

New Zealand gauges: Chile Tsunami 2010

A magnitude 8.8 earthquake at a depth of 35 km occurred 115 km NNE of Concepcion, Chile at 06:34 on 27 February 2010 UTC or 18:34 27 February in NZ Standard Time (NZST) [UTC+12].

The tsunami was recorded along all the east coast of New Zealand but also on most of the gauges on the west coast. The Scott Base gauge is in the Ross Sea (Antarctica).

All arrivals were on an upwards rising wave.

The following sea-level gauges were used for a post-event analysis using **1 minute data** from **18:00 27 February to 06:06 02 March (NZST)**. The exceptions are gauges at Tararu (Firth of Thames), Anawhata, and Scott Base (Ross Sea) where the records were at 5 minute intervals.

For the analysis, the peak upwards elevation of a wave above the concurrent tide level (amplitude) determined the peak wave and timing that was extracted, but where that wave was not the maximum total wave height (crest to trough), that value is given in [parentheses](#).

Elapsed times in decimal hours are all relative to the time the earthquake occurred, except the last column of Table 1 (*italics*), which is the elapsed time of the peak wave amplitude relative to the first arrival of the wave at that location.

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Table1: Location of source of sea-level gauge datasets

Station	Latitude (°N)	Longitude (°E)	Operating agency
Kaingaroa Chatham Is.	−43.7315	183.733	NIWA
Moturiki Is.	−37.6304	176.186	NIWA
Little Kaiteriteri	−41.048	173.027	Tasman District Council
Marsden Pt.	−35.842	174.5	Northland Regional Council]
Whitianga	−36.833	175.709	Environment Waikato
Sumner Head	−43.570	172.773	NIWA
Lyttelton Port	−43.6058	172.7222	Lyttelton Port Co. Ltd
Timaru Port	−44.392	171.254	PrimePort Timaru Ltd
Green Island	−45.9523	170.3867	NIWA
Dog Island	−46.652	168.412	NIWA
Jackson Bay	−43.957	168.616	NTC, Bureau of Meteorology
Port Taranaki,	−39.055	174.033	Port Taranaki Ltd
Kapiti Island	−40.842	174.938	NIWA
Raglan Wharf	−37.7944	174.880	Environment Waikato
Lottin Point	−37.5504	178.1590	GeoNet/LINZ
Gisborne	−38.6754	178.0229	GeoNet/LINZ
Tararu (Firth Thames)	−37.128	175.521	Environment Waikato
Anawhata	−36.921	174.461	NIWA
Scott Base (Ross Sea)	−77.85	166.767	NIWA/Antarctica NZ

Table 2: Primary measures of the recorded tsunami waves (where peak waves are recorded according to **peak elevation** of de-tided wave)

Station	Elapsed arrival time [hrs]	Arrival time [NZST 28 Feb]	Peak wave amplitude [m]	Associated wave height: crest-to-trough [max wave height] [m]	Wave period(s) at peak elevation [min]	Elapsed time of peak wave elevation [hrs]	Time at peak wave elevation [NZST 28 Feb]	Elapsed time of peak from first arrival [hrs]
Kaingaroa Chatham Is.	11.6	06:10	0.63	0.96 [1.55]	16	16.90	11:28	5.3
Moturiki Is.	13.28	07:51	0.40	0.62 [0.84]	18	18.48	13:03	5.2
Little Kaiteriteri	18.38	12:57	0.18	0.31	37	31.96	02:32 [1 Mar]	13.6
Marsden Pt.	14.03	08:36	0.24	0.49	35, 12	24.26	18:50	10.2
Whitianga	13.40	07:58	0.60	1.05 [1.25]	59	15.56	10:08	2.2
Sumner Head	14.03	08:36	0.77	1.29	135, 6–11	16.98	11:33	3.0
Lyttelton Port	14.10	08:40	0.99	1.93	156, 10-11	20.10	14:40	6.0
Timaru Port	13.75	08:19	0.70	1.26 [1.30]	58, 6-10	26.80	21:22	13.1
Green Island	13.40	07:58	0.36	0.63	33, 5-6	20.53	15:06	7.1
Dog Island	13.78	08:21	0.27	0.55 [0.59]	77, 5-6	26.16	20:44	12.4
Jackson Bay	17.73	12:18	0.29	0.51	24, 8-13	25.88	20:27	8.2
Port Taranaki,	16.11	10:41	0.17	0.25 [0.35]	11	21.03	15:36	4.9
Kapiti Island	12.86	07:26	0.09	0.22	51	33.35	03:52 [1 Mar]	20.5
Raglan Wharf	19.0	13:34	0.16	0.27	50	34.48	05:03 [1 Mar]	15.5
Lottin Point	12.53	07:06	0.26	0.48	12	13.71	08:17	1.2
Gisborne	12.80	07:22	1.00	1.77	54	21.83	16:25	9.0
Tararu (5 min)	15.68	10:15	0.24	0.43 [0.46]	120	23.60	18:10	7.9
Anawhata (5 min)	15.43	10:00	0.17	0.37	35, 15	42.10	12:40 [1 Mar]	26.7
Scott Base (5 min)	10.68	05:15	0.05	0.08	110	28.85	23:25	18.2

