33	317	144	367	611	60	0	0	1532	4.73	139.50
3.0	**3.5**	0	48	12	152	238	21	0	0	471	1.46	157.30
3.5	**4.0**	0	2	0	43	105	15	0	0	165	0.51	172.30
4.0	**4.5**	0	0	0	1	37	5	0	0	43	0.13	185.50
4.5	**5.0**	0	0	0	1	15	2	0	0	18	0.06	184.30
5.0	**5.5**	0	0	0	2	4	0	0	0	6	0.02	158.20
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	1135	8887	12223	4719	4839	540	5	12	32360		
%	**----**	3.51	27.46	37.77	14.58	14.95	1.67	0.02	0.04			
MHs	**----**	1.60	1.62	1.51	1.82	2.02	2.00	1.58	1.38			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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5.3. DEEPWATER SEASONAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT, SPECTRAL PEAK PERIOD AND SPECTRAL PEAK DIRECTION

5.3.1. SUMMER

		Tp(s)																	
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**Freq**	**%**	**MTp**
0.0	**0.5**	0	0	0	1	0	2	2	2	1	0	0	0	0	0	8	0.1	9.43
0.5	**1.0**	74	73	184	92	73	40	49	17	15	7	6	5	0	0	635	8.04	6.55
1.0	**1.5**	8	766	1048	1784	324	87	55	91	86	38	20	6	2	1	4316	54.65	6.33
1.5	**2.0**	0	39	709	665	474	64	37	47	73	29	31	13	10	1	2192	27.76	6.94
2.0	**2.5**	0	0	25	281	175	28	19	22	12	12	8	4	3	1	590	7.47	7.53
2.5	**3.0**	0	0	0	11	57	25	3	1	0	1	0	3	6	2	109	1.38	8.64
3.0	**3.5**	0	0	0	0	1	12	8	13	0	0	0	0	0	0	34	0.43	9.51
3.5	**4.0**	0	0	0	0	0	1	0	2	8	2	0	0	0	0	13	0.16	11.3
4.0	**4.5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	**5.0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq	**----**	82	878	1966	2834	1104	259	173	195	195	89	65	31	21	5	7897		
%	**----**	1.04	11.12	24.9	35.89	13.98	3.28	2.19	2.47	2.47	1.13	0.82	0.39	0.27	0.06			
MHs	**----**	0.8	1.23	1.39	1.47	1.68	1.64	1.46	1.6	1.54	1.59	1.57	1.68	2	2.13			

		DIRECTION(º)										
HS(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	0	1	2	4	1	0	0	0	8	0.10	124.60
0.5	**1.0**	48	276	197	63	48	3	0	0	635	8.04	70.90
1.0	**1.5**	166	1660	2100	244	131	15	0	0	4316	54.65	71.80
1.5	**2.0**	179	1063	583	172	179	15	0	1	2192	27.76	65.20
2.0	**2.5**	67	379	18	33	92	1	0	0	590	7.47	50.30
2.5	**3.0**	2	70	3	19	15	0	0	0	109	1.38	66.70
3.0	**3.5**	0	10	1	21	2	0	0	0	34	0.43	109.50
3.5	**4.0**	0	0	0	13	0	0	0	0	13	0.16	138.70
4.0	**4.5**	0	0	0	0	0	0	0	0	0	0.00	NaN
4.5	**5.0**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	462	3459	2904	569	468	34	0	1	7897		
%	**----**	5.85	43.8	36.77	7.21	5.93	0.43	0	0.01			
MHs	**----**	1.55	1.52	1.32	1.61	1.64	1.42	0	1.62			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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5.3.2. AUTUMN

Tp(s)																					
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**Freq**	**%**	**MTp**
0.0	**0.5**	3	0	0	0	2	0	0	3	6	3	2	0	0	0	0	0	0	19	0.23	10.07
0.5	**1.0**	66	48	100	161	130	71	37	48	46	68	26	8	5	0	1	0	0	815	10.07	7.89
1.0	**1.5**	7	257	249	836	716	217	85	129	132	149	54	17	10	6	3	1	0	2868	35.43	7.68
1.5	**2.0**	0	33	329	308	1015	252	114	178	124	95	88	57	56	7	3	2	1	2662	32.88	8.42
2.0	**2.5**	0	0	31	188	201	267	79	105	92	57	51	28	46	2	1	3	0	1151	14.22	9.28
2.5	**3.0**	0	0	0	41	29	47	49	53	43	32	13	19	15	5	1	1	0	348	4.30	10.37
3.0	**3.5**	0	0	0	5	8	12	26	37	38	27	7	5	6	2	0	0	0	173	2.14	10.99
3.5	**4.0**	0	0	0	0	1	8	8	5	6	7	4	0	0	0	0	0	0	39	0.48	10.59
4.0	**4.5**	0	0	0	0	0	0	5	4	1	3	0	0	0	0	0	0	0	13	0.16	10.67
4.5	**5.0**	0	0	0	0	0	1	0	5	1	0	0	0	0	0	0	0	0	7	0.09	10.39
5.0	**5.5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Freq	**----**	76	338	709	1539	2102	875	403	567	489	441	245	134	138	22	9	7	1	8095		
%	**----**	0.94	4.18	8.76	19.02	25.97	10.81	4.98	7.01	6.04	5.45	3.03	1.66	1.71	0.27	0.11	0.09	0.01			
MHs	**----**	0.82	1.25	1.46	1.47	1.59	1.8	1.96	1.89	1.83	1.72	1.78	1.93	1.99	2.06	1.61	1.89	1.57			

DIRECTION(º)												
HS(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	1	3	4	6	5	0	0	0	19	0.23	120.40
0.5	**1.0**	26	152	377	135	116	8	0	1	815	10.07	96.70
1.0	**1.5**	84	347	1635	374	389	37	0	2	2868	35.43	97.80
1.5	**2.0**	71	228	1215	466	578	99	2	3	2662	32.88	115.90
2.0	**2.5**	19	79	223	320	440	70	0	0	1151	14.22	147.10
2.5	**3.0**	4	3	18	90	199	34	0	0	348	4.30	168.70
3.0	**3.5**	0	0	0	50	115	8	0	0	173	2.14	169.70
3.5	**4.0**	0	0	0	2	35	2	0	0	39	0.48	179.00
4.0	**4.5**	0	0	0	0	12	1	0	0	13	0.16	187.50
4.5	**5.0**	0	0	0	0	6	1	0	0	7	0.09	190.80
5.0	**5.5**	0	0	0	0	0	0	0	0	0	0.00	NaN
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	205	812	3472	1443	1895	260	2	6	8095		
%	**----**	2.53	10.03	42.89	17.83	23.41	3.21	0.02	0.07			
MHs	**----**	1.49	1.41	1.45	1.75	1.97	1.99	1.74	1.38			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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5.3.3. WINTER

