

Monitoring Railways, Highways and Power Lines in the Tianjin Region with Multi-band InSAR Time Series Analysis

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ABSTRACT:

Large-scale man-made linear features, including railway, highway, and power lines and so on, have become the economic lifeline of each region. Till the end of 2009, China has been developing 3,829,200 km highway, 86,000 km railway in total and the longest high-speed rail (HSR) network of the world. In 2008, ice storm of China highlights the importance of power lines deformation monitoring. The deformation of highway, railway and power lines has become serious problems, for not only the loss of financial investment but also lives. Traditional techniques depending on leveling and GPS are labor intensive and expensive. Permanent Scatterers (PS) technique was developed as a powerful tool for deformation monitoring with the mm level accuracy. High resolution SAR data and comprehensive utilization of multi-sensor SAR data could provide broader applications and more reliable results for deformation monitoring. X-band provides high resolution(1m), short revisit period(11days), and sensitive subsidence information while L-band owns the ability of good coherence and wide area coverage. In this paper, we introduce the research carried out at the Institute of Space and Information Science of Hong Kong on time series analysis subject. Tianjin is one of the major subsidence regions in China and it is selected to be the study area. Three case studies were conducted including highway, railway and power tower. A total of 23 ALOS images acquired from 2007/01/17 to 2010/10/28 and 37 TerraSAR-X images acquired from 2009/4/29 to 2010/11/11 were used in INSAR time series analysis for retrieving deformation. The output of the work will be useful to drive future deformation monitoring strategy for highway, railway and power tower.