Institut de Ciències del Mar

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Job Offer: PhD Position

Bayesian Inversion of Seismic Intensities for Historical Earthquake Analysis

Context

Studying large **historical earthquakes** is crucial for **seismic hazard assessment**. Unlike instrumental events recorded by seismometers, historical earthquakes occurred before the advent of such instruments. Their **magnitude and location** must be inferred from **macroseismic intensity data,** such as historical documents and damage reports.

To estimate these parameters, seismologists use **Intensity Prediction Equations (IPEs),** which model ground shaking intensity as a function of earthquake magnitude, distance, attenuation, and local site conditions. However, IPEs must be **regionally calibrated** using instrumental data, and poorly calibrated models lead to **biased estimates** of historical earthquakes.

This project aims to develop a **Bayesian probabilistic approach** to jointly estimate earthquake **magnitudes, locations, and IPE parameters**, integrating both historical and instrumental data. Unlike traditional methods, this approach will **account for uncertainties more comprehensively**, leading to improved historical earthquake characterization. Ultimately, this research will contribute to the development of a **new seismicity catalog**, which will be used to **update and improve seismic hazard models for metropolitan France**.

Candidate Profile

The ideal candidate should have a **strong background in geosciences or computer science** and be proficient in **programming**. Applications from women are especially welcome. The candidate is expected to start on autumn 2025, but the starting date can be adjusted.

MINISTERIO DE CIENCIA E INNOVACIÓN
CSIC Consejo Superior de Investigaciones Científicas
EXCELENCIA SEVERO OCHOA

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Supervision & Collaboration

The PhD will be supervised by **Thomas Bodin** (ICM-CSIC, Barcelona) in collaboration with **Pierre Arroucau** (EDF) and the **SIGMA3 research program.** The student will participate in **scientific meetings** and contribute to developing algorithms for **French seismic databases**.

Application Process

For any information about the project and the application process, contact us at the following addresses. To apply, please send the following documents to: tbodin@icm.csic.es, pierre.arroucau@edf.fr

- **CV**
- **Statement of research interests**
- **Names and contact information of referees**

The Institute

The Institut de Ciències del Mar (ICM) is **the largest marine research centre** of the Spanish National Research Council (CSIC). It is also the first marine science centre to be accredited as a ***Severo Ochoa Centre of Excellence***, a recognition to the institution's leadership in the field of marine research in Spain and to its commitment to create social impact.

Our goal is to develop **research of excellence** to inspire a society in harmony with the blue planet, in line with the values of the **United Nations Decade of Ocean Science for Sustainable Development (2021-2030)**.

For further information, please visit our website.