TSUNAMI SIMULATION AND HAZARD ASSESSMENT ALONG THE COASTS OF FIJI

By Unaisi Rabetabeta RAWAIKALA (Tsunami Course, 2009)

Mineral Resources Department, Suva, Fiji

1. Fault Parameters of Tsunami Sources

Table 1. Fault Parameters of the eleven tsunami sources from the Tonga Trench.

Model Magnitude, Mw 8 & Mw 8.5 Scenario Earthquake Sources												
Scenario Earthquake	**Mw**	**Depth (km)**	**Dip (δ)º**	**Rake (λ)º**	**Strike (Ø)º**	**L (km)**	**W (km)**	**Slip-u (m)**	**Max Uplift (m)**	**Max Subsidence (m)**	**Lat (ºN)**	**Long (ºE)**
A1	8	0	45	90	210	162.2	70.79	2.14	1.23	-0.59	-23	185.4
B1	8	0	45	90	205	162.2	70.79	2.14	1.23	-0.59	-21	186.4
C1	8	0	45	90	200	162.2	70.79	2.14	1.23	-0.59	-19	187.14
D1	8	0	45	90	190	162.2	70.79	2.14	1.23	-0.59	-17	187.66
E1	8	0	45	90	160	162.2	70.79	2.14	1.23	-0.59	-15	187.36
F1	8	0	45	90	113	162.2	70.79	2.14	1.23	-0.59	-14.28	185.37
A2	8.5	0	45	90	210	305.49	101.16	4.47	2.55	-1.25	-23	185.4
B2	8.5	0	45	90	205	305.49	101.16	4.47	2.56	-1.25	-21	186.4
C2	8.5	0	45	90	200	305.49	101.16	4.47	2.56	-1.25	-19	187.14
D2	8.5	0	45	90	193	305.49	101.16	4.47	2.56	-1.25	-16.5	187.9
E2	8.5	0	45	90	113	305.49	101.16	4.47	2.56	-1.25	-14.28	185.37

Table 2. Fault Parameters of the five tsunami sources from the New Hebrides Trench.

Scenario Earthquake	**Mw**	**Depth (km)**	**Dip (δ)º**	**Rake (λ)º**	**Strike (Ø)º**	**L (km)**	**W (km)**	**Slip-u (m)**	**Max Uplift (m)**	**Max Subsidence (m)**	**Lat (ºN)**	**Long (ºW)**
VA1	8	0	45	90	302	162.2	70.79	2.14	1.23	-0.59	-23	171
VA2	8	0	45	90	323	162.2	70.79	2.14	1.23	-0.59	-22	169.5
VA3	8	0	45	90	329	162.2	70.79	2.14	1.23	-0.59	-20.5	168.52
VA4	8	0	45	90	347	162.2	70.79	2.14	1.23	-0.59	-19	167.74
VA5	8	0	45	90	344	162.2	70.79	2.14	1.23	-0.59	-17.25	167.51

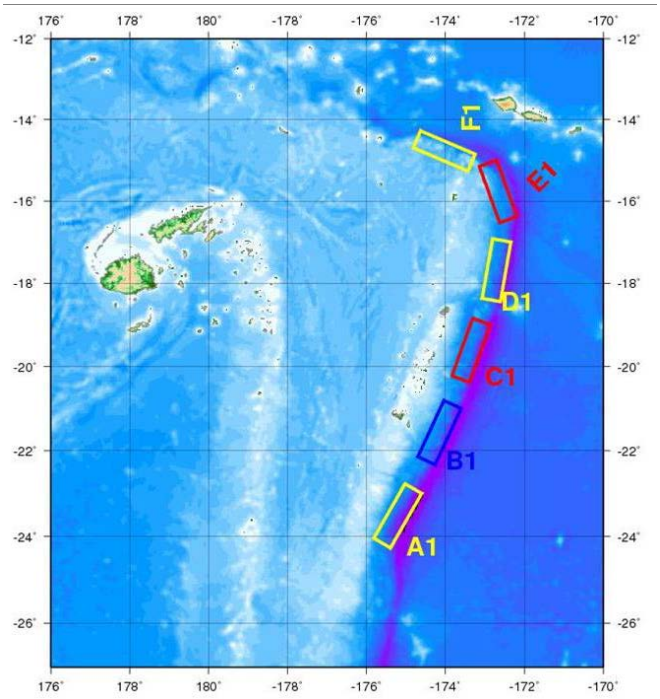

Figure 1. Fault areas of the six earthquake sources of model magnitude 8 along the Tonga Trench.

