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Analysis of post-earthquake landslide activity and geo-environmental effects

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Abstract:

Large earthquakes can cause huge losses to human society, due to ground shaking, fault rupture and due to the high density of co-seismic landslides that can be triggered in mountainous areas. In areas that have been affected by such large earthquakes, the threat of landslides continues also after the earthquake, as the co-seismic landslides may be reactivated by high intensity rainfall events. Huge amount of landslide materials created by earthquakes remain on the slopes will leads to a high frequency of landslides and debris flows after earthquakes which threaten lives and create great difficulties in post-seismic reconstruction in the earthquake-hit regions. So far only limited research has been done on the evolution of post-seismic landslides. This research aims to analyze the decay in post-seismic landslide activity in areas that have been hit by a major earthquake.

The study area is located in the epicenter area of the Wenchuan earthquake: the Yingxiu area, in Sichuan province, China (Fig.1). The area is located about 20 Km east to the epicenter of Wenchuan earthquake. The major active fault of the Wenchuan earthquake (Yingxiu-Beichuan fault) passes through the area. The area was seriously affected by ground shaking and fault rupture during the earthquake, and by co-seismic landslides, and has also witnessed a high frequency of post-seismic debris flows.

In order to obtain a better understanding of the potential threat of post-earthquake landslide, the study analyzes the factors that control post-earthquake landslide activity through making use of a series of remote sensing images which are taken on each year since the earthquake(Fig.2), Terrestrial Laser Scanning, and UAV stereo aerial photography to quantify the landslide volume change(Fig.3), as well as through numerical simulation of their initiation process. Currently the research is focused on quantifying and analyzing the volume change of the landslides.

