Geological 3D-model of the Basel region - a tool to explore geopotentials

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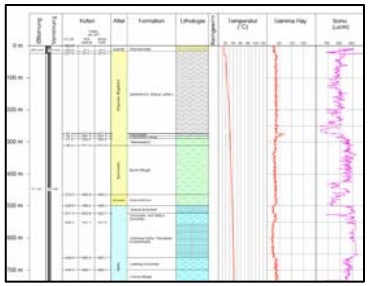
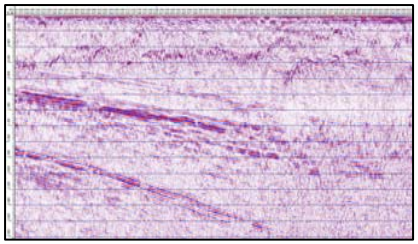
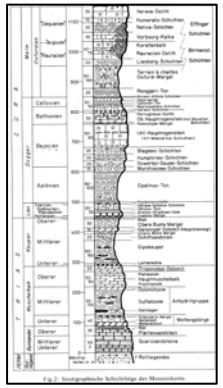
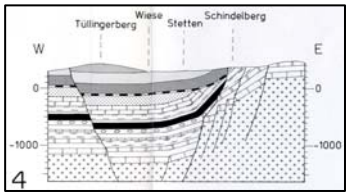
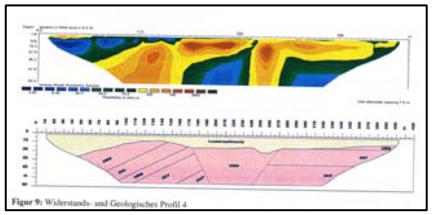


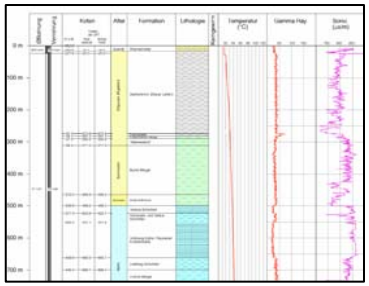
Where are useable geopotentials ?

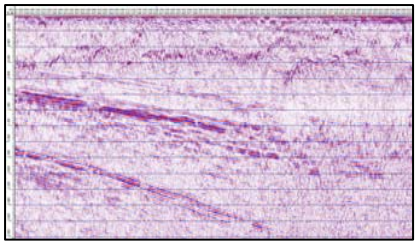




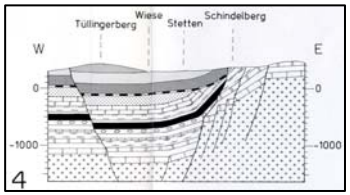


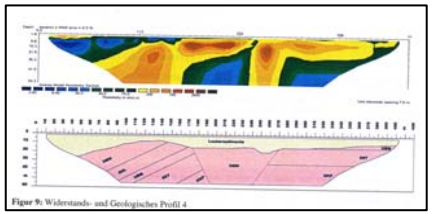


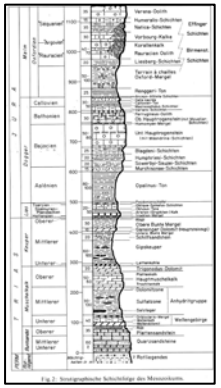




We need a tool to handle
exploration, rules and planning concepts !



