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Characterizing Landslide deformation in Annapurna range of the Himalayas using C-band and L-band InSAR observations

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The northern part of Nepal is located on Himalaya Mountains and is prone to have a lot of rain-induced landslides. Assessing the kinematics of landslides in those areas is an important topic to better understand landslide processes and mitigate hazards associated with them. The study area in this research consists of 3 landslides in Annapurna range of the Himalayas close to the Nepal-China border. The aim of the study is to evaluate the potential of SAR data for deriving the kinematics of landslides in this region. In order to achieve this goal we used the InSAR (Interferometric Synthetic-Aperture Radar) technique utilizing data from ALOS-1 satellite between the years 2007-2011 and from Sentinel-1 satellite between 2014 and 2016. Ground surface deformation is analyzed first by performing the PSI (Persistent Scatterers Interferometry) and SBAS (Small Baseline Subset) time-series analysis approaches to derive ground deformation and velocity in line-of-sight (LOS) direction from the satellite to the ground. To better evaluate the kinematics of landslides, LOS motions derived from InSAR analyses are projected to motion along the slope direction considering the area's local topography and satellite's incidence and heading angle parameters. Moreover, a post-processing strategy is implemented and the points with higher sensitivity to the satellite's acquisition geometry are considered for final ground surface deformation map which produces better and more accurate results. Finally, in order to assess the seasonal variations in the kinematics landslide, the impact of the seasonal heavy rainfall as a major triggering factor for landslides is analyzed and the results are discussed in the poster.

Index Terms: Landslide, ALOS-1, Sentinel-1, InSAR, Time-series analysis