Application of TCP-InSAR technique for the Deep-Seated landslides detection and monitoring at Cingjing village, Taiwan

LIU, Shouheng[1] ; LIN, Chingweei[1] ; CHEN, Roufei[2]* ; ZHANG, Lei[3]

[1]Department of Earth Sciences, National Cheng Kung University, Taiwan, [2]Department of Geology, Chinese Culture University, Taiwan, [3]Department of Land surveying and Geo-informatics, Hong-Kong polytechnic university, Hong-Kong

Taiwan located at an active mountain belt and subtropical climate environment, severe gigantic landslide that have caused considerable damages commonly occurred in mountainous areas. After the 2009 Hsiaolin landslide that caused 450 casualties, how to identify potential sites of Deep-Seated landslides, evaluate their activity and susceptibility become an important issue. In the past few years, our research team has processed many slope failures that have caused considerable damages by using airborne LiDAR Digital Elevation Model (DEM), and implemented related analyses for the goal of deep-seated landslide. Cingjing village located at Centre Taiwan is well known as one of the three high altitude agriculture area in mountainous regions. In this study, we using TCP-InSAR interfermotry from ALOS/PALSAR images to detect and monitoring the landslide activity and its susceptibility of deep-seated deformation over a large area. The method obtains more ground deformation information than other InSAR approaches, providing more comprehensive analytical results for the slope related hazard studies. Our TCP-InSAR result shows a significant subsidence pattern around the Cingjing area. Comparing the surface deformation data and the field investigation records, several imperceptible deep-seated landslide locations are found and the boundaries can be identified as well as the spatial distribution of instability to them. The deposition pattern also implies different landslide development types on the slopes. This case study shows the great potential of TCP-InSAR evaluating the slope activities and deformation in the vegetated mountain area. Combined with topography signatures from high resolution digital elevation model data, it will be an effective way to determine the stability of slopes and potential hazard locations over a large area.

Keywords: Deep-Seated landslides, TCP-InSAR technique, Airborne LiDAR, Cingjing village