



To Commemorate the 10th Year of 2004 Indian Ocean Tsunami

Taichung, Taiwan
18-22 November 2014

SCSTW-7



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INVESTIGATING THE INFLUENCE OF SMALL ISLANDS ON TSUNAMI WAVE PROPAGATION IN THE CASE OF MARCH 2005 TSUNAMI AROUND BANYAK ISLANDS OF INDONESIA BASED ON NUMERICAL SIMULATIONS

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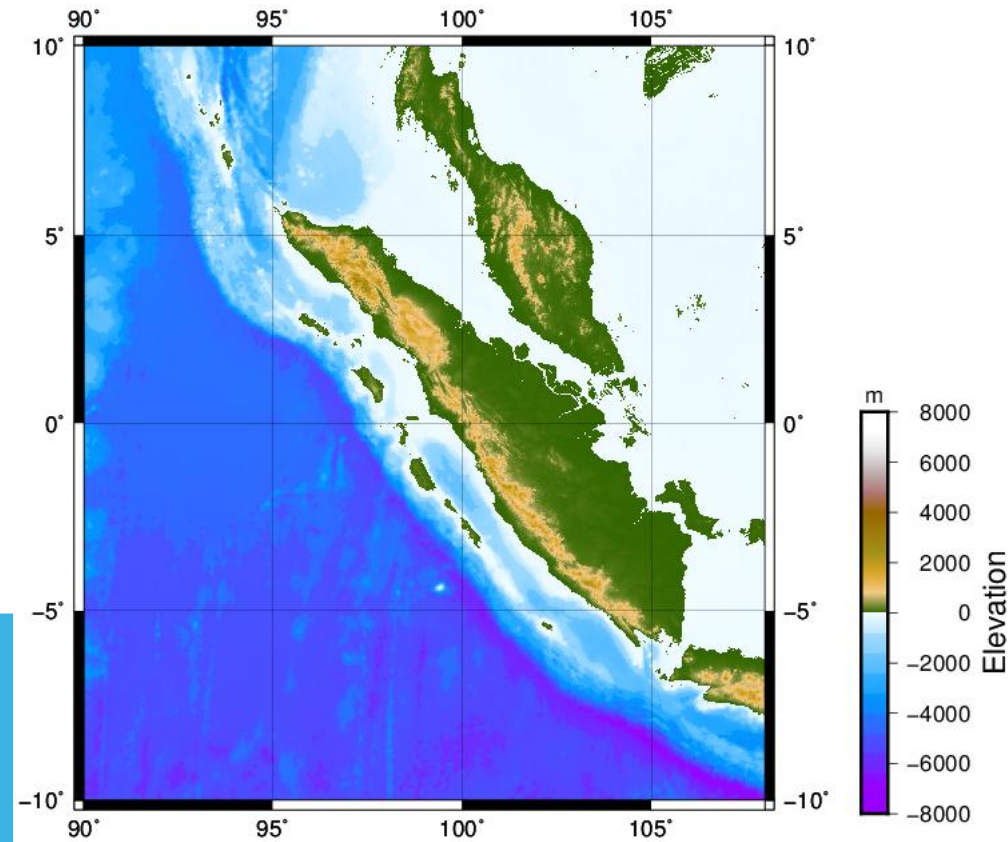
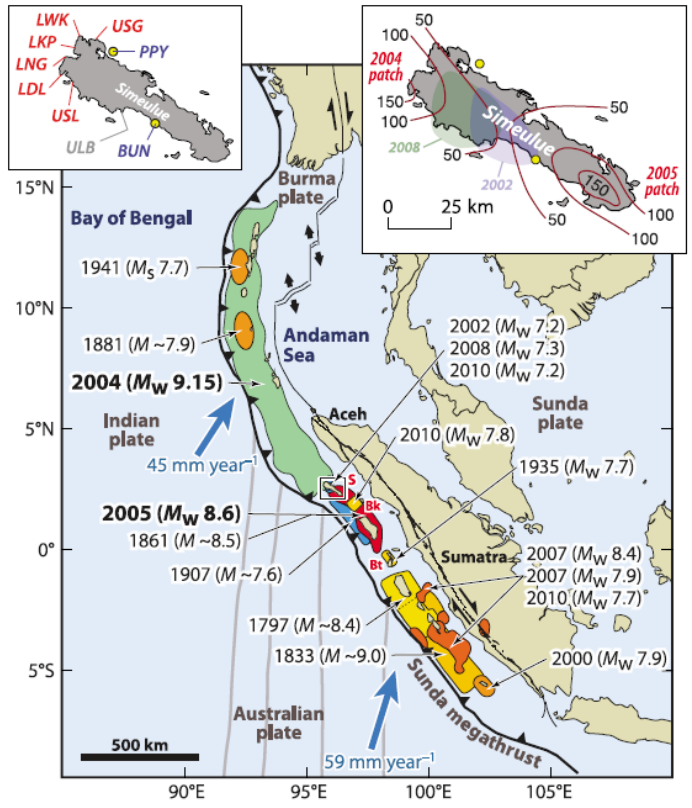
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Background

