

Riken International Symposium on Data Assimilation 2017

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Education

- 2012: Habilitation thesis, Geophysics, Université Paris-Diderot
- 2003: Ph.D., Geosciences, Princeton University
- 1998: M.Sc., Geophysics, Institut de Physique du Globe de Paris
- 1996: B.Sc., Physics, École Normale Supérieure de Lyon

Employment

- Since 2014: Professor of Geophysics, Institut de Physique du Globe de Paris
- 2008-2012: Associate professor of Geophysics, Institut de Physique du Globe de Paris
- 2004-2008: Associate professor of Geophysics, Université Joseph-Fourier, Grenoble
- 2003-2004: Research and teaching assistant, Institut de Physique du Globe de Paris

Current research activities

The main goal of my research is to help understand earth's core dynamics, which is indirectly reflected by the spatial and temporal variability of the earth's magnetic field. I mean at contributing to the understanding of the physical processes responsible for this variability, through proper analysis of magnetic observations and experimental results. A consistent relationship between observations and dynamical models of the core can be set up in the framework of data assimilation. I have been the PI of the [AVSGeomag](#) research program (funded by the Agence Nationale de la Recherche for years 2011–2016) whose goal was precisely to build assimilation tools for the assimilation of geomagnetic observations into dynamical models of the Earth's core. Since 2013, I have also collaborated with mantle dynamicists (resp. solar physicists) to investigate the possibility to use data assimilation to analyze observations connected with mantle convection (resp. solar activity).

Publications that may be of interest to RISDA 2017 attendees

Complete list available at www.ipgp.fr/~fournier/publications.html

1. Bocher, M., **Fournier, A.**, & Coltice, N. Ensemble Kalman filter for the reconstruction of the Earth's mantle circulation, submitted for publication to *Nonlinear Processes in Geophysics*.
2. Hung, C. P., Brun, A. S., **Fournier, A.**, Jouve, L., Talagrand, O., & Zakari, M. A new variational method to estimate the time dependent solar meridional circulation: Proof of concept, submitted for publication to *The Astrophysical Journal*.
3. Morzfeld, M., **Fournier, A.**, & Hulot, G., 2017. Coarse predictions of dipole reversals by low-dimensional modeling and data assimilation, *Physics of the Earth and Planetary Interiors*, **262**, 8–27. doi : [10.1016/j.pepi.2016.10.007](https://doi.org/10.1016/j.pepi.2016.10.007)
4. Bocher, M., Coltice, N., **Fournier, A.**, & Tackley, P. J., 2016. A sequential data assimilation approach for the joint reconstruction of mantle convection and surface tectonics, *Geophysical Journal International*, **204**, 200–214. doi : [10.1093/gji/ggv427](https://doi.org/10.1093/gji/ggv427)

5. Sanchez, S., **Fournier, A.**, Aubert, J., Cosme, E., & Gallet, Y., 2016. Modelling the archaeomagnetic field under spatial constraints from dynamo simulations: a resolution analysis, *Geophysical Journal International*, **207**, 983–1002. doi : [10.1093/gji/ggw316](https://doi.org/10.1093/gji/ggw316)
6. Hung, C. P., Jouve, L., Brun, A. S., **Fournier, A.**, & Talagrand, O., 2015. Estimating the deep solar meridional circulation using magnetic observations and a dynamo model: a variational approach, *The Astrophysical Journal*, **814**, 151 (21 pp). doi : [10.1088/0004-637X/814/2/151](https://doi.org/10.1088/0004-637X/814/2/151)
7. **Fournier, A.**, Aubert, J., & Thébault, E., 2015. A candidate secular variation model for IGRF-12 based on Swarm data and inverse geodynamo modelling, *Earth, Planets, and Space*, **67**, 81 (17 pp). doi : [10.1186/s40623-015-0245-8](https://doi.org/10.1186/s40623-015-0245-8)
8. Hulot, G., Sabaka, T., Olsen, N., & **Fournier, A.**, 2015. The present and future geomagnetic field, *Treatise on Geophysics*, 2nd edition, vol. 5, 33–78. doi : [10.1016/B978-0-444-53802-4.00096-8](https://doi.org/10.1016/B978-0-444-53802-4.00096-8)
9. Sanchez, S. M., **Fournier, A.**, & Aubert, J., 2014. The predictability of advection-dominated flux transport solar dynamo models, *The Astrophysical Journal*, **781**(1), 8 (15 pp). doi : [10.1088/0004-637X/781/1/8](https://doi.org/10.1088/0004-637X/781/1/8)
10. **Fournier, A.**, Nerger, L., & Aubert, J., 2013. An ensemble Kalman filter for the time-dependent analysis of the geomagnetic field, *Geochemistry, Geophysics, Geosystems*, **14**, 4035–4043. doi : [10.1002/ggge.20252](https://doi.org/10.1002/ggge.20252)
11. Aubert, J., & **Fournier, A.**, 2011. Inferring internal properties of Earth's core dynamics and their evolution from surface observations and a numerical geodynamo model, *Nonlinear Processes in Geophysics*, **18**, 657–674. doi: [10.5194/npg-18-657-2011](https://doi.org/10.5194/npg-18-657-2011)
12. **Fournier, A.**, Aubert, J., & Thébault, E., 2011. Inference on core surface flow from observations and 3-D dynamo modelling, *Geophysical Journal International*, **186**, 118–136. doi: [10.1111/j.1365-246X.2011.05037.x](https://doi.org/10.1111/j.1365-246X.2011.05037.x)
13. Lhuillier, F., **Fournier, A.**, Hulot, G., & Aubert, J., 2011. The geomagnetic secular-variation timescale in observations and numerical dynamo models, *Geophysical Research Letters*, **38**, L09306. doi: [10.1029/2011GL047356](https://doi.org/10.1029/2011GL047356)
14. **Fournier, A.**, Hulot, G., Jault, D., Kuang, W., Tangborn, A., Gillet, N., Canet, E., Aubert, J., & Lhuillier, F., 2010. An introduction to data assimilation and predictability in geomagnetism, *Space Science Reviews*, **154**, 247–291. doi: [10.1007/s11214-010-9669-4](https://doi.org/10.1007/s11214-010-9669-4)
15. Gillet, N., Jault, D., Canet, E., & **Fournier, A.**, 2010. Fast torsional waves and strong magnetic field within the Earth's core, *Nature*, **465**, 74–77. doi: [10.1038/nature09010](https://doi.org/10.1038/nature09010)
16. Canet, E., **Fournier, A.**, & Jault, D., 2009. Forward and adjoint quasi-geostrophic models of the geomagnetic secular variation, *Journal of Geophysical Research*, **114**, B11101. doi: [10.1029/2008JB006189](https://doi.org/10.1029/2008JB006189)
17. **Fournier, A.**, Eymin, C., & Alboussière, T., 2007. A case for variational geomagnetic data assimilation: Insights from a one-dimensional, nonlinear, and sparsely observed MHD system, *Nonlinear Processes in Geophysics*, **14**, 163–180. doi: [10.5194/npg-14-163-2007](https://doi.org/10.5194/npg-14-163-2007)