

Collaborative researches and activities on water-related disasters in ASEAN countries

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**International Research Institute of Disaster Science
Tohoku University**



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About us

Logo

- IRIDeS
- Iris, Iris laevigata or Japanese Iris
- Symbol of hope and nobility

Logo meaning

- Overturning the Japanese character meaning disaster 「災」 = reconstruction and sustainable and resilient societies
- Purple is the color of the Tohoku University
- The Iris is the symbol of “hope” and “dignity”



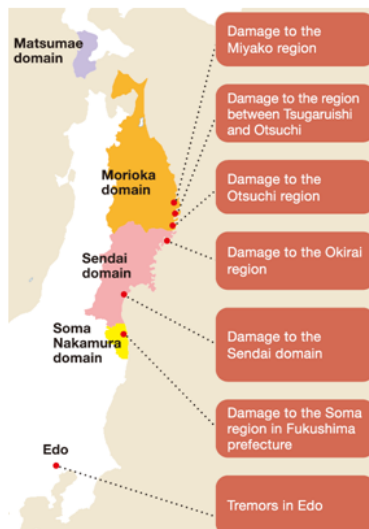
An example of our integrated research on science and literature

Select projects

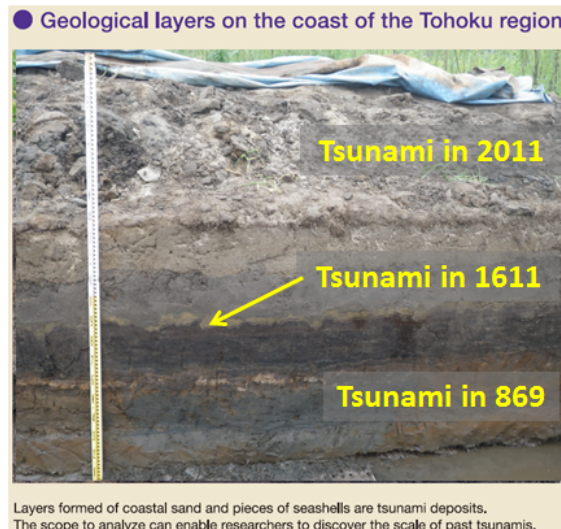
Integrated sciences for investigating historical disaster event

1611 Keicho Oshu Earthquake and tsunami

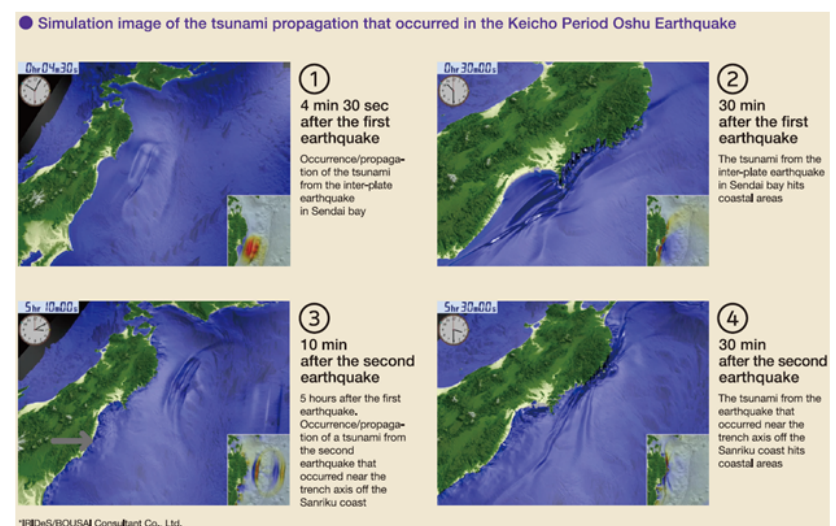
“History”

