## IHO TWCWG Data Analysis Comparison – Work Plan Task B

## Land Information New Zealand

#### **Purpose:**

To compare the results of Land Information New Zealand's (LINZ) tidal analysis procedure with other IHO partners.

### Procedure:

#### Input files

Observed data files were obtained from five tidal stations: Boston, Bahia de Corral, Port Nolloth, Punta Arenas, and Saint Malo. Files were in various formats and had to be re-formatted into a "Date-Time-Height" file before loading into the LINZ tidal database and using LINZ's Sea Level Information Management System <sup>1</sup> (SLIMS) to analyse the data and generate predictions.

Predictions and/or constituents calculated by the respective tidal offices were supplied by all but Saint Malo. A summary of the files available for this exercise are as follows:

Site	Coordinates	Observed Data	Predictions/Constituent File
Boston, United	42.35N, 71.05W	2010 – hourly	Predictions (NOAA, UKHO) –
States			hourly
Bahia de Corral,	39.52S, 73.26W	1994, 1995 – hourly	Constituent File (SHOA)
Chile			
Port Nolloth,	29.25S, 16.87E	2010 – hourly	Constituent File, Predictions –
South Africa			hourly (SANHO)
Punta Arenas,	53.10S, 70.54W	1992, 1993 – hourly	Constituent File (SHOA)
Chile			
Saint Malo,	48.64N, 2.02W	1986-2013 – 15 min (gaps)	N/A (SHOM)
France			

#### **Constituent Analysis**

Data were loaded into SLIMS and checked for gaps and any obvious erroneous data. Constituents were computed on this observed data using SLIMS for the year that the supplied data covered. For the Chilean sites, constituents were computed over the 2-year period, and for Saint Malo, LINZ's mult-year analysis procedure was followed.

In this multi-year procedure, constituents are computed for a period of 379 days for each calendar year (normally from 25 December of the previous year to 7 January of the following year). This was modified, depending on whether there were large gaps of data in the year. The yearly constituents were then entered into LINZ's "Harmonic Analysis" spreadsheet <sup>2</sup> and a selection of constituents was identified who's error and signal-to-noise ratios fell within certain tolerances. This selection makes up the "Master Set" of constituents and is used to calculate predictions.

#### Predictions

Predictions were computed using SLIMS for the year that the observed data covered, using the same time interval (i.e. 1 hour or 15 min). For cases where multiple years were provided, the latest

<sup>&</sup>lt;sup>1</sup> SLIMS uses Mike Forman's analysis and prediction algorithms, Pacific Marine Science Report 77-10.

<sup>&</sup>lt;sup>2</sup> This spreadsheet was developed by William Crawford, International Hydrographic Review, LXXII(2), 1995.

complete year was chosen. For example, the year 2010 was selected for Saint Malo because of data gaps in the years 2011 to 2013.

Predictions were supplied for the Boston (NOAA and UKHO) and Port Nolloth sites. Harmonic files were supplied for the Chilean sites. These constituents were imported into SLIMS and used to calculated predicted tides for the appropriate time period.

Observed tides and the various sets of predictions were copied into a spreadsheet. The levels were plotted, along with the residuals to see how the results compared.

### **Results:**

#### Boston

Predicted tides for 2010 were computed for Boston. Also available were predicted tides from NOAA, and predicted tides from the UKHO. The observed tides were compared to each of the predicted sets.



As a sample, observed, predicted and residual values were plotted for the first week in 2010:

The average difference, or residual, between observed and predicted tide was calculated for the three prediction sets. Standard deviation, maximum difference and minimum difference were also calculated for the residuals. Differences were similar between sets, and ranged between approximately -0.7 to 0.9 metres. The statistics are as follows:

Stats	NOAA	υκнο	LINZ
Average Difference	0.000	0.005	0.000
Standard Dev	0.128	0.132	0.131
Max difference	0.943	0.931	0.964
Min difference	-0.746	-0.723	-0.738

#### Bahia de Corral

Predicted tides for 1995 were computed for Bahia de Corral using the constituents calculated by SLIMS. Predictions were also created for the same year using constituents provided by SHOA. The observed tides were compared to each of the predicted sets.



Due to gaps in data, observed, predicted and residual values were plotted for the **last** week in 1995:

The average difference, or residual, between observed and predicted tide was calculated for the two prediction sets. Standard deviation, maximum difference and minimum difference were also calculated for the residuals. Differences were similar between sets, ranging between -0.4 to 0.8 metres for the supplied harmonics, to -0.4 to 0.7 metres for the LINZ predictions. The statistics are as follows:

SHOA	LINZ
-0.037	-0.028
0.147	0.112
0.821	0.731
-0.418	-0.352
	<b>SHOA</b> -0.037 0.147 0.821 -0.418

#### Port Nolloth

Predicted tides for 2010 were computed for Port Nolloth using the constituents calculated by SLIMS. The observed tides were compared to both the LINZ predictions and the predictions supplied by SANHO.



As a sample, observed, predicted and residual values were plotted for the first week in 2010:

The average difference, or residual, between observed and predicted tide was calculated for the two prediction sets. Standard deviation, maximum difference and minimum difference were also calculated for the residuals. Differences were similar between sets, ranging between -0.2 to 0.5 metres for the supplied predictions, to -0.4 to 0.4 metres for the LINZ predictions. The statistics are as follows:

Stats	SANHO	LINZ
Average Difference	0.092	0.000
Standard Dev	0.077	0.084
Max difference	0.480	0.408
Min difference	-0.220	-0.367

#### Punta Arenas

Predicted tides for 1993 were computed for Punta Arenas using the constituents calculated by SLIMS. Predictions were also created for the same year using constituents provided by SHOA. The observed tides were compared to each of the predicted sets.



