Tianjin INSAR Time Series Analysis Based on Multi-sensor Data

Qingli Luo

KEY WORDS: Multi-Sensor Systems and Sensor-Networks

ABSTRACT:

Ground subsidence becomes a world problem and China bears remarkable costs caused by subsidence. With the development of local industry and urbanization, excessive ground water withdrawal urges Tianjin to be one of the major subsidence regions in China. Traditional techniques depending on leveling and GPS are labor intensive and expensive. Permanent Scatterers (PS) technique was developed as a powerful tool for wide area subsidence monitoring with the mm level accuracy. With the launch of new generation high Resolution SAR satellites, the level of details visible in SAR images increased dramatically. TerraSAR can provide 1m resolution data with a short revisit period of 11 days. However, X-band cannot afford relatively so good coherence and wide area coverage as ALOS L-band data. Then, combining X-band and L-band, the subsidence monitoring result will be more reliable. Moreover, in order to fully consider both temporal and spatial decorrelation, we developed a multi-temporal DINSAR analysis based on minimum spanning tree (MST), creating a framework for optimal interferometric pairs selection instead of traditional single master image or small baselines methods. The strategy we adopted for analyzing this case study can be divided into the following steps: 1) L-Band DInSAR analysis over the whole region. In this way we can exploit the high coherence of L band and the wide coverage to find hot spot areas affected by surface displacement. 2) Once the hot spot areas are identified, we can focus the attention on smaller areas and collect many TerraSAR images, acquired with shorter revisit time. We can then carry out multi-temporal analysis and study the displacement time series. The output of the work will be useful to drive future acquisition policies of satellites.