An attempt to reduce atmospheric noise on InSAR analysis using numerical meteorological model.

Taku Ozawa[1]; Shingo Shimizu[1]

[1] NIED

Radar wave transmitted from SAR sensor is bent and slowed by the atmospheric effect. This effect is one of the largest error sources in the InSAR application. To reduce this noise, we are attempting to simulate atmospheric delay from a numerical meteorological model. In this presentation, we show its preliminary results.

We inter- and extra-polated temperature, pressure and humidity data of JMA Meso-scale model (MSM) in 141 layer (per 100m in the height of 0-10km, per 1000m in the height of 10-50km), and inputted them in the atmospheric delay simulation. It is assumed that atmospheric parameter in a layer is constant, and bending of radar wave at the layer boundary is calculated. Total atmospheric delay is derived from integration of delay along the calculated ray path. Moreover, we also consider the geometrical delay from comparison between the integrated distance of the calculated ray path and the slant-range.

In case studies in Mt. Nasu and Mt. Fuji, fringe patterns correlated with topography were well corrected. Heretofore, atmospheric delay has been reduced by the linear expression of topographic elevation, and almost same result could be obtained from its method. However, its method could not be used in the area without other mountains that crustal deformation didn't occur. Therefore the simulation of atmospheric delay from a numerical meteorological model is useful method which can resolve its problem.

Around steep topographies, a fringe pattern indicating slant-range change of several centimeters remains on the corrected interferogram. This residual fringe must be caused by the coarse resolution of MSM, and therefore numerical meteorological model with higher resolution is needed for more improvement. In the future study, we generate such model generated by the Cloud Resolving Storm Simulator (CReSS), and attempt to correct atmospheric noise correction from it.