TSUNAMI HAZARD ASSESSMENT ALONG THE WEST COAST OF CENTRAL LUZON, PHILIPPINES

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(Tsunami Course, 2014)

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1-1. Fault Parameters of Tsunami Sources (single-segment cases)

Table 1. Manila Trench Segment 3 (MT3) fault parameters adapted from Salcedo (2010).

	Magnitude	Longitude (°E)	Latitude (°N)	Length (km)	Width (km)	Strike (°)	Dip (°)	Rake (°)	Slip (m)	Depth (km)
Historical	7.6	119.06	13.93	97.72	53.21	359	40	98	1.21	0
Maximum	8.3	119.06	13.93	238	87.88	359	40	98	3.42	0

Table 2. Manila Trench Segment 4 (MT4) fault parameters adapted from Salcedo (2010).

	Magnitude	Longitude (°E)	Latitude (°N)	Length (km)	Width (km)	Strike (°)	Dip (°)	Rake (°)	Slip (m)	Depth (km)
Historical	6.6	120.60	12.85	32.00	16.00	310	25	90	1.00	0
Maximum	8.1	120.60	12.85	190	77.40	310	25	90	2.63	0

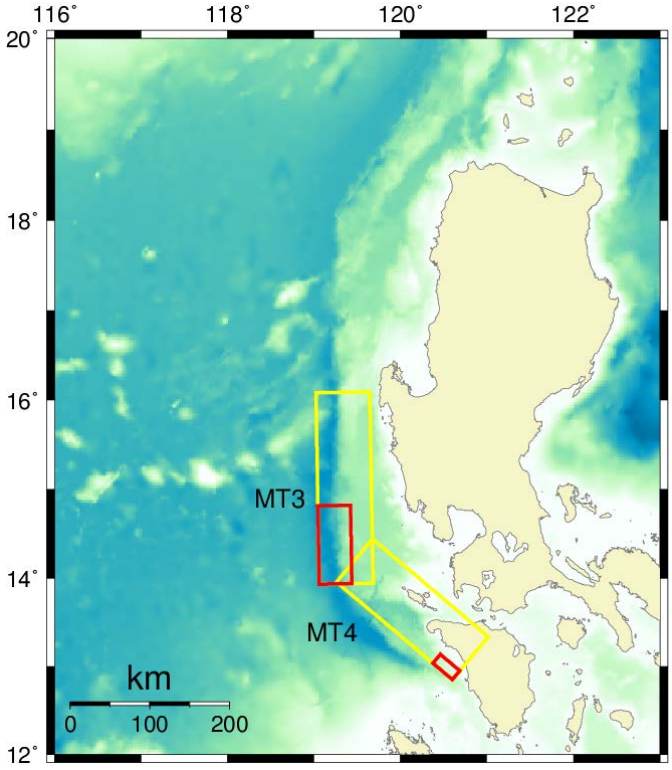

Figure 1. Rectangular fault segments used for the single-segment cases. Historical case (red rectangles) and Maximum Credible case (yellow rectangles) for Manila Trench segments 3 and 4.

1-2.Fault Parameters of Tsunami Sources (multi-segment case)

Table 3. Manila Trench Segments 1-6 fault parameters from Nguyen *et al.* (2014).

	Longitude (°E)	Latitude (°N)	Length (km)	Width (km)	Strike (°)	Dip (°)	Rake (°)	Slip (m)	Depth (km)
E1	120.5	20.2	190.0	120.0	354.0	10	90	25.0	30
E2	119.8	18.7	250.0	160.0	22.0	20.0	90	40.0	30
E3	119.3	17.0	220.0	160.0	2.0	28.0	90	40.0	30
E4	119.2	15.1	170.0	90.0	356.0	20.0	90	28.0	30
E5	119.6	13.7	140.0	110.0	344.0	22.0	90	12.0	30
E6	120.5	12.9	95.0	80.0	331.0	26	90	5.0	30

Table 4. Fault parameters for Manila Trench segments 1-4 maximum credible case (Salcedo, 2010).

