

Tsunami are sometimes called 'tidal waves' but this is incorrect as they have nothing to do with tides.

air, reaching speeds up to 1000 km/h. therefore be unnoticed by ships or from the may be less than a metre. Tsunami waves may a deep ocean, the length from crest to crest away from their source. As a tsunami crosses period. Tsunami waves move outwards, of which may or may not be the highest. A tsunami is a series of sea waves, the first eruptions or even ocean meteorite impacts. like earthquakes, landslides, volcanic Tsunami can be caused by under-sea events all the way to the seafloor.

A tsunami is different from normal waves on the ocean. Normal ocean and wind swell waves may cause motion in the water to depths of 150 m. In contrast, the passage of a tsunami involves the movement of water all the way to the seafloor.

Tsunami can be caused by under-sea events like earthquakes, landslides, volcanic eruptions or even ocean meteorite impacts. A tsunami is a series of sea waves, the first of which may or may not be the highest. The waves are of extremely long length and period. Tsunami waves move outwards, away from their source. As a tsunami crosses a deep ocean, the length from crest to crest may be less than a metre. Tsunami waves may therefore be unnoticed by ships or from the air, reaching speeds up to 1000 km/h.

TSUNAMI EXPLAINED



Figure 1: "The Great Wave off Kanagawa." (19th century woodcut by Hokusai)

tsunami is a Japanese word: tsu meaning 'harbour' and nami meaning 'wave'.

tsunami



Australian Government

tsunami

A W A R E N E S S



tsunami which spread from ocean floor generated a The displacement of the average slip of 5–10 m. 100–150 km, and had an The width of the fault was ruptured the entire 1200 km length of the Andaman Thrust. under the Eurasian Plate. Australian plate is sliding of Sumatra where the Indo- occurred off the west coast A magnitude 9.3 earthquake

Figure 3: The 26 December Sumatra-Andaman Islands earthquake. The large red dot indicates the epicentre of the main shock.



26 December 2004

ANDAMAN-SUMATRA EARTHQUAKE:

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Figure 5: Two small boats stranded on the first floor of a building after the 2004 Indian Ocean Tsunami. (Nalini Kasynathan – courtesy OxfamCAA)

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Australian Government

Geoscience Australia

Bureau of Meteorology

Attorney-General's Department

Emergency Management Australia

This pamphlet is produced jointly by Emergency Management Australia, Geoscience Australia and the Bureau of Meteorology.

AUSTRALIAN TSUNAMI

In the last few thousand years the Australian coast may have experienced large tsunami, as evidenced by shell, coral and boulder deposits found well above sea level and several kilometres inland.

Minor tsunami are recorded about once every two years in Australia, but most are small and present little threat to our coastal communities. The tsunami threat to Australia varies from 'relatively low', for most of our coastline, to 'moderate' on the north-west coast of WA due to its proximity to Indonesia and other countries in that region prone to large earthquakes and volcanic activity.

Several large tsunami have hit Australia's north-west coast—the largest at Cape Leveque, WA, in 1977, with a 6 m wave height. Further south in the Onslow-Exmouth region, in June 1994, tsunami waves with over 4 m 'run-up' (i.e. it travelled inland to a point 4 m above sea level) appeared out of a calm sea and washed 300 m inland. Both of these WA tsunami were generated by earthquakes in Indonesia.

In May 1960, a great earthquake in Chile generated the largest recorded tsunami along the east coast of Australia. The event generated tsunami waves of just under a metre (trough to crest) at the Fort Denison tide gauge in Sydney Harbour. Slight to moderate damage (mainly to boats) resulted in harbours at Lord Howe Island, Evans Head, Newcastle, Sydney and Eden.

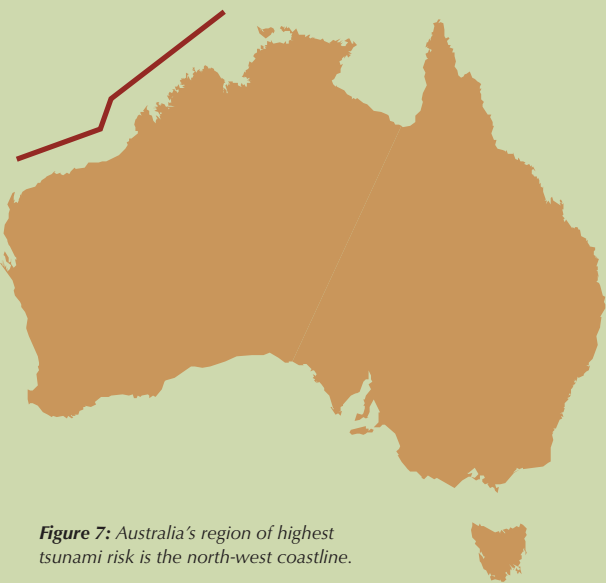


Figure 7: Australia's region of highest tsunami risk is the north-west coastline.