Occurance big earthquakes and tsunami

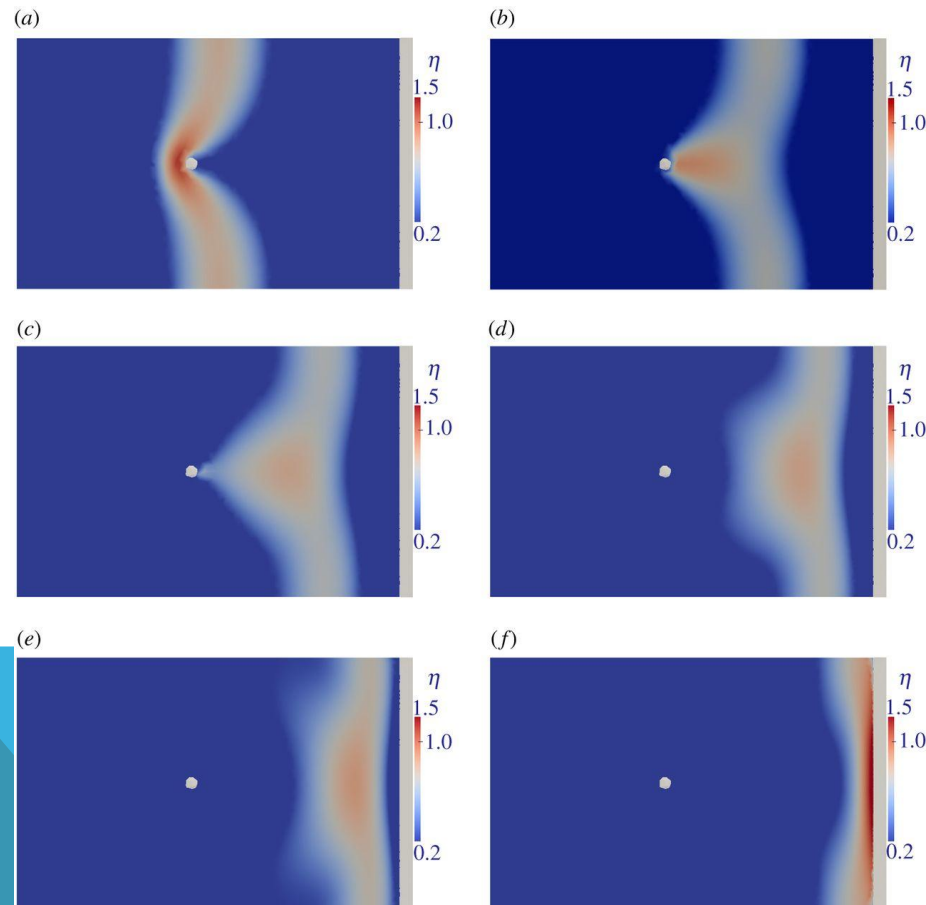
- Indonesia is an archipelagic country which consists of many islands.
- Located in ring of fire where a large numbers of the big earthquake have been occurred.