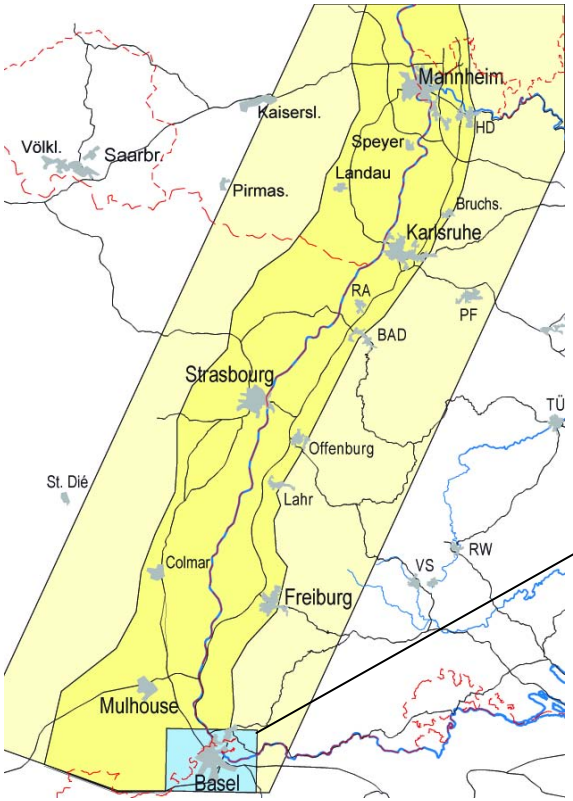


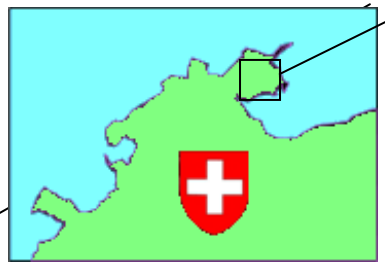


„GeORG“
INTERREG IV A project

Geological 3D-model of the Basel Region

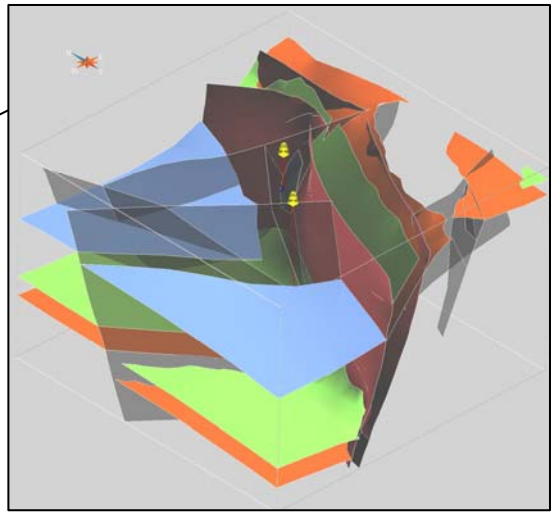
- **motivation**
- **data management**
- **input data**
- **modelling**
- **current stage**





size
30 km x 20 km
x 6 km (depth)

3D-surfaces model



detail (size 4 x 4 km)

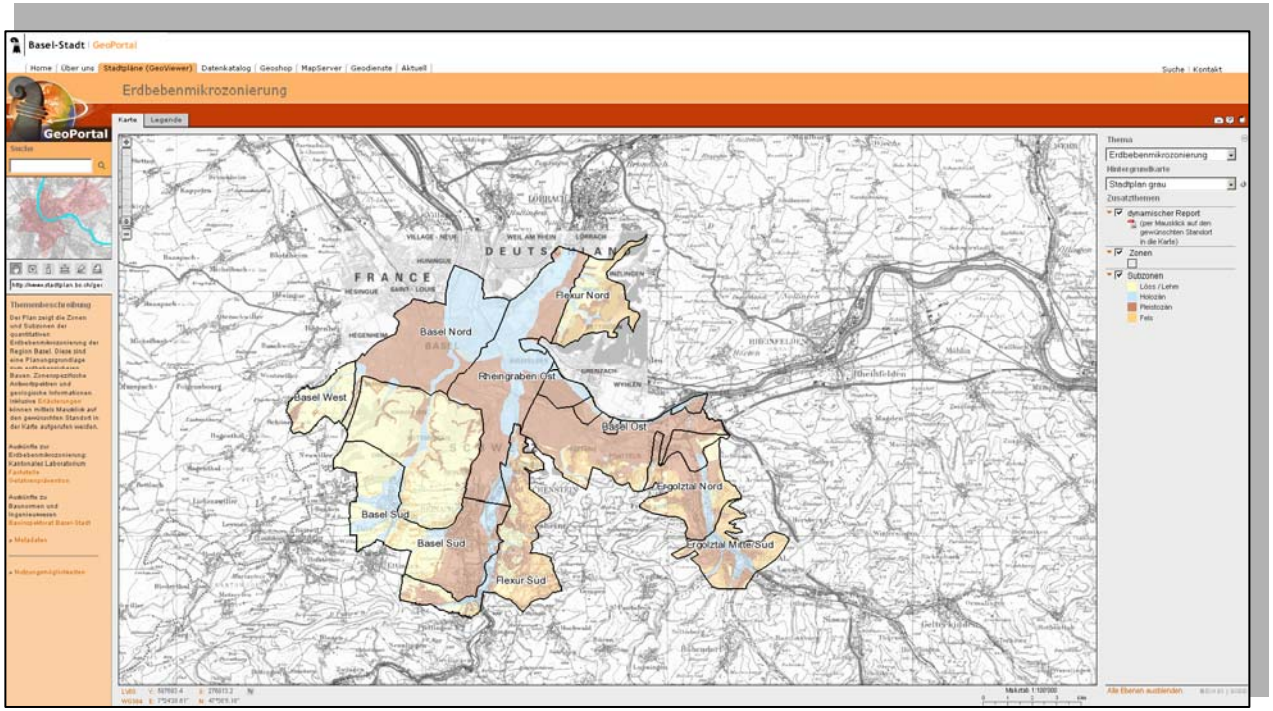
Topics with relevance to geopotentials

Geothermal energy (shallow and deep)
Traffic infrastructure (tunneling)
Technical infrastructure
Groundwater management
Storage of gas (CO2)

