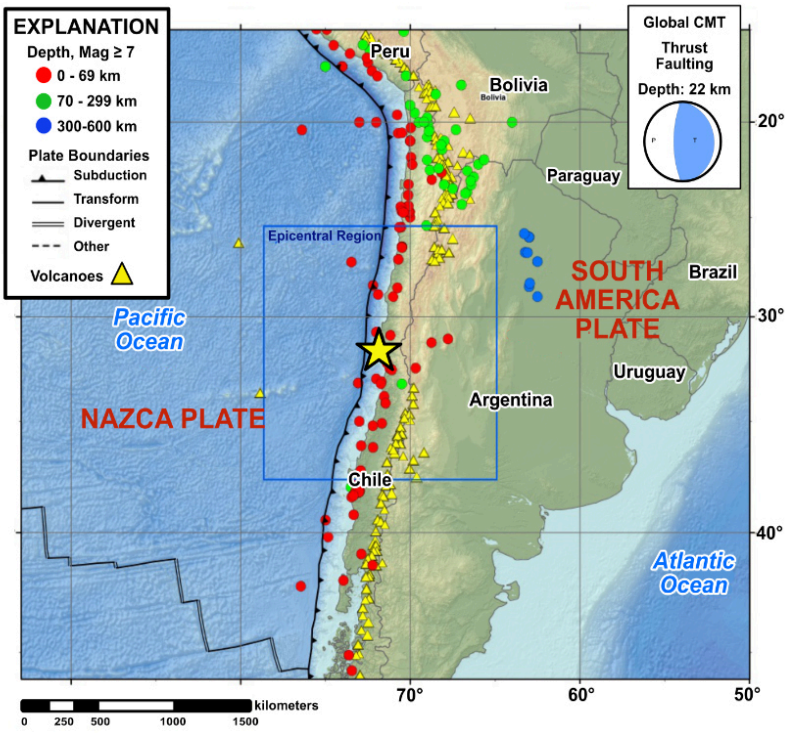
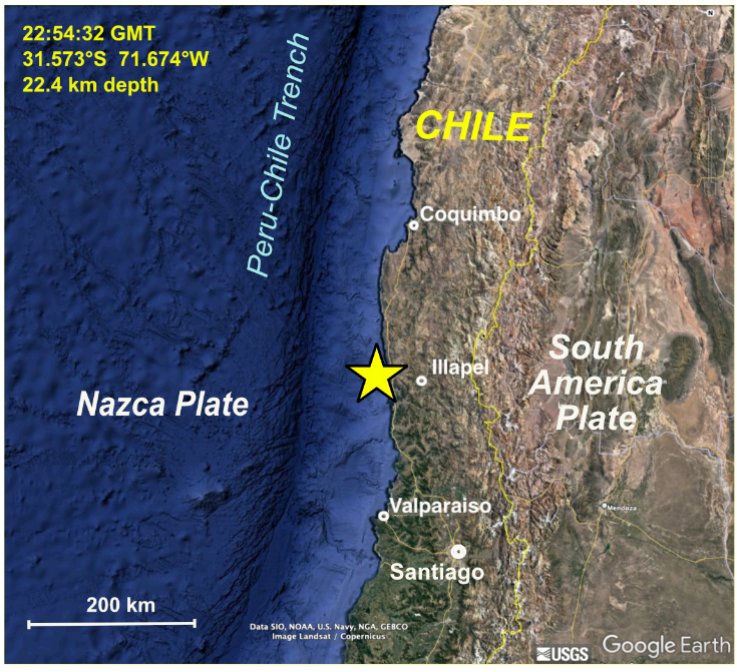
Off Illapel, Chile, 16 September 2015, UTC 22:55, Mw 8.3

The 16 September 2015 magnitude 8.3 earthquake that occurred at 2255 UTC 48 km W of Illapel, Chile, generated a tsunami that was observed all over the Pacific region and caused damage locally. More than one million people were evacuated from coastal regions of Chile to escape the tsunami. The tsunami waves flooded and caused damage in areas of Coquimbo, La Serena, Tongoy, Concón, and Illapel, but no deaths were reported from the tsunami. Previously, in February 2010, a magnitude 8.8 Mw located near the central coast of Chile generated a tsunami that caused 156 fatalities.

The Pacific Tsunami Warning Center (PTWC) issued its 1st advisory information at 2300 UTC, and continued issuing threat information messages for the next 24 hours with the final message issued at 2305 UTC on September 17. A 4.75 m high tsunami wave was measured on the Coquimbo, Chile sea level gauge, and 1-2 m high waves were measured elsewhere in Chile.

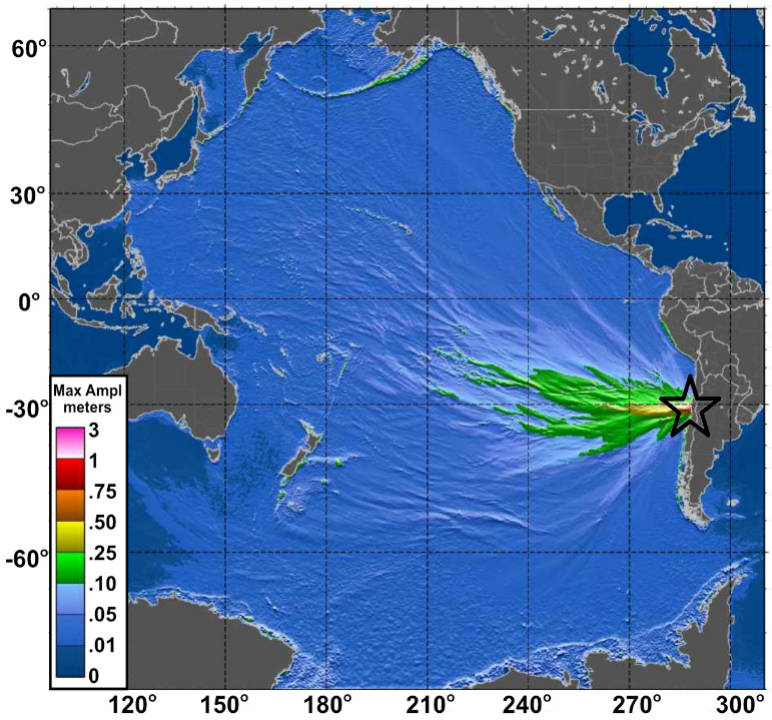
According to the USGS, the 16 September 2015 earthquake occurred as a result of thrust faulting on the interface between the Nazca and South America plates in Central Chile. In the region of the earthquake, the Nazca plate subducts eastward beneath the South American plate at a rate of 65 mm/yr. At least 15 people were reported killed and 34 injured from the earthquake.



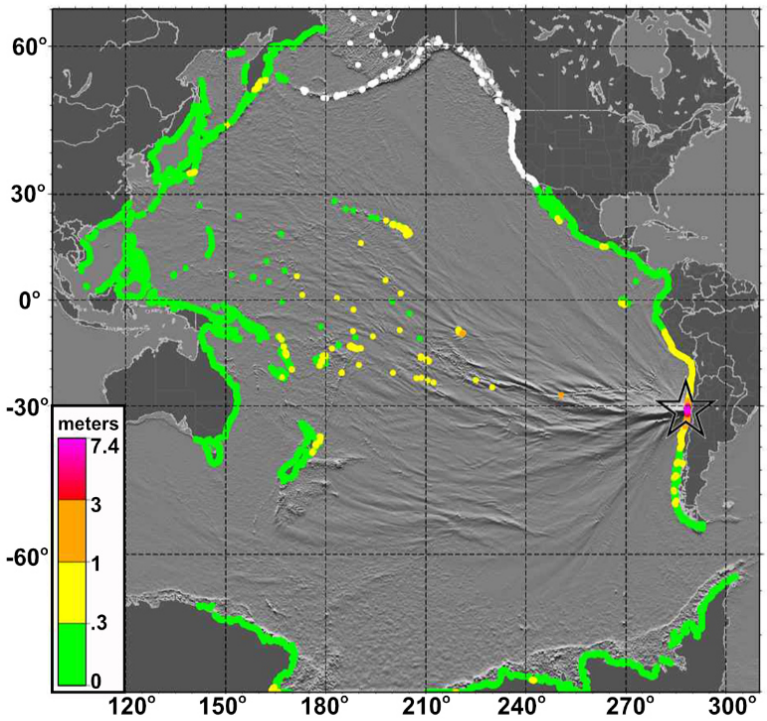


Top right: Regional tectonics and seismicity M7 or greater by depth. Epicenter of the 16 September Mw 8.3 earthquake is shown by the yellow star.

