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Investigating potential landslide combing time-series InSAR with detailed geomorphological mapping

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People are used to live, produce and construct along rivers in the bottom of valleys in mountainous area due to the limitation of available water and land resources. Correspondingly, catastrophic landslide hazards often occurred in this area causing massive casualties and property loss. In addition, river-side landslides could block river and pose flood risk to upstream and downstream due to the increase of water level and potential failure of the debris dam. The Interferometric Synthetic Aperture Radar (InSAR) technique is one of the most efficient methods for ground deformation monitoring, landslide observation, interpretation and assessment at regional scale, due to its large coverage, high spatial resolution, high accuracy, and long-term acquisition under all weather conditions. In this study, we use multi-temporal and multi-band SAR data and time series InSAR to investigate slow-moving and potential landslides in a mountainous region with steep topography for the period December 2007 - August 2017 using the Small Baseline Subsets (SBAS) technique. This enabled the identification of 11 active earthflows, 123 active landslides with deformation rates exceeding 100 mm/yr and 221 new instabilities added into the pre-existing landslide inventory map. Time series analysis of a typical earthflow reveals that seasonal velocity changes are characterized by comparatively rapid acceleration and gradual deceleration with distinct kinematic zones with different mean velocities, although velocity changes appear to occur synchronously along the landslide body over seasonal timescales. The observations suggest that the post-seismic effects (acceleration period) on landslide deformation last some 6-7 months.