SVC49-01　　　　　　会場:102B　　　　　　　　　時間:5 月 25 日 14:15-14:30

地球統計学的手法に基づく，VLF-MT による表層比抵抗の分布特性の把握～台湾北部・大屯火山群を例に
Geostatistical analysis of VLF-MT resistivity data at the Tatun Volcano Group, Taiwan

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　Tatun Volcano Group (TVG) is composed of over twenty volcanoes, which were formed within faults at the northern tip of Taiwan. Its active heat discharge from fumaroles and springs also suggests a large amount of volcanic fluids released from a potentially-existing magma beneath Chishinshan volcano (e.g., Yang et al., 1999; Ohba et al., 2010; Konstantinou et al., 2007). Komori et al. (2014) conducted AMT surveys for a better understanding of this magma degassing, and found low resistivity anomalies associated with the hydrothermal activity of the TVG.

　In the TVG, we also conducted VLF-MT, which uses an electromagnetic wave with a singular frequency such as 22.1 kHz. Generally, its high simplicity of use enables a huge numbers of measurements at low cost, compared to AMT surveys. Therefore, VLF-MT could easily and extensively trace a surface distribution of hydrothermal fluids discharged from a deeper part, although its sounding depths are only a few tens to hundreds meters. However, it is quite often that there are many missing data points, mainly due to inaccessibility and high-level noises. Consequently, a sparse distribution of the surface resistivity is obtained, which might result in wrong spatial features of the resistivity at the survey areas.

　Geostatistics is potentially a good tool to solve the above problem. It was theoretically developed by Krige (1951) to evaluate a quality of mines by estimating data values at unsampled points from a viewpoint of statistics. To date, it has been widely used for explorations of oils and geothermal/groundwater resources, by applying to data such as temperature, crack density, porosity, permeability, and chemical composition (e.g., Koike and Ichikawa, 2006; Anderson and Fairley, 2008). Because this method is mathematically based on statistics, it would enable a fair inference with regard to a spatial property of the obtained data.

　The present study applied the Geostatistics to over 300 VLF-MT resistivity data of the TVG, which were conducted in 2009-2010 by Kagiyama et al. (2010, JPGU meeting) and in 2012-2013 by Komori et al. (2014, CA meeting). The numerical code GSLIB (Deutsch and Journel, 1998) was used for our geostatistic works. The data were first processed to make an experimental semivariogram. It was used to estimate a model variogram by assuming values of nugget, sill, and range, on the basis of the criteria put by Kitanidis (1997). The modeled variogram was input to Simulated Annealing (SA) process to estimate a statistically-plausible spatial distribution of the surface resistivity. In the presentation, we will show preliminary results by the above processes, and examine its relation to structural features and hydrothermal activity of the TVG.

キーワード: 大屯火山群, 熱水活動, VLF-MT, 地球統計学, 焼きなまし法
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