

Multi-disciplinary PhD study of magma intrusion processes

Applications are invited for a 4-year PhD fellowship at the Nordic Volcanological Center (NordVulk), University of Iceland, in collaboration with Uppsala University, Sweden, and Oslo University, Norway. The position is available from June 1st 2021, and no later than July 1st, 2021.

Title:

Multi-disciplinary study of magma intrusion processes

Research area:

Geophysics, structural geology

Project description:

The aim of the project is to better understand magma intrusion processes through a combined approach using field studies of extinct volcanic systems, laboratory models of magma injection, as well as modelling of monitoring data from recent magma intrusion episodes in Iceland. Key questions include the role of elastic versus inelastic processes in accommodating magma intrusions and magma flow, and the interaction of magma and host rock. To achieve this goal, the project is multi-disciplinary and includes a component of field mapping of magma intrusions in Iceland, as well as laboratory and numerical modelling in relation to the field observations. The integrated results of these three approaches will be compared to geophysical and geodetic data monitored during recent volcano unrest episodes in Iceland.

The field component of the project includes mapping of host rock conditions and deformation associated with selected intrusions in eroded Tertiary volcanic centers in Eastern Iceland. The intrusions and their host rocks will be examined in the field and recorded with photogrammetry to allow quantitative structural mapping and analysis from virtual outcrops. The laboratory experiments will involve simulation of magma intrusions of varying viscosity, intruding into host rock of variable strength, in order to understand how these varying conditions influence magma emplacement. The experiments will be 2-dimensional, such that sideview monitoring will fully resolve the inelastic damage accommodating the emplacement of the model magma, with possibility to test the effect of layering. In addition, the experiments will reveal both local-scale deformation in the vicinity of growing intrusions and larger-scale deformation at the surface, in order to link the field observations and the numerical models. Numerical modelling will address how such varying conditions and lateral heterogeneities in host rock properties influence ground deformation, that is used for inferring geometry and parameters of magma intruding into active volcanoes during unrest episodes.

Qualifications and specific competences:

MS-degree in geology, Earth Science, or geophysics. Willingness to learn necessary

techniques to apply during the Ph.D. project. Mobility of the selected candidate for this position is required, with divided study time between Reykjavik, Uppsala and Oslo.

Place of employment and place of work:

The PhD student will join the NordVulk team within the Institute of Earth Sciences, University of Iceland for a period of three years. During the studies several periods of various length will be spent at University of Oslo, Norway, and Uppsala University, Sweden. Furthermore, the student will be enrolled at Uppsala University, Sweden, where the fourth and final year of the PhD will be spent. A cotutelle agreement between the two Universities secures that a student will receive a dual degree upon graduation.

Field campaigns will be carried out in Iceland in the summer of 2021 and 2022. Laboratory modelling of magma intrusion processes will be carried out at University of Oslo, Norway.

PhD Supervisors:

Freysteinn Sigmundsson, NordVulk, Institute of Earth Sciences, University of Iceland, Iceland

Steffi Burchardt, Department of Earth Sciences, Uppsala University, Sweden

Olivier Galland, Njord Center - Physics of Geological Processes, Department of Geosciences, University of Oslo, Norway

Application procedures

1. Before you apply

Documentation of language skills:

English language qualifications may be documented by one of the following tests:

- **TOEFL test** (internet-based), minimum score: 83. The graduate school does not accept the paper-based test, nor the TOEFL ITP test. Remember to ask the test center to send your test results to University of Iceland in order to enable verification of your test results. **University of Iceland's TOEFL code is 7949.**
- **IELTS (academic) test**, minimum average score: 6.5 points
- **Cambridge English Language Assessment:**
Cambridge Certificate of Proficiency (**CPE**)
Cambridge English: Certificate of Advanced English with grade A,B or C (**CAE**)
Cambridge English: First Certificate with grade A (**FCE**)

The test result must not be more than two years old at the time of application.

The English language test should be taken before applying and included in the application documents.

The following applicants are exempted from documenting their English qualifications:

- Applicants with citizenship from the following countries: Australia, Canada, Ireland, New Zealand, the United Kingdom, the United States, or one of the Nordic countries (Denmark, Finland, Iceland, Norway or Sweden).
- Applicants with a Bachelor's or Master's programme completed in Australia, Canada, Ireland, New Zealand, the United Kingdom, or the United States.

2. How to apply:

All information in the application must be in English or a Scandinavian (i.e. Norwegian, Swedish or Danish) language, preferably English. A certified English translation is required for documents written in languages other than English or one of the Scandinavian languages.

The application must contain the following information:

As a minimum all applications must include (pdf-files only, max. 10 MB, no zip):

- Personal information
- Academic background
- Names on two references. The reference letters may be sent directly to rikke@hi.is
- Curriculum vitae of applicant, including list of publications
- Motivation letter (max. 2 pages)
- Transcripts, grade point averages (weighted and unweighted), and diploma(s) for both Bachelor's and Master's degree. If the original documents are not in English or one of the Scandinavian languages then copies of the original documents as well as a certified English translation must be attached.
- Documentation of language skills if required.

After submission of the application, you will receive a confirmation e-mail.

Please be aware that you must scan/merge all documents into one large PDF file and send as an attachment to rikke@hi.is. If you wish to refer to scientific papers, large reports, theses and the likes, please indicate a URL where the information is available.

NordVulk reserves the right to verify the authenticity of your educational diploma and transcripts:

- Request additional information to verify an application.
- Reject the application if it is proven, or if the Programme Committee has reasonable belief, that the information provided is false or if the applicant refuses to provide the requested information, whether or not an offer has already been made.

Please note:

- The Programme Committee may request further information or invite the applicant to attend an interview.

All interested candidates are encouraged to apply, regardless of their personal background.

Applicants seeking further information are invited to contact:

NordVulk leader Rikke Pedersen, phone +354 525 5483 , e-mail: rikke@hi.is.