		Tp(s)																		
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**Freq**	**%**	**MTp**
0.0	**0.5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
0.5	**1.0**	8	14	15	36	43	7	8	14	31	14	0	0	0	0	0	0	190	2.29	8.16
1.0	**1.5**	5	258	209	524	622	90	82	56	131	80	27	19	2	0	0	0	2105	25.35	7.46
1.5	**2.0**	0	45	657	361	1175	338	112	182	135	138	78	19	1	0	3	0	3244	39.06	7.88
2.0	**2.5**	0	0	95	380	317	454	127	97	96	77	49	29	15	6	3	2	1747	21.04	8.58
2.5	**3.0**	0	0	0	156	126	100	76	74	71	52	21	2	5	1	0	0	684	8.24	9.08
3.0	**3.5**	0	0	0	7	43	25	29	28	29	26	14	0	0	1	0	0	202	2.43	10.00
3.5	**4.0**	0	0	0	0	10	11	9	9	20	16	9	1	4	0	0	0	89	1.07	10.95
4.0	**4.5**	0	0	0	0	0	0	5	1	1	5	8	2	5	0	0	0	27	0.33	12.78
4.5	**5.0**	0	0	0	0	0	0	0	1	0	0	3	3	4	0	0	0	11	0.13	14.07
5.0	**5.5**	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	6	0.07	14.17
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Freq	**----**	13	317	976	1464	2336	1025	448	462	514	408	211	79	36	8	6	2	8305		
%	**----**	0.16	3.82	11.75	17.63	28.13	12.34	5.39	5.56	6.19	4.91	2.54	0.95	0.43	0.1	0.07	0.02			
MHs	**----**	0.93	1.3	1.68	1.8	1.76	2.08	2.12	2.08	1.97	2.05	2.25	2.22	2.98	2.4	1.95	2.13			

		DIRECTION(º)										
HS(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	0	0	0	0	0	0	0	0	0	0.00	NaN
0.5	**1.0**	3	34	94	35	17	5	1	1	190	2.29	96.40
1.0	**1.5**	67	409	1080	317	210	20	0	2	2105	25.35	91.10
1.5	**2.0**	77	608	1459	606	442	50	0	2	3244	39.06	100.20
2.0	**2.5**	18	225	508	454	494	47	1	0	1747	21.04	125.30
2.5	**3.0**	3	59	98	208	292	24	0	0	684	8.24	147.30
3.0	**3.5**	0	8	11	65	107	11	0	0	202	2.43	160.40
3.5	**4.0**	0	0	0	27	52	10	0	0	89	1.07	172.80
4.0	**4.5**	0	0	0	1	22	4	0	0	27	0.33	184.00
4.5	**5.0**	0	0	0	1	9	1	0	0	11	0.13	180.20
5.0	**5.5**	0	0	0	2	4	0	0	0	6	0.07	158.20
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	168	1343	3250	1716	1649	172	2	5	8305		
%	**----**	2.02	16.17	39.13	20.66	19.86	2.07	0.02	0.06			
MHs	**----**	1.57	1.71	1.68	1.99	2.23	2.25	1.54	1.33			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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5.3.4. SPRING

		Tp(s)																	
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**Freq**	**%**	**MTp**
0.0	**0.5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	**1.0**	17	17	56	69	37	19	11	2	4	12	0	0	1	0	0	245	3.04	6.79
1.0	**1.5**	2	397	470	1046	455	101	45	77	67	26	16	4	3	0	0	2709	33.6	6.68
1.5	**2.0**	0	59	887	604	1059	177	91	107	89	86	27	4	3	1	1	3195	39.63	7.22
2.0	**2.5**	0	0	112	536	347	236	69	67	21	36	6	3	0	1	0	1434	17.78	7.6
2.5	**3.0**	0	0	0	74	168	53	36	21	15	17	4	2	1	0	0	391	4.85	8.32
3.0	**3.5**	0	0	0	1	10	33	4	14	0	0	0	0	0	0	0	62	0.77	8.76
3.5	**4.0**	0	0	0	0	4	7	3	5	4	1	0	0	0	0	0	24	0.3	9.55
4.0	**4.5**	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	0.04	9.21
4.5	**5.0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq	**----**	19	473	1525	2330	2080	626	262	293	200	178	53	13	8	2	1	8063		
%	**----**	0.24	5.87	18.91	28.9	25.8	7.76	3.25	3.63	2.48	2.21	0.66	0.16	0.1	0.02	0.01			
MHs	**----**	0.88	1.31	1.59	1.66	1.8	2.02	1.95	1.91	1.74	1.83	1.77	1.88	1.62	1.97	1.72			

		DIRECTION(º)										
Hs(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	0	0	0	0	0	0	0	0	0	0.00	NaN
0.5	**1.0**	7	88	81	30	38	1	0	0	245	3.04	87.50
1.0	**1.5**	74	1025	1129	274	172	34	1	0	2709	33.60	77.70
1.5	**2.0**	141	1261	1056	430	286	21	0	0	3195	39.63	77.30
2.0	**2.5**	54	682	306	190	191	11	0	0	1434	17.78	77.80
2.5	**3.0**	24	185	25	50	105	2	0	0	391	4.85	84.60
3.0	**3.5**	0	30	0	16	14	2	0	0	62	0.77	101.90
3.5	**4.0**	0	2	0	1	18	3	0	0	24	0.30	177.80
4.0	**4.5**	0	0	0	0	3	0	0	0	3	0.04	190.00
4.5	**5.0**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	300	3273	2597	991	827	74	1	0	8063		
%	**----**	3.72	40.59	32.21	12.29	10.26	0.92	0.01	0			
MHs	**----**	1.78	1.75	1.59	1.76	1.92	1.72	1.36	0			

Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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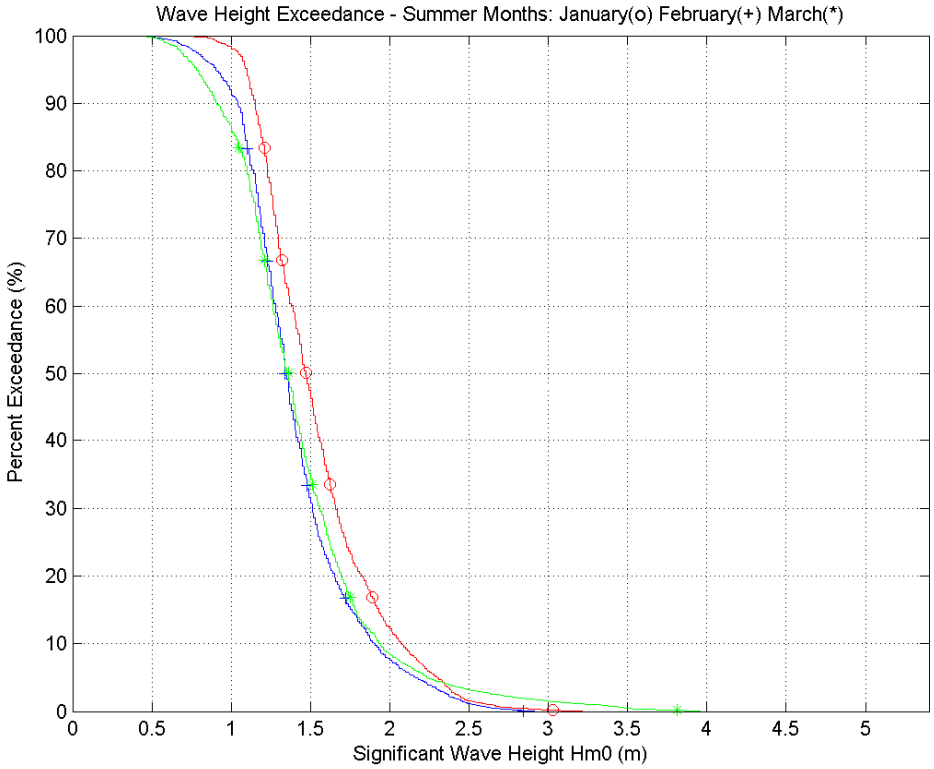
5.4. DEEPWATER SEASONAL EXCEEDANCE CURVES FOR TOTAL SIGNIFICANT WAVE HEIGHT

5.4.1. SUMMER



Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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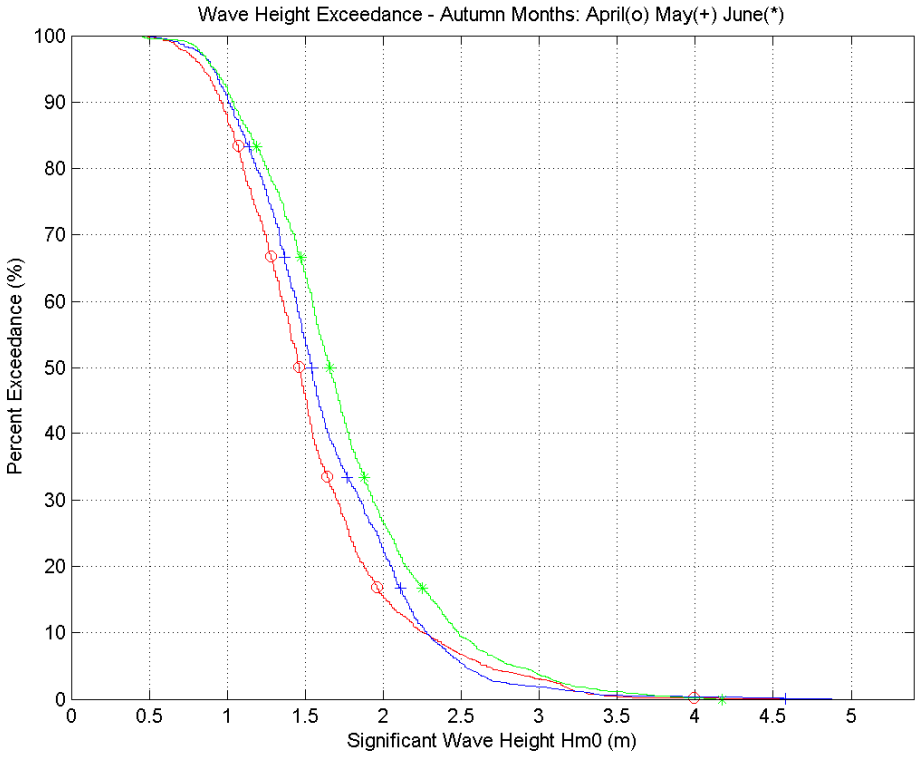
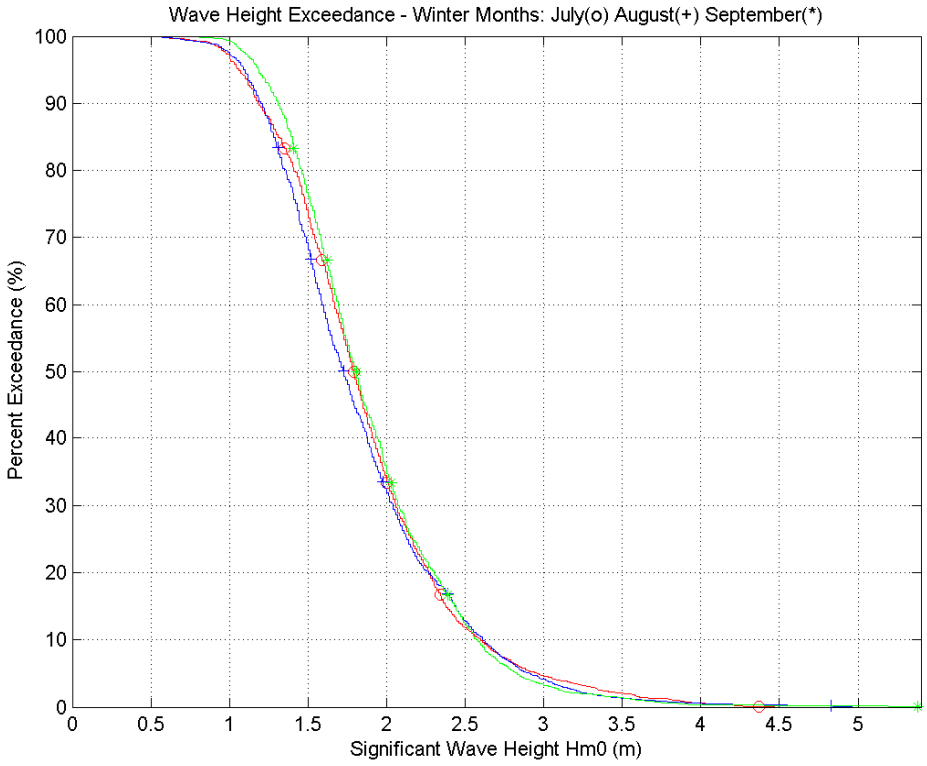
5.4.2. AUTUMN



