

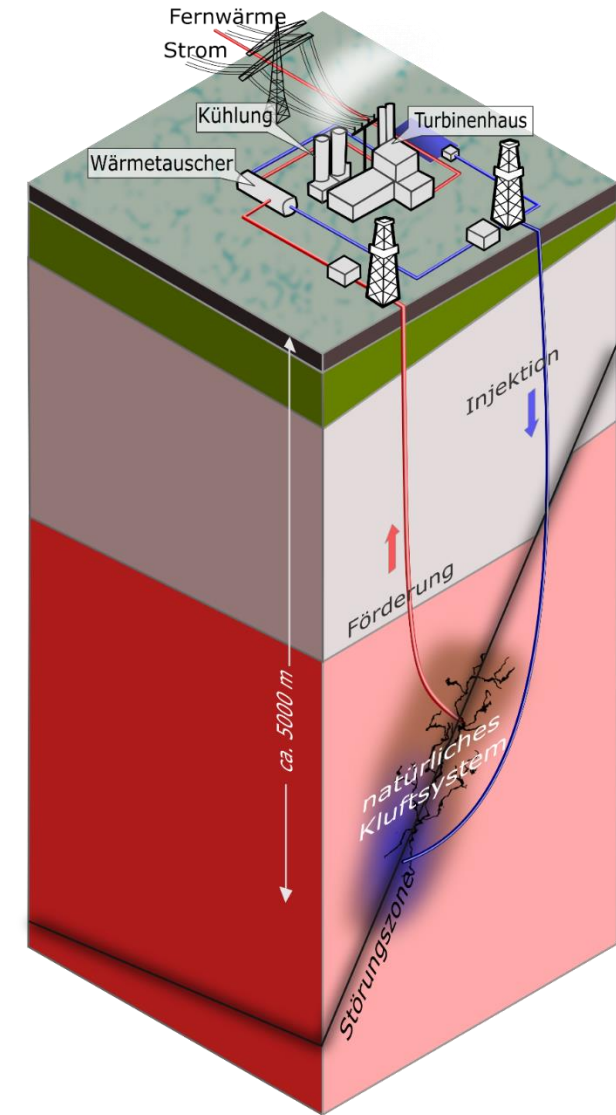
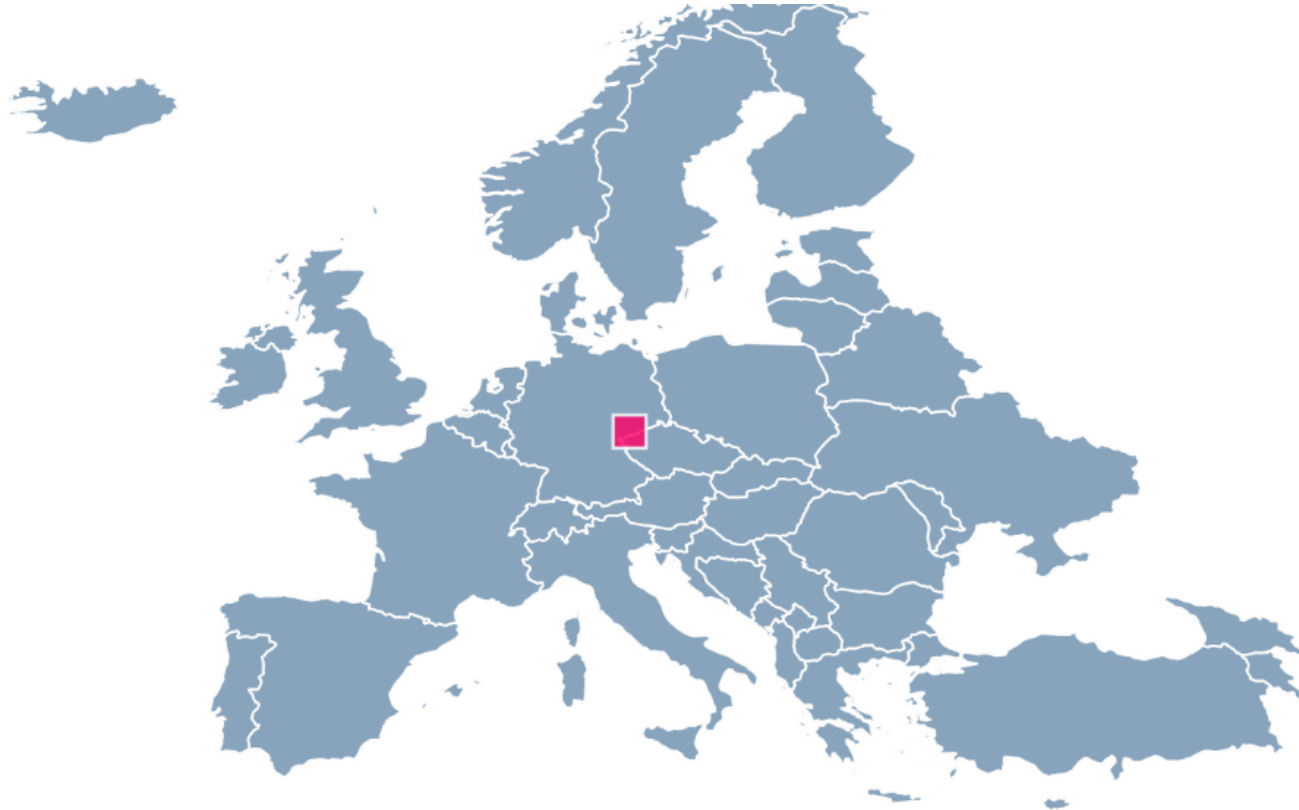
# 3D model of a geothermal reservoir in fractured crystalline rock and its use for science communication

[ Sascha Görne  
Federal Institute for Geosciences and Natural Resources ]

[ the project ]



## Geothermie im Granit Sachsens Geothermal Energy from Granites in Saxony



\*) The project ,Geothermie im Granit Sachsens (GIGS)‘ is funded by the Federal Ministry for Economic Affairs and Energy (Project ID: 0324243).

