

Tsunami hazard risk and early warning projects at Global Geophysics Institute, Vietnam

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on behalf of
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Outline of presentation

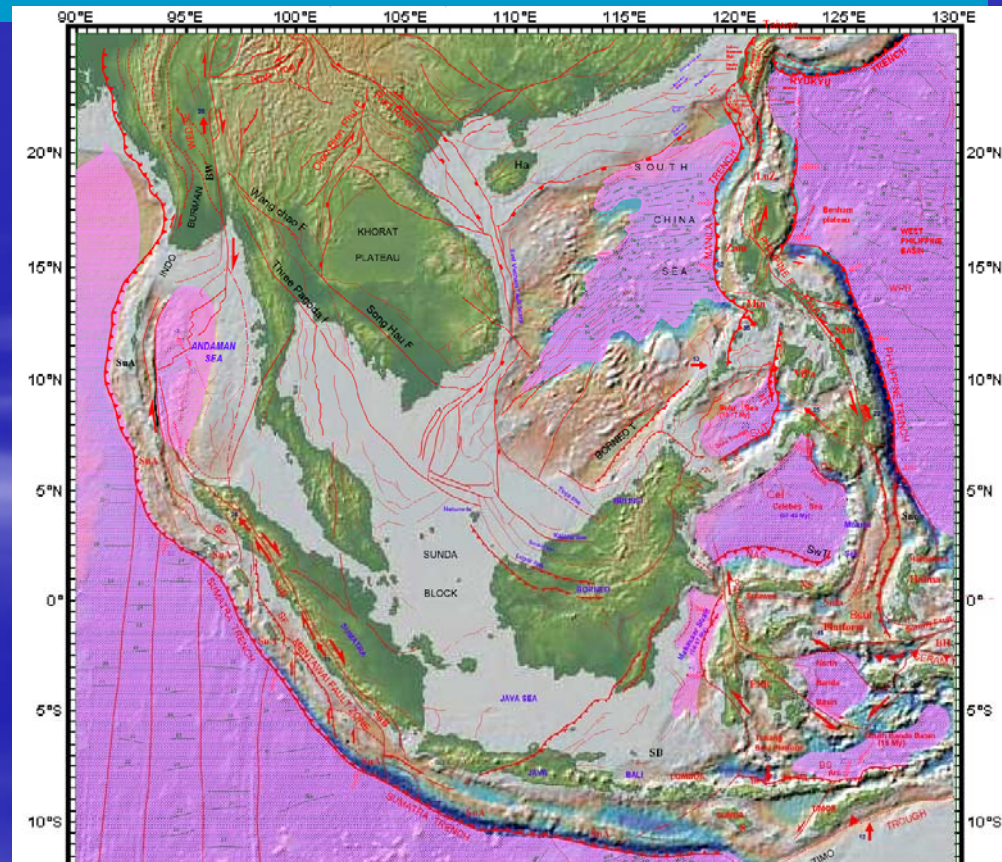
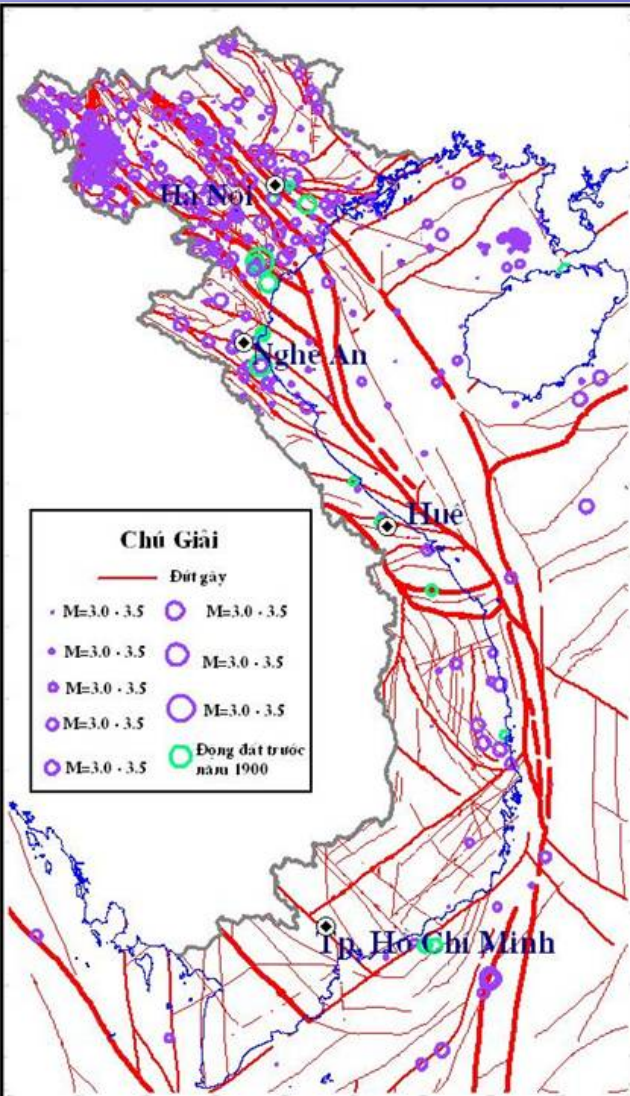
- roles and responsibilities of Global Geophysics Inst. (GGI) for tsunami in Vietnam
- some current activities – hazard risk & early warning centre
- why New Zealand participation?

