

## Generation of the 2004 Sumatra-Andaman Tsunami and its implication

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The slip distribution of the 2004 Sumatra-Andaman earthquake is estimated using five tsunami waveforms observed at tide gauges and tsunami height data obtained from two satellite altimetry data. The coseismic vertical deformation surveyed along the coast of Sumatra Island, Nicobar Islands, and Andaman Islands, are also used to constrain the fault model. Our result is compared with the results obtained from seismic waveforms [Ammon et al., 2005] and from surface deformation data including the GPS observations [Subarya, et al., 2006] to understand the tsunami generation due to the earthquake.

The average rupture speed of the 2004 Sumatra-Andaman earthquake is estimated to be about 2 km/s from tsunami waveform analysis. The rupture extends about 1200 km toward north-northwest along the Andaman trough. The largest slip of 29m is estimated on the plate interface near the trench off the northwest coast in the Aceh province in Sumatra. This large slip should be responsible for large tsunami run-up heights of about 35m surveyed along the northwest coast of Aceh province in Sumatra Island. Another large slip of 10-15m is estimated on the plate interface near Nicobar Islands. The slip amount near Little Andaman becomes 6 m. The slip amount beneath North and Middle Andaman Islands are very small, about 1m. The total seismic moment is calculated to be  $8.2 \times 10^{22}$  Nm (Mw 9.2)

The slip distribution is similar to the result estimated using the seismic data by Ammon et al, [2005], but the amount of slip off the northern Sumatra in this study is larger than that estimated by Ammon et al., [2005], about 15m. Our slip distribution is also similar to the result estimated using the surface deformation data by Subarya et al. [2006]. Their slip amount of about 30m off the northern Sumatra is the same as that in this study. This can be explained by the slow rupture processes close to the trench which generate smaller seismic waves than the expected from the slip amounts. There is also possibility that the large tsunami was generated by the additional uplift near a toe of an inner trench slope with a large horizontal movement due to the large slip off the northern Sumatra. This type of the tsunami generation mechanism was suggested by Tanioka and Seno [2001] for the 1896 Sanriku tsunami earthquake.

### References

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