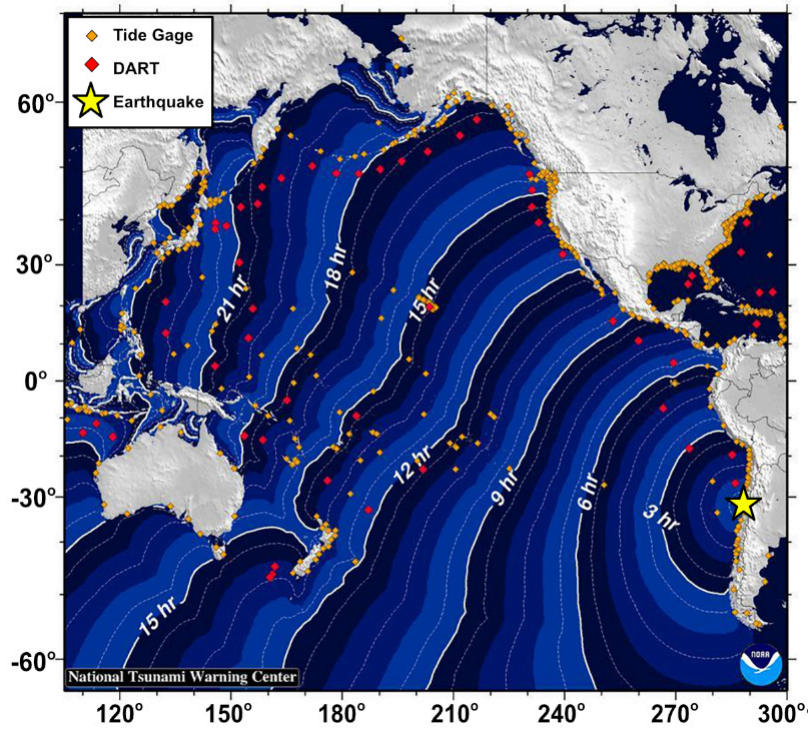
Bottom right: Geographic setting.



PTWC Realtime Forecast of Tsunamis (RIFT) model simulation showing the predicted maximum offshore tsunami wave amplitudes from the 16 September 2015 earthquake off Illapel, Chile.

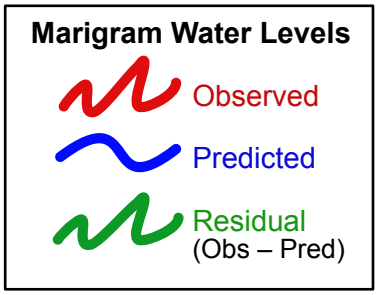


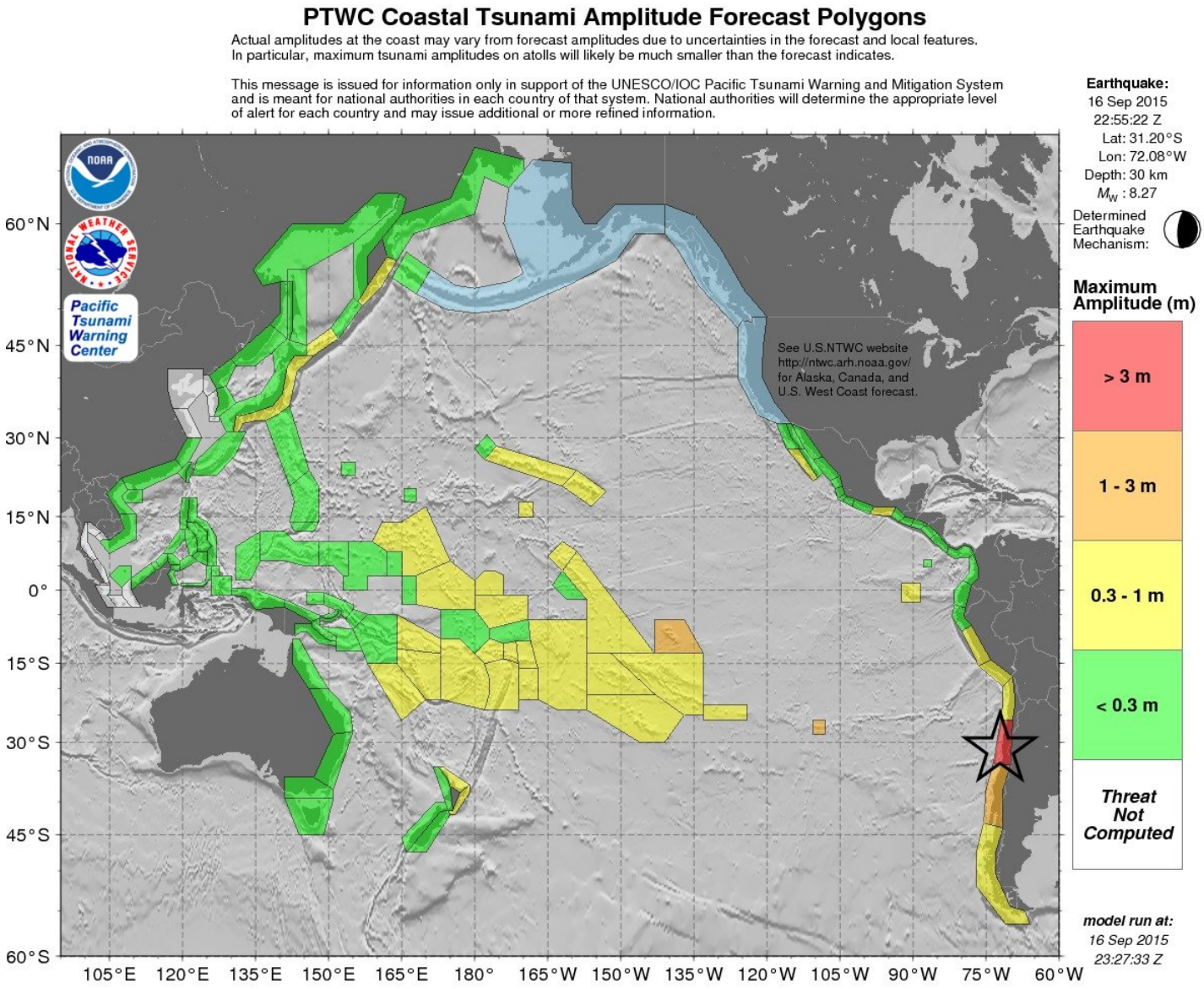
Detailed model of forecast coastal tsunami amplitudes from the M 8.3 earthquake on 16 September 2015 off Illapel, Chile. (PTWC Realtime Forecast of Tsunamis (RIFT) Model)



