



## **A proposal for the selection of numerical dynamo models for data assimilation practice**

Alexandre Fournier (1), Julien Aubert (2), and Erwan Thébault (1)

(1) Institut de Physique du Globe de Paris, Géomagnétisme, Paris cedex 5, France (fournier@ipgp.fr), (2) Institut de Physique du Globe de Paris, Dynamique des Fluides Géologiques, Paris cedex 5, France

In this contribution we propose a selection procedure to retain (or discard) a numerical model of the geodynamo candidate to the practice of the assimilation of geomagnetic observations. Considering a given dynamo run, the first step consists in the extrapolation of the values of the model outputs to their expected earth-like values, by using the type of scaling laws which have come to the fore in dynamo modelling over the past 5 years. The idea is then to extract multivariate statistics from this free model run, relating the magnetic field and its rate of change at the top of the core with the flow at the top of the free stream. This prior information, supplied by the numerical model, is next used to solve the inverse problem of estimating the field and the flow compatible with a given geomagnetic core field and secular variation model, for which it is fundamental to have a good handle on uncertainties. Inspection of the amplitude and distribution of the magnetic residuals, together with comparison of the large-scale component of the estimated flow with previously published core flow maps, allows us to retain (or discard) the dynamo model under scrutiny in the prospect of using it for geomagnetic data assimilation practice. We will illustrate this selection exercise resorting to three dynamo models of increasing complexity, using the contribution of Thébault et al. (2010) to the latest release of the IGRF as our target geomagnetic field model.

Thébault, E., Chulliat, A., Maus, S., Hulot, G., Langlais, B., Chambodut, A., Menvielle, M., 2010. IGRF candidate models at times of rapid changes in core field acceleration, *Earth Planets Space*, 62, 753-763, doi:10.5047/eps.2010.05.004.