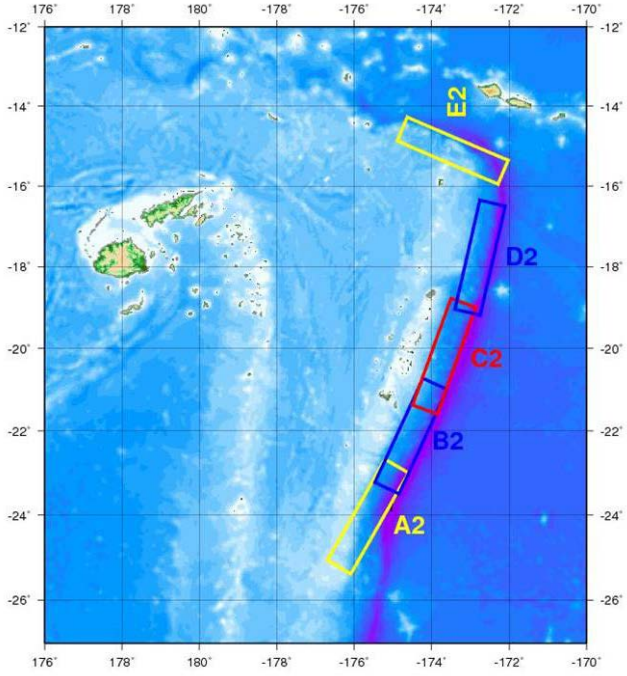

Figure 2. Fault areas of the five earthquake sources of model magnitude 8.5 along the Tonga Trench.

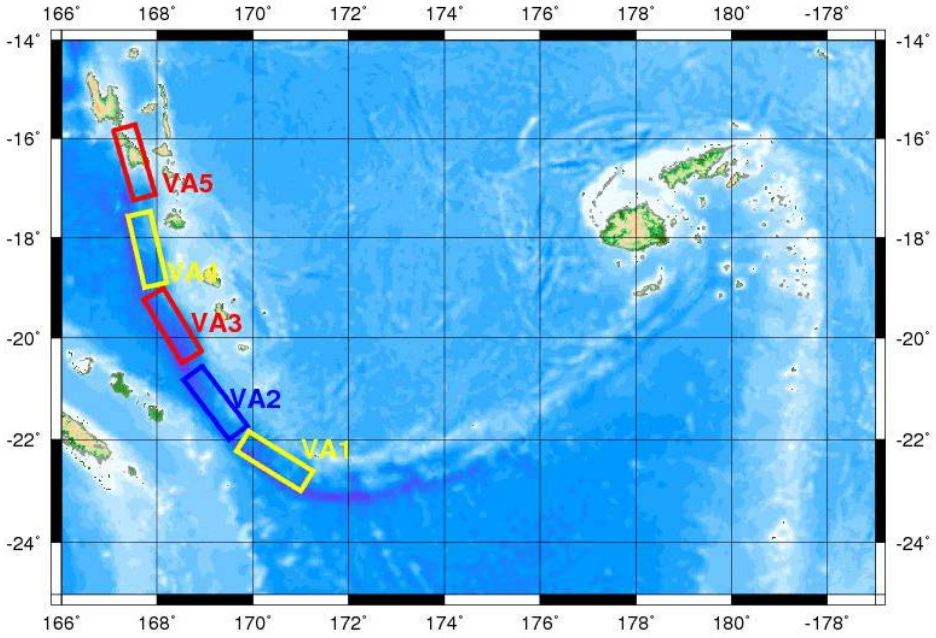

Figure 3. Fault area of the five earthquake sources of model magnitude 8 along the New Hebrides Trench.