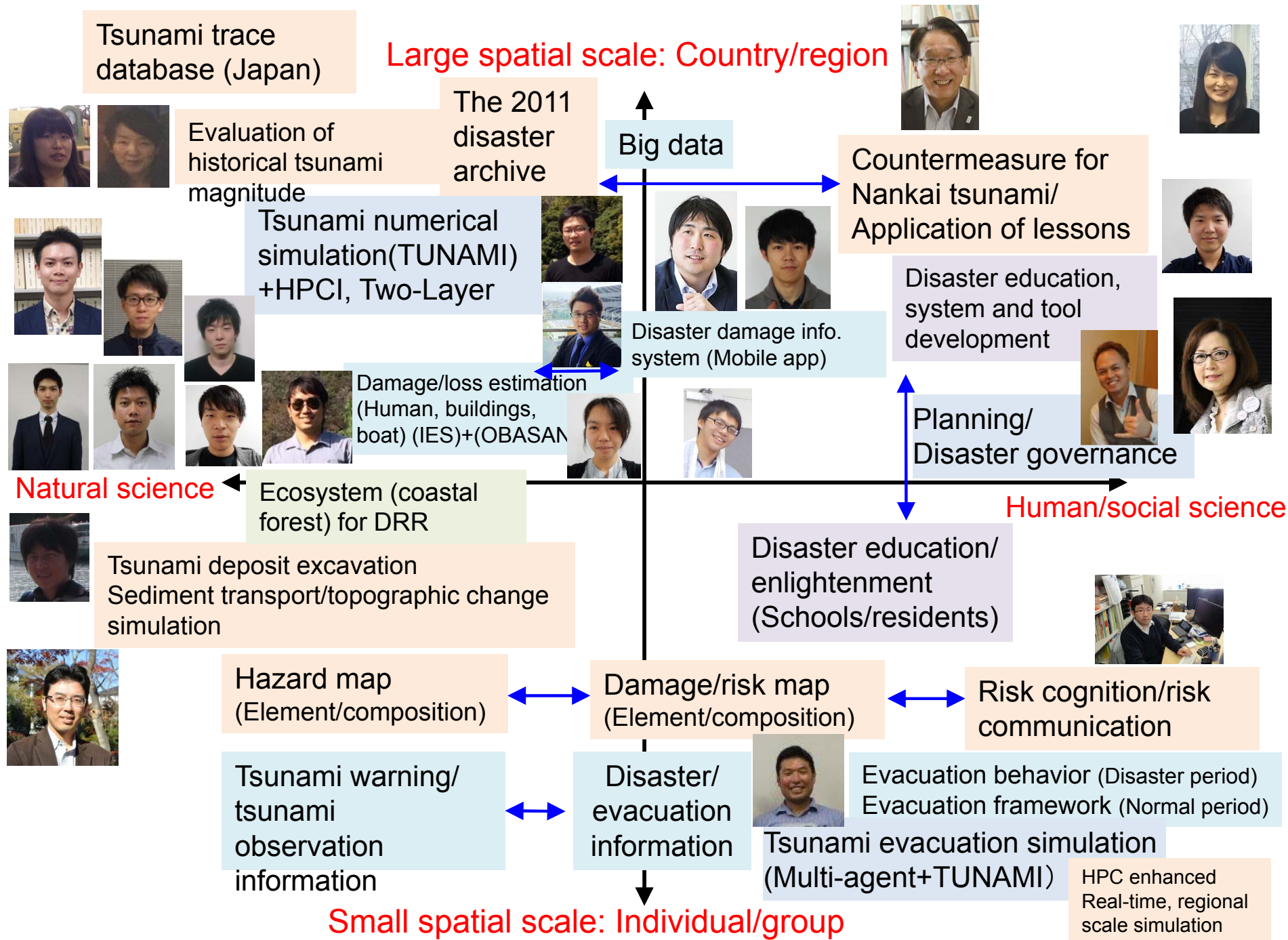


“Science”



“Engineering”