Source: Meltzner et al. (2012)

Background

- Several studies previously revealed the influence of small islands in tsunami wave propagation towards the lee side area.
- They were conducted by post-tsunami survey data and numerical simulation.
- The studies indicated that tsunami waves were significantly higher at the lee side of the small island (Stefanakis et al. 2014).



Source: Stefanakis et al. 2014

Focus Group Discussion

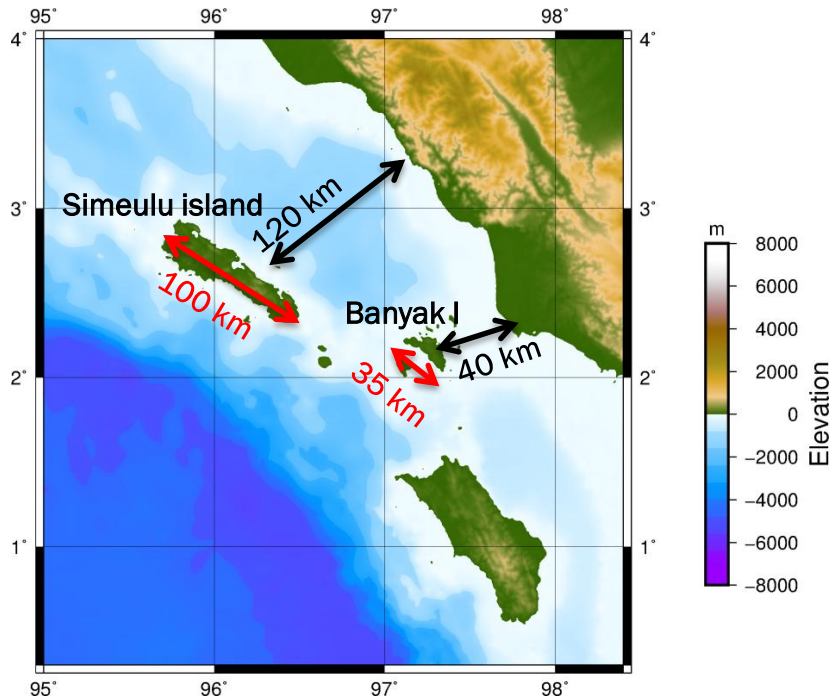
Government Preparedness After One Decade The Indian Ocean Tsunami



