Assessment of Active Landslides and Displacement Dynamics in Northern Hunza-Nagar District, Pakistan

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Hunza-Nagar district in northern Pakistan is constantly threatened by landslide activity due to its rugged terrain. The present study focused on the northern area of Hunza-Nagar, aiming to demarcate active landslides and analyze their temporal displacement dynamics. InSAR-based temporal monitoring was conducted using Sentinel 1 images from January 5, 2019, to January 15, 2023, with the LiCSBAS package. The study identified five active landslides: Hummari Bala Landslide (V1), Shabbir Abad Landslide (V2), Hakalshal Landslide (V3), Gojal Landslide (V4), and Nagar Landslide (V5), along with a previously reported active but now dormant Mayoon Landslide. The temporal displacement of these landslides reveals varying velocities (V1 =106.3 mm/yr, V2 = 115.7 mm/yr, V3 = 64.2 mm/yr, V4 = 41.2 mm/yr, and V5 = 52.2 mm/yr). These dynamic movements pose a significant threat, indicating an increased risk of future landslides. Consequently, mitigation of these landslide bodies is imperative to minimize potential damage in the area. The study also conducted a correlation analysis between temporal displacement, seismic, and rainfall data, revealing that seismic events and rainfall are the predominant factors contributing to the observed movements. These findings provide valuable insights into landslide dynamics in a vulnerable region, laying a foundation for proactive measures to mitigate hazards associated with large-scale landslides in the northern part of the Hunza- Nagar area.