RUPTURE PROCESS OF THE 2004 SUMATRA-ANDAMAN EARTHQUAKE

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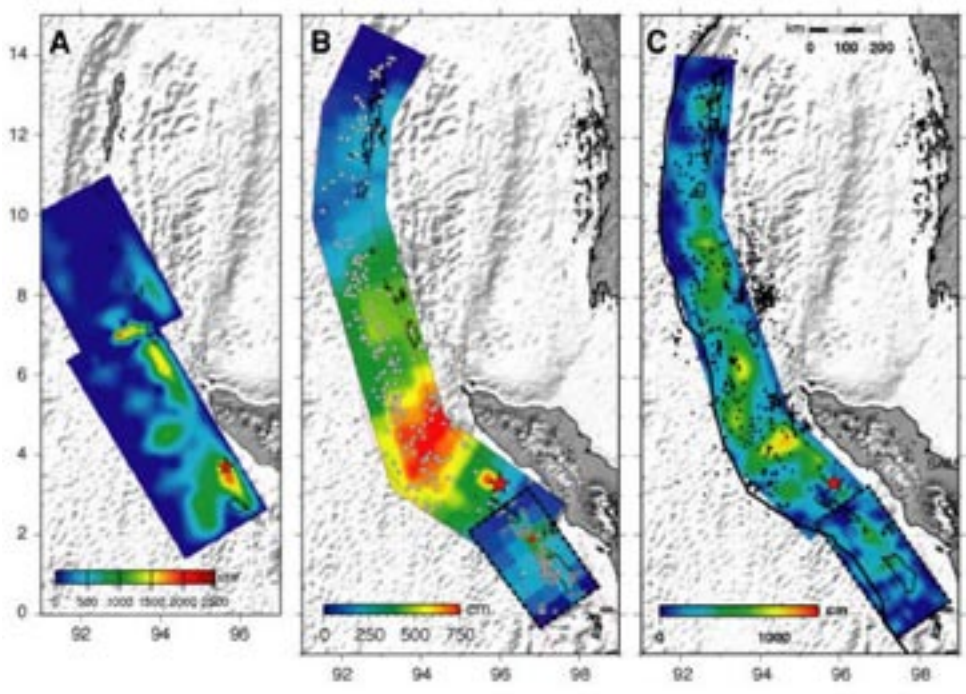
An extensive data set of broadband body wave and surface wave observations from IRIS GSN stations is used to constrain the rupture process of the 26 December 2004 rupture. The rupture initiated slowly, with small slip and a slow rupture speed for the first 40 to 60 seconds. Then the rupture expanded at a speed of about 2.5 km/s toward the north northwest, extending 1200 to 1300 km along the Andaman trough. Peak displacements reached about 15 m along a 600-km segment of the plate boundary offshore of northwestern Sumatra and the southern Nicobar islands. Slip was less in the northern 400 to 500 kilometers of the aftershock zone, and at least some slip in that region may have occurred on a time scale beyond the seismic band.

Ammon, C., et al., Rupture process of the 2004 Sumatra-Andaman earthquake, Science, 308, 1133-1139, 2005.

Supported by NSF grants EAR-0125595, EAR-0337491.



(A) Fault slip 168s after rupture initiation estimated by using 20 azimuthally distributed teleseismic SH waveforms. The rupture model consists of two faults, the first having a strike of 329° and a dip of 8° and the second having a strike of 333° and a dip of 7°. (B) Slip distribution from analysis of intermediate period surface waves and long-period seismograms. While small-scale features are averaged out, this model provides an excellent fit to all long period seismic observations for the event. (D) Slip distribution obtained using teleseismic body waves (50 to 200 s), intermediate period three component regional waves (50 to 500 s) and long-period teleseismic waves (250 to 2000 s).