5.4.3. WINTER



Data Source: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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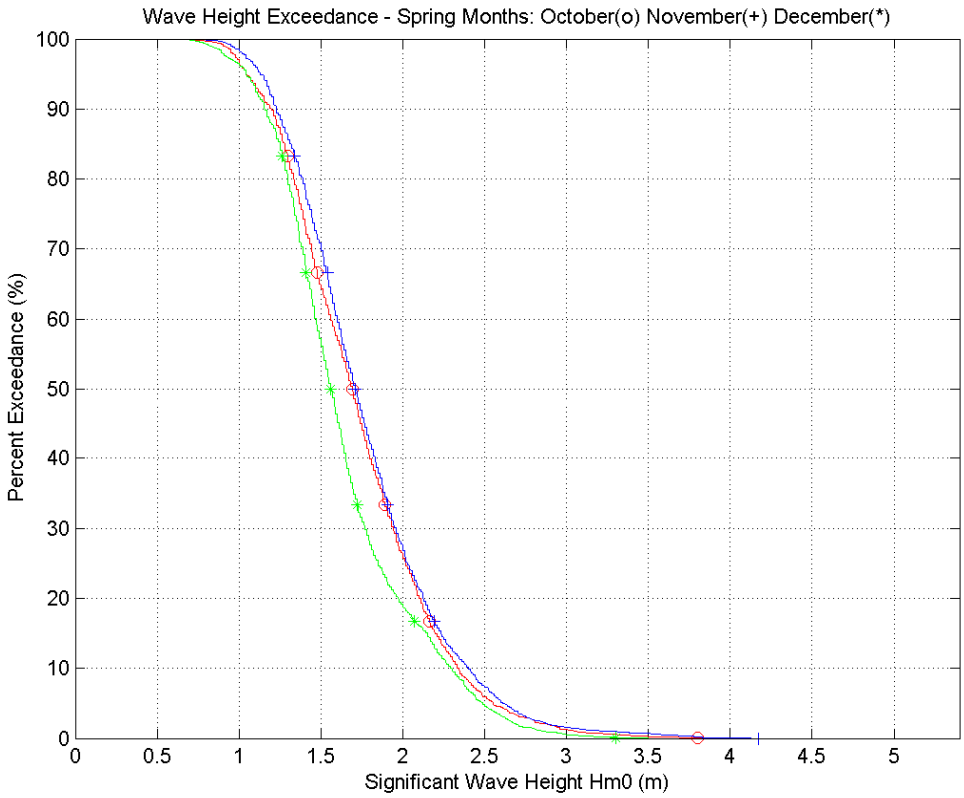
5.4.4. SPRING



Data Source Figures 5.4.1 to 5.4.4: Modeled wave data (Grid Point 4515) – BOMOS [ref. 2]

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5.5. CONTINENTAL SHELF ANNUAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK PERIOD

		Tp(s)																	
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**Freq**	**%**	**MTp**
0.0	**0.5**	18	0	5	11	2	7	9	16	18	5	0	0	0	0	91	0.27	8.31
0.5	**1.0**	236	337	700	911	551	251	199	256	160	16	8	0	4	1	3630	10.70	6.95
1.0	**1.5**	46	1993	2373	4493	2966	720	608	1080	238	35	6	9	10	0	14577	42.98	6.89
1.5	**2.0**	0	138	2317	1924	3186	1041	586	876	105	7	1	1	1	5	10188	30.04	7.34
2.0	**2.5**	0	3	218	1355	1008	800	354	296	49	3	8	5	1	0	4100	12.09	7.72
2.5	**3.0**	0	0	12	206	301	207	149	82	23	0	0	3	3	1	987	2.91	8.19
3.0	**3.5**	0	0	0	18	73	85	55	25	1	0	1	5	0	0	263	0.78	8.61
3.5	**4.0**	0	0	0	0	7	28	11	0	0	0	0	0	0	0	46	0.14	8.58
4.0	**4.5**	0	0	0	0	0	10	15	2	0	0	0	0	0	0	27	0.08	9.32
4.5	**5.0**	0	0	0	0	0	1	5	2	0	0	0	0	0	0	8	0.02	9.56
5.0	**5.5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Freq	**----**	300	2471	5625	8918	8094	3150	1991	2635	594	66	24	23	19	7	33917		
%	**----**	0.88	7.29	16.58	26.29	23.86	9.29	5.87	7.77	1.75	0.19	0.07	0.07	0.06	0.02			
MHs	**----**	0.82	1.20	1.44	1.50	1.62	1.82	1.74	1.55	1.31	1.20	1.56	2.14	1.47	1.79			

Data Source: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

5.6. CONTINENTAL SHELF ANNUAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT AND SPECTRAL PEAK DIRECTION

		DIRECTION(º)										
Hs(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
----	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**-----**
0.0	**0.5**	5	17	19	28	21	1	0	0	91	0.27	117.60
0.5	**1.0**	106	1076	1581	500	297	55	7	8	3630	10.70	84.90
1.0	**1.5**	480	4103	6977	1547	1340	97	18	15	14577	42.98	84.00
1.5	**2.0**	330	2921	3634	1837	1343	113	9	1	10188	30.04	92.50
2.0	**2.5**	68	1345	785	969	818	111	4	0	4100	12.09	103.40
2.5	**3.0**	2	196	104	326	290	69	0	0	987	2.91	135.40
3.0	**3.5**	0	35	26	76	113	13	0	0	263	0.78	148.20
3.5	**4.0**	0	0	10	1	31	4	0	0	46	0.14	170.30
4.0	**4.5**	0	0	15	0	12	0	0	0	27	0.08	129.90
4.5	**5.0**	0	0	3	0	5	0	0	0	8	0.02	153.40
5.0	**5.5**	0	0	0	0	0	0	0	0	0	0.00	NaN
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	991	9693	13154	5284	4270	463	38	24	33917		
%	**----**	2.92	28.58	38.78	15.58	12.59	1.37	0.11	0.07			
MHs	**----**	1.44	1.52	1.41	1.69	1.75	1.85	1.41	1.10			

Data Source: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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5.7. CONTINENTAL SHELF SEASONAL DISTRIBUTION OF TOTAL SIGNIFICANT WAVE HEIGHT, SPECTRAL PEAK PERIOD AND SPECTRAL PEAK DIRECTION

