Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SEM33-P13 Room:Convention Hall Time:May 26 18:15-19:30

Development of resistivity modeling code designed to high-density electrical prospecting for cylindrical rock samples

SUZUKI, Takeshi[1*] ; YOSHIMURA, Ryokei[2] ; OSHIMAN, Naoto[2]

[1]Graduate School of Science, Kyoto University, [2]DPRI, Kyoto University

Crustal electrical resistivity structures are obtained through geoelectromagnetic observations, and are used to interpret characteristics of subsurface crustal activities such as earthquake occurrence and volcanic activities (e.g., Ogawa et al., 2001; Yoshimura et al., 2009). Because electrical properties are very sensitive to the existence of fluid, geoelectromagnetic methods are used to detect crustal fluid.

Resistivity images are interpreted in relation between the porosity of rock and its connectivity with several mixing lows (e.g., Archie, 1942; Hashin and Shtrikman, 1962; Glover et al., 2000). In order to verify the applicability and scalability of such interpretations, we plan to carry out high-density electrical prospecting for rock samples whose other geophysical characteristics are well known.

As the first step of laboratory experiments, we have developed a numerical simulation code of DC method for cylindrically-shaped samples as a tool for feasibility studies. In our code, three dimensional finite-difference methods described in Dey and Morrison (1979) is modified for the cylindrical coordinate system.

For performance evaluation, the results of numerical experiment were compared with results of electrical prospecting to simulation sample (conductive plastic). As a result, we confirmed a cylindrical-shaped outer boundary is represented consistently by developed code. Also, we detected thin structure whose thickness is 1mm or less and estimated its resistivity by forward modeling.

In this presentation, we will report the results of comparison between numerical simulations and electrical prospecting to simulation sample.

Keywords: rock experiments, electrical resistivity, numerical simulations