[EJ] Evening Poster | S (Solid Earth Sciences) | S-TT Technology & Techniques

[S-TT48]Synthetic Aperture Radar

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ALOS-2 and Sentinel-1, which have highly enhanced capacity compared to previous SAR satellites, were launched in 2014, and their utilization has been widely expanding as the data has accumulated. Now we are facing a new and abundant era of the satellite SAR, along with a worldwide trend to an open and free data policy of satellite data, and with next-generation advanced SAR satellite plans by several countries. In addition, SAR technologies with other platforms, such as ground-based SAR with high temporal resolution and UAV (Unmanned Aerial Vehicle) SAR with flexible operability, have also been developed and used for various targets. These facts indicate that the SAR utilization data has become widespread in both basic researches (e.g., earth science) and diverse applications (e.g., disaster prevention and forest monitoring). In this session, we would like to share a broad knowledge and information regarding SAR. A wide range of research topics from basic researches to advanced applications will be welcomed.

[STT48-P08]Deposit of Pyroclastic Material Detected by InSAR images for Shinmoedake Volcano and Suwanosejima Island

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Introduction

The Geospatial Information Authority of Japan (GSI) has been monitoring ground surface deformation throughout Japan by interferometric SAR (InSAR) analysis using ALOS-2 data. Monitoring of volcanic activity is significant because it directly leads to disaster mitigation through prediction of eruption. However, once eruptions occur, pyroclastic materials such as volcanic ash, pyroclastic flow, etc. are often deposited on the surface of the earth, and the surface deformation may not be obtained due to decorrelation of the InSAR image. In this presentation, we examine the InSAR images around Shinmoedake volcano erupted in the fall of 2017 and Suwanosejima island to get how the pyroclastic material can be seen in InSAR images.

Shinmoedake volcano

The eruption of Shinmoedake began early in the morning of October 11, 2017. Fig 1 shows InSAR images around the crater related to the eruption. Since ALOS−2 can acquire multiple SAR images in a short period of time, we obtain a large number of images. In Fig. 1 (a), at the beginning of the eruption, decorrelation was found on the east side of the crater, and in the next 10 days, the decorrelation region spread to the east and west in Fig 1 (b). In Fig. 1 (c), after the series of eruption converged, the part accumulated in (b) correlated and showed subsidence, which is considered to represent shrinkage due to gravity or cooling.

Fig. 1 (d) (e) (f) shows the 14-day InSAR images and the start time is shifted by 12 hours, respectively. Since the start time corresponded to the beginning of the eruption, the sequence of the eruption may affect the

InSAR images. However, these images differ not only in acquisition time but also in the incident angle of SAR radio waves and the direction of observation. Therefore, the difference in the patterns appearing on the image does not necessarily represent the change in the deposition condition of the pyroclastic material on the surface of the earth. For example, in Fig 1 (b) and (d) (observation from the west direction), an elongated bulge of about 500 m in length is found in the northeast side of the crater, however, in the eastward observation including Fig 1 (e) this bulge is not found. Therefore, the InSAR images likely depend on observation conditions such as the observation direction of the satellite.

In Figs. 1 (b) and (c), a displacement indicating a bulge appears around the decorrelated region. Good correlation is obtained in the peripheral region where the deposition is relatively small, and the deposition depth increases toward the center of the deposition.

Suwanosejima island

Volcanic activity of Suwanosejima island is active, however, conspicuous decorrelation area in InSAR images are almost found only in the Ontake crater.

Upward displacement on the NE side of the Ontake crater in July 2016 (Fig 2 (a)) was found, it sank (Fig 2 (b)) and then disappeared (Fig 2 (c)). Using other InSAR images, this displacement is:

−Formed between July 11 and July 25

−Extinction between August 31 and October 26

Although large eruption was not observed directly during the formation period, ash fall was observed in the settlement of the island of July 23, the maximum rainfall intensity after formation (11.5mm rainfall for 10 minutes, 24.0mm rainfall for 1 hour) has been observed on October 24. Because the area is a steep slope with no vegetation, there is a possibility that the accumulation of pyroclastic material once formed was washed away by heavy rain.