Differential SAR Interferometry Time Series Analysis for Detecting Crustal Deformation in the Polar Regions

Koichiro Doi[1, 2]
[1]*National Institute of Polar Research*
[2] *The Graduate University for Advanced Studies, SOKENDAI*

In the polar regions, it is limited to implement precise observations such as ground-based GNSS observations to detect crustal deformation due to the harsh environment. Satellite remote sensing observations is useful to detect crustal deformation over a larger area.
One of methods to detect crustal movements using satellite remote sensing data is applying differential interferometric Synthetic Aperture Radar (DInSAR) analysis to satellite synthetic paperture radar (SAR) data. This method is often used to detect crustal deformation occurred during earthquakes, and a method drived from the DInSAR, called DInSAR time series analysis, is applied to time series SAR data to detect crustal deformation with longer time scale. PSInSAR analysis is one of the DInSAR time series analysis methods, which is a method to apply the DInSAR process to radar scatterers with strong and stable scattering intensity (Persistent Scatterer: PS). In urban areas, man-made structures such as buildings are selected as PSs, but in polar regions with little vegetation, exposed rocks are the candidates.
We apply the PSInSAR analysis to SAR time series data with a length of approximately three years acquired by the European Space Agency's satellite Sentinel-1. In the presentation, results applied to the SAR data time series observed in Japan are shown to compare the results with crustal deformation obtained from GNSS observations.