Der Digital Geothermie Kongress 2020

Leibniz Institute for Applied Geophysics

Temporal Evolution of Faults in the Molasse Basin

A Case Study of the Geretsried Geothermal Project

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PLAY TYPE

Faults – a major control on permeability

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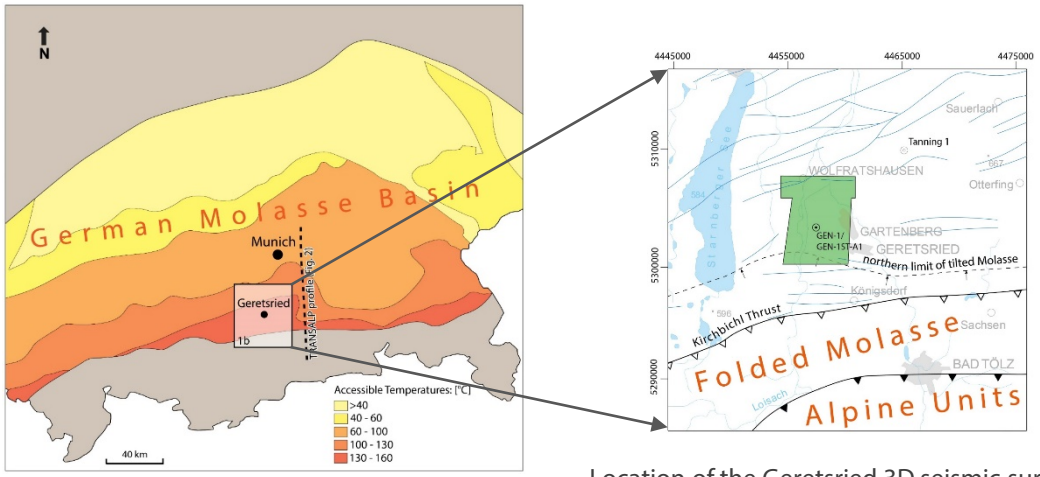
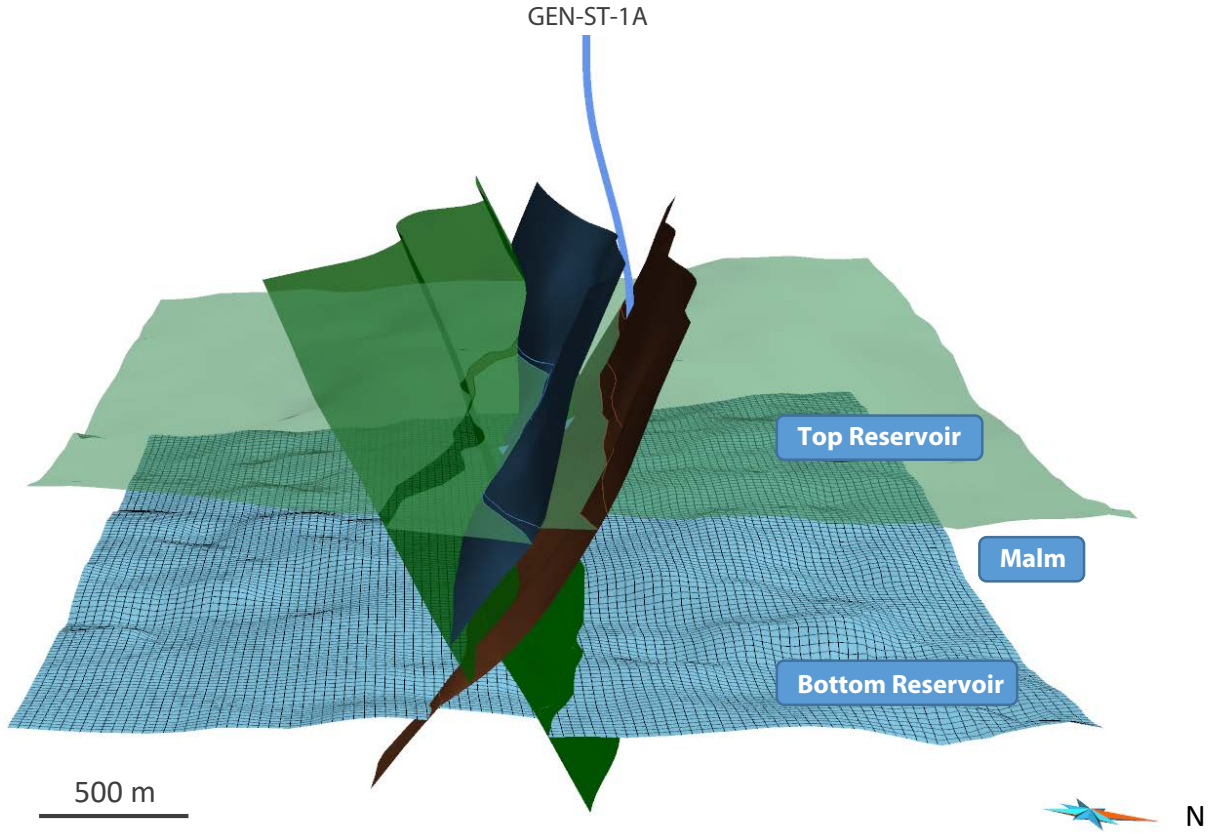
Faults can act as barriers or conduits to fluid flow depending on:

- kinematic evolution (history of movement)
- position within the current stress field (slip tendency)
- rock type surrounding the fault



after Agemar et al. (2014)

Location of the Geretsried 3D seismic survey



Crossing conjugate faults as an exploration target in Geretsried (GOCAD model)

Structural analysis Workflow

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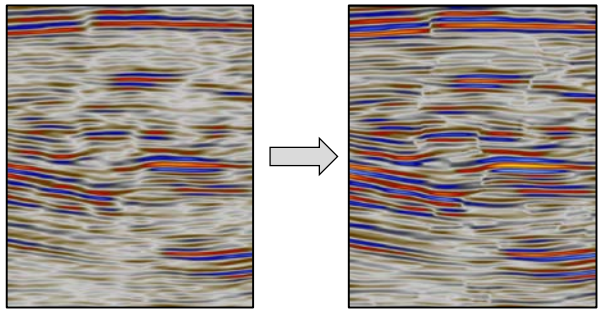
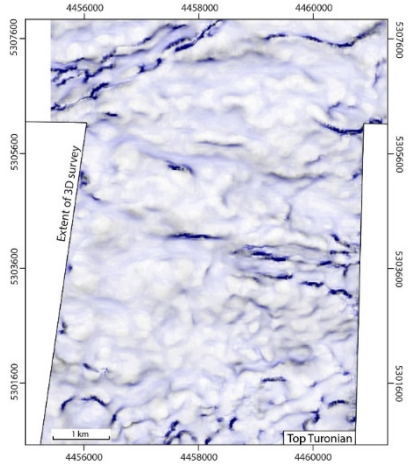
1. Data conditioning

