

Tsunami Magnitudes in Samoa, Tonga and New Zealand

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Seven tsunamis were generated along Samoa to New Zealand during 2003-2009, and these tidal records have been reported by NOAA and ITIC. The Tonga tsunami of May 3, 2006 was widely observed in the Pacific zone (double amplitude: Pago Pago 54cm, Maui, Hawaii 42cm, Crescent City 54cm). The Samoa tsunami of September 29, 2009 was also observed (semi-amplitude: Pago Pago 216cm, Hawaii 17-36cm, California 10-44cm). By judging from the diagram of the attenuation of wave-height with distance, the tsunami magnitudes are determined to be $m=2$ and $m=3$, respectively. The magnitude scales are normal for earthquake magnitude (M 7.9-8.0). The magnitude of the Samoa tsunami in September 2006 is $m=0$. The magnitudes of New Zealand tsunamis in August 2003, December 2004 and September 2007 are $m=1$ and the July 2009 tsunami is $m=0.5$. For earthquake magnitudes, the magnitude scales of the tsunamis in 2003 and 2007 are normal, but those of the tsunamis in 2004 and 2009 (earthquakes, >7.8) are the 1-2 grade low. The source areas of Samoa-Tonga tsunamis in May 2006 and September, 2009 located along the trough, and the New Zealand tsunamis in 2004 and 2007 near the Auckland Island. For the submarine earthquakes having $M>7.0$, the percentages of generating tsunamis were 54 % from Samoa to Kermadec and 61% in New Zealand since 1900.

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