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Field investigation and movement deposition scale forecasting of a typical high-locality landslide in the dry season

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Abstract: During the dry season of December 2020, two sliding subzones of the Qingliu landslide in southwest China slid out of stability, severely damaging the buildings on the slope. To investigate the mechanism and movement of landslides in the dry season, we employed high-resolution unmanned aerial vehicle mapping, electrical resistivity tomography, on-site union boreholes, groundwater detection, deep displacement monitoring, and numerical simulation to analyze the deep geotechnical structural characteristics, groundwater types and runoff paths, and destabilization range and movement processes at different times. Preliminary analysis showed that the slow infiltration of rainwater during the rainy season and infiltration of snow melt in winter, topography, and loess clay layers of the slide zone type are related to the triggers of landslide instability. Four layers of rock-soil stratification interfaces with different resistivity values, revealed by electrical resistivity tomographycomprising loess-like pulverized clay, gravelly pulverized clay, and bedrock, existed at different burial depths in the longitudinal section. Borehole and displacement monitoring revealed the existence of a primary slip surface and several secondary slip surfaces, with an average thickness of 16-22 m and a maximum daily displacement at the slip surface of approximately 2.29 mm. The deepest groundwater level of the water-bearing section in the borehole was 25.8 m, and it percolates and drains through fractures in the loess-like layer. Startup acceleration, deceleration pileup, front-edge pileup stopping, and middle- to rear-edge pileup stopping are the four primary discrete element simulation forecasting movement phases. The findings help deepen the understanding of similar dry-season landslides and their disaster-causing effects.

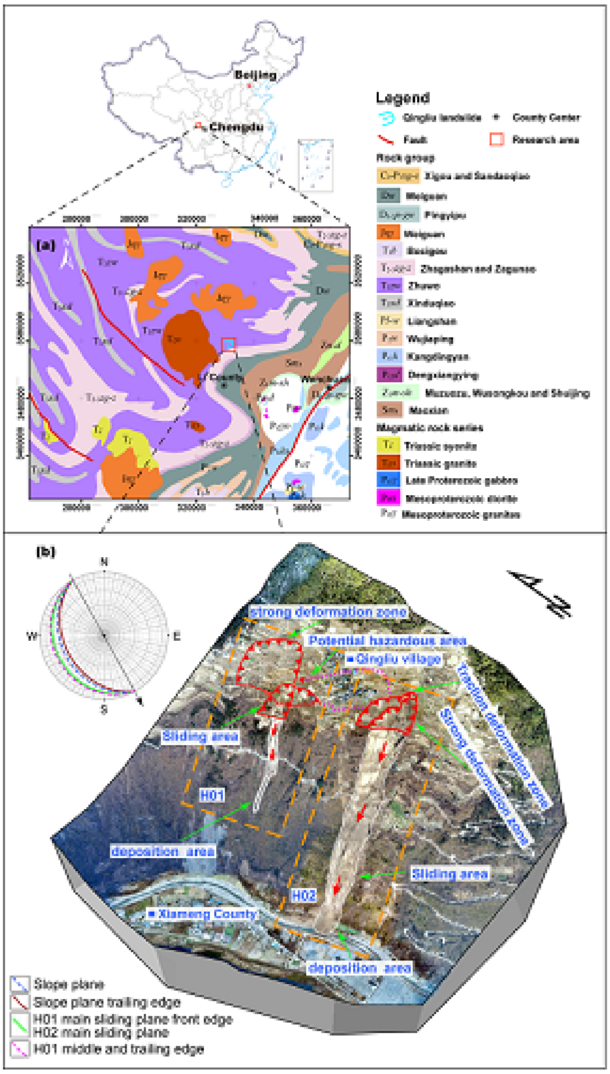

Fig. 1 Geographical situation and geo-tectonic setting of H01 and H02 zoning of Qingliu landslide, Li County, Southwest China. (a. 1:500,000 regional geological map; b. High-resolution UAV orthophotography and geometric interpretation)