Earthquake hazard evaluation

„Quantitative Microzonation Map“

In cooperation with the Swiss Seismological survey (SED)



www.geo.bs.ch/erdbebenmikrozonierung or www.geo.bl.ch/

Data management

input data modeling

wells

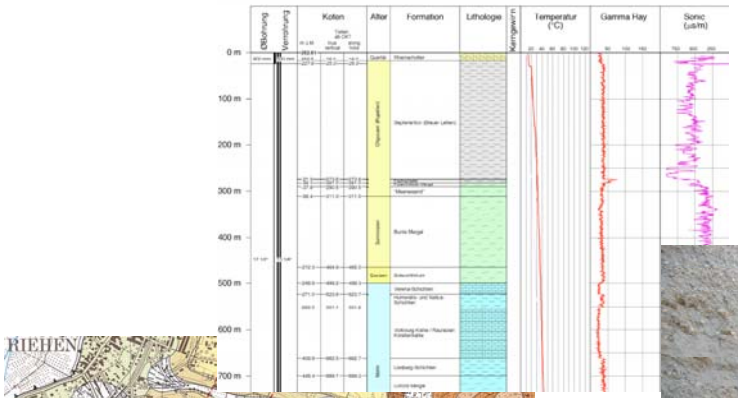
reports

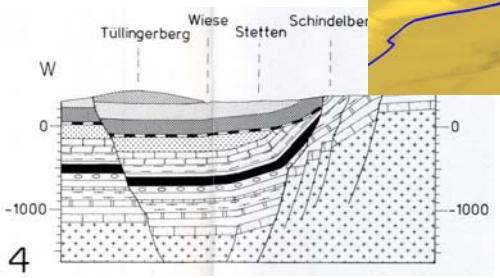
maps

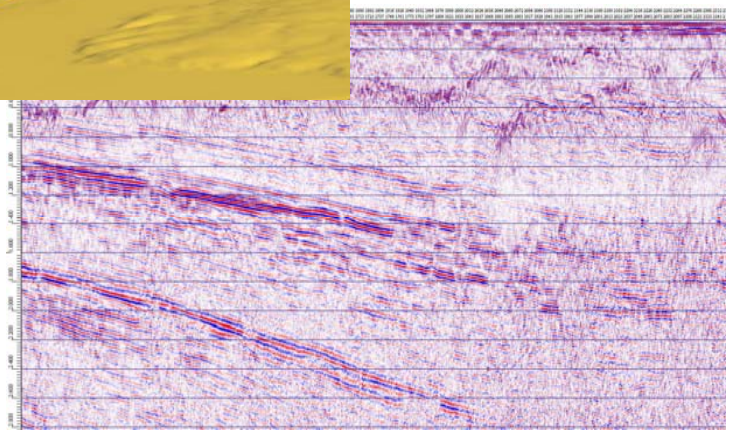
dem

profiles

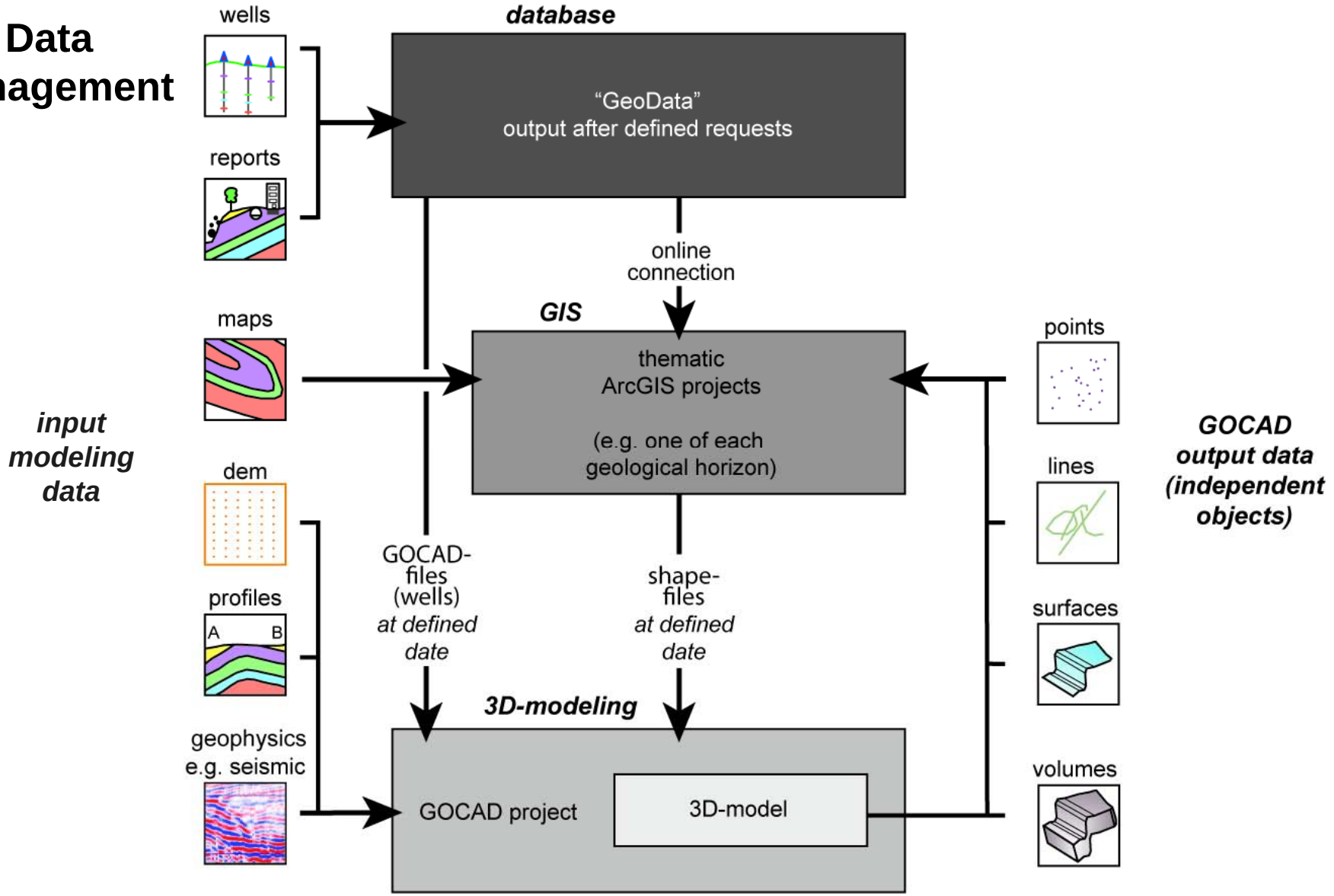
geophysics e.g. seismic



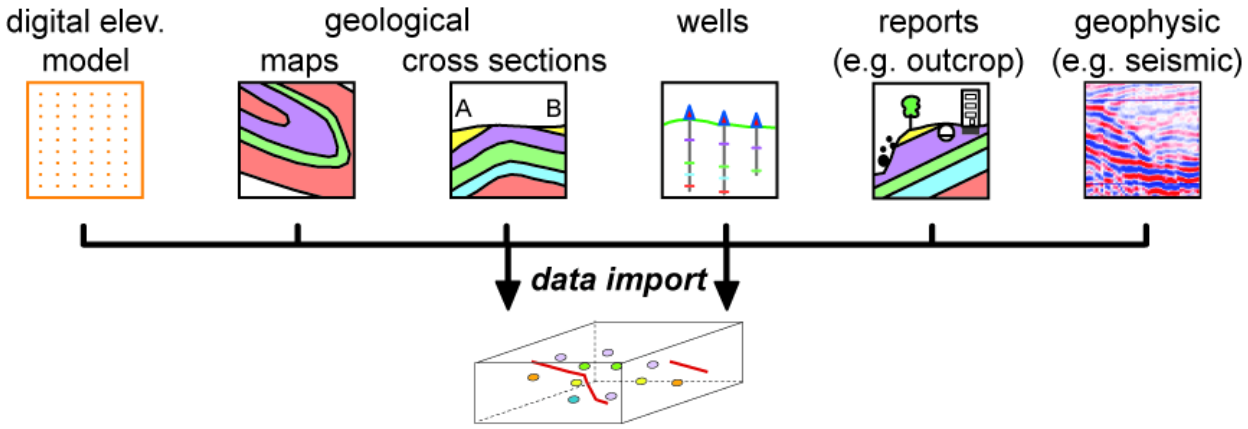




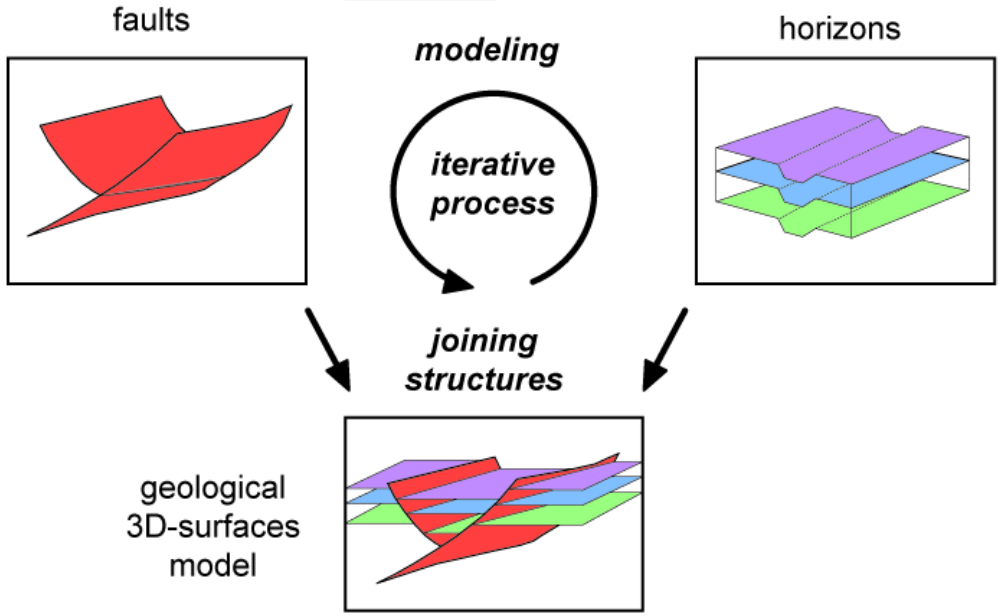
