Geophysical Research Abstracts,
Vol. 11, EGU2009-7788-1, 2009
EGU General Assembly 2009

Large > 10 m coseismic oblique slip along the rupture of the Mw 7.9 12 May 2008 Wenchuan earthquake (Sichuan, China)

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At 02:28:01pm (06:28:01utc), on 12th May 2008, an Mw 7.9 (Ms 8.0) earthquake ruptured in the Longmen Shan along the eastern margin of the Tibetan Plateau in Sichuan, China. The epicenter was located inside the mountain range (N30.989°, E103.329°) in Wenchuan County. Field survey after the event allowed locating ruptures along the NE striking Longmenshan fault belt, that show mainly oblique right-lateral thrusting in agreement with the centroid moment tensor (GCMT, USGS). The earthquake produced several coseismic surface rupture zones striking SW-NE with a total length of more than 300 km. The main rupture zone is located along the Yingxiu-Beichuan fault and extends almost continuously for about 275 km. The Hanwang rupture zone is about 85 km long and follows the southern part of the Guanxian-Anxian fault striking sub-parallel to the YBF and about 15-20 km to the southeast. Another rupture zone the Xiaoyudong rupture zone strikes NW for about 6 km and links the Yingxiu and the Hangwang faults. All ruptures show oblique NE-SW striking right-lateral thrusting, except the NW-SE striking Xiaoyudong fault, which is a NE directed left-lateral thrust. The main Yingxiu-Beichuan rupture records the largest oblique offset with maximum values of about 9-10 m vertical throw and equivalent horizontal displacement, implying more than 10 m of surface slip on the main thrust fault plane. The rupture follows preexisting degraded scarps that were not identified before the rupture emphasizing the need for exhaustive active fault and geomorphic studies to be carried along the Longmen Shan margin of the Tibetan plateau.