



Priorities for Geoscience in Australia

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APPLYING GEOSCIENCE TO AUSTRALIA'S MOST IMPORTANT CHALLENGES

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Two suggestions.

One for the region with global opportunities.

One for Australia Also with global opportunities

Mega thrust earthquakes and tsunami's

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Intraplate continental deformation processes.





MEGATHRUST EARTHQUAKES

Tsunami risk

John Schneider and Phil Cummins

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The 2004 Indian Ocean Tsunami: One of the most Lethal Natural Disasters in Human History



Total Deaths: 227,898

From Tsunami Evaluation Coalition Synthesis Report (2006)

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The 2011 Tohoku Earthquake and Tsunami: The Most Costly Natural Disaster in Recorded History



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Why Was the Death Toll so High?

Inadequate Preparedness.

2004 IOT: No one had foreseen the potential for a large tsunami, especially one of such massive scale. Hence, Sumatra and the Indian Ocean at large had not even considered tsunami mitigation measures.

2011 Tohoku: Although Japan was thought to be well prepared for tsunamis, the size of the 2011 event turned out to be far larger than anyone had expected. Hence, even the seemingly impressive tsunami mitigation measures were, in the end, inadequate.

Is Preparedness a Serious Component of Response/Recovery?

For the IOT, the tsunami Evaluation Coalition Synthesis Report (2006) documents the effectiveness - and lack thereof - of the international humanitarian response. It noted:

• "It is notable that disaster risk reduction (DRR) and preparedness, though demonstrably cost-efficient and effective if correctly undertaken, receive only a small portion of international aid."

• "Despite advances in early warning systems, the tsunami response has rarely enhanced local preparedness or significantly reduced longer term vulnerability."

Preparedness was only a very small fraction of the response/recovery effort, and was largely directed at warning systems and public awareness in areas already impacted by the tsunami.

Tsunami Preparedness is Underpinned by Geology – i.e., Paleotsunami Studies

- Only paleotsunami studies can extend knowledge beyond the historical record to cover the long return periods of the largest events
- For both IOT and Tohoku, paleotsunami studies revealed evidence for recurrence of large events similar to those that caused the modern disasters



2004 IOT along with prehistoric tsunami deposits in pit off Thai coast (Jankaew et al., 2008)



Tsunami deposit attributed to 869 Jogan tsunami, in core collected near Sendai (Sawai et al., 2008)

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The Real Killer: Local Tsunamis



January 10, 2003

December 29, 2004

Satellite images of the city of Banda Aceh, pop. 400,000, before (left) and after (right) it was devastated by the 2004 Indian Ocean Tsunami (images courtesy NASA).

A large, local tsunami can arrive within minutes, devastating coastal areas even several km from the coast. Such tsunamis are responsible for the massive death tolls in recent events. Large coastal cities in the Indian and Pacific Oceans that could experience such tsunamis include:

Chittagong,Bangladesh	Karachi, Pakistan	Nuku'alofa, Tonga
Padang, Indonesia	Kaosiung, Taiwan	Cilacap, Indonesia
Cebu City, Philippines	Seattle, USA	Concepcion, Chile

An International Paleotsunami Program for Tsunami Disaster Reduction

Should be focused on subduction zones with large coastal populations that have yet to experience a major tsunami disaster (e.g. Makran, Arakan, SW Pacific).

Unlike the 'quick technological fix' promised by warning systems, the commitment should be for a long term, basic science program spanning at least a decade.

Capacity building should be a major part of the program, along with outreach to the disaster management community to ensure uptake of results.

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34th IGC - GGI presentation



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Digital Elevation Model



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The Cadell Scarp





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Two ideas for consideration:

- 1. An international Paleotsunami program
- 2. An intraplate processes program

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 building 4d understanding of how continents deform



Thank you

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