

**QUICK FORECASTING OF TSUNAMI IN BALI AND NUSA TENGGARA REGIONS,  
BASED ON THE TSUNAMI DATABASE SYSTEM**

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**1. Fault Parameters of Tsunami Sources**

Table 1. Fault parameters for computation of tsunami modeling.

Mag (M)	Depth of Center Fault (km)	Depth of Right Bottom Corner of Fault (km)	Strike (°)	Dip (°)	Rake (°)	Length (L) (km)	Width (W) (km)	Slip (D) (m)
7.0	0	0*	270	45	90	50.119	25.059	1.58
7.5	0	0*	270	45	90	89.125	44.563	2.82
8.0	0	0*	270	45	90	158.489	79.245	5.01
7.0	20	11.140	270	45	90	50.119	25.059	1.58
7.5	20	4.245	270	45	90	89.125	44.563	2.82
8.0	20	0*	270	45	90	158.489	79.245	5.01
7.0	40	31.140	270	45	90	50.119	25.059	1.58
7.5	40	24.245	270	45	90	89.125	44.563	2.82
8.0	40	11.983	270	45	90	158.489	79.245	5.01
7.0	60	51.140	270	45	90	50.119	25.059	1.58
7.5	60	44.245	270	45	90	89.125	44.563	2.82
8.0	60	31.983	270	45	90	158.489	79.245	5.01

Remark: \* Depth of right bottom corner of fault had negative values which were forced to be zero.

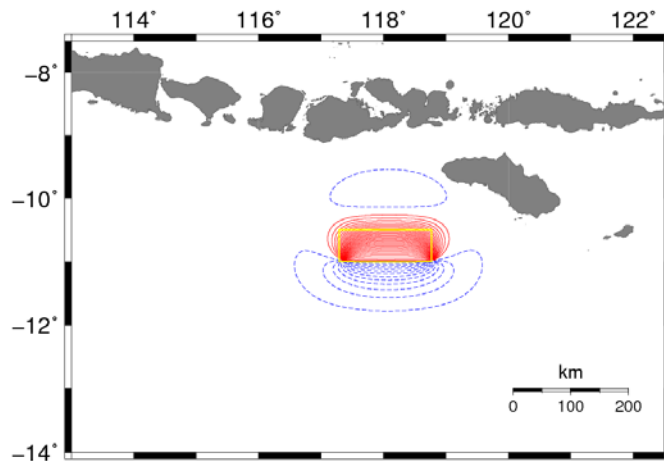


Figure 1. Deformation area of source point C with magnitude 8.0, depth of 0 km. The red contours show uplift area with contour interval of 0.1 m, blue contours show subsidence area with contour interval of 0.05 m, and yellow rectangle is the fault projection to surface.

