



## stayCERENA – December 2024

### November in a nutshell



- November 4-5<sup>th</sup>, 2024 | PhD Open Days
- November 5<sup>th</sup>, 2024 | Técnico Innovation Summit
- November 18-22<sup>nd</sup>, 2024 | “Science and Engineering Go To School”
- November 28<sup>th</sup>, 2024 | CERENA Seminar by Zaid Al-Shomali “**Impact of naturally occurring radioactive materials in water treatment facilities**”



*Activities of the month of November*

## Our people

### Ricardo Araujo – Researcher for EnvG

The tired eyes of someone who has just become father for the third time don't dim Ricardo Araújo's enthusiasm when the topic is science. An adventurous geoscientist, Ricardo's childhood dream of becoming a paleontologist is a reality today. In fact, when he's not in Room 2.I.04 of the Minas Building (IST), you can find him in the Geoscience

Museum (picture). Here, true treasures in the form of fossils and minerals surround whoever visits.

Today, Ricardo believes that one of the most urgent challenges of society is to learn to live in harmony with the biosphere and geosphere. He is especially committed to Sustainable Development Goal #10: reducing inequalities within and among countries. For him, science plays a crucial role in empowering people and communities to overcome limiting beliefs. One project he's particularly proud of is his involvement in



training the first generation of Mozambican paleontologists, a cause that has taken him to Mozambique on several occasions. The Miombo woodlands of those regions make him feel good, he says, quite as much as listening to some black metal. Professionally, he advocates for simplifying communication and harnessing the power of social media platforms like Instagram and TikTok to make science more accessible and democratic.

*In your view, what does a researcher do?*

R: "Being a researcher is the purest expression of creative freedom. You get to develop your own expertise and methods, and combine them with those already existing. A researcher

is an explorer."

*What are you working on at the moment?*

R: "I'm working on two main projects: first, establishing a lab to study the origins of endothermy (warm-bloodedness) in birds and mammals, exploring its links to climate change and potential medical implications. This involves collaboration with experts in fields like otolaryngology, veterinary sciences, AI, and paleontology. Second, I'm involved in significant paleontological discoveries, including dinosaur embryos, mammal ancestors from Mozambique, a new dinosaur species from Portugal, and new fossil sites from the Algarve that shed light on the origins of mammals and dinosaurs."

## Baraa Osman, PhD in Petroleum Engineering



Baraa is a citizen of the world. Throughout his career in subsurface geophysical characterization, he has lived and worked across multiple countries. The side-effect of this continent-hopping? He can converse fluently in Arabic, Malay, Vietnamese, and English (and his Portuguese is improving by day). With a background in offshore structures, petroleum production and carbon capture and storage, Baraa joined the ranks of CERENA PhD students last year, working within the EnerG group to study geothermal systems (he is based in Room 2.i.08 at the moment, in the Minas Building of IST). His advisors are Amílcar

Soares and José Manuel Marques at IST and Dario Sergio Cerósimo at GALP.

*What work are you doing at the moment?*

B: “I am using subsurface data to study geothermal systems: how to find them, how to characterize them and know their physical limits.”

*What results do you expect from your work?*

B: “I expect to describe how the underground geothermal systems are behaving with a high level of detail. In other words, the expected result is a high-resolution geothermal model”

*What would you like to do when you finish your PhD?*

B: “I would like to start a geothermal consultant branch in my company in Vietnam.”

## Sílvia Carvalho, Lab Technician

A chemist by background, Sílvia is [MIL](#)'s official lab technician. As *non-destructive characterizer*, she manages techniques like X-ray fluorescence, X-ray diffraction, nano CT scanning and more to study the microstructure and composition of materials at different scales. The *non-destructive* approach aligns with Sílvia's tranquil nature. Her heart belongs to the small village of her grandparents, a peaceful spot where the Douro River flows lazily by, and the landscape alternates between Portuguese hills and Spanish *vistas*. Sílvia is firmly convinced that the most important Sustainable Development Goal is #3, Good Health and

Wellbeing: “If we can be healthy, everything else will follow naturally. Health is a fundamental need,” she says. A sentiment that's hard to disagree with.



In her role, Sílvia manages the lab’s facilities, supporting both ongoing research by scientists and students, as well as offering these advanced services to external clients in exchange for funding that helps maintain the lab. She likes this work due to its versatility and the opportunity to connect with professionals from a wide variety of fields. For *non-destructive* visits and infos, Sílvia’s office is located at the MIL, near the Geoscience Museum in the Mines building at IST.

*What is the challenge of science today?*

S: “To promote development without destroying the environment.”

*What makes you happy?*

S: “Good health and travels.”

## New integrated members



These people are officially joining the ranks of CERENA’s integrated members. Some of them were already part of CERENA while others come from different realities such as the [C5Lab](#). Bem-vindxs! Welcome!

[Ana Filipa Cristino](#)

[António Pedro Alves de Campos](#)

[José Condeço](#)

[Samuel Santos](#)

[Luísa Marques](#)

[Mahboobeh Attei](#)

[Diogo Narciso](#)

[Danilo Bertagna Silva](#)

[Marta Ramos-Andrés](#)

## Science Story



Let's take a journey into the world of clean energy. The **Moving2Neutrality (M2N) Agenda** is a big project funded by Portugal's Recovery and Resilience Plan (**PRR**). In a nutshell, the M2N agenda is about reducing carbon emissions in transportation. The maritime and aviation transport sectors are hard to electrify, but **green hydrogen** and **biofuels** are two game-changing energy sources that could help the planet breathe easier.

