

Technical University of Denmark



## Updating the CHAOS series of field models using Swarm data and resulting candidate models for IGRF-12

Finlay, Chris; Olsen, Nils; Tøffner-Clausen, Lars

*Publication date:*  
2014

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

[Link back to DTU Orbit](#)

*Citation (APA):*  
Finlay, C., Olsen, N., & Tøffner-Clausen, L. (2014). Updating the CHAOS series of field models using Swarm data and resulting candidate models for IGRF-12. Abstract from 2014 AGU Fall Meeting, San Francisco, CA, United States.

**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.

**GP51A-3703** Updating the CHAOS series of field models using Swarm data and resulting candidate models for IGRF-12[Back to:](#)[Christopher Finlay](#)

Friday, December 19, 2014 08:00 AM - 12:20 PM  
Moscone South  
Poster Hall

Ten months of data from ESA's Swarm mission, together with recent ground observatory monthly means, are used to update the CHAOS series of geomagnetic field models with a focus on time-changes of the core field. As for previous CHAOS field models quiet-time, night-side, data selection criteria are employed and the magnetic field data is used in the instrument frame with Euler angles for the rotation to the North-East-Center (NEC) frame co-estimated. The new model spans more than 15 years between 1999 and 2014, with the internal field being time-dependent up to spherical harmonic degree 20 using a 6th order spline representation with knot points spaced at 0.5 year intervals. The resulting field model is able to consistently fit data from six independent low Earth orbit satellites: Oersted, CHAMP, SAC-C and the three Swarm satellites. As an example, we present comparisons of the excellent model fit obtained to both the Swarm data and the CHAMP data. The new model also provides a good description of observatory secular variation, capturing rapid field evolution events during the past decade. Maps of the core surface field and its secular variation can already be extracted in the Swarm-era. We therefore conclude that Swarm data is suitable for building high-resolution models of the large-scale internal field, and proceed to extract IGRF-12 candidate models for the main field in epochs 2010 and 2015, as well as the predicted linear secular variation for 2015-2020. The properties of these IGRF candidate models are briefly presented.

**Authors**[Christopher Finlay](#)*Technical University of Denmark - Space*[Nils Olsen](#)*Technical University of Denmark - Space*[Lars Tøffner-clausen](#)*Technical University of Denmark - Space***View Related Events**[Session: ESA's Swarm Mission, One Year in Space III Posters](#)[Section/Focus Group: Geomagnetism and Paleomagnetism](#)[Day: Friday, December 19, 2014](#)