



## **The effect of the 2008 Mw 7.9 Sichuan earthquake on regional landslide patterns between 2001 and 2012**

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Large earthquakes have a major impact on patterns of regional landsliding. Here, we utilise a twelve-year record of forest cover change in the region of the 2008 Sichuan earthquake in order to assess geomorphic factors contributing to slope instability in years prior to, during, and after the earthquake. The satellite-based catalogue of forest cover change developed by Hansen et al. (2013) compares favourably with results from a study of earthquake-induced slope instability undertaken by Parker et al. (2011), indicating that our correlation of tree loss with regional landsliding is reasonable. While we cannot account for slope stability on unvegetated slopes, the temporal nature of the dataset allows us to account for the presence of pre-existing landslides or barren rock slopes which have complicated previous studies.

We assess a number of geomorphic factors including slope, aspect, curvature, ruggedness, height and distance from river channels, and the hydrological slope (calculated using the downslope distance to river channels). In order to account for spatial distributions as a result of local seismicity, interpreted landslide locations were normalised against a randomly generated distribution of points seeded using observed landslide concentrations within 1 km x 1 km cells. We find that while few metrics allow us to distinguish the 2008 data from the random dataset, aspect played an important role in determining susceptibility, and slopes with a greater hydrological slope demonstrate a greater susceptibility for failure. In addition, we observe a notable decrease in the elevation of landslides in the year of the earthquake, and progressive increase in elevations in successive years following. This may either be a result of retrogressive slope failure, or a return to 'normal' stability conditions in the four years following the earthquake.

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Parker, N. Robert; Densmore, Alexander, L.; Rosser, Nicholas J. et. al., 2011. Mass wasting triggered by the 2008 Sichuan earthquake is greater than orogenic growth. *Nature Geoscience* 4, 339-452.