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Satellite Remote Sensing Investigation of 21 July 2020 Shaziba Landslide, China

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We present the results of remote sensing analysis of deformation related to the 21 July 2020 Shaziba landslide in China. The landslide, which occurred following the heavy precipitation from June to August 2020, is located at the Qingjiang River, approx. 30 km from Enshi City in Hubei Province of China. It destroyed over 60 houses, and by blocking the course of the river, formed a landslide dam, which threatened the safety of people and infrastructure downstream. Although Shaziba landslide occurred in form of reactivation of an old landslide, the landslide prone slope was not instrumented prior to this most recent failure. Therefore, high-resolution remote sensing imagery was used as a very effective source of information for a detailed investigation of the evolution of this slope failure. We collected the satellite remote sensing data covering a time period from June 2016 to July 2021 and comprise optical and radar data. Firstly, cross-correlation analysis using satellite optical imagery from Planet and Sentinel-2 systems was used to retrieve the lateral direction and magnitude of landslide movements. Next, multi-temporal interferometry (MTI) analysis based on Sentinel-1 and TerraSAR-X SAR data was exploited to obtain pre- and post-failure deformation. Results from different MTI techniques including Persistent Scatterer (PS), Small Baseline Subsets (SBAS), and Eigendecomposition based Maximum-likelihood-estimator of

Interferometric phase (EMI) were compared to evaluate the most suitable method for InSAR time-series analysis of deformation related to the evolution of Shaziba landslide. Finally, several high-resolution DEMs derived from TanDEM-X (TDX) data were analyzed using repeat-pass interferometry and stacked together to compensate for the errors related to DEM alignment in order to precisely estimate the landslide volume. The results highlight how the integration of various remote sensing sensors helps to gain a better understanding of landslide evolution process and characterization.