

Two-year postdoctoral position in ERC-Synergy project: Turbulent flow and transport in karst conduits

The role

You are a scientist with interest and or experience in **fluid mechanics** and are looking for an exciting project in which you will tackle **earth science issues with a high scientific and societal impact**. You are motivated by understanding water flow and solute transport in caves and conduits characterized by complex geometries. You are capable of analyzing data and constructing models to represent the key features of conduit scale processes.

We are a multidisciplinary research team (<https://erc-karst.eu/>) funded by the European Research Council (ERC: <https://erc.europa.eu>) involving physicists (B. Noetinger, M. Dentz), hydrogeologists (P. Renard), mathematicians (B. Mohar), computer scientists (S. Lefebvre) from Spain, France, Canada, Slovenia and Switzerland. Our aim is to establish novel tools to model groundwater flow and solute transport in karst systems at multiple scales based on strong physical principles using a combination of field, laboratory, and numerical experiments.

In the team, **you will be working on characterizing and quantifying conduit scale water flow and solute transport to achieve a new fundamental understanding of these processes**. The tasks include laboratory experiments of flow and solute transport in 3D-printed synthetic karst conduits obtained from real cave data, analysis of experimental and numerical data. The experimental methods involve laser imaging and PIV to assess local flow and transport properties. Based on these data and data from detailed CFD simulation, the aim is to identify the conduit scale flow and transport laws under complex geometries at different Reynolds numbers. You will strongly interact with the project partners at IFPEN in Paris for the laboratory experiments, and at University of Neuchatel for cave characterization.

What do we look for?

- **Qualifications**

Ph.D. degree in engineering, computational science, physics, applied mathematics, geophysics, earth science, or a related field.

- **Professional experience**

- Experience in fluid mechanics (experimental/numerical).
- Experience in programming (Python/C++).
- Experience in manipulating and analyzing large data sets.

- **Competences Duties and responsibilities**

- Participate in regular project meetings with team members and collaboration partners.
- Analyze and compare numerical and experimental data.
- Collaborate with the teams in charge of laboratory experiments and conduit characterization.
- Disseminate of the research results in peer reviewed journals and conferences.
- Contribute to project reports.

- Identify areas for research, develop new research methods and extend the research portfolio.
- Continue to update personal knowledge and develop skills within the own specialist research area

Working conditions

- **Contract duration: {length} 2 years, possible extension for an additional year**
- Estimated annual gross salary: 40,000 €/year
- Target start date: December 1st, 2024

The group

The [Groundwater and Hydrogeochemistry](#) Group studies hydraulic, chemical, thermal and mechanical processes in permeable media using laboratory, mathematical, numerical and, field methods. The research topics include groundwater resources, emerging pollutants, artificial recharge, anomalous transport in porous media, marine intrusion in coastal aquifers, water decontamination methodologies, CO₂, and nuclear waste storage, geothermal energy, and, induced seismicity.

The institute

The **Institute of Environmental Assessment and Water Research (IDAEA)** is an environmental science institute devoted to the study of the human footprint on the biosphere. Much of the research work at this institute is centred on two of the great environmental challenges of our time: cleanliness and availability of water and quality of air.

Founded in 2008 as a member of the **Spanish National Research Council (CSIC)**, the Institute brings together a wide range of expertise in environmental science. It is organized under two Departments (Environmental Chemistry and Geosciences), established with a strong record of publication in top scientific journals, leading international projects, membership on international committees, and adopting a high-profile contribution to the identification and remediation of environmental problems.

IDAEA has demonstrated strengths in the analysis of organic pollutants and their impact on ecosystems, the study and management of water resources, the development of multivariate resolution algorithms in chemometrics, and in the study of inhalable particulate matter and toxic gases.

IDAEA has been awarded with the distinctive **Centre of Excellence “Severo Ochoa”** (2020-2023), distinction that indicates the high-quality scientific leadership and global impact of the work developed at the centre.

We offer a diverse and inclusive environment where no discrimination against disability, gender, nationality, religion or sexual orientation will occur during the selection process.

How to apply?

Those interested may email their **CV, motivation letter, complete course grades and transcript, contact information of two reference persons, and link to or copies of your PhD Thesis and/or relevant publications** to **Marco Dentz** at marco.dentz@csic.es, adding *Application postdoc ERC Karst* to the email subject.

Deadline: open until filled

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