Roles & responsibilities of GGI for tsunami in Vietnam

1. Tsunami and earthquake hazard risk mapping in Vietnam
2. Establishment of earthquake and tsunami information and early warning centre

Government regulation dated 16/11/2006

- The regulation instructs GGI to develop an earthquake information and tsunami warning system for Vietnam
- This regulation applies to these events:
 - a) Earthquakes of $M \geq 3.5$ in the territory of Vietnam or in the coastal area;
 - b) Volcanic eruptions or earthquakes of $M \geq 6.5$ in the South China Sea;
 - c) Tsunami that can cause damage to the coast of Vietnam



stage 1: designing the network, building stations, and selecting equipment supplier (2008-2009)

- Site survey
- Designing the network
- Selecting the equipment supplier

stage 2: Installing, training and operating (2010-2011)

- Receiving equipment
- Training
- Installation
- Operational

Development of a Tsunami Early Warning System for Vietnam

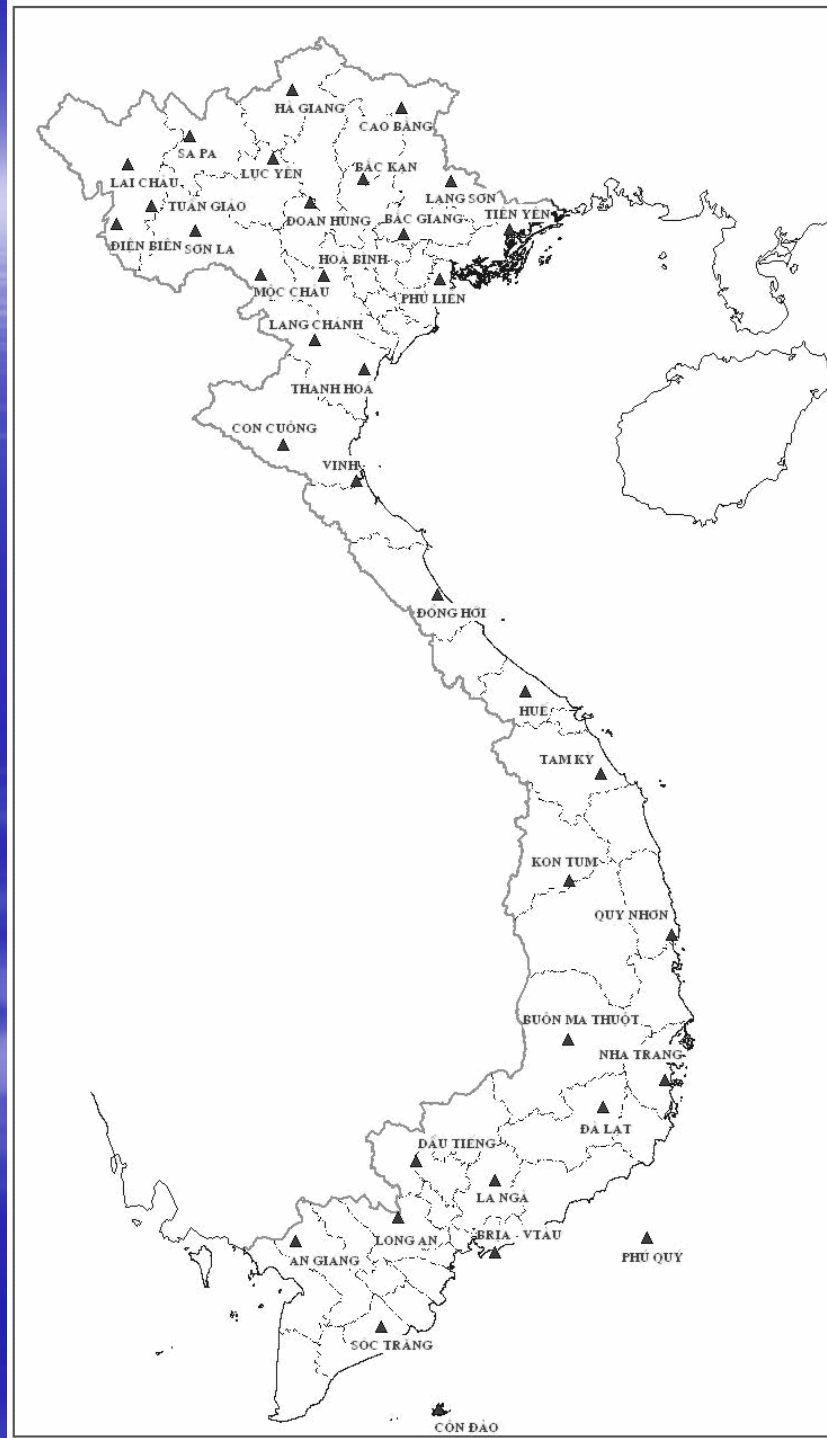
This project is in planning stages at present