2. Tide Gauge Stations

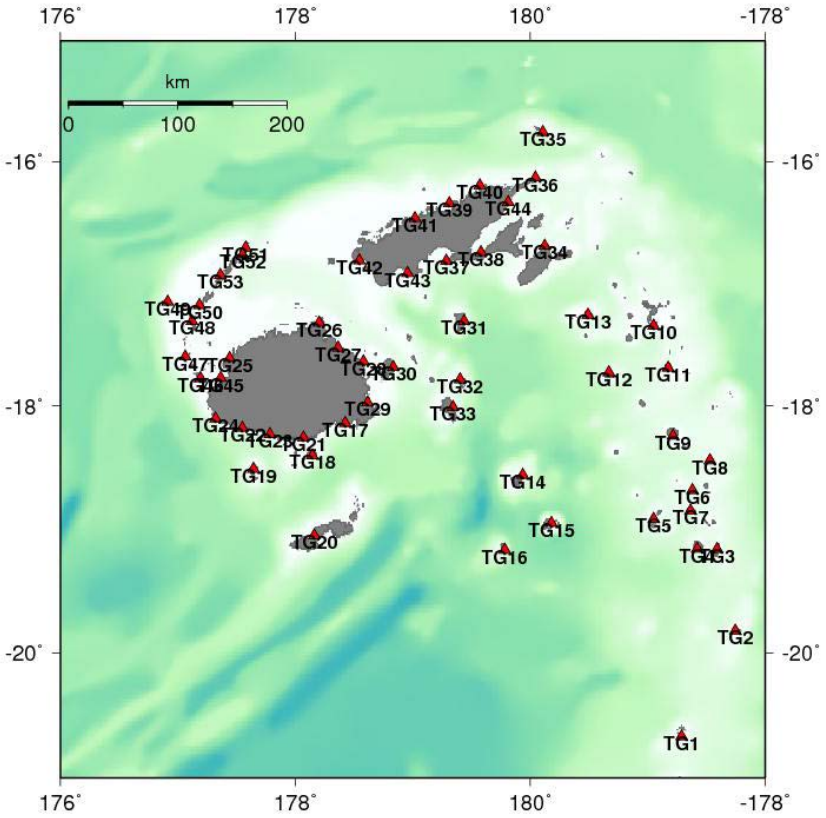

Figure 4. Map of the assumed tide gauge locations along the coastlines of Fiji.

Table 3. Assumed Tide Gauge Locations along the coastlines of Fiji.

Station Number	Station Name	Depth (m)	Latitude (º)	Longitude (º)
TG1	Onoilau	1.0	-20.6697	181.2904
TG2	Vatoa	36.5	-19.8213	181.7479
TG3	Ogea	1.3	-19.1610	181.5896
TG4	Fulaga	2.0	-19.1581	181.4238
TG5	Kabara	31.3	-18.9173	181.0501
TG6	Moce	54.7	-18.6839	181.3804
TG7	Namuka i Lau	1.0	-18.8517	181.3648
TG8	Waiqori (Oneata)	37.8	-18.4409	181.532
TG9	Waciwaci (Lakeba)	1.0	-18.241	181.216
TG10	Susui-VanuaBalavu	1.0	-17.343	181.05
TG11	Tuvuca	1.0	-17.687	181.176

TG12	Cicia	1.0	-17.725	180.671
TG13	Yacata	2.6	-17.257	180.492
TG14	Nairoi (Moala)	1.0	-18.560	179.936
TG15	Totoya	16.2	-18.951	180.180
TG16	Qalikarua(Matuku)	93.2	-19.168	179.784
TG17	Suva	8.9	-18.137	178.425
TG18	Beqa	1.0	-18.403	178.146
TG19	Vatulele	1.0	-18.512	177.644
TG20	Vunisea (Kadavu)	21.0	-19.049	178.162
TG21	Pacific Harbour	7.2	-18.256	178.069
TG22	Korotogo	66.9	-18.179	177.549
TG23	Namatakula	35.2	-18.229	177.783
TG24	Natadola	13.1	-18.103	177.321
TG25	Lautoka	3.7	-17.608	177.440
TG26	Wananavu Resort	5.4	-17.319	178.205
TG27	Namara	24.5	-17.523	178.366
TG28	Qoma	8.3	-17.637	178.582
TG29	Bau	5.0	-17.972	178.615
TG30	Levuka	27.9	-17.681	178.834
TG31	Nasau (Koro)	72.7	-17.308	179.440
TG32	Korobasaga(Nairai)	28.1	-17.783	179.404
TG33	Lamiti (Gau)	41.9	-18.009	179.343
TG34	Matei (Taveuni)	1.0	-16.690	180.124
TG35	Cikobia	61.5	-15.756	180.11
TG36	Udu Point	17.5	-16.131	180.046
TG37	Costeau Resort	36.1	-16.813	179.287
TG38	Cicia(NatewaBay)	1.0	-16.742	179.581
TG39	Vorovoro	4.0	-16.341	179.311
TG40	Tacilau	3.7	-16.193	179.572
TG41	Nukubati	5.8	-16.464	179.021
TG42	Navanievu	1.1	-16.809	178.545
TG43	Cora Wainunu	13.4	-16.914	178.957
TG44	Naboutini	20.8	-16.331	179.812
TG45	Sheraton Denarau	6.6	-17.772	177.365
TG46	Malolo Lailai	1.0	-17.774	177.195
TG47	Yanuya Island	14.2	-17.598	177.065

