In situ stress in potential siting areas in northern Switzerland from stress data and 3D geomechanical-numerical models

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Introduction

- 1. Why is crustal stress important?
- 2. What are the stress sources?
- 3. How to decribe the stress state?







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six independent components



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[k]

Depth

-5

-6

-7 0

20

40

S_h

60

80

Stress and pressure [MPa]

Po

3. How to decribe the stress state?



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Outline





1. Stress data Switzerland

Approx. 300 data for S_{Hmax} orientation
Three boreholes with stress magnitudes

2. Sensitivity study of in-situ stress

- Case example on the basis of the geological model of Nördlich Lägern*
- 3D geomechanical elasto-plastic model
- Impact of rock stiffness and strength
- Impact of faults and topography
- * Equivalent geomechanical modelling is currently being performed for the other SF/HLW siting areas (Jura Ost and Zürich Nordost)

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Stress Regime vs. Depth



Interim Summary



Stress orientations

- long wave-length and well known

- controlled by Moho and topography

Stress magnitudes

- S_V well-known from density logs
- S_h estimates only at three sites in Switzerland
- variability of S_h and S_H is poorly known

Stress regime

- varies with depth from strike-slip to extensional
- local and shallow resolution is low
- Geomechanical models are helpful tools to study the 3D stress field and its variability

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Location of the Local 3D Geomechanical Model



Location of the Local 3D Geomechanical Model





Model Geometry: Formations and Faults











Potential Future NS Shortening





Potential Future NS Shortening





Potential Future NS Shortening





Summary and Conclusions





