

## Monitoring of the variation of underground resistivity structure by measuring the neutral current of 500 kV electric power lines

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The study of anomalous electromagnetic phenomena associated with the crustal activities has been carried out by using the power line system of the Tokyo Electric Power Co. Inc. The observed neutral point current data at an electrical substation generally contain the induced current of external source geomagnetic variations. We attempt to develop the observation method to monitor the changes of underground electrical resistivity structure from the neutral point current data. The most awkward problem is that the observed neutral point current data at a substation is considered as the sum of electric currents from the neighboring two substations. We formulated a new analyzing processes to obtain the electromagnetic response functions which are calculated from the neutral point current and horizontal magnetic field. These response functions are expected to contain information of one-dimensional resistivity structure under three substations. Furthermore, we expand this approach to calculate of the apparent resistivity and phase components, which are frequently utilized in the conventional magnetotelluric (MT) method. We introduced a frequency-independent factor parameter. To obtain the factor parameter, temporary MT observation is required near the substations. The proposed method was applied to the neutral point current data acquired at substations in the western part of Kanto district (Higashi-Yamanashi, Shin-Fuji, and Shin-Hadano substations) in central Japan. The magnetic data at the Kakioka Magnetic Observatory, Japan Meteorological Agency have been used in this study. The results indicate that this approach seem to promise to monitor the variations of underground electrical resistivity structure associated with crustal activities.

### Reference:

M. Harada, J. Izutsu, T. Uetake, T. Terayama, and T. Nagao, Monitoring of the variation of underground electrical resistivity structure by measuring the neutral point current of 500 kV electric power line, Bull. Inst. Oceanic Res. & Develop., Tokai Univ., **30**, 2009. *in press*