

**VALIDATION OF TSUNAMI INUNDATION MODELLING FOR THE JUNE 23,
2001 PERU EARTHQUAKE**

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1. Fault Parameters of Tsunami Sources

Table 1. Fault parameters for the Heterogeneous Slip Model (Mw 8.2).

No.	Strike	Dip	Slip angle	Length (km)	Width (km)	Slip (m)	Top depth (km)	Southern corner of subfault	
								Longitude	Latitude
1	309°	21°	34.25	30.00	30.00	0.80	8.12	72.20°W	18.25°S
2	309°	21°	39.89	30.00	30.00	0.90	18.87	72.03°W	18.05°S
3	309°	21°	50.14	30.00	30.00	1.00	29.62	71.85°W	17.86°S
4	309°	21°	69.49	30.00	30.00	0.60	40.37	71.68°W	17.66°S
5	309°	21°	94.38	30.00	30.00	0.40	51.12	71.50°W	17.46°S
6	309°	21°	33.45	30.00	30.00	2.30	8.12	72.42°W	18.08°S
7	309°	21°	40.47	30.00	30.00	3.00	18.87	72.24°W	17.89°S
8	309°	21°	50.77	30.00	30.00	3.50	29.62	72.07°W	17.68°S
9	309°	21°	62.63	30.00	30.00	2.00	40.37	71.90°W	17.48°S
10	309°	21°	74.53	30.00	30.00	1.30	51.12	71.72°W	17.29°S
11	309°	21°	44.38	30.00	30.00	2.60	8.12	72.63°W	17.90°S
12	309°	21°	52.31	30.00	30.00	3.50	18.87	72.46°W	17.70°S
13	309°	21°	61.37	30.00	30.00	4.50	29.62	72.29°W	17.51°S
14	309°	21°	68.54	30.00	30.00	2.80	40.37	72.11°W	17.31°S
15	309°	21°	72.97	30.00	30.00	2.00	51.12	71.94°W	17.11°S
16	309°	21°	46.53	30.00	30.00	1.60	8.12	72.85°W	17.73°S
17	309°	21°	53.58	30.00	30.00	2.30	18.87	72.68°W	17.53°S
18	309°	21°	63.69	30.00	30.00	3.10	29.62	72.51°W	17.33°S
19	309°	21°	68.03	30.00	30.00	2.10	40.37	72.33°W	17.13°S
20	309°	21°	70.06	30.00	30.00	1.50	51.12	72.16°W	16.94°S
21	309°	21°	25.98	30.00	30.00	0.90	8.12	73.07°W	17.55°S
22	309°	21°	51.85	30.00	30.00	1.20	18.87	72.90°W	17.36°S
23	309°	21°	69.39	30.00	30.00	1.90	29.62	72.72°W	17.16°S
24	309°	21°	77.85	30.00	30.00	1.40	40.37	72.55°W	16.96°S

Table 1. Continued.

No.	Strike	Dip	Slip angle	Length (km)	Width (km)	Slip (m)	Top depth (km)	Southern corner of subfault	
								Longitude	Latitude
25	309°	21°	85.04	30.00	30.00	1.00	51.12	72.38°W	16.76°S
26	309°	21°	20.69	30.00	30.00	0.60	8.12	73.29°W	17.38°S
27	309°	21°	26.14	30.00	30.00	0.60	18.87	73.11°W	17.18°S
28	309°	21°	51.29	30.00	30.00	0.80	29.62	72.94°W	16.98°S
29	309°	21°	70.81	30.00	30.00	0.50	40.37	72.77°W	16.79°S
30	309°	21°	89.65	30.00	30.00	0.60	51.12	72.59°W	16.59°S
31	309°	21°	22.42	30.00	30.00	0.40	8.12	73.50°W	17.20°S
32	309°	21°	21.38	30.00	30.00	0.10	18.87	73.33°W	17.01°S
33	309°	21°	72.97	30.00	30.00	0.60	29.62	73.16°W	16.81°S
34	309°	21°	92.67	30.00	30.00	0.20	40.37	72.98°W	16.61°S
35	309°	21°	79.16	30.00	30.00	0.20	51.12	72.81°W	16.41°S
36	309°	21°	31.93	30.00	30.00	0.20	8.12	73.72°W	17.03°S
37	309°	21°	60.19	30.00	30.00	0.30	18.87	73.55°W	16.83°S
38	309°	21°	64.3	30.00	30.00	1.80	29.62	73.36°W	16.64°S
39	309°	21°	77.03	30.00	30.00	0.40	40.37	73.20°W	16.44°S
40	309°	21°	56.37	30.00	30.00	0.10	51.12	73.03°W	16.24°S

2. Tide Gauge Stations

Table 2. Information of the tide gauge stations used in the tsunami waveform inversion.

