



Roger Handsworth lowers a tide gauge at Casey Station.

# Tsunami detected at Antarctic stations

The effects of the Aceh earthquake on 26 December 2004, and the subsequent tsunami in the Indian Ocean, were detected by tide gauges at Mawson, Casey and Macquarie Island about 12 hours after the earthquake. The tsunami travelled at approximately 720 km/h.

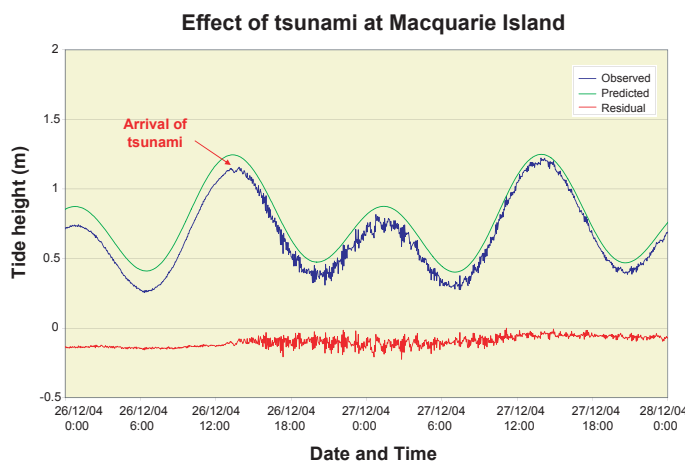
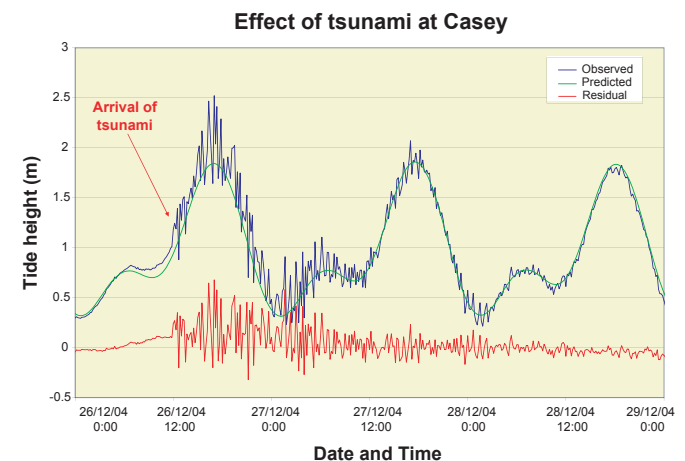
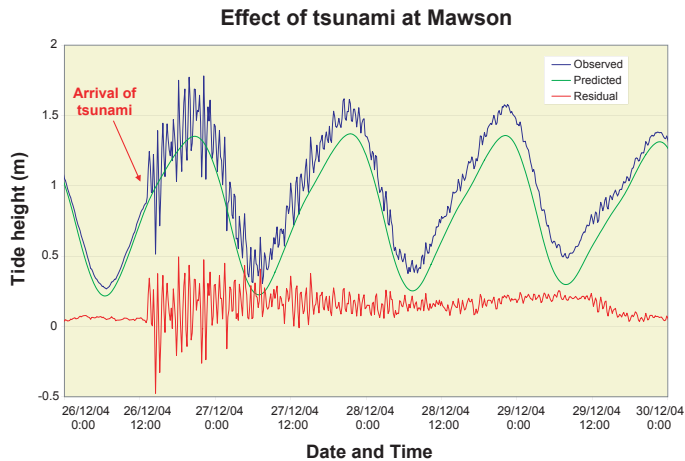
While the effects in Antarctica and the Southern Ocean were small compared to the tragic consequences in nearby coastal areas, detection of the tsunami many thousands of kilometres from the earthquake's epicentre reveals the enormous energy released by the event.

The records showed that after the tsunami hit, there was an increase in tide height of about 500 mm at Mawson, 600 mm at Casey and 200 mm at Macquarie Island. These higher tides continued for several days at Mawson and Casey and about 18 hours at Macquarie Island. Mawson is around 8300 km from the earthquake epicentre, while Macquarie Island is around 9000 km distant. Anecdotal evidence at Casey suggests that the tsunami pushed the ice up the wharf road by several metres.

For the past 10 years the AAD has been operating tide gauges at its stations on Macquarie Island, Casey, Davis and Mawson and at the Chinese station Zhongshan, with a view to measuring long-term sea level change and establishing accurate data for shipping operations, charting and mapping. The gauges are accurate to the millimetre and can detect changes in sea level due to storm surges and earthquakes. The tide gauges at Mawson and Macquarie Island are linked via radio modems, landlines and satellite to the AAD headquarters, where they can be downloaded in real time.

For more information on tsunamis visit the National Oceanographic and Atmospheric Administration website <<http://www.noaa.gov>>. For tsunami propagation around the world visit <[http://www.pmel.noaa.gov/tsunami/Mov/indo\\_gl2.mov](http://www.pmel.noaa.gov/tsunami/Mov/indo_gl2.mov)>. For maximum computed tsunami heights around the globe visit <[http://www.pmel.noaa.gov/tsunami/indo20041226/max\\_global.pdf](http://www.pmel.noaa.gov/tsunami/indo20041226/max_global.pdf)>. The site shows peak effects of the tsunami at Heard Island and the Mawson and Casey regions.

—HENK BROLSMA  
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The charts show the tidal record at Mawson, Casey and Macquarie Island before and after the earthquake. The green, regular wave is the predicted tide – from previous tidal observations we can predict the time and the height of tides to a reasonable degree of accuracy, barring storm surges and extreme lows in the weather systems. The dark blue wave is the observed tide. The irregular red wave ('residual') at the base of the chart shows the difference between the predicted tide and the observed tide. Note how small the difference between the predicted and observed tides is before the tsunami and the rapid increase after the tsunami arrives.