Analysing observatory data for Gauss coefficient time dependence

Vincent Lesur (1) and Matthias Holschneider (2)

(1) GFZ German Research Centre For Geosciences, Sec. 2.3, (2) University Potsdam, Institute for mathematics

One of the key quantities required to improve our magnetic field models is the time correlation function for the Gauss coefficients. To characterise these functions for each coefficient, the major difficulty remains the separation of internal and external field contributions. We propose here an approach using exclusively magnetic observatory data, and based on harmonic spline functions. The inversion process is set in the Bayesian framework. We extend first the harmonic spline, as introduced by Shure et al. (1982), for magnetic external fields so that all observatory data can always be fitted to the expected level of accuracy, by both the external and internal harmonic splines. The separation between external and internal fields relies then exclusively on the prior we give on the field behaviour. The technique has been tested on synthetic data sets. Preliminary results will be presented for applications on real data.

Shure, L., Parker, R., & Backus, G., 1982. Harmonic splines for geomagnetic modelling, Physics of the Earth and Planetary Interiors, 28, 215–229.