PhD Research Fellow in Computational Geodynamics - The effects of anisotropic mantle viscosity on subduction dynamics

Job description
Position as PhD Research Fellow in Computational Geodynamics available at the Centre for Earth Evolution and Dynamics, Department of Geosciences at the University of Oslo.

The successful candidate will pursue the PhD study for a total period of 36 months, carrying out a project entitled “The effects of anisotropic mantle viscosity on subduction dynamics”. We are looking for a self-motivated, highly qualified candidate with a solid theoretical background and in the upper segment of their class. The successful candidate will work in an international team, thus good written and oral communication skills in English are required. Excellence and independent scientific thinking will be the main selection criteria. Starting date should be no later than September, 2021.

No one can be appointed for more than one PhD Research Fellowship period at the University of Oslo.

More about the position
Olivine, the main rock-forming mineral of Earth's mantle, responds to tectonic stress by deforming viscously over millions of years. This deformation creates an anisotropic (direction-dependent) texture that typically aligns with the mantle flow direction. We can observe this anisotropic texture by detecting directional differences in seismic wave propagation speed across the textured mantle. According to laboratory experiments on olivine, we expect this texture to also exhibit anisotropic viscosity (AV), with deformation occurring more easily when it is parallel to, rather than across, the texture. Seismic constraints indicate strong olivine alignment under oceanic plates, in a direction parallel to their movement, while this pattern seems to be more complex near subduction zones. In a subduction zone, where an oceanic plate sinks into the mantle and induces a mantle flux around the sinking slab, olivine alignment varies significantly, complicating the interpretation of seismic anisotropy.

The associated AV may result in complex viscosity variations around the slab, which should affect overall mantle flow patterns, and consequently impact the stresses, thermal structure, and volcanism near subduction zones. Although AV fundamentally affects these mantle systems, it has never been considered in its full 3D form within geodynamic models. Recent laboratory measurements on deforming olivine provide us a new deformational framework that allows us to relate AV to the texture of the olivine crystals in the rock. We can utilize this new framework to create a numerical tool that incorporates coupled olivine texture development and anisotropic viscosity into 3D numerical models of mantle deformation. The candidate will develop numerical geodynamic models of subduction and will use this tool of AV to constrain the evolution and the impact of AV on mantle flow around subduction zones.

This PhD project is part of a Norwegian Research Council funded Young Talent Project - ANIMA: Anisotropic viscosity in Mantle dynamics (https://prosjektbanken.forskningsradet.no/#/project/NFR/314742/Sprak=en).

Qualification requirements
The Faculty of Mathematics and Natural Sciences has a strategic ambition to be among Europe’s leading communities for research, education and innovation. Candidates for these fellowships will be selected in accordance with this, and expected to be in the upper segment of their class with respect to academic credentials.

- Master’s degree or equivalent in Geophysics or related fields
- A foreign completed M.Sc.-level degree corresponds to a minimum of four years higher-level education in the Norwegian educational system
- Fluent oral and written communication skills in English.

Candidates without a Master's degree have until 30 June, 2021 to complete the final exam.

Grade requirements:
The norm is as follows:

- the average grade point for courses included in the Bachelor’s degree must be C or better in the Norwegian educational system
- the average grade point for courses included in the Master’s degree must be B or better in the Norwegian educational system
- the Master’s thesis must have the grade B or better in the Norwegian educational system
- Fluent oral and written communication skills in English
- English requirements for applicants from outside of EU/EEA countries and exemptions from the requirements: http://www.mn.uio.no/english/research/phd/application/application.html

The purpose of the fellowship is research training leading to the successful completion of a PhD degree.

The fellowship requires admission to the PhD programme at the Faculty of Mathematics and Natural Sciences. The application to the PhD programme must be submitted to the department no later than two months after taking up the position. For more information see:

http://www.uio.no/english/research/phd/
Personal skills
- Must have a good understanding of geodynamic processes, especially of subduction dynamics
- Have a strong computational background. Knowledge of C++ programming language is particularly desirable
- Must have capability of presenting (in oral and/or written form) their research

We offer
- Salary NOK 482 200 - 526 000 per annum depending on qualifications in a position as PhD Research fellow, (position code 1017)
- Attractive welfare benefits and a generous pension agreement
- Vibrant international academic environment
- Sufficient research fund for conference participations throughout the program
- Career development programmes
- Oslo’s family-friendly surroundings with their rich opportunities for culture and outdoor activities

How to apply
The application must include
- Cover letter - statement of motivation and research interests
- CV (summarizing education, positions and academic work, scientific publications and presentations)
- Copies of the original Bachelor and Master’s degree diploma, transcripts of records and
- Master’s Thesis abstract (max 1 page)
- Documentation of English proficiency
- List of publications and academic work that the applicant wishes to be considered by the evaluation committee, including CREdIT author statements (https://www.elsevier.com/authors/policies-and-guidelines/credit-author-statement) on the percentage of work the applicant contributed.
- Names and contact details of 2-3 references (name, relation to candidate, e-mail and telephone number)

The application with attachments must be delivered in our electronic recruiting system, please follow the link “apply for this job”. Foreign applicants are advised to attach an explanation of their University's grading system. Please note that all documents should be in English (or a Scandinavian language).

Applicants may be called in for an interview.

Formal regulations
Please see the guidelines and regulations for appointments to Research Fellowships at the University of Oslo.

According to the Norwegian Freedom of Information Act (Offentleglova) information about the applicant may be included in the public applicant list, also in cases where the applicant has requested non-disclosure.

The University of Oslo has an agreement for all employees, aiming to secure rights to research results etc.

Inclusion and diversity are a strength. The University of Oslo has a personnel policy objective of achieving a balanced gender composition. We also want to have employees with diverse expertise, combinations of subjects, life experience and perspectives. We will make adjustments for employees who require this.

Contact information
For further information please contact:
Ágnes Király, e-mail: agnes.kiraly@geo.uio.no or Prof. Clinton Conrad, c.p.conrad@geo.uio.no

For questions regarding the electronic recruitment system, please contact HR manager Torunn Standal Guttormsen: t.s.guttormsen@mn.uio.no

About the University of Oslo
The University of Oslo is Norway's oldest and highest rated institution of research and education with 28 000 students and 7000 employees. Its broad range of academic disciplines and internationally esteemed research communities make UiO an important contributor to society.

Centre for the Earth Evolution and Dynamics (CEED) is a Norwegian Centre of Excellence that provides a stimulating and well-funded research environment. The main goal of the centre is to develop a model that explains how mantle processes drive plate tectonics and trigger massive volcanism and associated environmental and climate changes throughout Earth's history.

The centre explores the distribution and history of tectonic plates in time and space, and examines the driving mechanisms that steer all stages of the 'Wilson Cycle', and aims to establish the links between Earth's interior, crust and oceans, atmosphere and biosphere. CEED endeavors to also unravel similarities and differences of our planet with earth-like planetary bodies.
The centre was established in 2013 and consists of ca. 70 full time and part time professors and researchers, PhD Research Fellows and Postdoctoral Research Fellows.

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