A group of key national entities and top research institutions, led by Petrogal, is working together to make this happen. At the heart of the M2N project are six major initiatives, four of which are focused on creating a Green Hub at Galp's production facility in Sines. These include the creation of **Green Hydrogen**, a **Synthetic Ethanol** unit, an **Alcohol-to-Jet** unit (for cleaner aviation fuel), and a **Hydroprocessing** unit (to improve fuel quality). They're also working on producing **Cellulosic Ethanol** and setting up a network of **hydrogen refueling stations** across the country.

CERENA is involved in two work packages, contributing to this huge project in two ways.

The first is a project called **GrAPHy**. This team is working on using renewable energy to make ammonia, a key ingredient in fertilizer. **Ammonia (NH<sub>3</sub>)** is currently produced from two main constituents: nitrogen (extracted from the air) and hydrogen. While hydrogen is obtained from methane, green hydrogen is planned to be intermittently available from non-fossil sources, such as from water through electrolysis powered by renewable energy. To make it all run smoothly, they're also developing a digital twin, which is a virtual copy of the plant system, to help monitor and improve the process in real time.

The second work package includes a strict collaboration with the CQE. This project focuses on **green fuels** to decarbonize both maritime transport and aviation. This part of the project looks at turning waste materials—like used oils and biomass—into sustainable fuels that can be used in airplanes and ships. They're also working on creating sulphur-free catalysts, to produce cleaner fuels under industrial conditions.

In summary, the Moving2Neutrality Agenda represents a big step towards decarbonizing key transport sectors, with a focus on renewable energy solutions and sustainable fuel production.



Graphical idealization of the M2N Agenda. There are two work packages that CERENA is involved with, the production of a green ammonia hub and the incorporation of non-fossil fuels for aviation transport.

## Pre-holiday CERENA Friday Beers



Attention CERENA IST team: mark your calendars for a group gathering on **December 13<sup>th</sup>** around **5pm**! Location to be determined (stay tuned). We'll be doing the classic BYO (Bring Your Own) since we're on a bit of a budget.

## Dates to diary



- December 3-6<sup>th</sup> 2024 | [Int'l Conference on Bioinformatics and Biomedicine](#), Instituto Superior Técnico Lisbon
- December 3<sup>th</sup> 2024 | Meeting SciComm Office and CERENA-FEUP (Room F405, 12:15pm)
- December 5-6<sup>th</sup> 2024 | [14<sup>th</sup> Groundwater Seminar](#), Universidade Lusófona
- December 13<sup>th</sup> 2024 | Pre-holiday CERENA Friday Beers! Save the date and stay tuned...
- December 19<sup>th</sup> 2024 | 12:30 CERENA Seminar by Vasco Miranda “**Mapping and monitoring vegetation of the Antarctic Peninsula**”

## Publications



Pereira, J. L., & Azevedo, L. (2024). [Electrical resistivity tomography inversion combining deep variational autoencoder and stochastic adaptive sampling](#). *Geophysics*, 90(2), 1-47.

Nazerigivi, A., Ghiassi, B., Dionísio, A., & Vasconcelos, G. (2024). [Experimental investigation on the moisture movement behavior of granites](#). *Bulletin of Engineering Geology and the Environment*, 83(11), 1-28.

Nazerigivi, A., Ghiassi, B., Vasconcelos, G., & Dionísio, A. (2024). [Numerical modeling of salt crystallization in masonry: A critical review of developed numerical models](#). *Journal of Cultural Heritage*, 70, 143-156.

Fagandini, C., Todaro, V., Escada, C., Azevedo, L., Gómez-Hernández, J. J., & Zanini, A. (2024). [Coupled hydrogeophysical inversion through ensemble smoother with multiple data assimilation and convolutional neural network for contaminant plume reconstruction](#). *Stochastic Environmental Research and Risk Assessment*, 38(11), 4227-4242.

Marques, L., Vieira, M., Condeço, J., Henriques, C., & Mateus, M. (2024). [A Mini-Review on Recent Developments and Improvements in CO2 Catalytic Conversion to Methanol: Prospects for the Cement Plant Industry](#). *Energies*, 17(21), 5285.

## Health and Wellbeing



Mobility exercises for desk workers help improve posture, increase flexibility, and relieve tension in areas like the neck, shoulders, and back, reducing the risk of injury from prolonged sitting. Focusing on stretches for the hips, glutes, chest, and shoulders can also enhance range of motion and prepare the body for more physical activity. Here are some mobility exercises to do at your desk:

### **Rubber Neck**

Sit up tall, lower your right ear down towards your right shoulder (you don't have to touch it!), hold for a few seconds, and repeat on opposite side.

### **Bobblehead**

Drop your chin down towards your chest and GENTLY roll your head from side to side.

## Look Around

Turn your head to the left, look over your shoulder, and hold for a few seconds ... repeat on the right.

## Reach for the Sky

Interlace your fingers and reach up towards the sky, as high as you can ... keeping your palms facing up towards the ceiling.

## Shoulder Rolls

Raise both shoulders toward the ears, then slowly roll them backward. Repeat, rolling forward. Do this 3x in both directions.

☺ Watch [this 5 minutes](#) video for a guided session.

## Cultural Tips



### [Ainda temos o amanhã \(There's still tomorrow\)](#) – Movie, 2023

Set in postwar 1940s Italy, it follows Delia breaking traditional family patterns and aspiring to a different future, after receiving a mysterious letter.

Director: Paola Cortellesi



## Quote of the month

P.B. Shelley, Ode to the West Wind



**O Wind,  
If Winter comes, can Spring be far behind?**