

# GeoNet Update



**Ken Gledhill**

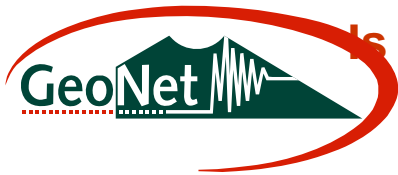
GeoNet Project Director

Chair, Intergovernmental Coordination Group,  
Pacific Tsunami Warning and Mitigation System

*GNS Science*



# New Zealand GeoNet



Is an integrated geological hazards monitoring and data collection system. All data are freely available to facilitate research, emergency management and decision making

- ⇒ Stronger research capabilities
- ⇒ Enhanced community resilience

## Real-time hazard monitoring

- Earthquakes
- Volcanic unrest
- Tsunami
- Land stability
- Land deformation



## End users

- Emergency managers
- Scientific researchers
- Engineers
- Lifeline utility groups
- Insurance
- Planners, decision makers
- General public



## Major Events Since 2009 ....

- 2009 (July): Dusky Sound Earthquake ( $M_w$  7.6)
- 2009 (September): Samoan Islands Tsunami
- 2010 (February): Chile Tsunami
- 2010 (September): Darfield Earthquake ( $M_w$  7.1)
- 2011 (February): Christchurch Earthquake ( $M_w$  6.2)
- 2011 (March): Japan Tsunami
- 2011 (June): Canterbury Earthquake ( $M_w$  6.0)
- 2011 (December): Canterbury Earthquakes ( $M_w$  5.8, 5.9)
- 2012 (August): Tongariro Eruption





# GeoNet Web Traffic 2001 to 2012

- Early years (Dino the dinosaur) 10 hits/s
- 2005 Upper Hutt earthquakes 300 hits/s
- 2010 Darfield Earthquake 5,000 hits/s
- 2012 Deep North Island Earthquake 16,000 hits/s



**Hits/s = requests received by the website per second**

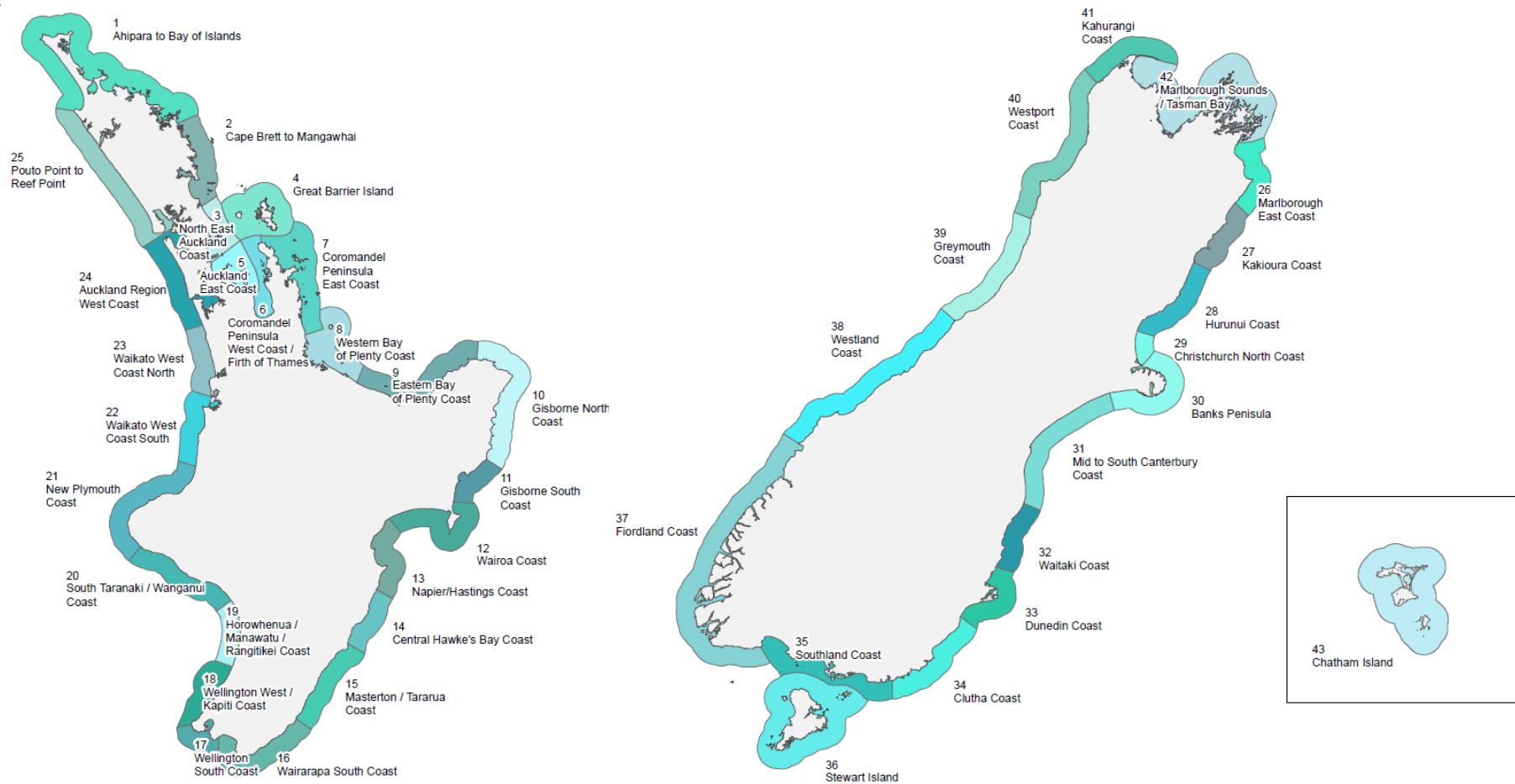
# The New Zealand Tsunami Warning System

