PS-InSAR for Large-Scale Subsidence Estimation In Central Taiwan - Preliminary Study For Future Project

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Subsidence is an urgent problem for traffic safety for Taiwan High Speed Rail especially in the section across central Taiwan. Besides precise leveling and GPS measurement, another effective, efficient, long-term and large-scale monitoring of subsidence is necessary. This work is a preliminary research for future project on PS-InSAR for monitoring subsidence by using SAR data acquired by advanced satellite radar sensor like TerraSAR-X and/or the airborne radar system constructed by the Aerial Survey Office, Forestry Bureau, Council of Agriculture, Executive Yuan, Taiwan, which will be operational soon. In this paper, PS-InSAR with ALOS data is used to evaluate the large-scale surface displacement in central Taiwan. The area of study field is 33km*54km and comprises extensive vegetation area, mountains and public roads. Vegetation area would deteriorate the coherence of interferogram used in PS-InSAR. Hence, it's more complicated to obtain applicable result derived from such area by SAR interferometry or PS-InSAR. Finally, the PS-InSAR result is analyzed and then evaluated by comparing with precise leveling data. Both of the displacement patterns are similar to each other. The statistic figure derived from differences on vertical displacement velocity vectors on 200 PSs and 200 benchmarks shows that the mean is 1.4cm/year, the maximum is 4.5cm/year and the standard deviation is 1.4cm/year. The conclusion infers that monitoring large-scale subsidence in central Taiwan by using PS-InSAR is available and it has a good potential to be realized to a national-level regular project. In the future, PS-InSAR result can be improved more and more when better radar data is available and exploited.

Keyword: Radar, PS-InSAR, Subsidence