

Pressure Source Model Inferred from Crustal Deformation Preceding Seismic Swarm in 2013 beneath Tarumae Volcano

KOSHIROMARU, Takuma¹ ; MURAKAMI, Makoto^{1*}

¹ISV, Hokkaido University

Tarumae-volcano is an active volcano with an altitude of 1,041 m located in the southwestern part of Hokkaido. In past 350 years, three major magmatic eruptions occurred, i.e. Plinian eruptions in 1667 and 1739 and dome forming eruption in 1909. Volcanic activity in recent years is restricted to gas emission or volcanic earthquake activity at the shallow part of the volcano. A spherical source model for inflation/deflation sequence is inferred at shallow depth beneath the summit dome by campaign GPS observations by the Meteorological Agency. No sign of crustal deformation is found at the deeper depth of the volcano by continuous GPS observation in a regional scale either by the Geographical Survey Institute nor the Meteorological Agency. Thus, until now, a crustal deformation which suggests fluid activity beneath the Tarumae-volcano at deeper depths had not been detected.

In July, 2013 swarm seismic activity started at the depths of between 2-5 km about 2 km to the west of summit dome. In addition a crustal deformation preceding the swarm was identified at several observation sites. The size of the change was at about 1 micro radian or micro strain level. Because the change appeared commonly at several stations around the volcano, it is highly likely that the strain and tilt change is resulting from a activity of a source at a depth beneath the volcano. A spherical inflation source was inferred from the observation data. The estimated position is at the m.s.l. depth of 4.2 km and about 1.3 km to the NNW of the summit horizontally with inflation volume of $3.4 \times 10^5 \text{ m}^3$.

Since the position and time of activation of the source are close to those of seismic activity, it is likely that there is some geodynamic relationship between swarm seismicity and crustal deformation. In our presentation we also discuss possible relationship between them.

Keywords: Crustal Deformation, Active Volcano, Swarm Earthquake, Tarumae Volcano