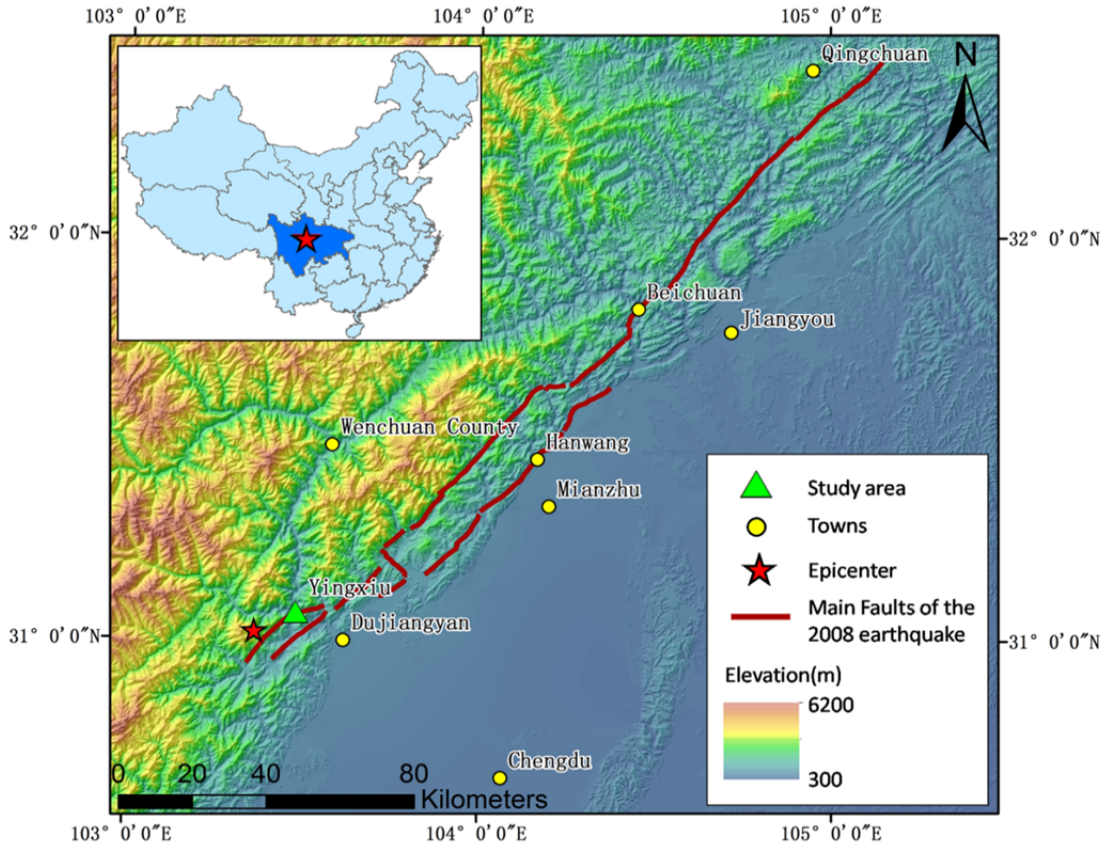

Figure 1. The location of the study area

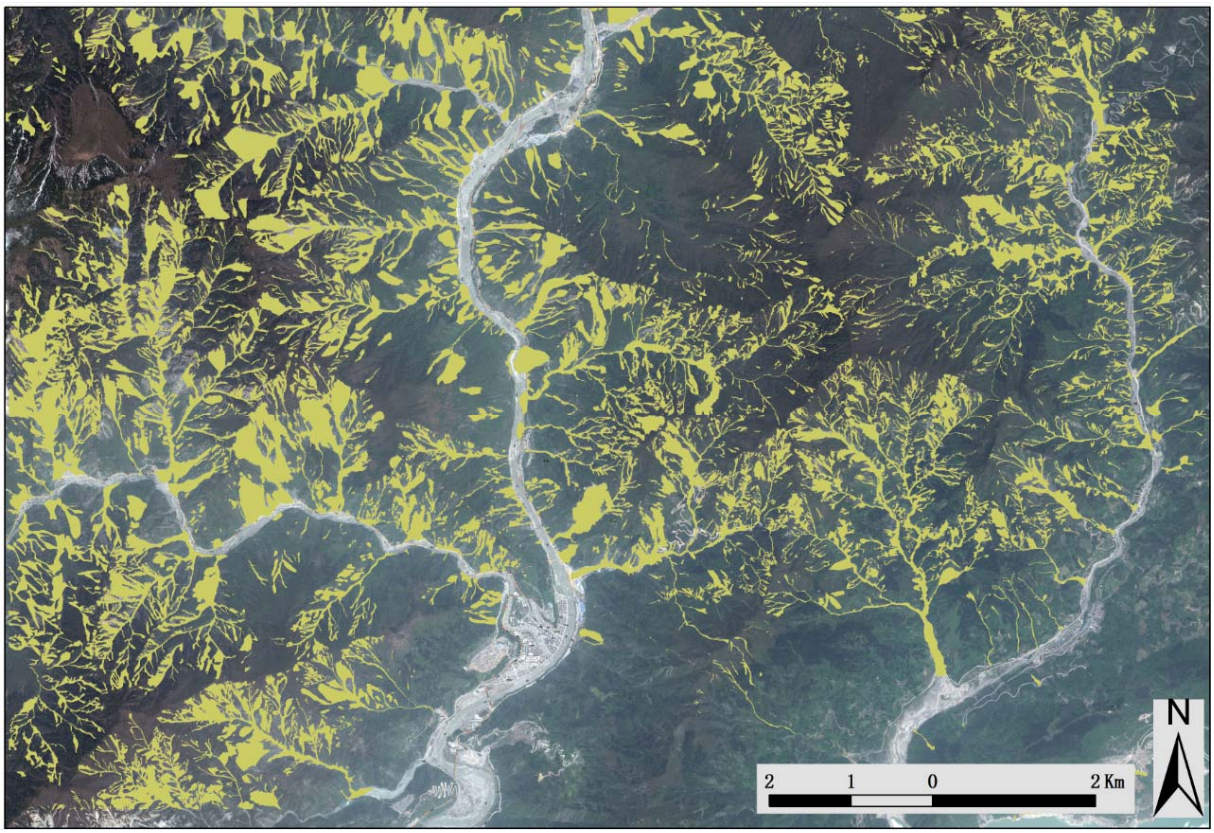

Figure 2. Detailed landslide inventory made based on the satellite image of 2011

