Monitoring Ground Surface Displacement in China Case Studies of Landslides in the Three Gorges Area and Pubugou Reservoir Area, Crust Tectonic Movement in Tibet, Subsidence in South China

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Monitoring ground surface displacement in the Three Gorges by InSAR or correlation processing could help to mitigate landslide disasters by providing warnings of impending landslides as well as assessing what impacts they may have on specific large population centres. By using InSAR measures as precursors for ground collapse not only could help reduce loss of lives and property, and also could benefit to related research. ScanSAR interferometric application could greatly benefit tectonic research. PS InSAR and SBAS time series analysis in measurement of large scale ground surface subsistence would promote SAR operational application worldwide.

The methodological research will greatly enhance the ability of interferometric applications.

This research will promote the exchange between Chinese and European scientists. In addition, a new group of young scientists will be trained whilst taking part in the project.

There are many large scale hydropower projects in operation and the construction in progress in China, and thousands of landslides cause a lot of resources waste and property losses in these areas. Landslides represent one of the most diffuse and problematic natural hazards in many parts of the world, threatening urban areas, human activities and cultural heritage, thus influencing the socio-economic conditions of many countries. Thus, it is urgent to investigate new means to monitor landslide hazards in these reservoir areas.

InSAR is a potential earth observation approach, and it has been demonstrated to have a variety of applications in measuring ground movement, urban subsidence and landslides. Currently InSAR provides the ability to map accurate DEM and measure ground deformation to sub-centimetre accuracy. However, many factors affect InSAR to measure ground movement since dam constructions are built in a large scale area with a complicated climate and unstable geology. GPS has been widely used for deformation monitoring. GPS can provide three-dimensional earth surface deformation with high accuracy and high time resolution. And its performance is not sensitive to the weather and earth surface conditions. But the spatial resolution of GPS is low and its coverage is small. Comparing InSAR and GPS there are many complementary characteristics can be found. For example, the time resolution of GPS is high and its performance is not sensitive to the surface conditions. But the spatial resolution of GPS is low and its coverage is small. Unlike GPS, the time resolution of InSAR is low and its performance is sensitive to the surface conditions. But the spatial resolution of InSAR is high and its coverage is large. So it is foreseeable that integration of InSAR and GPS can overcome the limitations of a single technique and allow us to monitor landslide hazards with unprecedented time and spatial resolution.

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InSAR

InSAR

ScanSAR

PS InSAR

SBAS   SAR
InSAR

InSAR

InSAR   DEM

InSAR   GPS   GPS

GPS

InSAR GPS   GPS

GPS   GPS

InSAR   InSAR

InSAR GPS