# [ the project ]



## Geothermie im Granit Sachsens Geothermal Energy from Granites in Saxony

### PROJECT AIMS:

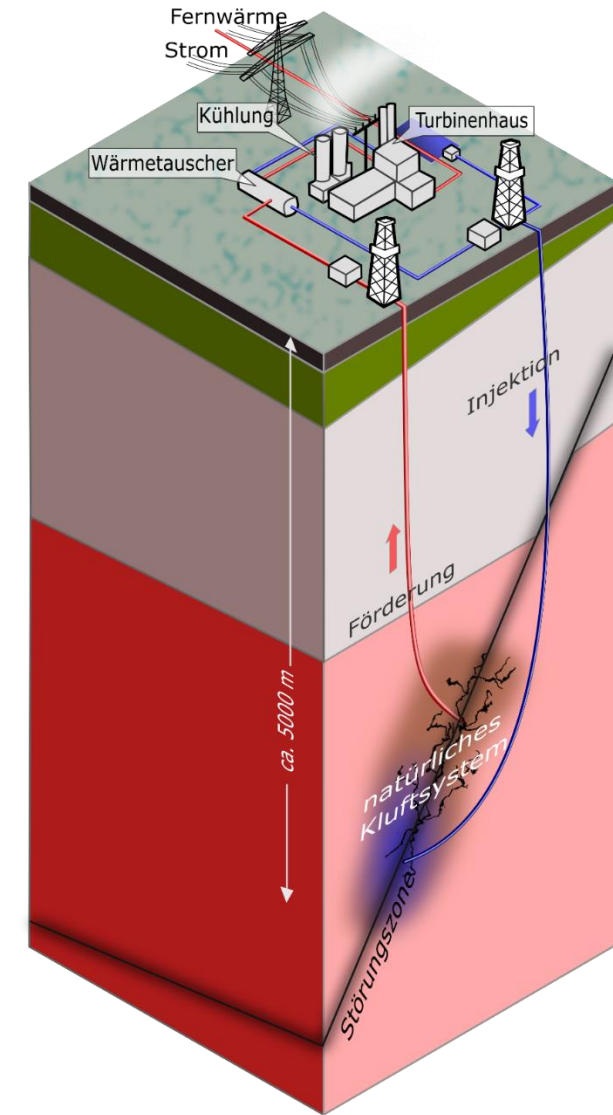
Pre project phase\* (11/2017 - 06/2019)

- preparation of an exploratory drilling in eastern Germany (Ore Mountains)
- creation of a detailed geological 3D model
- data management for the scientific research programme

### PROJECT AIMS:

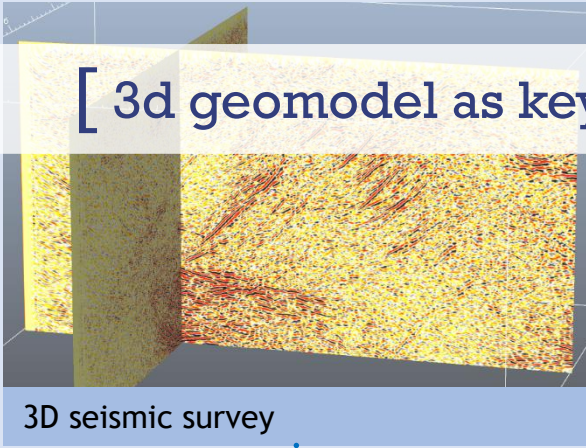
Main project (01/2020 - 12/2023)

- drilling of a 4.5 km deep research well for the estimation of fault-bound geothermal reservoirs
- evaluation of 3d seismic acquisition
- characterization of the fault system
- economic feasibility study

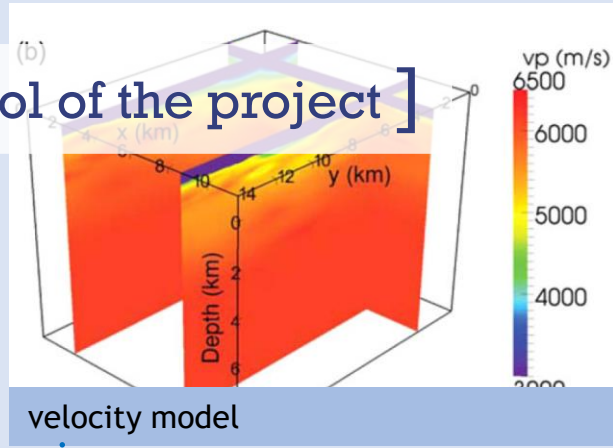


\*) The project ,Geothermie im Granit Sachsens (GIGS)‘ is funded by the Federal Ministry for Economic Affairs and Energy (Project ID: 0324243).

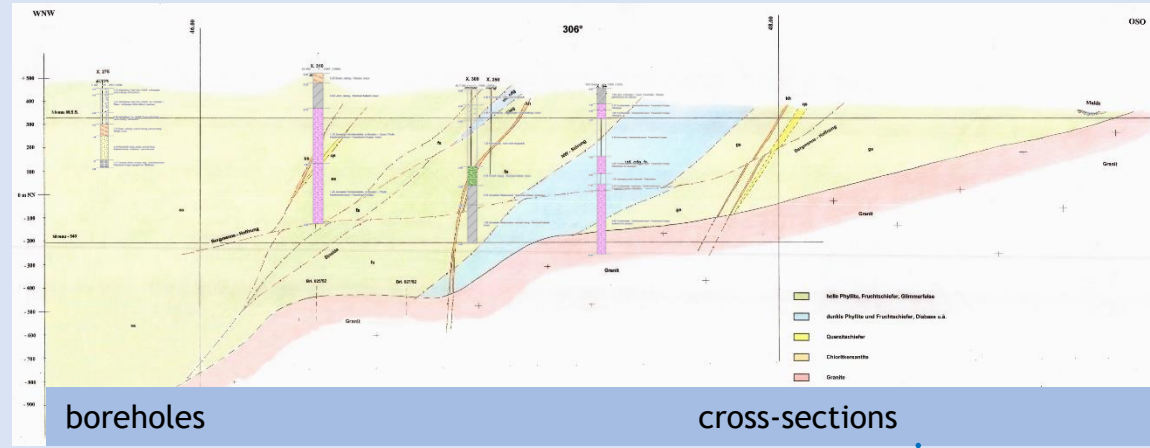
# [ 3d geomodel as key tool of the project ]