	Magnitude	Longitude (°E)	Latitude (°N)	Length (km)	Width (km)	Strike (°)	Dip (°)	Rake (°)	Slip (m)	Depth (km)
MT1	8.4	119.20	17.75	277	91.00	20	41	79	3.72	0
MT2	8.4	119.10	16.06	254	91.16	1	36	95	3.69	0
MT3	8.3	119.06	13.93	238	87.88	359	40	98	3.42	0
MT4	8.1	120.60	12.85	190	77.40	310	25	90	2.63	0

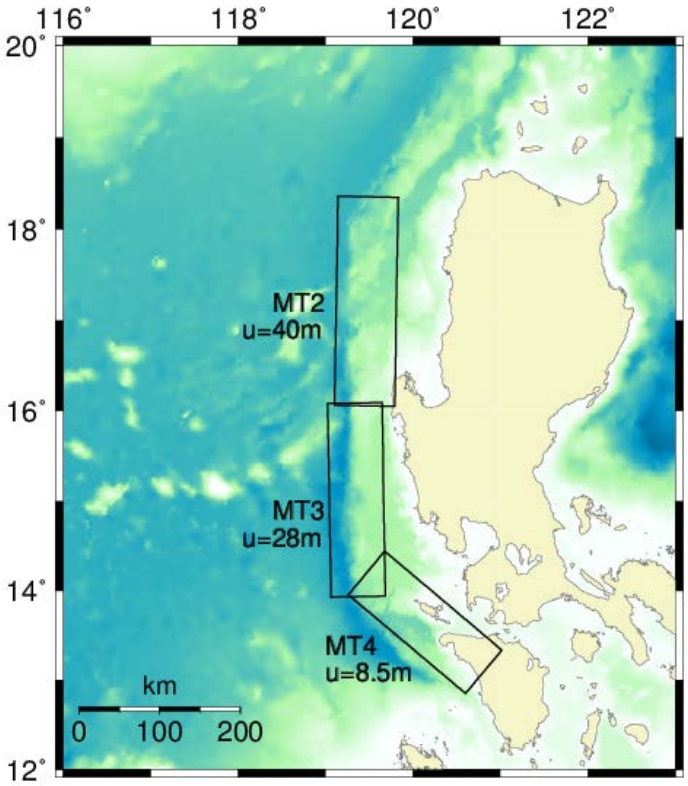

Figure 2. Rectangular fault segments used for the multi-segment case of Manila Trench segments 2, 3 and 4.

Table 5. Fault parameters for Manila Trench Segments 2-4 multi-segment case used in this study.

	Longitude (°E)	Latitude (°N)	Length (km)	Width (km)	Strike (°)	Dip (°)	Rake (°)	Slip (m)	Depth (km)
MT2	119.10	16.06	254	91.16	1	36	95	40	0
MT3	119.06	13.93	238	87.88	359	40	98	28	0
MT4	120.60	12.85	190	77.40	310	25	90	8.5	0

2. Tide Gauge Stations

Table 6. Tide gauge station location and water depth along the west coast of Central Luzon.

CODE	Longitude (°E)	Latitude (°N)	Depth (m) GEBCO 1’	Depth (m) GEBCO 30”
StaCruz	119.89167	15.75833	1.2	1.0
Candelaria	119.90833	15.66667	5.6	4.0
Masinloc	119.94167	15.52500	1.0	1.0
Palauig	119.88333	15.44167	11.2	12.0
Iba	119.95833	15.34167	1.0	2.0
Botolan	120.00000	15.25000	3.5	9.0
Cabangan	120.01667	15.16667	4.6	5.0
San Felipe	120.05000	15.05833	1.0	1.0
San Narciso	120.05000	15.01667	1.0	1.0
San Antonio	120.04167	14.95833	5.7	12.0
Olongapo	120.25833	14.81667	1.0	8.0
NAMRIA*	120.23333	14.75833	4.2	13.0
PHIVOLCS*	120.18333	14.74167	1.0	36.0
Morong	120.23333	14.69167	15.7	16.0
NPP	120.29167	14.62500	11.0	27.0
Bagac	120.36667	14.59167	1.0	15.0
Mariveles	120.50000	14.42500	1.0	16.0
Corregidor*	120.59167	14.37500	1.0	25.0
Balanga	120.57500	14.70000	8.1	4.0
Orion	120.60000	14.61667	8.4	16.0
Limay	120.62500	14.51667	5.5	22.0
Obando	120.91667	14.66667	1.0	1.0
Manila	120.94167	14.59167	4.6	7.0
Rosario	120.82500	14.42500	5.2	7.0