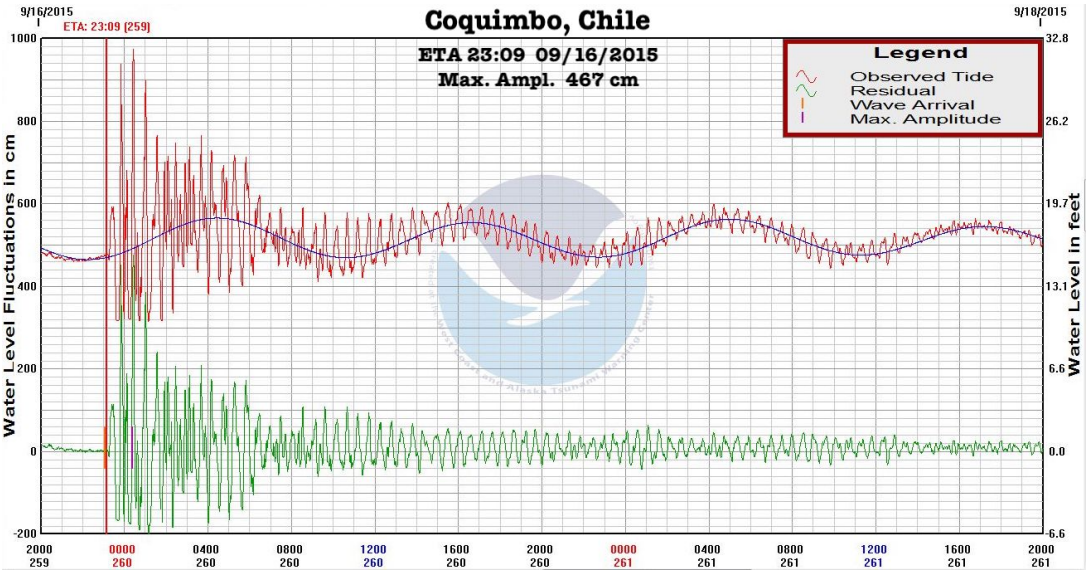
Tsunami travel time contours in hours, starting from the earthquake origin time (23:54:31 UTC, 16 September 2015). (National Tsunami Warning Center)

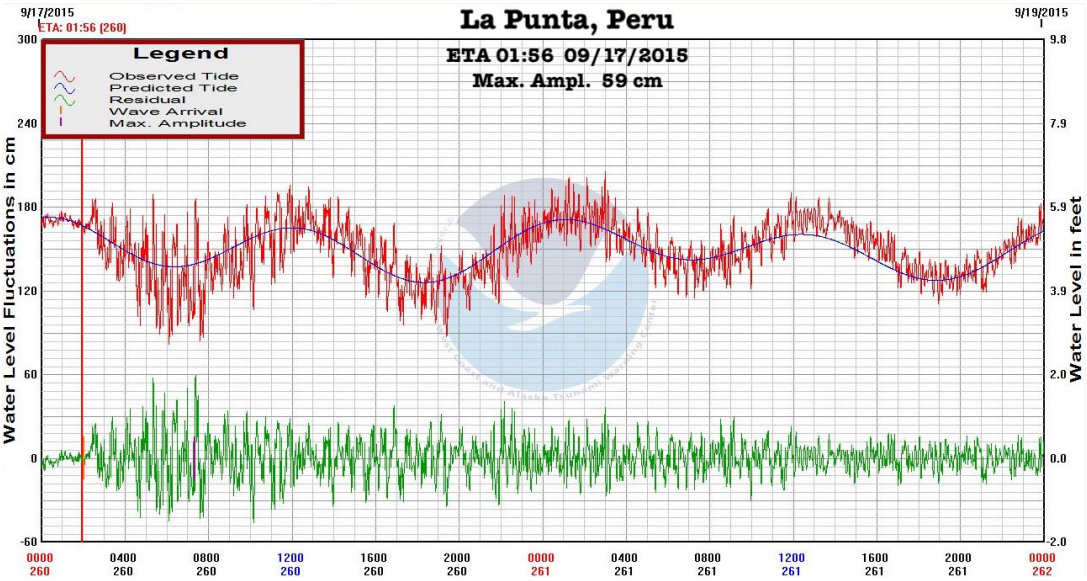
***Marigrams** on the following pages are in the order of earliest to latest wave arrival times. All marigrams show 48 hour records, with UTC time and Julian day marked in 4-hour increments on the x-axis. **Vertical scales differ**.*