Note: NZST is UTC+12 hrs and elapsed time is from the earthquake at 18:34 NZST (06:34 UTC) on 27 February 2010

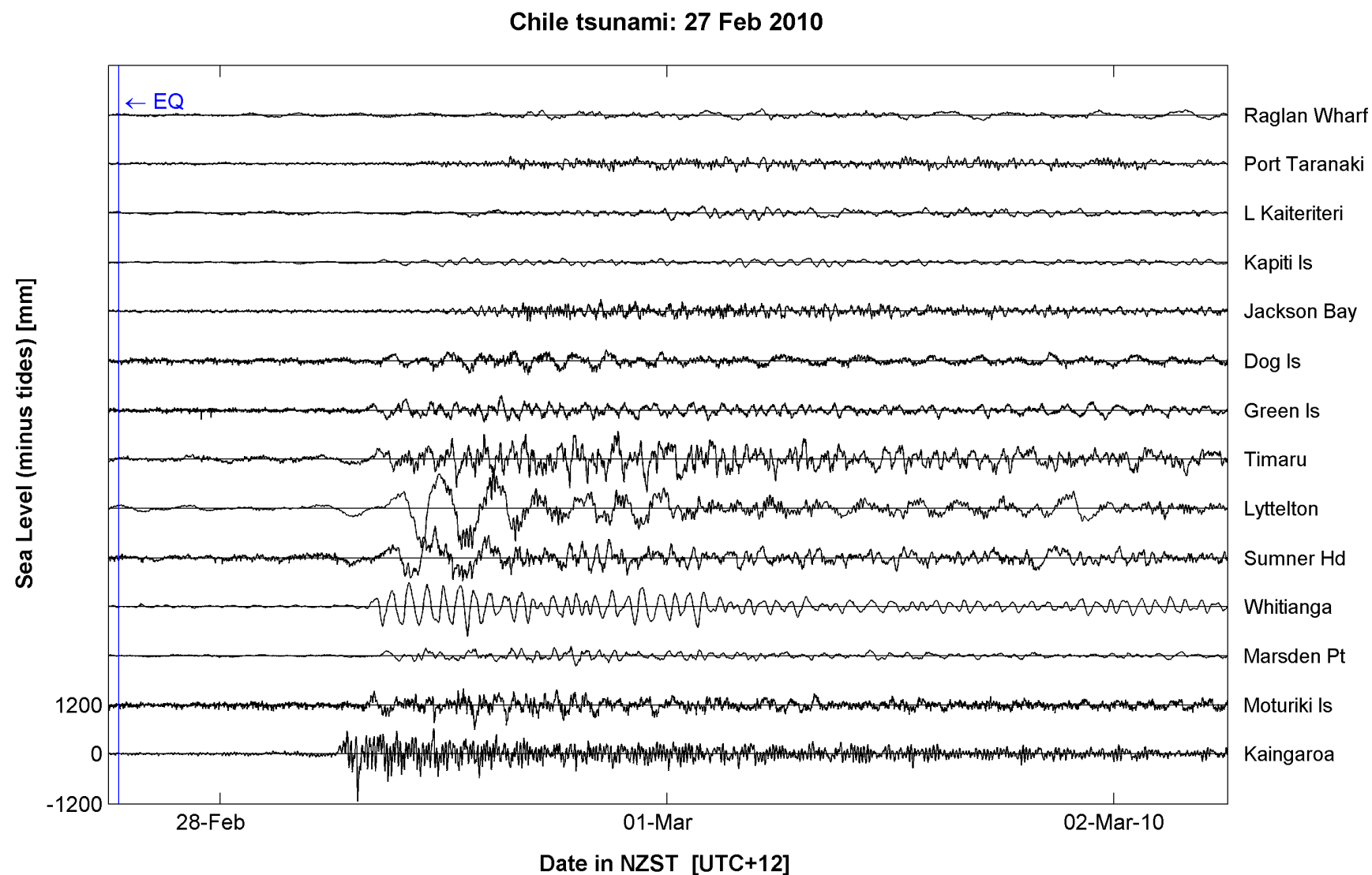


Figure A: Response of sea-level gauges in New Zealand (1-minute records) to the Chile tsunami [M 8.8 18:34 NZST 27-Feb-2010], with the tide removed by digital band-pass filtering and **plotted in NZST [UTC+12]**. EQ marks the time of the earthquake.

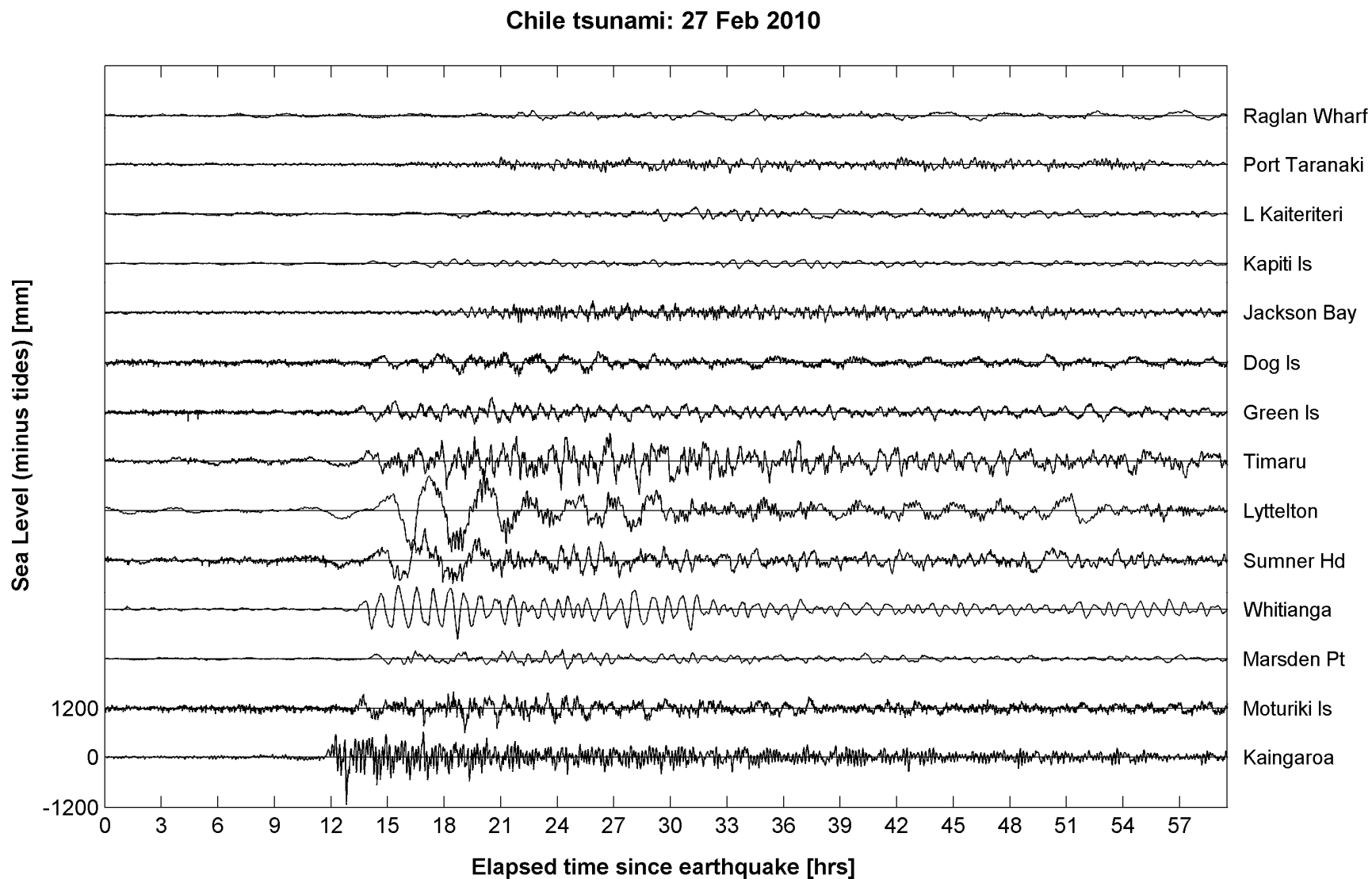


Figure B: Response of sea-level gauges in New Zealand (1-minute records) to the Chile tsunami [M 8.8 18:34 NZST 27-Feb-2010], with the tide removed by digital band-pass filtering and **plotted in elapsed time since the earthquake.**

