

Land subsidence in Semarang, Indonesia, observed by InSAR time-series analysis using ALOS/PALSAR data

Mika Arimoto^{1*}, Yo Fukushima², Manabu Hashimoto², Youichiro Takada²

¹PASCO Corporation, ²DPRI, Kyoto University

In order to precisely measure the land subsidence in Semarang, Indonesia, we performed a small-baseline interferometric synthetic aperture radar (SAR) time-series analysis using the images acquired by the Japanese Advanced Land Observation Satellite (ALOS). We used a total of 34 SAR images, acquired from both the ascending and descending orbits, and obtained the subsidence time-series in the two line-of-sight (LOS) directions. Before solving for the displacement time-series, we corrected for artifacts due to orbital inaccuracies and atmospheric phase delay. We obtained the time-series of quasi-vertical displacements by decomposing the displacement time-series in the two LOS directions. The result shows that the subsidence is limited on low-land areas where an aquifer system is well developed, suggesting that the cause of the subsidence is extraction of water from the aquifer. The subsidence was estimated to be practically constant with time with no clear seasonal effects. The maximum subsidence rate of 10 cm/year was obtained at a location where subsidence had not been identified before. Our study also shows the effectiveness of L-band SAR data to monitor land subsidence over time.

Keywords: InSAR, Crustal deformation, land subsidence, Indonesia, Semarang