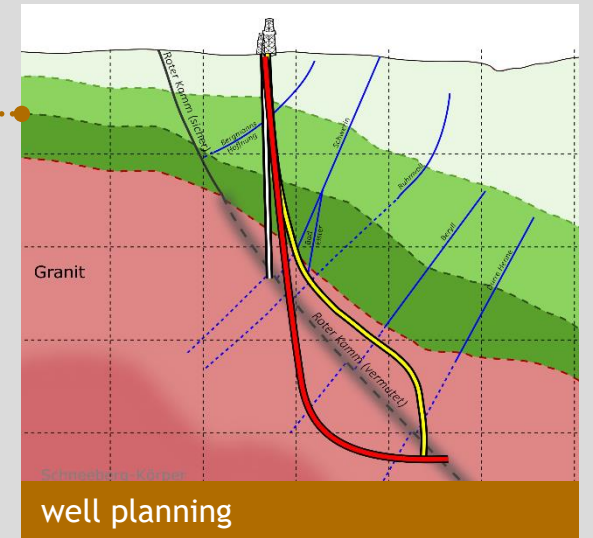
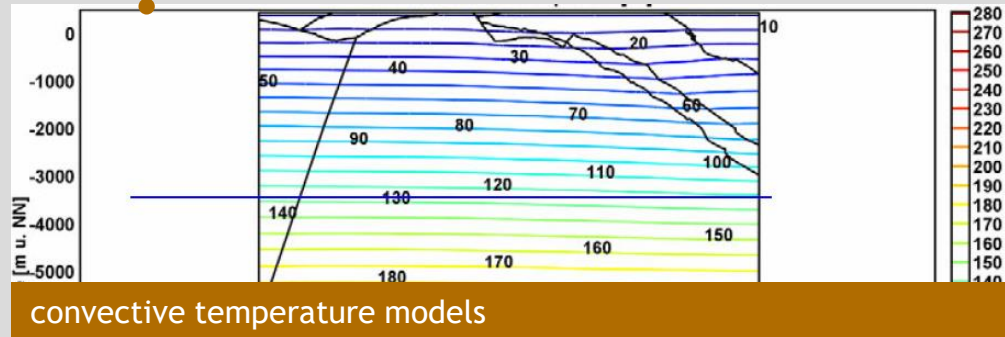
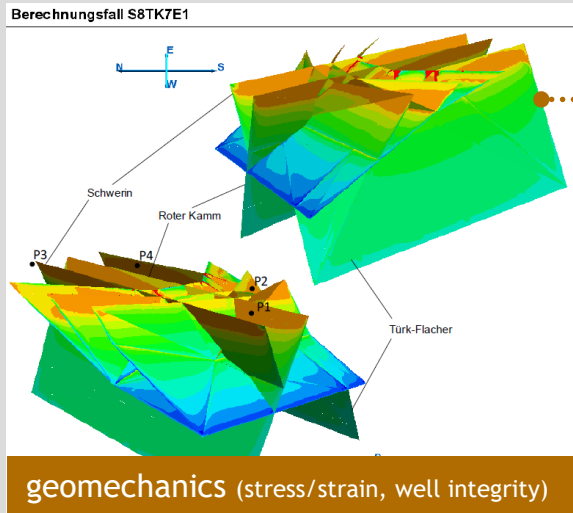
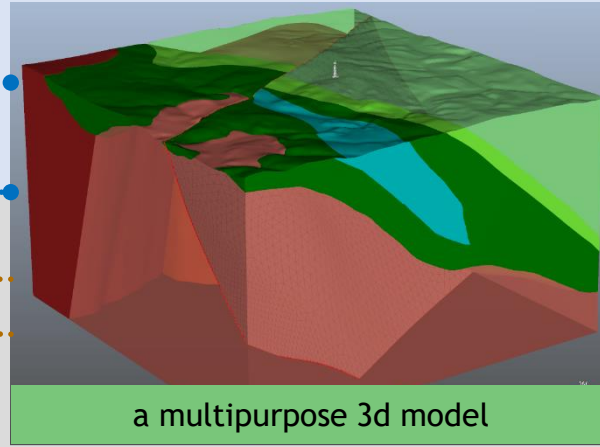
+



