



4-year PhD contract

Modeling GHG Fluxes Between Surface and Subsurface Ecosystems: From Field and Lab Experimentation to Global Upscaling

The Museo Nacional de Ciencias Naturales

The MNCN-CSIC is a multidisciplinary science center capable of addressing complex and integrative research questions in the natural sciences. The PhD will be associated with the Geochemical and Geoenvironmental Monitoring Lab, which has strengths in environmental and geo-biological monitoring of Earth ecosystems.

The Working Group

The group's research focuses on studying the impacts of climate variability, human activities, and underlying geobiological processes on the biogeochemical exchange mechanisms of greenhouse gases (GHGs) between the subsoil, soil, and atmosphere. This research is carried out in collaboration with international and multidisciplinary partners in different geological contexts (karstic, volcanic) and at various spatial and temporal scales. The resulting scientific knowledge is applied to protect the cultural and natural resources of the studied areas through the prevention and mitigation of both natural risks and human impacts.

The Project

GASBIOSUB is a project aimed at understanding and leveraging the potential of underground ecosystems as regulators of GHGs for sustainable technological applications. The project focuses on gathering extensive data on GHG fluxes to improve modeling and accurately quantify the impact of subterranean ecosystems on global GHG balances. Research includes estimating GHG exchange between underground ecosystems and local atmospheres in various cavities (karstic and volcanic) over two annual cycles. Global modeling techniques will be used to derive equations for daily and seasonal GHG variations, enhanced by satellite data on temperature and soil humidity. The models will also simulate future carbon-GHG regulation under climate change scenarios. Finally, global mapping will assess the role of subterranean atmospheres as CO₂ reservoirs, emitters, or CH₄ sinks, contributing to a better understanding of regional and global carbon-GHG budgets.

What do we offer?

- **4-year fully-funded PhD contract (project PID2023-146299OB-C21 by the Spanish Ministry).**
- Gross salary of ca. 19.000 € (1st year) and ca. 23.500 € (years 2-4).
- Well-structured PhD study plan, including hands-on training and specialized courses, international conferences and research stays. We are committed to promoting your career development and maintaining an inclusive and friendly working atmosphere.
- Working language will be Spanish and English.

Eligibility

- MSc. in Geology, Biology, Environmental Sciences or a related field.
- Interest in Data mining, GIS Techniques, and Global modelling. Programming skills related to data analysis are advantageous. Previous knowledge is desirable but not required.
- Previous experience or training in handling field-deployable and laboratory instrumentation for environmental monitoring is an asset
- Curiosity, self-motivation and organizational skills are essential.

Application Procedure

- Tentative deadline: September 29th. Starting date early (January-March) 2025.
- Review of applications will start immediately and interviews will be held in October.
- Submit a single pdf to Sergio Sanchez-Moral (ssmilk@mncn.csic.es) with a motivation letter describing your interests, a short description of past and present work, CV, and contact information for two referees.
- Informal emails for further information are welcome.