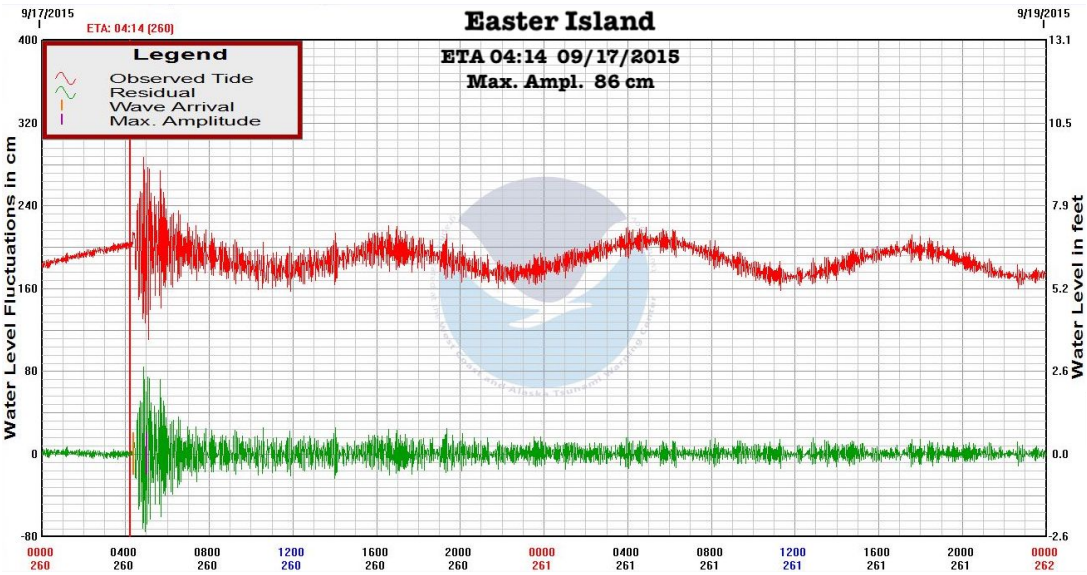


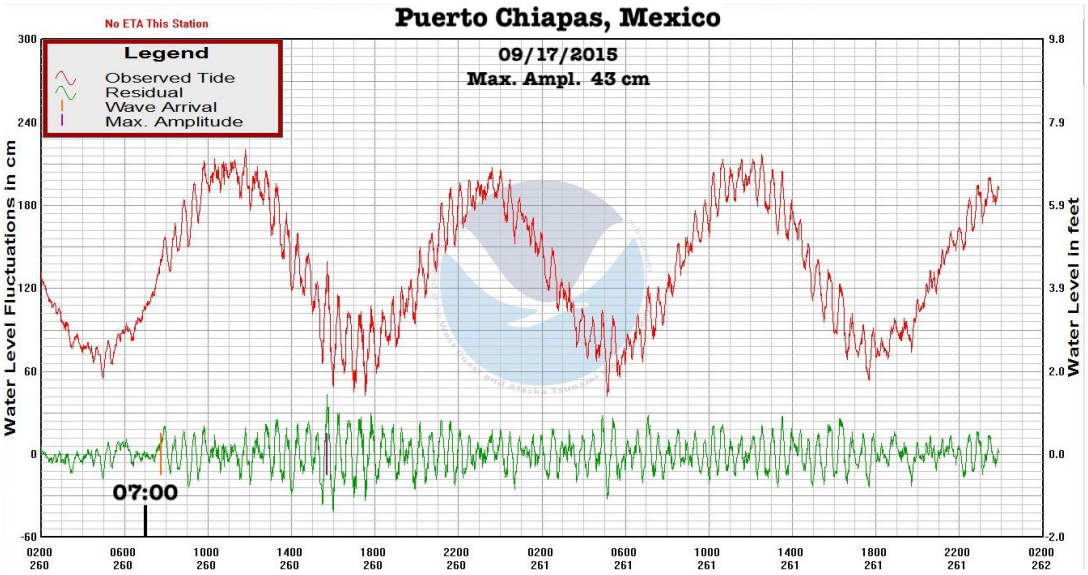


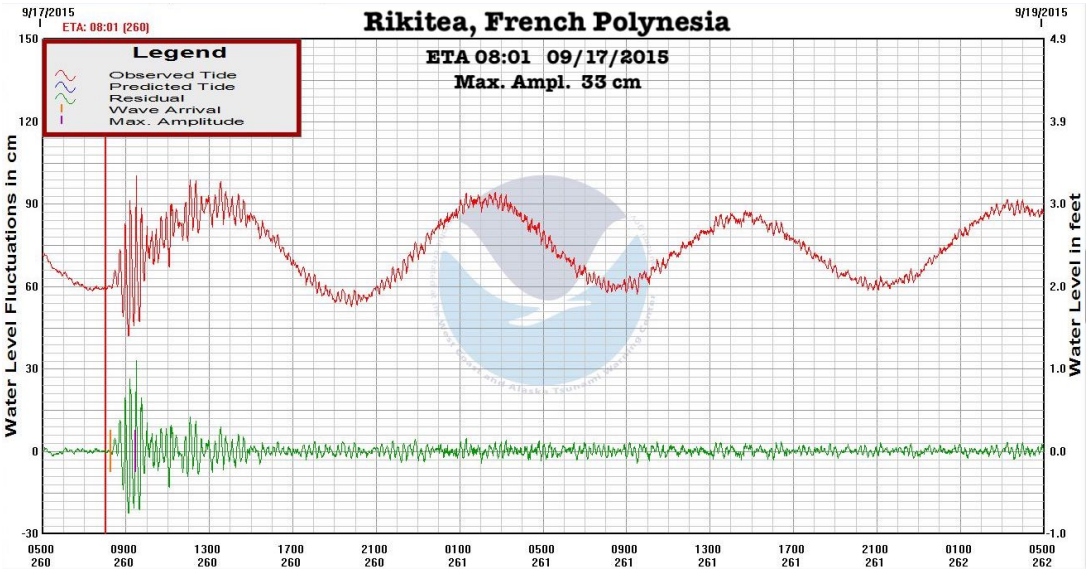
PTWC's forecast of maximum tsunami amplitude by regional polygons, based on the Real-time Inundation Forecast of Tsunamis (RIFT) model. The model was run at 23:27 UTC on 16 September 2015, 32 minutes after the earthquake.

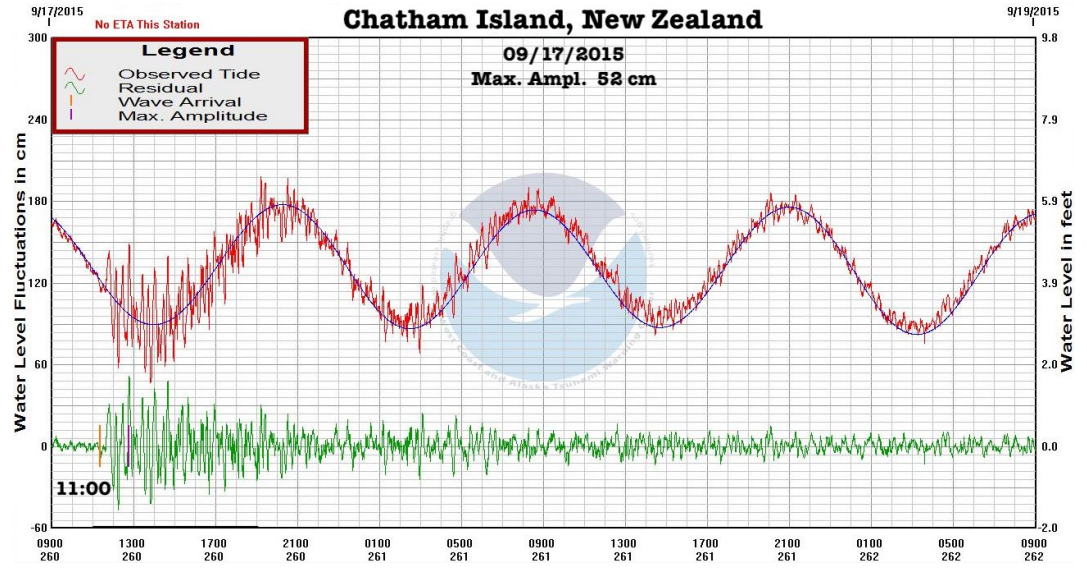

Coquimbo, Chile
ETA 23:09 09/16/2015
Max. Ampl. 467 cm
Legend
Observed Tide
Residual
Wave Arrival
Max. Amplitude
Water Level Fluctuations in cm
Water Level in feet
9/16/2015
9/18/2015
ETA: 23:09 (259)

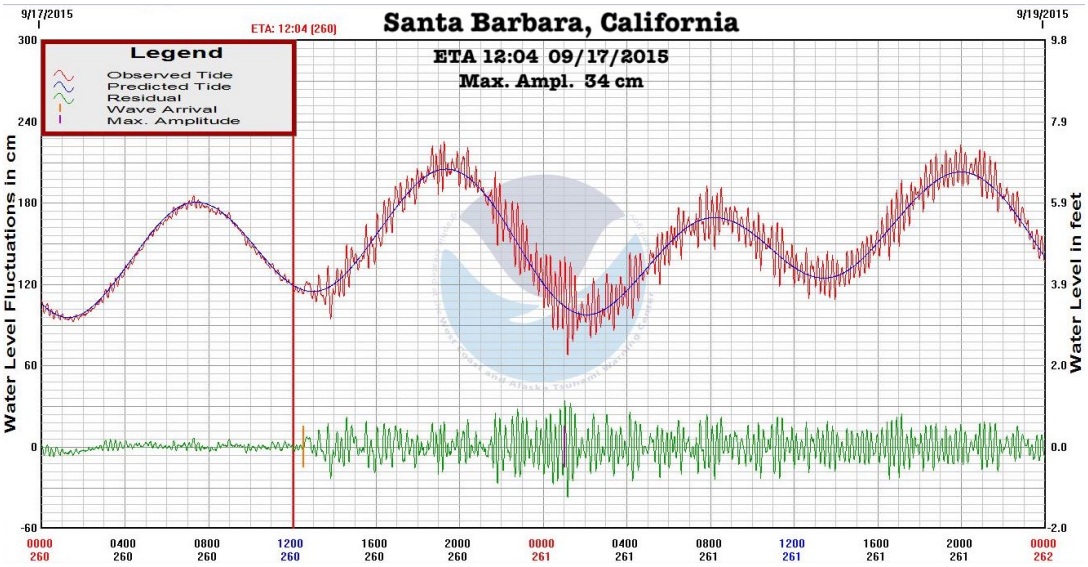

La Punta, Peru
ETA 01:56 09/17/2015
Max. Ampl. 59 cm
Legend
Observed Tide
Predicted Tide
Residual
Wave Arrival
Max. Amplitude
Water Level Fluctuations in cm
Water Level in feet
9/17/2015
9/19/2015
ETA: 01:56 (260)