- The Ministry of Civil Defence & Emergency Management (MCDEM) is the agency responsible for tsunami preparedness, education and response in New Zealand
- GNS Science are MCDEM's science advisers for geological hazard - formalised by a Memorandum of Understanding between the two organisations
- Within the GeoNet, GNS Science operates a duty system including a multi-organisation tsunami experts panel to advise MCDEM on likely tsunami impacts
- **Currently New Zealand does not operate a warning system for local source tsunami and the emphasis for the local case is on preparedness and education of natural tsunami signs**

# The New Zealand Tsunami Warning – Threat Levels and Coastal Zones

- For regional and distant tsunami threats, New Zealand relies on the Pacific Tsunami Warning Centre (PTWC) in Hawaii for the first notification of a possible tsunami threat
- The advice provided by GNS Science is in the form of threat levels (based on likely surge heights) for 43 predefined coastal zones around the New Zealand coast
- This information can be used to inform evacuation decisions if evacuation planning is in place in the affected regions
- The first forecasts are then revised in consultation with a panel of experts which meet by telephone as soon as possible after the first notification

# Coastal Zones for Tsunami Warnings





# Tsunami Threat Levels

Maximum water level along coastal sections

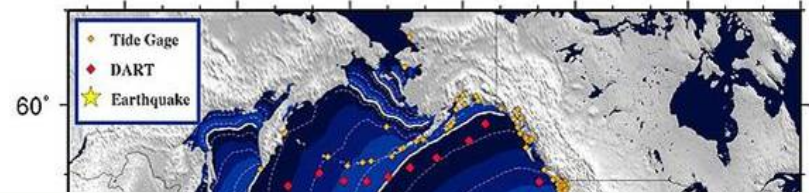
- Threat Levels:

- 20cm - 1m Threat to beach and small boats
- 1m - 3m Some land threat
- 3m - 5m Moderate land threat
- 5m – 8m High land threat
- 8m+ Severe land threat (local & regional sources)

