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

	ORIGINAL	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G
DATE	30/05/1999	15/08/2003	17/03/2005	29/10/2010	26/03/2018	20/07/2018	03/08/2020	
EXECUTION	JLIMA	LMANOEL	JLIMA	EOR/JAMLIMA	EOR	EOR	EOR	
VERIFICATION	LMANOEL	JLIMA	LMANOEL	LMANOEL/GGM	WCB	WCB	WCB	
APPROVAL	MALP	AMAIA	AMAIA	LEVY	ARTHUR	ARTHUR	ARTHUR	

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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.

STATEMENT

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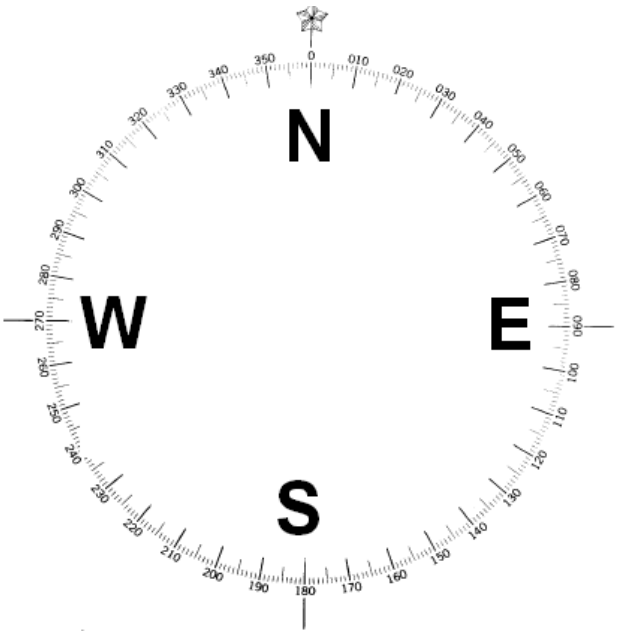
2 - SYSTEM OF UNITS AND DIRECTION CONVENTION

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 : 1035,0 hPa
Mean : 1014,8 hPa
Absolute minimum : 999,0 hPa

SOURCE: SIMO - Measured data in Campos Basin in the period from 1966 to 1998.

3.2 - Relative Humidity

Absolute maximum: 100 %
Mean : 82 %
Absolute Minimum : 33 %

SOURCE: Measured data in Campos Basin in the period from 1966 to 1998.

3.3 - Rainfall

Annual Absolute Maximum : 1360 mm
Monthly Maximum Total Height : 304 mm
Monthly Minimum Total Height : 2 mm
24 Hours maximum : 115 mm

SOURCES: DHN - Engineering Manual (Design subsidies) Meteorological Data - SENGE -1970.

3.4 - Air Temperature (DRY BULB)

Absolute maximum : 37,0ºC
Mean : 24,6ºC
Absolute minimum : 14,0ºC

SOURCE: Measured data in Campos Basin in the period from 1987 to 2004.

3.4.1 - Percentage of temperature occurrence in monthly basis

Range of Temperature (°C)	JAN	FEV	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
12 – 14								0.24					0.02
14 – 16								1.38		0.07			0.11
16 – 18					0.07	0.59	2.08	7.97		0.36	0.29		0.92
18 – 20				0.21	0.94	6.62	13.3	17.7	9.09	2.95	4.03	0.08	4.44
20 – 22	0.43		0.07	0.62	8.32	24.7	31.5	28.6	30.2	9.26	9.5	1.53	12.62
22 – 24	6.15	0.65	21.3	5.22	27.2	34.0	36.2	32.6	36.1	36.9	19.7	14.8	20.79
24 – 26	37.69	26.9	17.5	23.6	41.2	24.7	13.9	10.6	17.0	31.2	37.2	46.9	27.51
26 – 28	46.24	47.4	44.8	43.8	18.2	8.99	2.75	0.73	5.78	5.83	21.8	26.5	23.01
28 – 30	8.46	19.5	27.3	21.0	3.84	0.25	0.15	0.08	1.27	2.53	5.61	9.18	8.52
30 – 32	0.94	5.39	7.53	5.01	0.15				0.34	0.70	1.00	0.89	1.90
32 – 34	0.09	0.07	0.45	0.42						0.07	0.36		0.13
34 –36											0.36		0.13

SOURCE: Measured data in Campos Basin in the period from 06/87 to 05/91

3.4.2 - Characteristics Monthly Values (°C)

MONTH	MINIMUM	MEAN	MAXIMUM
JAN	22.0	26.94	35.0
FEB	21.5	27.65	37.0
MAR	21.0	27.46	36.0
APR	17.2	26.71	36.0
MAY	17.0	25.36	33.0
JUN	18.0	24.25	32.0
JUL	16.0	23.39	32.0
AUG	14.0	22.86	32.0
SEP	14.0	23.10	32.0
OCT	16.0	24.33	33.0
NOV	18.0	25.50	36.0
DEC	20.0	26.38	35.0

SOURCE: Measured data in Campos Basin in the period from 06/87 to 05/91.

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 …

		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)

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

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.

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”)

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)	9.30	9.80	9.80	9.80	10.00	10.00
	TZ: ZERO UP-CROSSING PERIOD (s)	6.88	7.24	7.24	7.24	7.39	7.39
	HMAX: MAXIMUM WAVE HEIGHT (m)	7.14	8.30	8.62	8.79	9.01	9.30
	THMAX: PERIOD ASSOCIATED TO HMAX (s)	10.05	10.36	10.44	10.48	10.54	10.60
	WS : ASSOCIATED WIND SPEED (m/s) IN THE SAME DIRECTION	12.74	15.53	16.30	16.70	17.24	17.92
	CS : ASSOCIATED CURRENT (m/s) IN THE SAME DIRECTION	0.64	0.77	0.80	0.82	0.84	0.87

Continue …

		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

Continue …

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.

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

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.

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	0.0	0.0	0.0	1.7	2.1	2.7	3.0	3.2	3.3	3.4	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.6
10	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.7	3.9	4.0	4.1	4.2	4.3	4.3	4.3	4.3	4.3	4.3
20	HsTotal(m)	0.0	0.0	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.0	4.1	4.2	4.3	4.4	4.5	4.5	4.5	4.5	4.5
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	4.3	4.4	4.5	4.6	4.6	4.6	4.6	4.6
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	4.4	4.5	4.6	4.7	4.7	4.7	4.7	4.7
100	HsTotal(m)	0.0	0.7	1.0	1.3	1.7	2.1	2.7	3.2	3.8	4.2	4.4	4.5	4.6	4.7	4.8	4.8	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	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5
3.5	3.4	3.3	3.1	3.0	2.8	2.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.3	4.2	4.1	4.0	3.9	3.7	3.6	3.4	3.3	3.1	2.9	2.7	2.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.4	4.4	4.3	4.2	4.1	3.9	3.8	3.7	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.1	0.0	0.0	0.0	0.0	0.0
4.5	4.5	4.4	4.3	4.2	4.1	4.0	3.8	3.7	3.5	3.4	3.2	3.0	2.9	2.6	2.4	2.1	0.0	0.0	0.0	0.0
4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	3.8	3.7	3.6	3.3	3.2	3.1	2.8	2.7	2.5	2.2	1.8	0.0	0.0
4.8	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	3.9	3.7	3.6	3.4	3.3	3.1	3.0	2.8	2.6	2.4	2.1	1.7

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

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	0.0	0.0	0.0	0.0	2.4	2.9	3.3	3.6	3.9	4.1	4.3	4.5	4.6	4.7	4.8	4.8	4.8
10	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.8	4.3	4.6	4.9	5.1	5.3	5.4	5.5	5.6	5.7	5.7
20	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.8	4.5	4.8	5.1	5.3	5.5	5.6	5.7	5.9	5.9	6.0
30	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.2	5.4	5.6	5.7	5.9	6.0	6.1	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	5.1	5.3	5.5	5.7	5.9	6.0	6.2	6.2	6.3
100	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	5.7	5.9	6.1	6.2	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	20.0	20.5	21.0	21.5
4.8	4.7	4.7	4.6	4.5	4.4	4.2	4.1	3.9	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.3	0.0	0.0	0.0	0.0
5.7	5.7	5.6	5.6	5.5	5.4	5.2	5.1	5.0	4.8	4.7	4.5	4.3	4.2	4.0	3.8	3.7	3.5	3.3	3.1	3.0
6.0	6.0	5.9	5.8	5.7	5.6	5.5	5.4	5.2	5.1	4.9	4.8	4.6	4.4	4.3	4.1	3.9	3.8	3.6	3.5	3.3
6.1	6.1	6.0	6.0	5.9	5.8	5.6	5.5	5.3	5.2	5.0	4.9	4.8	4.6	4.4	4.3	4.1	4.0	3.8	3.7	3.5
6.3	6.3	6.2	6.2	6.1	5.9	5.8	5.7	5.6	5.4	5.2	5.1	4.9	4.8	4.6	4.5	4.3	4.2	4.0	3.8	3.7
6.5	6.5	6.5	6.4	6.3	6.2	6.1	5.9	5.8	5.6	5.5	5.3	5.1	5.0	4.8	4.7	4.5	4.4	4.3	4.1	3.9

22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.8	2.6	2.4	2.2	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.1	3.0	2.8	2.6	2.4	2.3	1.9	0.0	0.0	0.0	0.0	0.0	0.0
3.4	3.1	3.0	2.8	2.6	2.5	2.3	2.1	1.7	0.0	0.0	0.0	0.0
3.5	3.4	3.2	3.1	2.9	2.8	2.6	2.4	2.2	2.0	0.0	0.0	0.0
3.8	0.0	3.5	3.4	3.3	3.0	2.9	2.8	2.6	2.4	2.3	2.1	1.9

