

PhD Position - SPAC-CRADLE

- Call: **Contratos predoctorales PIF 2026**, associated to the project:

“SPAC-Cradle: Cascading dynamics of energy, carbon and water in the soil-plant-atmosphere continuum through an integrated observation and modelling system”, funded under the 2025 call “Proyectos de Generación de Conocimiento” (Convocatoria 2025).

- Application deadline: **please check the official PIF 2026 call announcement (bases de la convocatoria) for exact dates**. <https://www.csic.es/es/formacion-y-empleo/formacion-de-personal-investigador/doctorado/contratos-predoctorales#:~:text=19%2F12%2F2025%20al%2008%2F01%2F2026>
- Department: **ICA-CSIC**, Tech4Agro group (tech4agro.csic.es) (Madrid, SPAIN)
- Contract: Predoctoral contract (PIF), duration and conditions as established by the official 2026 call regulations
- Provisional dates: **2026-2030**
- Degree: Master’s degree (or equivalent) giving access to a PhD programme, in Hydrology, Geophysics, Geology, Environmental Sciences, Agricultural/Forest Engineering, Physics, or a related field
- Occupancy rate: Full time
- Vacancy Type: Predoctoral research position (PhD candidate), Subproject 1 — **CRADLE-ROOTS**

Job description

YOUR JOB

We are seeking a motivated PhD candidate (predoctoral contract) to join the **SPAC-CRADLE** project, funded by the Spanish 2025 “Proyectos de Generación de Conocimiento” call. SPAC-CRADLE develops an integrated framework — inspired by the Newton’s cradle analogy — to understand how energy, carbon and water cascade through the Soil-Plant-Atmosphere Continuum (SPAC). The project is structured around two interconnected subprojects: **Newton’s Cradle Action (SP1, CRADLE-ROOTS)**, focused on the soil-root system, and **Newton’s Cradle Reaction (SP2, CRADLE-FLUX)**, focused on plant-atmosphere interactions, linked through an Integrated Observation System (IOS) deployed at three pilot sites with contrasting climates: **Champagne (France)**, **Majadas de Tiétar (Spain)** and **Tenerife (Spain)**.

As a PhD candidate at **Tech4Agro (ICA-CSIC)**, co-supervised by **Dr. Benjamin Mary** and **Dr. Héctor Nieto**, you will work within WP1 (Soil), contributing to the development of a robust scientific basis for time-lapse geophysical soil mapping in complex agroecosystems, and to WP4 (Connecting the pieces), where geophysical and remote sensing observations are coupled to a hydrological/SPAC model through data assimilation. You will be part of a multidisciplinary and international team (forest engineers, geophysicists, remote sensing specialists) and will collaborate with project partners (SpecLab-CSIC, Universidad de La Laguna) and international collaborators (Sorbonne Université, University of Padova, CESBIO/Météo France).

Your tasks as a PhD candidate

- Deploying and operating **geophysical monitoring systems** (ERT, FDEM, EIT) across the pilot sites to investigate soil moisture, root water uptake, and subsurface properties;
- Developing **pedophysical relationships** linking geophysical data to soil hydraulic properties, and contributing to open-source/open-data resources;
- Conducting **field and laboratory campaigns**, including soil sampling and validation against continuous monitoring data;
- Contributing to **data assimilation and modelling** within WP4, coupling geophysical and remote sensing observations with the SPAC model;
- Communicating research findings through **peer-reviewed manuscripts** and presentations at national and international conferences (e.g. EGU, AGU);
- Participating in **outreach and mentoring activities**, and traveling for national and international

fieldwork, training stays, and conferences.

PhD training and thesis plan

Your thesis will consist of at least three scientific manuscripts, tentatively: 1. A state-of-the-art review of SPAC and soil hydrodynamic numerical models, with a focus on wooded vegetation; 2. Retrieval of soil and root properties using applied geophysics and numerical models; 3. Data assimilation in the SPAC model (WP4), evaluating performance with and without assimilation, including validation with near-real-time data.

You will undertake annual research stays (≥ 1 month each), tentatively including: Universidad de La Laguna (Spain) to work on the SPAC model with Dr. Omar García-Tejera; University of Padova (Italy) for CATHY/CFM soil hydrology tools; and CESBIO or Météo France (France) for data assimilation techniques. You will also complete digital-skills training (geospatial technologies, data assimilation, cloud computing) through summer schools and certifications (e.g. UIMP-CSIC, ESA Academy, ECMWF, International Soil Modeling Consortium), and will be enrolled in the UIMP Science and Technology doctoral programme.

Job profile

- You have knowledge of soil hydrology, and ideally geophysical methods (ERT/EMI) and their application in environmental or agronomic contexts;
- Knowledge of spatial data analysis, geostatistics, or pedophysics is advantageous;
- You have a basic understanding of hydrological/SPAC modelling techniques; experience with inverse and/or data assimilation approaches is a plus;
- You have basic proficiency in scientific programming (e.g. Python), or a strong willingness to develop these skills;
- You are proficient in English, both written and spoken;
- You hold, or are about to complete, a Master's degree granting access to a PhD programme.

Skills and Attitudes

- You excel in both independent and collaborative research settings, within a multidisciplinary and international team;
- You are highly organized, detail-oriented, and methodical in fieldwork and data analysis;
- You have strong problem-solving skills and creativity in developing new methodologies;
- You are willing to disseminate your work through papers, conferences, and open-source code (GitHub);
- You are proactive, with a positive attitude towards learning and international mobility.

How to apply

WHAT WE CAN OFFER YOU

- A full-time predoctoral (PIF) contract associated with the SPAC-CRADLE project, hosted at Tech4Agro, ICA-CSIC (Madrid, Spain), for its duration as established by the PIF 2026 call regulations;
- Co-supervision by Dr. Benjamin Mary and Dr. Héctor Nieto (Tech4Agro-CSIC), with regular collaboration with SpecLab-CSIC and Universidad de La Laguna;
- Access to research-grade geophysical instrumentation (electromagnetic mapping, ERT/EIT systems, Ohmpi sensors), CSIC's High Performance Computing centre (Drago), and three fully instrumented field sites (Champagne, Majadas de Tiétar, Tenerife);
- Funded international training stays, conference attendance (national and international, at least one per year), and open-access publication support.

How to apply

Please refer to the official **PIF 2026** call announcement (bases de la convocatoria) published by the CSIC formal application procedure, eligibility requirements, and deadlines, as these are not detailed in the project memoria (<https://www.csic.es/es/formacion-y-empleo/formacion-de-personal-investigador/doctorado/contratos-predoctorales#:~:text=19%2F12%2F2025%20a%2008%2F01%2F2026>)

In parallel, interested candidates are encouraged to send an informal expression of interest — including a motivation letter, CV, and (if available) academic transcripts — to

benjamin.mary@ica.csic.es, with the subject line **“Application PhD SPAC-CRADLE”**.

For more information about this position, please contact **Dr. Benjamin Mary** (benjamin.mary@ica.csic.es) or **Dr. Héctor Nieto**, Tech4Agro group, ICA-CSIC.

CSIC maintains an equal opportunities and diversity policy; everyone is encouraged to apply for this position.