Postdoctoral associate researcher

Job offer from the institut de physique du globe de Paris | CNRS UMR 7154

Researcher in	Experimental geophysics, geochemistry and petrology
Duration	1 year
Affectation	IPGP, Cuvier building – CAGE Team
Salary	2400 to 3000 € before tax, commensurate with experience (≤ 3 years, up to 6 years)
Date of publication	01/02/2023
Starting date	As soon as possible
Location	IPGP, 1 rue Jussieu, 75238 Paris CEDEX

The institut de physique du globe de Paris

A world-renowned geosciences organisation, the IPGP is associated with the CNRS and an integrated institute of the Université Paris Cité. 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 aeras are structured through 4 main unifying themes: Interiors of the Earth and Planets, Natural Hazards, Earth System and Origins.

The IPGP is in charge of labelled observation services in volcanology, seismology, magnetism, gravimetry and erosion. And 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 and state-of-the-art experimental and analytical facilities 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.

Team Department

The CAGE team (Cosmochemistry, Astrophysics, and Experimental Geophysics) brings together researchers and teachers with common research foci aimed at the formation of the solar system and its early evolution, the formation of the Earth, its differentiation and its ancient geologic history. Our team uses interdisciplinary methods and complimentary skillsets to explore the origin of the solar system, Earth, and life. Our work includes astrophysical numerical modeling, studies of extraterrestrial matter, isotope geochemistry, mineralogy, high-temperature and/or high-pressure physicochemical modeling, along with other congruent fields.

The team members are very involved in IPGP's development of experimental methods using piston-cylinder, multi-anvil, and laser-heated diamond anvil cell apparatus, aerodynamic levitation heating, controlled atmosphere observations (SEM, FEG FIB), and analytical development of IPGP's mass spectrometers (MC-ICP-MS Neptune, Triton TIMS, Nobility & HelixSTT for rare gases and in situ coupling with laser ablation). Numerical simulations at IPGP are developed using two computing clusters that comprise our S-CAPAD system. Additionally, our team has open access to ionic probes through INSU's national service and

CRPG (Nancy), as well as various lines of synchrotron radiation (ESRF, APS, DESY). Along with a broad range of geochemical projects, our team members are actively involved in many other research topics and projects including chemical geodynamics of the Earth and major Archean geochemical cycles, the structure and physicochemical properties of minerals and rocks in the deep Earth, and the application of isotopic analysis in medicine.

A detailed description of the team is available at https://www.ipgp.fr/la-recherche/equipes/cage/

The webpage of the project supervisor, Charles Le Losq, is visible at https://charlesll.github.io

Missions

In 2023, as part of the IVIMAP project that has been funded by the Labex UnivEarthS of the University of Paris Cité, the team will receive a new diamond anvil cell with dual-stage heating. This cell will complement existing devices to study the physical and chemical properties of high-pressure magmas. This new device thus opens doors to study an important question: what influence exerts pressure on the properties of a magma? Answering this question will require the coupling of new experimental data with existing ones, in order to integrate the effect of pressure in the i-Melt model of the properties of magmas, which is based on the coupling of deep learning with thermodynamic modelling (see e.g. https://medium.com/pytorch/from-windows-to-volcanoes-how-pytorch-is-helping-us-understand-glass-8720d480f4f2).

Under this contract, the researcher will develop the diamond anvil cell device and perform Raman spectrometry, viscosity measurements and phase equilibrium observations on silicate liquids. The objective will be to develop this method and to provide new *in situ* data in order to better understand the influence of pressure on the properties of magmatic liquids.

We will then use these data and the i-Melt model to understand the influence of viscosity on the convective dynamics of magmatic oceans, and thus the impact of their evolution for the history of the primitive earth or the influence of viscosity of magmatic oceans on phase measurements in the case of exoplanets that appear to have oceans of lava on their surface, such as CoRoT-7b or 55 Cancri e.

Activities

> The researcher will have as activities

- conducting diamond anvil cell experiments;

- the synthesis of products in piston-cylinder press;

- acquisition of Raman spectra;

- the development of viscosity measurements in diamond anvil cells;

- writing articles and participating at conferences.

Expected Skills

> Specific training

The candidate must have a doctorate in Earth Sciences, Experimental Petrology, Experimental Geochemistry or Experimental Physics. A profile integrating knowledge of high pressure experiments, particularly using diamond anvil cells, is welcome.

> Computer tools

The candidate must master the usual tools for writing articles and processing data (Libre Office Writer, Spreadsheets, Zotero, etc.). Knowledge of the Python programming language is also welcome since data processing will preferably be done in Python, for example for Raman spectra using the Rampy library maintained by the manager.

> Professional qualities

The candidate must be rigorous, methodical and organized, know how to work in a team, have a spirit of initiative and be autonomous.

The candidate should demonstrate the skills required for high-precision experimental work: patience, calm, perseverance, and rigour.

The candidate must also adhere to strict compliance with the ethical principles surrounding the activities of IPGP researchers, including the principles of equality, equity, impartiality, probity, integrity, neutrality and non-discrimination.

Obligations and risks

> Schedules

The work will be carried out during the time slots defined in the IPGP internal rules document, from Monday to Friday.

> Risks

The work will be done in the laboratory, in an environment with potential electrical, laser, chemical, cryogenic and burn risks.

> Telework

It will be possible for the researcher to benefit from one day of teleworking per week.

> Displacements

Travel for conferences, colloquia or any other event benefiting the scientific life of the candidate is to be expected.

Training and experience required

> Minimum experience of 1 year

> Level or degree: PhD in Earth Sciences, Experimental Petrology, Experimental Geochemistry or Experimental Physics

How to apply

> CV, list of publications and cover letter to be sent to the contacts listed below

> 2 recommendation letters to be sent to the contacts listed below

> Application deadlines: 01/04/2023

> Contacts (2 mandatory contacts for the interview)

Charles Le Losq: lelosq@ipgp.fr

James Badro: badro@ipgp.fr