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

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	0.0	0.0	2.2	2.8	3.2	3.6	3.8	4.1	4.3	4.5	4.7	4.8	5.0
10	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.8	3.3	3.7	4.0	4.3	4.6	4.9	5.1	5.3	5.5	5.7	5.8
20	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	0.0	2.5	3.1	3.5	3.9	4.2	4.5	4.8	5.0	5.2	5.5	5.7	5.8	6.0
30	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	2.0	2.7	3.2	3.6	3.9	4.3	4.6	4.9	5.1	5.3	5.6	5.7	6.0	6.1
50	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	2.1	2.7	3.2	3.8	4.1	4.4	4.8	5.0	5.3	5.5	5.7	5.9	6.1	6.3
100	HsTotal(m)	0.0	0.0	0.0	0.0	0.0	2.1	2.7	3.2	3.8	4.2	4.5	4.9	5.1	5.4	5.6	5.8	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	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5
5.1	5.1	5.1	5.1	5.1	5.0	4.9	4.8	4.6	4.3	4.1	3.8	3.4	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0	6.1	6.1	6.2	6.2	6.2	6.1	6.1	5.9	5.8	5.5	5.3	5.1	4.9	4.6	4.3	4.1	3.8	3.5	3.1	2.5
6.2	6.3	6.4	6.4	6.5	6.5	6.5	6.4	6.3	6.1	6.0	5.7	5.5	5.3	5.0	4.8	4.5	4.3	4.0	3.7	3.4
6.3	6.4	6.5	6.6	6.6	6.6	6.6	6.6	6.5	6.3	6.2	5.9	5.7	5.5	5.2	5.0	4.8	4.4	4.2	3.9	3.7
6.4	6.6	6.7	6.8	6.8	6.8	6.8	6.8	6.7	6.6	6.4	6.2	6.0	5.7	5.5	5.3	5.0	4.8	4.5	4.3	4.0
6.6	6.7	6.9	7.0	7.1	7.1	7.1	7.1	7.0	6.9	6.7	6.5	6.3	6.1	5.8	5.6	5.3	5.1	4.9	4.7	4.4

22.0	22.5	23.0	23.5	24.0	24.5	25.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.1	2.5	0.0	0.0	0.0	0.0	0.0
3.4	3.1	2.6	0.0	0.0	0.0	0.0
3.8	3.4	3.1	2.8	0.0	0.0	0.0
4.2	4.0	3.6	3.4	3.0	2.7	2.1

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

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	0.0	2.1	2.8	3.3	3.6	3.9	4.2	4.5	4.8	5.0	5.3	5.4	5.6	5.8
10	HsTotal(m)	0.0	0.0	0.0	0.0	1.5	2.1	2.7	3.2	3.7	4.1	4.5	4.7	5.0	5.2	5.5	5.7	5.9	6.1	6.3
20	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.8	4.3	4.5	4.8	5.1	5.4	5.6	5.8	6.0	6.2	6.4
30	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.8	4.3	4.6	5.0	5.2	5.4	5.7	5.9	6.1	6.3	6.5
50	HsTotal(m)	0.0	0.0	0.0	0.0	1.7	2.1	2.7	3.2	3.8	4.4	4.7	5.0	5.3	5.5	5.8	6.0	6.2	6.4	6.6
100	HsTotal(m)	0.0	0.0	0.0	1.3	1.7	2.1	2.7	3.2	3.8	4.5	4.9	5.1	5.4	5.6	5.8	6.0	6.2	6.4	6.6

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	20.5	21.0	21.5
6.0	6.1	6.2	6.3	6.4	6.4	6.3	6.3	6.1	5.9	5.7	5.4	5.1	4.8	4.4	4.1	3.7	3.3	0.0	0.0	0.0
6.5	6.6	6.8	6.9	7.0	7.1	7.2	7.2	7.1	7.0	6.8	6.6	6.3	5.9	5.7	5.3	5.1	4.8	4.6	4.2	3.9
6.6	6.7	6.9	7.0	7.2	7.3	7.4	7.4	7.4	7.2	7.0	6.8	6.5	6.3	6.0	5.7	5.4	5.1	4.9	4.5	4.3
6.6	6.9	7.0	7.1	7.3	7.4	7.5	7.5	7.5	7.4	7.2	7.0	6.7	6.5	6.1	5.9	5.6	5.3	5.0	4.7	4.5
6.7	6.9	7.1	7.2	7.3	7.5	7.6	7.6	7.6	7.6	7.4	7.2	6.9	6.6	6.3	6.1	5.8	5.5	5.3	4.9	4.7
6.8	7.0	7.2	7.3	7.5	7.6	7.7	7.8	7.8	7.8	7.7	7.5	7.2	6.9	6.5	6.3	6.0	5.8	5.5	5.3	5.0

22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.6	3.3	2.8	0.0	0.0	0.0	0.0	0.0
4.0	3.7	3.4	3.0	2.6	0.0	0.0	0.0
4.2	4.0	3.7	3.3	3.1	2.6	0.0	0.0
4.4	4.1	4.0	3.6	3.3	3.1	2.7	2.1
4.7	4.5	4.2	4.0	3.8	3.5	3.2	2.9

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

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.

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.

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

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

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).

(*) The Total Significant Wave Height (Hst) was obtained as Hst=4*sqrt(m_0), where m_o 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).

(*) The Total Significant Wave Height (Hst) was obtained as Hst = 4*sqrt(m_0), where m_o was the integrated area of the whole wave power spectrum. The Primary Spectral Peak was the spectral peak period of the whole wave spectrum.

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).

(*) 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.

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.

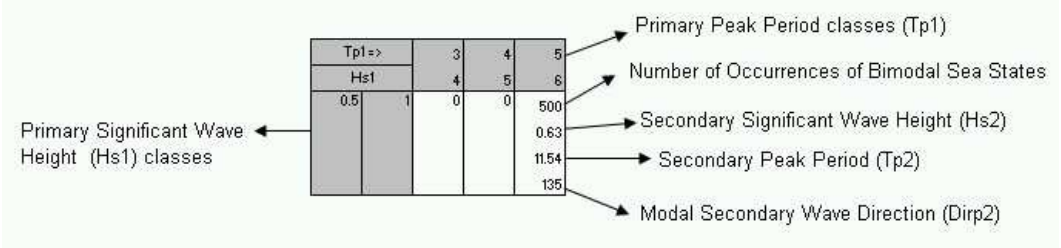
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

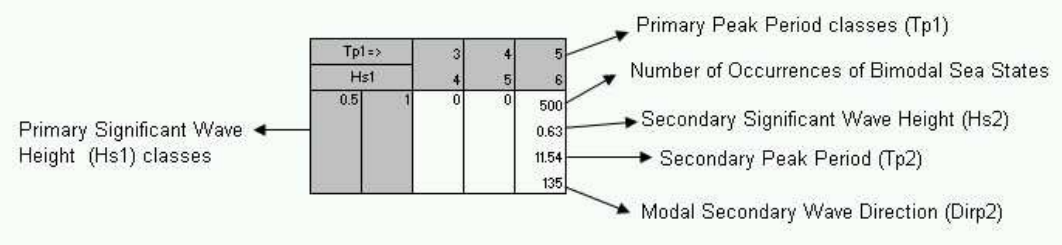
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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	1	0	0	0	0	0	0	0	0	1	0.1
		0	0	0.22	0	0	0	0	0	0	0	0		
		0	0	10.04	0	0	0	0	0	0	0	0		
		0	0	147	0	0	0	0	0	0	0	0		
0.5	1.0	0	37	28	19	5	0	0	0	1	0	0	90	9.33
		0	0.71	0.68	0.63	0.65	0	0	0	0.78	0	0		
		0	10.46	10.59	11.24	11.85	0	0	0	4.2	0	0		
		0	158	180	158	180	0	0	0	15	0	0		
1.0	1.5	0	54	197	115	46	4	1	0	0	0	1	418	43.32
		0	0.82	0.76	0.75	0.86	1.05	1.27	0	0	0	1.09		
		0	10.88	11.38	11.96	12.61	5.63	5.89	0	0	0	5.39		
		0	158	158	180	158	270	36	0	0	0	353		
1.5	2.0	0	5	99	142	48	7	2	0	0	0	0	303	31.4
		0	0.61	0.78	0.85	0.88	1.11	1.37	0	0	0	0		
		0	10.68	12.94	12.96	13.24	11.54	5.59	0	0	0	0		
		0	158	180	180	180	180	45	0	0	0	0		
2.0	2.5	0	0	12	71	32	5	0	0	0	0	0	120	12.44
		0	0	1.3	0.77	1.02	1.69	0	0	0	0	0		
		0	0	11.56	14.51	14.41	5.95	0	0	0	0	0		
		0	0	135	180	180	23	0	0	0	0	0		
2.5	3.0	0	0	0	12	10	2	1	0	0	0	0	25	2.59
		0	0	0	1.37	1.07	1.73	1.4	0	0	0	0		
		0	0	0	15.92	17.66	5.88	5.36	0	0	0	0		
		0	0	0	158	158	23	173	0	0	0	0		
3.0	3.5	0	0	0	0	3	2	0	0	0	0	0	5	0.52
		0	0	0	0	0.93	1.05	0	0	0	0	0		
		0	0	0	0	13.31	17.96	0	0	0	0	0		
		0	0	0	0	158	158	0	0	0	0	0		
3.5	4.0	0	0	0	0	3	0	0	0	0	0	0	3	0.31
		0	0	0	0	1.08	0	0	0	0	0	0		
		0	0	0	0	14.93	0	0	0	0	0	0		
		0	0	0	0	180	0	0	0	0	0	0		
	Freq.	0	96	337	359	147	20	4	0	1	0	1	965	
	%	0	9.95	34.92	37.2	15.23	2.07	0.41	0	0.1	0	0.1		

SOURCE: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals.

(*) 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.



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.

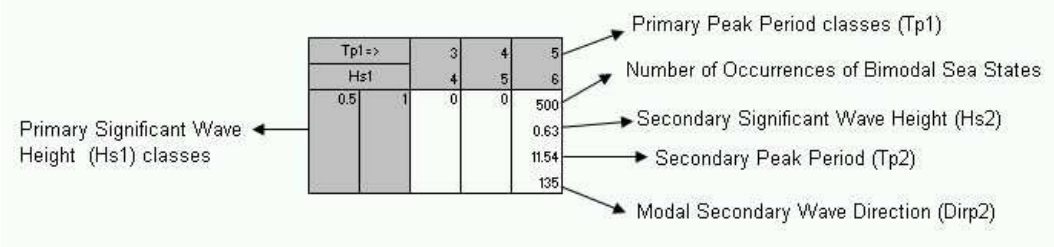
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

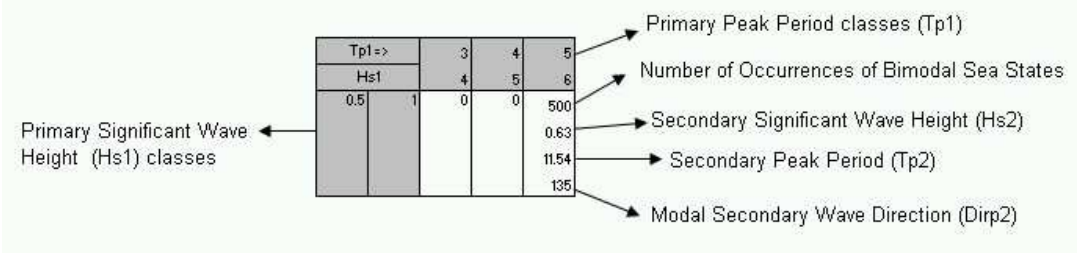
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