Code	Station name	Latitude	Longitude	Tsunami arrival time (min)	Sampling rate (min)
antf	Antofagasta, Chile	23.65°S	70.42°W	57.90	1
aric	Arica, Chile	18.47°S	70.34°W	36.99	1
cald	Caldera, Chile	27.06 °S	70.83°W	91.22	1
call	Callao, Peru	12.07°S	77.17°W	93.44	1
coqu	Coquimbo, Chile	29.93°S	71.35°W	124.10	1
iqui	Iquique, Chile	20.22°S	70.17°W	39.90	1
juan	Juan Fernandez, Chile	33.62°S	78.83°W	152.03	1
lobo	Lobos de Afuera, Peru	6.94°S	80.72°W	250.89	1
matni	Matarani, Peru	16.99°S	72.10°W	0.00	1
anto	San Antonio, Chile	33.58°S	71.63°W	155.12	1
valp	Valparaiso, Chile	33.03°S	71.617°W	148.30	1

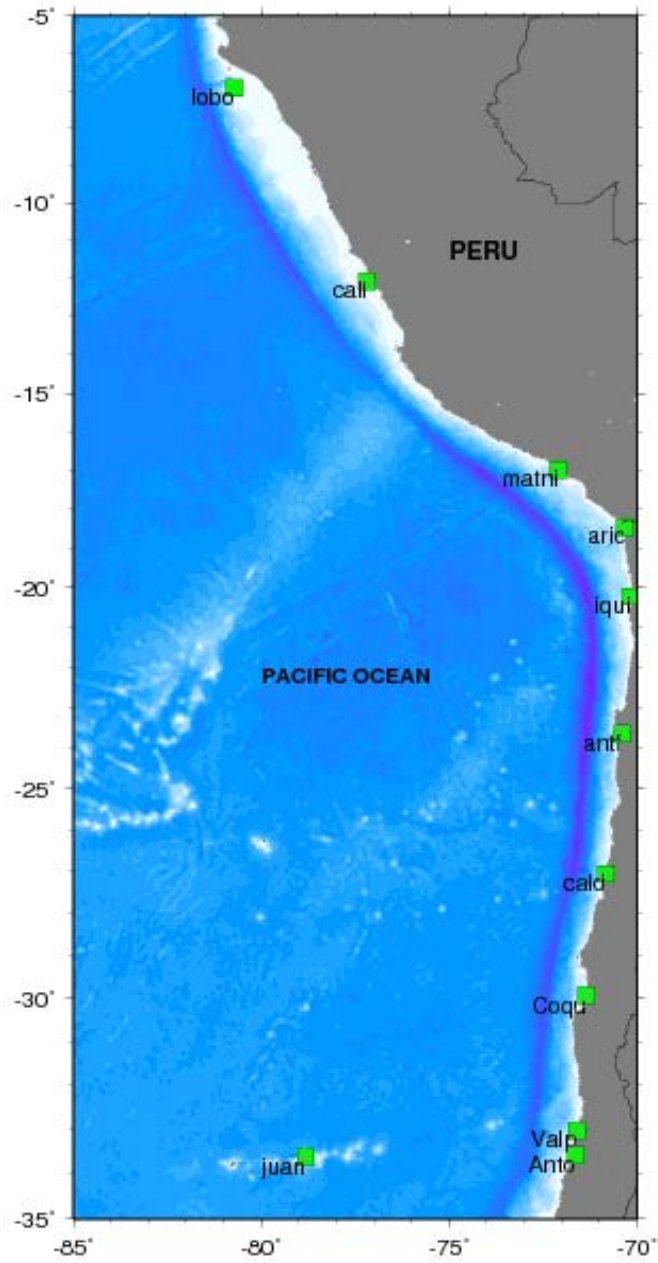


Figure 1. Locations of the tide gauge stations used in the tsunami waveform inversion.