As a sample, observed, predicted and residual values were plotted for the first week in 1993:

The average difference, or residual, between observed and predicted tide was calculated for the two prediction sets. Standard deviation, maximum difference and minimum difference were also calculated for the residuals. Differences were similar between sets, ranging between -0.5 to 0.6 metres for the supplied harmonics, to -0.5 to 0.5 metres for the LINZ predictions. The statistics are as follows:

Stats	SHOA	LINZ
Average Difference	0.076	0.037
Standard Dev	0.187	0.170
Max difference	0.596	0.525
Min difference	-0.479	-0.450

#### Saint Malo

Predicted tides for 2010 were computed for Saint Malo using the constituents calculated by SLIMS. The observed tides were compared to the LINZ predictions. Neither predictions nor a harmonic file were supplied for this comparison.



As a sample, observed, predicted and residual values were plotted for the first week in 2010:

The average difference, or residual, between observed and predicted tide was calculated for the prediction set. Standard deviation, maximum difference and minimum difference were also calculated for the residuals. Differences ranged between -0.7 to 0.9 metres. The statistics are as follows:

Stats	SHOM	LINZ
Average Difference	N/A	0.017
Standard Dev	N/A	0.190
Max difference	N/A	0.931
Min difference	N/A	-0.745

# Appendix – Master Constituents Computed by LINZ:

## Boston

Name	Amplitude	Phase	SNR
Z0	281.5461	0.00	
M2	138.4661	109.33	74405.117
N2	32.6123	77.83	4127.420
S2	20.9558	146.08	1704.215
К1	13.9748	203.86	1355.897
01	11,4168	186.75	904,949
м4	2 3708	27 39	349 310
т.2	8 6667	162 60	291 490
MG	2 2060	200 25	251.150
NTT O	5.2909	200.33	177 042
NUZ VO	0./343 F 000F	147 60	177.042
KZ D1	5.9225	147.62	136.121
PI	4.3139	200.37	129.204
2MN6	2.0822	239.42	100.281
MN4	1.2624	9.58	99.041
M8	0.6004	249.46	52.858
MO3	0.7092	200.82	49.858
MS4	0.8792	61.76	48.039
2N2	3.3678	59.12	44.016
MK 3	0.5602	235.64	31.109
2MS6	1.1338	328.76	29.733
Q1	1.7025	165.31	20.124
LDA2	2.0504	137.01	16.315
М3	0.3654	140.73	13.235
NO1	1.0780	198.45	8.068
2MK 5	0.2556	106.42	6.770
503	0 2540	228 11	6 395
.т1	0.2310	220.11	6 042
2MKE	0.9329	220.33	4 192
MITO	0.4237	550.05 66 01	2 7/7
MUZ	0.0413	CO 22	2.747
MK4	0.2039		2.584
3MK /	0.0961	343.74	2.528
SIGI	0.5786	153.72	2.324
SN4	0.18/8	65.49	2.192
RHOI	0.5241	176.02	1.907
S4	0.1679	120.22	1.752
EPS2	0.6594	113.29	1.687
S01	0.4746	210.82	1.564
2SM6	0.2313	21.01	1.237
MF	2.7044	270.63	1.228
MSK6	0.2207	18.17	1.127
001	0.4027	243.84	1.126
SSA	2.4987	355.92	1.048
SK4	0.1195	118.61	0.887
PHI1	0.3488	226.34	0.845
SK3	0.0892	309.23	0.789
MSN2	0.4378	64.41	0.744
MSM	2.0439	316.57	0.701
MKS2	0 3996	245 97	0 620
002	0.3876	60 13	0.583
OQ2 OCVE	0.0706	06 72	0.505
	0.0700	167 00	0.310
	0.2033	116 22	0.401
ALPI 201	0.2520	110.22	0.445
ZÕT	0.2507	12.20	0.430
UPSI	0.2390	05.71	0.397
MSF	1.5289	65.25	0.392
TAU1	0.2168	240.96	0.326
ETA2	0.2134	16.58	0.177
MM	0.9840	77.79	0.163
CHI1	0.0902	128.59	0.056
THE1	0.0509	147.45	0.018

## Corral

Name	Amplitude	Phase	SNR
Z0	114.0086	.00	
М2	44.5692	334.37	31518.291
S2	16.6316	344.63	4388.954
К1	16.3365	354.29	4995.854
01	11.1732	315.08	2336.936
N2	10.4483	307.15	1732.145
992	5 6716	173 35	3 295
K)	5 2930	340 24	444 526
л2 D1	1 0002	250.27	444.320
PI	4.9003	550.37	404.304
ME	4.3514	20.10	1 150
MF	3.3542	30.12	1.152
MUZ	2.12//	285.44	71.831
QI	2.1075	288.60	83.143
MSM	1.642/	290.39	0.2/6
NU2	1.6164	323.89	41.456
2N2	1.4517	267.78	33.438
J1	.9290	9.86	16.156
NO1	.9044	352.05	15.311
MKS2	.5949	303.23	5.615
RH01	.5428	307.52	5.515
SIG1	.4491	243.95	3.776
THE1	.4445	67.63	3.699
LDA2	.4288	251.97	2.917
UPS1	.4284	34.98	3.436
EPS2	.4082	274.67	2.644
L2	.3998	350.44	2.536
PHI1	.3973	330.34	2.955
001	.3862	60.92	2.792
M4	.3758	284.90	26.516
ALP1	.3611	255.19	2.441
BET1	.3414	298.12	2.182
MSF	.3329	213.13	0.011
TAU1	.3225	14.84	1.947
ETA2	.3171	4.15	1.595
SK3	.2959	43.38	11.801
MK3	.2672	274.85	9.622
201	.2509	218.98	1.178
CHT1	2462	352.41	1.135
MS4	2423	325 64	11 023
2MG6	2301	200 31	10 516
SO1	2045	246 62	0 783
GK4	1922	251 47	6 936
M3	1834	199 98	4 533
MGN2	1793	211 74	0 510
MG	1692	120 16	5 626
MO2	1500	206 51	2 116
MO3	.1599	200.51	3.440 4 4E0
54 GO2	.1541	329.13	4.459
505	.1270	2/1./0	2.194
MIN4	.0810	304.95	1.232
3MK /	.0723	/9.48	1.077
UUZ	.0688	199.21	0.075
ZMN6	.0669	136.66	0.889
MK.4	.0619	267.72	0.719
2SK5	.0605	315.47	0.733
SN4	.0566	211.72	0.601
MSK6	.0563	316.58	0.630
2MK6	.0536	134.41	0.571
M8	.0528	49.86	0.508
2MK5	.0355	169.14	0.252
2SM6	.0306	346.71	0.186