The Tsunami Warning Centre will have the ability to:

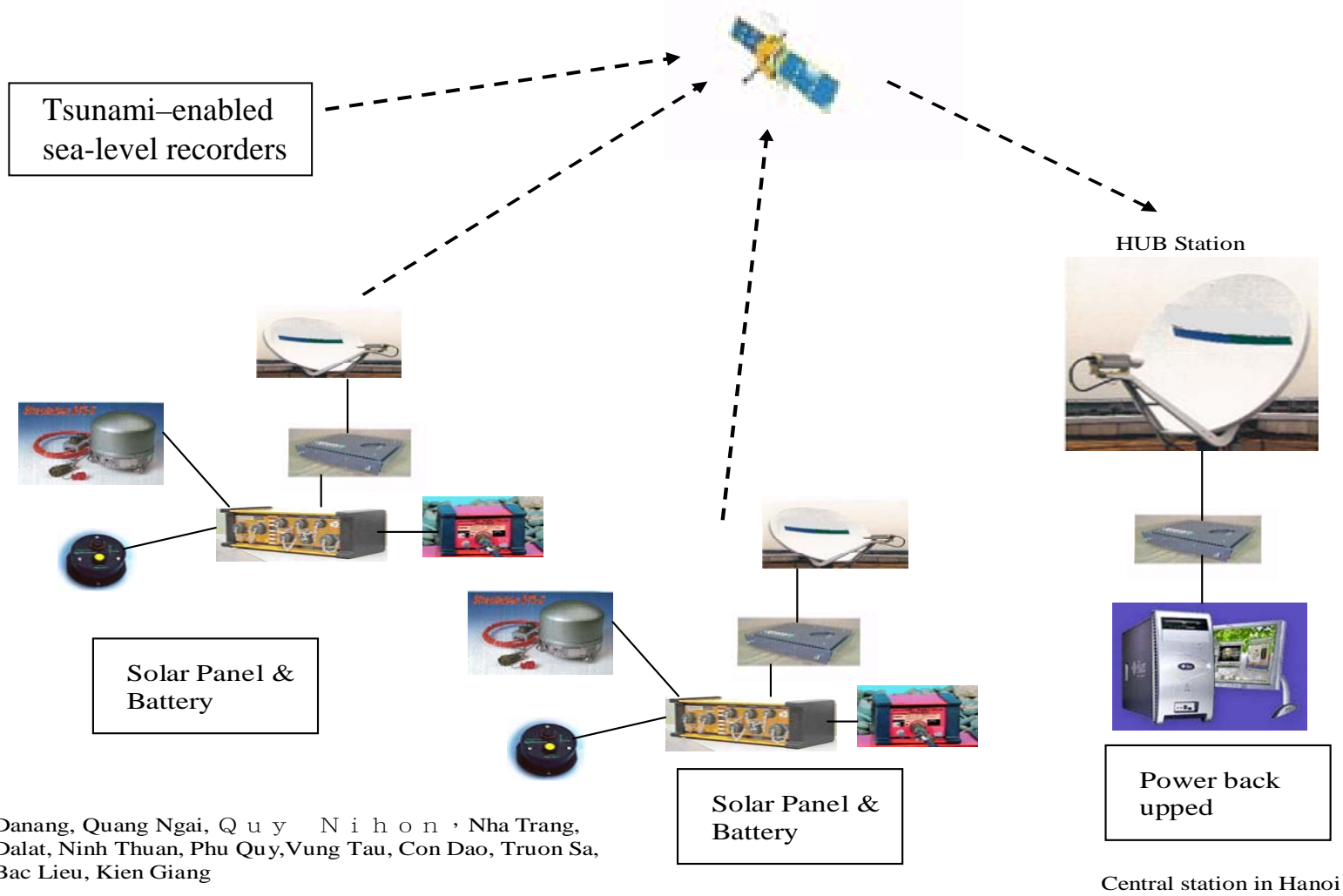
- Receive tsunami warning messages from the International Tsunami Warning Centres (PTWC, JMA)
- Receive national broadband seismograph network data in real-time and use this to provide a national earthquake information capability by locating and estimating size and likely tsunami generation potential of earthquakes
- Receive national sea level (tsunami) network data in real-time to confirm tsunami generation, and give the “all clear” once the tsunami waves have passed
- Receive international sea level data and seismic data in real time to provide a regional (less than three hours tsunami travel time) earthquake location and characterisation capability. International data exchange is required to meet this aim
- Use the information from a catalogue of pre-calculated water models for identified seismic sources. This requires the identification of all likely tsunami sources in advance