**existing tide gauge stations*

Figure 3. Tide gauge stations along the west coast of Central Luzon, green circle indicates existing stations and red circle are hypothetical tide gauge stations.

Table 7. Tide gauge station location and water depth along Subic Bay coast.

CODE	Longitude (°E)	Latitude (°N)	Depth (m) GEBCO 1’	Depth (m) GEBCO 30”
TG01	120.10833	14.75833	7.4	7.0
PHIVOLCS*	120.18333	14.74167	1.0	36.0
TG02	120.20833	14.80833	1.0	1.0
TG03	120.22500	14.87500	1.0	1.0
TG04	120.25833	14.84167	1.0	6.0
TG05	120.25833	14.81667	1.0	8.0
TG06	120.25833	14.80000	3.5	8.0
NAMRIA*	120.23333	14.75833	4.2	13.0
TG07	120.24167	14.69167	15.7	16.0
TGO8	120.25833	14.67500	3.3	1.0

**existing tide gauge stations*

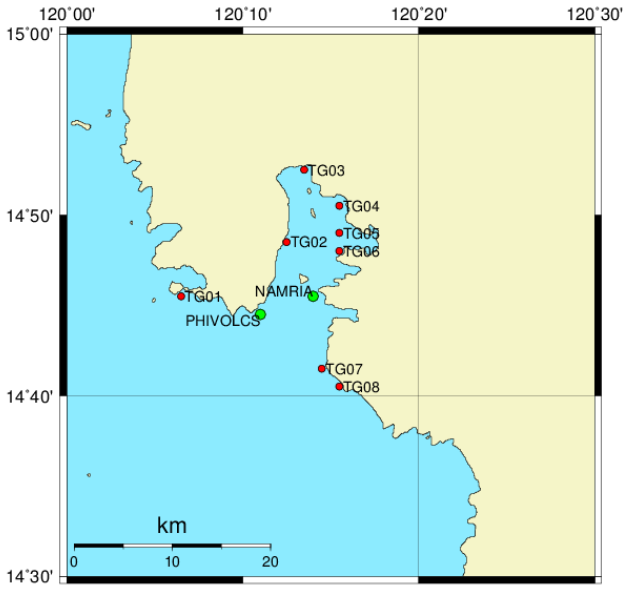

Figure 4. Location of tide gauge stations along Subic Bay coast,
red indicates hypothetical stations and green are existing tide gauge stations.

3. Results (Tsunami Height)

Table 8. Maximum tsunami heights along the west coast of Central Luzon using GEBCO30".