## Port Nolloth

Z0   118.1528   0.00     M2   55.3381   89.42   35008.254     S2   23.5231   108.12   6325.737     N2   12.0808   78.60   1668.451     K2   6.6311   104.49   502.682     K1   5.5494   117.63   334.347     MSF   2.6044   25.93   1.868     NU2   1.8976   60.25   41.165     O1   1.6818   248.86   30.708     ZN2   1.6451   58.76   30.939     P1   1.5120   109.45   24.820     MS4   1.4285   227.60   61.666     MF   1.3670   61.43   0.515     MSM   1.2912   348.38   0.459     L2   1.1630   83.71   15.463     SSM   0.6190   307.83   0.149     RHO1   0.7181   160.78   5.99     M4   0.6918   196.30   14.463     M3   0.6364 <t< th=""><th>Name</th><th>Amplitude</th><th>Phase</th><th>SNR</th></t<>	Name	Amplitude	Phase	SNR
M2   55.3381   89.42   35008.254     S2   23.5231   108.12   6325.737     N2   12.0808   78.60   1668.451     K2   6.6311   104.49   502.682     K1   5.5494   117.63   334.347     MSF   2.6044   252.93   1.868     NU2   2.5094   68.59   71.988     MU2   1.8976   60.25   41.165     O1   1.6818   248.86   30.708     SN2   1.6451   58.76   30.939     P1   1.5120   109.45   24.820     MS4   1.4285   227.60   61.666     MF   1.3670   61.43   0.515     MS4   1.4285   238.45   48.418     Q1   0.9747   219.56   10.314     MM   0.7359   187.93   0.149     RH01   0.7181   160.78   5.599     M4   0.4994   233.37   7.537     2SK5	Z0	118.1528	0.00	
S2   23.5231   108.12   6325.737     N2   12.0808   78.60   1668.451     K2   6.6311   104.49   502.682     K1   5.5494   117.63   334.347     MSF   2.6044   252.93   1.868     NU2   1.8976   60.55   41.165     O1   1.6818   248.86   30.708     2N2   1.6451   58.76   30.939     P1   1.5120   109.45   24.820     MS4   1.4285   227.60   61.666     MF   1.3670   61.43   0.515     MSM   1.2912   348.38   0.459     L2   1.1630   83.71   15.463     SSM6   0.9945   23.845   48.418     Q1   0.9747   219.56   10.314     MM   0.6364   303.23   6.260     SSA   0.6190   307.83   0.106     J1   0.5524   125.31   3.313     THE1 <t< td=""><td>м2</td><td>55.3381</td><td>89.42</td><td>35008.254</td></t<>	м2	55.3381	89.42	35008.254
N2   12.0808   78.60   1668.451     K2   6.6311   104.49   502.682     K1   5.5494   117.63   334.347     MSF   2.6044   252.93   1.868     MU2   1.8976   60.25   41.165     Ol   1.66818   248.86   30.708     SN2   1.6451   58.76   30.939     P1   1.5120   109.45   24.820     MS4   1.4285   227.60   61.666     MF   1.3670   61.43   0.515     MSM   1.2912   348.38   0.459     L2   1.1630   83.71   15.463     ZSM6   0.9945   238.45   48.418     Q1   0.747   219.56   10.314     MM   0.7359   187.93   0.149     RHO1   0.514   125.31   3.313     THE1   0.5524   125.31   3.313     THE1   0.554   329.59   3.112     SN4	S2	23.5231	108.12	6325.737
K2   6.6311   104.49   502.682     K1   5.5494   117.63   334.347     MSF   2.6044   252.93   1.868     NU2   2.5094   68.59   71.988     MU2   1.8976   60.25   41.165     O1   1.6818   248.86   30.708     ZN2   1.6451   58.76   30.939     P1   1.5120   109.45   24.820     MS4   1.4285   227.60   61.666     MF   1.3670   61.43   0.515     MSM   1.2912   348.38   0.459     L2   1.1630   83.71   15.463     SZM6   0.9945   238.45   48.418     Q1   0.7181   160.78   5599     M4   0.6918   196.30   14.463     M3   0.6364   303.23   6.260     SSA   0.6190   307.83   0.106     J1   0.5524   125.31   3.313     THE1   0.535	N2	12.0808	78.60	1668.451
K1 5.5494 117.63 334.347   MSF 2.6044 252.93 1.868   NU2 1.8976 60.25 41.165   O1 1.6818 248.86 30.708   2N2 1.6451 58.76 30.939   P1 1.5120 109.45 24.820   MS4 1.4285 227.60 61.666   MF 1.3670 61.43 0.515   MSM 1.2912 348.38 0.459   L2 1.1630 83.71 15.463   2SM6 0.9945 238.45 48.148   Q1 0.7151 160.78 5.599   M4 0.6918 196.30 14.463   M3 0.6364 30.23 6.260   SSA 0.6190 307.83 0.106   J1 0.5524 125.31 3.313   THE1 0.5354 329.59 3.112   SN4 0.4994 23.37 7.537   201 0.3564 170.11 1.379   SO1 0.3427 324.81 <t< td=""><td>к2</td><td>6 6311</td><td>104 49</td><td>502 682</td></t<>	к2	6 6311	104 49	502 682
NSF2.6044252.931.868NU21.897660.2541.165O11.6818248.8630.708ZN21.645158.7630.939P11.5120109.4524.820MS41.4285227.6061.666MF1.367061.430.515MSM1.2912348.380.459L21.163083.7115.463ZSM60.9945238.4548.418Q10.9747219.5610.314MM0.7359187.930.149RH010.7181160.785.599M40.6918196.3014.463M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.632ZMS60.3755202.216.903EPS20.370850.221.572Q010.3664170.111.379S010.3427324.811.2752Q10.3186175.091.102ZMK50.31334.651.924ETA20.3097136.421.096MK20.23680.832.671SK30.2191229.610.742SG10.23	K1	5 5494	117 63	334 347