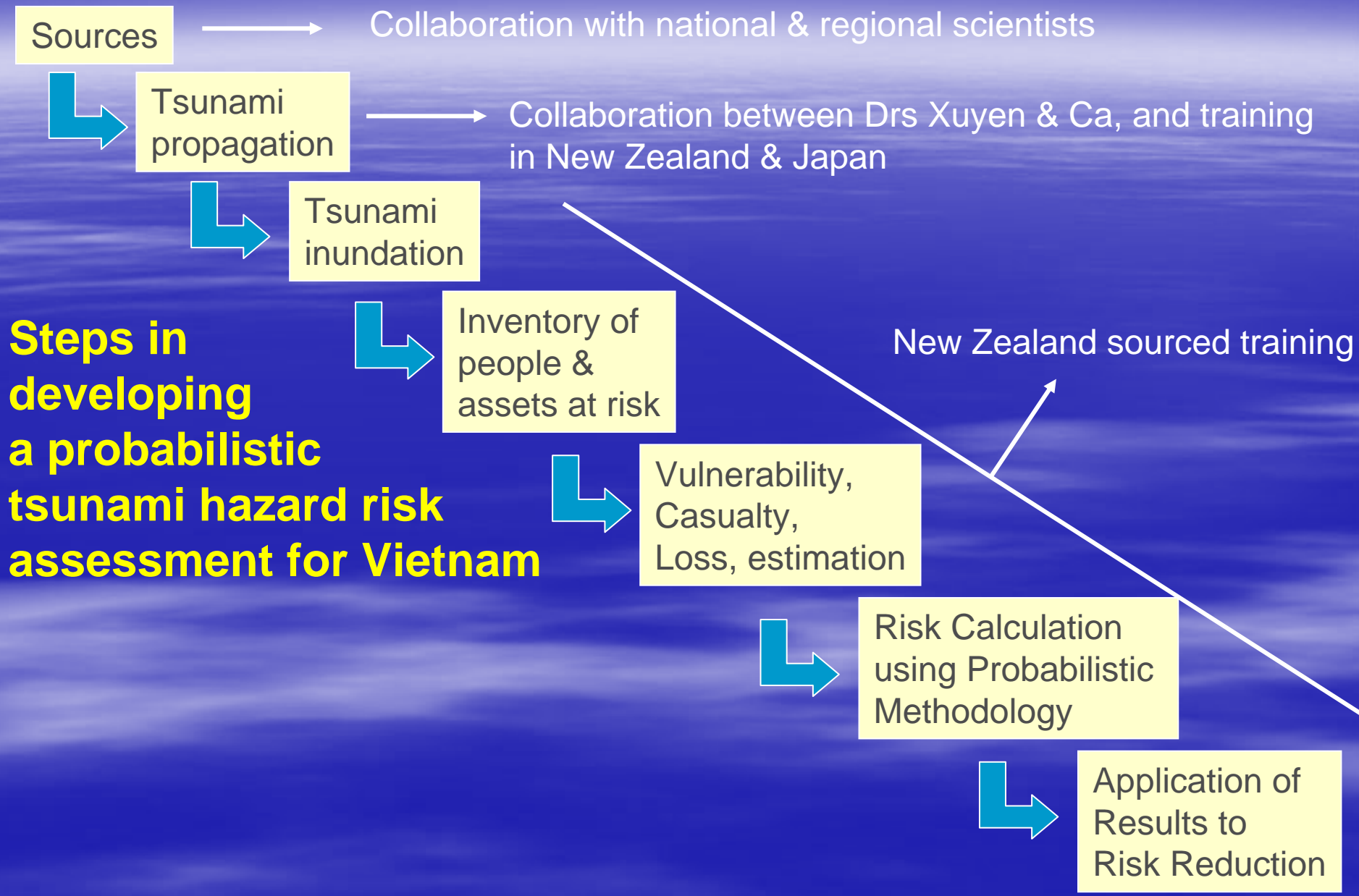
Proposed seismic network

- Station spacing of 100-200 km
- 36 stations covering the country
- Real-time datastream



