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Failure mode and mechanisms of the Majiagou landslide in the Three Gorges reservoir, China

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There are more than 5000 landslides or potential landslides in the Three Gorges Reservoir area. The water impoundment of the Three Gorges Reservoir that began in 2003 has triggered numerous landslides, causing a huge loss of life and property. Failure mode and mechanism are the premises for stability evaluation and reinforcement design of landslide. This study uses the Majiagou landslide in Zigui County, Hubei province, as an example to study the failure mode and mechanism of landslides in the Three Gorges Reservoir area. The Majiagou landslide has severely deformed since 2003 and is now sliding at several centimeters per year, threatening the safety of people living on and around the landslide site.

Field investigations utilizing an integrated system of GPS monitoring sites, inclinometers and groundwater level gauges define slope surface movements, internal displacements, groundwater level and other conditions that are germane to the mode and mechanisms of failure.

The results suggest that the Majiagou landslide is a retrogressive landslide that presently contains two sub-landslides and two failure surfaces. The deformation and failure developed from the front to the back parts, with failure of the front sub-landslide opening up space for the back one to slide into. Our results suggest that the deformation of the Majiagou landslide is mainly triggered by the coupled action of reservoir water level changes and heavy rainfall; however, it is difficult to determine which one plays a major role. These findings should be useful for stability evaluation and reinforcement design of landslides in similar geological settings in the Three Gorges Reservoir area and other parts of the world.

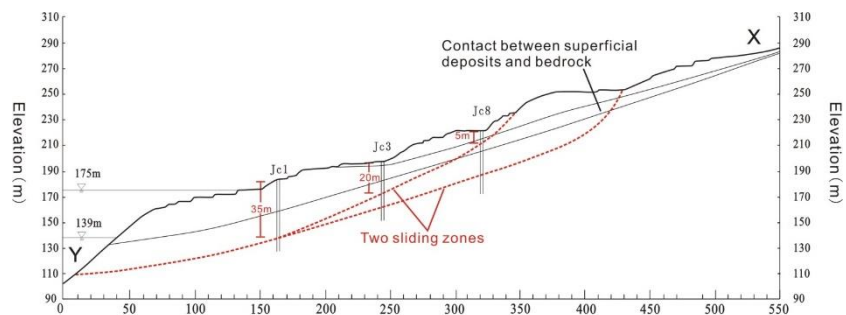


Fig. 1 Sketch map of failure mode of the Majiagou landslide

Keywords Three Gorges Reservoir; Majiagou landslide; Integrated monitoring system; Failure mode; Failure mechanism

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