ND2   2.5034   52.75   1.000     NU2   1.8976   60.25   41.165     Ol   1.6818   248.86   30.708     2N2   1.6451   58.76   30.939     P1   1.5120   109.45   24.820     MS4   1.4285   227.60   61.666     MF   1.3670   61.43   0.515     MSM   1.2912   348.38   0.459     L2   1.1630   83.71   15.463     ZSM6   0.9945   238.45   48.418     Q1   0.9747   219.56   10.314     MM   0.7359   187.93   0.149     RHO1   0.7181   160.78   5.599     M4   0.6918   196.30   14.463     M3   0.6364   303.23   6.260     SSA   0.6190   307.83   0.106     J1   0.5524   125.31   3.313     THE1   0.5354   202.21   6.72     SN4   0.4994<	MGE	2 6044	252 93	1 868
NO2   1.8094   08.39   1.1365     Ol   1.6818   248.86   30.708     2N2   1.6451   58.76   30.939     P1   1.5120   109.45   24.820     MS4   1.4285   227.60   61.666     MF   1.3670   61.43   0.515     MSM   1.2912   348.38   0.459     L2   1.1630   83.71   15.463     Q1   0.9747   219.56   10.314     MM   0.7359   187.93   0.149     RHO1   0.7181   160.78   5.599     M4   0.6918   196.30   14.463     M3   0.6364   30.23   6.260     SSA   0.6190   307.83   0.106     J1   0.5524   125.31   3.313     THE1   0.5354   329.59   3.112     SN4   0.4994   23.37   7.537     2sK5   0.4207   249.45   3.468     MO3   0.3889 </td <td>MUTO</td> <td>2.0044</td> <td>69 50</td> <td>71 000</td>	MUTO	2.0044	69 50	71 000
MO2 1.6976 00.23 11.10376   O1 1.6818 248.86 30.708   2N2 1.6451 58.76 30.939   P1 1.5120 109.45 24.820   MS4 1.4285 227.60 61.666   MF 1.3670 61.43 0.515   MSM 1.2912 348.38 0.459   L2 1.1630 83.71 15.463   2SM6 0.9945 238.45 48.418   Q1 0.9747 219.56 10.314   MM 0.7359 187.93 0.149   RH01 0.7181 160.78 5.599   M4 0.6918 196.30 14.463   M3 0.6364 303.23 6.260   SSA 0.6190 307.83 0.106   J1 0.5524 125.31 3.313   THE1 0.5354 229.59 3.112   SN4 0.4994 233.37 7.537   2SK5 0.4207 249.45 3.468   MO3 0.3889 208.66	MU2	1 9076	60.35	/1.900
Oli   1.0818   248.86   30.708     2N2   1.6451   58.76   30.939     P1   1.5120   109.45   24.820     MS4   1.4285   227.60   61.666     MF   1.3670   61.43   0.515     MSM   1.2912   348.38   0.459     L2   1.1630   83.71   15.463     SZM6   0.9945   238.45   48.418     Q1   0.9747   219.56   10.314     MM   0.7359   187.93   0.149     RHO1   0.7181   160.78   5.599     M4   0.6918   196.30   14.463     M3   0.6364   303.23   6.260     SSA   0.6190   307.83   0.106     J1   0.5524   125.31   3.313     THE1   0.5354   329.59   3.112     SN4   0.4994   233.37   7.537     2sK5   0.4207   249.45   3.468     MO3   0.3	MUZ	1.0970	00.25	41.105
2N2 1.0431 36.76 30.939   P1 1.5120 109.45 24.820   MS4 1.4285 227.60 61.666   MF 1.3670 61.43 0.515   MSM 1.2912 348.38 0.459   L2 1.1630 83.71 15.463   ZSM6 0.9945 238.45 48.418   Q1 0.7359 187.93 0.149   RH01 0.7181 160.78 5.599   M4 0.6918 196.30 14.463   M3 0.6364 303.23 6.260   SSA 0.6190 307.83 0.106   J1 0.5524 125.31 3.313   THE1 0.5354 329.59 3.112   SN4 0.4994 233.37 7.537   2SK5 0.4207 249.45 3.468   MO3 0.3889 208.66 2.338   MSN2 0.3755 202.21 6.903   EPS2 0.3708 50.22 1.572   OO1 0.3427 324.81	01	1.0010	240.00	30.708
P1 1.5120 109.45 24.820   MS4 1.4285 227.60 61.666   MF 1.3670 61.43 0.515   MSM 1.2912 348.38 0.459   L2 1.1630 83.71 15.463   2SM6 0.9945 238.45 48.418   Q1 0.9747 219.56 10.314   MM 0.7359 187.93 0.149   RH01 0.7181 160.78 5.599   M4 0.6918 196.30 14.463   M3 0.6364 303.23 6.260   SSA 0.6190 307.83 0.106   J1 0.5524 125.31 3.313   THE1 0.5354 329.59 3.112   SN4 0.4994 23.37 7.537   2SK5 0.4207 249.45 3.468   MO3 0.3889 208.66 2.338   MS2 0.3778 43.13 1.632   2MS6 0.3755 202.21 6.903   EFPS2 0.3097 136.42	ZINZ	1.0451	58.76	30.939
MS4 1.4285 227.60 61.666   MF 1.3670 61.43 0.515   MSM 1.2912 348.38 0.459   L2 1.1630 83.71 15.463   2SM6 0.9945 238.45 48.418   Q1 0.9747 219.56 10.314   MM 0.7359 187.93 0.149   RHO1 0.7181 160.78 5.599   M4 0.6918 196.30 14.463   M3 0.6364 303.23 6.260   SSA 0.6190 307.83 0.106   J1 0.5524 125.31 3.313   THE1 0.5354 329.59 3.112   SN4 0.4994 233.37 7.537   28K5 0.4207 249.45 3.468   MO3 0.3889 208.66 2.338   MSN2 0.3778 43.13 1.632   2MS6 0.3755 202.21 6.903   EPS2 0.3708 50.22 1.572   Q01 0.3427 324.81	PI	1.5120	109.45	24.820
MF1.367061.430.515MSM1.2912348.380.459L21.163083.7115.4632SM60.9945238.4548.418Q10.9747219.5610.314MM0.7359187.930.149RH010.7181160.785.599M40.6918196.3014.463M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.1191162.710.272QQ20.1	MS4	1.4285	227.60	61.666
MSM1.2912348.380.459L21.163083.7115.4632SM60.9945238.4548.418Q10.9747219.5610.314MM0.7359187.930.149RH010.7181160.785.599M40.6918196.3014.463M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.5722010.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MK20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH11 <td< td=""><td>MF</td><td>1.3670</td><td>61.43</td><td>0.515</td></td<>	MF	1.3670	61.43	0.515