Tide Gauge	Historical		Maximum Credible Case		Multi-segment
	MT3 (m)	MT4 (m)	MT3 (m)	MT4 (m)	Case (m)
StaCruz	0.088	0.008	0.939	0.224	11.458
Candelaria	0.138	0.022	1.634	0.338	13.669
Masinloc	0.036	0.003	0.492	0.077	14.56
Palauig	0.228	0.025	2.273	0.532	18.214
Iba	0.561	0.038	3.823	0.900	29.236
Botolan	0.368	0.024	4.278	0.686	23.994
Cabangan	0.258	0.016	2.660	0.584	19.472
SanFelipe	0.280	0.028	3.001	0.589	24.333
SanNarciso	0.285	0.026	2.988	0.657	23.47
SanAntonio	0.317	0.020	2.308	0.609	16.144
Olongapo	0.462	0.018	1.311	0.699	9.002
NAMRIA*	0.881	0.033	2.962	1.251	24.325
PHIVOLCS*	0.458	0.033	1.833	0.662	13.032
Morong	0.988	0.028	2.289	0.903	19.11
NPP	0.904	0.042	2.820	0.960	15.213
Bagac	0.497	0.025	2.798	1.577	26.002
Mariveles	0.411	0.023	1.979	1.355	14.014
Corregidor*	0.403	0.023	1.213	0.813	8.376
Balanga	0.058	0.004	0.309	0.203	1.367
Orion	0.061	0.004	0.318	0.202	1.674
Limay	0.071	0.005	0.364	0.216	1.976
Obando	0.090	0.005	0.587	0.333	2.425
Manila	0.089	0.004	0.389	0.268	1.777
Rosario	0.174	0.010	0.721	0.475	4.058

**existing tide gauge stations*

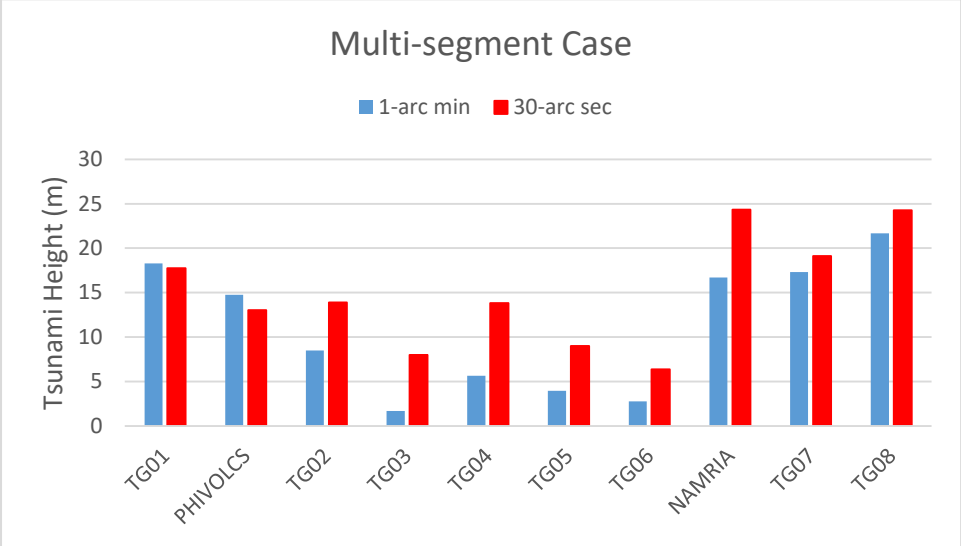

Figure 5. Maximum wave amplitude along Subic Bay coast for multi-segment case.

4. Conditions for Computation

Table 9. Tsunami propagation parameters of the bathymetry data used in the simulation.

	GEBCO 1-arc minute	GEBCO 30-arc seconds
Spatial Grid Size (m)	1774.48571	1774.48571
Grid Dimension (nx x ny)	420x600	420x600
Temporal grid size (sec)	2	2

Table 10. Spatial domain parameters used for tsunami inundation modelling.

Region	Longitude (°E)	Latitude (°N)	Spatial Grid Resolution, Δx	Total Grid Size, nx x ny	Data Source	
					Bathymetry	Topography
1	116.0	12.0	1-arc min	420x600	GEBCO30”	GEBCO30”
2	119.5	14.25	20-arc seconds	225x315	GEBCO30”	GEBCO30”
3A	119.9	15.0	6.66667-arc sec	189x270	GEBCO30”	GEBCO30”
3B	120.0833	14.667	6.66667-arc sec	135x135	GEBCO30”	GEBCO30”
3C	120.25	14.41667	6.66667-arc sec	135x135	GEBCO30”	GEBCO30”
4A	119.91667	15.3	2.22222-arc sec	135x189	GEBCO30”	SRTM 3”
4B	119.96667	15.18333	2.22222-arc sec	189x189	GEBCO30”	SRTM 3”
4C	119.98333	15.08333	2.22222-arc sec	162x162	GEBCO30”	SRTM 3”
4D	119.96667	15.0	2.22222-arc sec	270x81	GEBCO30”	SRTM 3”
4E	120.25	14.7833	2.22222-arc sec	135x162	GEBCO30”	SRTM 3”
4F	120.33333	14.5	2.22222-arc sec	135x216	GEBCO30”	SRTM 3”

