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

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.

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 variarion 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