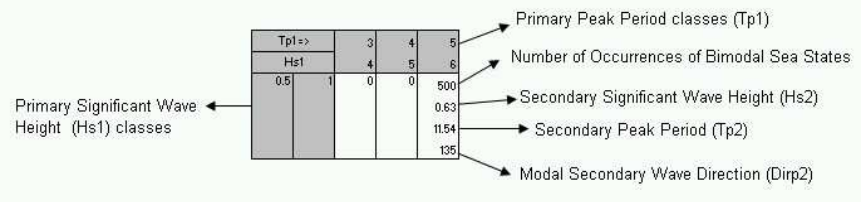
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

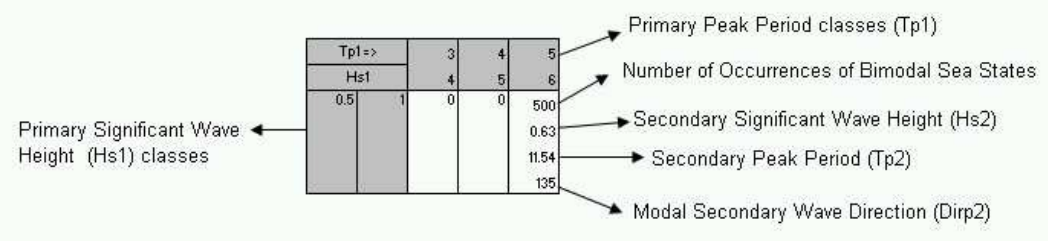
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

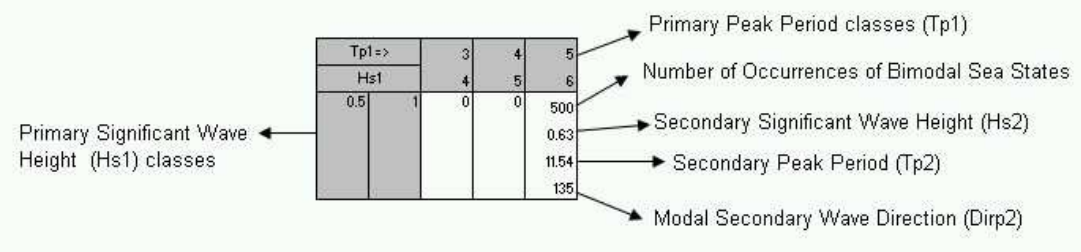
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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	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.	%
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 0 0	0 0 0 0	1 0.9 10.67 193	5 0.44 16.4 135	18 0.62 11.54 158	18 0.6 5.45 135	10 0.58 4.58 68	14 0.67 4.83 23	5 0.72 7.38 68	4 0.7 6.25 45	0 0 0 0	1 0.46 8.68 132	1 0.81 4.41 8	0 0 0 0	0 0 0 0	0 0 0 0	77	14.34
1.0	1.5	0 0 0 0	1 1.11 10.24 139	4 0.65 10.34 158	25 1.08 10.48 180	42 0.79 11.53 180	40 0.67 12.77 158	31 1.02 5.35 23	29 0.94 5.56 45	31 1.14 5.92 45	18 1.13 5.54 45	7 1.18 7.11 90	3 0.94 6.09 23	5 0.98 7.21 45	4 1.03 6.65 45	4 0.89 5.04 23	0 0 0 0	244	45.44
1.5	2.0	0 0 0 0	0 0 0 0	2 0.83 16.79 158	21 1.13 11.43 135	15 0.92 12.79 180	26 0.99 14.49 180	17 1.2 5.61 135	7 1.39 6.88 135	8 1.56 5.59 45	12 1.27 5.13 0	9 1.04 8.26 68	2 1.22 4.2 135	3 1.27 6.32 45	0 0 0 0	1 1.26 8.98 130	1 1.2 5.66 65	124	23.09
2.0	2.5	0 0 0 0	0 0 0 0	0 0 0 0	5 1.56 11.47 202	17 1.51 13.61 158	8 0.78 11.7 135	7 1.36 11.68 180	4 1.12 6.12 113	6 1.83 7.54 135	2 1.97 7.76 68	5 1.64 5.72 23	1 1.48 7.21 68	1 1.82 6.69 40	1 1.83 5.12 168	3 1.3 4.51 45	1 2.18 7.94 133	61	11.36
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1.92 10.45 183	5 1.12 14.47 158	6 1.35 5.51 68	3 2 6.97 113	1 1.22 6.06 162	4 1.74 6.87 45	0 0 0 0	1 2.21 5.51 190	0 0 0 0	1 1.81 7.37 220	1 1.55 4.72 103	0 0 0 0	23	4.28
3.0	3.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 0.99 16.79 115	1 1.92 12.34 194	3 1.03 15.75 180	0 0 0 0	1 2.5 7.76 143	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 2.24 5.2 0	0 0 0 0	0 0 0 0	7	1.3
3.5	4.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1.87 11.91 110	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	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	0.19
	Freq. %	0 0	1 0.19	7 1.3	56 10.43	95 17.69	98 18.25	74 13.78	57 10.61	52 9.68	40 7.45	21 3.91	8 1.49	10 1.86	7 1.3	9 1.68	2 0.37	537	

SOURCE: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals.

(*) 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.



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.

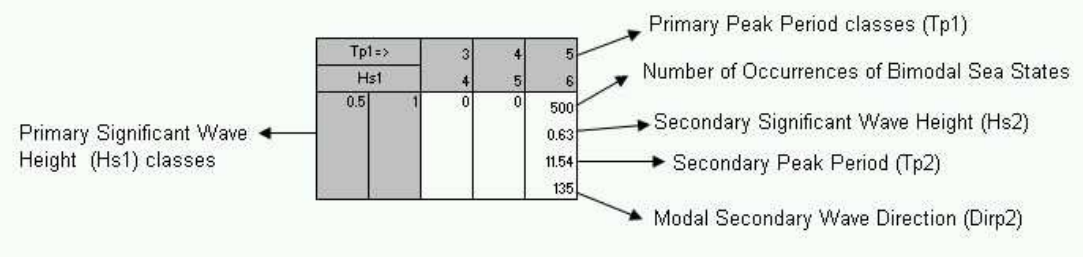
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

5.7.16 –Hs_1 x Tp_1 from SSE and associated Hs_2, Tp_2, $Dirp_2$ for Bimodal sea states

		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	1 0.86 8.19 115	0 0 0 0	2 0.58 13.65 135	7 0.4 10.96 158	11 0.82 5.89 90	7 0.66 5.75 45	14 0.84 5.37 68	20 0.72 6.45 45	7 0.85 6.75 45	0 0 0 0	3 0.75 7.76 90	1 0.72 5.42 310	0 0 0 0	0 0 0 0	73	12.03
1.0	1.5	0 0 0 0	1 0.96 11.51 165	8 0.89 9.13 68	10 1.11 7.95 202	21 0.89 11.67 158	38 0.69 11.78 158	49 0.97 5.88 45	42 1.05 5.74 23	53 1.03 5.53 45	31 1 6.8 90	10 1.01 7.13 90	15 1.28 5.47 23	9 1.16 6.15 0	4 1.17 6.64 45	6 1.04 8.62 158	297	48.93
1.5	2.0	0 0 0 0	1 1.02 9.23 112	1 1.02 10.14 174	8 0.9 10.4 158	12 0.99 13.28 180	19 1.24 10.71 180	11 1.08 11.65 158	12 1.4 4.76 23	27 1.45 7.14 158	24 1.44 6.93 90	13 1.38 5.92 23	8 1.2 8.04 68	5 1.3 7.82 45	3 1.25 5.48 23	2 1.7 8.46 23	146	24.05
2.0	2.5	0 0 0 0	0 0 0 0	1 2.11 12.34 208	3 1.63 10.14 202	11 1.38 11.91 202	6 0.94 4.59 0	8 1.69 6.02 23	6 1.62 6.52 180	5 1.96 6.74 23	9 1.5 6.03 0	2 1.66 5.75 68	4 1.78 7.82 113	5 1.63 6.46 23	1 1.89 5.72 35	2 1.42 4.81 45	63	10.38
2.5	3.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 0.92 16 120	3 1.36 8.55 225	0 0 0 0	0 0 0 0	5 1.94 6.98 135	5 2.45 7.65 158	0 0 0 0	3 2.08 6.83 23	2 2.61 10.04 90	0 0 0 0	1 1.57 5.85 243	20	3.29
3.0	3.5	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1.86 12.34 196	1 1.64 6.32 98	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 2.16 9.75 93	0 0 0 0	1 2.76 6.24 338	4	0.66
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	2 2.4 6.48 90	0 0 0 0	1 2.32 7.7 154	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	3	0.49
4.0	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	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 2.27 8.46 98	0 0 0 0	0 0 0 0	0 0 0 0	1	0.16
	Freq. %	0 0	3 0.49	10 1.65	23 3.79	52 8.57	78 12.85	76 12.52	76 12.52	110 18.12	77 12.69	25 4.12	34 5.6	23 3.79	8 1.32	12 1.98	607	

SOURCE: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals.

(*) 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.



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.

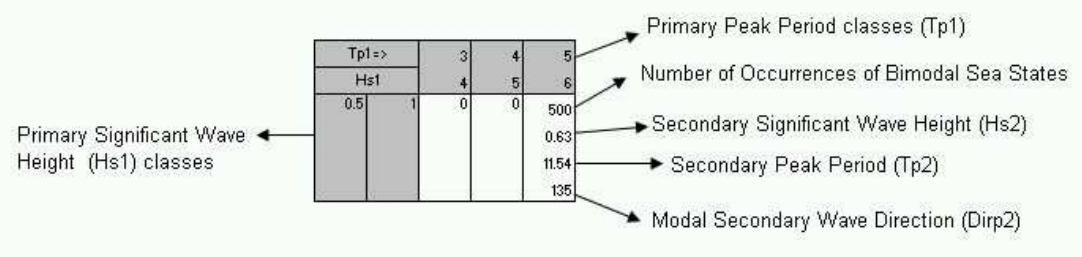
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

