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MIS26-10 Room:422 Time:April 29 11:30-11:45

Magnetotelluric measurements of volcanic lightning at Sakurajima, Japan

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Magnetotelluric (MT) method uses the natural electromagnetic (EM) field variation to image subsurface resistivity structure, and usually involves measuring two horizontal electric field components (Ex and Ey) and three magnetic field components (Bx, By, and Bz) at the Earth's surface, where the subscripts x and y indicate the N?S and E?W directions, respectively. In the MT data recorded 3 km away from the active crater of Sakurajima volcano, pulse-like signals that synchronize with the volcanic lighting are frequently observed within 3 minutes from the eruption onset (Aizawa et al. 2010). However the sampling rate on that paper was so low as 15 Hz that the physical properties of volcanic lightning, such as waveform of EM radiation, amplitude of electric current, and its duration, were not investigated.

In the presentation, we show the result from the temporal MT observation with the sampling rate of 65 kHz. The MT data were recorded at two sites approximately 3km away from the active crater between October 27 and November 6, 2013. The preliminary analysis shows the following features of volcanic lightning;

(1) There are two types of discharges. One is the assemblage of several pulses. Another is the EM burst that continues several ms.

(2) The duration of each pulse in the assemblage type is short as a few tens of micro seconds, but its amplitude is far strong than that of EM burst.

(3) Regarding the discharges of the pulse type, there are examples that the first discharge is weaker than the second and third discharges.

The points of (1) and (2) are similar to the lightning in the thundercloud. However, its duration is approximately 1/10~1/100 of that of thundercloud. In addition, we will show the data of physical unit (mv/Km and nT) which was recovered by incorporating the frequency response of the logger and induction coil, and will closely investigate the relationship between MT signals and the corresponding lighting movie. In addition, the 32 Hz MT data since December 2011 will be presented.

References

Aizawa, K., A. Yokoo, W. Kanda, Y. Ogawa, and M. Iguchi (2010), Magnetotelluric pulses generated by volcanic lightning at Sakurajima volcano, Japan, Geophysical Research Letters, 37, L17301, doi:10.1029/2010GL044208.

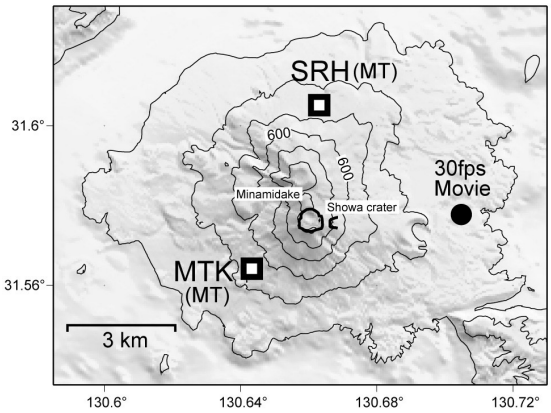

Fig.1