3. Results (Tsunami Height)

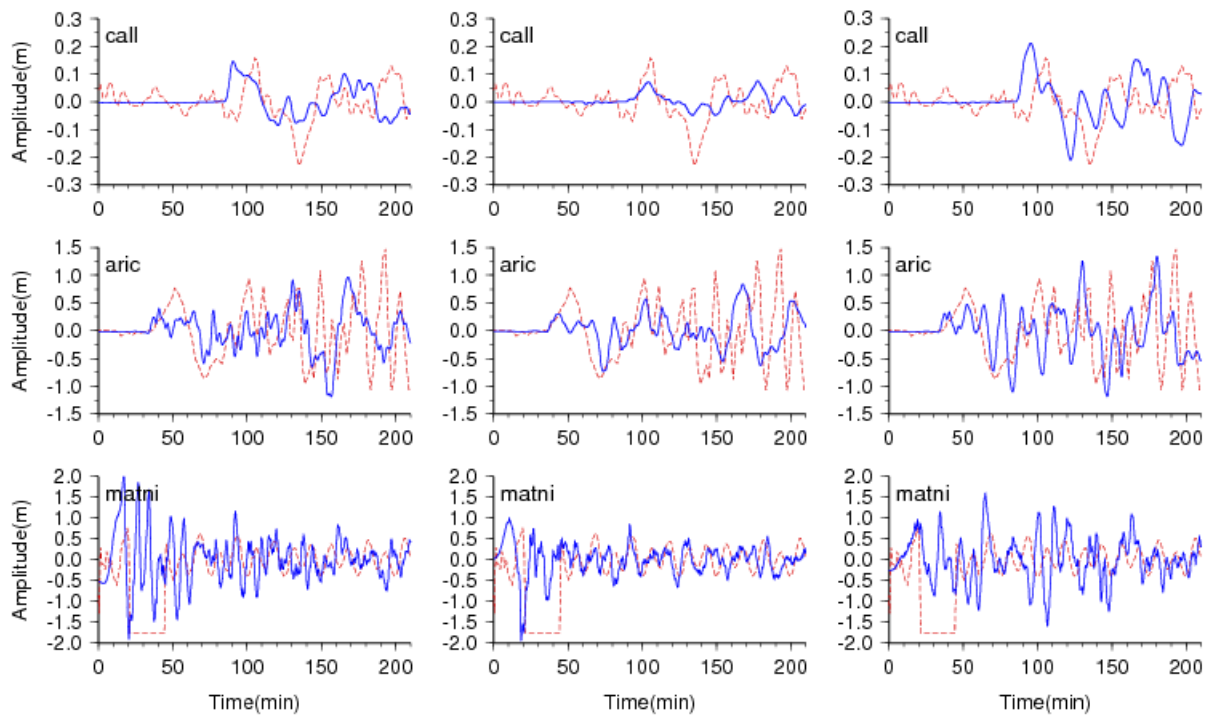


Figure 2. Comparison between computed tsunami waveforms (blue lines) and observed ones (dash red lines) for three tide gauge station, (left: USM, center: HSM and right: TWIM).