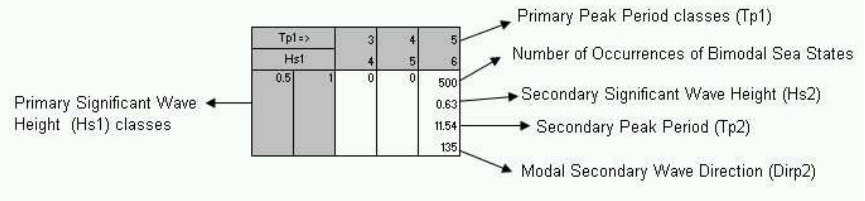
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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	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	0.5	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	1 0.81 6.78 16	0 0 0 0	2 0.39 12.64 135	3 0.79 11.58 135	0 0 0 0	4 0.71 5.39 45	12 0.6 6.73 113	7 0.9 5.76 23	4 0.91 5.79 23	3 0.61 6.62 68	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	36	6.33
1	1.5	0 0 0 0	0 0 0 0	5 0.81 11.68 135	20 0.93 10.98 180	10 0.74 12.85 113	18 0.83 9.04 135	16 0.96 5.52 23	39 0.98 5.7 23	58 0.94 5.36 23	37 1.13 5.92 23	9 1.31 7.38 23	6 0.93 7.67 68	1 1.27 7.06 73	1 1.01 7.16 93	0 0 0 0	220	38.66
1.5	2	0 0 0 0	0 0 0 0	4 0.77 8.16 135	9 0.56 10.8 113	11 1.21 9.34 180	7 1.45 9.94 202	17 1.21 8.52 158	14 1.03 5.76 45	33 1.24 5.71 23	43 1.36 6.47 45	28 1.46 7.77 90	7 1.65 5.98 0	0 0 0 0	3 1.66 6.52 23	0 0 0 0	176	30.93
2	2.5	0 0 0 0	0 0 0 0	0 0 0 0	6 0.63 10.17 202	8 1.33 12.22 180	6 0.85 14.49 158	2 1.29 5.75 202	17 1.52 6.57 202	13 1.52 6.59 180	18 1.16 6.59 90	10 1.79 6.93 23	5 1.79 8.23 68	1 1.54 8.26 100	1 2.25 7.31 10	0 0 0 0	87	15.29
2.5	3	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1.05 13.13 244	2 2.01 12.05 202	3 1.63 6.42 202	1 1.54 5.99 171	7 1.52 6.3 180	6 1.39 7.64 90	6 1.65 6.8 158	2 1.57 7.7 45	0 0 0 0	1 2.03 5.66 250	1 2.33 5.36 0	30	5.27
3	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	1 2.64 14.42 196	1 1.49 6.92 210	3 1.36 6.65 0	2 1.62 6.56 135	2 2.08 6.74 90	1 2.34 8.61 116	1 2.32 7.47 131	0 0 0 0	0 0 0 0	11	1.93
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	2 0.86 16.79 158	1 2.19 6.74 233	0 0 0 0	1 2.46 6.17 187	0 0 0 0	1 2.35 8.83 126	1 2.53 9.75 209	0 0 0 0	0 0 0 0	6	1.05
4	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	0 0 0 0	0 0 0 0	1 1.81 5.89 234	0 0 0 0	0 0 0 0	1 2.25 7.82 208	0 0 0 0	0 0 0 0	0 0 0 0	2	0.35
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	1 2.75 7.7 216	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	0.18
	Freq. %	0 0	1 0.18	9 1.58	37 6.5	33 5.8	33 5.8	45 7.91	85 14.94	123 21.62	111 19.51	58 10.19	23 4.04	4 0.7	6 1.05	1 0.18	569	

SOURCE: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals.

(*) 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.



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.

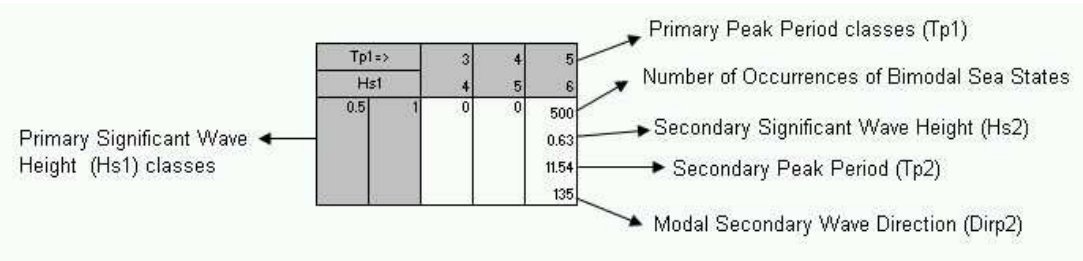
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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	5	0	2	1	1	0	2	2	0	1	1	0	0	0	15	4.92
		0	0.61	0	0.27	0.94	0.82	0	0.64	0.95	0	0.92	0.66	0	0	0		
		0	7.06	0	13.3	4.74	12.34	0	6.61	5.17	0	6.48	7.42	0	0	0		
		0	45	0	180	355	193	0	68	23	0	18	45	0	0	0		
1.0	1.5	0	2	9	8	10	12	9	15	20	9	4	0	1	2	3	104	34.1
		0	0.68	1.13	1	0.81	0.87	1.25	0.96	1.02	0.85	1.25	0	1.38	0.96	1.08		
		0	8	8.2	7.86	12.28	11.51	6.12	5.79	6.16	6.22	5.97	0	7.26	7.82	10.24		
		0	68	45	158	180	180	202	68	68	45	45	0	80	158	135		
1.5	2.0	0	0	4	19	10	6	9	12	26	10	5	2	1	2	0	106	34.75
		0	0	1.18	0.91	1.18	1.1	1.31	1.4	1.38	1.4	1.25	1.79	0.69	1.13	0		
		0	0	8.61	12.11	9.63	9.51	6.5	7.39	6.32	6.67	7.79	6.52	5.25	8.98	0		
		0	0	68	180	180	113	202	202	68	45	45	0	111	135	0		
2.0	2.5	0	0	0	3	6	7	5	7	11	12	3	0	0	1	1	56	18.36
		0	0	0	1.26	0.87	0.9	1.09	1.56	1.8	1.59	1.75	0	0	2.03	2.06		
		0	0	0	9.57	15.65	4.62	5.36	7.02	6.43	7.16	7.31	0	0	9.94	5.82		
		0	0	0	113	135	113	113	0	113	45	68	0	0	217	188		
2.5	3.0	0	0	0	0	1	0	3	3	6	1	0	0	1	0	0	15	4.92
		0	0	0	0	1.98	0	0.59	1.51	1.48	2.19	0	0	2.56	0	0		
		0	0	0	0	13.3	0	17.07	6.16	6.2	7.88	0	0	9.57	0	0		
		0	0	0	0	128	0	135	225	180	214	0	0	73	0	0		
3.0	3.5	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	4	1.31
		0	0	0	0	0	0	0	1.65	1.54	0	0	0	0	0	0		
		0	0	0	0	0	0	0	6.24	6.28	0	0	0	0	0	0		
		0	0	0	0	0	0	0	180	202	0	0	0	0	0	0		
3.5	4.0	0	0	0	0	0	1	2	2	0	0	0	0	0	0	0	5	1.64
		0	0	0	0	0	1.76	0.92	2.94	0	0	0	0	0	0	0		
		0	0	0	0	0	15.52	17.36	7.21	0	0	0	0	0	0	0		
		0	0	0	0	0	186	135	225	0	0	0	0	0	0	0		
	Freq.	0	7	13	32	28	27	28	43	67	32	13	3	3	5	4	305	
	%	0	2.3	4.26	10.49	9.18	8.85	9.18	14.1	21.97	10.49	4.26	0.98	0.98	1.64	1.31		

SOURCE: Campos Basin data (PROCAP1, PROCAP2., P-18 e P-25). The wave data was tabulated at 3-hour intervals.

(*) 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.



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.

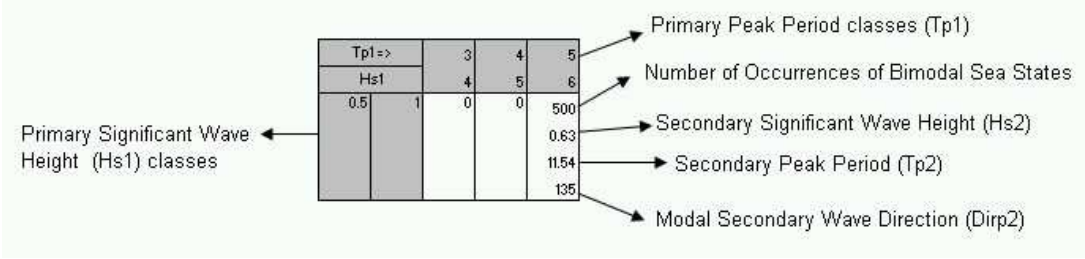
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

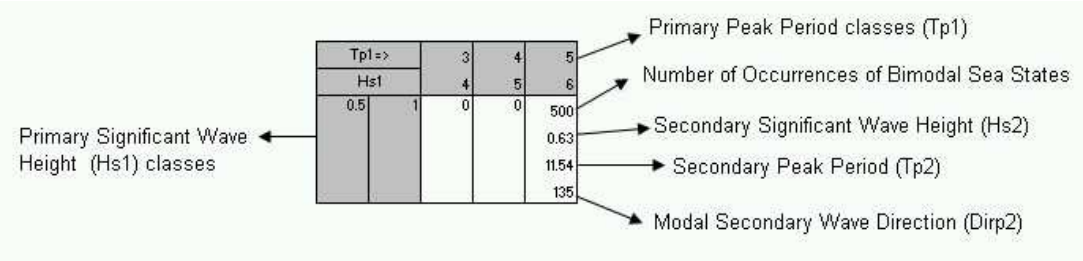
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

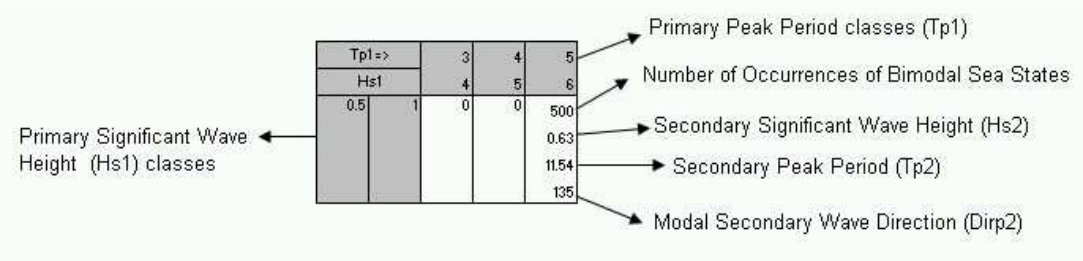
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

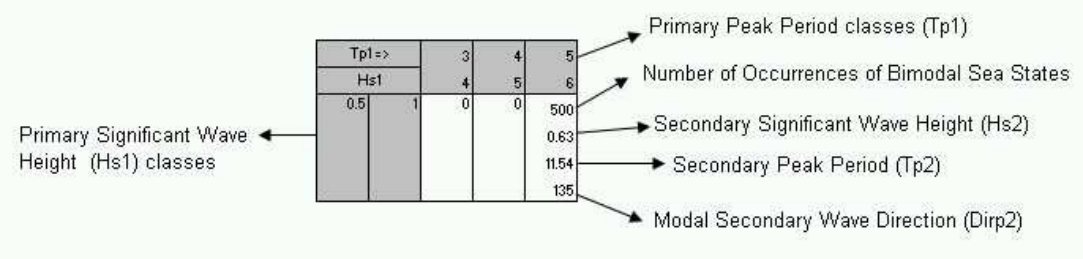
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



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.

