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Seismic activity near the Sunda and Andaman trenches

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Subduction zones are generally characterized by well-defined inclined seismic zones extending, in some cases, down to about 670 km deep beneath the Earth. The Sumatra subduction zone is characterized by the Indo-Australia Plate subducting beneath the Sunda plate and Andaman micro plates about 55 mm/yr, causing seismic activity along the plate boundary. We therefore try to investigate the seismic activity of the shallow part of Sumatra Subduction zone near the Sunda and Andaman trenches.

Hypocentral data obtained from the Data Management Center at the Incorporated Research Institutions for Seismology for the period from January 1964 to December 2010 of magnitude greater than 4.3 were used for the analysis. Spatial distribution of focal mechanisms was analyzed to investigate the geometry of faulting during earthquake fault slip using the data available from the Global Centroid Moment Tensor solution database for the period from January 1976 to April 2011.

Seismic activity of the shallow part of Sumatra subduction zone near the trench and outer-rise region was analyzed by using earthquake locations and their focal mechanism solutions. The study region was divided into 5 sub regions and in each sub region, the focal mechanism solutions were analyzed according to the depth variation of bathymetry. Pressure axes, Tensional axes and Null axes of earthquake faults were plotted and the distribution of the P, T, and N axes of focal mechanisms were investigated. The results of the study can be concluded as given below.

The present study shows that normal faulting events are recorded more than the reverse faulting events in the outer-rise region. In the near trench of the region, reverse faulting events were observed more than the normal faulting events and more reverse faulting events were observed in the shallow part of the trench. Although only the focal mechanism solutions of large events were used for the analysis which may have location errors, the results of the present study agree reasonably with those obtained for the other subduction zones. Patterns of hypocenter distribution and focal mechanisms found in this study are almost the same as that found under the outer-rise/outer-trench slopes of subduction zones by previous investigators of other subduction zones. The characteristics of these focal mechanisms for the shallow seismic zone near the trench region may be due to the bending of the subdcting plate near the trench.

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