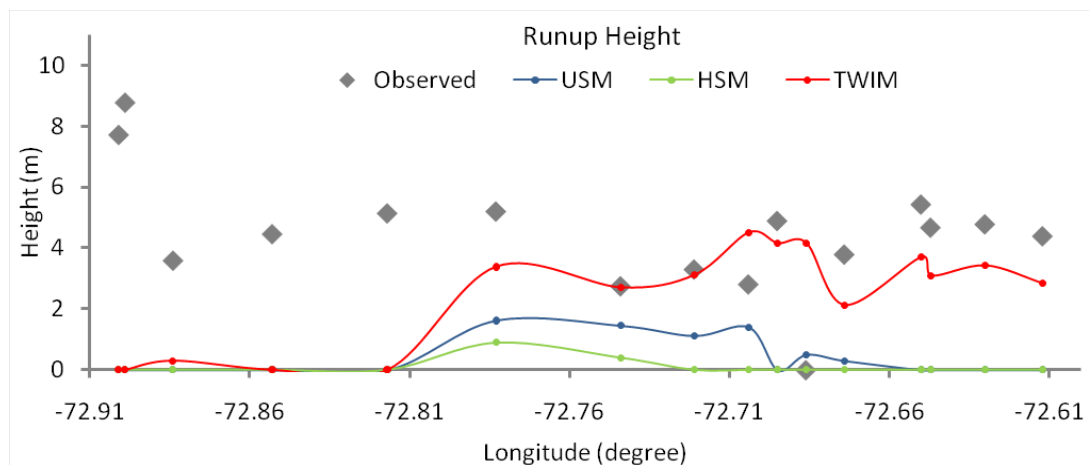


Figure 3. Comparison between the observed tsunami run-up height (gray diamond) and the computed tsunami run-up height from each model (line in blue: USM, line in green: HSM and line in red: TWIM).

