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Monitoring Three Gorge Area Landslide currently movement by Mutilplatform SAR Interferometry

Tao Li¹, Yangmao Wen², Lulu Chen¹, and Jinge Wang³

¹GNSS Research Center, Wuhan University, Wuhan, China (taoli@whu.edu.cn)

²School of Geodesy and Geomatics, Wuhan University, Wuhan, China (ymwen@sgg.whu.edu.cn)

³Three Gorges Research Center for Geo-hazards, China University of Geosciences, Wuhan, China (wangjinge@cug.edu.cn)

Three Gorge area landslide hazards developed very fast after the Dam started to impound the water since 2007. There were lots of research literatures concentrated on the Badong Huangtupo Landslide area for the whole city center had to change its position in 2009. Several literatures used Envisat SAR images time series to monitoring the surface deformation from 2008~2010. The results showed good consistent with the water level changes and precipitation. The high resolution TerraSAR Spotlight images had been used to monitoring the Shuping landslide and Fanjiaping landslide area in Zigui country from 2009~2012, the InSAR results showed good details of the landslide boundary and deformation rate with DInSAR technology.

This paper studies several landslide area in the Three Gorge by InSAR technology in the past few years, such as Huangtupo, Huanglashi, Daping and Baiheping landslide area, etc. al. The high resolution SAR images covered Badong and Wushan area have been collected, including the Sentinel-1, TerraSAR, RadarSAT-2, ALOS-2 SAR images. The high resolution topography in those landslide area have been collected both by UAV lidar and high resolution topography map.

The Huangtupo landslide area changed a lot in the past 3 years with the buildings ruins cleared and red soil covered by the local government. The time series results by Sentinel data in this area shows the big changes but could not derive reasonable deformation results.

Three Gorges Research Center for Geo-hazards (TGRC) of China University of Geosciences (CUG) built the Badong field test site in Huangtupo landslide area. This test site is composed with a tunnel group and a series of monitoring system including the inside sensors, surface deformation monitoring sensors and so on. In this paper, we mounted several new designed dihedral corner reflectors on the Huangtupo landslide area for high precision deformation monitoring by InSAR. Both the ascending and the descending orbit data of RadarSAT-2 high resolution SAR image and TerraSAR Spotlight images have been collected in this field.

The preliminary results from those new acquiring SAR data series show that the traditional landslide area such as Huanglashi, Daping, Baiheping are all moving slowly with good coherence in SAR image series. The poor vegetation coverage in those landslide area helped to get the credible InSAR results. The high resolution DEM is the critical elements for the DInSAR techniques

in those landslide area. The steep topography in those landslide area distorted the SAR images correspondingly.

Our results shows that it is possible to use ascending and descending high resolution SAR images to monitor the landslide area with mm level precision, while the vegetation is not so dense. High resolution SAR interferometry helped a lot for the landslide boundary detection and detailed analysis. The lower resolution SAR images such as Sentinel-1 still could provide some deformation results in landslide area, but it need more auxiliary data to interpret the results.