TG48	Yalobi	5.7	-17.307	177.120
TG49	Viwa	55.4	-17.149	176.913
TG50	Mantaray1	11.5	-17.175	177.183
TG51	Yasawa I Rara	1.0	-16.707	177.579
TG52	Bukama	1.0	-16.760	177.554
TG53	Tavewa	10.8	-16.929	177.361

3. Results (Tsunami Height)

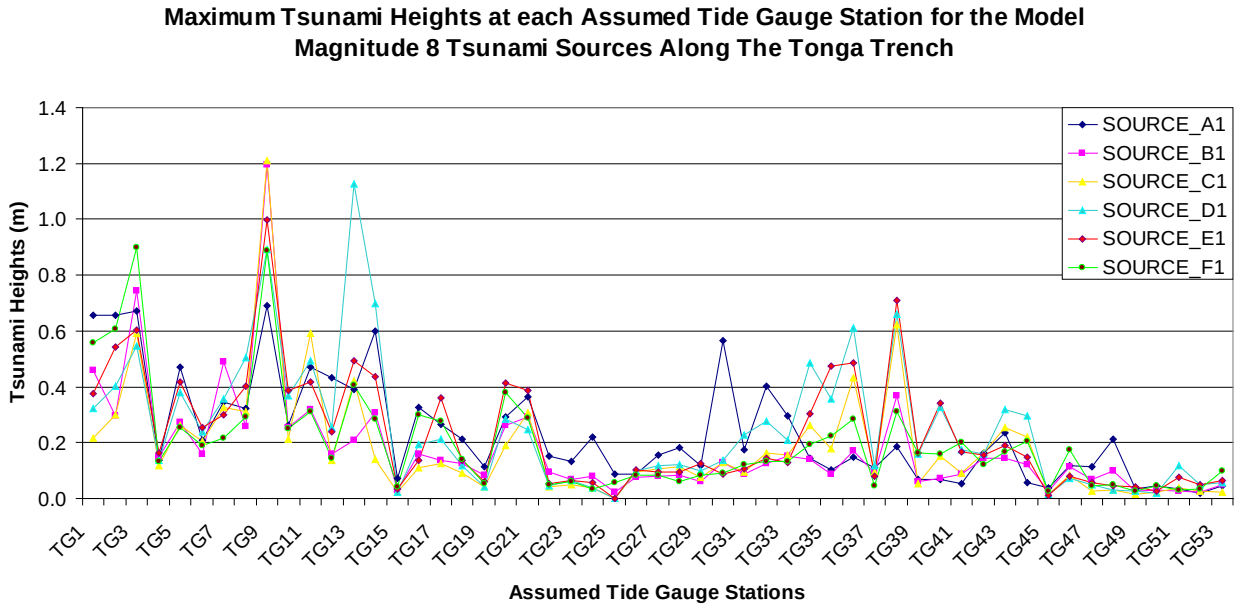

Figure 5. Maximum Tsunami Heights for the 53 assumed tide gauge stations.
for the model Mw 8.0 sources along the Tonga Trench.