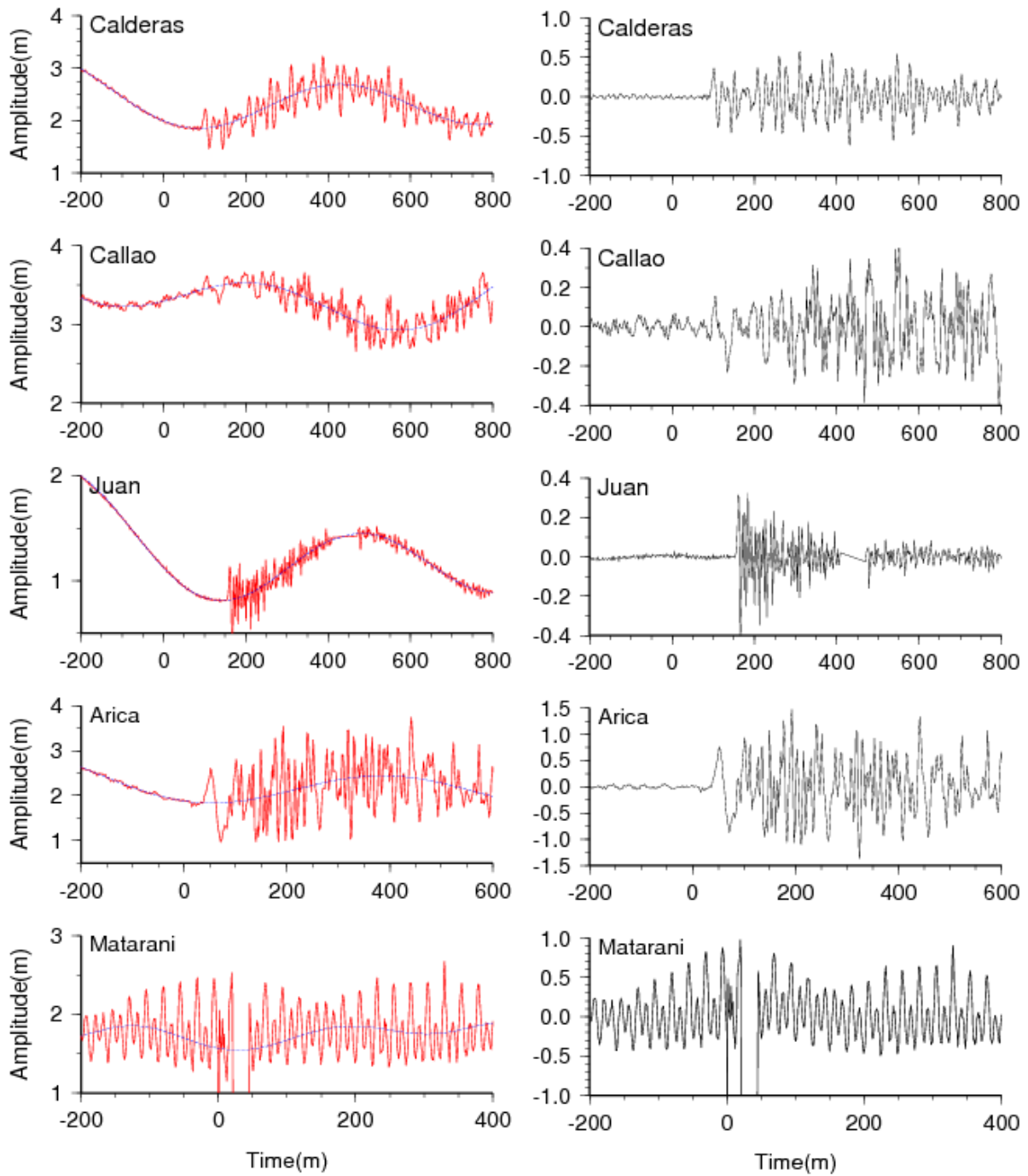


Figure 4. Right: Original tsunami waveform observed (red line) with the fitted astronomical tide signal (blue line). Left: Tsunami signal after subtracting the astronomical tide signal.

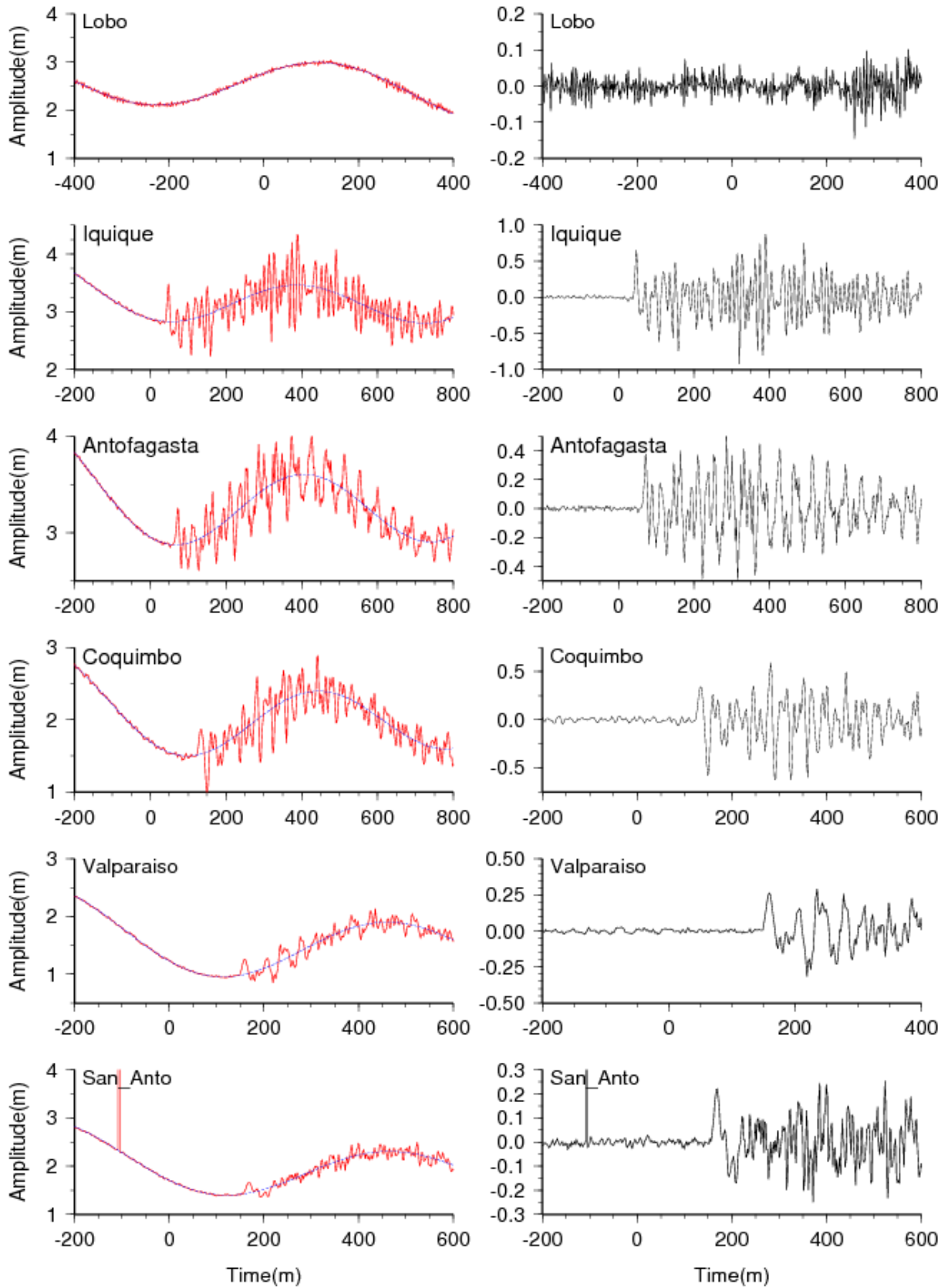


Figure 4. Continued.