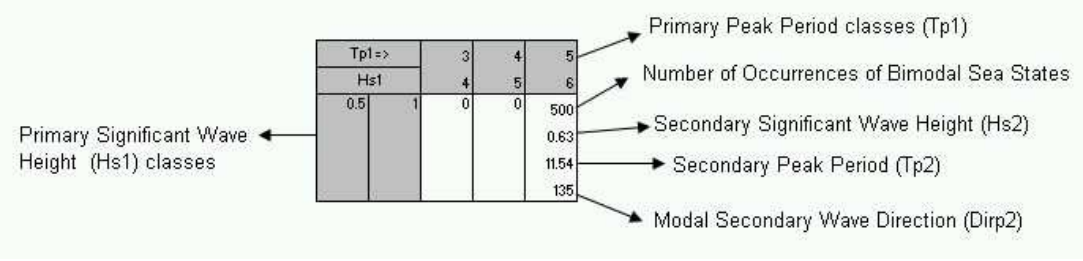
(*) The Primary Spectral Peak Period Tp_1 is the spectral peak period associated with the most energetic peak in the wave power spectrum. For unimodal sea states, the power spectrum has only one significative peak.

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.

(*) 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.



6 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)

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 (ºC), salinity [PSU] and density (kg/m^3) for transects Rn, Tr and Rs respectively.

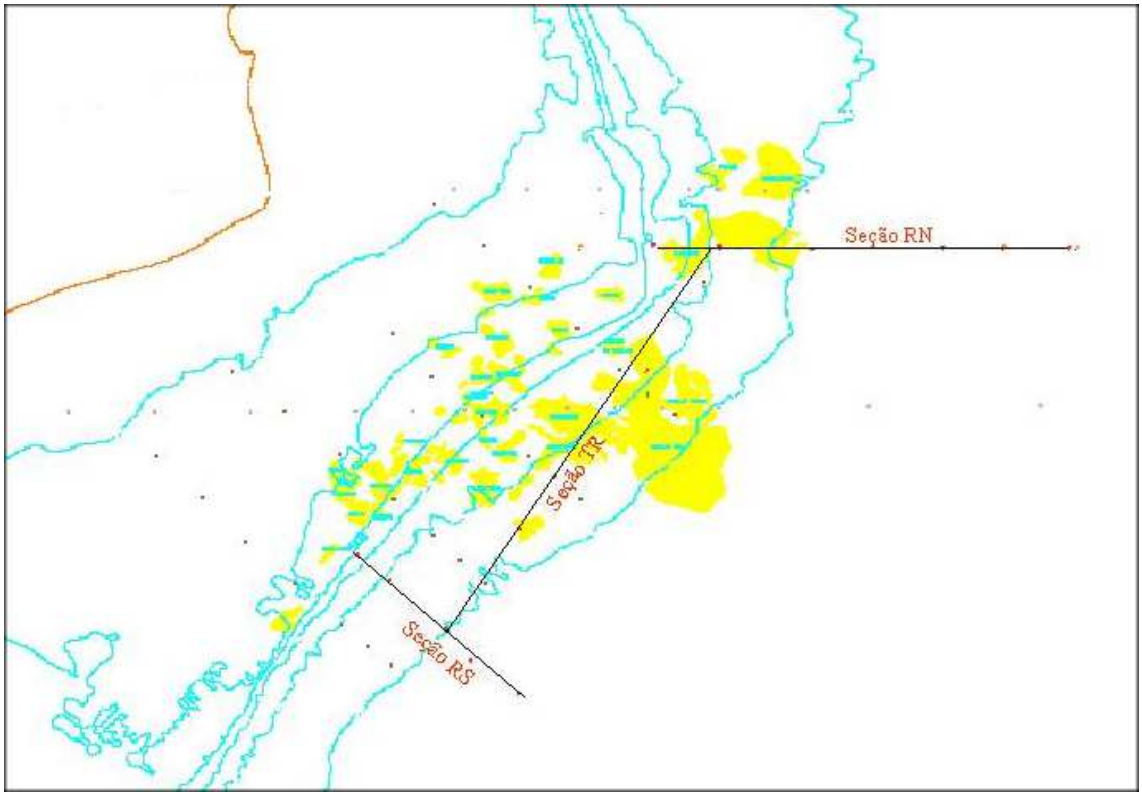
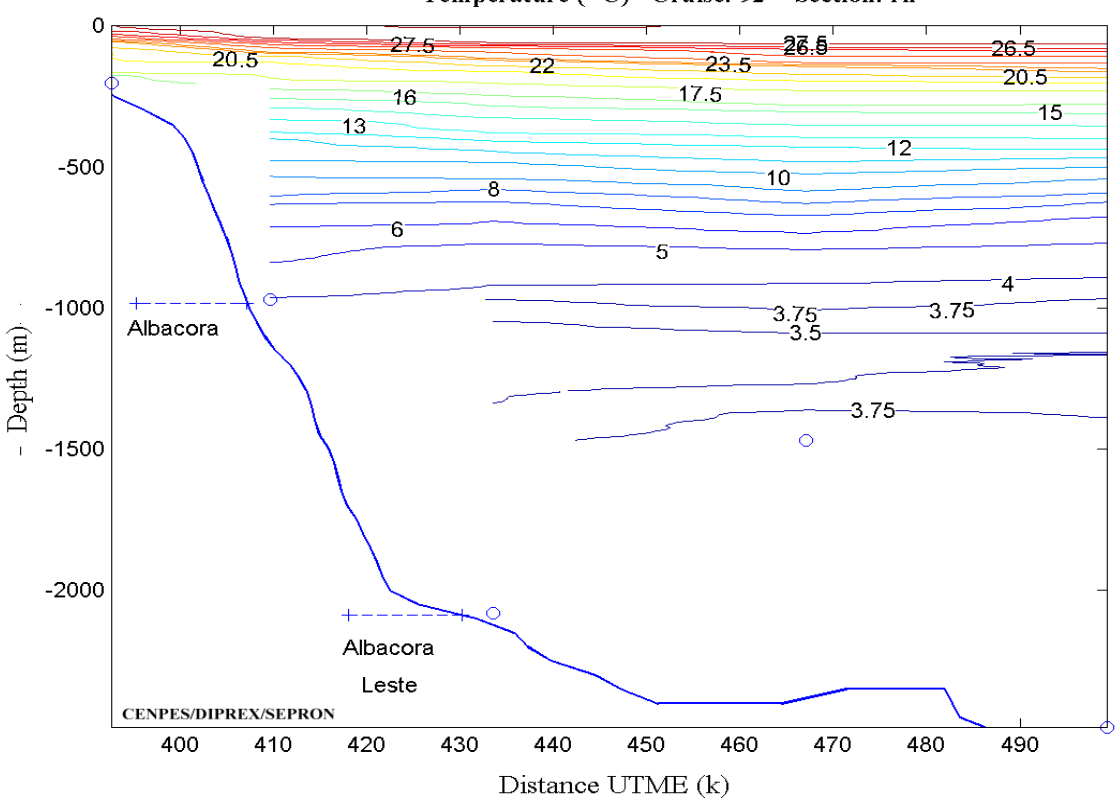
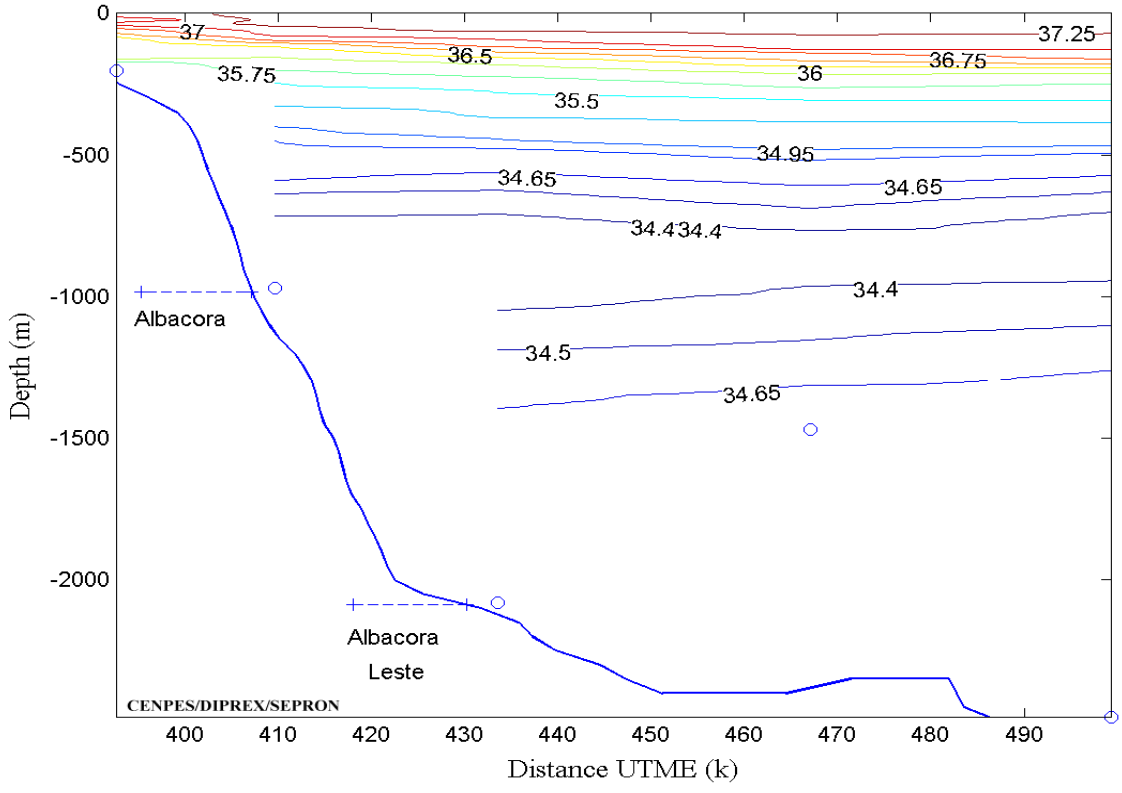


Figure 6.1 – Map of Campos Basin with position of three transects Rn, Tr and Rs.

