

## Call for Applications - PhD Scholarship – 04/2026-03/2029

### Hydrogeological Functioning of Thermal Springs in the Eastern Pyrenees: Assessment of Geothermal Potential in Mountain Areas

**Are you a geologist-hydrogeologist looking to contribute to an interdisciplinary project on energy transition?**

**Join our team for an ambitious PhD project in the Pyrenees!**

#### PhD Project Framework

This PhD is part of the **interdisciplinary** project PIROS, funded by the **European POCTEFA program (2026-2030)**, dedicated to **cross-border cooperation** between Spain, France, and Andorra. The **PIROS project** places research and innovation at the heart of the **energy transition**, exploring the potential of **geothermal energy** as a **renewable** energy source in the **mountain areas** of the Eastern Pyrenees. Its ambition is to promote **sustainable development** in the Pyrenean region and improve the quality of life for its inhabitants.

The **key objectives** of PIROS are to **assess and enhance the geothermal potential** of thermal spring sources in the region; **determine the optimal uses** by area (electricity production, heating, health/wellness, or other direct applications); **analyze the socio-economic impact** of geothermal energy on regional sustainable development; and **contribute to energy sovereignty** and the fight against climate change in the Pyrenees.

The **ambitions of PIROS** are supported by a **consortium** that brings together major players in research and innovation at the interface of structural geology, hydrogeology, geophysics, geothermics, and history, including: Universitat de Barcelona (Spain), Andorra Recerca i Innovació (Andorra), Institut Cartogràfic de Catalunya (Spain), Université Paris-Saclay (France) in association with Sorbonne Université, Consell Comarcal de l'Alt Urgell (Spain), and CNRS Occitanie Est – Université de Montpellier (France).

Together, these partners aim to **change the perception and use of geothermal energy**, laying the scientific and technical foundations for its integration into local energy policies and its sustainable exploitation.

## PhD Project

**PhD Title:** Hydrogeological Functioning of Thermal Springs in the Eastern Pyrenees: Assessment of Geothermal Potential in Mountain Areas

**Mode:** Joint supervision between the universities of Paris Saclay (UPS) and Barcelona (UB). **Dual degree** (UPS and UB).

**Funding:** EU – Université Paris Saclay Contract

**Start:** 01/04/2026

**End:** 30/03/2029

**Supervision:** A. Benedicto and C. Marlin (Université Paris Saclay)

**Co-supervision:** I. Cantarero (University of Barcelona)

**Co-advising:** V. Plagnes (Sorbonne Université) and D. Guinoiseau (Université Paris Saclay)

**Host Laboratories:** GEOPS (CNRS-Université Paris Saclay) / METIS (SU-CNRS-EPHE) (Sorbonne Université) / MPGA (University of Barcelona)

**Doctoral School:** ED 129 SEIF (Sciences de l'Environnement Ile de France) and ED University of Barcelona

**Brief Summary of the PhD Objective:** This PhD aims to conceptually model the **hydrogeological functioning of natural hot springs in the Eastern Pyrenees**, located at the border between Spain, Andorra, and France. The goal is to analyze and understand their spatial variability (temperature, chemical composition, flow rate), as well as the geological, structural, and hydrodynamic controls that govern them.

**Methodology:** The work will be based on:

- A **systematic sampling** of hot waters.
- **Geochemical** (major and trace elements) and **isotopic** (light isotopes and gases) **analyses** to determine:
  - The **origin of the waters** and their **recharge zone**,
  - Their **path within the geological framework**, the **depth of the reservoirs**, and their **temperature**,
  - And the **volumes of water** involved in the system.
- **Radiogenic dating** using radiocarbon to estimate the **apparent residence times of the waters**.