Data management



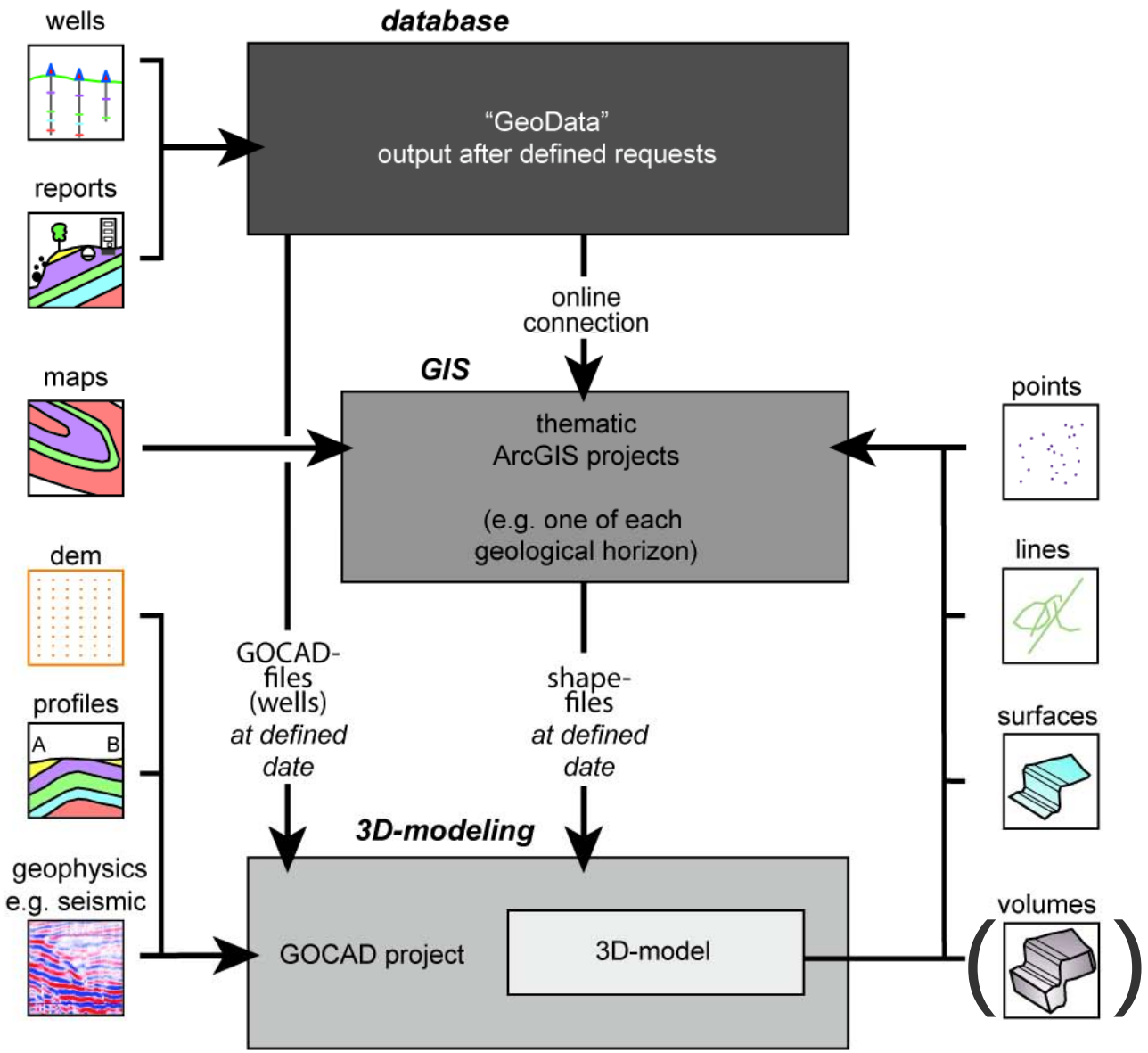
Data management



modeling in GOCAD



data management

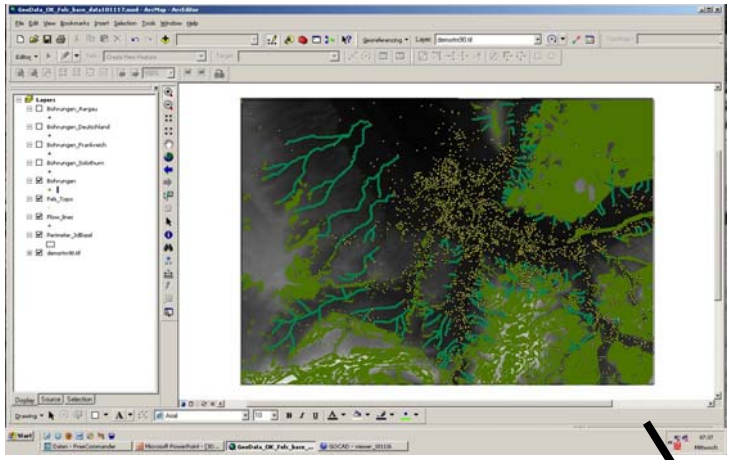


data management

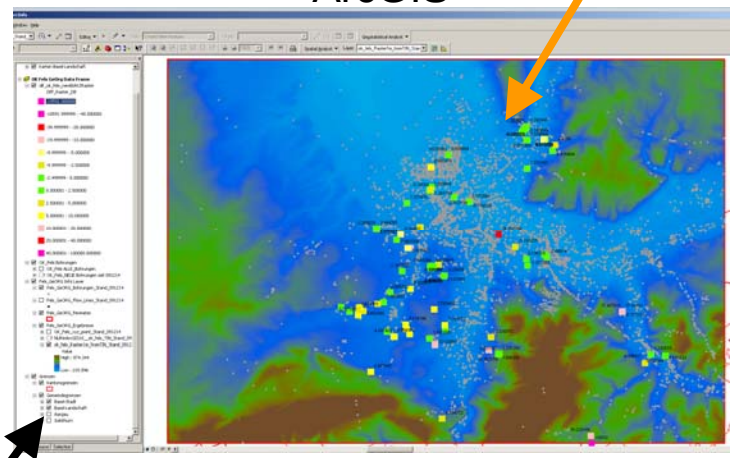
horizon related ArcGIS projects
