Report on the faulting mechanism of the Mw 7.9
Wenchuan earthquake, China

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The magnitude (Mw) 7.9 Wenchuan earthquake occurred on 12 May 2008 in the
Longmen Shan region, the transition zone between the Tibetan Plateau and the
Sichuan Basin, China, resulting in extensive damage throughout central and western
China. Official estimates of casualties released by the Chinese Government as of 4
June 2008 include 69,122 confirmed deaths, 373,606 injured, and 17,991 missing
persons.

Preliminary teleseismic waveform analysis shows that the earthquake
propagated unilaterally to the northeast for ~300-km-long on a thrust fault dipping at
a low angle (~30°) (Chinese Earthquake Network Center, 2008; United States
Geological Survey, 2008; Harvard University, 2008). On the basis the preliminary
analytical seismic mechanisms and determined epicentral location, we have inferred
that the earthquake was triggered by the pre-existing Longmen Shan Thrust Belt
striking northeast-southwest.

To understand the seismic faulting mechanism and surface deformation
features associated with the earthquake, including rupture length and slip distribution,
our survey group traveled to the epicentral area immediately after the earthquake.
Here we report the main results of our field investigations that show deformation
features resulting from the Wenchuan earthquake. Our field investigations reveal that
a 250-300-km-long surface rupture zone formed during the 2008 Mw 7.9 Wenchuan
earthquake along the Longmen Shan Thrust Belt. The 2008 Wenchuan earthquake
occurred in response to compressive tectonic stress oriented perpendicular to the
Longmen Shan Thrust Belt and resulting from relative motion between the Tibetan
Plateau and the Sichuan Basin.