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Surface Recovery of Landslides Triggered by 2008 Ms8.0 Wenchuan Earthquake (China): a Case Study in a Typical Mountainous Watershed

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The Ms8.0 Wenchuan earthquake that occurred on 12 May 2008 in southwestern China and triggered numerous landslides is one of the stronger events in the steep eastern margins of the Tibetan Plateau. The surfaces of these landslides have recovered gradually with vegetation, which provides useful information about the evolution of the environment as well as the long-term assessment of landslides after earthquakes.

The Mianyuanhe watershed shows many co-seismic landslides. The active fault passing through its center is selected as a study area with the aim to analyze the annual surface recovery rate (SRR) of landslides by interpretation of remote sensing images in five periods from 2008 to 2013.

The results are here described:

1. Although a large amount of loose deposits were transformed into debris flows, the surfaces of the landslides recovered rapidly with vegetation and almost no landslides occurred at new sites after the Wenchuan earthquake. In the year 2008, the exposed surface projected area (ESPA) of the landslides showed a total area of 56.3 km² and covered 28.9% of the study area, which was reduced rapidly to 19.1% in 2011 and 15.8% by 2013.
2. The study area was divided into four geologic units, including clastic rocks, melange zone, carbonate rocks and magmatic rocks. Smaller ESPAs and higher SRRs were found in the former two units versus the latter two.

3. A single large landslide shows an SRR lower than a group of smaller ones having an equal total surface, whereas the SRRs of debris flows are lower than those of rock falls and landslides.

4. The vegetation cover should return to the pre-earthquake level in approximately 2020, which indicates that the impact of the Wenchuan earthquake on landslides and debris flows activities would cease almost completely.

