Monitoring of ground deformation all over Japan by InSAR and utilizing 2.5-D analysis

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GSI (Geospatial Information Authority of Japan) has been conducting SAR interferometry (InSAR) analysis with ALOS-2 data to monitor ground deformation all over JAPAN. In addition, we have conducted InSAR urgent analyses once natural disasters such as volcanic crisis or large earthquakes occur. We provide InSAR-derived deformation data to the Earthquake Research Committee, the Coordinating Committee for Prediction of Volcanic Eruptions and others. Furthermore, we publish those data on GSI website for general users.

InSAR analysis with a pair of observation data can reveal only line-of-sight (LOS) deformation. However, quasi-up-down and quasi-east-west component deformation may be calculated by combining LOS deformations observed from both east and west direction. This analysis method is called 2.5-D analysis (Fujiwara et al., 2000). “Quasi” means that the directions of obtained deformation by 2.5-D analysis are slightly different from up-down and east-west.

LOS deformation from InSAR analysis is usually represented in rainbow color, and is difficult to understand intuitively. Furthermore, deformation direction can’t be identified from such InSAR image. On the other hand, 2.5-D analysis image is easier to understand and deformation direction can be identified. GSI has been considering a way to make InSAR image more understandable to general public, and 2.5-D analysis is one of the candidates. The 2018 Hokkaido Eastern Iburi Earthquake is an example of utilizing 2.5-D analysis. The quasi-up-down component deformation was utilized in setting a recovery survey area.

In this presentation, we will introduce ground deformations detected by InSAR analysis and some examples of 2.5-D analysis derived from earthquakes and volcanic activities.

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