

Damage Detection to the 2004 Niigata-ken Chuetsu Earthquake Using RADARSAT Images

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Abstracts

Recent earthquakes like the 1994 Northridge and the 1995 Kobe earthquakes, have reminded us of the importance of grasping damage information of built-up areas at an early stage in order to resume normal activities and for restoration planning. Synthetic aperture radar (SAR) has a remarkable capability to record the physical value of the earth's surface, regardless of weather conditions or the amount of sunlight. A strong earthquake (Mw 6.6) occurred in the middle part of Niigata prefecture, Chuetsu region, Japan in the evening of October 23, 2004. A substantial number of wooden houses collapsed in the town of Kawaguchi by this earthquake. Damage to lifelines, such as roads, highways, railroads, electrical power, gas, and water, was also significant. The most notable damage was numerous landslides which occurred in the upland village of Yamakoshi, and they destroyed the entire village. Aerial photographs and a high-resolution satellite, IKONOS, image captured the damaged areas on the next day of the earthquake. Canadian SAR satellite, Radarsat, also observed the area by the fine beam-mode, which acquires the earth surface with approximately 8 m resolution, on 2 days after the event. In this paper, first, we introduced a building damage detection technique that was developed based on the datasets of the 1995 Kobe, Japan and the 2003 Bam, Iran earthquakes using SAR images and applied to pre- and post-event Radarsat SAR images of the 2004 Niigata earthquake. Then, the limitation of the damage detection by the proposed method in built-up areas was revalidated. In the upland regions, we also examined the possibility to identify the large-scale landslides using SAR data comparing with the IKONOS image.