## 2. Source Points, Coastal Points and Forecast Points

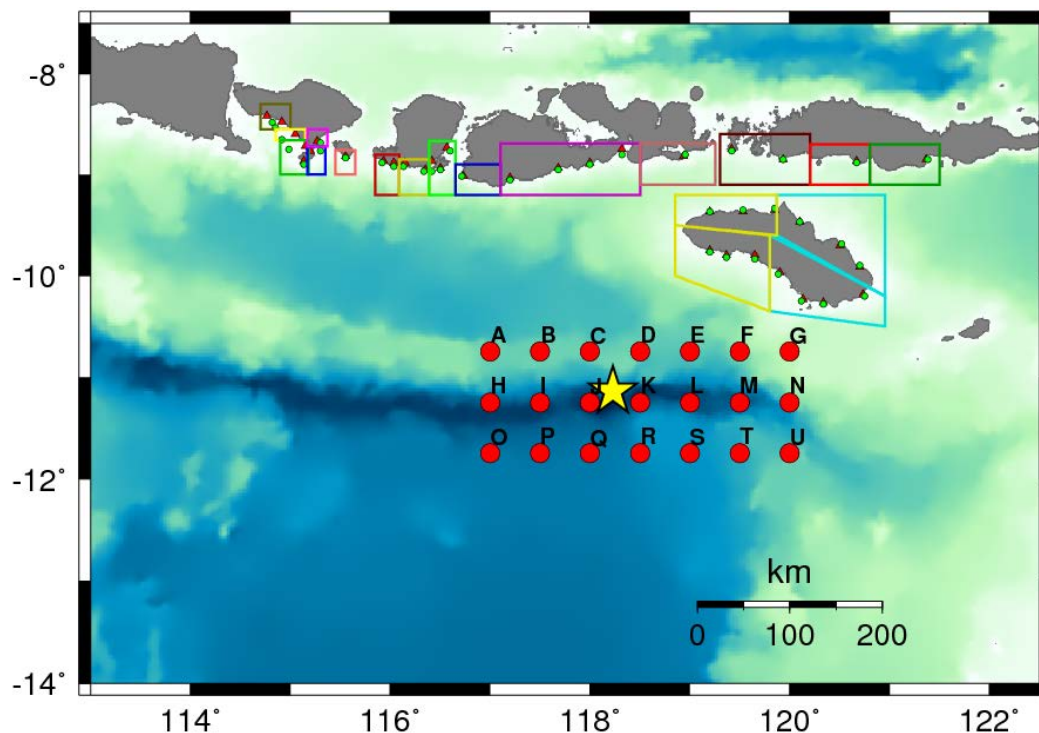


Figure 2. Yellow star denotes real case of the 1977 Sumbawa earthquake (Mw 8.3). Red circles denote 21 source points, rectangles denote 19 coastal blocks, red triangles denote coastal points and green circles denote forecast points.

Table 2. Location of the 21 source points.

<b>Source Point</b>	<b>Longitude (°E)</b>	<b>Latitude (°S)</b>
A	117.00	10.75
B	117.50	10.75
C	118.00	10.75
D	118.50	10.75
E	119.00	10.75
F	119.50	10.75
G	120.00	10.75
H	117.00	11.25
I	117.50	11.25
J	118.00	11.25
K	118.50	11.25
L	119.00	11.25
M	119.50	11.25
N	120.00	11.25
O	117.00	11.75
P	117.50	11.75
Q	118.00	11.75
R	118.50	11.75
S	119.00	11.75
T	119.50	11.75
U	120.00	11.75

