

SHORT COURSE

Rock stress, Hydro-mechanical coupling and induced seismicity

Prof. Ove Stephansson and Prof. Dr. Arno Zang
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October 1st – 2nd 2018, University of Neuchatel, Switzerland

General Course Info

The course hosted by University of Neuchatel will be held by Prof. Dr. Ove Stephansson and Prof. Dr. Arno Zang, German Research Centre for Geosciences, GFZ Potsdam. The event aims at providing training on recent developments of rock stress and its measurement in the Earth's Crust as well as on its applicability in science and industry. Guest lecture will be held by Valentin Gischig on a case example of integrated stress measurements.

Course Material

The first part of this course is following the main structure of the book 'Stress Field of the Earth's Crust' by Arno Zang and Ove Stephansson, Springer Netherlands, 322 pages, 2010 with a DVD containing extra video materials. The second part will focus on specialized lectures related to recent stress measurements at the sites for spent nuclear fuel in Sweden and Finland, the fundamentals of hydro-mechanical coupling and its importance for fluid-induced seismicity. The role of stress and seismicity during hydraulic fracture growth for geothermal applications will be evaluated based on examples from controlled laboratory and underground experiments in crystalline rock mass.

Lecturers

Ove Stephansson (German Research Centre for Geosciences, GFZ Potsdam, Germany) is an Engineering Geologist and Rock Mechanics specialized in rock stress and its measurement. Geological disposal of radioactive waste and spent nuclear fuel and underground construction are additional research interests.

Arno Zang (German Research Centre for Geosciences, GFZ Potsdam, Germany) is permanent staff scientist at GFZ and professor of Geophysicist and Rock Mechanics at Potsdam University. His research portfolio includes rock fracture mechanics, stress estimation from deep boreholes, induced seismicity in geothermal reservoirs and underground experiments.

Valentin Gischig (CSD) is a geologist at CSD Ingenieure AG, specialized in geomechanics and geophysics. He has worked in geomechanical and geophysical in-situ characterization for various projects including landslides and hydraulic stimulation experiments.

Program

Day 1 (Introductory lectures)

1. Introduction to Rock Stress (OS)
2. Rock Stress Terminology (OS)
3. Strength and Failure of Rock (AZ)
4. Fracture Mechanics (AZ)
5. Crustal Stress Models (AZ)
6. Borehole Breakouts and Hydraulic Fracturing (OS)
7. Core-based Methods (AZ)

Day 2 (Specialized lectures)

8. Local Stress Data (Stresses at sites for deposition of spent nuclear fuel in Sweden and Finland), OS
9. Best Estimate Stress Model, OS
10. Stress and Seismicity (Impact of injection style on fluid-induced seismicity), AZ
11. Hydro-mechanical coupling and fluid-induced seismicity, OS
12. World Stress Map and its Application to Science and Industry, (OS+AZ) pending final time schedule and guest lecturer
13. Integrated stress measurements for the ISC experiment at the Grimsel test site (VG)
14. Conclusions & Closure, OS+AZ

Detailed schedule will be communicated to the participants in due time. Minor adjustments to the program are possible.

Venue

University of Neuchâtel, Science Faculty
Emile Argand 11, CH-2000 Neuchâtel

Registration fee

- Students: CHF 200.-, free for students from the Water-earth system PhD school.
- Regular participant: CHF 400.-

The Registration fee includes the course material book 'Stress Field of the Earth's Crust' by Arno Zang and Ove Stephansson, Springer

Contact and Registration

For additional information and for registration, please contact Corinne Carraux-Drey, corinne.carraux@unine.ch, +41 32 718 25 65