

Landslide Investigation and Measurement in Hong Kong Based on Improved PSInSAR Approach

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Abstract: Persistent Scatterer Interferometry (PSInSAR), so-called Multi-Temporal SAR Interferometry (MT-InSAR), which extracts the temporal ground deformations using time series SAR images over the specific area, has been proven to be an effective and powerful tool for monitoring slope displacements with millimetric precision. However, conventional PSInSAR methods, based on hypothesize of slowly linear velocity movement or neighborhood high correlation, are not suitable to investigate the typical landslide of Hong Kong. Because most of the landslides here are very small in area and the main mechanism is brittle failure (i.e. the little place changed suddenly with neither prior sign of settlement nor any creep movement before). To overcome the limitation of conventional PSInSAR applications in landslide studies, a slope instability-oriented Small Baseline Subsets (S-SBAS) algorithm has been proposed and applied in this paper. As a research data source, 45 high resolution TerraSAR-X images collected between 13, May, 2008 and 26, Dec., 2010 over Hong Kong have been used for large area investigation and landslide measurement. And the landslide distribution map and related in situ data provided by relevant government have been used for validation purpose. Finally, the investigation results derived by S-SBAS approach are in good agreement with the real distribution of landslide in Hong Kong and the ground displacement values are reliable also.

Keywords: PSInSAR, landslide investigation, slope instability, brittle failure, ground displacement