Figure 8: Unusual tidal fluctuations were recorded in Augusta, South Australia, during the December 2004 tsunami. The strong currents caused by the tsunami dragged bathers out to sea, but they were either rescued or made it back to shore on their own. (Images courtesy Dave Piper)

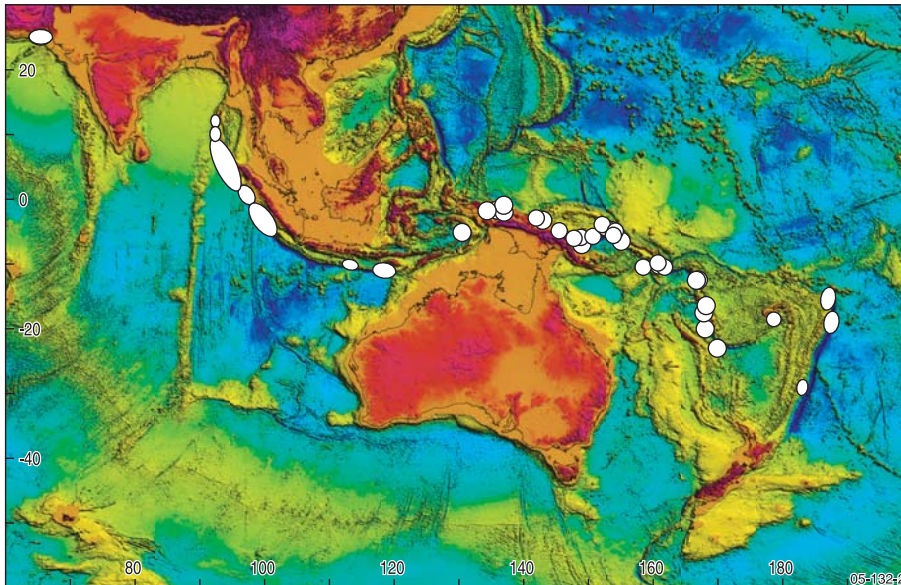


Figure 9: A map of the earth's surface, showing the major tectonic plate boundaries and locations of historic tsunamigenic earthquakes. The tsunami threat to the region originates from the system of subduction zone plate boundaries (also known as ocean trenches) extending through Indonesia, New Guinea, Vanuatu, Fiji and the trench systems to the north and south of New Zealand.

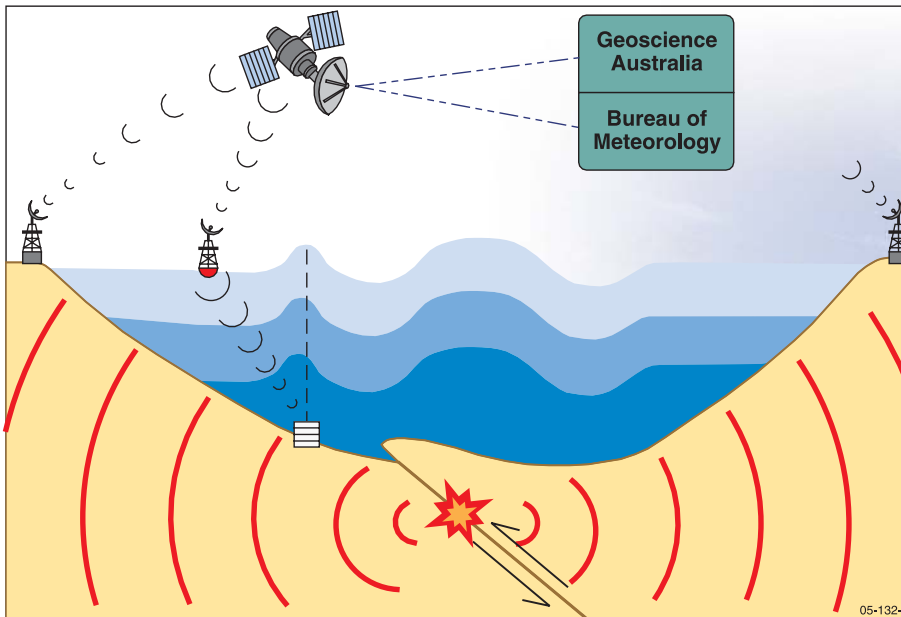


Figure 10: An undersea earthquake causes displacement of both the seafloor and the sea surface, and the spreading out of seismic waves (in red). The disturbance in the sea surface radiates outward as a tsunami, which travels much slower than the seismic waves. Once the seismic waves are detected by distant (usually land-based) seismometers, sea-level data from coastal tide gauges or DART buoys are analysed to determine whether a tsunami has actually been generated.

If SHAKE DROP ROAR

then **RUN** and **WAIT**

WHAT ARE THE WARNING SIGNS OF AN IMPENDING TSUNAMI?

SHAKE

Evidence of a large undersea earthquake may be felt prior to a tsunami by an on-going shaking of the ground in coastal regions.

DROP

Sea level may drop dramatically before the arrival of a tsunami.

ROAR

A roaring sound may precede the arrival of the tsunami.

WHAT DO I DO IF THERE IS A TSUNAMI?

If SHAKE DROP ROAR then RUN and WAIT.

RUN

Evacuate immediately to higher ground or well away from the waters edge. Do not go towards shore to watch a tsunami.

WAIT

Wait at the safe place for several hours. The tsunami may arrive within 30 minutes of the earthquake or other warning sign.

The backwash of a tsunami is also dangerous. As the large volume of water pushed onto land recedes back towards the ocean it may carry debris and people back to sea with it.



Figure 11: "Tsunami Ready" sign in Washington, USA. (Image courtesy NOAA)



Figure 12: Kalutara Beach, Sri Lanka 26 December 2004 showing withdrawal of the ocean from the coastline prior to the arrival of the tsunami wave. (Image courtesy Digital Globe)

Figure 13: Kalutara Beach, Sri Lanka 1 January 2004 showing normal coastal wave conditions. (Image courtesy Digital Globe)