

Title: Nationwide land deformation monitoring: application of InSAR time series analysis to Japan

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Geodetic observations can be often powerful tools for natural disaster monitoring. To proactively monitor the potential of disaster risk, spatiotemporally comprehensive observations are required. Synthetic aperture radar (SAR) is one of promising techniques for the purpose. An interferometric SAR (InSAR) method has been utilized to broadly and locally map ground surface changes. However, the standard InSAR is not always effective because it does not have sufficient measurement accuracy due to various errors. Against the background, InSAR time series analysis is an effective technique to improve the detectability by statistically processing a large number of InSAR images.

We processed ALOS-2 satellite data observed over 7 years from 2014 to 2021 for InSAR time series analysis. In general, it is difficult for InSAR to distinguish spatially long-wavelength tectonic signals from long-wavelength noises which are comparable. To overcome the shortcoming, we derived a complete nationwide surface change map that has both tectonic wide-ranging deformation and locally distributed deformation, by incorporating displacements which are measured at nationwide deployed GNSS sites.

Our deformation map successfully detects various types of land deformations such as inflation/deflation of volcanoes, ground subsidence, landslides, post-seismic deformation which have slowly proceeded with a few cm/mm per year. In this presentation, we will show the analysis results and the effectivity of InSAR-based nationwide land monitoring.

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