example:
„base unconsolidated rocks“

database: new borehole data

ArcGIS



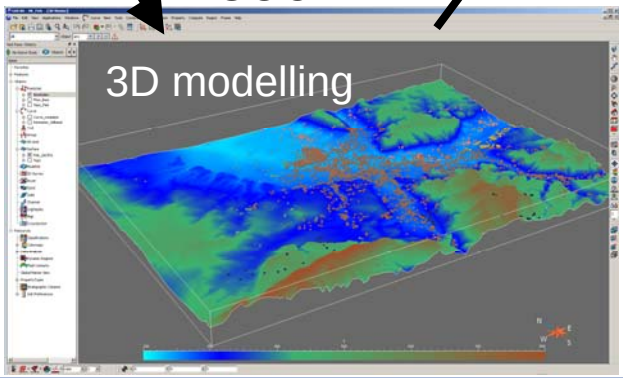
ArcGIS



visualization of relevant input data:

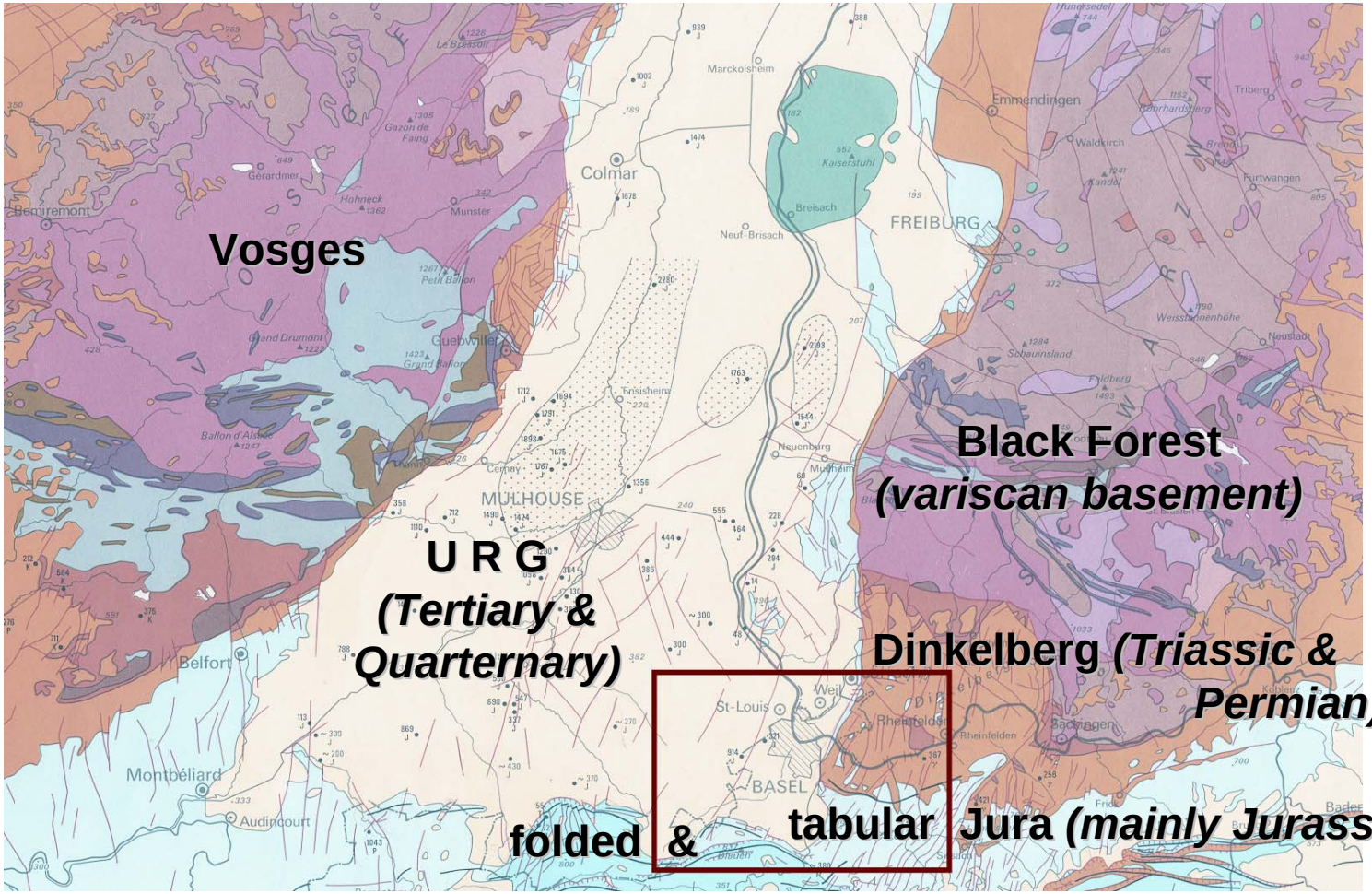
- borehole data
- dem
- geol. maps
- „flow lines“