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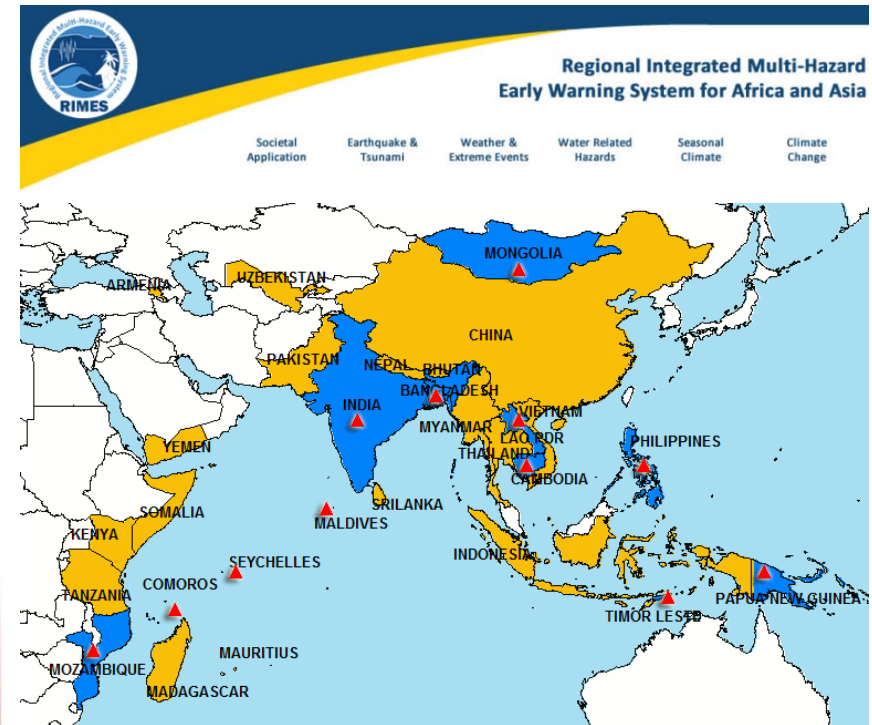
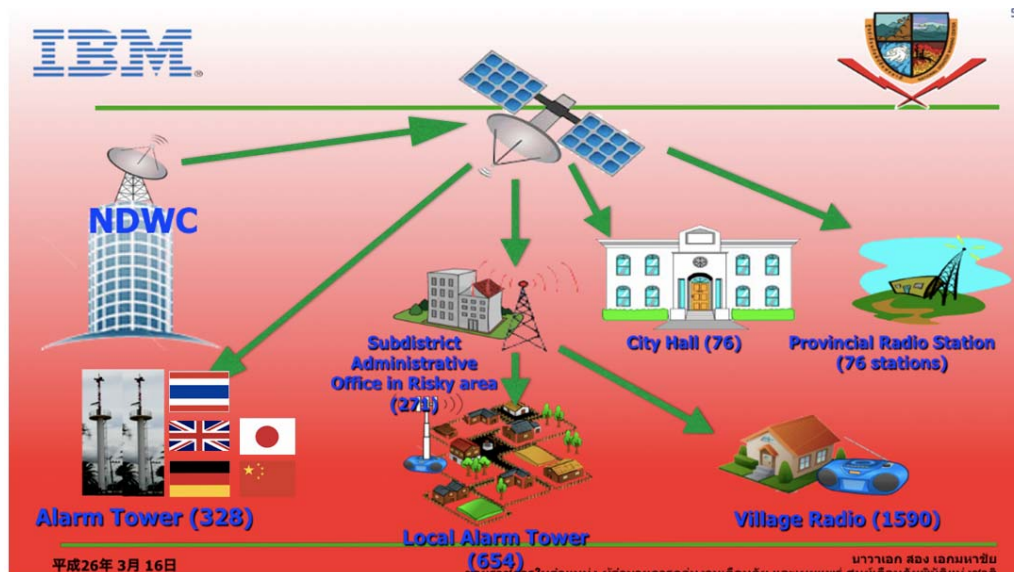
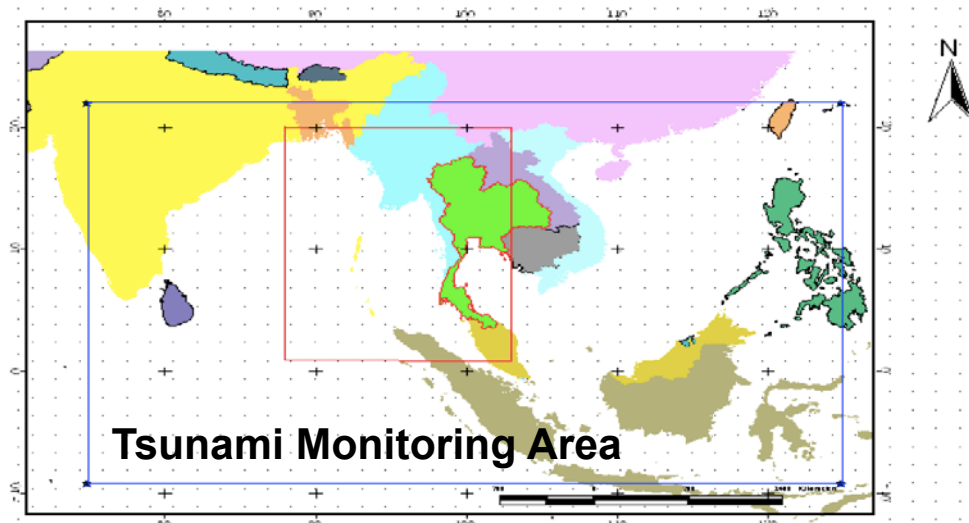
After the 2004 Indian Ocean tsunami