+



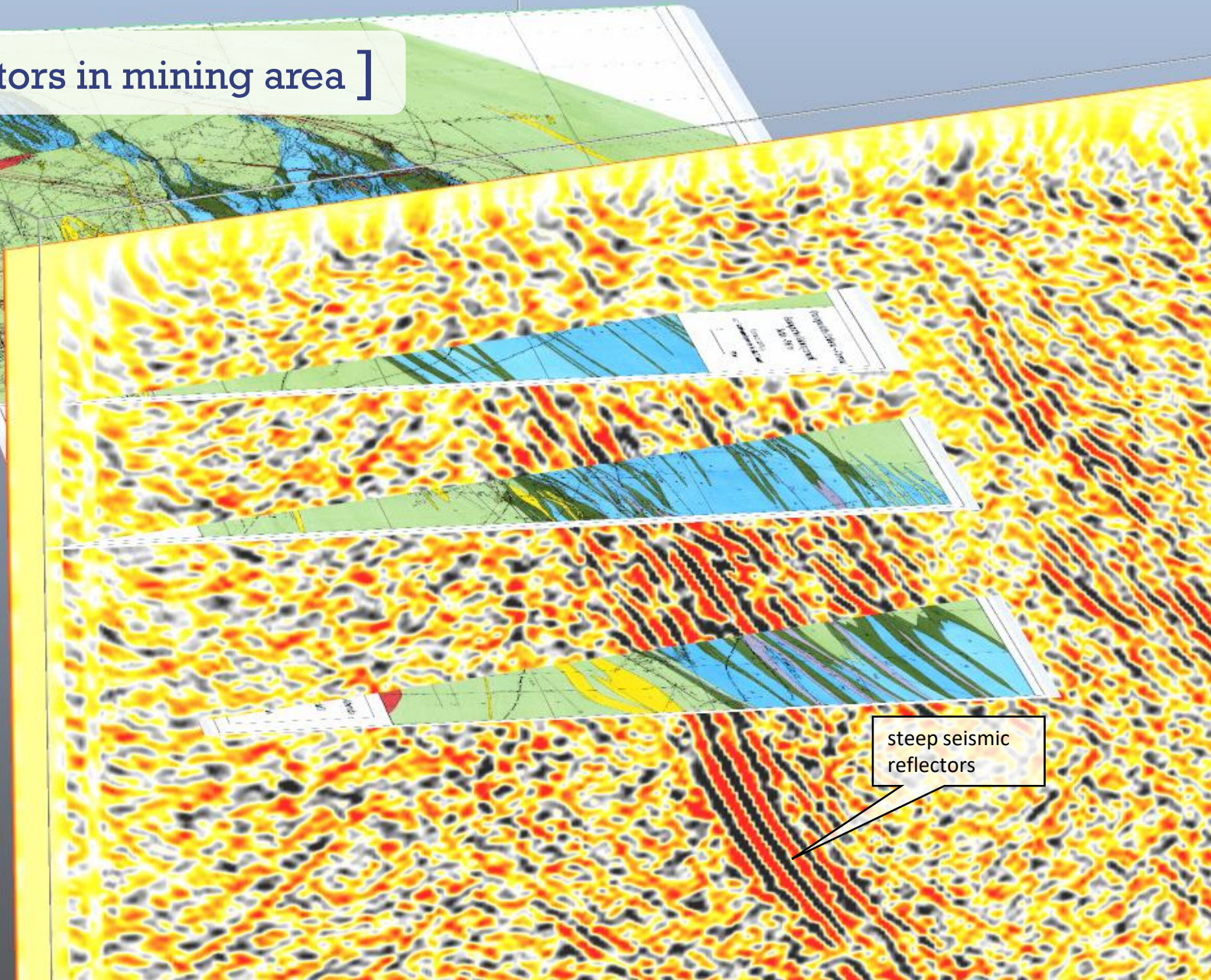
INPUT  
OUTPUT



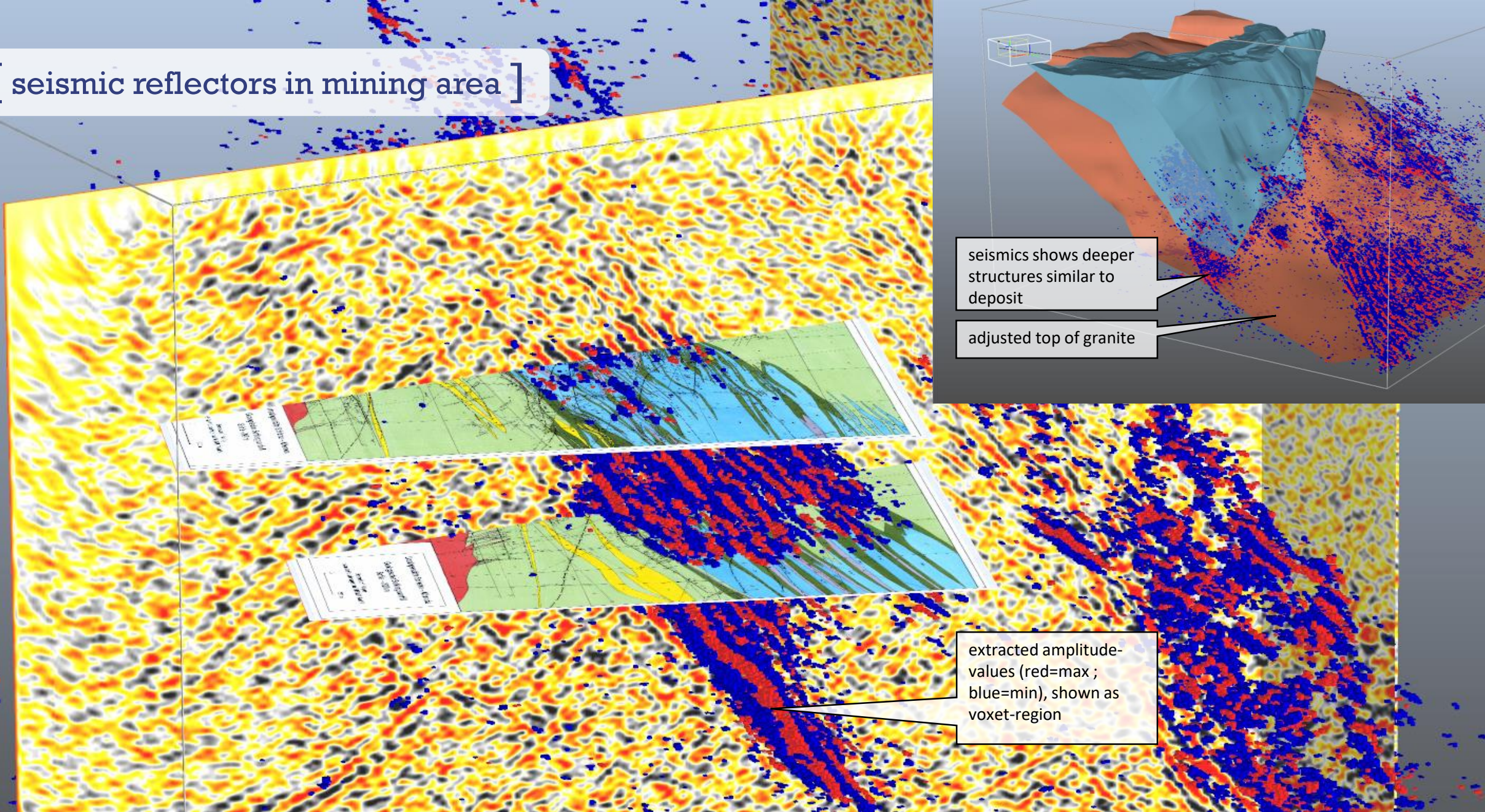
[ seismic reflectors in mining area ]

horizontal sections  
through uranium  
mine

steep seismic  
reflectors



[ seismic reflectors in mining area ]



seismics shows deeper structures similar to deposit

adjusted top of granite

extracted amplitude-values (red=max ; blue=min), shown as voxel-region

[ one word about (un)certainities ]

top of Granite  
(proven)