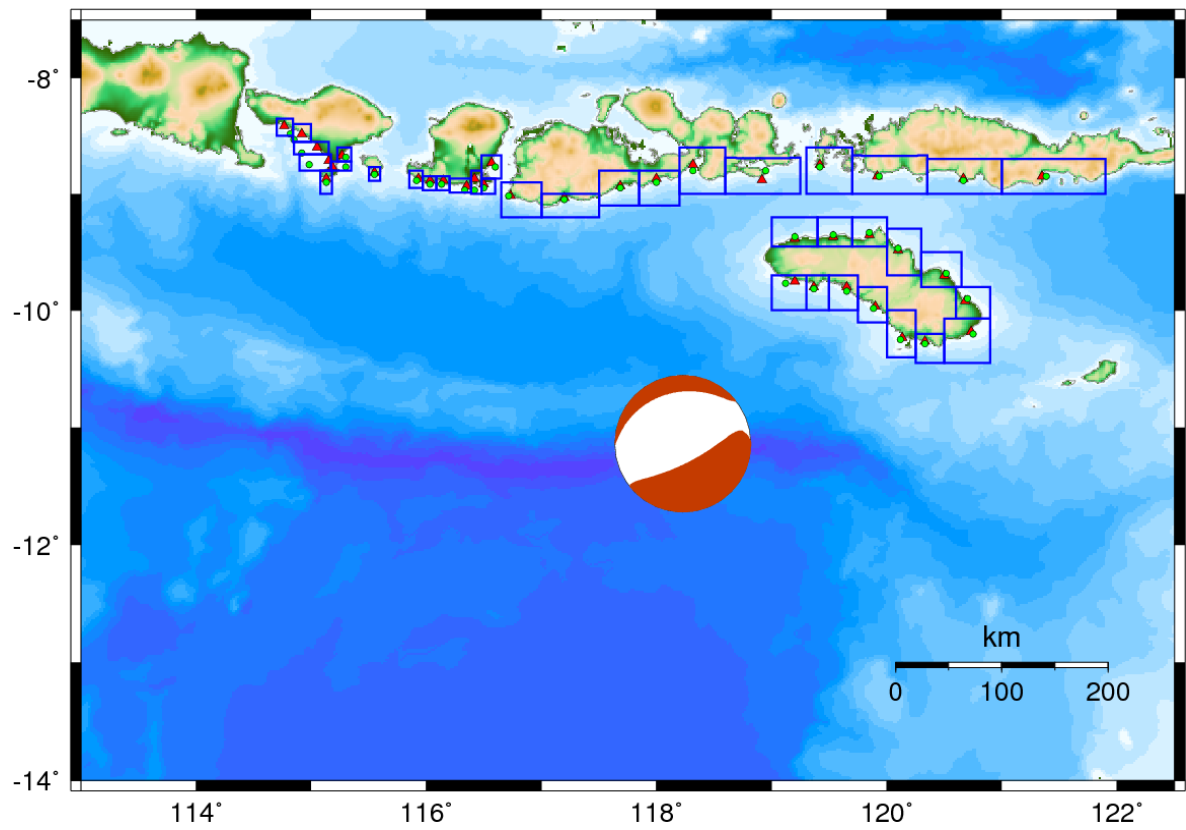


Figure 3. The location and focal mechanism of the 1977 Sumbawa earthquake (Mw 8.3) from the Global (Harvard) CMT catalog. The mechanism indicates normal fault. Rectangles denote small coastal blocks.

Table 3-1. Location of coastal points and forecast points using finer mesh.

Coastal Point (Location Name)	Coastal Point Symbol	Coastal Points			Forecast Points		
		Long (°E)	Lat (°S)	Depth (m)	Long (°E)	Lat (°S)	Depth (m)
Airsatang	CP1	114.778	8.417	1	114.778	8.439	47.8
Antasari	CP2	114.928	8.483	1	114.861	8.528	49.8
Klatinguning	CP3	115.050	8.583	1	114.928	8.656	46.3
Kuta	CP4	115.161	8.722	1	114.989	8.750	48.2
Pecatu	CP5	115.144	8.856	1	115.144	8.889	52
Benoa	CP6	115.183	8.750	1	115.300	8.750	47.5
Sanur	CP7	115.261	8.672	1	115.311	8.672	49
Nusa Penida	CP8	115.578	8.822	1	115.578	8.833	49.7
Pelangang	CP9	115.933	8.850	1	115.933	8.867	49.5
Blongas	CP10	116.033	8.878	12.5	116.033	8.922	53.5
Mangkung	CP11	116.156	8.878	1	116.144	8.906	42.7
Bumbang	CP12	116.356	8.922	3.8	116.350	8.967	58.9
Awang	CP13	116.422	8.850	1	116.422	8.950	51
Sunut	CP14	116.494	8.922	1	116.494	8.950	43.1
Rambang	CP15	116.561	8.733	2.6	116.594	8.767	48.7
Sejorong	CP16	116.733	9.011	1	116.733	9.028	40
Garantah	CP17	117.200	9.028	46.9	117.200	9.033	81.9
Plampang	CP18	117.683	8.933	21.9	117.667	8.950	37.8
Boalloka	CP19	118.000	8.878	13.5	117.994	8.906	52.1
Doromata	CP20	118.311	8.733	1	118.311	8.794	49.6
Gerampi	CP21	118.939	8.806	22.6	118.950	8.806	45.3

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Coastal Point (Location Name)	Coastal Point Symbol	Coastal Points			Forecast Points		
		Long (°E)	Lat (°S)	Depth (m)	Long (°E)	Lat (°S)	Depth (m)
Komodo	CP22	119.411	8.728	1	119.411	8.744	46.4
Tanahdamar	CP23	119.928	8.850	1	119.933	8.850	43.4
Watu-ngbong	CP24	120.661	8.861	1	120.661	8.872	35.3
Larantuka	CP25	121.356	8.856	1	121.367	8.856	66.6
Ubuoleta	CP26	119.200	9.750	1	119.200	9.761	51.3
Waturarere	CP27	119.361	9.772	1	119.361	9.806	51.1
Praigaga	CP28	119.644	9.800	8.5	119.644	9.817	53.3
Tandulujangga	CP29	119.906	9.950	1	119.889	9.972	60.6
Lalindi	CP30	120.133	10.217	1	120.122	10.239	45.2
Manukangga	CP31	120.328	10.256	1	120.328	10.278	55.8
Lakadale	CP32	120.728	10.183	3.9	120.744	10.200	47.8
Lakahembi	CP33	120.517	9.706	5.9	120.517	9.667	57.1
Yawang	CP34	120.689	9.911	11.4	120.700	9.900	48.2
Mondu	CP35	120.094	9.472	50.5	120.094	9.467	72.1
Larawali	CP36	119.844	9.356	26.6	119.844	9.350	58.3
Weetebula	CP37	119.194	9.378	35	119.194	9.372	93
Manukalada	CP38	119.528	9.378	31.8	119.528	9.372	67.8

Table 3-2. Location of coastal points and forecast points using coarse mesh.

