Detecting the landslide vulnerability in the epicentre of Wenchuan Earthquake via SBAS-InSAR method

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Valleys in the epicentre of Wenchuan Earthquake (Sichuan Province, China) are severely subjected to landside risks partially due to the persistent influences of the serious earthquake in 2008. Without enough regionally in-situ monitoring measures, the method of multi-temporal, differential interferometric synthetic aperture radar (D-InSAR) provides an efficient to monitor the surface subsidence and thus the landslide vulnerability. In this study, we used the Sentinel Satellite Images (2015-2018) to extract the subsidence information along river valleys near the Wenchuan Earth epicentre, which was well validated by the in-situ observation of one GPS station (RSME=1.6 cm, $p<0.01$). Our results showed the persistent ground subsidence (1.5 mm yr^{-1}, $p<0.01$) at many places, which was also related to terrain aspect besides to the well-proved conditions of slope, vegetation cover and soil layer. This fact that implied the terrain aspect should be taken into accounts in landside vulnerability analyses, because precipitation is locally more abundant in windward places. Results emphasized the higher vulnerability of landslide in summer, which could be attributed to more precipitation during summer in the study area. Our study extracted over 100-km valleys (and especially ~50 places) with high landslide vulnerability (subsidence rate > 1.20 mm yr^{-1}), which should be paid high-prior careful attentions so as to avoid potential geological disasters.