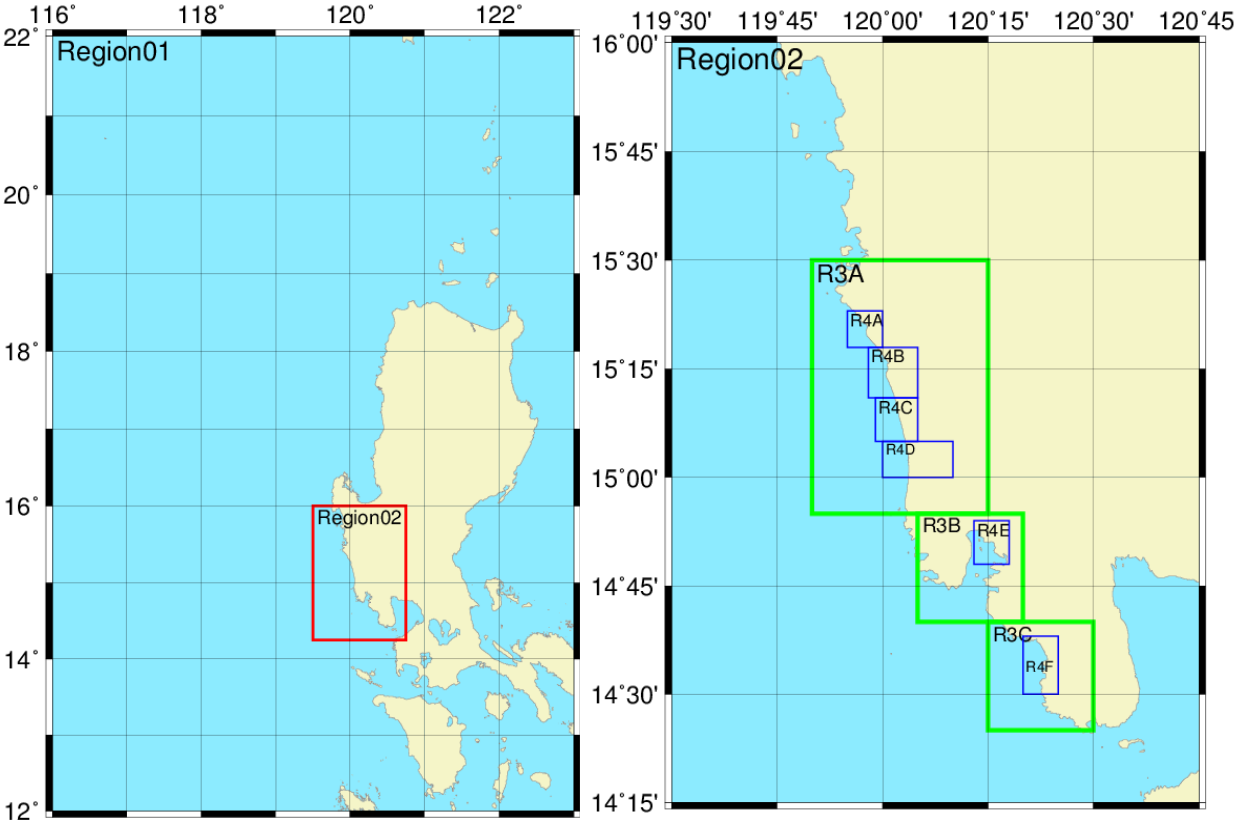

Figure 6. Extent of each region used in the inundation modelling.