5.7.1. SUMMER

		Tp(s)												
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Freq**	**%**	**MTp**
0.0	**0.5**	7	0	1	2	0	4	5	2	0	0	21	0.26	6.79
0.5	**1.0**	79	157	386	273	122	60	58	36	18	0	1189	14.79	6.27
1.0	**1.5**	8	812	1085	1799	440	113	88	203	34	5	4587	57.05	6.31
1.5	**2.0**	0	18	579	553	378	59	54	46	11	0	1698	21.12	6.63
2.0	**2.5**	0	0	7	196	156	38	7	15	5	0	424	5.27	7.30
2.5	**3.0**	0	0	0	5	36	30	5	2	8	0	86	1.07	8.39
3.0	**3.5**	0	0	0	0	8	6	15	7	0	0	36	0.45	9.04
3.5	**4.0**	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Freq	**----**	94	987	2058	2828	1140	310	232	311	76	5	8041		
%	**----**	1.17	12.27	25.59	35.17	14.18	3.86	2.89	3.87	0.95	0.06			
MHs	**----**	0.78	1.15	1.31	1.36	1.56	1.55	1.41	1.36	1.42	1.25			

	DIRECTION(º)											
HS(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	1	4	5	5	5	1	0	0	21	0.26	123.40
0.5	**1.0**	47	523	431	124	56	8	0	0	1189	14.79	72.80
1.0	**1.5**	212	1752	2157	295	156	8	4	3	4587	57.05	72.00
1.5	**2.0**	124	929	394	126	113	12	0	0	1698	21.12	62.60
2.0	**2.5**	15	319	20	37	29	4	0	0	424	5.27	52.40
2.5	**3.0**	0	46	4	33	2	1	0	0	86	1.07	79.60
3.0	**3.5**	0	2	2	26	5	1	0	0	36	0.45	130.70
3.5	**4.0**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	399	3575	3013	646	366	35	4	3	8041		
%	**----**	4.96	44.46	37.47	8.03	4.55	0.44	0.05	0.04			
MHs	**----**	1.38	1.41	1.24	1.48	1.45	1.49	1.11	1.2			

Data Source: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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5.7.2. AUTUMN

		Tp(s)																
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**Freq**	**%**	**MTp**
0.0	**0.5**	10	0	4	8	2	3	4	6	18	5	0	0	0	0	60	0.69	8.66
0.5	**1.0**	106	84	164	347	236	120	88	146	109	11	5	0	4	1	1421	16.33	7.48
1.0	**1.5**	15	380	354	970	886	260	212	396	96	6	4	6	10	0	3595	41.32	7.39
1.5	**2.0**	0	39	335	294	855	280	196	367	19	0	0	1	1	5	2392	27.49	7.86
2.0	**2.5**	0	0	70	190	176	206	110	110	16	0	0	0	0	0	878	10.09	8.06
2.5	**3.0**	0	0	5	61	42	57	68	23	9	0	0	2	2	1	270	3.10	8.49
3.0	**3.5**	0	0	0	6	17	17	15	2	1	0	0	0	0	0	58	0.67	8.38
3.5	**4.0**	0	0	0	0	3	16	4	0	0	0	0	0	0	0	23	0.26	8.62
4.0	**4.5**	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0.05	8.89
4.5	**5.0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Freq	**----**	131	503	932	1876	2217	963	697	1050	268	22	9	9	17	7	8701		
%	**----**	1.51	5.78	10.71	21.56	25.48	11.07	8.01	12.07	3.08	0.25	0.1	0.1	0.2	0.08			
MHs	**----**	0.78	1.2	1.43	1.4	1.53	1.74	1.69	1.49	1.13	0.77	1.01	1.66	1.36	1.79			

		DIRECTION(º)										
HS(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	4	12	14	16	14	0	0	0	60	0.69	110.80
0.5	**1.0**	41	257	734	225	137	22	2	3	1421	16.33	92.70
1.0	**1.5**	104	462	1979	465	544	29	8	4	3595	41.32	98.20
1.5	**2.0**	66	250	915	550	558	46	6	1	2392	27.49	116.80
2.0	**2.5**	18	81	180	268	261	70	0	0	878	10.09	137.90
2.5	**3.0**	0	4	8	124	113	21	0	0	270	3.10	160.40
3.0	**3.5**	0	3	9	9	36	1	0	0	58	0.67	161.10
3.5	**4.0**	0	0	5	1	14	3	0	0	23	0.26	169.60
4.0	**4.5**	0	0	0	0	4	0	0	0	4	0.05	173.00
4.5	**5**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	233	1069	3844	1658	1681	192	16	8	8701		
%	**----**	2.68	12.29	44.18	19.06	19.32	2.21	0.18	0.09			
MHs	**----**	1.38	1.32	1.34	1.64	1.7	1.89	1.39	1.09			

Data Source: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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5.7.3. WINTER

		Tp(s)															
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**Freq**	**%**	**MTp**
0.0	**0.5**	0	0	0	0	0	0	0	8	0	0	0	0	0	8	0.09	10.43
0.5	**1.0**	21	50	36	121	109	46	29	63	25	5	3	0	0	508	5.66	7.53
1.0	**1.5**	17	337	370	631	844	185	157	308	70	16	2	3	0	2940	32.76	7.29
1.5	**2.0**	0	46	681	498	1039	482	192	353	52	7	1	0	0	3351	37.34	7.56
2.0	**2.5**	0	2	76	460	328	333	185	137	21	3	8	5	1	1559	17.37	7.93
2.5	**3.0**	0	0	4	116	114	78	63	53	6	0	0	1	1	436	4.86	8.13
3.0	**3.5**	0	0	0	11	39	32	17	16	0	0	1	5	0	121	1.35	8.69
3.5	**4.0**	0	0	0	0	4	12	5	0	0	0	0	0	0	21	0.23	8.42
4.0	**4.5**	0	0	0	0	0	6	15	2	0	0	0	0	0	23	0.26	9.40
4.5	**5.0**	0	0	0	0	0	1	5	2	0	0	0	0	0	8	0.09	9.56
5.0	**5.5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Freq	**----**	38	435	1167	1837	2477	1175	668	942	174	31	15	14	2	8975		
%	**----**	0.42	4.85	13	20.47	27.6	13.09	7.44	10.5	1.94	0.35	0.17	0.16	0.02			
MHs	**----**	0.95	1.26	1.6	1.72	1.68	1.92	1.97	1.67	1.49	1.45	1.89	2.45	2.42			

		DIRECTION(º)										
HS(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	0	0	0	7	1	0	0	0	8	0.09	142.80
0.5	**1.0**	10	117	249	75	38	10	4	5	508	5.66	88.40
1.0	**1.5**	82	579	1455	422	361	32	4	5	2940	32.76	93.40
1.5	**2.0**	56	698	1353	737	458	47	2	0	3351	37.34	101.90
2.0	**2.5**	6	292	358	476	392	33	2	0	1559	17.37	121.00
2.5	**3.0**	0	46	75	134	141	40	0	0	436	4.86	141.80
3.0	**3.5**	0	13	14	32	51	11	0	0	121	1.35	154.10
3.5	**4.0**	0	0	5	0	15	1	0	0	21	0.23	168.00
4.0	**4.5**	0	0	15	0	8	0	0	0	23	0.26	120.40
4.5	**5**	0	0	3	0	5	0	0	0	8	0.09	153.40
5	**5.5**	0	0	0	0	0	0	0	0	0	0.00	NaN
5.5	**6.0**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	154	1745	3527	1883	1470	174	12	10	8975		
%	**----**	1.72	19.44	39.3	20.98	16.38	1.94	0.13	0.11			
MHs	**----**	1.46	1.64	1.58	1.82	1.93	2.03	1.45	1.04			

