On long-baseline self-potential monitoring on the Izu-Oshima Island

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SUMMARY

Izu-Oshima Island is an active volcanic island on the Izu-Bonin Arc, in the south of the Japan mainland about 120 km from Tokyo. Since the last eruption in 1986, geodetic surveys have indicated long-term inflation of the volcanic body. Based on the eruption history of the volcano, it is thought that we will soon have the next eruption. In preparation and eruption stages, we can expect several EM phenomena due to Streaming potential and spatiotemporal variation of the resistivity structure from enhancement of hydrothermal activity and ascent of the magmatic body.

In order to monitor the spatial distribution of the self-potential (SP), we have continued the Network-MT survey with the aid of the commercial telephone network of Nippon Telegraph and Telephone Corp. (NTT). For a reference, we also measure 3-component magnetic field in the central caldera area. Since the network-MT survey can only be done in areas where telephone service is available, large observation-free areas existed in the central caldera. On the other hand, in order to mainly monitor the spatiotemporal variation of the SP field, we have maintained SP monitoring network in the vicinity of the central summit cone. However, the network was not connected outside of the summit caldera. Therefore, in addition to the Network-MT survey, we have recently combined both surveys by setting one common electrode, which is located near the northern rim of the caldera. The electrode is connected both to the inner SP survey and to the outer Network-MT survey. The total number of the electrodes is 21 and 14, respectively, for the inner and the outer networks.

In this presentation, we will show basic design of the whole observation system and time series including the intense geomagnetic storm in May, 2024. We will then present characteristics of the spatial distribution of the SP field and frequency response functions between respective voltage differences and the horizontal magnetic field.

Keywords: Izu-Oshima volcano, monitoring volcanic activity, self-potential monitoring, Network-MT