

Toward an Innovation for Large Scale Data Analysis in EM-ACROSS

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As presented by Kumazawa et al., Ogawa et al. and Fujii et al. in this session, we are planning to restart a development study of EM-ACROSS in collaboration with Earth-Life Science Institute and Volcanic Fluid Research Center of Tokyo Institute of Technology. This presentation re-evaluates an observation scheme and data analysis procedures in EM-ACROSS by reference to a trial data obtained from a preliminary test at Shizuoka University. The main purpose of this study is to obtain valuable knowledge about the processes of extracting transfer function with noise level information from very large scale raw data with noise, bias and missing data.

The preliminary test was conducted from 2007 to 2012. Source signal was transmitted from an electric current dipole located in the Suruga campus of the university, and its response was observed at three sites; Shimizu-hokubu site (electric field, distance of 17km from the source), Tawaramine site (magnetic field, 18km) and Asahata site (magnetic field, 7km). Observation period is a maximum of 5 years while missing periods exist due to blackouts and mechanical failures, and the whole data size is dozens of terabytes.

A specific subject of this study is an elimination of irrelevant variation in the observed data caused by an environmental change near the surface of the ground. Since such variation greatly influences resulting transfer functions, a refined data stacking method and a data correction method by auxiliary information (micro earthquake, meteorological data, etc.) are indispensably required. Furthermore, a use of current dipole transmission by a pair of ground electrode is considered as a reason of the variation. To quantitatively assess its instability and to obtain valuable knowledge for improvements are also required.

Keywords: ACROSS, Electromagnetic sounding, Volcano, Big data