



PhD Research Position

Image and Signal Processing group (ISP). Universitat de València. <https://isp.uv.es>

We look for highly motivated individuals with a degree in physics or mathematics and expertise in machine learning to do research on *AI-driven equation discovery to Characterize the terrestrial biosphere dynamics under extreme events*. The intersection of Artificial Intelligence (AI) and Earth/Environmental Sciences presents a transformative opportunity to enhance our understanding of complex Earth systems. Earth systems, characterized by complex interactions among the atmosphere, biosphere, hydrosphere, and geosphere, exhibit nonlinear behaviors that are difficult to model using traditional approaches. Recent advances in AI, particularly in equation discovery methods like Sparse Identification of Nonlinear Dynamics (SINDy), Bayesian Machine Scientist, and transformer-based discovery models, provide promising tools for uncovering underlying dynamical systems from data. This research aims to develop and apply these AI-driven tools to improve our understanding of crucial Earth processes, focusing on phenology, vegetation dynamics, and the impacts of extreme events.

Requirements: Degree in Physics or Mathematics, English proficiency, experience in machine learning, dynamic systems, differential equations, differential geometry, symbolic regression and programming skills in Python or Julia

Want to know more? Main references:

- <https://www.pnas.org/doi/full/10.1073/pnas.1517384113>
- <https://ieeexplore.ieee.org/document/9324639>
- <https://www.nature.com/articles/s41586-019-0912-1>
- <https://www.sciencedirect.com/science/article/pii/S0370157323003411>
- <https://onlinelibrary.wiley.com/doi/book/10.1002/9781119646181>
- <https://openreview.net/forum?id=7YqV4deFAc>

The scientific offer: The scientific offer provides an exceptional opportunity to collaborate with a diverse team of top European researchers at the intersection of machine learning and Earth sciences, working on exciting projects with significant societal, economic, and environmental impacts. It includes access to extensive computational resources, funding for international conferences, ELLIS workshops, retreats, and the chance to become an ELLIS PhD student. With flexibility for remote work and the freedom to explore new ideas and contribute to other European projects, the role supports personal and professional growth in a dynamic and impactful research environment.

The economic offer: The position offers a gross monthly salary of approximately €1,600, as per the UV salary tables, along with coverage under the public health system. Tuition fees are fully covered.

Timeline: To start in early 2025 | 3 years thesis

The ISP environment. Now 50 and growing, the team tackles diverse Earth and climate science challenges with AI. It is an international group; meetings are in English. Focused on serendipity and stepping out of comfort zones, the group emphasizes causality, physics-aware ML, and collaborative project-based work.

Inquiries: send questions and a 1-page CV in a pdf to Gustau Camps-Valls gustau.camps@uv.es