

Long-term seismic quiescence and activation anomalies preceding to the 2004 Sumatra and the 2005 Nias earthquakes

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I find long-term precursory seismic quiescence and activation anomalies before the 2004 Sumatra (M_w 9.1) and the 2005 Nias (M_w 8.6) earthquakes. An earthquake catalog created by International Seismological Center is analyzed between 1964 and 2004, including 1153 earthquakes shallower than 100 km with the body wave magnitude of $5.0 \leq M \leq 6.0$. A detailed analysis of the earthquake catalog using a gridding technique (ZMAP) shows that the 2004 Sumatra and the 2005 Nias earthquakes are preceded by not only a seismic quiescence anomaly started in December 1987, but also a seismic activation anomaly started in July 1989. The quiescence and activation areas are located very closely each other between 2S and 6N, which cover the area around the rupture initiation point of the 2004 Sumatra earthquake and the whole area ruptured by the 2005 Nias earthquake. The observed spatial pattern of quiescence and activation can be explained by stress perturbation due to a long-term slow slip event located on the two main shock faults, which is predicted by a numerical simulation [Kato *et al.*, 1997].

Kato, N., M. Ohtake, and T. Hirasawa (1997), Possible mechanism of precursory seismic quiescence: Regional stress relaxation due to preseismic sliding, *Pure Appl. Geophys.*, 150, 249-267.

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