



## **Real-time monitoring and early warning of Ganjingzi landslide in Wu Gorge, Yangtze River, China**

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Monitoring and early warning is one of the essential measures for landslides risk mitigation, with the goal of reducing major casualties and property losses. The construction of the Three Gorges Reservoir has induced a series of landslides reactivation, and some new instability problems also arisen. In order to detect these landslides with potential damages, to establish a real-time monitoring and early warning system is necessary. As a case study, a monitoring system for Ganjingzi landslide in the Three Gorge Reservoir area is described in this paper. The monitoring network includes global navigation satellite system to monitor absolute surface displacement, crackmeter and extensometer to monitor relative displacement along cracks, inclinometer to monitor subsurface displacement, piezometer to monitor ground water level, and rainfall and reservoir water level monitoring. Compared to traditional methods, the recording process of real-time monitoring system is continuous, and the monitoring frequency can be adjusted as needed. Once the set threshold of sensor is exceeded, the monitoring frequency will increase immediately and send out alarm message. The system successfully reported an extreme situation of the Ganjingzi landslide during the rainfall event of 164.8mm on June 24, 2016, enabling local emergency department to respond in a timely manner. Moreover, the comprehensive judgment from monitoring results since 2015 indicated that deformation of the Ganjingzi landslide is step-like, and short acceleration period occurs during the rainy season (June to September). The study provides a simple, effective and flexible solution for early warning system of reservoir-induced landslides. According to the interpretation of monitoring data, further studies are required on the triggering mechanism and possible kinematic evolution of Ganjingzi landslide, which is important to release reliable service of landslide warning information.