Coastal Point (Location Name)	Coastal Point Symbol	Coastal Block (Prefecture)	Coastal Points			Forecast Points		
			Long (°E)	Lat (°S)	Depth (m)	Long (°E)	Lat (°S)	Depth (m)
Airsatang	CP1	Jembrana	114.767	8.417	1	114.817	8.483	45.4
Antasari	CP2		114.917	8.483	1	114.850	8.533	56
Klatinguning	CP3	Tabanan	115.050	8.600	1	114.917	8.650	42.6
Kuta	CP4	Badung	115.150	8.717	1	114.983	8.750	45
Pecatu	CP5		115.133	8.867	1	115.133	8.900	64.1
Benoa	CP6	Denpasar	115.183	8.767	1	115.300	8.767	57.7
Sanur	CP7	Gianyar	115.267	8.667	5.9	115.300	8.683	42.8
Nusa Penida	CP8	Klungkung	115.550	8.817	1	115.550	8.833	62.8
Pelangang	CP9	Lombok Barat	115.933	8.867	17.6	115.917	8.883	90.8
Blongas	CP10		116.033	8.883	11.2	116.033	8.917	29.5
Mangkung	CP11	Lombok Tengah	116.150	8.883	1	116.133	8.917	67.6
Bumbang	CP12		116.350	8.933	4.6	116.333	8.967	69.9
Awang	CP13	Lombok Timur	116.417	8.867	1.2	116.417	8.967	80.9
Sunut	CP14		116.500	8.917	1	116.500	8.950	39.3
Rambang	CP15		116.567	8.733	9.5	116.600	8.767	53.6
Sejorong	CP16	Sumbawa Barat	116.733	9.017	1	116.717	9.017	32.6
Garantah	CP17	Sumbawa	117.200	9.033	61.7	117.200	9.050	176.7
Plampang	CP18		117.683	8.933	10.6	117.683	8.950	49.1
Boalloka	CP19		118.000	8.867	1	118.000	8.900	48.1
Doromata	CP20		118.317	8.750	36	118.317	8.800	52
Gerampi	CP21	Bima	118.917	8.880	8.1	118.950	8.800	53.7
Komodo	CP22	Manggarai Barat	119.417	8.750	1	119.417	8.767	70.1
Tanahdamar	CP23		119.917	8.850	1	119.933	8.850	80.5
Watu-ngbong	CP24	Manggari	120.667	8.867	1	120.667	8.883	105.2
Larantuka	CP25	Ngada	121.350	8.850	7.2	121.383	8.850	308.9

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Coastal Point (Location Name)	Coastal Point Symbol	Coastal Block (Prefecture)	Coastal Points			Forecast Points		
			Long (°E)	Lat (°S)	Depth (m)	Long (°E)	Lat (°S)	Depth (m)
Ubuoleta	CP26	Sumba Barat 1	119.200	9.750	1	119.120	9.767	57.2
Watukarere	CP27		119.367	9.800	9.3	119.367	9.817	72.3
Praigaga	CP28		119.650	9.800	1	119.650	9.833	75.2
Tandulujangga	CP29	Sumba Timur 1	119.900	9.967	1	119.883	9.983	85
Lalindi	CP30		120.133	10.233	1	120.117	10.250	53
Manukangga	CP31		120.333	10.267	6.8	120.333	10.283	60.4
Lakadale	CP32		120.733	10.183	12.9	120.750	10.200	52.6
Lakahembi	CP33	Sumba Timur 2	120.500	9.700	13.1	120.517	9.683	45.2
Yawang	CP34		120.683	9.917	11.4	120.700	9.900	70.8
Mondu	CP35		120.100	9.483	49.2	120.100	9.467	138.6
Larawali	CP36	Sumba Barat 2	119.850	9.350	55.9	119.850	9.333	136.3
Weetebula	CP37		119.200	9.383	68.9	119.200	9.367	270.3
Manukalada	CP38		119.533	9.367	122.7	119.533	9.350	221.8