**Wave run-up is potentially up to twice as high** (on steep slopes and v-shaped valleys near the coast)

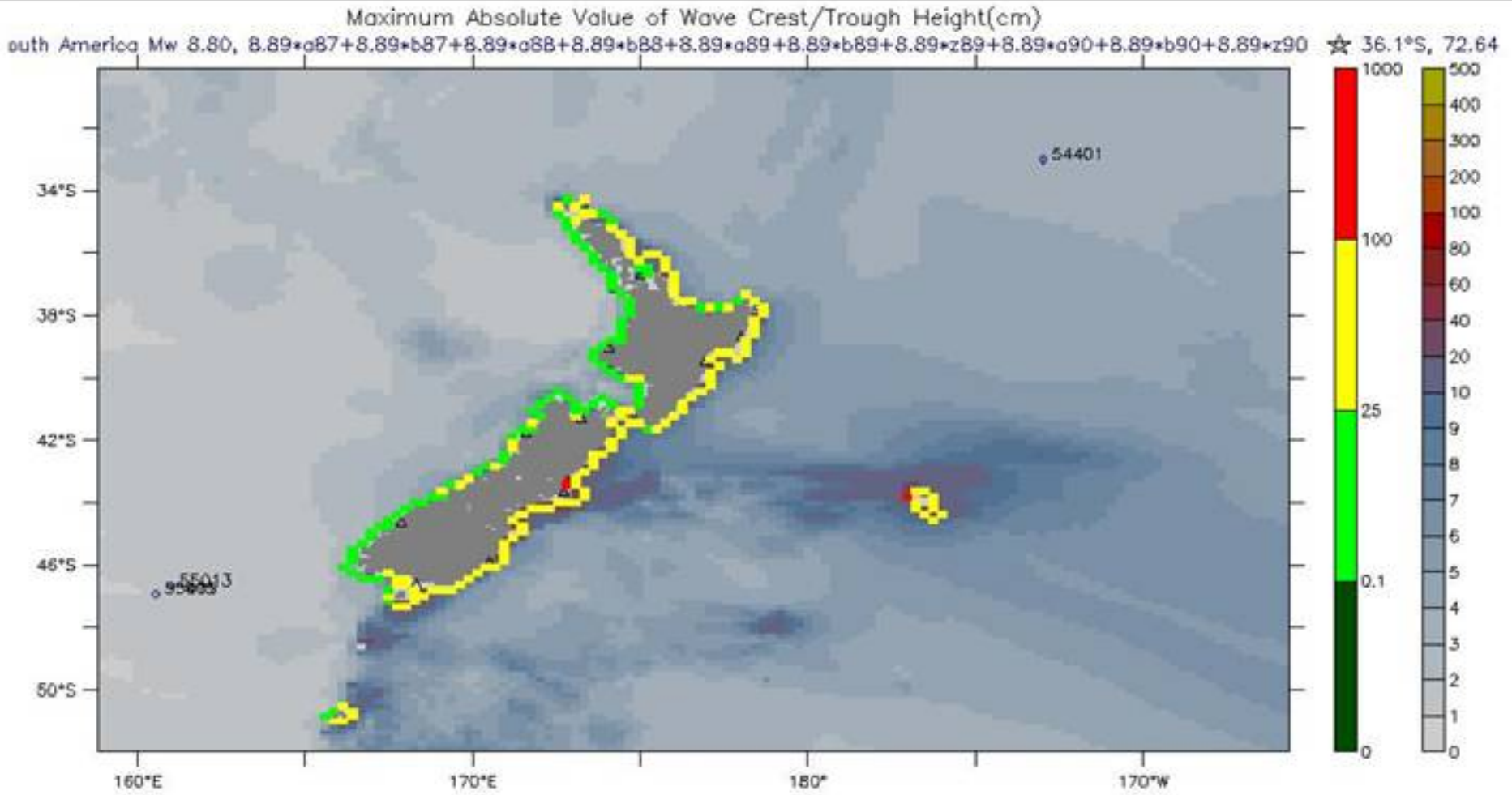
- Tidal states are not included in the threat levels**

