Synthetic test for a 3-D global inversion of the electrical conductivity by using the Sq band

*Takao Koyama[1]

1. Earthquake Research Institute, University of Tokyo

The electrical conductivity is sensitive and enhanced due to the presence of fluids, high thermal anomaly, metals and so forth, and is one of the important physical parameter to elucidate the interior and dynamics of the Earth. The electromagnetic sounding is a suitable tool to reveal the electrical conductivity strucutre in the deep Earth, and has been widely used for over a hundred years. For shorter periods than 10000 sec, a plain wave approximation of the EM field may be valid and generally used in, say, magnetotelluric method. For longer periods than a few day, a simple P10 distribution approximates well the EM variations in global scale. An intermediate band, however, has complex distribtusions and careful consideration of a spatial distirbution of the EM variation must be necessary.
In this study, we test the 3D global inversion by using the syntetic data with higher modes of the spatial distirbution. In a forward modeling part, an integral equation method is used, as the boundary conditions are already satisfied in synthtic Green's functions and thus numerical grids are not necessary in the air. In an inversion part, a quasi-Newton method and an adjoint approach are adapted to reduce a number of forward calculations.
In this presentation we show the synthtic results and discuss the possibility to elucidate the electrical conductivity structure in the mantle, especially, mantle transition zone and around by using the Sq field data.

Keywords: Sq, electrical conductivity, inversion