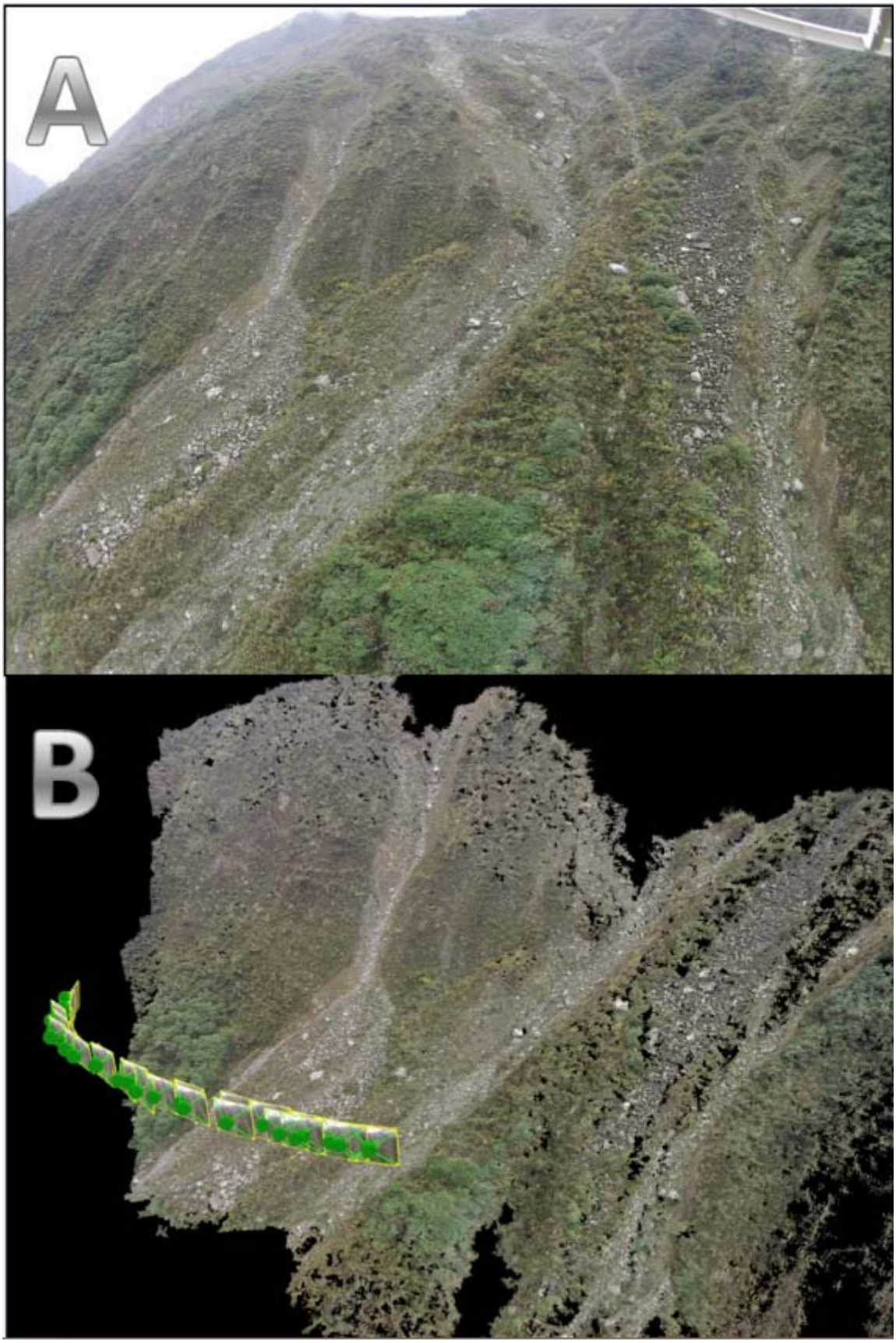

Figure3. Point cloud(B) generated from UAV stereo aerial photos(A). The green spots in B indicates where the aerial photos were taken.