- ✓ Tsunami warning systems
- ✓ Tsunami evacuation and planning
- ✓ Tsunami fragility functions for buildings
- ✓ Tsunami hazards in Indian Ocean and South China Sea

After the 2011 Tohoku tsunami

- ✓ 2012 Jakarta flood
- ✓ 2013 Super typhoon Haiyan and storm surge
- ✓ World Tsunami Awareness Day
- ✓ Disaster reduction class

Tsunami warning systems



Regional Integrated Multi-Hazard Early Warning System for Africa and Asia

National Disaster Warning Center (NDWC), Thailand

Source: Ekmahachai (2013)

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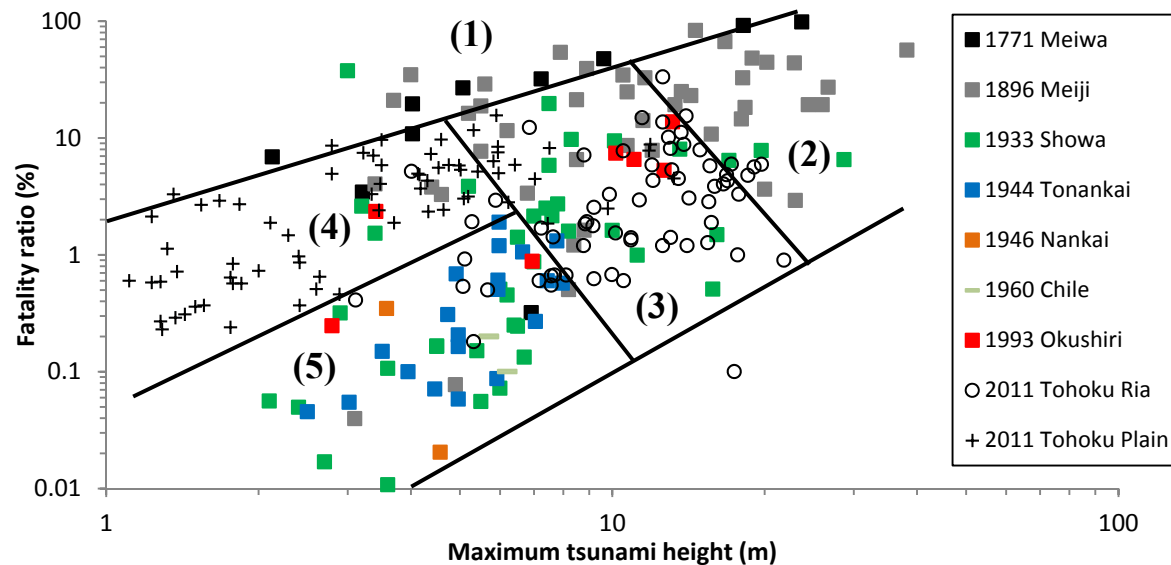
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Comparison of fatality ratio with other historical tsunamis