Data Source: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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5.7.4. SPRING

		Tp(s)												
Hs	**----**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Freq**	**%**	**MTp**
(m)	**----**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Freq**	**%**	**MTp**
0.0	**0.5**	1	0	0	1	0	0	0	0	0	0	2	0.02	4.94
0.5	**1.0**	30	46	114	170	84	25	24	11	8	0	512	6.24	6.5
1.0	**1.5**	6	464	564	1093	796	162	151	173	38	8	3455	42.13	6.8
1.5	**2.0**	0	35	722	579	914	220	144	110	23	0	2747	33.5	7.05
2.0	**2.5**	0	1	65	509	348	223	52	34	7	0	1239	15.11	7.36
2.5	**3.0**	0	0	3	24	109	42	13	4	0	0	195	2.38	7.81
3.0	**3.5**	0	0	0	1	9	30	8	0	0	0	48	0.59	8.37
3.5	**4.0**	0	0	0	0	0	0	2	0	0	0	2	0.02	9.79
4.0	**4.5**	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	**5.0**	0	0	0	0	0	0	0	0	0	0	0	0	0
Freq	**----**	37	546	1468	2377	2260	702	394	332	76	8	8200		
%	**----**	0.45	6.66	17.9	28.99	27.56	8.56	4.8	4.05	0.93	0.1			
MHs	**----**	0.87	1.25	1.51	1.57	1.67	1.88	1.64	1.51	1.45	1.35			

		DIRECTION(º)										
HS(m)	**---**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Freq**	**%**	**MDir**
0.0	**0.5**	0	1	0	0	1	0	0	0	2	0.02	126.00
0.5	**1.0**	8	179	167	76	66	15	1	0	512	6.24	89.20
1.0	**1.5**	82	1310	1386	365	279	28	2	3	3455	42.13	79.40
1.5	**2.0**	84	1044	972	424	214	8	1	0	2747	33.50	80.00
2.0	**2.5**	29	653	227	188	136	4	2	0	1239	15.11	75.10
2.5	**3.0**	2	100	17	35	34	7	0	0	195	2.38	87.60
3.0	**3.5**	0	17	1	9	21	0	0	0	48	0.59	126.60
3.5	**4.0**	0	0	0	0	2	0	0	0	2	0.02	195.90
4.0	**4.5**	0	0	0	0	0	0	0	0	0	0.00	NaN
4.5	**5**	0	0	0	0	0	0	0	0	0	0.00	NaN
Freq	**----**	205	3304	2770	1097	753	62	6	3	8200		
%	**----**	2.5	40.29	33.78	13.38	9.18	0.76	0.07	0.04			
MHs	**----**	1.6	1.64	1.48	1.65	1.66	1.43	1.58	1.24			

Data Source: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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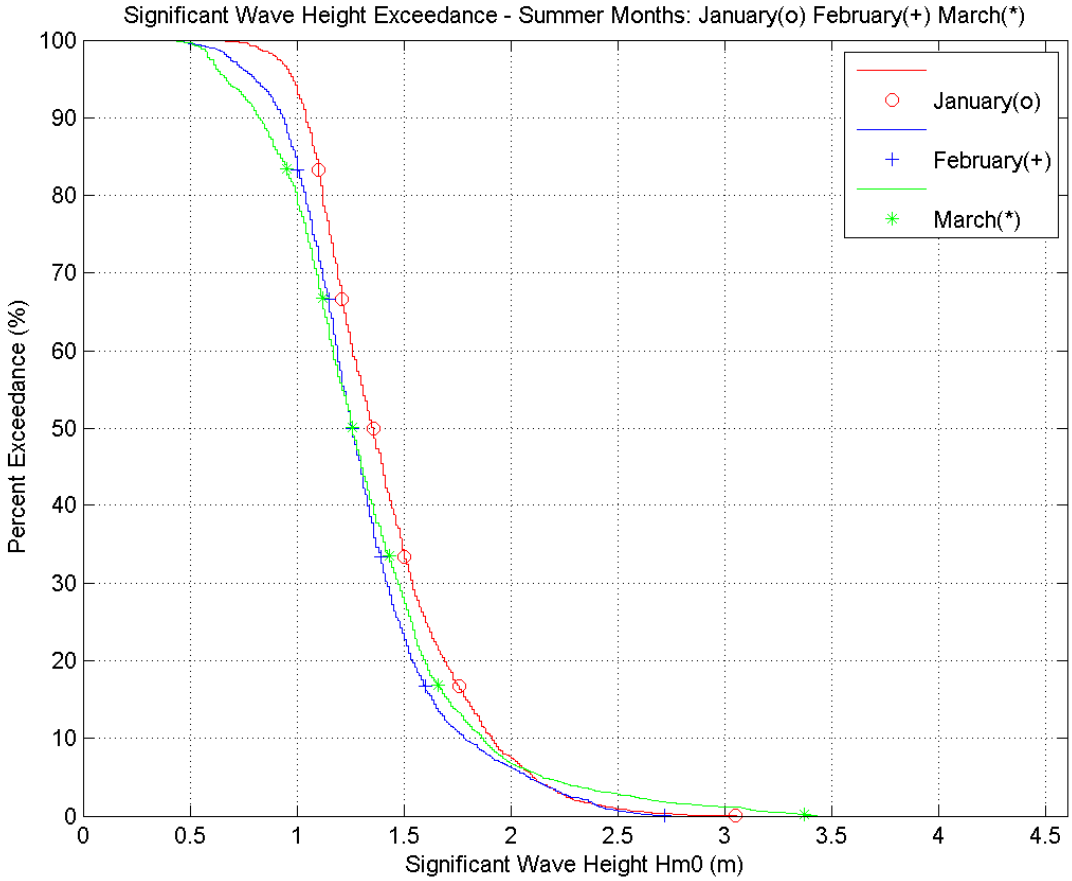
5.8. CONTINENTAL SHELF SEASONAL EXCEEDANCE CURVES FOR TOTAL SIGNIFICANT WAVE HEIGHT