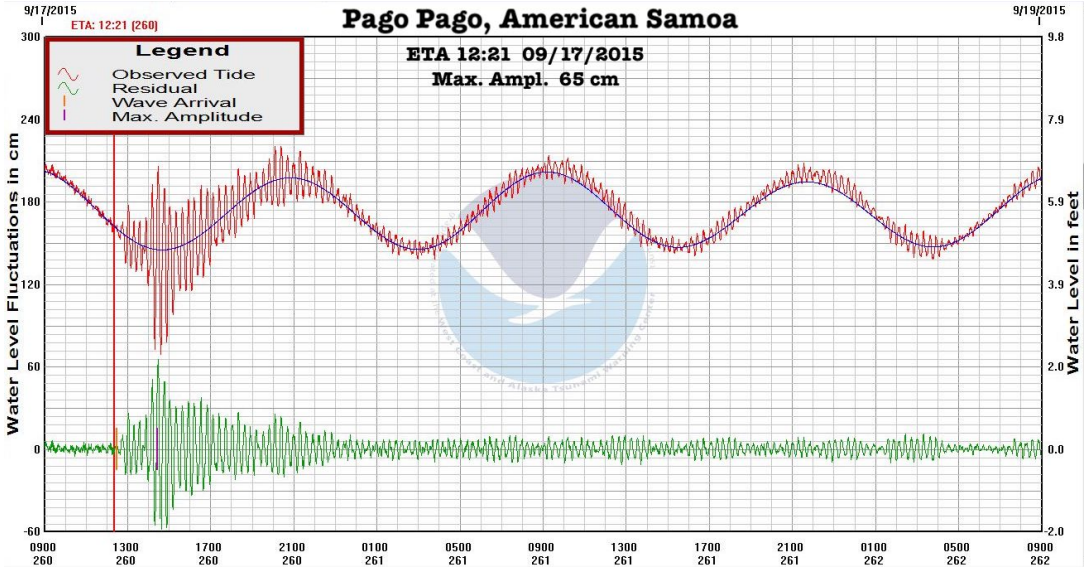

Easter Island
ETA 04:14 09/17/2015
Max. Ampl. 86 cm
Legend
Observed Tide
Residual
Wave Arrival
Max. Amplitude
Water Level Fluctuations in cm
Water Level in feet
9/17/2015
9/19/2015
ETA: 04:14 (260)

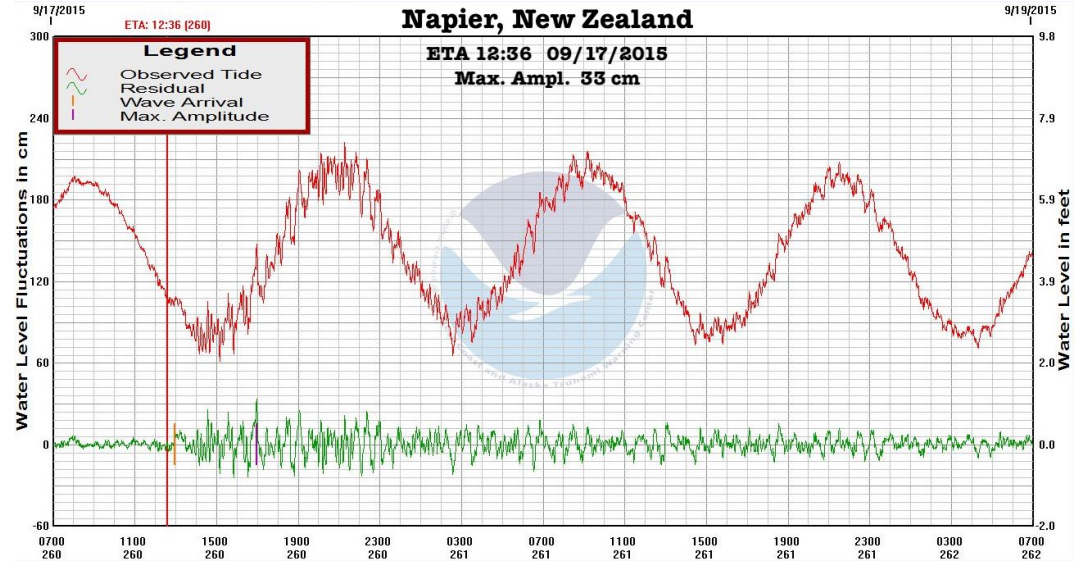

Puerto Chiapas, Mexico
No ETA This Station
Legend
Observed Tide
Residual
Wave Arrival
Max. Amplitude
09/17/2015
Max. Ampl. 43 cm
Water Level Fluctuations in cm
Water Level in feet
07:00

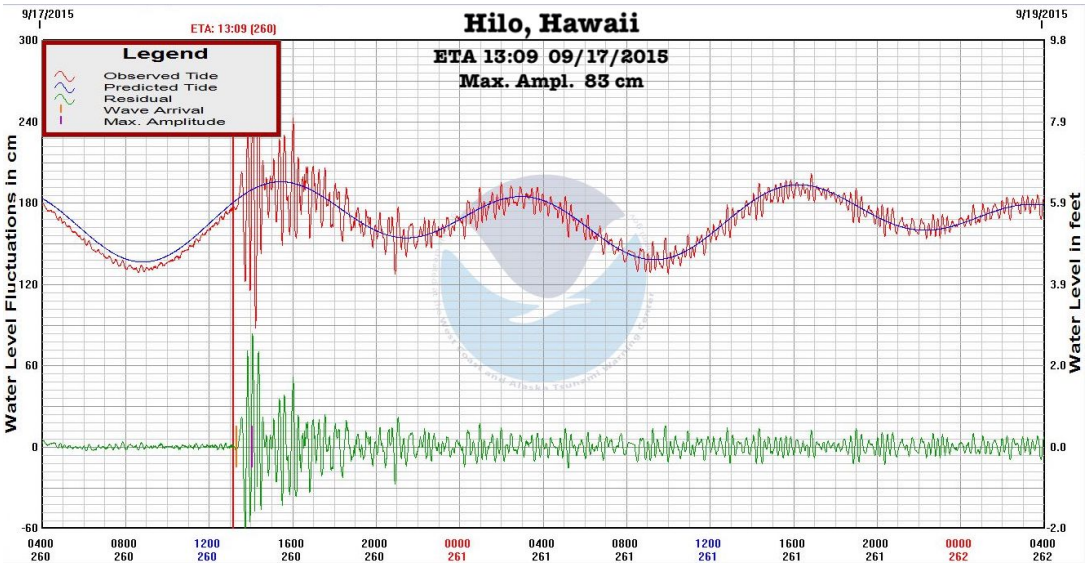

Rikitea, French Polynesia
9/17/2015
9/19/2015
ETA: 08:01 (260)
Legend
Observed Tide
Predicted Tide
Residual
Wave Arrival
Max. Amplitude
ETA 08:01 09/17/2015
Max. Ampl. 33 cm
Water Level Fluctuations in cm
Water Level in feet

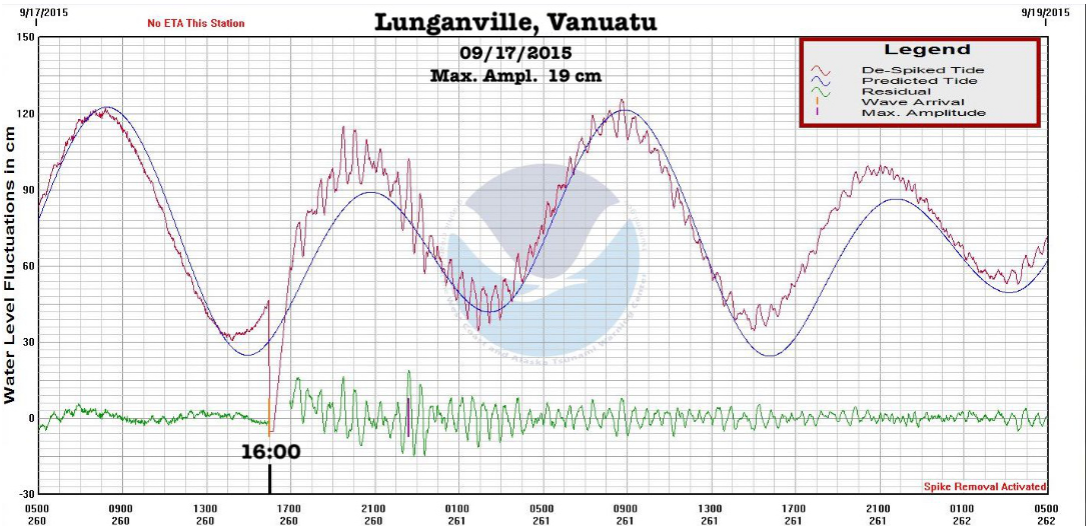

Chatham Island, New Zealand
9/17/2015
9/19/2015
No ETA This Station
Legend
Observed Tide
Residual
Wave Arrival
Max. Amplitude
09/17/2015
Max. Ampl. 52 cm
Water Level Fluctuations in cm
Water Level in feet
11:00

