

R003-03

Zoom meeting A : 11/2 PM2 (15:45-18:15)

16:25~16:45

Electric self-potential change before and during the 2018 phreatic eruption of Iwo-Yama Volcano, Kirishima Volcanic Complex

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A small phreatic eruption occurred on 19 April 2018 at Iwo-Yama (or Io-Yama) Kirishima volcano complex, Japan. At the location 500m north of the eruption vent, magnetotelluric (MT) monitoring station (Aizawa et al., 2013) have recorded electric and geomagnetic fields before and during the phreatic eruption. We first report that significant electric self-potential change occurs simultaneously with precursory ‘ground tilt with tremor’, which started 5 minutes before the onset of the eruption. After the onset of the eruption, the steam effusion became significant, and the northward electric field dramatically increased. Approximately 5 minutes after the onset of the phreatic eruption, an explosion occurred with a cock’s tail plume that emitted rocks and blackish ash. Soon after the explosion, the plume return to be steam dominant, and northward electric field also return to be normal level. The most plausible explanation of the electric field change is electrokinetic origin caused by the groundwater movement. Based on the change in ground tilt and electric field, we propose that the electric field changes were all generated by the movement of shallow cold groundwater above the clay rich layer (Tsukamoto et al., 2018). The high temperature fluid intrusion, which caused ‘ground tilt with tremor’, promotes the boiling beneath the eruption vent, and subsequently gather the cold groundwater to compensate the vaporized water. Similar self-potential changes were also observed at the time without eruptions. Our data and interpretation suggest that shallow groundwater flow controls the preparation process and the occurrence of phreatic eruptions. Shallow groundwater flow can be monitored by electric self-potential.

References

Aizawa K., T. Koyama, M. Uyeshima, H. Hase, T. Hashimoto, W. Kanda, R. Yoshimura, M. Utsugi, Y. Ogawa, and K. Yamazaki (2013), Magnetotelluric and temperature monitoring after the 2011 sub-Plinian eruptions of Shinmoe-dake volcano, *Earth Planets Space*, 65 (No. 6), 539-550.

Tsukamoto K., Aizawa K., Chiba K., Kanda W., Uyeshima M., Koyama T., Utsugi M., Seki K., and Kishita T. (2018), Three-dimensional resistivity structure of Iwo-yama volcano, Kirishima Volcanic Complex, Japan: Relationship to shallow seismicity, surface uplift, and a small phreatic eruption, *Geophysical Research Letters*, 45, 12,821-12,828.

<https://doi.org/10.1029/2018GL080202>.