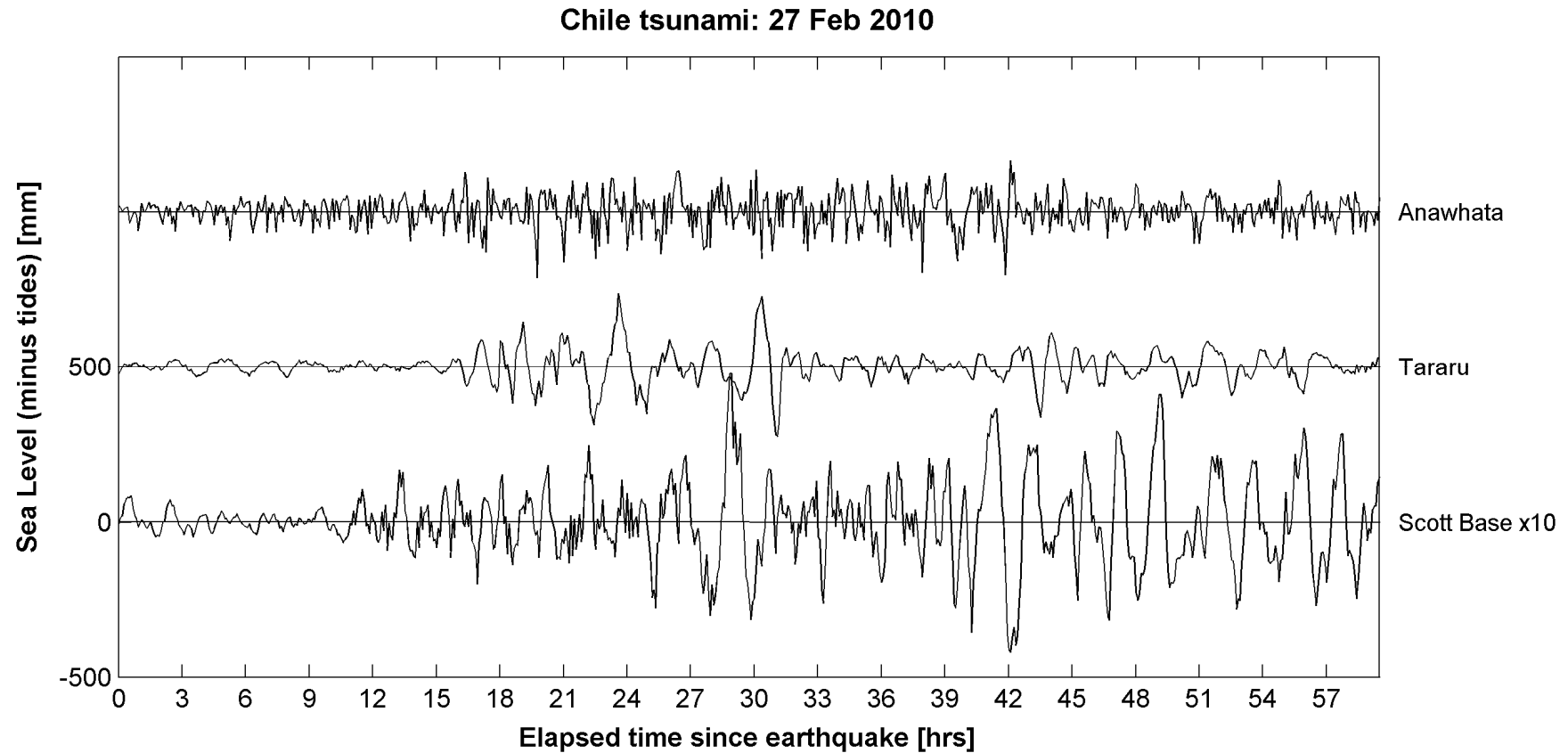


Figure C: Response of sea-level gauges in New Zealand (5-minute records) to the Chile tsunami [M 8.8 18:34 NZST 27-Feb-2010], with the tide removed by digital band-pass filtering and **plotted in elapsed time since the earthquake**. Note: Scott Base record scaled up by 10X.