5.8.1. SUMMER



Data Source Figures 5.4.1 to 5.4.4: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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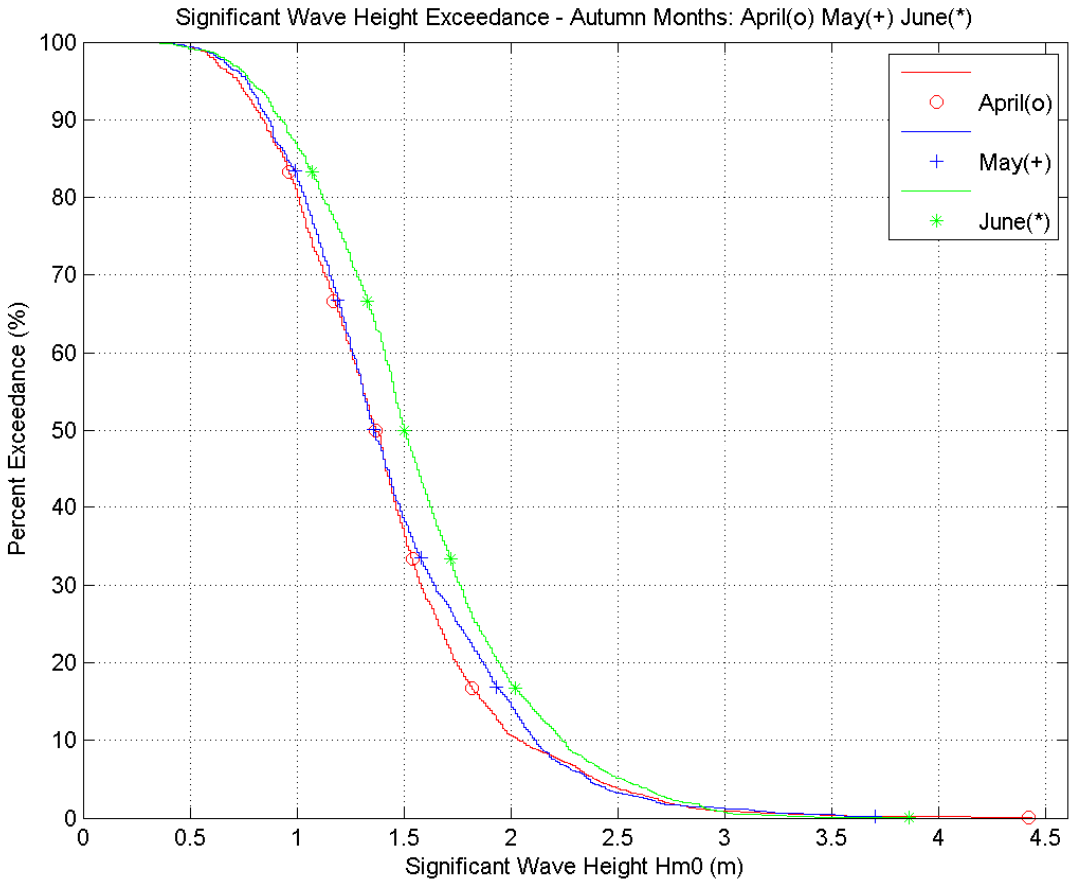
5.8.2. AUTUMN



Data Source Figures 5.4.1 to 5.4.4: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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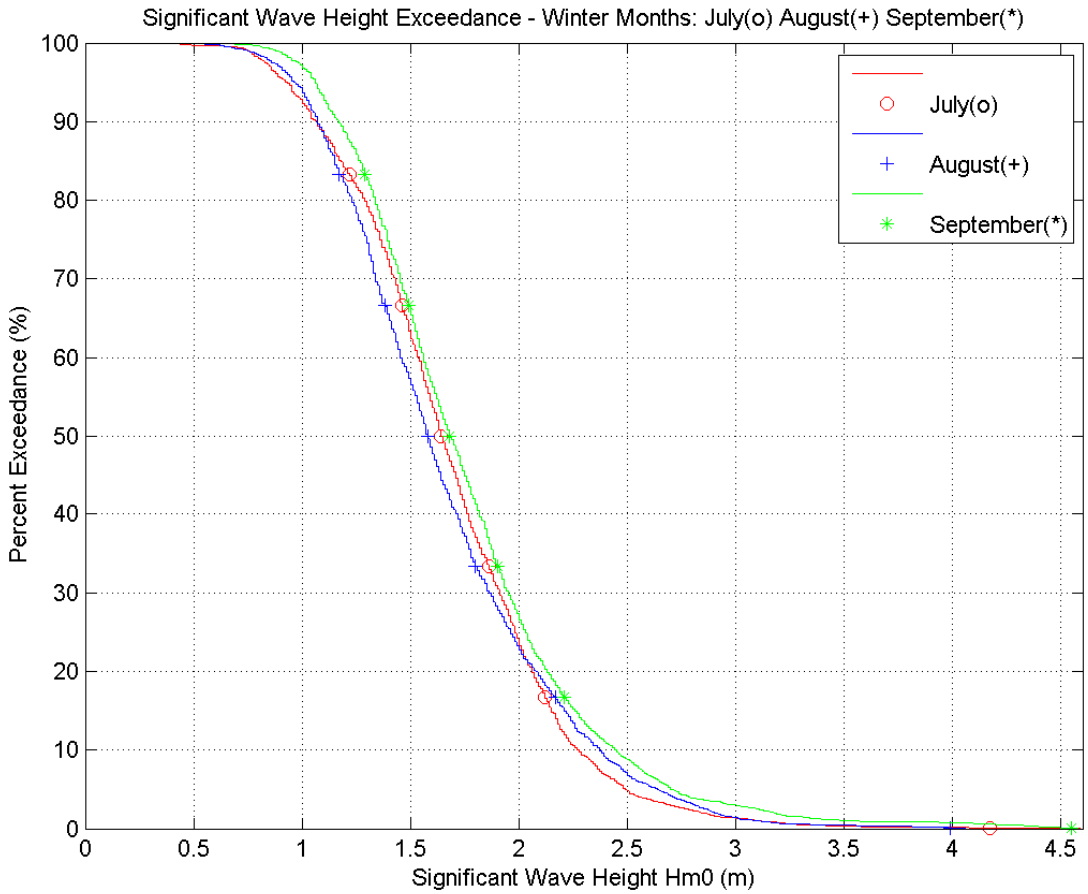
5.8.3. WINTER



