



## **Post-Doctoral and PhD Positions: 3D integrated geophysical-petrological modelling of the crust and mantle at global scale**

The Faculty of Physics (Universidad Complutense de Madrid) invites applications for a Post-Doctoral Researcher and a PhD positions. The research project will involve multi-scale seismic, topography and satellite gravity field data imaging and petrological modelling of the crust and mantle at global scale within an integrated framework. Our group has recently developed a global lithospheric-upper mantle thermochemical model using state of the art terrestrial and satellite data sets and we seek suitable candidates to extend the model upwards (crust) and downwards (transition zone-lower mantle).

The intended starting date for the two positions is January 15, 2021. Consideration of applications will begin on October 16 and continue until the positions are filled. Potential candidates should send a cover letter outlining their research interests, motivation and suitability, a full CV and contact details of three referees via email to Dr Javier Fulléa ([jfulléa@ucm.es](mailto:jfulléa@ucm.es)) using the subject line "WINTERC, [PD or PhD]". For additional information on the project or working at UCM please contact Javier Fulléa. Specific information on the positions is given below.

### **Post-Doctoral researcher: global 3D thermochemical structure of the transition zone and lower mantle**

A position for a geophysicist with expertise in lithospheric imaging using seismic and gravity data. Experience jointly modelling two or more geophysical data sets will be positively evaluated. Experience in data processing and strong computational skills are required. The successful candidate will extend a recently developed global thermochemical upper mantle model (currently down to 400 km depth) into the transition zone and lower mantle. He or she will use the existing multi-parameter inversion geophysical-petrological tools in the group and will develop them further. The method will be applied to massive seismic datasets comprising fundamental and higher mode surface-waves phase velocities and satellite gravity data (geoid and gravity anomalies, gravity gradients). As part of the research plan the candidate is expected to assess possible dynamic contributions to present-day surface topography based on the 3D viscosity and density fields from the new model. The transition zone-lower mantle model will be coupled with the crustal model to be developed in the course of this project (see PhD- position below). The position is initially available for 1 year with the possibility of extending another year based on performance.

### **Qualifications:**

Applicants must hold a PhD or an equivalent degree within Geophysics/Geodynamics. Evidence of the ability to present and publish the result of research at international level and

documented research potential. Ability to conduct independent research. Proficiency in both written and oral English.

**PhD project: global 3D thermal and lithological structure of the crust**

**Duration: (3 years)**

The PhD project involves the development of a global model of the crust in terms of lithology and temperature integrating available petrological (crustal xenoliths, mid oceanic ridge basalts, exposed basement rocks) seismic (waveform tomography, controlled and passive source local studies) gravity (terrestrial and satellite) and surface heat flow data sets. In contrast to the mantle, where thermodynamic equilibrium is prevalent, vast portions of the crust are thermodynamically metastable, with their mineralogical assemblage and physical properties reflecting instead the conditions present at the moment of rock formation. Therefore, a fundamental methodological development in the project will be to define a comprehensive lithological parameterization of the crust suitable for inversion of large scale geophysical data sets. The candidate will use the existing multi-parameter inversion geophysical-petrological tools in the group and will develop them further. The crustal model will be coupled with the existing lithospheric-upper mantle model in the group and the transition zone-lower mantle model to be developed in the course of this project (see Post-Doctoral position above).

**Qualifications:**

Applicants must hold a M.Sc. or equivalent degree in geosciences. Familiarity in petrology/mineral physics for candidates with a geophysical profile will be considered an advantage. Likewise, modelling and coding experience (e.g., computational petrology) for candidates with a geological profile will be considered an advantage. Ability to conduct independent research and interest in pursuing an academic career. Proficiency in both written and oral English.