

A role of splay fault in tsunami generation of the 2004 Sumatra Andaman Earthquake

Wonn Soh[1]; Hideaki Machiyama[2]; Kenji Hirata[1]

[1] JAMSTEC; [2] KOCHI/JAMSTEC

The giant tsunami just after the Sumatra-Andaman Earthquake of 26th December 2004 (Mw 9.3) hit the Indian Ocean coast. It was higher and more devastating than predicted from the seismic records. Two months after the earthquake we conducted a research cruise around the tsunami source area over the outer arc high in the area off northern Sumatra. By ROV observation, we discovered a surface break of the earthquake fault as the co-seismic rupture on the trenchward edge of the outer arc high. Here the seafloor was intensively and freshly shattered, particularly on the hanging wall of the fault thrust. Aftershock distribution using OBS supports the interpretation that the co-seismic rupture was displaced in association with a splay fault that propagated from a low-angle detachment. A tsunami inversion experiment that takes the splay fault into consideration suggests us that the seafloor can be significantly uplifted particularly in the area above the splay fault and that the total amount of co-seismic slip was suits with a GPS observation data to be significantly smaller than that predicted by widely accepted rupture-to-accretionary-toe hypothesis. Our results demonstrate a role of the splay fault to cause a hazardous tsunami in trench-type giant earthquake.