Raúl Bitrán #1305
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Postdoctoral position in marine biogeochemistry at Center for Advanced Studies in Arid Zones (CEAZA)

The Center for Advanced Studies in Arid Zones, in La Serena, Chile, is hiring a postdoctoral researcher with a Ph.D. in either microbiology, molecular genetics, ocean biogeochemistry, or related fields.

Scientific context: Current evidence indicates that the coastal and open ocean has been losing oxygen (O_2) since the middle of the last century, with consequences for living organisms and biogeochemical cycles that are not yet fully understood (e.g., Breitburg et al., 2018). Although observations and model simulations document a net decline of the global ocean O_2 inventory, there is disagreement among analyses resulting in inconsistent regional estimates of the rate of O_2 loss (i.e., deoxygenation) (e.g., Oschlies, 2018). Uncertainties and differences between estimates could be attributable to the scarcity of accessible data, the use of different datasets (Grégoire et al., 2021), and the inadequacy of biogeochemical models to accurately describe key metabolic pathways in oxygen-depleted waters such as in the Oxygen Minimum Zones (OMZs).

Building a stronger capacity to understand the causes of these discrepancies and predict the impacts of low oxygen on marine ecosystems has become critical in order to identify strategies for ensuring ecosystem services sustainability, socio-economic adaptation and climate change (CC) mitigation.

Microbial communities dominate numerically and in biomass in the ocean, exerting a great influence on the biogeochemistry of the oceans. Despite their relevance, they are rarely included in marine biogeochemical models, such as those used to predict the response of the oceans to climate change. Within the framework of the CLAP project (Research Program for Climate Action Planning, https://oceandecade.org/actions/research-program-for-climate-action-planning), we will develop state-of-the-art simulations to evaluate the oceanic response to CC in the coastal region of Central Chile. To achieve this goal, we seek to incorporate "multi-omics" information from our regional ecosystem into a regional Earth System Model fitted with locally collected biogeochemical data.

In a novel approach, the postdoctoral researcher will have to integrate biogeochemical and "metaomics" measurements on oceanographic dynamics into an existing biogeochemical model (BioEBUS) (*see* Montes et al., 2014), to assess their contribution to biogeochemical processes in a coastal upwelling ecosystem with low-oxygen waters off Central Chile. Although genetic data serve as a potent and sensitive tracer of biogeochemistry, they remain under-exploited. Yet, omics data can uncover processes and functions that may have been previously overlooked, which is invaluable for creating a more realistic scheme of the primary biogeochemical processes and identifying similarities and differences through time

in terms of microbial diversity, activity, and biogeochemical functions (Louca et al., 2016). The work will consist in tuning a 1D biogeochemical model that describes metabolic coupling along the redox gradient at sites along the coast of Central Chile where data exists (Iquique, Coquimbo, Concepción). The model will be then integrated in the parametrizations to an NPZD-type model driven by the 3D general circulation as simulated by a regional hydrodynamical model.

The ideal candidate should have a solid background in molecular microbiology techniques (PCR, DNA/cDNA library preparation) and in the handling of omics data, with bioinformatics experience in massive sequencing data analysis (metagenomics/metatranscriptomics and taxonomic markers) and multivariate microbial ecology. Experience in global or regional hydrodynamical modeling would be considered a plus.

Requirements:

Doctorate in Oceanography, Marine Science, Molecular Biology, Microbiology or equivalent. Demonstrable experience in research related to marine biogeochemistry, microbial genomics or transcriptomics.

Desired Qualifications:

- Knowledge of marine biogeochemical processes
- Communication skills in English and Spanish
- Ability to work independently and as part of a team
- Motivation and experience in scientific writing and publishing.

Terms of Appointment

The appointment is for 18 months and could be extended up to 12 months based on satisfactory performance and depending on approval of CLAP Phase 2 (2026-2030). We will provide competitive salaries/benefits depending on the candidate's qualifications based on center guidelines. The position is available from the first of August, 2024. The Postdoctoral Researcher will be co-supervised by A. Galán (UCM), R. González (CEAZA-UCN) and B. Dewitte (CEAZA) and will work in a multidisciplinary team that includes specialists in microbial oceanography, physical oceanography, and marine biogeochemistry. The project will in particular rely on the collaboration with LOMIC (France), COPAS Coastal at University of Concepción (Chile), IPGP (France) and CERFACS (France), and visits to these institutions will be favored during the course of the project.

Candidates may apply by submitting a single PDF file, including i) a cover letter outlining the research interests/strengths, ii) CV, and iii) contact information for at least two references, to Alex Galán (agalan@ucm.cl) and Boris Dewitte (boris.dewitte@ceaza.cl).

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Application Deadline: Agosto 15, 2024

References

Breitburg, D., Levin, L. A., Oschlies, A., Grégoire, M., Chavez, F. P., Conley, D. J., et al. (2018). Declining oxygen in the global ocean and coastal waters. Science 359:6371. doi: 10.1126/science.aam7240.

Grégoire, M., Garçon, V. et al., 2021, A Global Ocean Oxygen Database and Atlas for Assessing and Predicting Deoxygenation and Ocean Health in the Open and Coastal Ocean, Frontiers in Marine Science, doi: 10.3389/fmars.2021.724913.

Louca, S. et al., 2016, Integrating biogeochemistry with multi omic sequence information in a model oxygen minimum zone. PNAS, E5925–E5933, doi/10.1073/pnas.1602897113

Montes, I. et al., 2014, High-resolution modeling of the Eastern Tropical Pacific oxygen minimum zone: Sensitivity to the tropical oceanic circulation, J. Geophys. Res.-Oceans, 119, 5515–5532, doi:10.1002/2014JC009858, 2014.

Oschlies, A. (2018). “Reconciling systematic differences between observed and simulated ocean deoxygenation,” in Proceedings of the 4th International Symposium on the Effects of Climate Change on the World’s Oceans 4 (ECCWO), Meeting, Washington, DC.