Geophysical Research Abstracts
Vol. 21, EGU2019-11779, 2019
EGU General Assembly 2019

Deformation measurements of water engineering using multi-band InSAR time series analysis

Ruya Xiao (1,2), Zhenhong Li (2), and Xiufeng He (1)

(1) School of Earth Science and Engineering, Hohai University, Nanjing, China, (2) School of Engineering, Newcastle University, Newcastle upon Tyne, UK

Water engineering, also known as hydraulic engineering, mainly includes dams, reservoir embankments, water defense structures, seawalls, water channels and resettlement zones, etc. The huge projects, like the Three Gorges Dam in China, are well managed and under full safety monitoring. However, there are still a large number of small and medium-sized hydraulic structures which lack necessary safety monitoring. For instance, the amount of reservoirs in China is 98,000, most of which have serviced for over 50 years, and about 1/3 of the reservoirs were in risk at the beginning of the 21st century. What's more, more than 14,500 km of seawalls suffers erosion and almost 3,000 km of water channels cross seismic fault and mining goaf. Satellite-based InSAR provides us with an innovative way to monitor the hydraulic structures with a large area and low cost. Sentinel-1 working at C-band with a coverage of 250 km could offer a quick glance over a large area. More details of small deformation are detected by high-resolution TerraSAR-X or COSMO-SkyMed data, as well as L-band ALOS-2 provides more information for the large deformation and fast decorrelation areas. In this manuscript, we will take the Yellow River Delta, Shandong Province, China, which suffers land subsidence due to groundwater and brine extraction, as the study area. The deformation process of several reservoir embankments (i.e. Shuangwangcheng reservoir, Guangnan reservoir, Yeyuan reservoir), as well as the seawalls of Laizhou Bay, will be revealed by multi-band InSAR with different spatial resolutions. We will also evaluate the performance of different DEM products (i.e. TanDEM and SRTM1) in the terrain phase removal of the InSAR data processing. The application will prove the feasibility of InSAR for the general survey of water structures and for decision support and engineering risk mitigation.