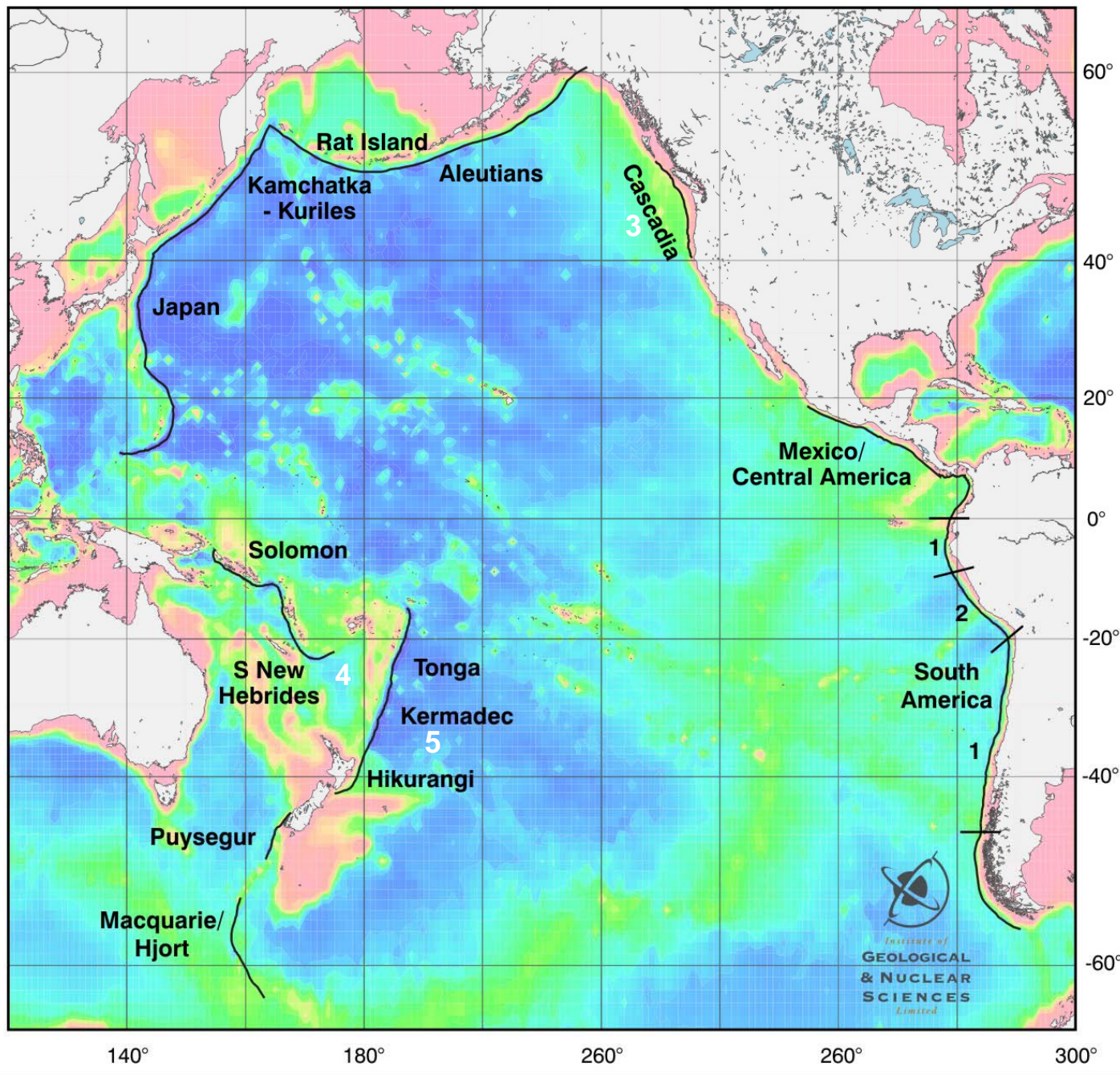
Seismic & tsunami monitoring network





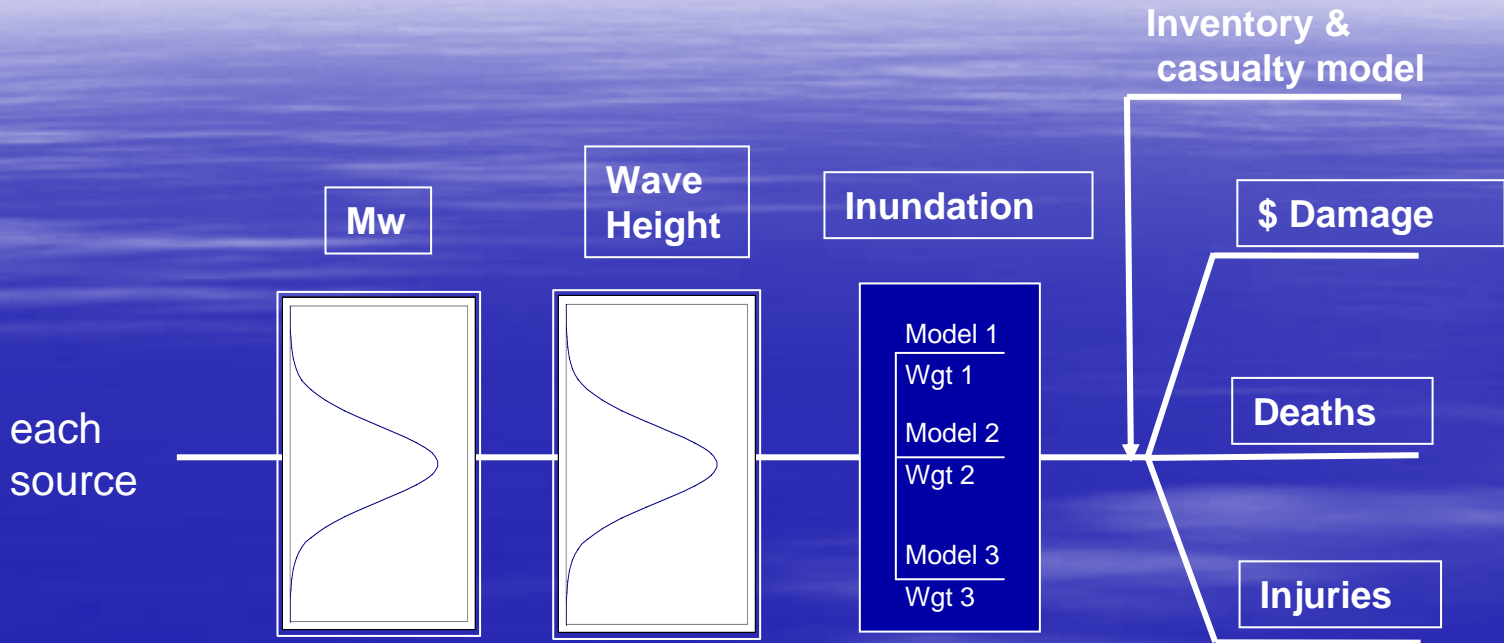
New Zealand connection to South China Seas tsunami hazard risk & early warning systems is in collaboration with GGI, Vietnam

- based on a 2 year, capacity-building project funded from New Zealand to assist GGI fulfilling roles and responsibilities assigned by Vietnam government
- GNS Science led a New Zealand-wide tsunami risk assessment in 2005 (Berryman et al, 2005 - <http://www.civildefence.govt.nz/memwebsite.nsf>)
- GNS Science via GeoNet Project (<http://www.geonet.org.nz>) is responsible for the earthquake & GPS monitoring network and advising Civil Defence authorities on tsunami early warning in New Zealand



Subduction margins in the circum-Pacific region.