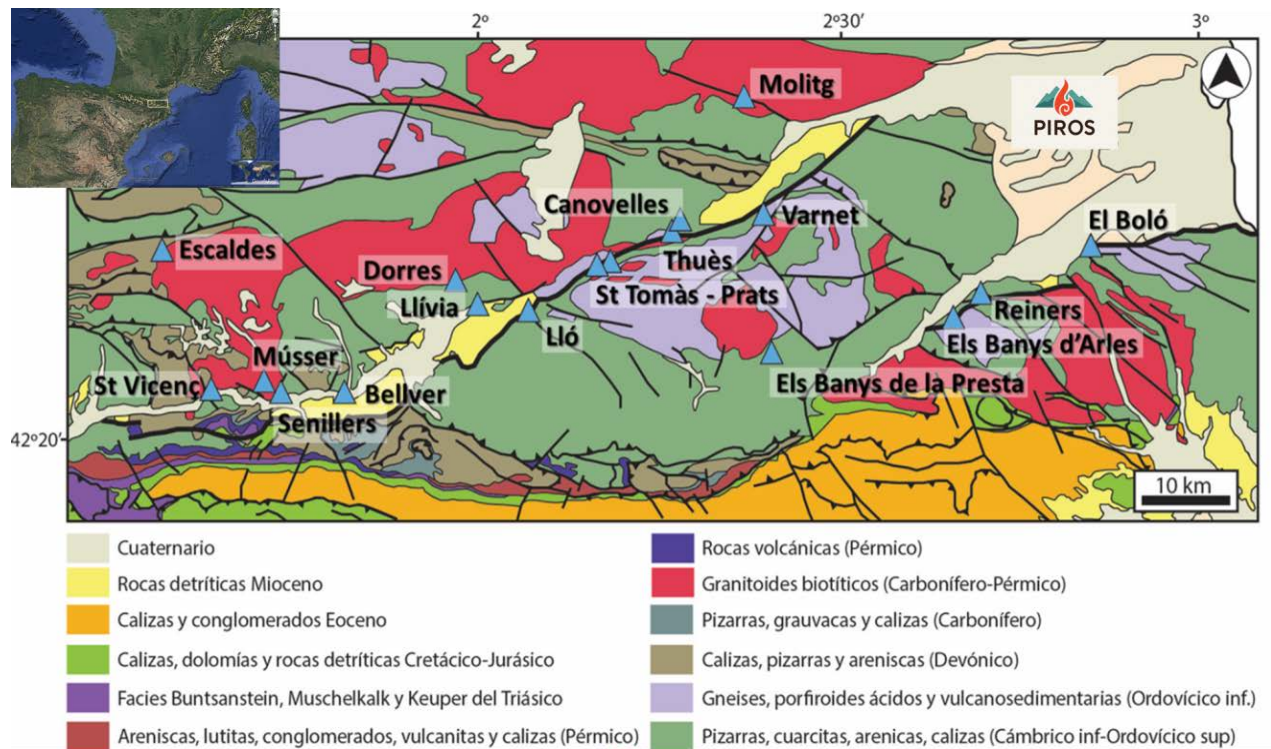
**Collaboration and Integration of Results:** This PhD is part of a **collaborative project** with three other PhDs:

- Characterization of geological and structural constraints (regional and local), to be carried out at the University of Barcelona in joint supervision with Université Paris Saclay,
- Characterization of thermal anomalies and hydrothermal fluxes, to be carried out at the University of Montpellier in joint supervision with the University of Barcelona,
- 3D modeling of reservoirs based on geological and geophysical data, to be carried out at the University of Barcelona in joint supervision with the University of Montpellier.

The PhD student will need to coordinate their research with these complementary projects, ensuring **data harmonization**. The geochemical and hydrogeological results will be integrated with geological, structural, petrophysical, and geophysical data, and then used for 3D numerical modeling. These models will help understand the overall functioning and specificities of the studied geothermal systems, aiming to establish a general synthesis.

**Valorization of Work:** In addition to the usual **contributions to national and international conferences**, as well as the publication of **scientific articles** of international rank, the PhD student will also be responsible for regularly updating a **dedicated web page** for the PhD project (text, photos, videos), as part of the PIROS project, to ensure accessible and transparent dissemination of scientific progress.

**Study Area (Fig. 1):** The cross-border study area will cover the hot springs of Escaldes in Andorra, and St Vicenç in Spain to the west, up to Molitg in the Têt Valley and Le Boulou in the Tech Valley in France.



*Fig. 1. Study zone covered by the PhD.*

## Desired Profile

A passionate and versatile geologist-hydrogeologist.

### Key Skills:

- **Expertise in hydrochemistry and isotopic geochemistry:** You master the methods of analyzing hydrogeological systems and wish to apply them to a unique study area to understand the functioning of a strategic groundwater resource.
- **Good level in general and structural geology:** You wish to apply your knowledge to establish links between groundwater flow and the geological environment.
- **Autonomy and field experience:** You have already carried out field missions and know how to take the initiative.
- **International openness:** You are ready to work between France, Andorra, and Spain, you speak French fluently, and ideally Spanish or Catalan (both orally and in writing), and you also master English.

- **Good oral and written communication skills:** You enjoy communicating your work and research through videos, web pages, social networks, scientific meetings, workshops, and scientific articles.
- **Collaborative spirit:** You enjoy exchanging, cooperating, and working in a multidisciplinary team.
- **Resilience and adaptability:** Working in the mountains, under all weather conditions, is not an obstacle for you, and you can easily establish first contact with unknown interlocutors.

**Then, join our team: APPLY!**

**Before January 25, 2026\***

- **Driving license** acquired and/or valid in the EU **required**.

**Additional Assets:**

Experience in scientific communication (creating web pages, videos, social networks) will be a real plus to enhance the project results.

Fluent communication in English will be an additional asset, potentially replacing Spanish, French, or Catalan.

\*For more information and/or to submit your application, use the platforms through which you found this call for applications and send a copy to one of the following contacts.

**Contacts**

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