[JJ] Evening Poster | S (Solid Earth Sciences) | S-VC Volcanology

[S-VC41]Active Volcanism

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This session discusses various aspects of active volcanisms including, but not limited to, recent and historical eruptions, various phenomena associated with the volcanic activities, underground structures of the volcanoes, and developments of new instruments based on geophysical, geochemical, geological, and multidiscipline approaches. We also welcome studies on understanding and predicting the transitions of the eruptive activities from observational, theoretical, and experimental approaches.

[SVC41-P30]Investigation of Long Term Vertical Displacement of Izu-Oshima observed by GNSS (2001-2017)

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It is known that inflation as volcano deformation of Izu-Oshima is continued for at least last 20 years. It is suggested that the uplift associated with the inflation is not as large as expected from a spherical magma chamber model derived from horizontal displacement. In the caldera area near the summit, relatively new ejecta is accumulated thickly by the eruption in about last 1700 years after a caldera formation and consolidation settlement in this area is likely continued for today. Behavior of the vertical displacement of Izu-Oshima is complexed. We investigated a long-term variation of the vertical displacement of the volcano using GNSS data from 2001 to 2017, to make clear about the details of the volcano deformation going on for a long time.

In our investigation, the absolute coordinates of GNSS stations, calculated by a static analysis for each day, were used. For about 20 stations, the northward and the eastward displacements were calculated in a plane rectangular coordinate system, and the ellipsoid height was adopted as the vertical component. Long-term ground deformation was examined using the average displacement velocity(cm/yr). Two periods of the investigation were from Jan. 2001 to Feb. 2011 and from Jan. 2013 to Dec.2016 to avoid the coseismic change and the postseismic displacement of the 2011 off the Pacific coast of Tohoku Earthquake. In each period, a model was assumed in which the ground displacement was derived from a volcanic inflation caused by a spherical pressure source and from a horizontal movement of the plate motion and estimated the optimal model parameter from the horizontal displacement velocities of the GNSS stations. For example, the plate motion was 1.2cm/yr north-westward, the position of the spherical source was the north of the caldera with the depth of 4.4km and the volume change rate of the source was $1.4\times10^6 m^3$/yr for the first period. To clarify the behavior of the vertical displacement(uplift) of Izu-Oshima, the observed uplift velocity and the one calculated from the optimal model were compared.

For the first period(Jan.2001-Feb2011), uplift was observed for stations all around the volcano and the maximum uplift was as much as about 0.5cm/yr, though it was just a half of the estimated uplift from the model. This was common for the uplift observed at the hillside and the foot of the volcano. It was suggested that a prolate ellipsoidal pressure source was more suitable than the spherical one. In the summit and caldera area, the observed uplift is much smaller. It seemed that the spatial distribution of

uplift was discontinuous in the neighborhood of the caldera rim. The uplift in the summit and caldera area was small by about 0.5cm/yr relative to the hillside and foot area.
For the second period(Jan.2013-Dec.2016), uplift rate of almost all station became bigger by about 0.7cm/yr. To subtract this, the distribution of uplift is similar to the first period, even though estimation errors of displacement velocity were not so small.
The uplift bias of about 0.7cm/yr in the second period is very important for the prediction of the volcanic activity of Izu-Oshima. It should be decided that this uplift bias is caused by the postseismic effect of the 2011 earthquake or by a inflation of deeper pressure source which makes a similar uplift in a wide area of the volcano.