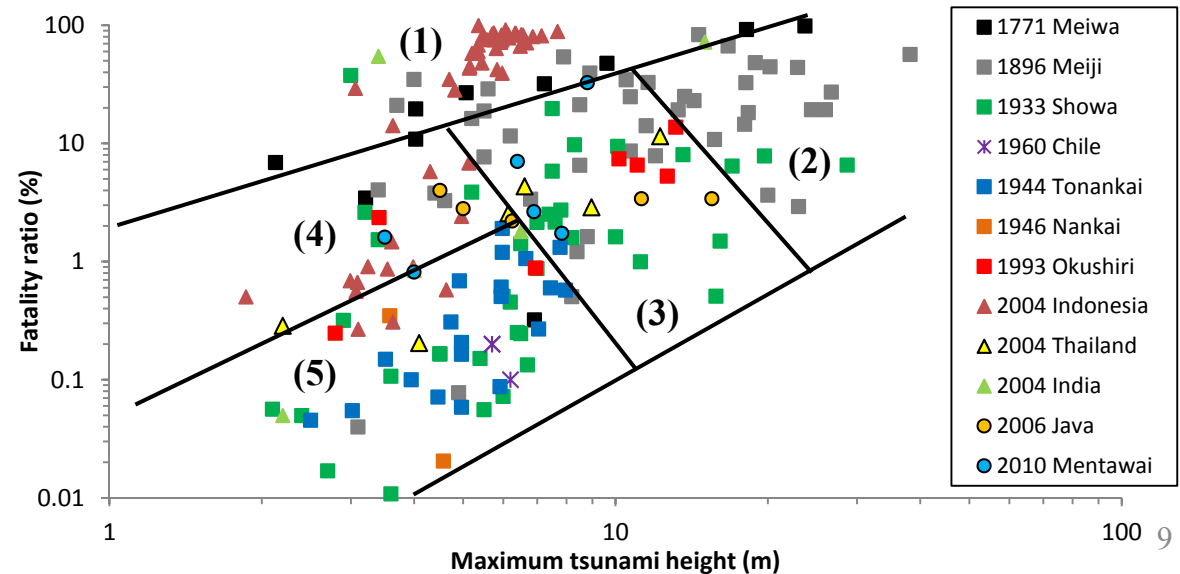
Tsunamis in Japan

- (1) 240 years ago
- (2) 100 years ago
- (3) 37 years after prior event
- (4) 400 years no tsunami
- (5) 10 years after prior event

