

An Equivalent Source Method for Modelling the Global Lithospheric Magnetic Field

Kother, Livia Kathleen; Hammer, Magnus Danel; Finlay, Chris; Olsen, Nils

Published in:
Geophysical Research Abstracts

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Kother, L. K., Hammer, M. D., Finlay, C., & Olsen, N. (2014). An Equivalent Source Method for Modelling the Global Lithospheric Magnetic Field. *Geophysical Research Abstracts*, 16, [EGU2014-6673].

DTU Library Technical Information Center of Denmark

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



An Equivalent Source Method for Modelling the Global Lithospheric Magnetic Field

Livia Kother (1), Magnus D. Hammer (2), Christopher C. Finlay (1), and Nils Olsen (1)

(1) Division of Geomagnetism, DTU Space, Technical University of Denmark, Kgs. Lyngby, Denmark, (2) Copenhagen, Denmark

We present a new technique for modelling the global lithospheric magnetic field at Earth's surface based on the estimation of equivalent potential field sources. As a demonstration we show an application to magnetic field measurements made by the CHAMP satellite during the period 2009-2010 when it was at its lowest altitude and solar activity was also remarkably quiet. Both scalar and three component vector field data are utilized. Estimates of core and large-scale magnetospheric sources are removed from the measurements using the CHAOS-4 model. Quiet-time and night-side data selection criteria are also employed to minimize the influence of the ionospheric field. The model for the remaining lithospheric magnetic field consists of magnetic point sources (monopoles) arranged in an icosahedron grid. The corresponding source values are estimated using an iteratively reweighted least squares algorithm that includes model regularization and Huber weighting. Data error covariance matrices are implemented, including both the latitude dependence of data error variances and covariances between the vector field components due to unmodelled sources. Results show good consistency with the field structures obtained in the CHAOS-4 and MF7 models using more conventional spherical harmonic based approaches. Advantages of the equivalent source method include its local nature, allowing e.g. for regional grid refinement, and the ease of transforming to spherical harmonics when needed. Future applications will make use of Swarm data in combination with high resolution aeromagnetic measurements.