### 3. Results (Tsunami Height)

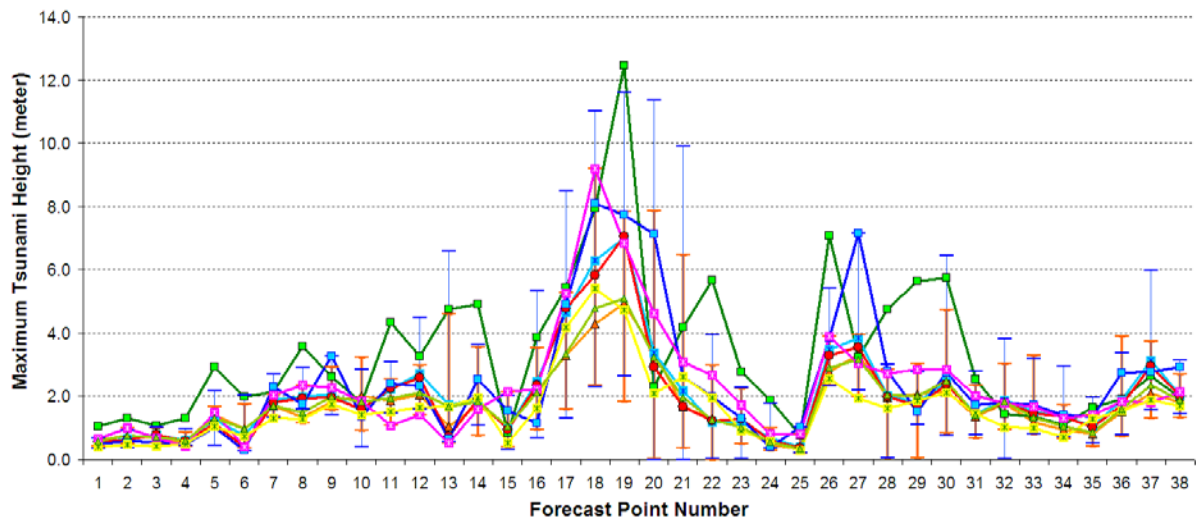


Figure 4. Comparison of tsunami heights by using finer mesh and coarse mesh.

Remark of the graphic:

- Tsunami heights using coarse mesh (1850 m) with Green's law
- \* Tsunami heights at forecast points using coarse mesh (1850 m)
- ⊠ Tsunami heights at coastal points using coarse mesh (1850 m)
- ▲ Mean at the coast using coarse mesh (1850 m)
- ▲ Median at the coast using coarse mesh (1850 m)
- I The range of minimum and maximum tsunami heights at the coast using coarse mesh (1850 m)
- Tsunami heights at coastal points using finer mesh (616.67 m)
- ⊠ Mean at the coast using finer mesh (616.67 m)
- Median at the coast using finer mesh (616.67 m)
- I The range of minimum and maximum tsunami heights at the coast using finer mesh (616.67 m)

