Estimate of crustal deformation around Azumayama Volcano by using SAR data

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Azumayama Volcano is located along the border of the Yamagata and Fukushima Prefecture. The volcanic alert level of Azumayama has been raised to Level 2 since Dec. 2014, which is the highest in the Fukushima prefecture. Level 2 means a probability of an eruption which can damage the area near the crater.
 The Advanced Land observing Satellite2 (ALOS2) / Phased Allay L-band Synthetic Aperture Radar (PALSAR2) observes the large area. The technique of interferometric SAR (InSAR) analysis can estimate the ground displacement with the cm-level resolution.
 In this research, we examined a crustal deformation around Azumayama. We analyzed the ALOS2/PALSAR2 data observed from September 2015 to November 2016 using the technology of InSAR, comparing the results with the measurement from the 6 GNSS stations around Azumayama. If the crustal deformation obtained by the InSAR analysis of ALOS2/PALSAR2 data is consistent with the measurement by GNSS observation at the corresponding locations, we could integrate the two methods to estimate the crustal deformation of the whole area around Azumayama, spatially- and time-continuously which should complements each other.
 As a result, we detected the local crustal deformation around Azumayama by InSAR. The crustal uplift had occurred at Oana crater through 2014/9/9-2015/6/2. No crustal deformation was observed from 2015/6/2 to fall 2015. The subsidence at the west of Azumayama since fall 2015 seemed to be detected for the first time by InSAR.
 The InSAR estimates showed very good agreement with the GNSS observations within their errors except for a few cases where phase propagation delays through the ionosphere or troposphere should limit the accuracy of InSAR.
 No GNSS station is located at the west of Azumayama. InSAR analysis can contribute to estimate the crustal deformation in the whole volcanic area. By integrating the two different methods of InSAR and GNSS, we would be able to monitor the deformations around Azumayama Volcano multi-dimensionally. It will be an important step toward prevention and/or mitigation of natural disaster.

Keywords: Mt. Azuma, crustal deformation, interferometric SAR, prevention and reduction of natural disaster