(A)



(B)



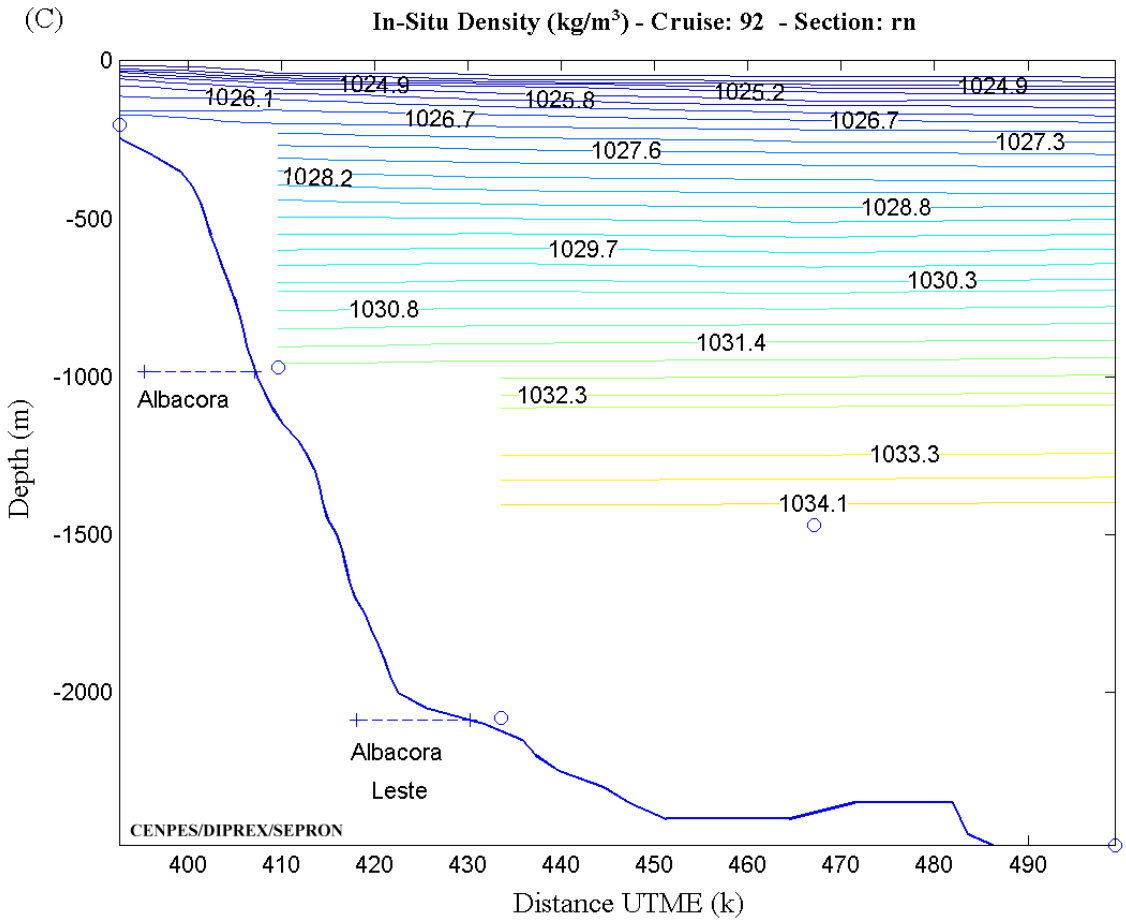
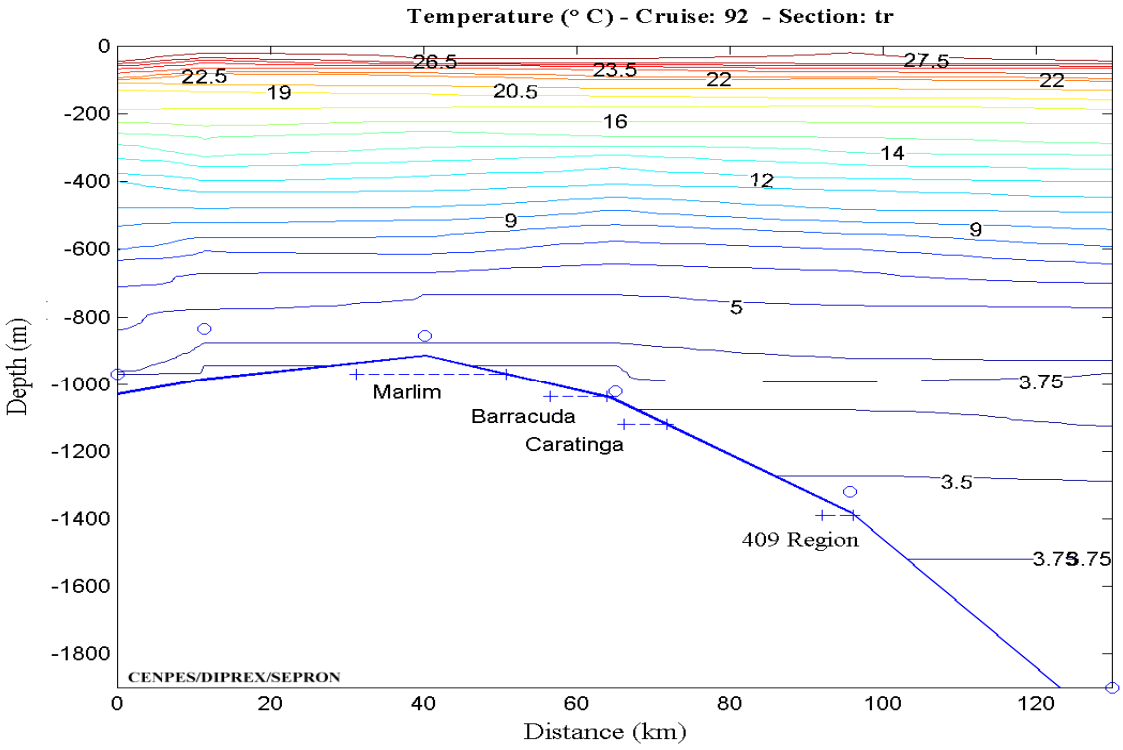
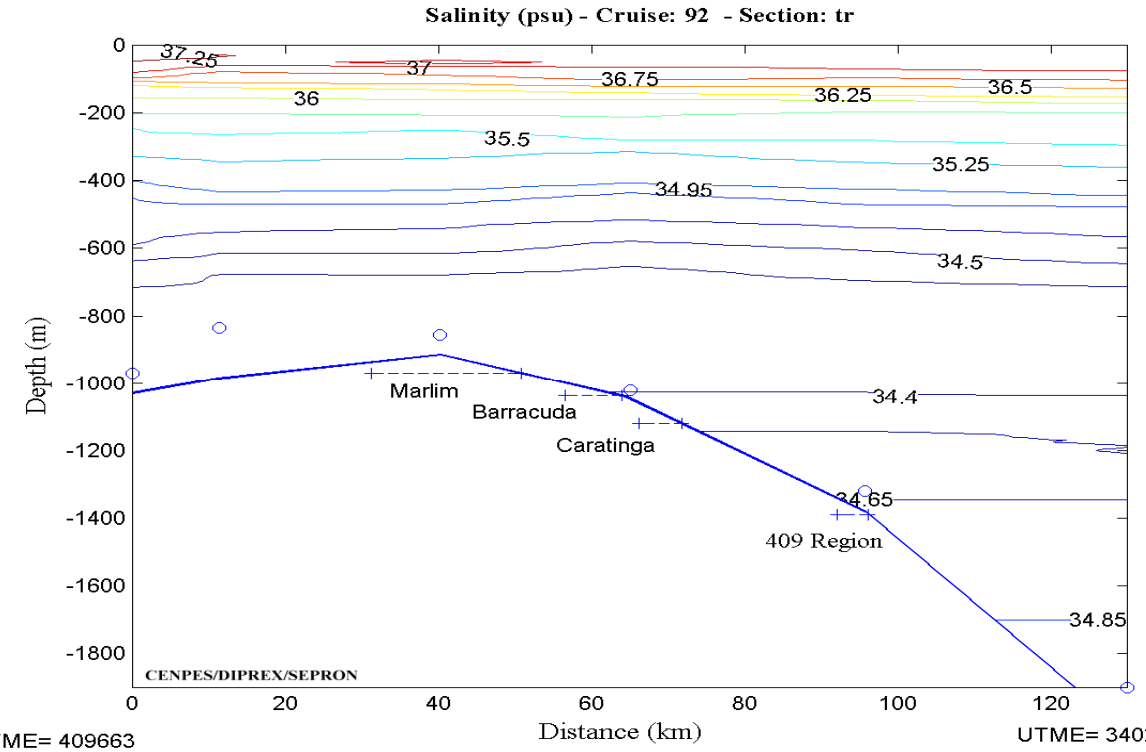


Figure 6.2 - (A) Temperature section for Transect RN
(B) Salinity section for Transect RN
(C) In-Situ Density Section for Transect RN