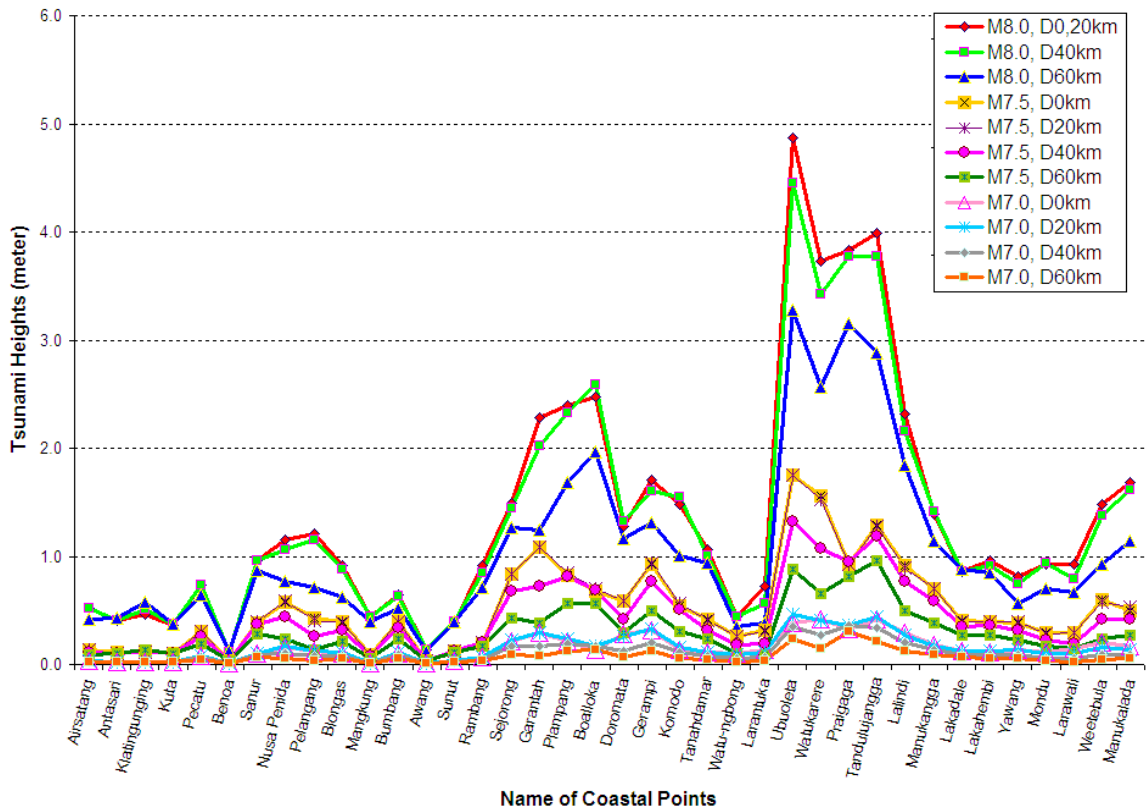


Figure 5. Tsunami heights at coastal points according to different magnitudes and depths.

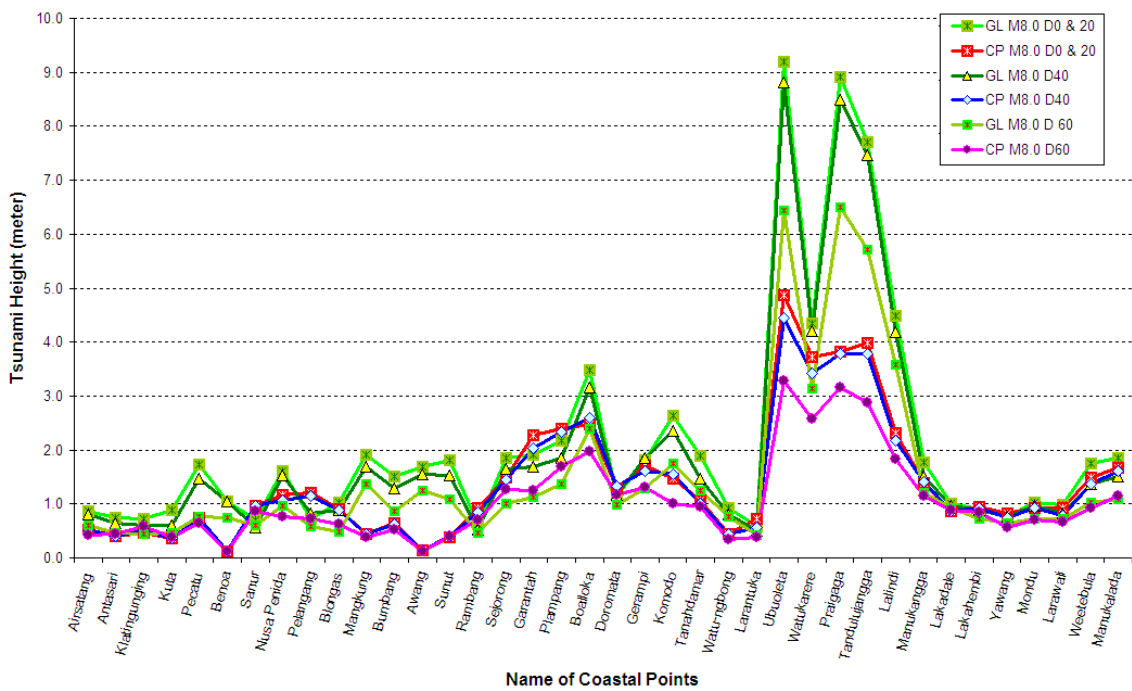


Figure 6. Tsunami heights of Green's law calculation at coastal points.

#### 4. Conditions for Computation

Table 4. Region for computation and data used for simulation.

Area	113.0° E-122.5° E / 7.5° S- 14.0 °S
Bathymetry data	1 arc-minute GEBCO
$\Delta t$	3.0s