Data Source Figures 5.4.1 to 5.4.4: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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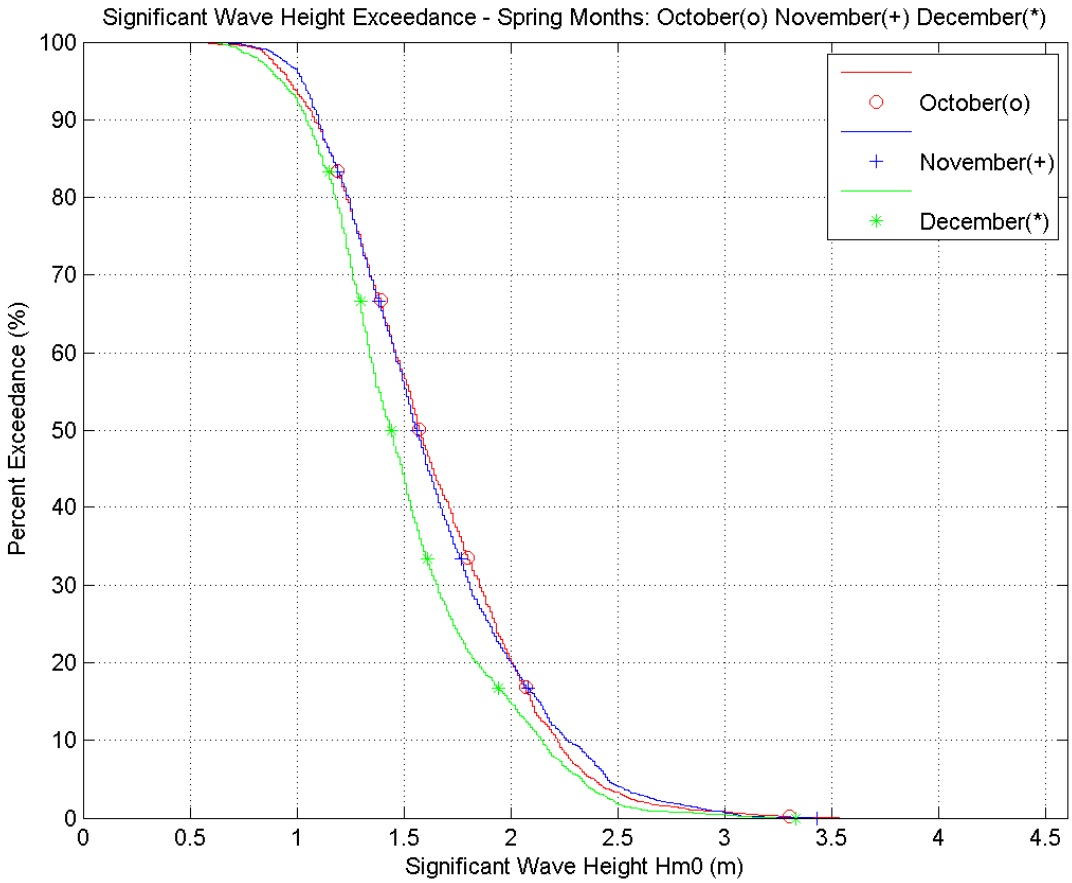
5.8.4. SPRING



Data Source Figures 5.4.1 to 5.4.4: Modeled wave data (Grid Point 4427) – BOMOS [ref. 2]

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6. CURRENT DATA

6.1. ANNUAL DISTRIBUTION OF SURFACE SPEED AND DIRECTION FOR GOLFINHO REGION

Direction →		N	NE	E	SE	S	SW	W	NW			
Speed (m/s)										Total	%	Mean
0.00	0.10	373	225	142	138	222	348	377	413	2238	21.91	296.5
0.10	0.20	650	466	105	68	269	1044	752	507	3861	37.80	282.1
0.20	0.30	333	270	39	15	112	1000	425	152	2346	22.97	260.2
0.30	0.40	147	169	9	4	49	555	131	38	1102	10.79	251.6
0.40	0.50	83	79	6	0	14	230	33	7	452	4.43	261.0
0.50	0.60	26	43	1	0	3	69	9	5	156	1.53	295.1
0.60	0.70	4	17	0	0	0	19	3	0	43	0.42	305.2
0.70	0.80	1	6	0	0	0	0	0	0	7	0.07	35.5
0.80	0.90	0	9	0	0	0	0	0	0	9	0.09	38.1
0.90	1.00	0	0	0	0	0	0	0	0	0	0.00	NaN
Total		1617	1284	302	225	669	3265	1730	1122	10214		
%		15.83	12.57	2.96	2.20	6.55	31.97	16.94	10.98			
Mean		0.19	0.23	0.13	0.10	0.16	0.24	0.18	0.14			

Data source: ENGENHARIA/IEEPT/EEPTM/EDI [ref. 3]

6.2. ANNUAL DISTRIBUTION OF SURFACE SPEED AND DIRECTION FOR JUBARTE REGION

Direction →		N	NE	E	SE	S	SW	W	NW			
Speed (m/s)										Total	%	Mean
0.00	0.10	42	51	37	59	88	85	82	74	518	5.90	233.1
0.10	0.20	69	52	74	117	302	344	294	163	1415	16.12	230.0
0.20	0.30	89	20	11	65	537	614	307	139	1782	20.30	223.2
0.30	0.40	47	9	3	54	666	692	282	95	1848	21.05	217.9
0.40	0.50	46	3	0	49	440	555	157	42	1292	14.72	217.5
0.50	0.60	62	0	0	48	438	376	69	6	999	11.38	207.4
0.60	0.70	28	0	0	38	278	256	29	4	633	7.21	205.0
0.70	0.80	3	0	0	7	54	135	5	3	207	2.36	215.5
0.80	0.90	0	0	0	1	9	58	0	2	70	0.80	222.2
0.90	1.00	0	0	0	0	0	14	0	0	14	0.16	224.5
1.00	1.10	0	0	0	0	0	1	0	0	1	0.01	229.6
Total		386	135	125	438	2812	3130	1225	528	8779		
%		4.40	1.54	1.42	4.99	32.03	35.65	13.95	6.01			
Mean		0.33	0.15	0.13	0.31	0.39	0.40	0.29	0.24			

Data source: ENGENHARIA/IEEPT/EEPTM/EDI [ref. 3]

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7. REFERENCES

[1] CLIMATOLOGICAL NORMAL (INMET - NATIONAL INSTITUTE of METEOROLOGY). 1992. (Station: Vitoria/ES - Lat: 20.19S Lon: 42.51W ALT:37.1m – Period of data: 1961 a 1990)

[2] OCEANWEATHER Inc. 1999. “Brazilian Offshore Meteorological and Oceanographic Study (BOMOS)”, Joint Industry Project.

[3] PETROBRAS/ENGENHARIA/IEEPT/EEPTM/EDI. 2006. Ocean Data Acquiring – Technical Report 1 to 4.

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