UTME= 409663
UTMN= 7552588

UTME= 340205
UTMN= 7442726

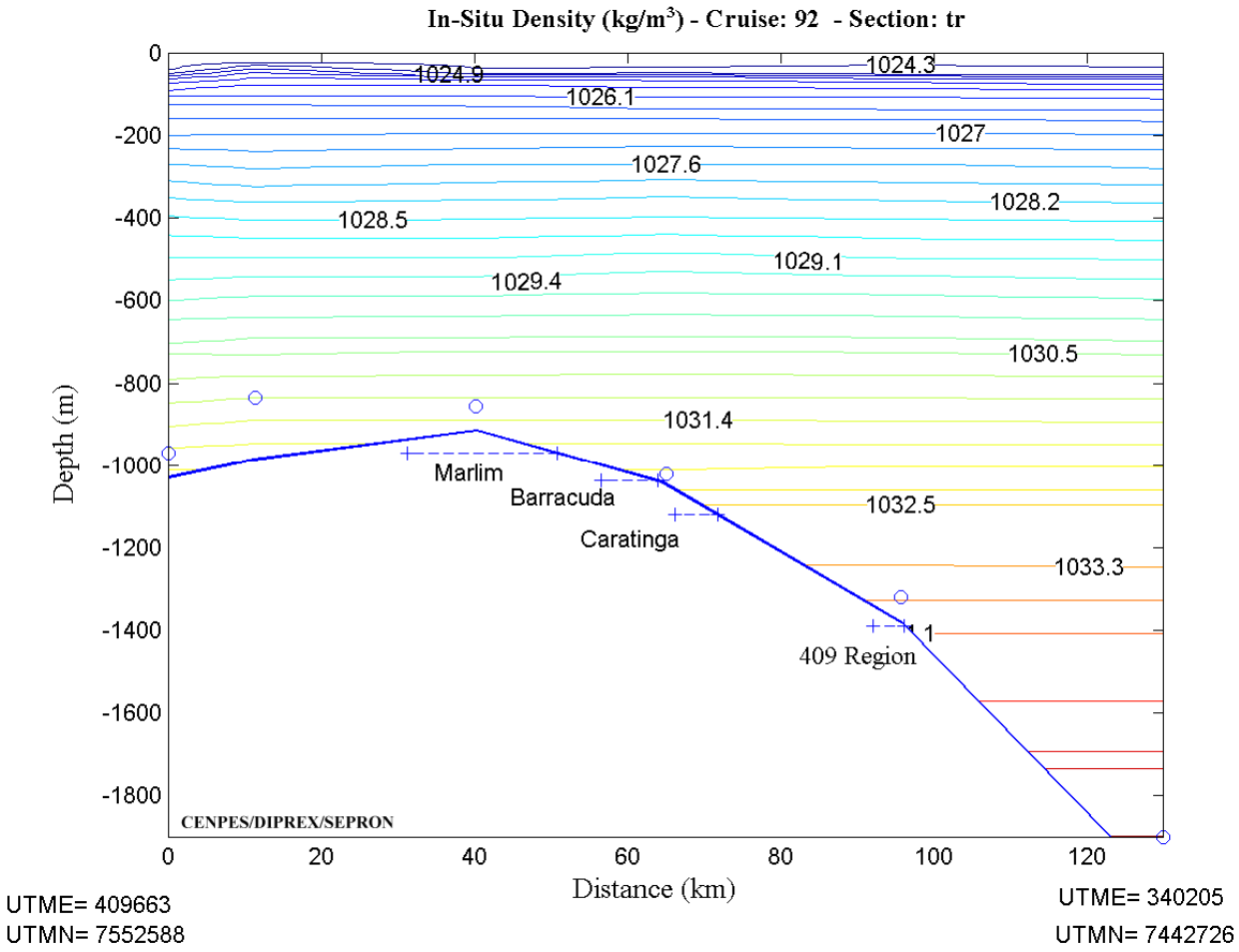
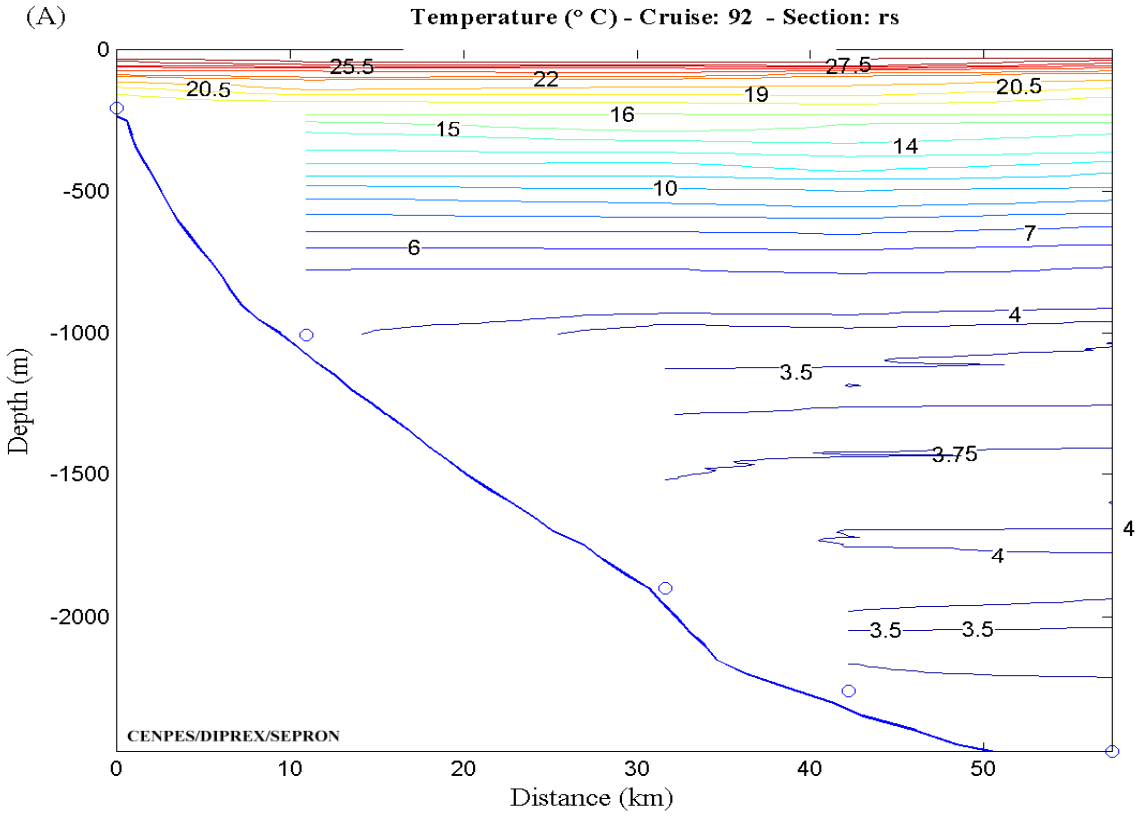
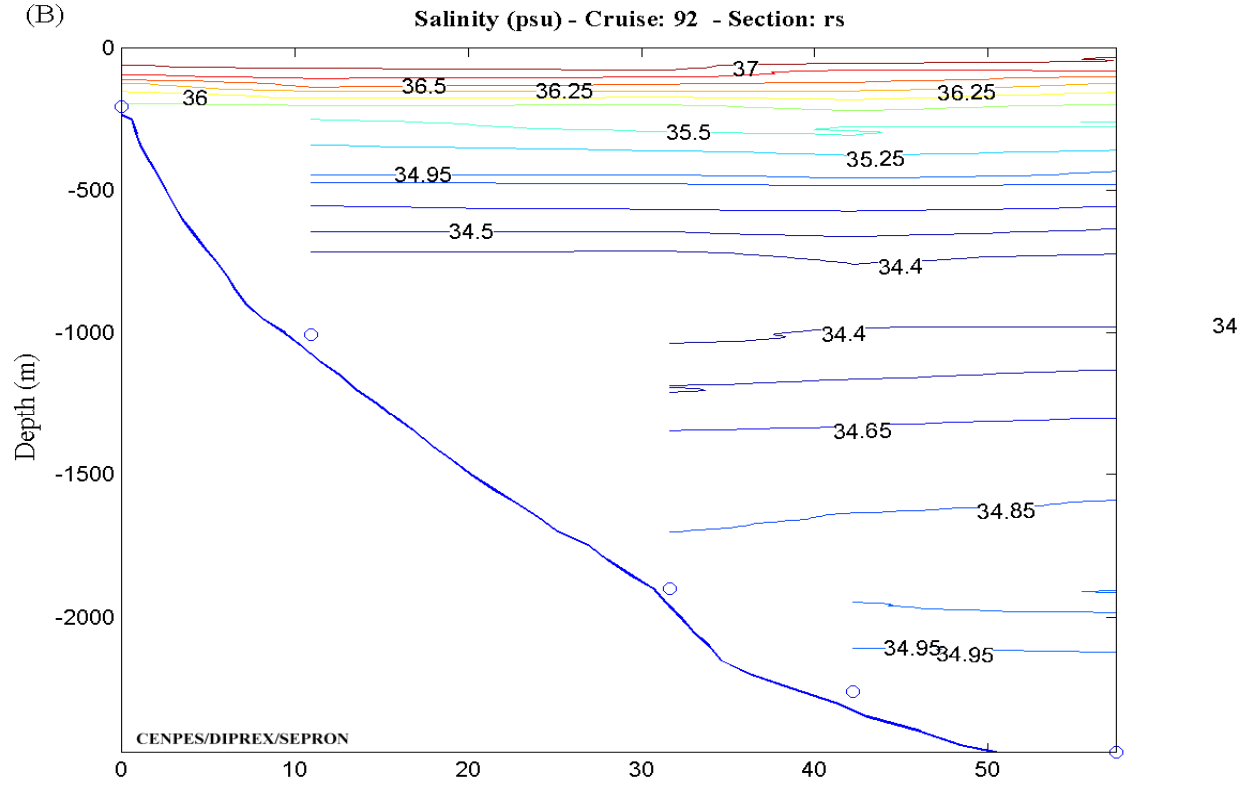


Figure 6. 3 (A) Temperature Section for Transect TR
(B) Salinity Section for Transect TR
(C) In-Situ Density Section for Transect TR

(A)



(B)



