Geophysical Research Abstracts,
Vol. 11, EGU2009-9548, 2009
EGU General Assembly 2009


# Continued earthquake hazard in Northern Sumatra: Ground shaking potential of future earthquakes

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Over the last half decade, a series of major subduction zone earthquakes have ruptured a large part of the Sunda trench, putting the high earthquake hazard of this region into focus. The sequence started with the great $M_w$=9.3 event of 26 December 2004 and was followed by an $M_w$=8.7 event on 28 March 2005 and two further events ($M_w$=8.4 and $M_w$=7.9) on 12. September 2007. The major subduction zone earthquakes have been propagating southwards along the trench, and currently the remaining stress is expected to be released along the subduction zone in a long stretch from the Andaman Sea in the north to the southernmost extension of the 2007 ruptures, especially in the southernmost part close to the Sunda Strait. However, there is an additional and significant hazard due to potential earthquakes along the Great Sumatran Fault (GSF), a major right-lateral strike-slip fault parallel to the western coast of Sumatra. The GSF accommodates the trench parallel component of plate convergence along the Sunda trench where strain partitioning is a result of the oblique collision. There has been no significant earthquake during the last two centuries along the northern part of the GSF, which is considered a seismic gap. Furthermore, the occurrence of subduction earthquakes along the Sunda trench has brought the structure closer to rupture. The GSF is assumed to be capable of producing earthquakes with magnitudes up to M=7.9, the largest known event occurred in 1892 with M=7.7. It is therefore urgent that the seismic hazard in Banda Aceh and its surroundings be re-evaluated in the light of the recent earthquakes. Ruptures along the GSF are used as future scenarios and the distribution of ground motion is computed based on a hybrid broad-band simulation method. Results indicate, for example, that the occurrence of an $M_w$=7.7 event on the northernmost segment of the GSF, with rupture propagating towards Banda Aceh, will have severe consequences for the region. Furthermore, it is emphasized that also smaller earthquakes can cause widespread damage in the region, especially considering possible amplification effects due to local geological conditions.