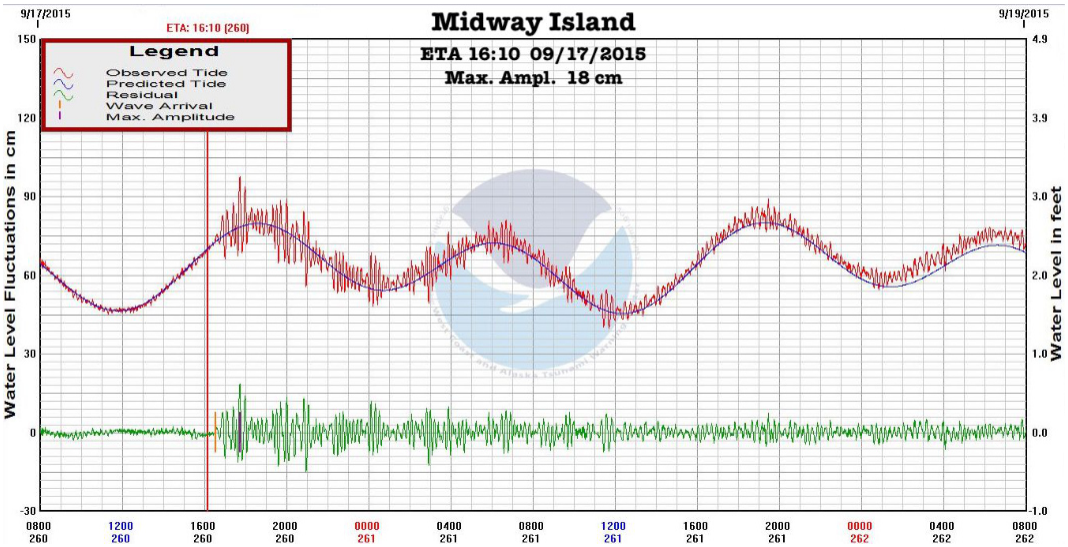

Santa Barbara, California
ETA 12:04 09/17/2015
Max. Ampl. 34 cm
ETA: 12:04 (260)
9/17/2015
9/19/2015
Legend
Observed Tide
Predicted Tide
Residual
Wave Arrival
Max. Amplitude
Water Level Fluctuations in cm
Water Level in feet

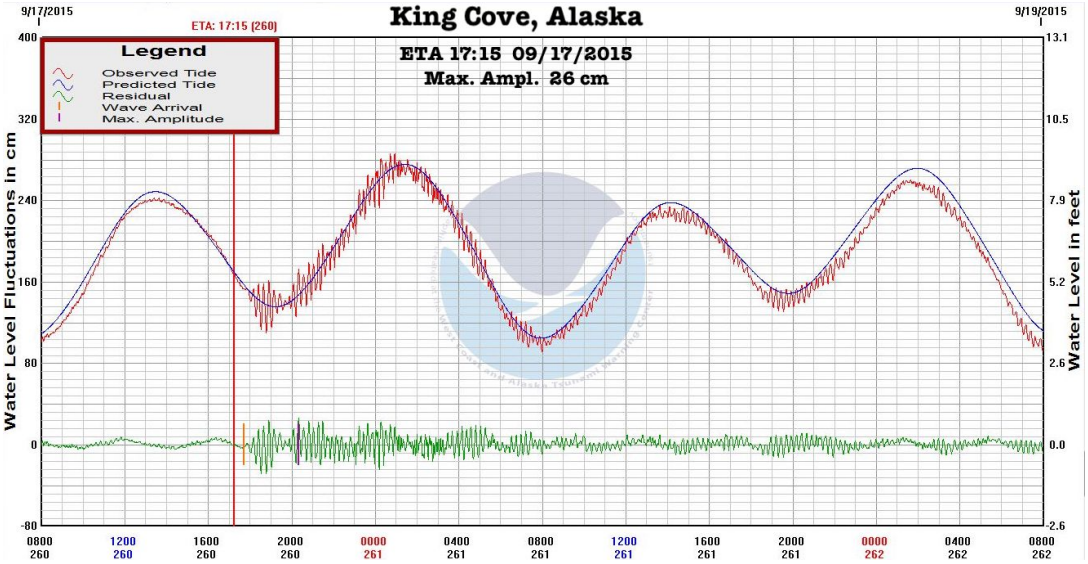

Pago Pago, American Samoa
ETA 12:21 09/17/2015
Max. Ampl. 65 cm
ETA: 12:21 (260)
9/17/2015
9/19/2015
Legend
Observed Tide
Residual
Wave Arrival
Max. Amplitude
Water Level Fluctuations in cm
Water Level in feet

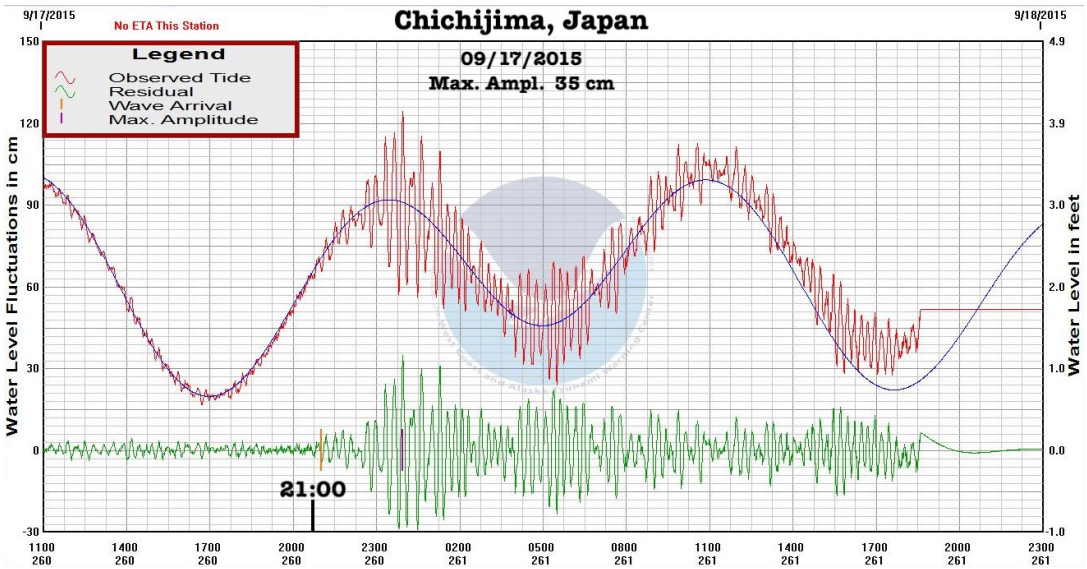

Napier, New Zealand
ETA 12:36 09/17/2015
Max. Ampl. 33 cm
ETA: 12:36 (260)
9/17/2015
9/19/2015
Legend
Observed Tide
Residual
Wave Arrival
Max. Amplitude
Water Level Fluctuations in cm
Water Level in feet

