



Detection and deformation monitoring of landslides by InSAR: applications along Jinsha River, China

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In recent years, massive landslides and the related secondary hazards such as the dammed lakes occurred in the mountainous areas of southwestern China, e.g., the Wenchuan earthquake-triggered landslide dammed lake at Tangjiashan in 2008 and the Jinsha River Baige landslide in October and November 2018 near the junction of Sichuan and Tibet Province, has attracted wide attention of the geoscience community. Geologists and disaster scientists have recognized the important role of remote sensing technology in the early detection and deformation monitoring of geohazards. Some leading countries, such as Italy and Norway, have completed nationwide InSAR monitoring projects and the results have been well applied in the field of geohazards prevention and monitoring.

We applied InSAR technology in the detection and deformation monitoring of geological hazards in the Jinsha River, mainly including 1) General survey: the mean deformation rate from InSAR stacking with atmospheric corrections conducted for a wide-range area would be helpful to narrow down the area of detailed investigation, as well as to initially establish a geological hazard inventory. 2) Detailed investigation: For potential geohazards delineated in the general survey, or the areas require special attention, multi-temporal, multi-band and high-resolution InSAR should be utilized. The exhaustive deformation time series and the retrospect results provide information for geologists to carry out risk assessments. 3) Field monitoring: For the key areas, or in the rapid response for hazards, ground-based radar equipment can be used to carry out monitoring work to quickly obtain deformation over a relatively large area of interest in a short period of time.

In this work, we will provide general survey results of landslides on the scale of hundreds of kilometres along the Jinsha River, as well as detailed results of InSAR time series analysis of Baige Landslide, Woda Landslide, and some other potential landslide failures with rapid moving trends. The deformation monitoring results of Baige landslide using ground-based radar after the first failure will also be included in this work. Finally, we will also list several challenges at this stage and the possible solutions.