



Monitoring the post-failure deformation of a consequent bedding rockslide by TS-DInSAR technique

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The Wenchuan earthquake triggered the failure of the bedding rock along the soft rock intercalation with large amount of debris accumulated on the smooth slip surface in Xujiaping rockslide. The upper rock slope of the soft rock intercalation adjacent to the main sliding rock mass still has the possibility of bedding displacement, as well as the debris on the slip surface. This paper is primarily concerned with the post-failure progressive deformation of the debris on the slip surface and the lateral consequent bedding slope with soft rock intercalation of Xujiaping rockslide. The slope structure, lithology and the distribution of the deposition and source area of the rockslide is investigated. Meanwhile, a stack of C-band SAR images acquired by the ESA Sentinel-1 satellites were used to carry out time-series differential synthetic aperture radar interferometry (TS-DInSAR) survey in 2018. The InSAR data show the post-failure deformation of Xujiaping rockslide area. The debris-cover area on the slip surface the rockslide have a maximum displacement rate detected of 46.48 mm/year and -38.95 mm/year along the line of sight (LOS) of the satellite. The monitoring points on the lateral rock slope show displacement rate ranging from 8.44 to 13.60 mm/year along the LOS, which indicates the similar direction of the movement along the slip surface. Through the field investigation, many fractures perpendicular to the bedding slip surface had been developed after the earthquake on the lateral slope of Xujiaping rockslide. These fractures could be the boundary condition of potential sliding discrete rock mass. Moreover, the structure and morphology of the black shale slip zone are fragmented or muddy. The existence of bedding sliding in the lateral rock mass is thus demonstrated. Besides, the results of the possible movement path of the falling debris were simulated by Rockyfor3D software, which shows a high correlation with the deformation of debris accumulation on the slip surface. So the rock fall may cause the deformation of the debris accumulation on the rockslide. The preliminary studies throw light on monitoring the post-failure deformation of consequent bedding rockslide. And TS-DInSAR technique is an effective method for monitoring the post-failure evolution of geodisasters in the long-term observation scale.