Detection of the small scale subsidence in the medium-scale residential area developed in 1970s using the time series SAR interferometry.

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Interferometric SAR becomes a confidential technology to measure the two-dimensional surface movement (deformation) using the two microwave SAR images and their phase difference observed individually and independently. Solution examples from the INSAR method were raised recently as can be seen at i.e., the Kumamoto earthquake of 2016, Mt. Ontake eruption of 2014, and subsidence examples. Target measurement accuracy reaches to the order of the sub millimeter. Recent theme that could potentially detect is the aging and deformation of the infrastructures.
There has constructed a plenty of the new residential towns in 1970s at the economic highly growth period. Hatoyama-new town, Hatoyama-Machi, Hiki-gun of Saitama-prefecture, nearby the Tokyo Denki University Campus was established by arranging (cutting and banking) the hill zone and it built 6000 houses. Forty years have passed after the completion, while a lot of earthquakes have encountered including the March 11th 2011, Earthquake. It is the right theme to monitor if the ground of the new town is rigid or slightly subsided as the urban engineering. This study measured two dimensional subsidence rate at the Hatoyama-Newtown by interferometrically processing the ALOS/PALSAR and ALOS-2/PALSAR-2 data from December 2006 to June 2016, for which 11 image pairs out of 15 scenes. As a result, it found that nearby the Hatoyama-elementary school and the Shouei elementary school,there measured the subsidence of 6.83mm per year, standard deviation of 5.28mm per year while the other areas did not detect the subsidence. Through this research, we confirmed that the subsidence detection using the SAR interferometry method is very effective. In future, we will consider the integration of the InSAR method with the time series SAR data will be the confidential method for monitoring the land surface movement.

Keywords: InSAR, Subsidence rate, cutting and banking