# WebSIFT Modelling



Maximum Wave Forecast Coastal Forecast DART Inversion Export

Update



Norfolk Island

▼RFRT  
RBCT  
Kermadec Islands

## Tsunami Threat Level Map

### Quick Statistics

#### Earthquake size and source:

M8.9, near east coast of Honshu Japan

#### Time of earthquake:

1846 NZDT 11/03/2011

#### First estimated tsunami arrival time in NZ:

0623 NZDT 12/03/2011  
(North Cape)



Relative sea level

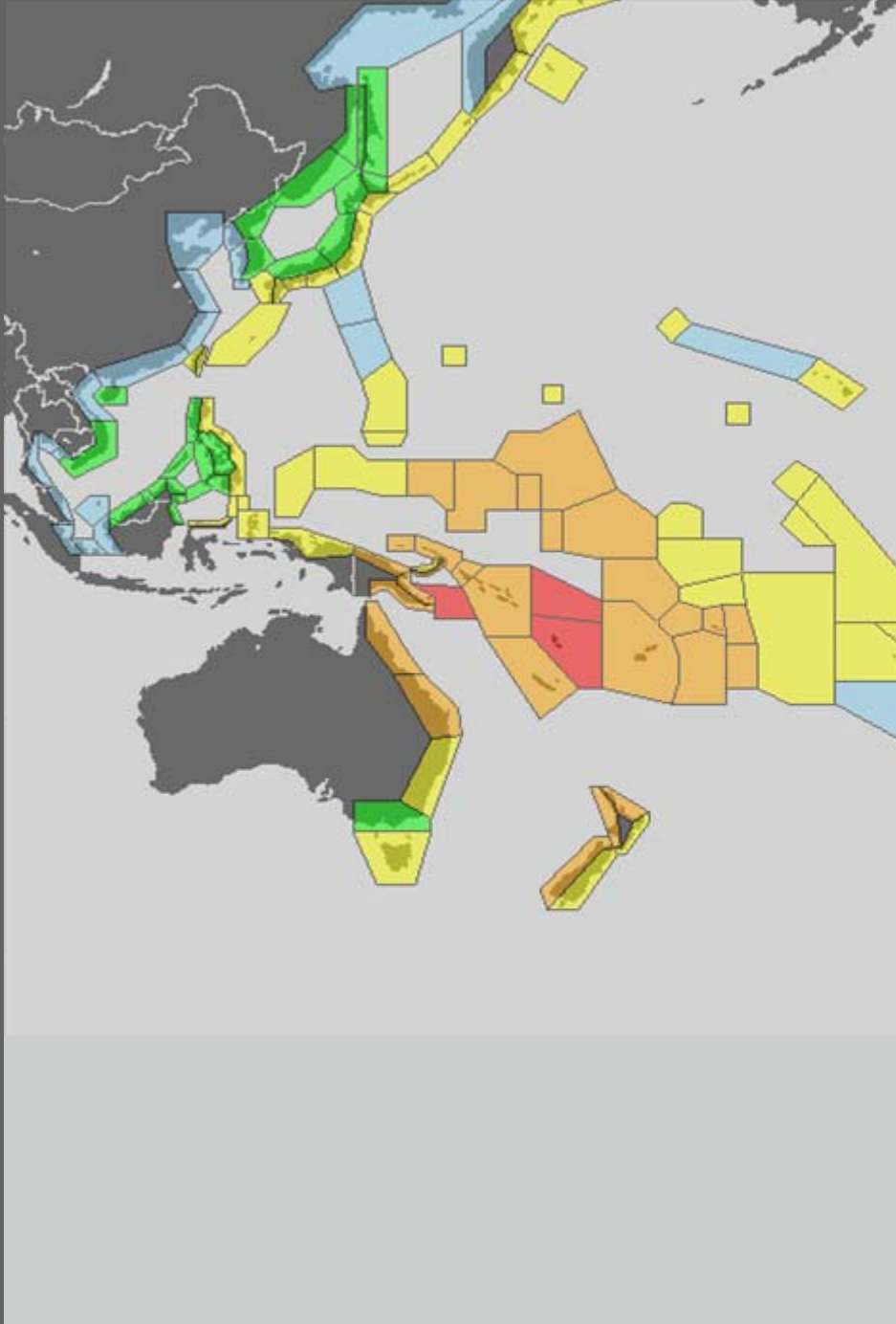
#### NOTE:

1. The stated threat levels may apply to any one of the series of waves generated by the event and not necessarily to the first wave. The first wave is not always the largest or highest and waves are likely to continue for many hours.
2. The threat levels suggest the largest wave at any coastal point inside the zone. Wave heights will vary within a zone.
3. The amplitudes do not include the tidal state (sea level) at the time the wave reaches the shore.
4. The estimate is for the maximum expected wave amplitude at shore. Run-up can be up to twice as high on steep slopes onshore near the coast, i.e. a wave measuring 5m at shore can run up as high as 10m on-land near the shore.
5. The colours used to illustrate threat levels do not relate to the colours used for evacuation zones (red, orange, yellow – see *Tsunami Evacuation Zones DGL08/08, MCDEM*).
6. The expected wave amplitudes (crest to sea level) at the shore are likely to be different to measurements given in PTWC bulletins. PTWC measurements are taken at sea level gauges in the open ocean or at coastal points off-shore from New Zealand. MCDEM information represents the official threat estimates.