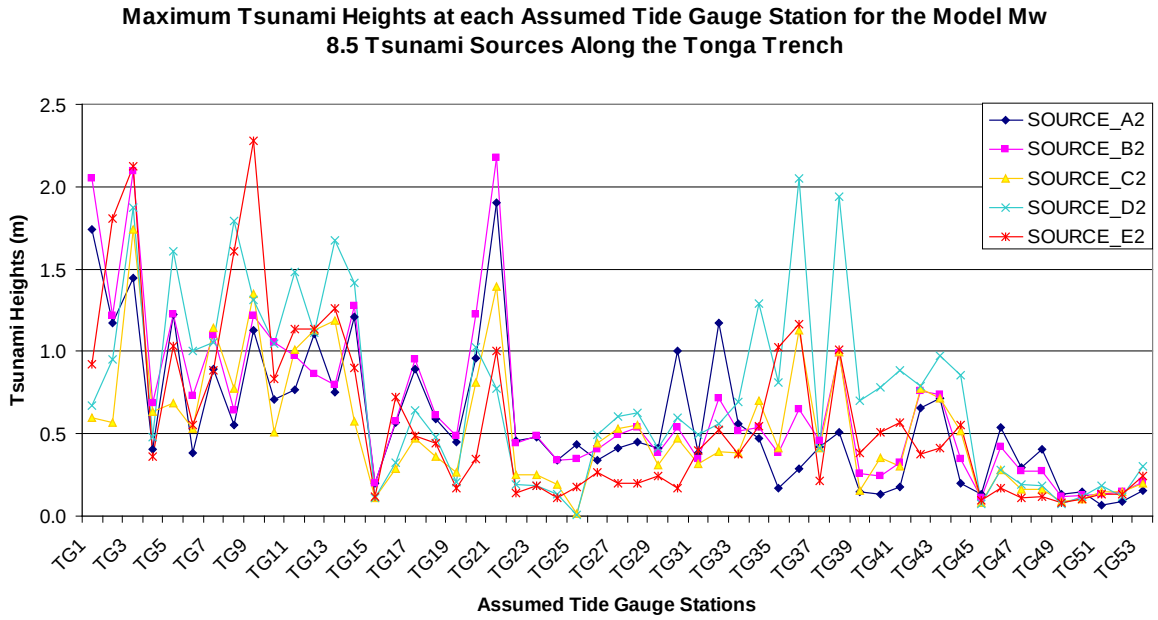

Figure 6. Maximum Tsunami Heights at each of the 53 assumed tide gauge stations for the source model Mw 8.5 along the Tonga Trench.

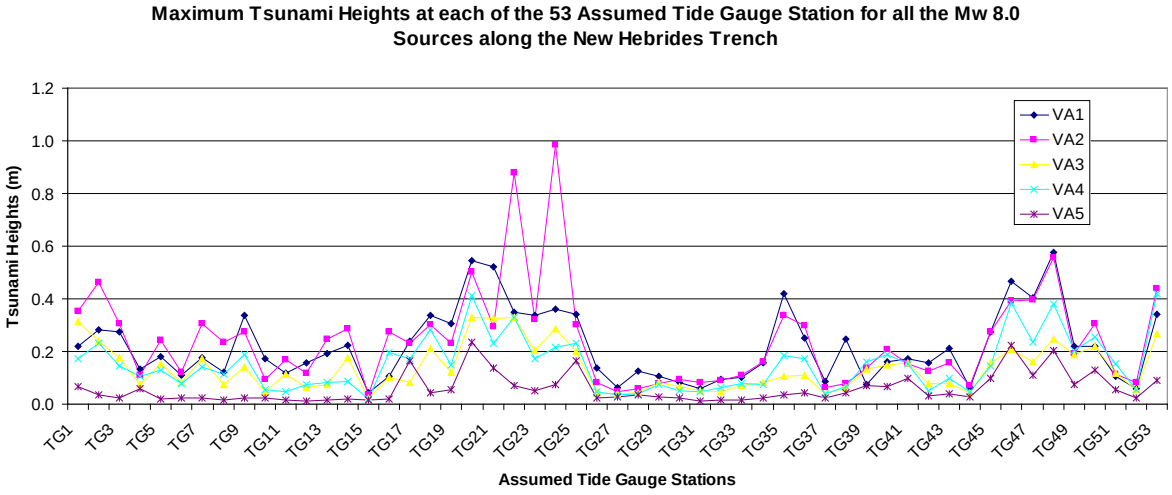

Figure 7. Maximum Tsunami Heights for the 53 assumed tide gauge stations for the source model of magnitude 8.0 along the New Hebrides Trench.

4. Conditions for Computation

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

Area	176º E-170º W / 27º S- 12 ºS (176 ºW to -170 ºE / -27 ºS to -12 ºS)
Bathymetry data	1 arc-minute GEBCO
Δt	3.0s
Δx	1749.2847 m
Δy	1844.6793 m