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Stress heterogeneity and its impact on seismicity pattern along the equatorial bifurcation zone of the Great Sumatran Fault, Indonesia

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Abstract

A stress transfer modeling revealed the stress heterogeneity and its correlation with the seismicity pattern in the bifurcation zone of the Great Sumatran Fault (GSF), where the GSF is divided into two separate sub-parallel segments up to 35 km apart, i.e. Angkola and Barumon, forming a strike-slip duplex at around equator. The analysis was conducted using a seismic catalog compiled from five institutions, i.e. the Indonesian Agency for Meteorology, Climatology, and Geophysics (BMKG), United States Geological Survey USGS), Harvard and Global Centroid Moment Tensor (GCMT), International Seismological Center (ISC), and Geoforschungszentrum (GFZ) Germany, in the period of 1970-2017. Our frequency-magnitude distribution analysis indicates that this zone has a high stress regime. Especially at the tip of the bifurcation zone, in which 20° clockwise rotation of principal stress and 20% increase in stress ratio are observed from the stress inversion. Consequently, events with magnitude larger than 6.0 are concentrated in this area. In addition, our stress transfer modeling reveals the mechanism of the stress heterogeneity at the bifurcation zone and a possible interaction between segment ruptures. Two main internal structures perpendicular to the strike-slip duplex are also observed from the displacement vector. Due to its high

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