L2 1.1630 83.71 15.463 2SM6 0.9945 238.45 48.418 Q1 0.9747 219.56 10.314 MM 0.7359 187.93 0.149 RHO1 0.7181 160.78 5.599 M4 0.6918 196.30 14.463 M3 0.6364 303.23 6.260 SSA 0.6190 307.83 0.106 J1 0.5524 125.31 3.313 THE1 0.5354 329.59 3.112 SN4 0.4994 233.37 7.537 2SK5 0.4207 249.45 3.468 MO3 0.3889 208.66 2.338 MSN2 0.3778 43.13 1.632 2MS6 0.3755 202.21 6.903 EPS2 0.3708 50.22 1.572 OO1 0.3564 170.11 1.379 SO1 0.3427 324.81 1.275 2Q1 0.3186 175.09 1.102 2MK5 0.3133 4.65 1.924 ETA2 0.3097 136.42 1.096 MN4 0.2946 130.56 2.623 MK2 0.2883 142.26 0.950 LDA2 0.2711 147.78 0.840 NO1 0.2575 260.03 0.720 S4 0.2509 266.60 1.902 2MN6 0.2345 356.36 2.692 M6 0.2336 80.83 2.671 SK3 0.2191 229.61 0.742 SIG1 0.2111 162.41 0.484 MSK6 0.2072 279.82 2.102 TAU1 0.1800 51.01 0.352 MK4 0.1627 265.12 0.800 CHI1 0.1583 107.74 0.272 QQ2 0.1541 95.17 0.271 SO3 0.1527 86.70 0.360 CHI1 0.1583 107.74 0.272 QQ2 0.1541 95.17 0.271 SO3 0.1527 86.70 0.360 CHI1 0.1583 107.74 0.272 QQ2 0.1541 95.17 0.271 SO3 0.1527 86.70 0.360 CHI1 0.1583 107.74 0.212 ALP1 0.1292 130.59 0.181 PH11 0.1157 95.68 0.145 M8 0.0940 224.01 1.419 3MK7 0.0914 87.82 0.667 SK4 0.0785 237.90 0.186 BET1 0.0495 229.75 0.027 2MK6 0.2345 356.36 2.692 MK3 0.0336 168.55 0.017	MSM	1.2912	348.38	0.459
2SM60.9945238.4548.418Q10.9747219.5610.314MM0.7359187.930.149RHO10.7181160.785.599M40.6918196.3014.463M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MX40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.902ZMN60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH11	L2	1.1630	83.71	15.463
Q10.9747219.5610.314MM0.7359187.930.149RH010.7181160.785.599M40.6918196.3014.463M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.3775202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MM40.2946130.562.623MK20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.22961.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272OQ20.154195.680.145M80.0940224.011.419MK70.91487.820.667SK40.078	2SM6	0.9945	238.45	48.418
MM0.7359187.930.149RH010.7181160.785.599M40.6918196.3014.463M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.13THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572QO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271S030.152786.700.360UPS10.1399177.840.212ALP1 <td< td=""><td>Q1</td><td>0.9747</td><td>219.56</td><td>10.314</td></td<>	Q1	0.9747	219.56	10.314
RH010.7181160.785.599M40.6918196.3014.463M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271SO30.152786.700.360UPS1 <t< td=""><td>MM</td><td>0.7359</td><td>187.93</td><td>0.149</td></t<>	MM	0.7359	187.93	0.149
M40.6918196.3014.463M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.537ZSK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271SO30.152786.700.360UPS10.1399177.840.212ALP1 <t< td=""><td>RHO1</td><td>0.7181</td><td>160.78</td><td>5.599</td></t<>	RHO1	0.7181	160.78	5.599
M30.6364303.236.260SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468M030.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271S030.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH11<	M4	0.6918	196.30	14.463
SSA0.6190307.830.106J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271S030.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M8 <t< td=""><td>МЗ</td><td>0.6364</td><td>303.23</td><td>6.260</td></t<>	МЗ	0.6364	303.23	6.260
J10.5524125.313.313THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572CO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.902ZMN60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271S030.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK4<	SSA	0.6190	307.83	0.106
THE10.5354329.593.112SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.902ZNN60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271S030.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET1 <td>J1</td> <td>0.5524</td> <td>125.31</td> <td>3.313</td>	J1	0.5524	125.31	3.313
SN40.4994233.377.5372SK50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.902ZMN60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271S030.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK6 <td>THE1</td> <td>0.5354</td> <td>329.59</td> <td>3.112</td>	THE1	0.5354	329.59	3.112
28K50.4207249.453.468MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET1 <t< td=""><td>SN4</td><td>0.4994</td><td>233.37</td><td>7.537</td></t<>	SN4	0.4994	233.37	7.537
MO30.3889208.662.338MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0336168.550.017	2.SK5	0.4207	249.45	3.468
