JULIEN AUBERT
aged 49, CNRS Senior Researcher
married, 2 children
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History of employment

10/2013-present	CNRS senior researcher (research director), IPGP, France
09/2004-10/2013	Associate CNRS researcher, IPGP, France
1/2011-9/2021	Head, Geological Fluid Dynamics group, IPGP

Degrees

Ph.D	Geophysics, Université Joseph Fourier, Grenoble, 2001
Habilitation Thesis	Geophysics, Université Paris 7 and IPGP, 2009

Research experience

I am interested in extracting the geophysical information contained in Earth's magnetic field. To this end, I study Earth's core magnetohydrodynamics and the geodynamo process through a combination of forward and inverse/geomagnetic data assimilation numerical modelling. Details can be found after this link.

Honors, awards

CNRS Bronze medal, 2010
Doornbos Memorial Prize of the SEDI (Study of the Earth's Deep Interior) 2006 Symposium.
Recipient, scientific grant of the Fondation Simone et Cino Del Duca, French Academy of Sciences, 2017.

Memberships

AGU member since 2005, EGU member since 2010

Selected publications

I have published 67 articles in peer-reviewed international journals, listed on this page. My bibliometric data as of December 1, 2021 amount to 4194/5892 citations for an h-index of 32/37, as measured by Publons and Google Scholar, respectively (click for up-to-date info). Below is a list of selected publications:

Aubert, J. and Finlay, C.C.: Geomagnetic jerks and rapid hydromagnetic waves focusing at Earth's core surface, Nature Geoscience 12, 393-398, 2019, doi: 10.1038/s41561-019-0355-1
Aubert, J., Gastine, T., and Fournier, A.: Spherical convective dynamos in the rapidly rotating asymptotic regime, J. Fluid. Mech. 813, 558-593, 2017, doi: 10.1017/jfm.2016.789
Aubert, J.: Geomagnetic forecasts driven by thermal wind dynamics in Earth's core, Geophys. J. Int. 203, 1738-1751, 2015, doi: 10.1093/gji/ggv394
Aubert, J., Finlay, C., Fournier, F.: Bottom-up control of geomagnetic secular variation by the Earth's inner core, Nature 502, 219-223, 2013, doi: 10.1038/nature12574

Aubert, J., Amit H., Hulot G., Olson P. :Thermochemical flows couple the Earth's inner core growth to mantle heterogeneity, Nature 454, 758-761, 2008, doi:10.1038/nature07109
Alken, P. et al.: International Geomagnetic Reference Field: the thirteenth generation, Earth Planets Space 73, 49, 2021. doi: 10.1186/s40623-020-01288-x
Christensen, U. and Aubert, J.: Scaling properties of convection-driven dynamos in rotating spherical shells and application to planetary magnetic fields, Geophys. J. Int. 166, pp. 97-114, 2006, doi: 10.1111/j.1365-246X.2006.03009.x

Selected invited oral contributions

21 invited oral contributions total, with the ones since 2010 listed below:

Modelling the geodynamo, a strongly scale-separated MHD system, UKMHD 2021 (virtual conference).
Computational advances and challenges in planetary dynamo modelling, CIG Developer Meeting 2020 (virtual confernece).
Recent progresses and applications of geomagnetic data assimilation, Japan Geoscience Union 2019, Chiba, Japan.
The interplay of core convection and hydromagnetic waves in geomagnetic variations, German Priority Program Dynamic Earth annual meeting, 2018, Göttingen.
Numerical geodynamo simulations in the light of satellite geomagnetic data: results and challenges, European Space Agency 4DEarth prospective meeting, Noordwijk (Netherlands).
Numerical geodynamo simulation reaches Earth's core dynamical regime, AGU 2016, San Francisco.
Geodynamo simulations: tools to understand and forecast the geomagnetic field evolution, EGU 2016, Vienna.
Coupled dynamics of the geomagnetic westward drift and Earth's inner core super-rotation, European Geophysical Union 2015, Vienna.
Forward and inverse modelling of the geomagnetic secular variation, European Geophysical Union 2014, Vienna.
Geomagnetic inverse problem and data assimilation: a progress report, European Geosciences Union 2013, Vienna, Austria.
Computational aspects of inverse geodynamo modeling: advantages of a spectral approach, CIG Developer Meeting 2012, Boulder, USA
Imaging flow throughout the Earth's core, SEDI 2012, Leeds, UK
Imaging flow within the Earth's core, AGU 2011, San Francisco, USA
Paleomagnetic secular variation from the standpoints of paleomagnetism and numerical dynamo modelling, AGU 2010, San Francisco, USA

