

Tectonic landform and paleoseismic activity of the northernmost Sumatran fault, Aceh Province, Indonesia

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The Sumatran fault is a major arc-parallel strike-slip fault that accommodates much of the right-lateral component of oblique subduction of the Indian-Australian plate beneath the Sunda plate. The 1900-km-long fault is divided into multiple segments, some of which ruptured the surface during the moderate to large historical earthquakes. The northern Sumatran fault in Aceh Province has not ruptured in the past 120 years and the seismic potential of the fault there is considered to be high. Since 2012, we have mapped the northern Sumatran fault based on interpretation of ALOS (Advanced Land Observing Satellite) PRISM (Panchromatic Remote-sensing Instrument for Stereo Mapping) satellite images taken between 2007 and 2011. We also conducted several campaigns of geologic field observations. The Sumatran fault in the study area is composed of the Aceh segment and Seulimeum segment. The Aceh segment is the direct northwestern extension of the main fault trace southeast of the study area. The Seulimeum segment lies east and branches northward from the Aceh segment, and is characterized by much more pronounced tectonic geomorphic features than the Aceh segment, suggesting that the late Quaternary slip on the northern Sumatran fault is mainly accommodated by the Seulimeum segment. We conducted a trenching survey on the Seulimeum segment at Lamtamot where fluvial terrace is cut by the fault. We identified geologic evidence of three seismic events after AD1280. Because there was no large recorded earthquake near the trench site in historical catalogue that dates back to AD1892, the average recurrence interval of surface-rupturing earthquakes on the Seulimeum segment is estimated to be less than 300 years.