certainty,  
shown as distance  
to boreholes

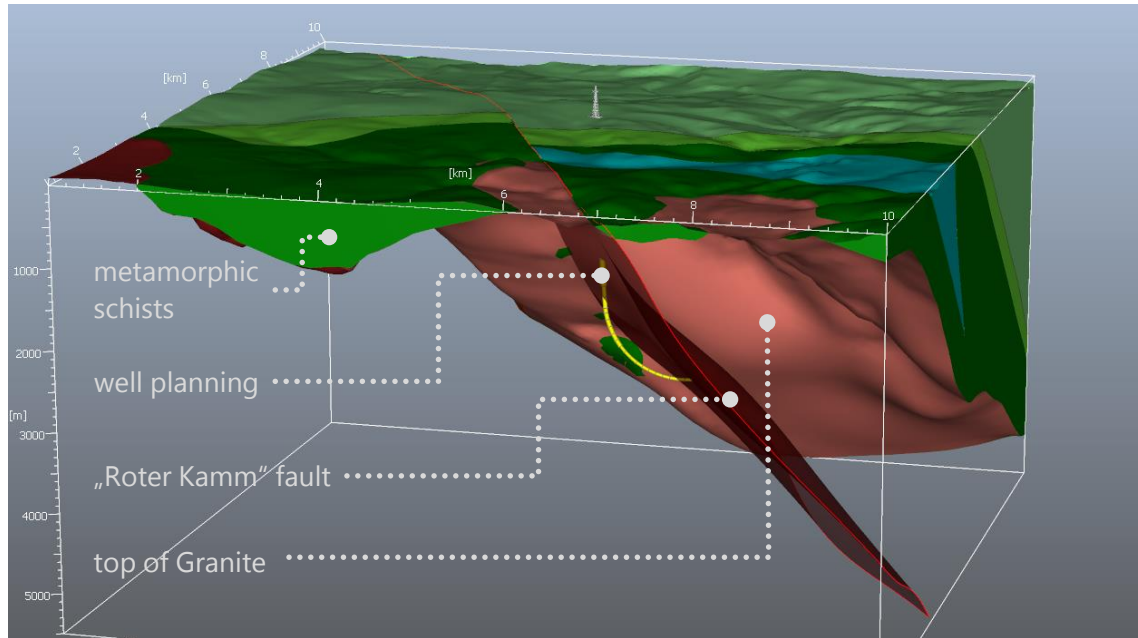
top of Granite  
(extrapolated)

-5.000 m NN



## [ results of seismic interpretation ]

- well fitting velocity model for migration and time-depth conversion
- top of Granite could be adjusted
- geological structure similar to the known mining field is suspected



## [ preliminary results of 3d modelling ]

### 3D-SEISMICS:

- 👍 velocity model and time-depth conversion
- 👍 reflection seismic exploration methods work to image major fault zones in crystalline rock

### GEOHERMAL RESEARCH:

- 👍 fractured zone as possible geothermal reservoir detected
- 👍 detailed well planning can be performed

👁️ borehole seismic acquisition (VSP)

### 3D-MODELL:

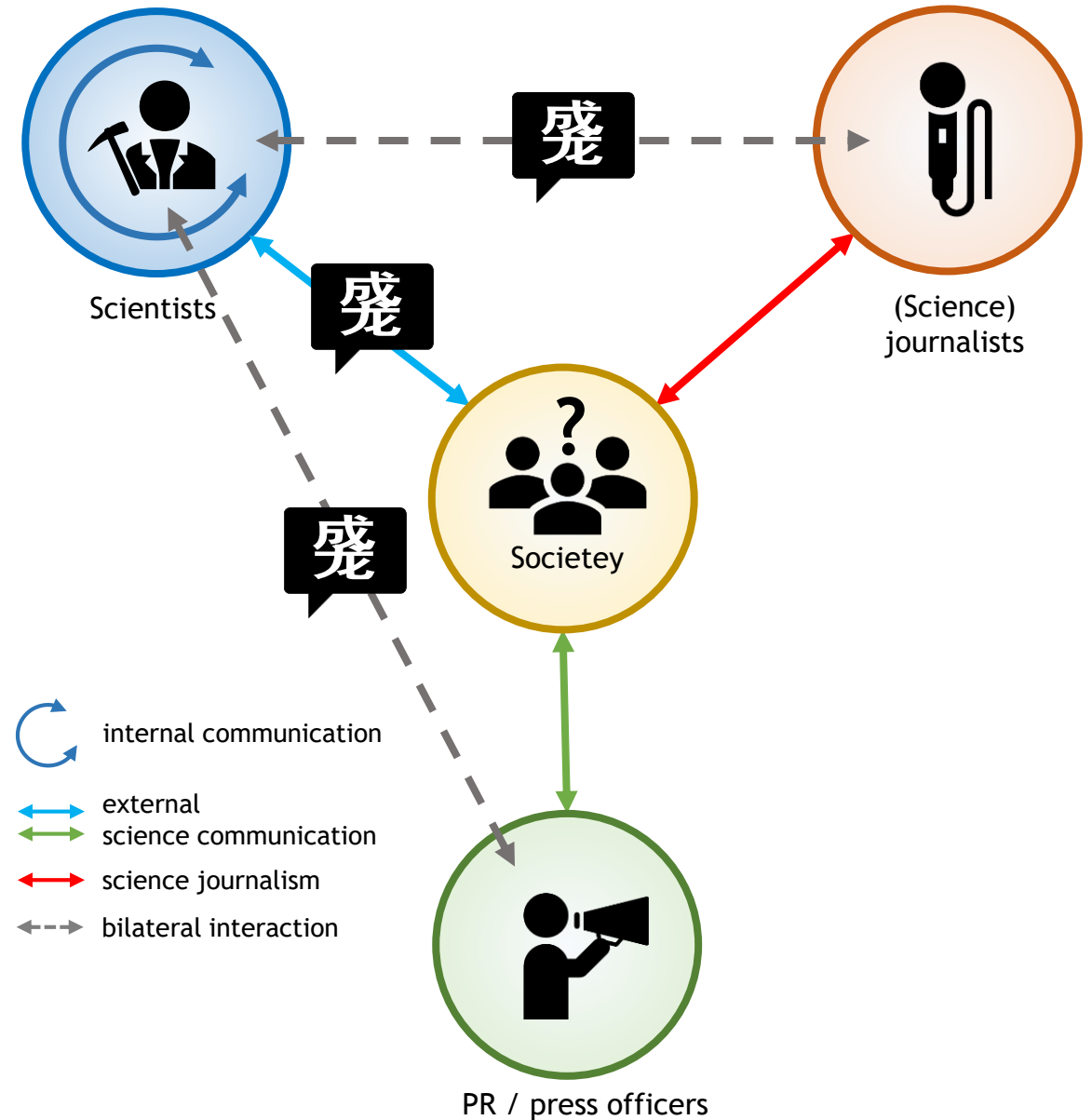
👁️ remesh to solid model

👁️ export for simulators (THCM models)