MSN20.377843.131.6322MS60.3755202.216.903EPS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272OQ20.154195.170.271S030.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0472252.980.109MK3 <t< td=""><td>MO3</td><td>0.3889</td><td>208.66</td><td>2.338</td></t<>	MO3	0.3889	208.66	2.338
NAME13.1213.1313.132MS60.3755202.216.903EFS20.370850.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0472252.980.109MK3 <td< td=""><td>MSN2</td><td>0 3778</td><td>43 13</td><td>1 632</td></td<>	MSN2	0 3778	43 13	1 632
LABOCLAINSLADAEPS20.370850.221.572CO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272QQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0336168.550.017	2MS6	0 3755	202 21	6 903
DEF220.516050.221.572OO10.3564170.111.379SO10.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.902ZMN60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0336168.550.017	FDC2	0.3708	50 22	1 572
SOL0.3304170.111.375SOL0.3427324.811.2752Q10.3186175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271S030.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0336168.550.017	001	0.3564	170 11	1 379
SO1 0.3186 175.09 1.102   2Q1 0.3186 175.09 1.102   2MK5 0.3133 4.65 1.924   ETA2 0.3097 136.42 1.096   MN4 0.2946 130.56 2.623   MKS2 0.2883 142.26 0.950   LDA2 0.2711 147.78 0.840   NO1 0.2575 260.03 0.720   S4 0.2509 266.60 1.902   2MN6 0.2345 356.36 2.692   M6 0.2336 80.83 2.671   SK3 0.2191 229.61 0.742   SIG1 0.2111 162.41 0.484   MSK6 0.2072 279.82 2.102   TAU1 0.1800 51.01 0.352   MK4 0.1627 265.12 0.800   CH11 0.1583 107.74 0.272   OQ2 0.1541 95.17 0.271   S03 0.1527 86.70 0.360   UPS1 0.1399 177.84	SO1	0.3304	224 91	1 275
ZQ10.5188175.091.1022MK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0472252.980.109MK30.0336168.550.017	201	0.3427	175 00	1 100
ZMK50.31334.651.924ETA20.3097136.421.096MN40.2946130.562.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0472252.980.109MK30.0336168.550.017	ZQI	0.3100	1/5.09	1.102
E1A20.3097130.421.096MN40.2946130.522.623MKS20.2883142.260.950LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0472252.980.109MK30.0336168.550.017		0.3133	4.05	1.924
MN4 0.2946 130.56 2.623   MKS2 0.2883 142.26 0.950   LDA2 0.2711 147.78 0.840   NO1 0.2575 260.03 0.720   S4 0.2509 266.60 1.902   2MN6 0.2345 356.36 2.692   M6 0.2336 80.83 2.671   SK3 0.2191 229.61 0.742   SIG1 0.2111 162.41 0.484   MSK6 0.2072 279.82 2.102   TAU1 0.1800 51.01 0.352   MK4 0.1627 265.12 0.800   CH11 0.1583 107.74 0.272   OQ2 0.1541 95.17 0.271   SO3 0.1527 86.70 0.360   UPS1 0.1399 177.84 0.212   ALP1 0.1292 130.59 0.181   PHI1 0.1157 95.68 0.145   M8 0.0940 224.01 1.419   SK4 0.0785 237.90	LIAZ	0.3097	130.42	1.096
MKS2 0.2883 142.26 0.950   LDA2 0.2711 147.78 0.840   NO1 0.2575 260.03 0.720   S4 0.2509 266.60 1.902   ZMN6 0.2345 356.36 2.692   M6 0.2336 80.83 2.671   SK3 0.2191 229.61 0.742   SIG1 0.2111 162.41 0.484   MSK6 0.2072 279.82 2.102   TAU1 0.1800 51.01 0.352   MK4 0.1627 265.12 0.800   CH11 0.1583 107.74 0.271   SO3 0.1527 86.70 0.360   UPS1 0.1399 177.84 0.212   ALP1 0.1292 130.59 0.181   PHI1 0.1157 95.68 0.145   M8 0.0940 224.01 1.419   3MK7 0.0914 87.82 0.667   SK4 0.0785 237.90 0.186   BET1 0.0495 229.75	MIN 4	0.2946	130.56	2.623
LDA20.2711147.780.840NO10.2575260.030.720S40.2509266.601.9022MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CH110.1583107.740.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0472252.980.109MK30.0336168.550.017	MKS2	0.2883	142.26	0.950
NO1   0.2575   260.03   0.720     S4   0.2509   266.60   1.902     2MN6   0.2345   356.36   2.692     M6   0.2336   80.83   2.671     SK3   0.2191   229.61   0.742     SIG1   0.2111   162.41   0.484     MSK6   0.2072   279.82   2.102     TAU1   0.1800   51.01   0.352     MK4   0.1627   265.12   0.800     CH11   0.1583   107.74   0.272     OQ2   0.1541   95.17   0.271     S03   0.1527   86.70   0.360     UPS1   0.1399   177.84   0.212     ALP1   0.1292   130.59   0.181     PHI1   0.1157   95.68   0.145     M8   0.0940   224.01   1.419     SK4   0.0785   237.90   0.186     BET1   0.0495   229.75   0.027     ZMK6   0.	LDA2	0.2711	147.78	0.840
S4   0.2509   266.60   1.902     2MN6   0.2345   356.36   2.692     M6   0.2336   80.83   2.671     SK3   0.2191   229.61   0.742     SIG1   0.2111   162.41   0.484     MSK6   0.2072   279.82   2.102     TAU1   0.1800   51.01   0.352     MK4   0.1627   265.12   0.800     CH11   0.1583   107.74   0.272     OQ2   0.1541   95.17   0.271     S03   0.1527   86.70   0.360     UPS1   0.1399   177.84   0.212     ALP1   0.1292   130.59   0.181     PHI1   0.1157   95.68   0.145     M8   0.0940   224.01   1.419     3MK7   0.0914   87.82   0.667     SK4   0.0785   237.90   0.186     BET1   0.0495   229.75   0.027     2MK6   0.	NOL	0.2575	260.03	0.720
