GAIA Sq モデルを用いたマントル電気伝導度構造の推定

小山 崇夫 [1]; 村田 友香 [2]; 藤田 茂 [3]; 藤井 郁子 [4]; 馬場 聖至 [5]; 三好 勉信 [6]; 藤原 均 [7]; 陣 英克 [8]; 品川 裕之 [8]
[1] 東大・地震研; [2] 気象庁; [3] 気象大; [4] 気象大学校; [5] 東大・地震研; [6] 九大・理・地球惑星; [7] 成蹊大・理工; [8] 情報通信研究機構

Estimation of electrical conductivity in the Earth's mantle by using the GAIA Sq model

Takao Koyama[1]; Yuka Murata[2]; Shigeru Fujita[3]; Ikuko Fujii[4]; Kiyoshi Baba[5]; Yasunobu Miyoshi[6]; Hitoshi Fujiwara[7]; Hidekatsu Jin[8]; Hiroyuki Shinagawa[8]
[1] ERI, University of Tokyo; [2] Japan Meteorological Agency; [3] Meteorological College; [4] Meteorological College; [5] ERI, Univ. of Tokyo; [6] Dept. Earth & Planetary Sci, Kyushu Univ.; [7] Faculty of Science and Technology, Seikei University; [8] NICT

We've tried to estimate the electrical conductivity of the mantle structure by using the Sq variation derived from the GAIA (Ground-to-topside model of Atmosphere and Ionosphere for Aeronomy).

The GAIA assimilates the meteorological reanalysis data (JRA-55) to the whole atmosphere-ionosphere coupled model and thus it is the well-modelled Sq field. We use this Sq model as an inducing field.

First we executed spherical harmonic expansion of the magnetic field of the GAIA for 3 day time series up to 50, which correspond to three sequential solar quiet days. And then, three-dimensional forward modeling in the spherical coordinate was executed in the frequency domain. Now, we suppose the 1-D structure in the Earth under the ocean-land lateral contrast. As the results, the calculated geomagnetic data inversely converted to the time domain could be closer to the observed time series data, compared to the GAIA Sq field itself, that is, total of RMS data misfit at 71 stations decreases by 40%.

Next, we try to find the best fit 1-D model in the mantle. We suppose the basic 1-D model as a standard model in the northwest Pacific by Baba (2017). We also try other models which are more or less conductive, and as the results, the original model or slightly more conductive model is the best to explain the vertical magnetic field data of Sq. We also try to estimate the 3-D electrical conductivity model in the Earth's mantle by using the Sq model of GAIA, and discuss it.