

An attempt to reveal the electrical conductivity distribution of the mantle

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We report an attempt to establish a electrical conductivity model of the mantle. In the data processing, what we have done are (1) construction of the updated data base of hourly geomagnetic field on the surface of the Earth to improve the data quantity and quality, (2) application of the Empirical Orthogonal Function to the data, and (3) computation of global geomagnetic response functions at all latitudes by revealing existence of the two source mechanisms. In the modelling, we developed a finite difference code with the staggered grid on the spherical coordinate and improved the accuracy in computation dramatically. Then, a faster computation on a finer grid was established by parallel computing. We will discuss about our latest results and future prospect in the study.

The electrical conductivity distribution of the mantle is of great interest to reveal the mantle dynamics as well as the seismic velocity distribution. However, there have been a number of difficulties to obtain reliable conductivity models. We report an attempt to establish a mantle conductivity model by improving our knowledge on the source field and Earth's response to it and applying a sensible method to the data set.

We verified mainly the data processing and the modeling method. In the data processing, what we have done are (1) construction of the updated data base of hourly geomagnetic field on the surface of the Earth to improve the data quantity and quality, (2) application of the Empirical Orthogonal Function to the data which are unevenly distributed and contain noises and gaps, and (3) computation of global geomagnetic response functions at all latitudes by revealing existence of the two source mechanisms. On the other hand, we developed a finite difference code with the staggered grid on the spherical coordinate and improved the accuracy in computation dramatically. Then, a faster computation on a finer grid was established by parallel computing. Details of the code is given by Uyeshima, Toh and Schultz (this meeting).

We will discuss about a progress in the modelling of the mantle conductivity with our code applied to the responses and about future prospect in the study.