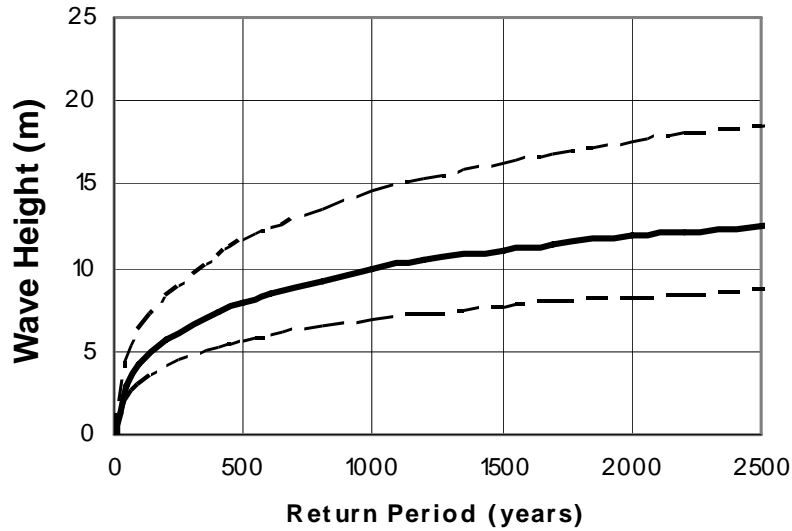
Monte Carlo Sampling using Probabilistic Methodology for Tsunami Risk Modelling



- ➔ For each of 109 sources (5 distant, 104 local/regional)
- ➔ For each event during 100,000 years
- ➔ For each of 22 coastal locations
- ➔ Calculate wave height, inundation, damage, deaths, injuries

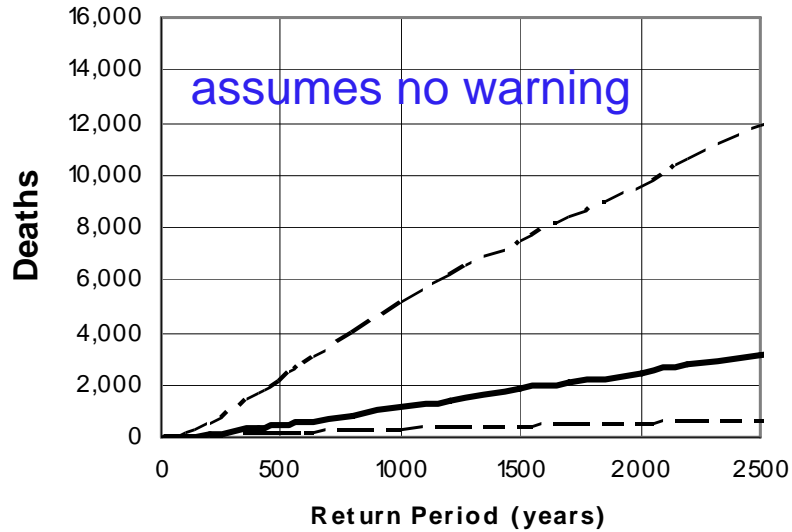
embrace uncertainty & think about frequency as well as magnitude !!!

Gisborne



Data plotted above		50 yrs	100	200	500	1000	2500
Height (m)	84%	4.4	6.2	8.3	11.6	14.5	18.5
	50%	2.9	4.2	5.7	8.0	9.9	12.5
	16%	2.0	2.9	4.0	5.6	6.9	8.6
Deaths	84%	46	160	520	2100	5100	12,000
	50%	11	37	110	440	1200	3100
	16%	1	11	32	110	240	640

Gisborne



	4.2m (100 yrs)	8.0m (500 yrs)	Delay	100 yrs	500 yrs
Deaggregation					
S America	47%	53%	> 3 hr	47%	53%
Subduction Zone	48%	42%	1-3 hr	48%	42%
Local faults	5%	5%	< 1 hr	5%	5%

Benefit of Warnings

No warning

90% effective for distant, 10% for local sources

99% effective for distant, 20% for local sources

- “effective” warning has different requirements in different parts of New Zealand

