

## Rupture process of the 2004 Sumatra earthquake using teleseismic body waves

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The 2004 Sumatra earthquake was one of the largest earthquakes in recorded history, and had a ~1500 km long rupture of more than 500 seconds duration. To describe the whole rupture process of this earthquake, records of at least 500 seconds in duration were required for analysis. However, it is difficult to compute later phases using traditional rupture process analysis based on ray theory, which often uses the duration of analysis before the arrival of the later phases. In addition, such methods never compute a long period phase like a W phase. Although Ammon et al., (2005) inverted the rupture process using the Spectral Element Method which can compute the phases discussed above, they used body and surface waves at slightly long period range from 20 to 2000 seconds.

This study analyzes the rupture process of this earthquake using the Green's functions calculated by the Direct Solution Method (DSM). The Green's functions were computed up to 1 Hz for IASP91 model (Kennett and Engdahl, 1991) using the DSM software developed by Dr.Takeuchi (<http://www.eri.u-tokyo.ac.jp/takeuchi/software/>). The slip distributions were also determined using the waveform inversion scheme presented in Kikuchi et al. (2003).

The main results of waveform inversion are as follows: the moment magnitude,  $M_w$ , was determined to be 9.1; the source duration was 500 seconds; and the rupture velocity was 2.5-3.0 km/s. The synthetic seismograms matched well with the observations including the later phases and W phase. The largest slip area was estimated to be located from south west to west of the Sumatra islands, the second and third largest slip areas were estimated to be around the Nicobar islands, but almost no slip was found around the Andaman region.