4. Conditions for Computation

Table 3. Boundary, resolution and data source for each computational domain.

Domain	Longitude		Latitude		Resolution	Data source	
	Min	Max	Min	Max	arc-second	Bathymetry	Topography
1	-78.00°	-70.00°	-19.00°	-11.00°	27	GEBCO 30c	GEBCO 30c
2	-74.00°	-72.00°	-18.00°	-16.00°	9	GEBCO 30c	GEBCO 30c
3	-73.15°	-72.40°	-17.00°	-16.25°	3	GEBCO 30c	SRTM
4	-72.92°	-72.58°	-16.75°	-16.50°	1	DHN	ASTER

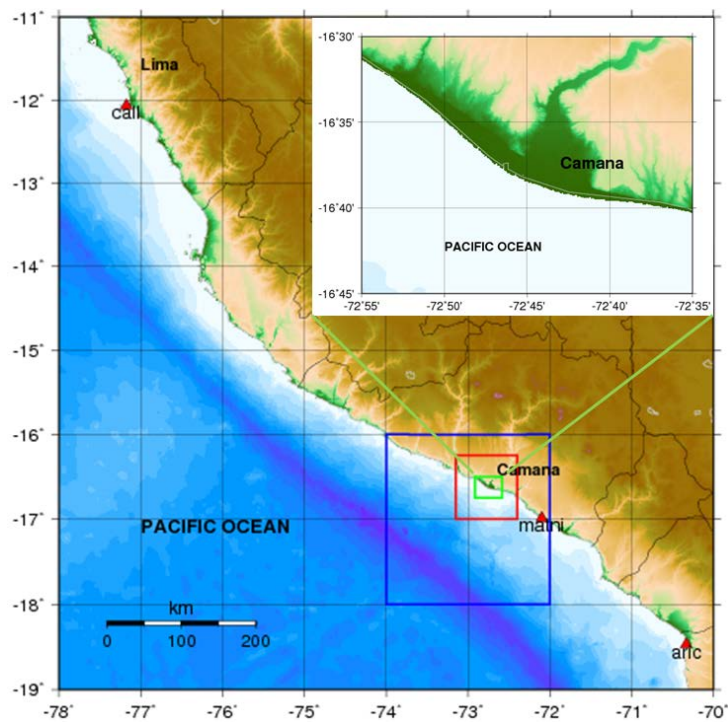


Figure 5. Location and boundary for each computational domain.

Table 4. Magnitude and source parameters for the Uniform Slip Model.

Magnitude (Mw)	Strike	Dip	Slip angle	Length (km)	Width (km)	Slip (m)	Top depth (km)	Southern left corner of fault	
								Longitude	Latitude
8.4	310°	18°	63°	270.00	95.00	4	29.6 km	72.20°W	18.25°S

Table 5. Source parameters obtained from the tsunami waveform inversion.

No.	Strike	Dip	Slip angle	Length (km)	Width (km)	Slip (m)	Error (m) +/-	Top depth (km)	Southern corner of fault	
									Longitude	Latitude
1	308°	18°	63°	50.0	50.0	1.15	0.91	14.15	72.20°W	18.25°S
2	308°	18°	63°	50.0	50.0	0.35	0.43	14.15	72.56°W	17.96°S
3	308°	18°	63°	50.0	50.0	2.84	1.78	14.15	72.92°W	17.67°S
4	308°	18°	63°	50.0	50.0	7.78	4.79	14.15	73.29°W	17.38°S
5	308°	18°	63°	50.0	50.0	3.8	1.83	14.15	73.65°W	17.09°S
6	308°	18°	63°	50.0	50.0	8.38	4.18	29.60	71.91°W	17.92°S
7	308°	18°	63°	50.0	50.0	0.36	0.22	29.60	72.27°W	17.63°S