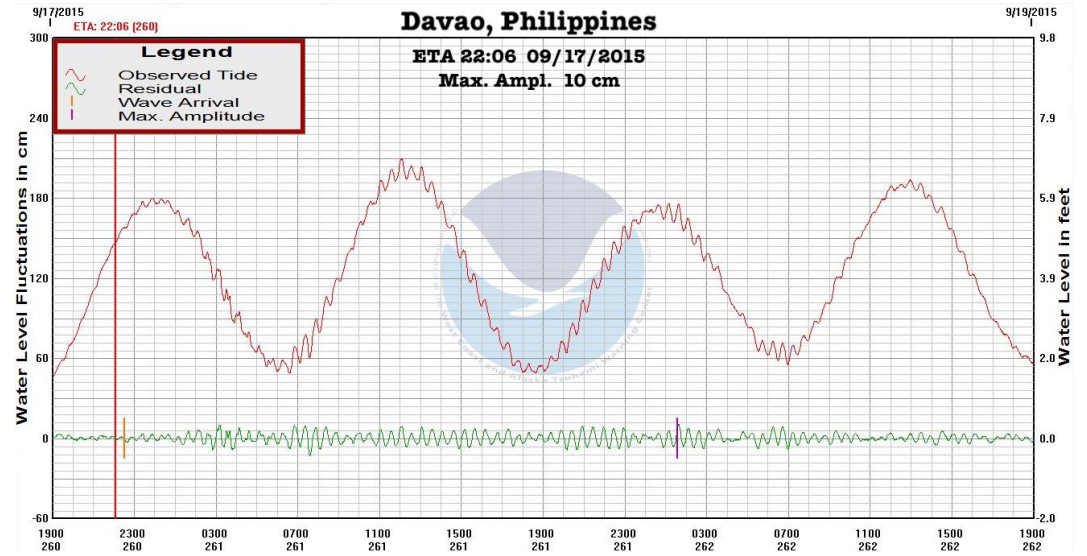

Hilo, Hawaii
ETA 13:09 09/17/2015
Max. Ampl. 83 cm
ETA: 13:09 (260)
Legend
Observed Tide
Predicted Tide
Residual
Wave Arrival
Max. Amplitude
9/17/2015
9/19/2015
Water Level Fluctuations in cm
Water Level in feet


Lunganville, Vanuatu
09/17/2015
Max. Ampl. 19 cm
No ETA This Station
Legend
De-Spiked Tide
Predicted Tide
Residual
Wave Arrival
Max. Amplitude
16:00
Spike Removal Activated
9/17/2015
9/19/2015
Water Level Fluctuations in cm


Midway Island
ETA 16:10 09/17/2015
Max. Ampl. 18 cm
ETA: 16:10 (260)
Legend
Observed Tide
Predicted Tide
Residual
Wave Arrival
Max. Amplitude
9/17/2015
9/19/2015
Water Level Fluctuations in cm
Water Level in feet


King Cove, Alaska
ETA: 17:15 (260)
ETA 17:15 09/17/2015
Max. Ampl. 26 cm
Legend
Observed Tide
Predicted Tide
Residual
Wave Arrival
Max. Amplitude
Water Level Fluctuations in cm
Water Level in feet
9/17/2015
9/19/2015


Chichijima, Japan
No ETA This Station
09/17/2015
Max. Ampl. 35 cm
Legend
Observed Tide
Residual
Wave Arrival
Max. Amplitude
21:00
Water Level Fluctuations in cm
Water Level in feet
9/17/2015
9/18/2015


Davao, Philippines
ETA: 22:06 (260)
ETA 22:06 09/17/2015
Max. Ampl. 10 cm
Legend
Observed Tide
Residual
Wave Arrival
Max. Amplitude
Water Level Fluctuations in cm
Water Level in feet
9/17/2015
9/19/2015

Tsunami damage to buildings in Coquimbo. (Photo credit: Servicio Hidrográfico y Oceanográfico de la Armada de Chile - SHOA)

Tide gauge in Coquimbo. Sea level stations are used to measure tsunamis and to inform decisions about tsunami warnings and cancellations. (Photo credit: MD Angove - NOAA)

Multiple ships aground in Coquimbo. (Photo credit: Servicio Hidrográfico y Oceanográfico de la Armada Chile - SHOA)

Tide gage/ Measurement Location	Observed Arrival time [GMT (J.Day)]	Peak amplitude above sea level [cm]	Time of Peak Amplitude [GMT (J.Day)]	Initial motion	Sample Interval (min)
CHILE					
Coquimbo, Chile	2305 (259)	467	0024 (260)	down	1
Valparaiso, Chile	2316 (259)	180	0042 (260)		1
Quintero, Chile	2316 (259)	177	0004 (260)	up	1
Talcahuano, Chile	0020 (260)	121	0208 (260)	up	1
Chanaral, Chile	2346 (259)	114	0058 (260)	up	1
Caldera, Chile	2332 (259)	114	0738 (260)	up	1
San Antonio, Chile	2321 (259)	100	0027 (260)	up	1
Juan Fernandez, Chile	2347 (259)	99	0021 (260)	up	1
Easter Island, Chile	0424 (260)	86	0502 (260)	up	1
Constitucion, Chile	2348 (259)	80	0209 (260)	up	1
Huasco, Chile	2320 (259)	77	0101 (260)	up	1
Quiriquina, Chile	0017 (260)	74	0327 (260)	up	1
Coronel, Chile	0008 (260)	65	0622 (260)	up	1
Lebu, Chile	2356 (259)	38	0136 (260)	up	1
Arica, Chile	0059 (260)	62	0544 (260)	up	1
Antofagasta, Chile	0001 (260)	49	0100 (260)	up	1
Corral, Chile	0048 (260)	36	0245 (260)	up	1
Paposo, Chile	2344 (259)	37	0206 (260)	up	1
Queule, Chile	0049 (260)	34	0441 (260)	up	1
Mejillones, Chile	0010 (260)	36	0111 (260)	up	1
Patache, Chile	0023 (260)	30	0228 (260)	up	1
San Felix, Chile	0013 (260)	28	0016 (260)	up	1
Pisagua, Chile	2356 (259)	20	0058 (260)	up	1
Bahia Mansa, Chile	0039 (260)	39	0835 (260)	up	1
Taltal, Chile	0002 (260)	30	0248 (260)	up	1
Ancud, Chile	0116 (260)	16	0723 (260)	up	1
Puerto Melinka, Chile	-	5	0402 (260)	-	1
Tocopilla, Chile	-	14	0426 (261)	-	1
PERU, ECUADOR					
Matarani, Peru	0051 (260)	20	0615 (260)	up	1
La Punta, Peru	0203 (260)	59	0722 (260)	up	1
Baltra, Ecuador	0448 (260)	18	0851 (260)	up	1
La Libertad, Ecuador	-	10	0704 (260)	-	1
Santa Cruz, Ecuador	0441 (260)	61	0649 (260)	up	1
COSTA RICA, EL SALVADOR					
Acajutla, El Salvador	0722 (260)	17	0738 (261)	-	1
La Union, El Salvador	0804 (260)	7	1247 (260)	-	1
Quepos, Costa Rica	0615 (260)	18	0722 (260)	up	1
MEXICO					
Acapulco, Mexico	0750 (260)	21	1032 (260)	-	1
Puerto Chiapas, Mexico	-	43	1534 (260)	-	1
Salina Cruz, Mexico	0746 (260)	23	1212 (261)	-	1
Zihuatanejo, Mexico	0801 (260)	40	1149 (260)	up	1