UTME=317008
UTMN=7464276

UTME=358032
UTMN=7424124

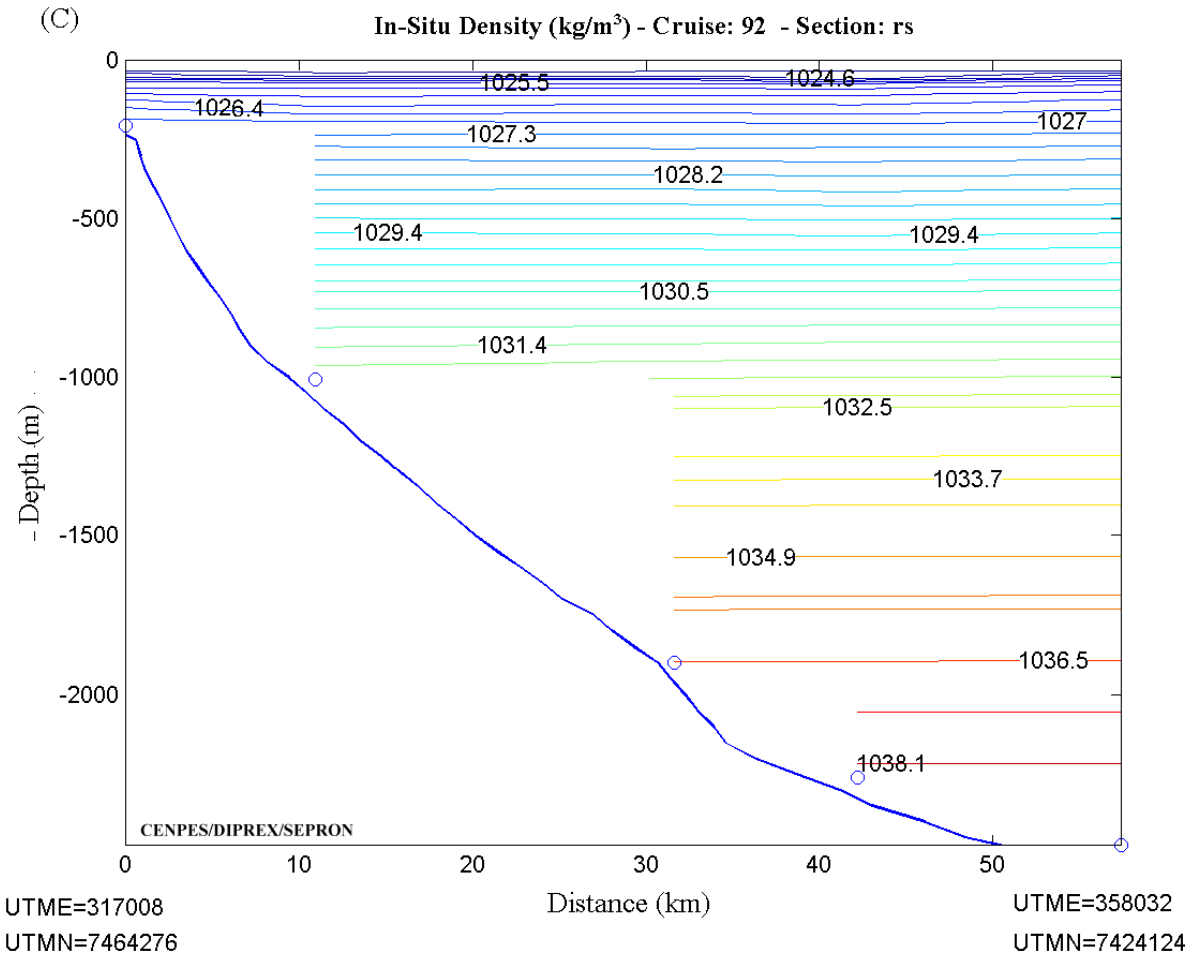


Figure 6. 4 (A) Temperature Section for Transect RS
(B) Salinity Section for Transect RS
(C) In-Situ Density Section for Transect RS

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.

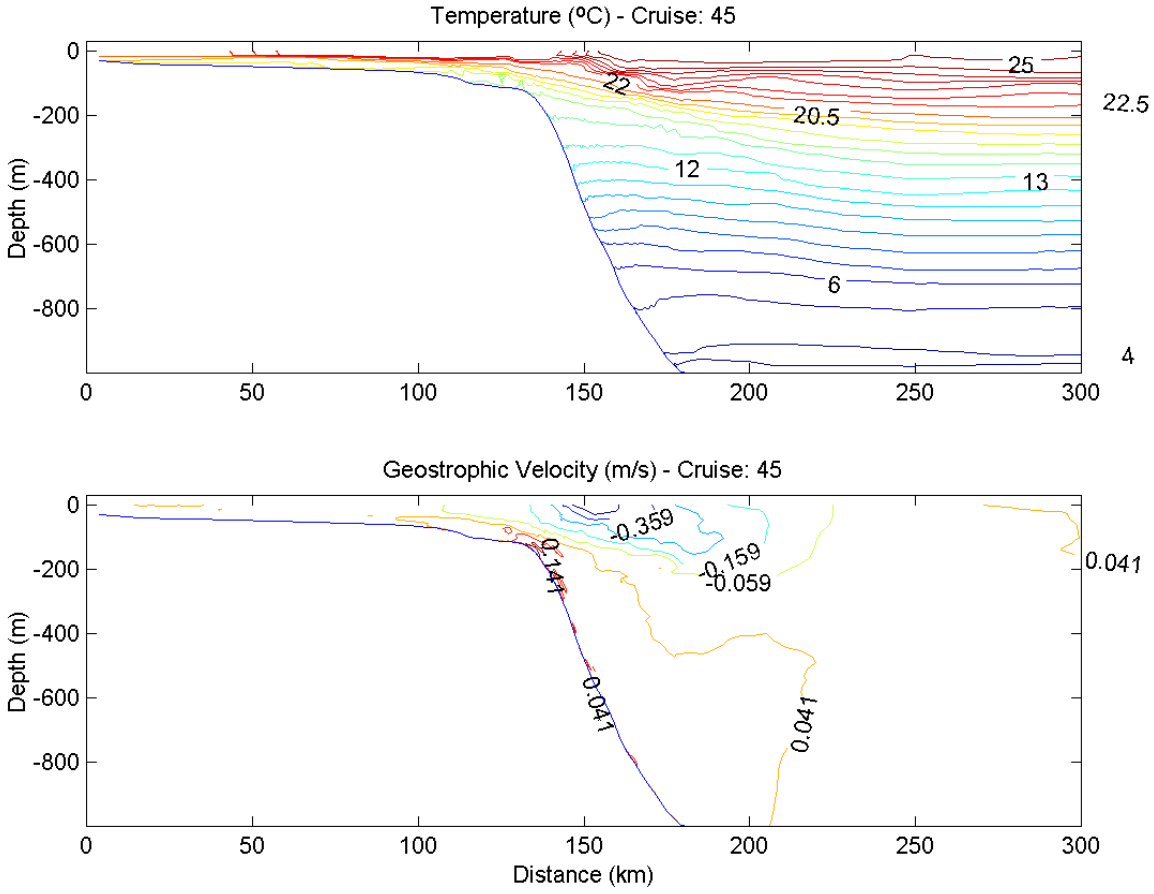


Figure 6.5 - (A) Temperature section crossing Marlim Field.
(B) Geostrophic Current section calculated using the density gradients estimated by the temperature section above.

The design current profiles are given for six different regions in Campos Basin. The map below shows their positions.

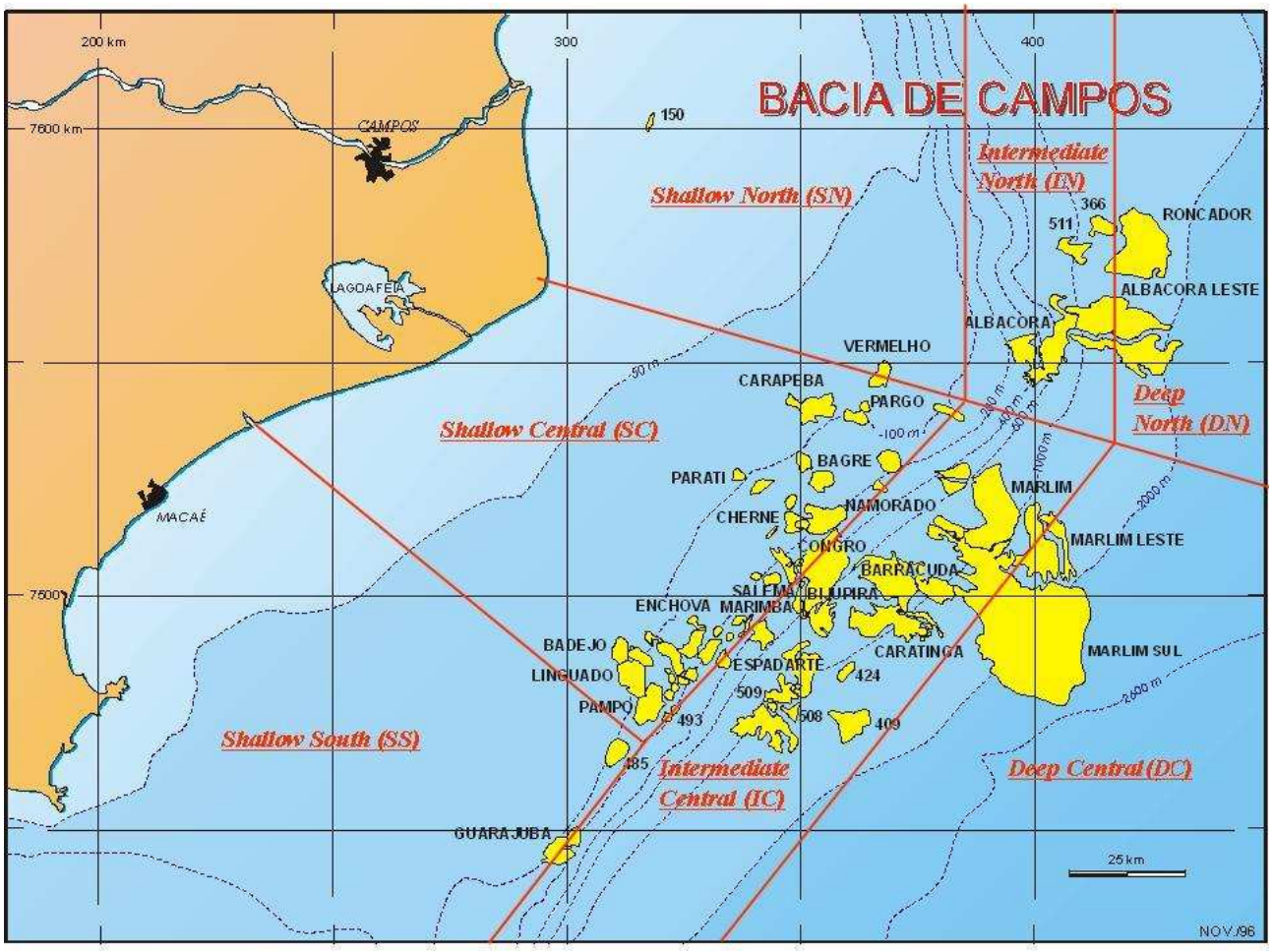


Figure 6.6 – The seven different regions: Shallow North (SN), Intermediate North (IN), Deep North (DN), Shallow Central (SC), Intermediate Central (IC), Shallow South (SS) and Deep Central (DC).

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

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)

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)

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)

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)

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)

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)

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)

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)

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)

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)

8.4 - Vertical Profile of Sea Water Density (kg/m^3)

DEPTH (m)	DENSITY (kg/m^3)		
	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)

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)

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)

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)

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)

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)

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)

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)

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)

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)

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

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

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

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

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

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

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

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

9.2 - Vertical Profile of Sea Water Temperature (^{O}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)

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)

9.4 - Vertical Profile of Sea Water Density (kg/m^3)

DEPTH (m)	DENSITY(kg/m^3)		
	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)

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)

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)

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)

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)

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)

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)

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)

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)

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)

10.2 - Vertical Profile of Sea Water Temperature (^{O}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)

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)

10.4 - Vertical Profile of Sea Water Density (kg/m^3)

DEPTH (m)	DENSITY (kg/m^3)		
	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)

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)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

11.2 - Vertical Profile Of Sea Water Temperature (^{O}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)

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)

11.4 - 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: Measured data (PROCAP1 - 1991/1992)

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).

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).

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).

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).

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).

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

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

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).

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

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.

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.

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.

12.2 - Vertical Profile of Sea Water Temperature (^{O}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

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

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

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).

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).

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).

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).

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).

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).

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).

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).

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).

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 90^0, 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.

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			
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	TOTAL	%	X Mean
-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			

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			
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	TOTAL	%	X Mean
.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 90^0, 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)

15 – ABBREVIATIONS

ABBREVIATIONS:

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

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)*

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