2MN60.2345356.362.692M60.233680.832.671SK30.2191229.610.742SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CHI10.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0472252.980.109MK30.0336168.550.017	S4	0.2509	266.60	1.902
M6   0.2336   80.83   2.671     SK3   0.2191   229.61   0.742     SIG1   0.2111   162.41   0.484     MSK6   0.2072   279.82   2.102     TAU1   0.1800   51.01   0.352     MK4   0.1627   265.12   0.800     CHI1   0.1583   107.74   0.272     OQ2   0.1541   95.17   0.271     SO3   0.1527   86.70   0.360     UPS1   0.1399   177.84   0.212     ALP1   0.1292   130.59   0.181     PH11   0.1157   95.68   0.145     M8   0.0940   224.01   1.419     3MK7   0.0914   87.82   0.667     SK4   0.0785   237.90   0.186     BET1   0.0495   229.75   0.027     ZMK6   0.0472   252.98   0.109     MK3   0.0336   168.55   0.017	2MN6	0.2345	356.36	2.692
SK3 0.2191 229.61 0.742   SIG1 0.2111 162.41 0.484   MSK6 0.2072 279.82 2.102   TAU1 0.1800 51.01 0.352   MK4 0.1627 265.12 0.800   CH11 0.1583 107.74 0.272   OQ2 0.1541 95.17 0.271   SO3 0.1527 86.70 0.360   UPS1 0.1399 177.84 0.212   ALP1 0.1292 130.59 0.181   PH11 0.1157 95.68 0.145   M8 0.0940 224.01 1.419   3MK7 0.0914 87.82 0.667   SK4 0.0785 237.90 0.186   BET1 0.0495 229.75 0.027   ZMK6 0.0472 252.98 0.109   MK3 0.0336 168.55 0.017	MG	0.2336	80.83	2.671
SIG10.2111162.410.484MSK60.2072279.822.102TAU10.180051.010.352MK40.1627265.120.800CHI10.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1292130.590.181PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0336168.550.017	SK3	0.2191	229.61	0.742
MSK6   0.2072   279.82   2.102     TAU1   0.1800   51.01   0.352     MK4   0.1627   265.12   0.800     CHI1   0.1583   107.74   0.272     OQ2   0.1541   95.17   0.271     S03   0.1527   86.70   0.360     UPS1   0.1399   177.84   0.212     ALP1   0.1292   130.59   0.181     PHI1   0.1157   95.68   0.145     M8   0.0940   224.01   1.419     3MK7   0.0914   87.82   0.667     SK4   0.0785   237.90   0.186     BET1   0.0495   229.75   0.027     ZMK6   0.0472   252.98   0.109     MK3   0.0336   168.55   0.017	SIG1	0.2111	162.41	0.484
TAU10.180051.010.352MK40.1627265.120.800CHI10.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PHI10.115795.680.145M80.0940224.011.419SK40.0785237.900.186BET10.0495229.750.027ZMK60.0336168.550.017	MSK6	0.2072	279.82	2.102
MK40.1627265.120.800CHI10.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.0272MK60.0472252.980.109MK30.0336168.550.017	TAU1	0.1800	51.01	0.352
CHI10.1583107.740.272OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.0272MK60.0472252.980.109MK30.0336168.550.017	MK4	0.1627	265.12	0.800
OQ20.154195.170.271SO30.152786.700.360UPS10.1399177.840.212ALP10.1292130.590.181PH110.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0472252.980.109MK30.0336168.550.017	CHI1	0.1583	107.74	0.272
SO3   0.1527   86.70   0.360     UPS1   0.1399   177.84   0.212     ALP1   0.1292   130.59   0.181     PH11   0.1157   95.68   0.145     M8   0.0940   224.01   1.419     3MK7   0.0914   87.82   0.667     SK4   0.0785   237.90   0.186     BET1   0.0495   229.75   0.027     ZMK6   0.0336   168.55   0.017	OQ2	0.1541	95.17	0.271
UPS10.1399177.840.212ALP10.1292130.590.181PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.027ZMK60.0336168.550.017	SO3	0.1527	86.70	0.360
ALP10.1292130.590.181PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.0272MK60.0336168.550.017	UPS1	0.1399	177.84	0.212
PHI10.115795.680.145M80.0940224.011.4193MK70.091487.820.667SK40.0785237.900.186BET10.0495229.750.0272MK60.0472252.980.109MK30.0336168.550.017	ALP1	0.1292	130.59	0.181
M8   0.0940   224.01   1.419     3MK7   0.0914   87.82   0.667     SK4   0.0785   237.90   0.186     BET1   0.0495   229.75   0.027     2MK6   0.0336   168.55   0.017	PHI1	0.1157	95.68	0.145
3MK7   0.0914   87.82   0.667     SK4   0.0785   237.90   0.186     BET1   0.0495   229.75   0.027     2MK6   0.0472   252.98   0.109     MK3   0.0336   168.55   0.017	M8	0.0940	224.01	1.419
SK4   0.0785   237.90   0.186     BET1   0.0495   229.75   0.027     2MK6   0.0472   252.98   0.109     MK3   0.0336   168.55   0.017	3MK7	0.0914	87.82	0.667
BET1   0.0495   229.75   0.027     2MK6   0.0472   252.98   0.109     MK3   0.0336   168.55   0.017	SK4	0.0785	237.90	0.186
2MK6   0.0472   252.98   0.109     MK3   0.0336   168.55   0.017	BET1	0.0495	229.75	0.027
MK3 0.0336 168.55 0.017	2MK6	0.0472	252.98	0.109
	MK 3	0.0336	168.55	0.017