# [ tell your neighbor: science communication ]

→ in theory: *the practice of informing, educating, sharing wonderment, and raising awareness of science-related topics* (Wikipedia)



## [ tell your neighbor: science communication ]

→ in theory: *the practice of informing, educating, sharing wonderment, and raising awareness of science-related topics* (Wikipedia)

intention:

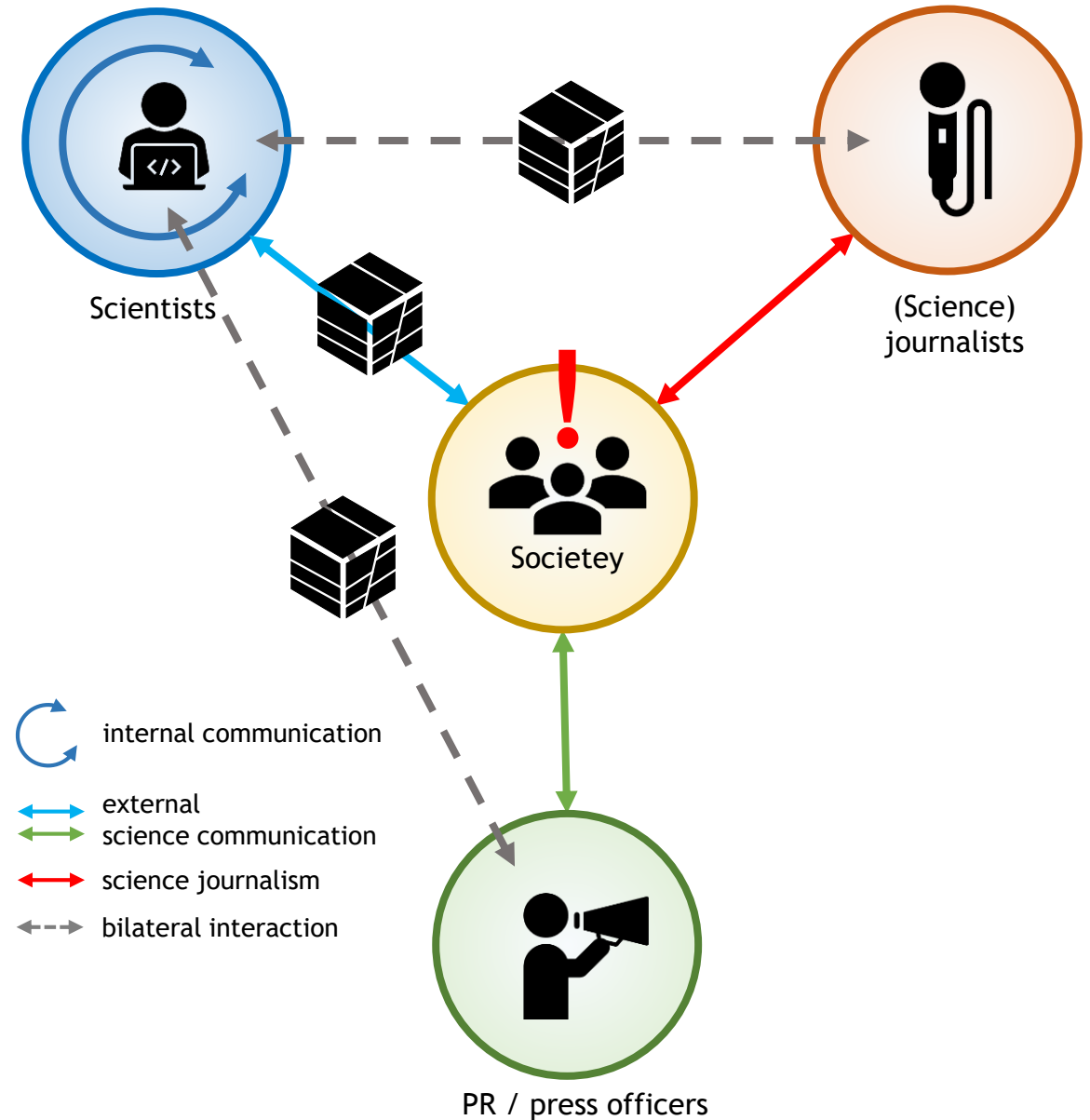
→ generate support for scientific research or study

→ inform public, support decision making

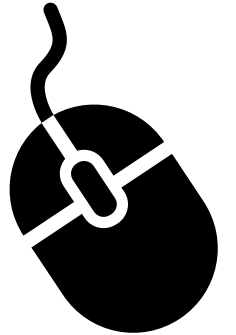
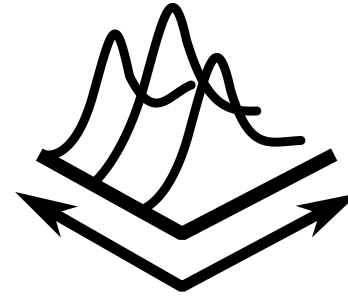
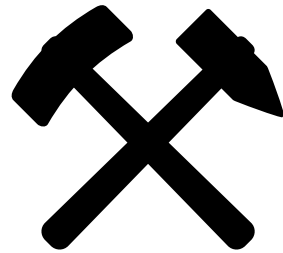
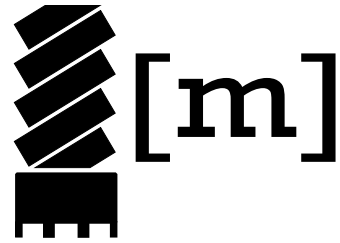
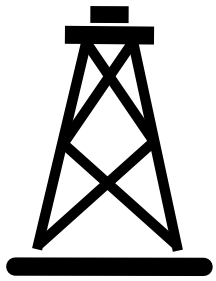
approach:

→ explaining methods rather than simply findings of science

→ using entertainment and persuasion including humour, storytelling and metaphors



[ numbers: what's inside the model? ]



