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Topographic changes due to the 2004 Chuetsu earthquake

Zhikun Ren (1), Takashi Oguchi (2), Peizhen Zhang (1,3), and Shoichiro Uchiyama (4)

(1) State Key Laboratory of Earthquake Dynamics,Institute of Geology, China Earthquake Administration, Beijing, China (rzk@ies.ac.cn), (2) Center for Space Information Science, The University of Tokyo, Chiba, 277-8568, Japan, (3) School of Earth Science and Geological Engineering, Sun Yat-Sen University, Guangzhou, 510275,China, (4) National Research Institute of Earth Science and Disaster Prevention, Ibaraki, Japan

On 23 October, a Mw 6.6 earthquake occurred in Chuetsu, Niigata prefecture, Japan, which triggered more than 7000 landslides and greatly modified the local topography.
After the earthquake, a 2-m-resolution Light Detection and Ranging (LiDAR) Digital Elevation Model (DEM) was surveyed in the epicentral area in 2005. Recently, the high-resolution and multi-temporal Light Detection and Ranging (LiDAR) Digital Elevation Models (DEMs) or DEM generated from stereo pair of remote sensing images have been proven valuable in monitoring geomorphic, co-seismic and volcanic surficial deformations. Hence, we studied the topographic changes due to the Chuetsu earthquake using pre-earthquake 10-m-resolution and post-earthquake 2-m-resolution DEMs data. The slope angle, relief and roughness all increased, indicating the Chuetsu earthquake is roughening the topography in the epicentral area. By subtracting the pre-earthquake DEM from the post-earthquake DEM, we obtained the co-seismic landslide volume to derive catchment-scale average denudation depth. The denudation distribution indicates correlation with local relief, as well as the uplifting caused by fault-related folding on the hangwall of Muikamachi fault.