Ground Deformation at Campi Flegrei caldera, Italy, revealed by InSAR analysis of ALOS-2/PALSAR-2

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Campi Flegrei caldera in Italy is also close to the metropolitan area of Naples and is one of the regions with the world's highest volcanic risks. The most recent eruption continued for 8 days in 1538 when Mt. Monte Nuovo was formed (VEI = 3). Since then, no eruption has occurred for about 500 years, but expansion and contraction of ground deformation have been reported frequently by GNSS analysis and interference analysis using SAR satellites (for example, Lundgren et al. (2001) And Troise et al. (2007)). Recently, several data showing expansive crustal deformation around Pozzuoli Bay have been reported and it is suggested that active volcanic activity is still continuing (Martino et al. (2013) and D 'Auria et al. (2015) etc). In addition, Chiodini et al. (2016) suggest that magma could be approaching the critical degassing pressure at Campi Flegrei and where accelerating deformation and heating are currently being observed.
ALOS-2, was launched on May 24, 2014, has an L-band SAR (PALSAR-2) and survey all over the world. We performed interferometry analysis using ALOS-2/PALSAR-2 data surveyed after 2014, detected the ground deformation of Campi Flegrei caldera, and tried estimating underground pressure source. As a result, it was found that the ground uplift of about 10 cm was detected in the interferometry analysis of the both orbit between 2015 and 2016, and the ground deformation can be explained by assuming a Mogi point source of about 4.6 $\times 10^6$ m^3 to about 3.8 km below the sea level. Furthermore, the InSAR analysis using pairs from 2016 to 2017 also detected the displacement up to about 6 cm toward the satellite can be seen around Campi Flegrei caldera, suggesting that the ground uplift is continue.
PALSAR-2 data were prepared by the Japan Aerospace Exploration Agency (JAXA) and were shared within PALSAR Interferometry Consortium to Study our Evolving Land surface (PIXEL). PALSAR-2 data belongs to JAXA. We would like to thank Dr. Ozawa (NIED) for the use of his RINC software. In the process of the InSAR, we used Digital Ellipsoidal Height Model (DEHM) based on the Shuttle Radar Topography Mission (SRTM 4.1) provided by Consortium for Spatial Information (CSI) of the Consultative Group for International Agricultural Research (CGIAR), and Generic Mapping Tools (P.Wessel and W.H.F.Smith, 1999) to prepare illustrations.

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