---

**1056**  
boreholes

---

**51.529**  
meters of drilling

---

**44**  
years

---

**32 mio.**  
seismic traces

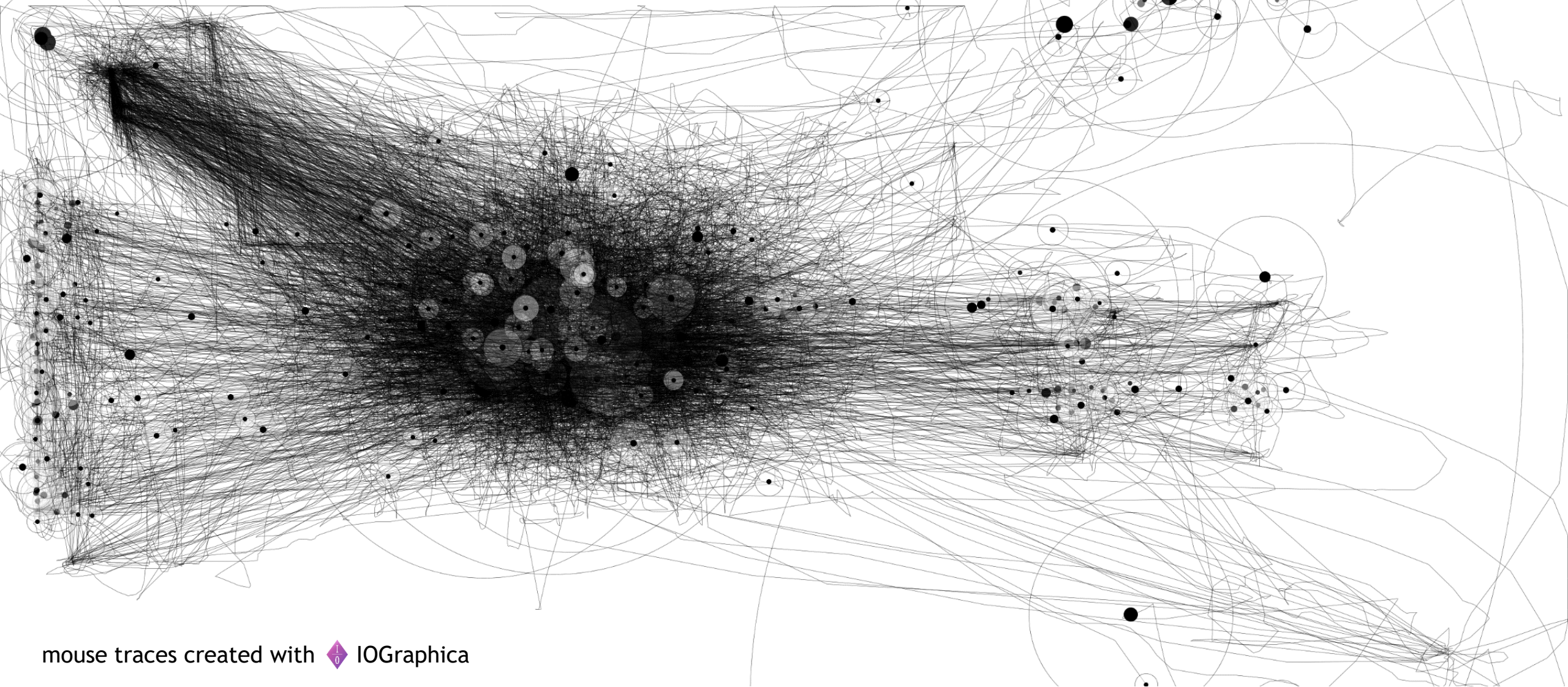
---


**450**  
GByte

---

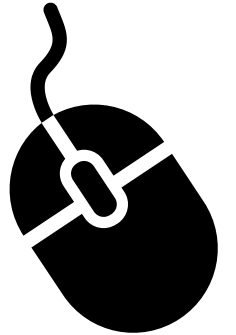
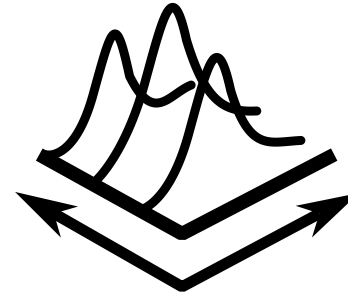
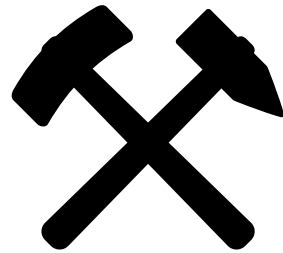
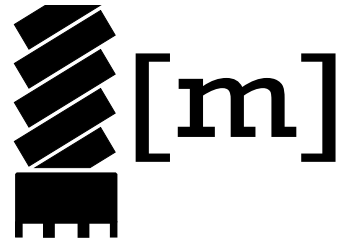
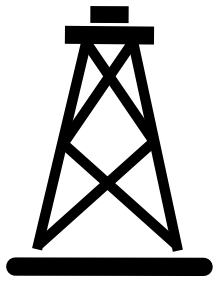
**1.000s**  
mouse moves

[ 3 hours of modeling ]



mouse traces created with  IOGraphica

[ numbers: what's inside the model? ]