Selected press and outreach

The Herky-Jerky Weirdness of Earth's Magnetic Field, EOS, December 21 2020
New Model Shines Spotlight on Geomagnetic Jerks, EOS, April 29 2019
Mystery of strange jerks in Earth's magnetic field solved by scientists, Newsweek, April 22 2019
Earth's shifting magnetic field linked to planet's changing core, Huffington Post, October 10 2013
Structuring the inner core, Nature News and Views, August 6 2008
Earth's coupled interior, Physics Today, september 2008

Community service, synergistic activities

Elected member, section 18 CoNRS, 2021-2026
Head of the group "Dynamique des Fluides Géologiques", IPGP, 2011-2021
PhD Defense Commitee, Céline Guervilly, Grenoble, 2010 (as referee), Mathieu Laneuville, Paris, 2013, Marine Lasbleis, Lyon, 2014 (as referee), Rakesh Yadav, Göttingen, 2015 (as referee), Marie Troyano, 2020 (as president)

Member of the scientific council of IPGP, 2007-2009
Keynote seminar organizer, IPGP, 2007-2009
Member of selection committees for University Lecturer positions in Université Claude Bernard, Lyon (2013), Université Paul Sabatier (Toulouse), Université Paris-Sud (Orsay), 2010
Convening: Earth's core dynamics session, EGU 2010 (co-convener), EGU 2013 & 2015 (Main convener), session on data assimilation in geosciences, EGU 2014 (co-convener), Vienna, Austria, session on Earth's core, AGU 2015 (co-convener)
Member of the organizing committee of the SEDI 2004 symposium, Garmisch-Partenkirchen, Germany.
Topical Editor, Solid Earth, EGU journals.
Referee for Nature, Science, PNAS, Geology, Icarus, Geophysical Journal International, Physics of the Earth and Planetary Interiors, Geophysical Research Letters, Earth and Planetary Science Letters, Journal of Fluid Mechanics, Geophysical and Astrophysical Fluid Dynamics.
Expert external reviewer for the ERC, NERC (UK), NSERC (Canada), NSF & NASA (USA), GACR (Czech Republic), ETH Zürich (Switzerland), BELSPO (Belgium) and DFG (Germany) funding agencies.

Advising

Florian Lhuillier (PhD. 2008-2011), Maylis Landeau (PhD. 2009-2013), Sabrina Sanchez (PhD. 2012-2016), Guillaume Pichon (PhD. 2014-2017), Tobias Schwaiger (PhD. 2017-2020), Jenny Wong (Postdoc 2019-2020)

Software development

I am a co-author of the PARODY numerical code for simulating planetary interior dynamics and magnetic field generation. Since 2006 I have been steadily developing the PARODY-JA branching of this code, which is freely distributed in the international community. Currently 19 groups are using the PARODY-JA code worldwide.
I am the author of the DMFI three-dimensional and dynamical visualization software, which is also freely distributed in the international community.

Funding ID

CNRS/INSU Funding Grants obtained as PI in 2005-2007, 2009-2011, 2014 and 2016 (amounts 4-15 k€/ year).
Participating scientist, ANR program AVSGeomag, 2011-2015 (300 k€).
Supercomputer time granted as PI by GENCI from 2007 to 2019: currently 10.4 million core.hours with equivalent value 280 k€.
Participating scientist, Région Île-de-France/IPGP SESAME grant for advanced supercomputing S-CAPAD, 2012 (320 k€) and DANTE, 2018 (600 k€)
PI, scientific subvention from the Fondation Del Duca of Institut de France, 2017-2020 (125 k€)
Leader of IPGP partner, ESA 4DEarth_Swarm_Core project, 2019-2021 (500 k€)