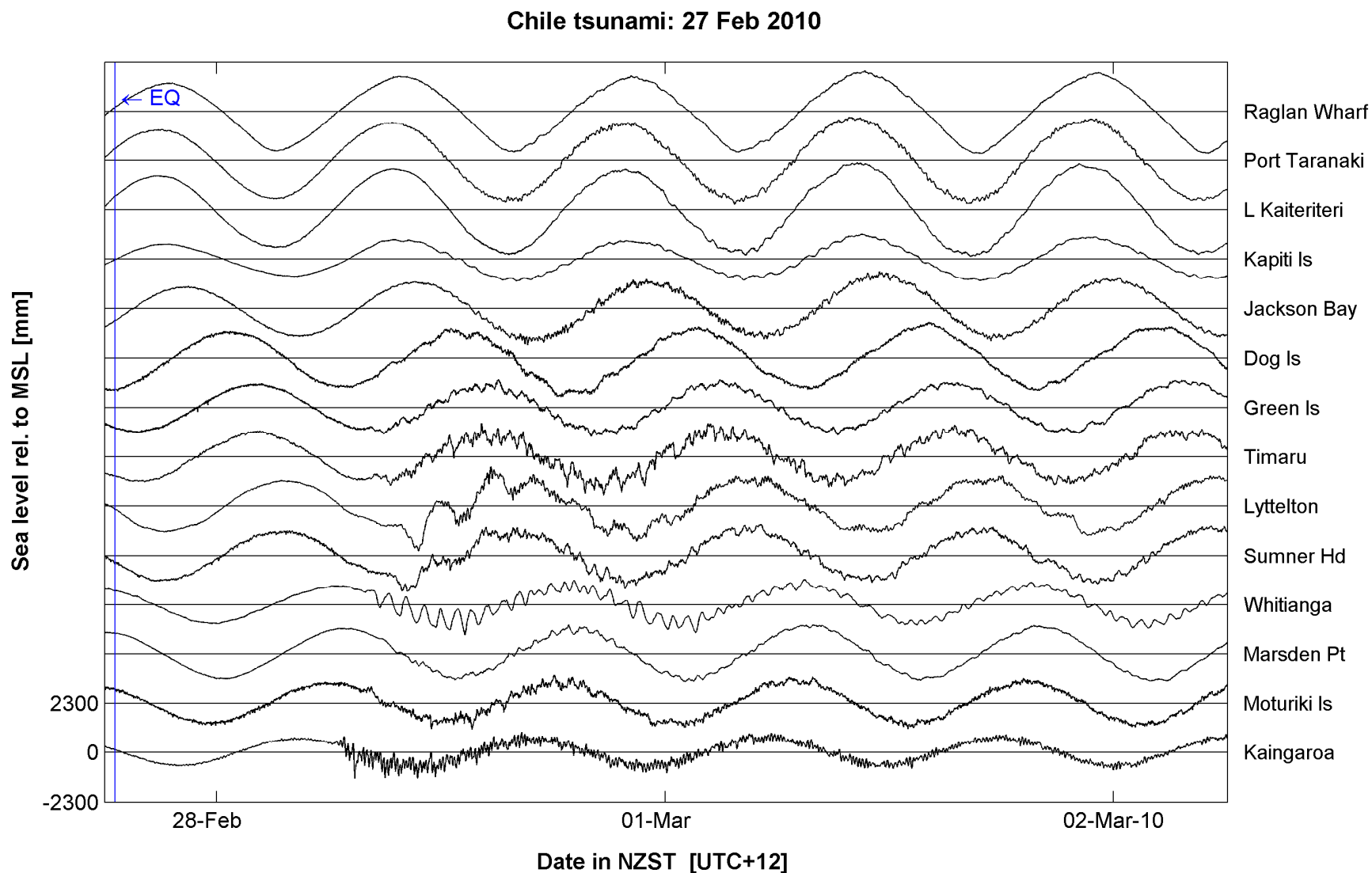


Figure D: Response of sea-level gauges in New Zealand to the Chile tsunami [M 8.8 18:34 NZST 27-Feb-2010] including the tide **plotted in NZST [UTC+12]**. EQ marks the time of the earthquake.

Acknowledgement: Sea-level gauge data is regularly supplied by the agencies listed in Table 1 and their ongoing contribution is acknowledged.