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Development of InSAR processing tools in NIED ?Part3?

OZAWA, Taku[1*]

[1]National Research Institute for Earth Science and Disaster Prevention

Synthetic aperture radar (SAR) became one of the useful tools for crustal deformation detection. Recently, InSAR processors which can be used freely in scientific research (e.g., ROI_PAC, GMTSAR, and Doris) were released, and enabled anyone to do crustal deformation detection by InSAR. Especially, algorithm of two-pass differential InSAR analysis matured, and it enabled anyone to obtain almost same results. On the other hand, advanced InSAR analysis methods, e.g., time-series analysis, have been recently used to detect precise crustal deformation. However, many issues to improve remains in such analyses. In order to research on improvements for such analysis, we are developing InSAR processor.

In this InSAR processor, general procedure is adopted. (1) Format conversion of SLC and creation of parameter files. (2) Rough co-registration of two SLCs considering parallel shift only. (3) Estimation of affine transformation coefficients. (4) SLC resampling. (5) Generation of the initial interferogram. (6) Simulation of a SAR intensity image and estimation of translation tables between geodetic and radar coordinates based on DEM. (7) Co-registration between simulated and observed SAR intensity images. (8) Correction of translation tables. (9) Simulation of the orbital and the topographic phase components. (10) Generation of differential interferogram. (11) Applying interferogram filter. (12) Geocoding.

In JPGU meeting 2013, we showed comparison between results from our processor and from GAMMA SAR processor. Although their results were roughly the same, it indicated that many improvement points remained. In 120th meeting of the Geodetic Society of Japan, we presented about improvement of coherence by the spectrum shift filter (Gatelli et al., 1994), improvement of calculation speed, and correspondence to skewed images. After that, this processor corresponded to the InSAR processing with FBS-FBD image pair of ALOS/PALSAR using SLC over-sampling and band-pass filter. We added DEM resampling function by over-sampling method and by the bi-cubic spline interpolation. Furthermore, we are attempting to improvement of the image matching now. After this correspondence, the first step of this development will be finished. In next step, we will attempt more improvements and additions of other advanced algorithms.

Keywords: SAR, InSAR, software, tool