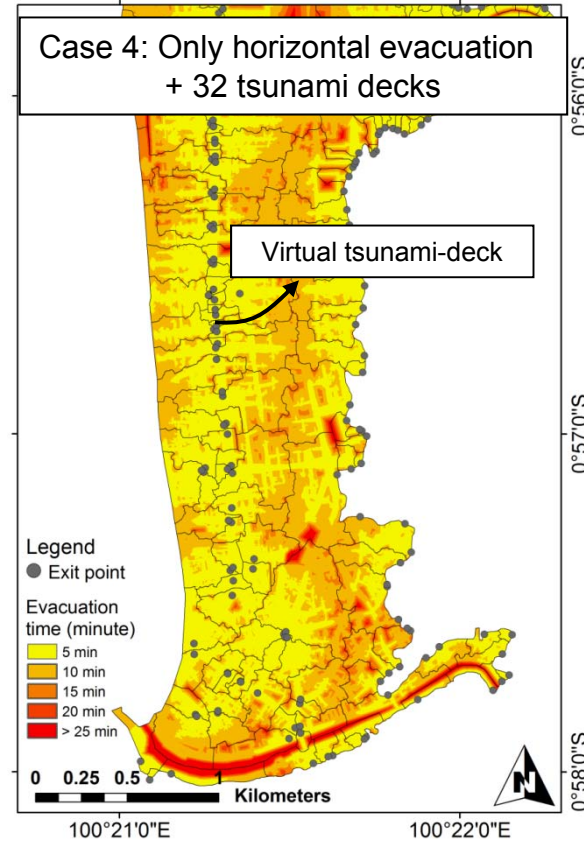
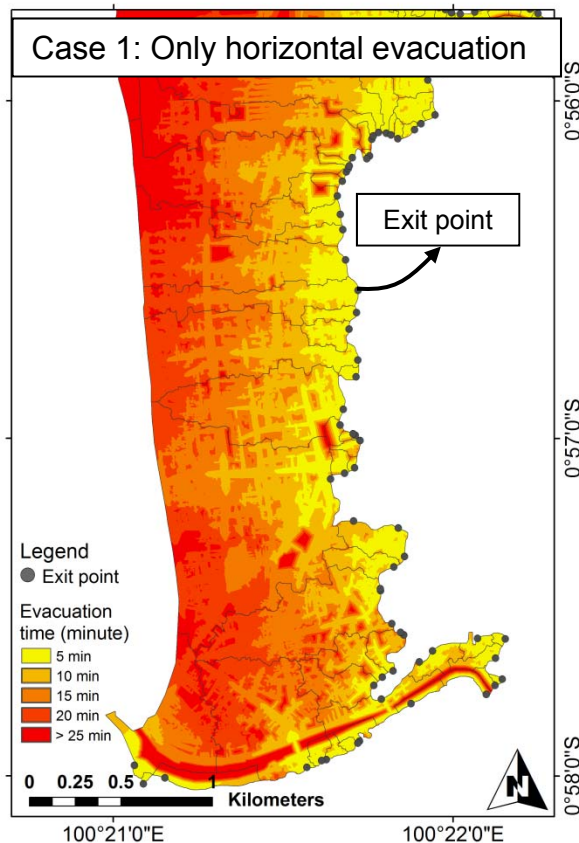
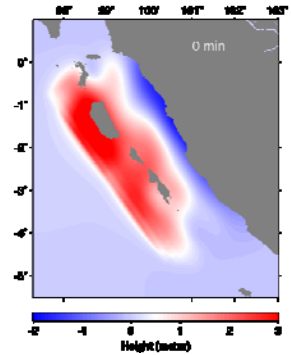
Tsunamis in Indian Ocean

- (1) Banda Aceh
- (2) —
- (3) • (4) • (5) Java & Mentawai

Suppasri et al. (2012) Coastal Engineering Journal
 Suppasri et al. (2013) Pure and Applied Geophysics

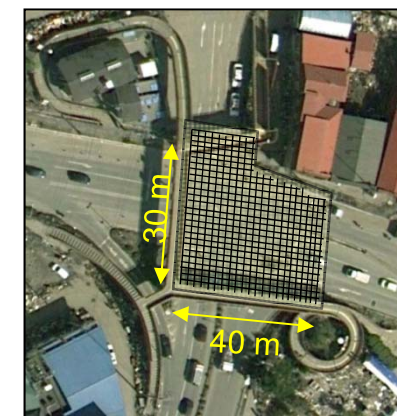


Evaluation of the pedestrian bridge as vertical evacuation and its possible enhancement – Application to Padang city (Dr. Abdul Muhari)



No land acquisition is needed but less space for evacuee

Land acquisition is needed but much space for evacuee



1. **Evacuation time** : Estimated Tsunami Arrival Time (ETA, 20 min) – Tsunami warning dissemination time (5min) – Reaction time (5min) = 10 min
2. Average evacuation time: 25.1 min

