**Research Associate in modelling geodynamic perturbations of climate signals**

Postdoctoral job offer from the Institut de Physique du Globe de Paris | UMR 7154

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| Researcher in | Global Geodynamics |
| Duration | 1 year, full time (additional 1-year renewal possible) |
| Department | Geomagnetism Group |
| Salary | 4 000 € / month |
| Date of publication | 13/10/2023 |
| Starting date | As soon as possible |
| Location | [1 rue Jussieu, 75005 Paris, FRANCE](https://goo.gl/maps/Ua1CMSywydfCrGtLA) |

# L’Institut de Physique du Globe de Paris (IPGP)

A world-renowned geosciences organisation, the [IPGP](http://www.ipgp.fr/en) is associated with the [CNRS](https://www.cnrs.fr/en/) and is an integrated institute of the new [Université de Paris](https://u-paris.fr/en/). Bringing together more than 500 people, the IPGP studies the Earth and the planets from the core to the most superficial fluid envelopes, through observation, experimentation and modelling.

The [research areas](http://www.ipgp.fr/en/research) are structured through four main unifying themes: [Interiors of the Earth and Planets](http://www.ipgp.fr/en/earth-and-planetary-interiors), [Natural Hazards](http://www.ipgp.fr/en/natural-hazards), [Earth System](http://www.ipgp.fr/en/earth-system-science) and [Origins](http://www.ipgp.fr/en/origins). A large number of multidisciplinary scientific projects are carried out by [16 groups in various fields](http://www.ipgp.fr/en/research-flowchart).

The IPGP is in charge of [observation services](http://www.ipgp.fr/en/observation) in volcanology, seismology, magnetism, gravimetry and erosion. The IPGP's permanent observatories monitor the four active French overseas volcanoes in Guadeloupe, Martinique, Réunion Island and Mayotte.

The IPGP hosts [powerful computing resources](http://webpublix.ipgp.fr/rech/scp/) and state-of-the-art experimental and analytical [facilities](http://www.ipgp.fr/en/plateforms-and-shared-services) and benefits from first-class technical support. The IPGP provides its students with geosciences training that combine observation, quantitative analysis and modelling, and that reflects the quality, richness and thematic diversity of the research conducted by the IPGP teams.

# Job Description

Global movements of hot rocks deep inside Earth’s solid mantle (i.e. mantle convection), drive changes in the external ellipsoidal figure of the Earth. Such changes of figure induce displacements of the rotation axis relative to the surface geography, a process called ‘True Polar Wander’ (TPW), and they perturb Earth’s orientation to incoming solar radiation via changes in precession and obliquity cycles. Mantle convection also drives vertical displacements of Earth’s solid surface (i.e. dynamic topography) and variations in sea level, thus influencing the interpretation of geological sea-level markers used to infer the stability of polar ice sheets in past geologic ‘warm’ periods, such as the Last Interglacial (LIG) and the mid-Pliocene warm period (MPWP). Major questions remain concerning the magnitude and timing of mantle-convection induced changes of: (1) bedrock topography and sea level changes; (2) precession and obliquity cycles and corresponding (Milankovitch) insolation variations; (3) TPW.

These outstanding questions are the focus of the *GYPTIS* (Geodynamic Perturbations of Climate Signals) research project funded by the *Agence Nationale de la Recherche* (ANR) in France. This project will use tomography-based reconstructions of the evolution of mantle convection to determine the corresponding impacts on sea level and Earth rotation variations. The goal is to obtain detailed maps of convection-induced perturbations of geological markers that record climate change in the recent and distant geologic past, extending back to the beginning of the Cenozoic era.

# Duties and Responsibilities:

* Collaborate with group members who work on computational codes used to reconstruct the spatiotemporal evolution of mantle convection (e.g. [doi.org/10.1002/2016JB012841](https://doi.org/10.1002/2016JB012841)).
* Employ the mantle convection reconstructions to predict the time-dependent evolution of Earth’s moment of inertia tensor and the corresponding changes in TPW and orbital parameters that control Milankovitch insolation variations ([doi.org/10.1051/0004-6361/201116836](http://doi.org/10.1051/0004-6361/201116836))
* Employ the mantle convection models to generate global maps of time-dependent evolution of dynamic surface topography, geoid/gravity anomalies and corresponding sea level variations.
* Check predictions (of TPW, Milankovitch cycles, and sea level) against corresponding geological data sets (e.g. paleomag pole positions, cyclostratigraphy, fossil corals/beaches).
* Participate in regular group meetings and actively interact with all group members.
* Present results in international conferences and workshops.
* Publish these results in peer-reviewed journals.
* Research activities will be carried out full time at the IPGP

# Required Qualifications:

* A Master’s degree and a PhD in Geophysics or Geological Sciences

# Expected Skills and Training:

* Experience in numerical geodynamic modelling, in particular modelling connections between mantle dynamics and surface geological/geophysical processes.
* Knowledge of fluid dynamics is preferable.
* Knowledge and experience in using scientific computing languages such as C++, Python, Matlab.
* Experience with GPlates and GMT software is highly desired.
* Experience working with Unix/Linux, or macOS, or Windows operating systems.
* Proficiency communicating and working in an international, collaborative and multidisciplinary research environment.
* A record of published research in recognized journals.
* Proficiency in spoken and written English.

# How to Apply

Applicants should submit:

(1) A cover letter including a statement of motivation and interests.

(2) A curriculum vitae (CV).

(3) The name and address of at least 2 persons of reference who can provide detailed assessments of the applicant’s aptitudes and skills.

The above items should be sent, via email, to Alessandro Forte ([forte@ipgp.fr](mailto:forte@ipgp.fr); [forte@ufl.edu](mailto:forte@ufl.edu)).

Applications will be accepted until the position is filled. Further inquiries relating to this job offer may be addressed to Alessandro Forte ([forte@ipgp.fr](mailto:forte@ipgp.fr); [forte@ufl.edu](mailto:forte@ufl.edu)) and Marianne Greff ([greff@ipgp.fr](mailto:greff@ipgp.fr)).