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Building damage mapping for the 2006 central Java, Indonesia earthquake using satellite SAR imagery

M. Matsuoka (1), F. Yamazaki (2)

(1) Earthquake Disaster Mitigation Research Center, NIED, Japan, (2) Dept of Urban Environment Systems, Chiba University, Japan

Synthetic aperture radar (SAR) has the remarkable ability to examine the Earth's surface, regardless of weather or sunlight conditions. A SAR-based remote sensing system can assess the damage to areas affected by large-scale disasters at an early stage. This can aid in recovery planning. On May 27, 2006 an earthquake struck Yogyakarta, Central Java, Indonesia, causing human suffering and severe building damage. PALSAR (Phased Array Type L-band Synthetic Aperture Radar) onboard the Japanese ALOS (Advanced Land Observing Satellite) imaged the affected areas on the morning following the earthquake. The European satellite, Envisat/ASAR, also imaged a wider area of central Java two days after the event. This paper applies a damage detection technique based on the difference of pre-seismic correlation coefficient and co-seismic correlation coefficient calculated from the three time-series images of the SAR dataset covering the Central Java earthquake. From a macroscopic point of view, the estimated damage distribution closely matched damage assessment derived from high-resolution satellite images and field surveys. Then, we examine the relationship between the difference in correlation coefficients and severe building-damage ratio derived from the field survey data. Finally, the sub-district-based mapping of severe damage ratio using SAR imagery is performed and we demonstrate that the estimated result shows the good agreement to the damage statistics of the earthquake.