On detection of crustal deformation associated with plate subductions with ALOS/ PALSAR data

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Crustal deformation data provides an essential input for the study of subduction zone earthquakes. In Japan, a nation-wide GPS network, GEONET, tracks the ground displacements with an average spacing of 20-25km. Interferometric SAR (InSAR) has a potential to complement such dense GPS networks, or to be the principal tool for regions lacking on-site geodetic networks, on monitoring the strain accumulations associated with plate subductions.

Measuring such subduction-related deformation using InSAR is a challenge because: 1) the displacements observed on the ground surface would have continuous and broad patterns (without any "sharp" signal features), 2) such patterns are similar to errors caused by orbital inaccuracy, and 3) phase delays and advances in the troposphere and ionosphere are additionally superimposed.

InSAR time-series analyses using multiple images may overcome the difficulty by mitigating the error components. We processed the SAR interferograms on Southwestern Japan, acquired from paths 414 (covering Kii peninsula) and 417 (covering Cape Muroto) in a period from 2006 to mid-2008. The interferograms indicate that orbital and/or atmospheric fringes are much larger than the expected deformation signals, indicating that a simple application of an InSAR time-series analysis may not be sufficient to detect the deformation signals. We seek the ways to improve our analysis by, for example, using GEONET GPS data.