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The Crustal Deformation of lava dome on Mt.Tarumae volcano detected by using ALOS/PALSAR

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Mt. Tarumae volcano located near both Tomakomai and Chitose town of Hokkaido is an andesitic active volcano of 1041m asl. There has been no eruption after 1978, but an incandescence phenomenon at the A-crater was sometimes observed after winter of 1999, and active smoke and emitting gas activity still continues. According to survey of Volcanic Observations and Information Center (VOIC) of Sapporo and Geological Survey of Hokkaido (GSH), the local expansion was observed from about 2006 in Campaign GPS observation at the mountaintop lava dome, and a volcanic tremor with the slant displacement was observed more in October, 2009. ALOS has L-band SAR (PALSAR), which is not affected by the vegetation, and the interference is good even in the mountainous area. So these methods are effective for the crustal deformation of the volcano areas looks like in Japan. We analyzed the crustal deformation around Mt.Tarumae volcano by using SAR interference method of ALOS/PALSAR. The SAR interference method is a technique to measure a phase difference between imaging pair. Therefore we cannot measure accurate displacement when the data of either of pairs during a snow season. Furthermore, if there is water vapor on the route between a satellite and the target, we cannot measure accurate variation as expected. The use of GPV data is demonstrated in the elimination of water vapor noise, but this method is yet to be established. Therefore, we used a pair other than the data with the possibility of the noise source such as the above since the satellite launching of January, 2006. As the results, we were able to detect the local crustal deformation of the mountaintop lava dome on Mt.Tarumae Volcano in plural interference pairs, especially a descending orbit. The two years recorded an estimated 2 or 3 cm displacement toward the satellite in the radar line-of-sight direction. This result is almost conformal to the result of campaign GPS, which during three years, an estimated 4 cm movement was recorded.

Some of PALSAR DATA using this report were prepared by ALOS 'Daichi' Domestic Demonstration on Disaster Management Application that CCPVE. Also, some of PALSAR DATA were prepared by PIXEL (PALSAR Interferometry Consortium to Study our Evolving Land surface). PALSAR DATA belongs to METI/JAXA (Ministry of Economy Trade and Industry/ Japan Aerospace Exploration agency). We would like to thank Dr. Shimada (JAXA) for the use of his SIGMA-SAR software. In the process of the InSAR, we used 'the digital elevation map 50m mesh' provided by GSI (Geological Survey Institute) and some figures were made using GMT (P. Wessel and W.H.F.Smith, 1999). We are also grateful to Dr. Okuyama (HVO) and Dr. Miyagi (JAXA) for the advice of drawing method by GMT.

Keywords: InSAR, ALOS/PALSAR, Tarumae Volcano, crustal deformation