1. Average evacuation time: 12.25 min
2. Total number of exposed population
 1. Daytime : 67,163
 2. Nighttime : 60,895

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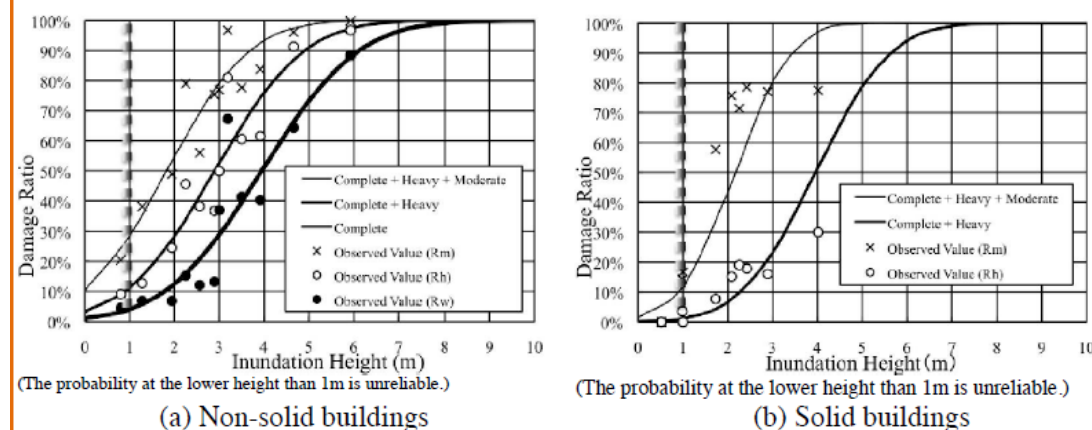
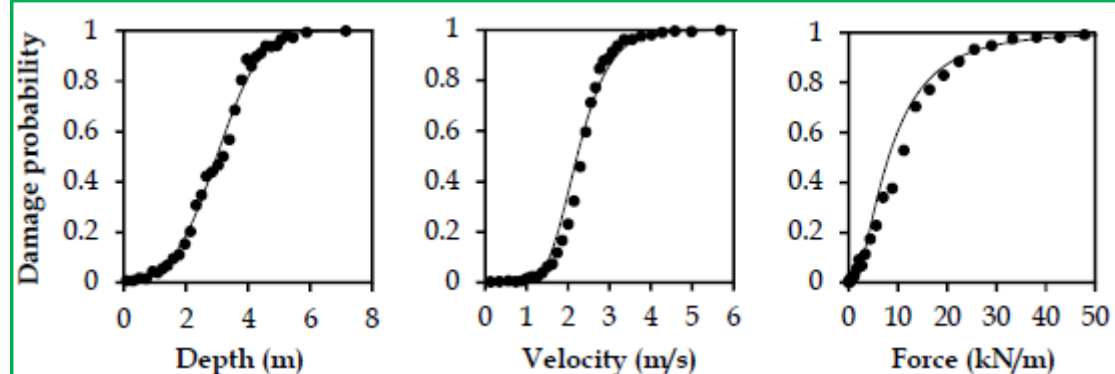
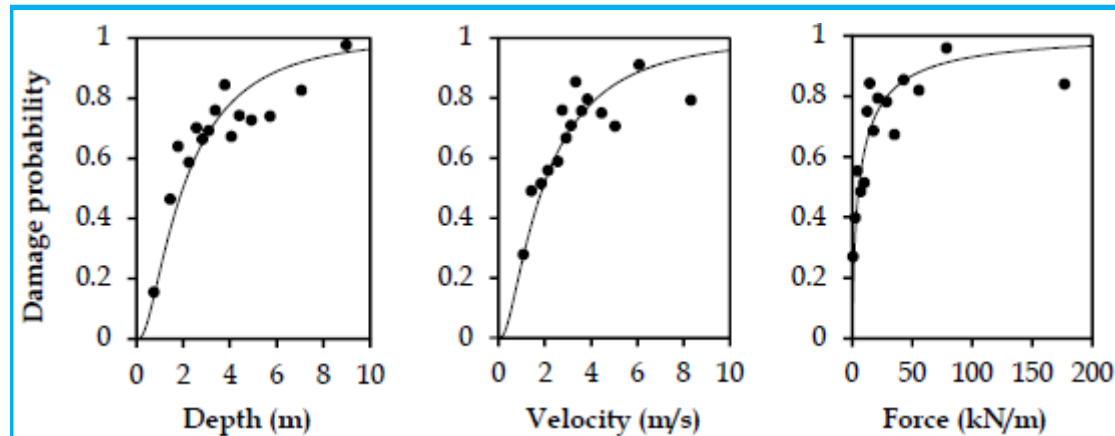
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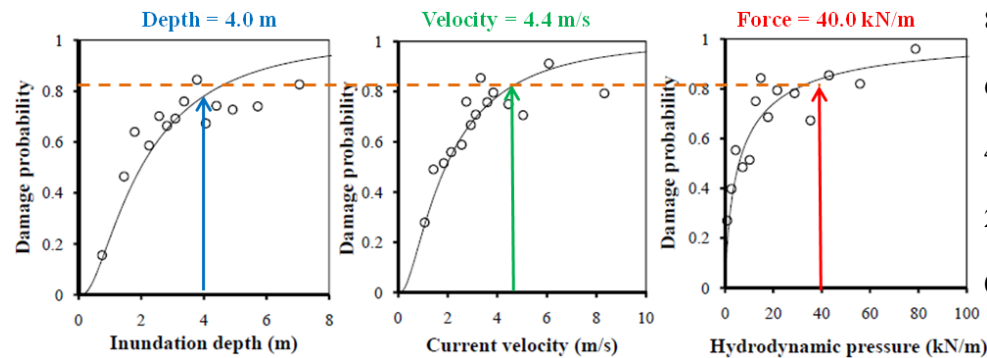
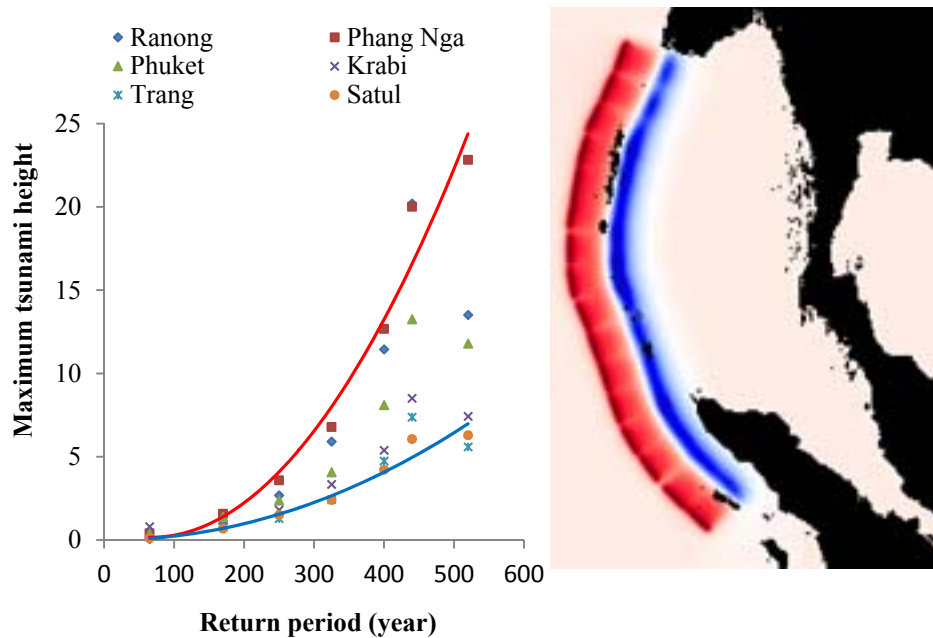
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Fragility curves based on the 2004 tsunami data



Southern Thailand (Ruangrassamee et al., 2006 and Suppasri et al., 2011)	Wood	> 1.5 m: no damage up to damage to secondary members only
		> 2.5 m: damage to some primary members up to collapse
		> 3 m: collapse
	RC with brick wall	< 1.0 m: no damage
		1.0 – 2.0 m: no damage up to damage to secondary members only
		2.0 – 3.0 m: damage to secondary up to some primary members
Banda Aceh, Indonesia (Koshimura et al., 2009 and Valencia et al., 2011)	Wood	< 2.0 m: moderate damage
		2.0 - 3.0 m: important damage
		> 3.0 m: total destruction
	RC with brick wall	< 2.0 m: no damage
		2.0 - 3.0 m: light damage
		> 3.0 m: moderate damage
Sri Lanka (Murao and Nakazato, 2010)	Non-solid	> 2.0 m: moderate damage
		> 3.0 m: heavy damage
		> 4.0 m: Complete damage
	Solid	> 2.5 m: moderate damage
		> 4.0 m: heavy damage

Tsunami risk evaluation in Thailand (Contribution to my home country!)



Indian Ocean

