

Ground deformation measurements in Izu-Oshima volcano (3)

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In Izu-Oshima volcano, inflation continues over 20 years since the end of the last eruption in 1986-87, suggesting magma accumulation for future eruptions. Recent continuous ground deformation observations revealed repetition of shorter term of deflation - inflation events of the volcano. High dense GPS network installed by Meteorological Research Institute made obvious that both the deflation and inflation occurred at the northern part of the caldera. Volumetric strain-meter installed at the northwestern flank by Japan Meteorological Agency also detects contraction and extension as associated with the deflation and inflation events. Further, three tilt-meters has been installed on the volcano since 2010 to reinforce surveillance of the volcanic activity. Cooperative use of dense GPS network and high sensitive and temporal resolution in-situ instrument data will contribute to development of the volcanic activity surveillance and estimation system.

Horizontal strain obtained from GPS baseline analysis results indicated both deflation and inflation sources locate beneath the northern part of the caldera. Since the areal and principal strains approximately show isotropic patterns, we estimated source parameters of Mogi model for the 2009-2010 deflation and 2010 inflation events. Both the deflation and inflation sources are estimated at the depth of 3600 m b.s.l., when horizontal components of the relative displacement data are used. -1.3 million cubic-meters and 2.9 million cubic-meters of the volumetric changes are obtained. Areal strain at the location of the volumetric strain-meter is calculated for the source parameters inferred from the GPS data. The estimated contraction and extension are -1.0 and 3.2 micro-strains for the 2009-2010 deflation and 2010 inflation periods. These values coincide well with about -1 and 3 micro-strains of the observed ones.

Keywords: Izu-Oshima volcano, ground deformation, geodetic data