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The Steady Crustal Deformation Analysis in Tokai region by InSAR

ANDO, Shinobu[1*] ; IWAKIRI, Kazuhiro[2] ; AOKI, Gen[2]

[1]MRI, [2]JMA

ALOS has an L-band SAR (PALSAR), which is of help to understand of a ground surface state, and its interferometric coherence is highly effective for the crustal deformation observation.

We analyzed the ALOS/PALSAR data around Omaezaki and Kakegawa cities in Shizuoka Prefecture, and tried to detect steady crustal deformation due to the subduction of the Philippine Sea plate. In this study, in order to obtain steady-state deformation (time series), we subjected to interference processing on the image pairs of a number of different imaging date interval. Then, using a variation of the satellite line-of-sight direction in the interference each images and we were calculated the average variation of the 46 days (stacking process). However, to reduce noise, we analysed except for some interferograms with obvious noise. This method can be expected to improve detection accuracy, because of able to reduce the influence of noise caused by the ionosphere.

We used 23 ascending data acquired from January 2007 to October 2010 and 19 descending data acquired from October 2006 to September 2010. Before solving for the displacement time series, we corrected the atmosphere phase delay by Japan Meteorological Agency nonhydrostatic model (JMA-NHM), and calculated the displacement of the satellite line-of-sight direction of the pair of all. The average displacement of the satellite line-of-sight direction of the 46 days was calculated under the assumption that the variation in the period of each pair is constant. The distance between the imaging date is different for each pair, but we did not weight during the averaging process.

As a result, steady-state deformation was hardly observed in the analysis of the ascending orbit data, but in the analysis of the descending orbit data, were observed the steady-state deformation the away from the satellite in the radar line-of-sight direction. This crustal deformation was significant in Omaezaki area, especially. These results are consistent with the displacement vector by GNSS. In this report, we also reported about InSAR time series analysis using *StaMPS* program was developed by the Stanford Institute of Technology.

Some of PALSAR data were prepared by the Japan Aerospace Exploration Agency (JAXA) via the Geospatial Information Authority of Japan (GSI) as part of the project ”ALOS Domestic Demonstration on Disaster Management Application” of the Earth Working Group. Also, we used some of PALSAR data that are shared within PALSAR Interferometry Consortium to Study our Evolving Land surface (PIXEL). PALSAR data belongs to Ministry of Economy Trade and Industry (METI) and JAXA. We would like to thank Dr. Shimada (JAXA) for the use of his *SIGMA-SAR* software. In the process of the InSAR, we used ”the digital elevation map 50m-mesh” provided by GSI, and Generic Mapping Tools (P.Wessel and W.H.F.Smith, 1999) to prepare illustrations.

Keywords: InSAR, Ground deformation, ALOS/PALSAR, Tokai region