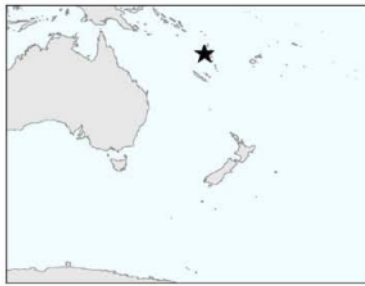
Maximum expected amplitude at shore	Threat definition
<20cm	No threat
20cm-1m	Threat to beach, harbours, estuaries & small boats
1m-3m	Minor land threat
3m-5m	Moderate land threat
5m-8m	High land threat
8m+	Severe land threat

Last updated: 0020 NZDT 12/03/2011

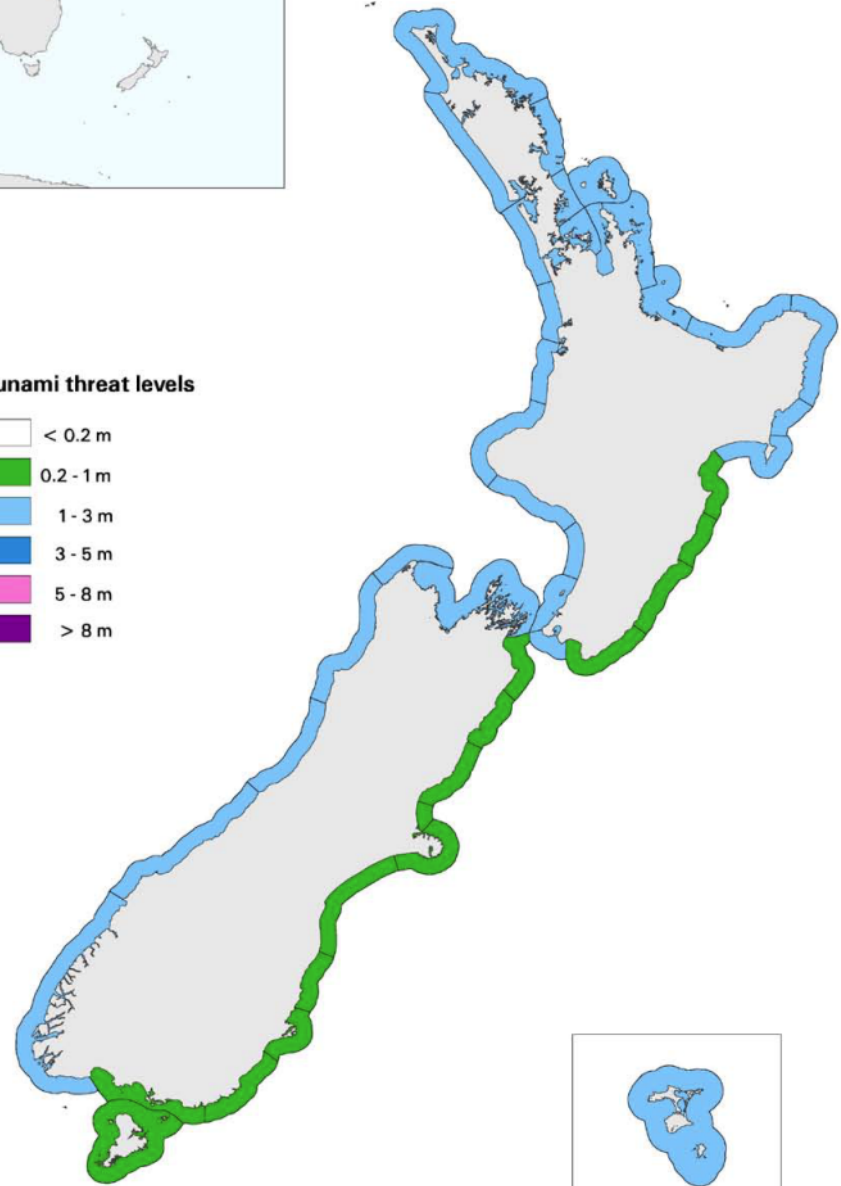
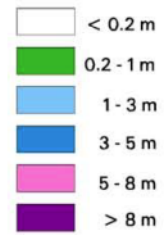
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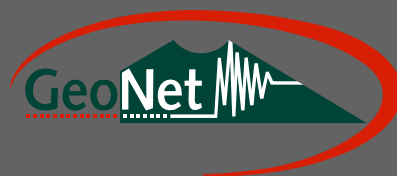
NH\_mw90\_7 Mw 9 Loc: 166.7E 15.4S



#### Tsunami threat levels







[www.geonet.org.nz](http://www.geonet.org.nz)

