Earth observation for landslide early warning system

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Abstract

Landslides are destructive geohazards to people and infrastructure, resulting in hundreds of deaths and billions of dollars of damage every year. Therefore, mapping the rate of accumulation of such geohazards and understanding their mechanics is of paramount importance to mitigate the resulting impacts and properly manage the associated risks. In this mid-term project report, the main outcomes relevant to the joint European Space Agency (ESA) and the Chinese Ministry of Science and Technology (MOST) Dragon-5 initiative cooperation project ID 59339 "Earth observation for seismic hazard assessment and landslide early warning system" are reported. The primary goals of the project are to further develop advanced SAR and optical techniques to investigate seismic hazard and risk, detect potential landslides on wide regions, and demonstrate EO-based landslide early warning system over selected landslides. Regarding the landslide hazard, in order to achieve these objectives, next tasks were developed up to now: a) a procedure for phase unwrapping errors and tropospheric delay correction; b) improvement of a cross-platform SAR offset tracking method for the retrieval of ground displacements; c) InSAR and PolInSAR monitoring and semiautomatic mapping of active displacement areas on wide regions, identification of triggering factors and modelling; d) application of InSAR-based landslide early warning system on selected sites. The achieved results, which mainly focus on selected sensitive regions including the Tibet Plateau and the Three Gorges in China and the Alcoy valley in Spain, provide essential assets for planning present and future scientific activities devoted to monitoring landslides. These analyses are crucial for an optimal prevention and management of these geohazards, as well as for a rapid response after their occurrence.