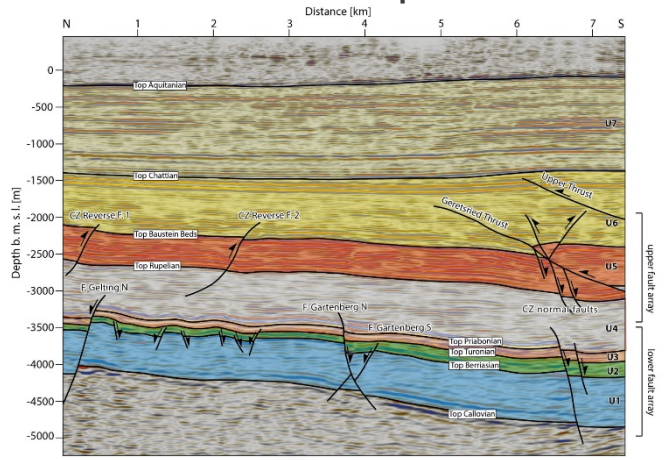


Pre-conditioned Post-conditioned

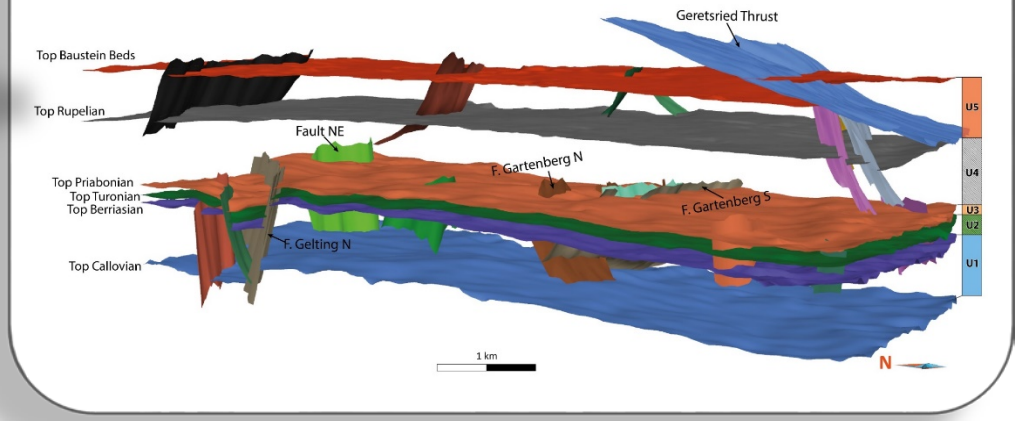
2. Attribute analysis



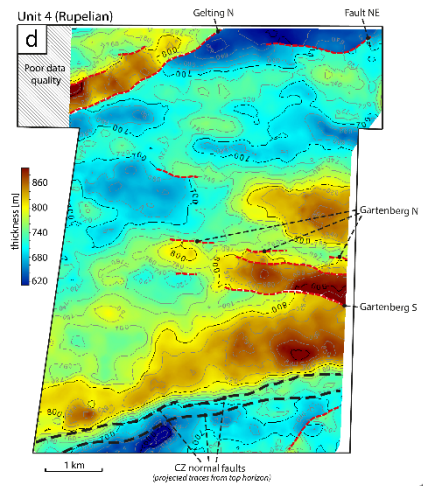
3. Seismic interpretation



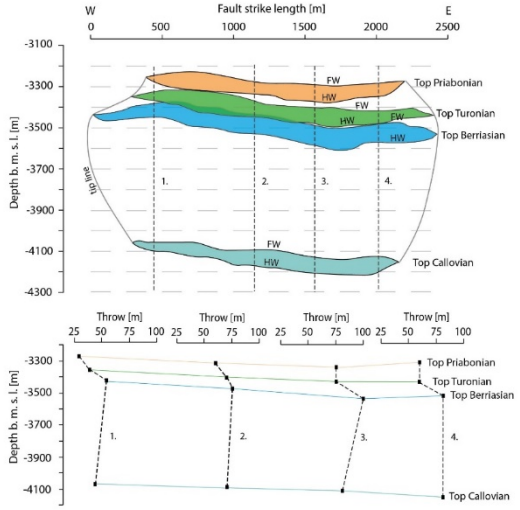
4. Structural modelling



5. Thickness maps



6. Juxtaposition diagrams



Results and implications

- Fault network evolved in three stages:
  1. Normal faulting in the Rupelian (c. 28-33 Ma)
  2. Normal faulting in the Chattian (c. 23-28 Ma)
  3. Reverse faulting in the mid-Miocene (c. 12-16 Ma)

- Mechanical stratigraphy is a key factor in controlling the decoupled deformation style

- Implications for geothermal exploration:
  - Prolonged inactivity and high horizontal stresses have an adverse effect on fault's hydraulic conductivity
  - Faults have low reactivation potential
  - Low risk of induced seismicity