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Postdoctoral position in plankton bio-geochemistry

We are advertising a 36-month postdoctoral position funded by the ERC ChORhizO project, starting on January 4th 2027.

Laboratoire d'Océanologie et Géosciences (LOG) - Wimereux
Laboratoire des sciences de l'environnement marin (LEMAR) - Brest

Project Description

We are looking for a marine bio-geochemist to investigate elemental processes linked to the role of Rhizaria in marine biogeochemical cycles. Marine Rhizaria are intriguing unicellular zooplankton that have thrived in the oceans since the early Cambrian. Until very recently, we have ignored the roles they play in marine biogeochemical cycles. We cannot cultivate them in the laboratory, and we long thought that they were not particularly abundant. In the last two decades, things have changed, and we now know that they can be very abundant in many different regions of the world, and that they likely play a disproportionate role in biogeochemical cycles. To further understand their roles, much work is still needed to characterize the geochemical composition and processes at the cellular level of Rhizaria. As part of the ERC ChORhizO project (https://chorhizo-project.eu), one of the key objectives is to understand and quantify how specific elements are acquired and transformed.

The successful candidate will lead four major tasks

1) **Quantify silicon dissolution kinetics of rhizarian skeletons**. So far, only one study (Erez et al., 1982) has looked at silicon dissolution of rhizarian skeletons, although not providing any quantitative measurements. Based on weight loss comparisons, rhizarian skeletons could dissolve 3-4x faster than diatom skeletons.

2) **Quantify celestite mass in acantharian skeletons and cysts**. Some Rhizaria, namely Acantharia, are the only known planktonic organisms building skeletons out of celestite ($SrSO_4$). Celestite is the densest oceanic biomineral, meaning that upon death, it ballasts acantharian skeletons (and cysts) thereby fueling gravitational fluxes. In the Southern Ocean, acantharian cysts accounted for 17% of annual POC fluxes (Belcher et al., 2018). Yet, we don't know how much celestite is found in their skeletons, so we cannot directly relate their celestite content to other elemental contents.

3) **Quantify elemental composition of Rhizaria**. The elemental composition of Rhizaria remains poorly characterised, despite their potential importance in marine elemental cycles. Element/Si ratios, such as Ge/Si, provide valuable insights into the processes controlling the uptake and cycling of silicon in biogenic silica (Sutton et al., 2018), but their application to siliceous Rhizaria remains largely unexplored. Similarly, the incorporation of trace elements into acantharian celestite skeletons is poorly constrained, limiting our understanding of their role in marine elemental cycles (e.g., N, Sr, Ba).

4) **Quantify silicon biomineralisation (production) of rhizarian skeletons**. In the past decade, we pioneered the use of the radionuclide ^{32}Si to quantify Rhizaria silicon production rates (Llopis Monferrer et al., 2021; Laget et al., 2023). Despite a significant weak correlation with Rhizaria biovolume, we still

do not understand the basic kinetics of silicon biomineralisation. We need to expand measurements to a broader range of species collected from diverse environments.

Location: The position will be based for the first 12 months in Brest, France, in the Laboratoire des sciences de l'environnement marin (LEMAR), and in Wimereux, France, in the Laboratoire d'Océanologie et de Géosciences, for the remaining 24 months. The position will be jointly mentored by Dr. Tristan Biard (LOG) and Dr. Jill Sutton (LEMAR).

Duration and salary: The successful candidate will be hired and paid by the Université du Littoral Côte d'Opale (ULCO) for a maximum of 36 months. Salary will depend on experience and will be in accordance with ULCO rules. Social security and paid leave will be in accordance with French legislation.

Qualifications and personal qualities

- The successful candidate will hold a PhD in marine bio-geochemistry or a related field, with strong expertise in trace-element geochemistry and ICP-MS instrumentation.
- We seek a candidate with solid experience in designing, conducting and analysing laboratory experiments.
- Previous postdoctoral experience would be an advantage, but is not mandatory.
- The successful applicant should work independently and in a structured manner, while being an effective team player with good communication skills.
- The ability to use a programming language (R or Python) is necessary, as is the ability to write scientific publications.

Contact for applications: For further information about the position, please contact Tristan Biard (tristan.biard@univ-littoral.fr). Applications should be sent as soon as possible to Tristan Biard (tristan.biard@univ-littoral.fr) and Jill Sutton (jill.sutton@univ-brest.fr). They should include a CV with publication record, a statement of research interests, and at least one support letter from a referee. Review of applications will begin as soon as received, and the position will remain open until filled.

References:

- Belcher, A., Manno, C., Thorpe, S. & Tarling, G. (2018). Acantharian cysts: high flux occurrence in the bathypelagic zone of the Scotia Sea, Southern Ocean. Mar. Biol. 165, 117.
- Erez, J., Takahashi, K. & Honjo, S (1982). In-situ dissolution experiment of radiolaria in the central North Pacific ocean. Earth Planet. Sci. Lett. 59, 245–254.
- Laget, M., Llopis-Monferrer, N., Maguer, J.-F., Leynaert, A. & Biard, T (2023). Elemental content allometries and silicon uptake rates of planktonic Rhizaria: Insights into their ecology and role in biogeochemical cycles. Limnol. Oceanogr. 68, 439–454.
- Llopis-Monferrer, N., Leynaert, A., Tréguer, P., Gutiérrez-Rodriguez, A., Moriceau, B., Gallinari, M., Latasa, M., L'Helguen, S., Maguer, J-F., Safi, K., Pinkerton, M.H. & Not, F. (2021). Role of small Rhizaria and diatoms in the pelagic silica production of the Southern Ocean. Limnol. Oceanogr. 66, 2187–2202.
- Sutton, J.N., André, L., Cardinal, D., Conley, D.J., de Souza, G.F., Dean, J., Dodd, J., Ehlert, C., Ellwood, M.J., Frings, P.J., Grasse, P., Hendry, K., Leng, M.J., Michalopoulos, P., Panizzo, V.N. & Swann, G.E.A. (2018). A review of the stable isotope bio-geochemistry of the global silicon cycle and its associated trace elements. Frontiers in Earth Science 5, 112. doi: 10.3389/feart.2017.00112.