#### **Punta Arenas**

Name	Amplitude	Phase	SNR
Z0	181.9091	0.00	
M2	49.6469	355.17	32153.875
К1	30.1111	65.28	15605.515
01	21.4858	20.58	7945.623
S2	20.3277	87.29	5390.456
P1	8.6755	56.49	1295.430
L2	8.3703	44.46	913.968
N2	8.2785	318.09	894.031
К2	5.9456	90.67	461.148
Мб	4.3742	104.48	627.674
MU2	4.0336	149.76	212.244
Q1	3.9150	354.11	263.808
SA	3.6979	358.55	1.411
2MS6	3.2203	163.71	340.196
2MN6	2.9324	67.40	282.087
LDA2	2.8391	31.02	105.150
NU2	2.3704	331.93	73.298
S1	2.3042	261.36	91.383
MF	2.2036	109.85	0.501
NO1	1.8921	48.74	61.619
EPS2	1.8499	111.47	44.642
MSF	1.8370	263.69	0.348
MSM	1.7557	237.03	0.318
т2	1.5397	69.47	30.926
MSN2	1.5146	280.16	29.926
J1	1.3028	96.57	29.213
MKS2	1.2885	178.43	21.658
SSA	1.1847	159.61	0.145
S01	1.1150	309.57	21.398
GAM2	1.1083	311.70	16.024
Н2	1.0849	116.04	15.354
TAU1	0.9499	45.59	15.530
2MK6	0.8893	162.30	25.944
MM	0.8006	252.14	0.066
H1	0.6460	354.78	5.444
MO 3	0.6133	334.31	72.301
M4	0.5835	299.54	147.275
PI1	0.5608	59.32	5.413
RH01	0.5497	346.04	5.201
SIG1	0.5305	338.92	4.844
2N2	0.4870	221.01	3.094
M8	0.4822	6.28	124.603
PHI1	0.4665	62.19	3.746
THE1	0.4581	65.18	3.612
2SM6	0.4492	204.26	6.619
MK3	0.4406	44.19	37.315
001	0.4172	186.77	2.996
PSI1	0.3774	125.05	2.451
MSK6	0.3697	209.16	4.484
CHI1	0.3388	17.21	1.976
SK3	0.3083	257.41	18.270
0Q2	0.3003	101.83	1.176
MN4	0.2995	261.61	38.801
ALPI	0.2780	233.35	1.330
2Q1	0.2611	346.96	1.173
BE.LT	0.2470	5.19	1.050
UPSI	U.2U49	347.13	U./23
MD4	0.1621	39.2U	⊥3.0/5 E 112
503 D2	0.1031	43.5⊥ 150 33	0 110
к <u>⊿</u> БФл Э	0.0000	100.33 201 CO	0.104
≞1АZ МЗ	0.0025	3∠⊥.0U 100 00	0.104 1 170
мк4	0 0522	20 91	1 179

#### TIDE PREDICTION COMPARISON – NEW ZEALAND

3MK7	0.0484	130.39	1.391
SN4	0.0479	63.38	0.992
2SK5	0.0316	347.23	0.416
S4	0.0267	138.56	0.308
SK4	0.0148	247.57	0.095
2MK5	0.0144	184.69	0.086

## Saint Malo

Name	Amplitude	Phase	SNR
Z0	677.7761	0.00	
M2	367.4270	177.36	538689.688
S2	143.7583	227.54	82463.625
N2	71.8372	160.96	20591.850
К2	40.9332	225.35	6685.716
M4	26.5487	278.64	14880.449
MU2	25.3157	195.74	2557.269
MS4	19.7826	335.64	8262.211
L2	18.1653	151.95	1316.684
NU2	12.3937	144.32	612.912
MN4	9.9928	255.75	2108.162
LDA2	9.4552	139.67	356.729
К1	9.4346	95.13	7614.086
2N2	8.5434	143.24	291.245
01	8.1488	344.15	5680.127
т2	7.8087	214.73	243.307
MSN2	6.3322	12.11	159.995
EPS2	5.9065	183.64	139.206
MK4	5.6537	335.47	674.831
SN4	3.5323	344.42	263.418
P1	3.4059	84.46	992.281
М3	3.2405	170.44	2396.667
S4	2.8527	61.70	171.807
Q1	2.2862	303.13	447.094
Мб	2.1563	341.95	3355.345
2MS6	2.1089	38.00	3209.451
MK 3	1.5678	224.15	561.003
S1	1.4766	262.56	186.508
SK3	1.2463	270.64	354.510
2MN6	1.2457	312.44	1119.813
MO 3	1.2284	144.25	344.400
SO3	0.7584	185.57	131.274
M8	0.6316	267.03	515.770
2MK6	0.6001	36.78	259.876
2SM6	0.5371	79.81	208.175