Multi-Frequency and Multi-Temporal InSAR Analysis for Monitoring Land Subsidence, Aswan City, Egypt

Noha Medhat\(^1,2\), Masa-yuki Yamamoto\(^1\), and Gad El-Qady\(^2\)

\(^1\)School of Systems Engineering, Kochi University of Technology 185, Miyanokuchi, Tosayamada, Kami, Kochi 782-8502, Japan
\(^2\)National Research Institute of Astronomy and Geophysics, Helwan, Cairo 11421, Egypt

Land deformation due to natural and anthropogenic impacts considered to be one of the challenging environmental problems in the Aswan area located in the southern part of Egypt. Specifically, we applied multi-sensor analysis in order to record the slow rate of subsidence with a high spatial resolution of COSMO-SkyMed (X-band) and Sentinel-1 TOPSAR (C-band) scenes. We proposed multi-temporal DInSAR data analysis by means of ascending and descending orbit tracks during the recent time period of 2012-2017. The stacked DInSAR results reported the occurrence of land subsidence of active urban areas. A strong correlation between the ground truth data, ground leveling, and the estimated Line of Sight (LOS) displacement time series values are reached, assuming the ground deformation controlled by seasonal surface water loading, lithological units, and subsurface water activity. The detection of short-term displacement highlights the priority of groundwater management plans in the affected urban areas.