---

**1056**  
boreholes

---

**51.529**  
meters of drilling

---

**44**  
years

---

**32 mio.**  
seismic traces

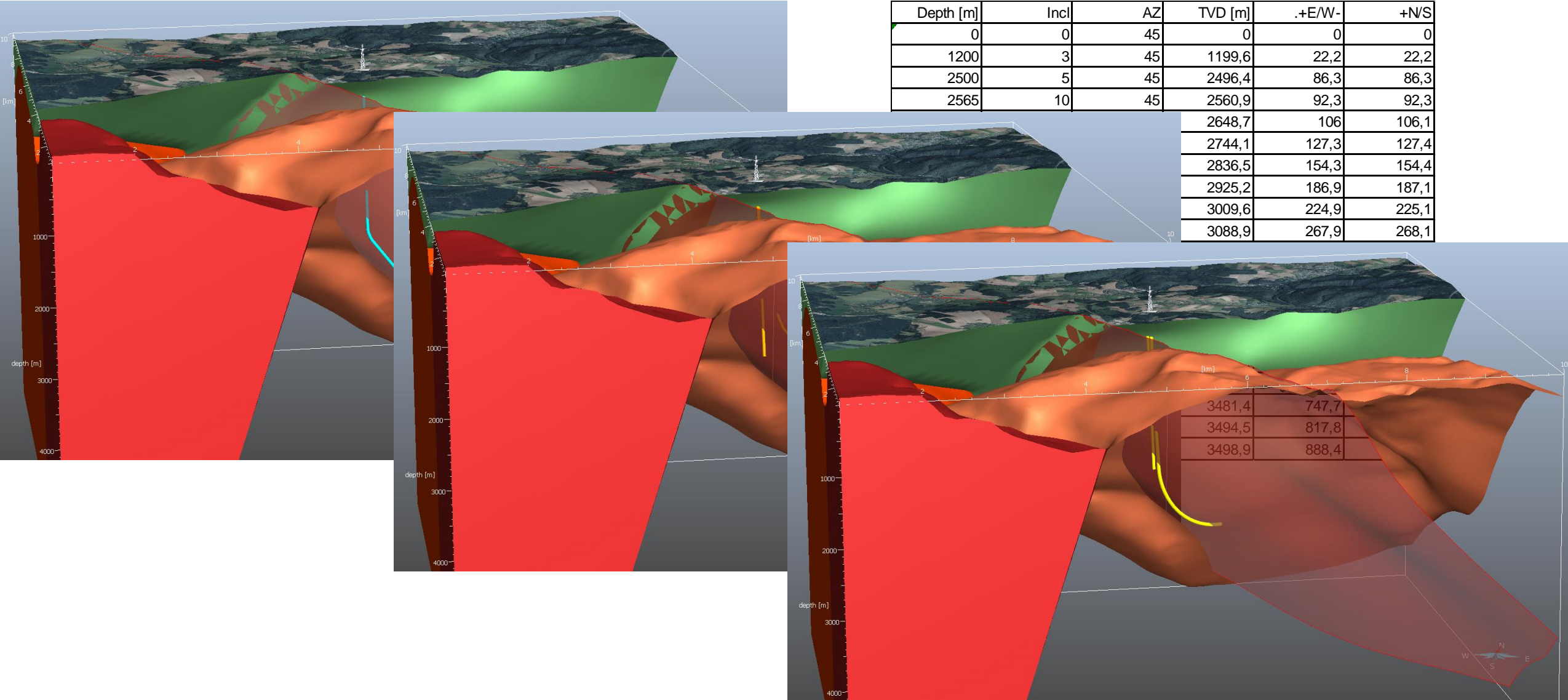
---

**450**  
GByte

---

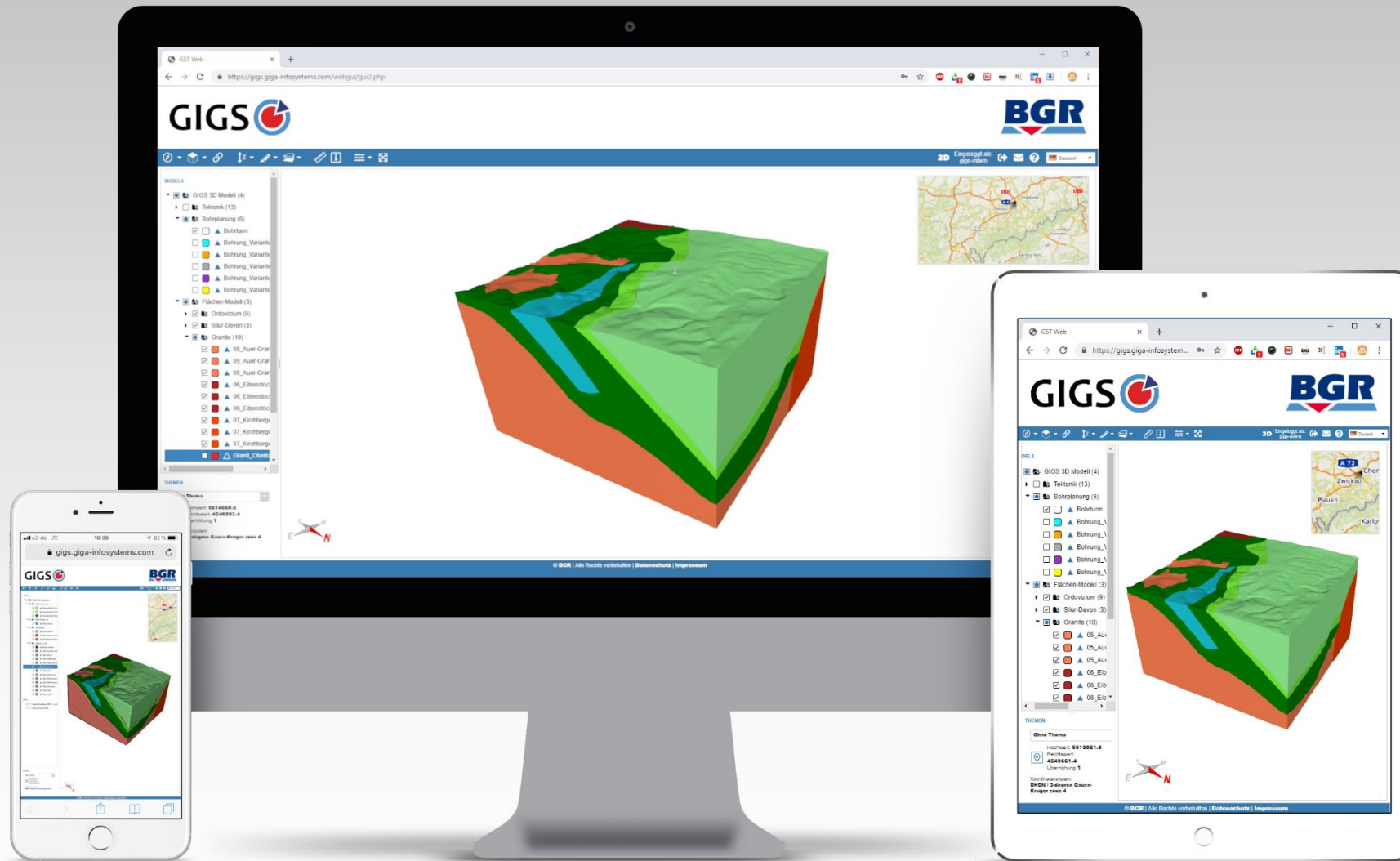
**1.000s**  
mouse moves

# [ example: communicate different well planings ]



# [ Go public! The model on the web ]

[gigs.giga-infosystems.com](https://gigs.giga-infosystems.com)



[ 3d models are the swiss knife among the communication tools! ]