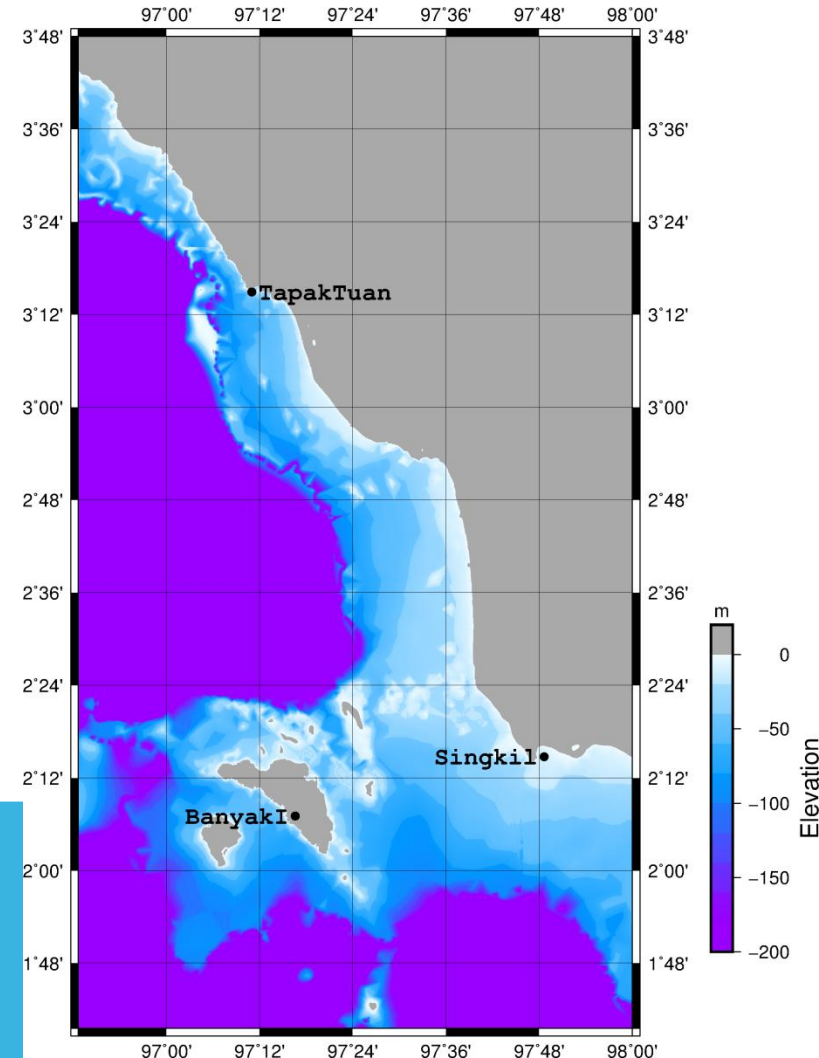
Findings:

- No evacuation route in Tapaktuan
- Event though located in high topography area, local government and community did not have an effort to enhance the tsunami mitigation in their area such as by create the escape hill.
- No education about preparedness toward tsunami disaster in the school and local community.
- This condition was happened

Study Area



- Both of the cities located near the earthquake's epicenter in 2005 but the tsunami impacts on the cities were different.
- Tapaktuan, however, was not significantly destroyed by tsunami waves in March 2005. On the other hand, the tsunami in 2005 gave adverse impacts on Singkil city.
- These contradictory findings lead to different tsunami mitigation facilities in the cities



Research Objectives

This research is aimed to investigate the influence of small islands in tsunami propagation toward the mainland by conducting tsunami numerical simulation

