# Co-seismic landslides induced by the 2008 Wenchuan Mw 7.9 earthquake, as revealed by ALOS PRISM and AVNIR2 imagery data

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The magnitude (Mw) 7.9 Wenchuan earthquake occurred on 12 May 2008 in the eastern marginal zone of the Tibetan Plateau, at the boundary with the Sichuan Basin, China (Lin et al., 2009), resulting in widespread damage, approximately 70,000 confirmed fatalities, 17,000 missing persons, and millions left homeless. Field investigations reveal that the earthquake produced a 285-km-long co-seismic surface rupture zone with a maximum vertical displacement of 6.5 m along pre-existing active faults of the Longmen Shan Thrust Belt (Lin et al., 2009). Numerous landslides induced by the earthquake occurred in a wide corridor about the co-seismic surface rupture zone (figure 1), leading to the damming of many rivers in intermountain areas and resulting in serious secondary damage after the main shock; however, the general distribution and structural features of landslides induced by the Wenchuan earthquake remain unclear because of limited access to the disaster area. To overcome this problem, remote sensing provides an effective method to obtain an overview of earthquake-induced landslides, providing a constraint on the nature of co-seismic ground deformation produced by strong earthquakes over a wide area. Satellite remote-sensing data acquired before and after an earthquake have been used in previous studies to gain an understanding of the ground deformation features of co-seismic surface ruptures produced by large earthquakes.

In this study, we report the results of an analysis of co-seismic landslides using high-resolution remote sensing data, including ALOS (Advanced Land Observing Satellite), PRISM (Panchromatic Remote-sensing Instrument), and AVNIR 2 (Advanced Visible and Near Infrared Radiometer type 2) data acquired before and after the 2008 Wenchuan earthquake. These data were released immediately after the earthquake by JAXA (Japan Aerospace Exploration Agency). Complementary fieldwork was conducted to validate interpretations made from analyses of remote sensing imagery data. Interpretations of remote sensing images, combined with fieldwork, reveal that co-seismic landslides are mainly restricted to a corridor of less than 18 km in width about the co-seismic surface rupture zone along a length of larger than 285 km along pre-existing active faults of the Longmen Shan Thrust Belt. The landslides mainly occurred upon steep slopes (dips of 30-75 degree). The distribution and topographic features of co-seismic landslides indicate a close relationship with seismic slip along the co-seismic surface rupture zone. The locations of landslides are controlled by the tectonic topography developed along pre-existing active faults of the Longmen Shan Thrust Belt. Our results demonstrate that remote sensing techniques provide a powerful tool in identifying co-seismic landslides produced in intermountain regions by strong earthquakes.

Reference

Lin, A., Ren, Z., Jia, D., and Wu, X., 2009. Co-seismic thrusting slip and slip distribution produced by the 2008 Mw 7.9 Wenchuan earthquake, China, Tectonophysics, in press.