Tide gage/ Measurement Location	Observed Arrival time [GMT (J.Day)]	Peak amplitude above sea level [cm]	Time of Peak Amplitude [GMT (J.Day)]	Initial motion	Sample Interval (min)
CALIFORNIA					
Alameda, CA	1344 (260)	6	2228 (260)	up	1
Arena Cove, CA	1250 (260)	17	2304 (260)	up	1
Crescent City, CA	1339 (260)	32	0038 (261)	up	1
La Jolla, CA	1147 (260)	11	0205 (261)	up	1
Los Angeles, CA	1208 (260)	16	1544 (260)	up	1
North Spit, CA	1328 (260)	11	0225 (261)	up	1
San Francisco, CA	1316 (260)	12	0422 (261)	up	1
Monterey, CA	1232 (260)	11	2022 (260)	up	1
Port San Luis, CA	1225 (260)	29	0053 (261)	up	1
Point Reyes, CA	1300 (260)	21	0035 (261)	up	1
Richmond, CA	1337 (260)	5	0844 (261)	-	1
Santa Barbara, CA	1233 (260)	34	0103 (261)	up	1
Santa Monica, CA	1217 (260)	23	1711 (260)	up	1
Ventura, CA	1226 (260)	33	1307 (261)	up	1
OREGON, WASHINGTON					
Charleston, OR	-	12	0536 (261)	-	1
South Beach, OR	-	7	2213 (260)	-	1
Port Orford, OR	1334 (260)	13	2132 (260)	up	1
Neah Bay, WA	-	8	0011 (261)	-	1
BRITISH COLUMBIA					
Bamfield, BC	-	-	2058 (260)	-	1
Langara Point, BC	-	4	2313 (260)	-	1
Cape Scott, BC	1515 (260)	7	0135 (261)	up	1
Neptune05, BC	-	-	1015 (261)	-	1
Tofino, BC	-	10	2317 (260)	-	1
ALASKA					
Akutan, AK	1723 (260)	7	1945 (261)	up	1
Alitak, AK	1823 (260)	5	2249 (260)	-	1
Amchitka, AK	-	9	2246 (260)	-	1
Atka, AK	1728 (260)	13	2005 (260)	up	1
Chignik, AK	1757 (260)	19	2206 (260)	up	1
Elfin Cove, AK	-	5	2311 (260)	-	1
King Cove, AK	1743 (260)	26	2020 (260)	-	1
Kodiak, AK	-	13	2024 (260)	-	1
Nikolski, AK	1726 (260)	23	2157 (260)	up	1
Port Alexander, AK	-	9	-	-	1
Seward, AK	1740 (260)	10	2213 (260)	up	1
Shemya, AK	1826 (260)	11	0053 (261)	-	1
Sitka, AK	1634 (260)	8	0023 (261)	-	1
Dutch Harbor, AK	1753 (260)	12	2121 (260)	up	1
Sand Point, AK	1731 (260)	19	2236 (260)	up	1
Saint Paul, AK	1859 (260)	9	0842 (261)	up	1
Yakutat, AK	1712 (260)	15	2203 (260)	up	1

Tide gage/ Measurement Location	Observed Arrival time [GMT (J.Day)]	Peak amplitude above sea level [cm]	Time of Peak Amplitude [GMT (J.Day)]	Initial motion	Sample Interval (min)
HAWAII, WAKE, SAMOA					
Barbers Point, HI	1357 (260)	10	1603 (260)	up	1
French Frigate Shoals, HI	-	-	-	-	1
Honolulu, HI	1359 (260)	11	1751 (260)	up	1
Hanalei, HI	1409 (260)	3	2141 (260)	-	1
Hilo, HI	1320 (260)	83	1405 (260)	up	1
Kahului, HI	1344 (260)	57	1426 (260)	up	1
Kawaihae, HI	1340 (260)	27	1623 (260)	up	1
Mokuloe, HI	1400 (260)	4	1942 (260)	up	1
Makai Pier, Waimanalo, HI	1354 (260)	21	1902 (260)	up	1
Nawiliwili, HI	1405 (260)	15	1712 (260)	up	1
Waianea, HI	1357 (260)	23	1612 (260)	up	1
Midway Is., HI	1634 (260)	18	1744 (260)	up	1
Wake Is., USA	1837 (260)	7	1853 (260)	up	1
Pago Pago, America Samoa	1230 (260)	65	1427 (260)	up	1
JAPAN					
Aburatsu, JP	2303 (260)	22	0645 (261)	-	1
Chichijima, JP	2100 (260)	35	2357 (260)	-	1
Hakodate, JP	2316 (260)	16	0816 (261)	up	1
Hanasaki, JP	2124 (260)	20	0208 (261)	-	1
Ishigakijima, JP	2342 (260)	10	0213 (261)	up	1
Kushiro, JP	2141 (260)	21	0510 (261)	-	1
Kushimoto, JP	-	24	0145 (261)	-	1
Mera, JP	2153 (260)	16	0314 (261)	-	1
Ofunato, JP	2119 (260)	20	0004 (261)	-	1
Naha, JP	2348 (260)	10	0407 (261)	-	1
Omaezaki, JP	2210 (260)	20	0359 (261)	-	1
Tosashimizu, JP	-	19	1013 (261)	-	1
NEW ZEALAND					
Auckland, NZ	-	5	1604 (260)	-	1
Castlepoint, NZ	1233 (260)	27	1604 (260)	up	1
Dunedin, NZ	-	5	0053 (261)	-	1
Korotiti Bay, NZ	1252 (260)	32	1417 (260)	up	1
Gisborn, NZ	1223 (260)	26	-	-	1
Kaikoura North Wharf, NZ	1232 (260)	21	1721 (260)	up	1
Lottin Point, NZ	1212 (260)	13	1402 (260)	up	1
North Cape, NZ	1315 (260)	18	1706 (260)	up	1
Chatham Island, NZ	-	52	1247 (260)	up	1
Port of Napier, NZ	1258 (260)	33	1656 (260)	up	1
Port Tauranga, NZ	1250 (260)	7	1829 (260)	up	1
Raoul Is., Kermadec, NZ	1158 (260)	20	1342 (260)	-	1
Raoul Is. Fishing Rock, NZ	1209 (260)	29	1656 (260)	up	1
Rarotonga, Cook Is., NZ	1118 (260)	22	1421 (260)	-	1
Queens Wharf, NZ	-	11	1700 (260)	-	1
Sumner Head Christchurch, NZ	-	25	1910 (260)	-	1

Tide gage/ Measurement Location	Observed Arrival time [GMT (J.Day)]	Peak amplitude above sea level [cm]	Time of Peak Amplitude [GMT (J.Day)]	Initial motion	Sample Interval (min)
FRENCH POLYNESIA					
Huahine, FP	1040 (260)	15	2217 (260)	-	1
Lifou, New Caledonia, FP	1518 (260)	4	1930 (260)	-	1
Mare, New Caledonia, FP	-	3	1759 (260)	-	1
Nuku Hiva, FP	0943 (260)	-	-	up	1
Ouinne, New Caledonia, FP	1449 (260)	24	2209 (260)	up	1
Papeete, FP	1018 (260)	15	1120 (260)	up	1
Rikitea Gambier, FP	0831 (260)	35	0920 (260)	up	1
Rikitea, FP	0817 (260)	33	0928 (260)	up	1
PHILIPPINES					
Davao, PH	-	10	0135 (262)	-	1
Legaspi, PH	-	6	0205 (261)	-	1
AUSTRALIA					
Esperance, AU	1823 (260)	10	0119 (261)	-	1
Milner Bay, AU	1951 (260)	4	2029 (260)	-	1
SOLOMON IS. and VANUATU					
Honiara, SI	-	-	-	-	1
Lata Wharf, SI	1715 (260)	23	2015 (260)	-	1
Port Vila, VU	-	-	-	-	1
Luganville, VU	-	19	2237 (260)	-	1
TONGA, FIJI, KIRIBATI					
Suva, FJ	-	10?	1755 (260)?	-	1
Nukualofa, TO	-	10?	1738 (260)?	-	1
Christmas Is., KI	1235 (260)	9	1324 (260)	up	1