Research Benefit

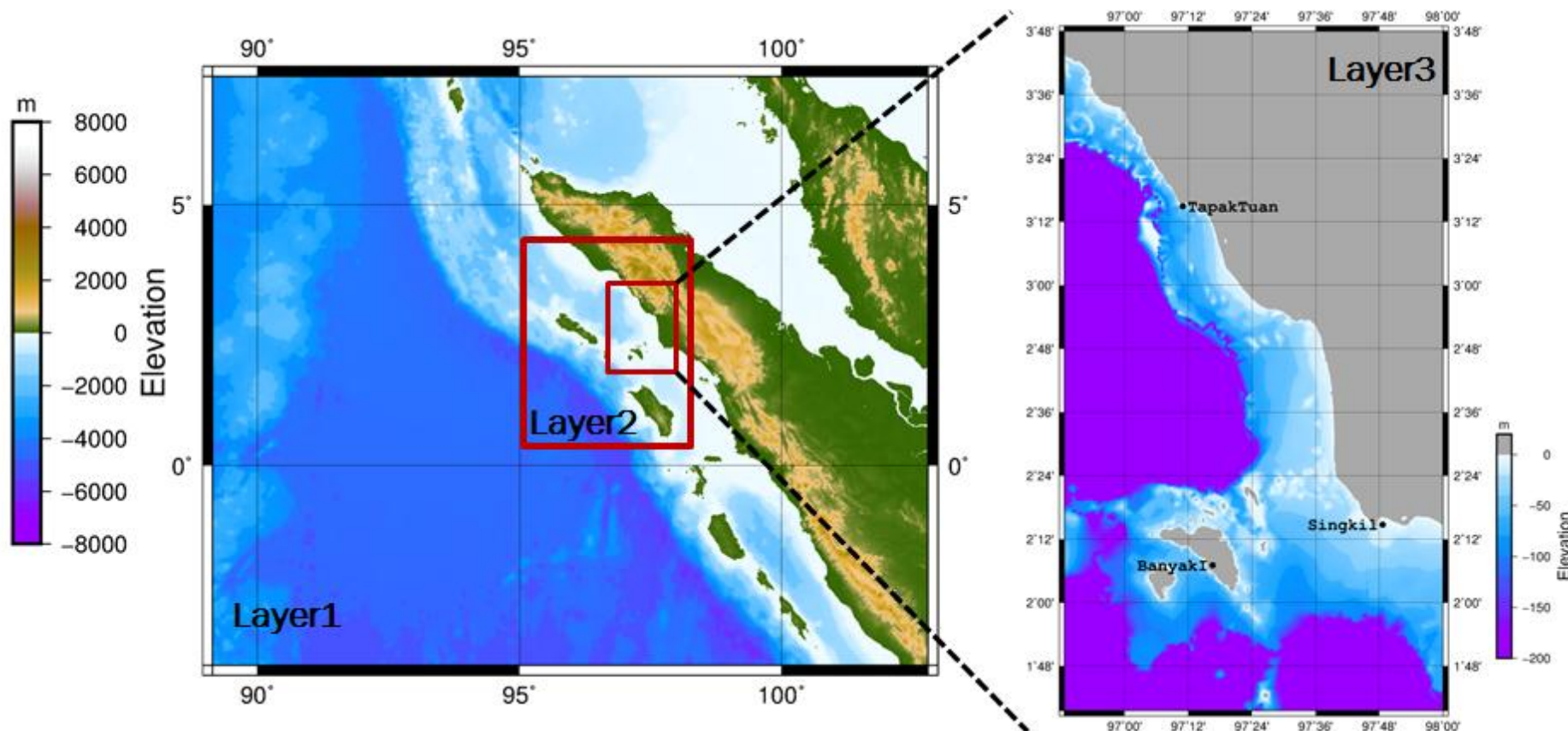
This result can be used as basic information to recommends the government and local community to enhance their preparedness and awareness toward tsunami hazard event though the last tsunami did not cause significantly damage. The local community still should anticipate the tsunami waves which propagated through the small island which can be amplify.



Grid Setup Used in COMCOT Model

TABLE 1. Model Parameters of the Nested Grids Employed in the Numerical Simulations

Layer No	Extend of Grid		Grid Size	Number Of grid	Coordinate System	Type SWE
	Longitude (°)	Latitude (°)				
1	From 89.145 to 102.798	from -3.834 to 7.451	1 min 1851 m	nx=819 ny=677	Spherical	Linear
2	From 94.818 to 98.38133	from 0.329 to 4.559	0.2 min 371 m	nx=1070 ny=1270	Spherical	Linear
3	From 95.005 to 95.524	from 4.721 to 5.21	0.0667 min 123.667 m	nx=1065 ny=1905	Spherical	Nonlinear

