Geophysical Research Abstracts, Vol. 8, 03093, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03093

Revised Backus series for modeling the intrinsic errors in scalar magnetic models

M. Mandea (1), M.A. Pais (2), R. Guedes Junior (2)

(1) GeoForschungsZentrum Potsdam (mioara@gfz-potsdam.de), (2) Departamento de Fisica da Universidade de Coimbra (pais@teor.fis.uc.pt)

The spherical harmonic models for the Earth's magnetic field contain substantial errors when derived from scalar intensity data, only. This appears, in spite of high accuracy of the intensity measurements and even the excellent fitting of the scalar models to the data, and is known as "Backus effect". This effect no longer arises if the global geomagnetic field models are derived from the three vector field components. In this study, we retrieve previous efforts to model the Backus effect. With the aim of surmounting some prior remaining shortcomings, as for instance the need to separate the observed error coefficients into Backus and non-Backus terms, we propose "revised Backus series" to fit to the discrepancies between scalar and vector field models. With this purpose, we initially identify the first order perturbation to be added to the zeroth order dipolar geomagnetic field. We thereafter deduce the most adequate recursive revised Backus series to be used. These new series are tested using MAGSAT already available models and our method compared with former published studies. Finally, we apply this new approach to analyse differences between new scalar and vector models based on Oersted satellite data. This study offers new insights into the possibility to take full advantage of scalar magnetic data when they are the unique available information for a given epoch.