

The Volcanic activity of Tarumaesan Volcano in 2013 and Trial of Application to the Eruption scenario

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Continuous observation network with tiltmeter and strainmeter in Mt.Tarumae, which is located on the southeastern edge of Shikotsu caldera, operated by Japan Meteorological Agency (JMA) and Hokkaido University Institute of Seismology and Volcanology (ISV) detected volcanic ground deformation during June 19 to July 4, 2013. According to the Mogi model (Mogi, 1958), the ground deformation is interpreted as volume increase of about 10^5 m^3 at about 3-4km in depth beneath sea level around Mt.Kitayama, is located in about 1.5km northwest from Tarumae summit. It is different from the deformation in shallow region (above the sea level) beneath the summit, reported by MRI (2008), the Meteorological Research Institute, and ISV et al.(2011). According to the classification suggested by MRI (2013), it corresponds to slowly accumulation process of magma, as magma chamber or dike intrusion. B-type earthquakes, have been occurred in shallow region (~sea level) beneath the summit, became active slightly in synchronization with the ground deformation. As a result of the process of volcanic fluid, the actual medium is unknown, rise to the volume increase area (depth 3-4km), it is interpreted as an increase in heat flux to shallow region beneath the summit.

Volcano-tectonic earthquake (VT earthquake) activated at a depth of 3-5km surrounding the deformation area in mid-July, after ground deformation, it is still ongoing. The VT seismicity was very active until August and maximum shock was M3.0 in late September. VT earthquakes have occurred in the relative high resistivity layer (50-500 Ωm) of Resistivity imaging by Yamaya et al. (2005, 2012). Whereas, it has not occurred in the deformation area and the path to beneath Tarumae summit, that is relative conductive area.

Order to carry out disaster prevention appropriately and promptly in the eruption, JMA has operated the eruption alert level on 31 volcanoes across the country. It is intended to share the consciousness of the local government by flow assuming the transition of volcanic activity, called the eruption scenario. For operating the level effectively, the eruption scenario, flow chart assuming the progress of the volcanic activity of each volcano, has been shared with the local government. As the lastest magma eruption is in 1909, major volcanic activity had been occurred in the very shallow part around lava dome for a long time. It is unknown what the phenomenon is observed when the magma is supplied to the shallow depth from the deeper. Therefore, the scenario that assumed the magma eruption is supplemented by the general knowledge that was observed at other volcanoes. The mechanism of the deformation and VT-seismicity is not clear. But, it can be considered of the distribution that related to the heat supply system or the geological structure beneath Tarumae. In this study, we tried to apply the interpretation of the ground deformation and VT-seismicity to the eruption scenario. However, our interpretation on the activity is unverifiable evidence so poor at present. In order to improve the eruption scenario certainly, elucidation of the magma supply system in Tarumae is essential, but it is not clear at present. To clarify the magma supply system, it is necessary to more information of geological structures and observed results such as ground deformation and VT-seismicity in this time. However, we are at present able to investigate detection of the high attenuation region used natural earthquake and to estimate fault plane solutions of VT earthquake (P-axes) using P-waves, and would like to approach. In addition, it is necessary to operate new observation system to capture phenomena such as seismic activity and ground deformation more certainly due to magma rising from the deep.

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