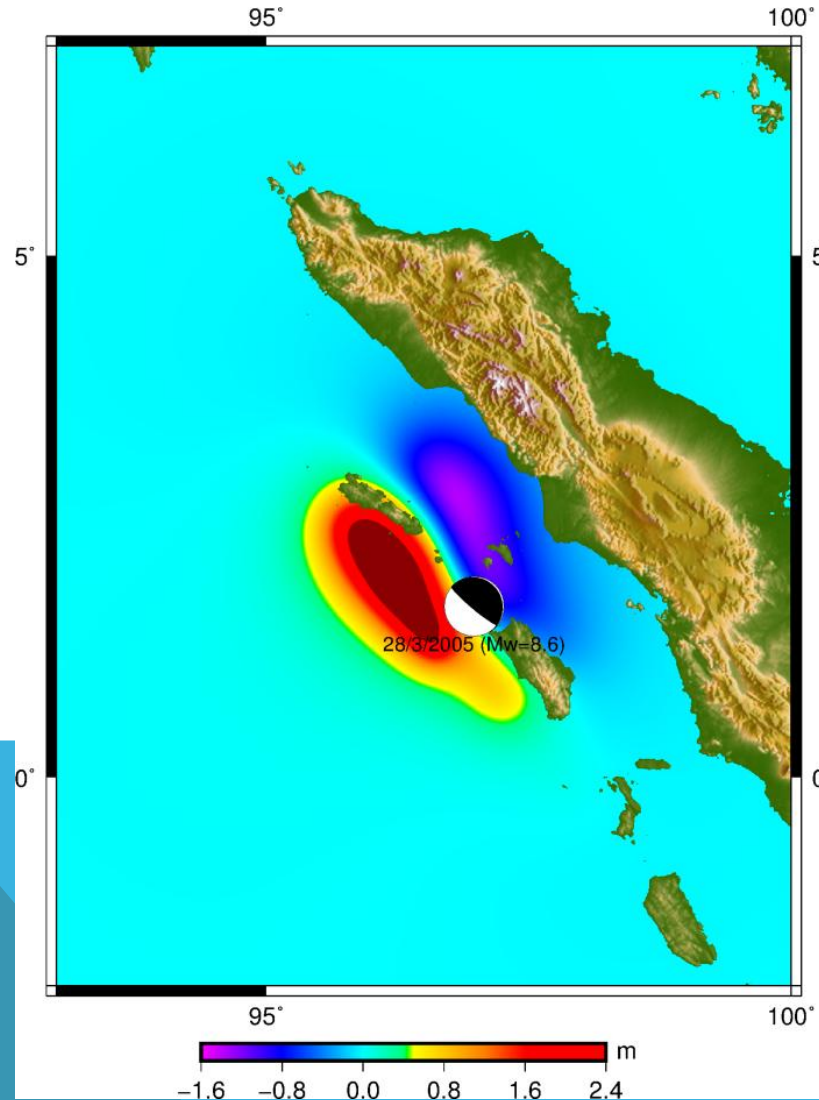


Earthquake Scenarios

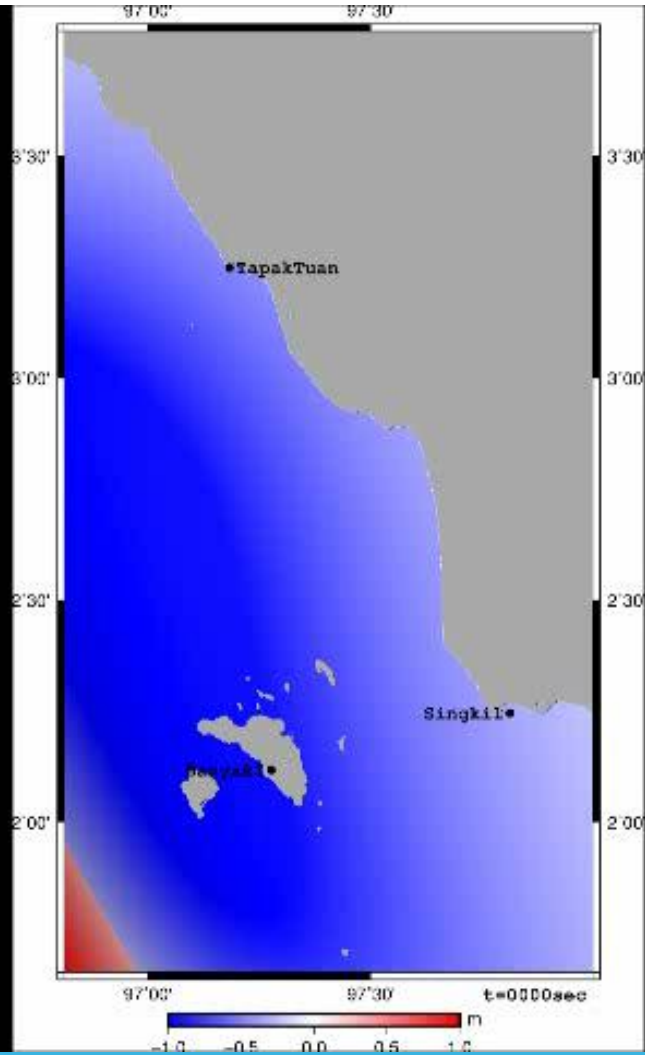
- Past Earthquake

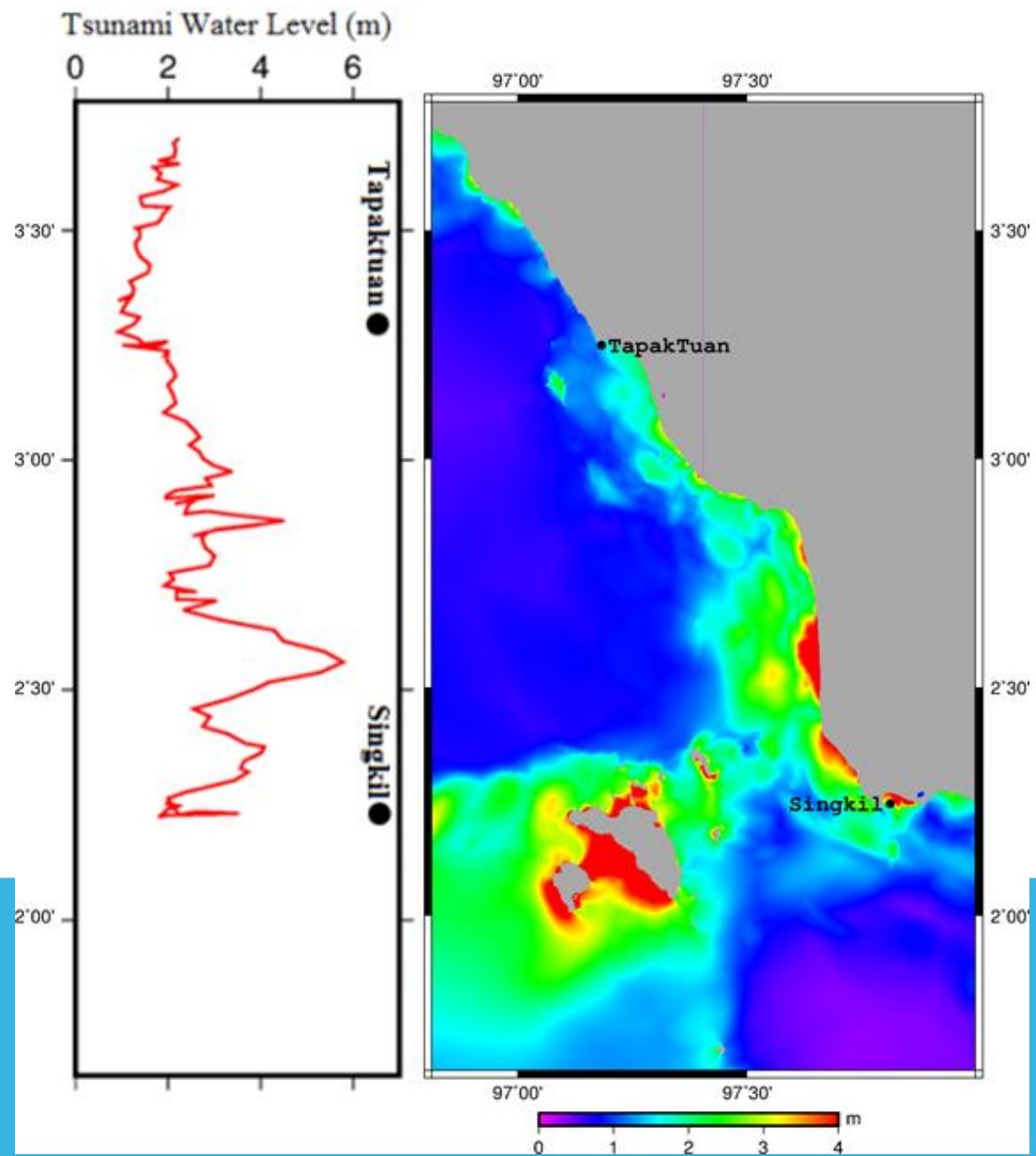
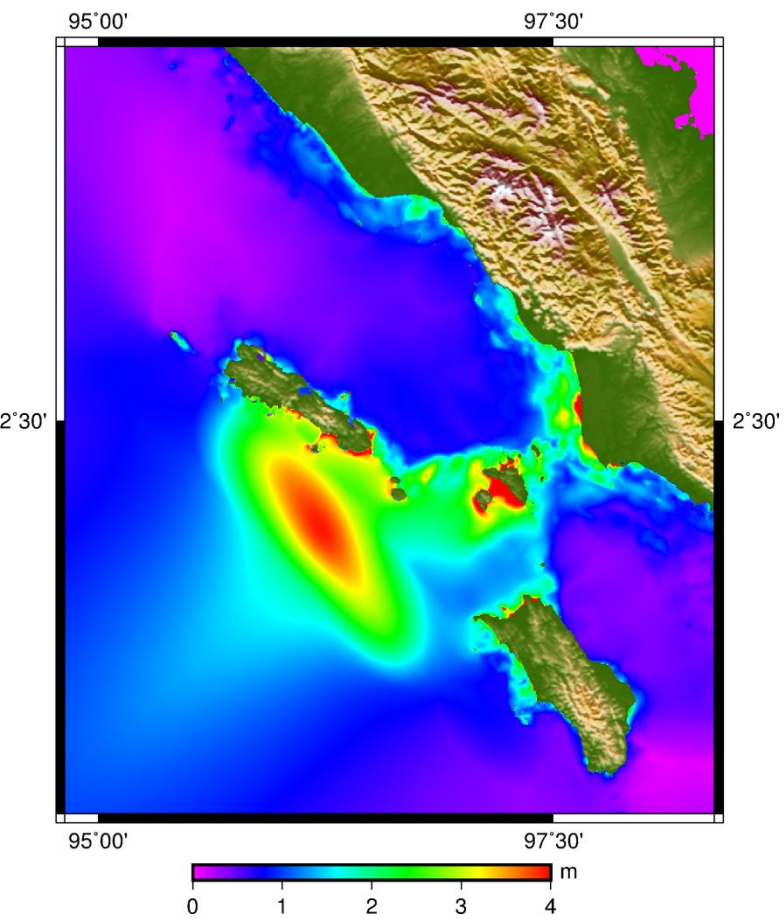
This research was use earthquake scenario which occured on 28 March, 2005

- March 28, 2005 with magnitude $M_w = 8.6$ based on scenario which developed by (Banerjee et al., 2005).



Results





CONCLUSION

- Based on the numerical simulation result by using COMCOT model that indicated the tsunami waves toward Tapaktuan was reduced due to influence of Simeulu Island
- Tsunami wave Amplification was observed around Singkil. This condition was happened because the tsunami waves which separating around the island was merged after through the island.



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“Nun. By the pen and what they inscribe”

THANK YOU VERY MUCH