GOCAD



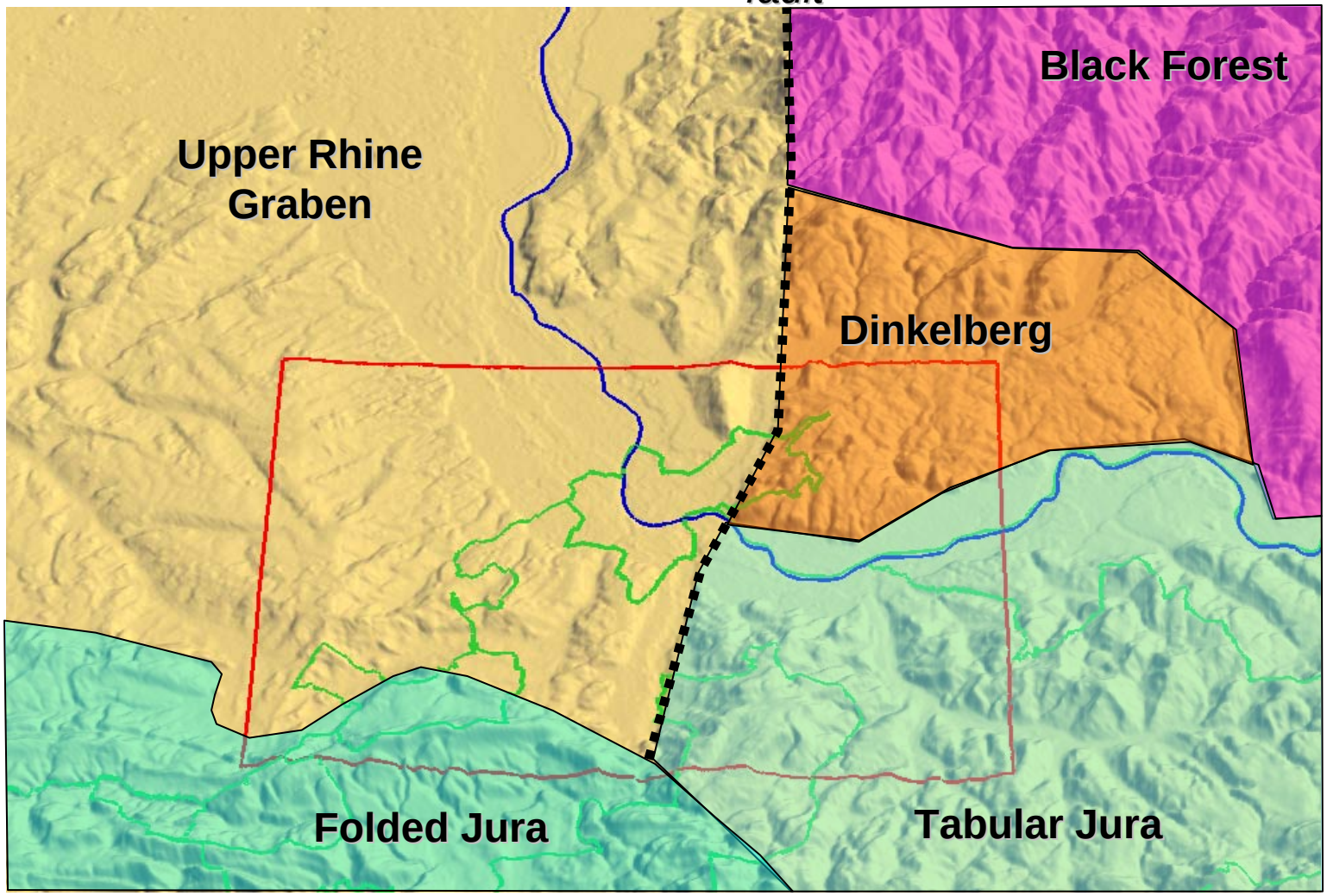
3D model in GOCAD overview

geological context of the 3D model Basel

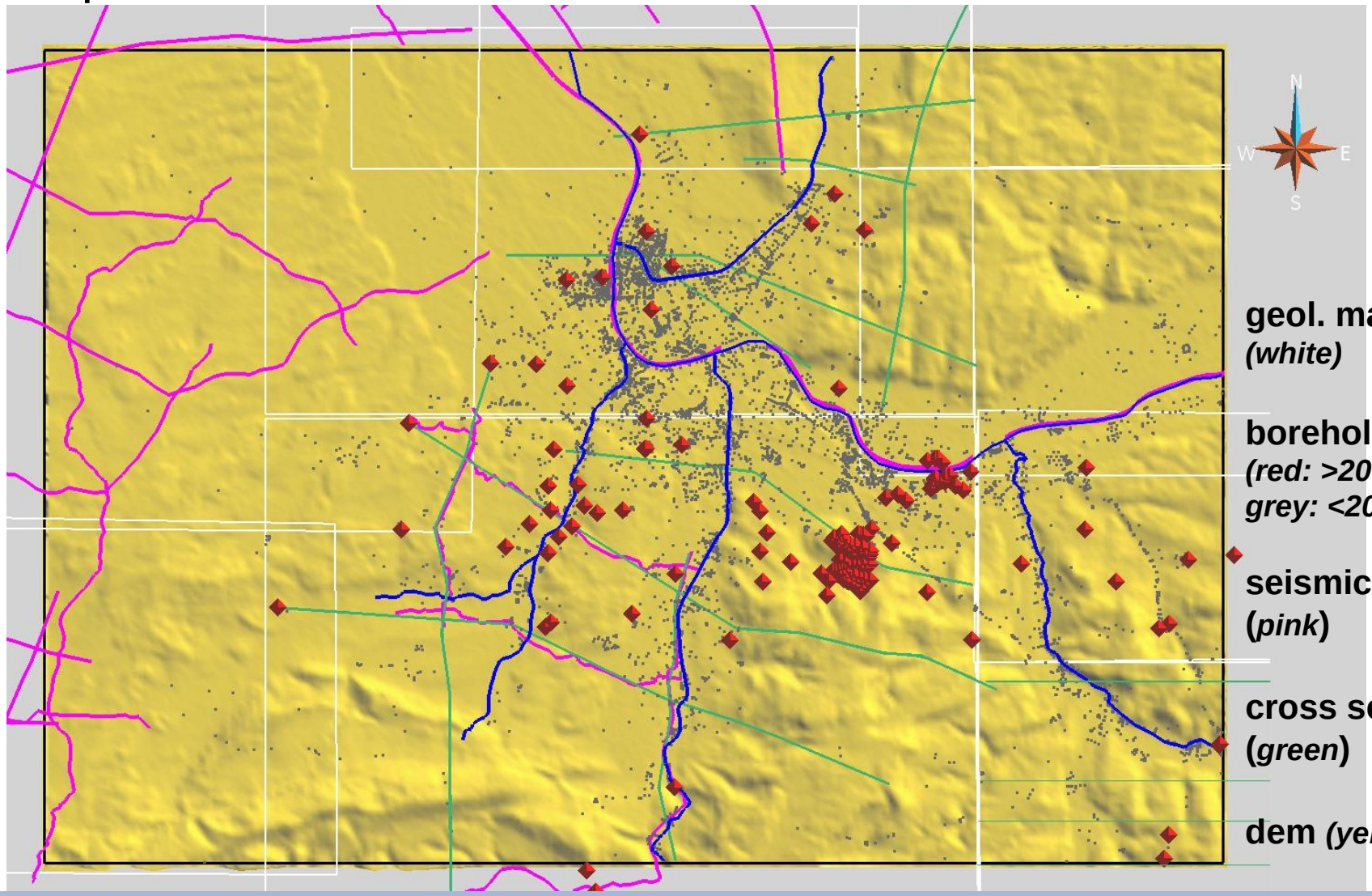


Fischer 1969

3D model in GOCAD overview



Input data



geol. maps ***(white)***

borehole data ***(red: >200m grey: <200m)***

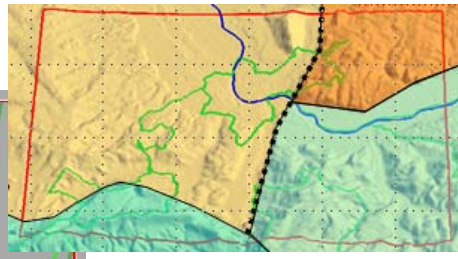
seismic lines (*pink*)

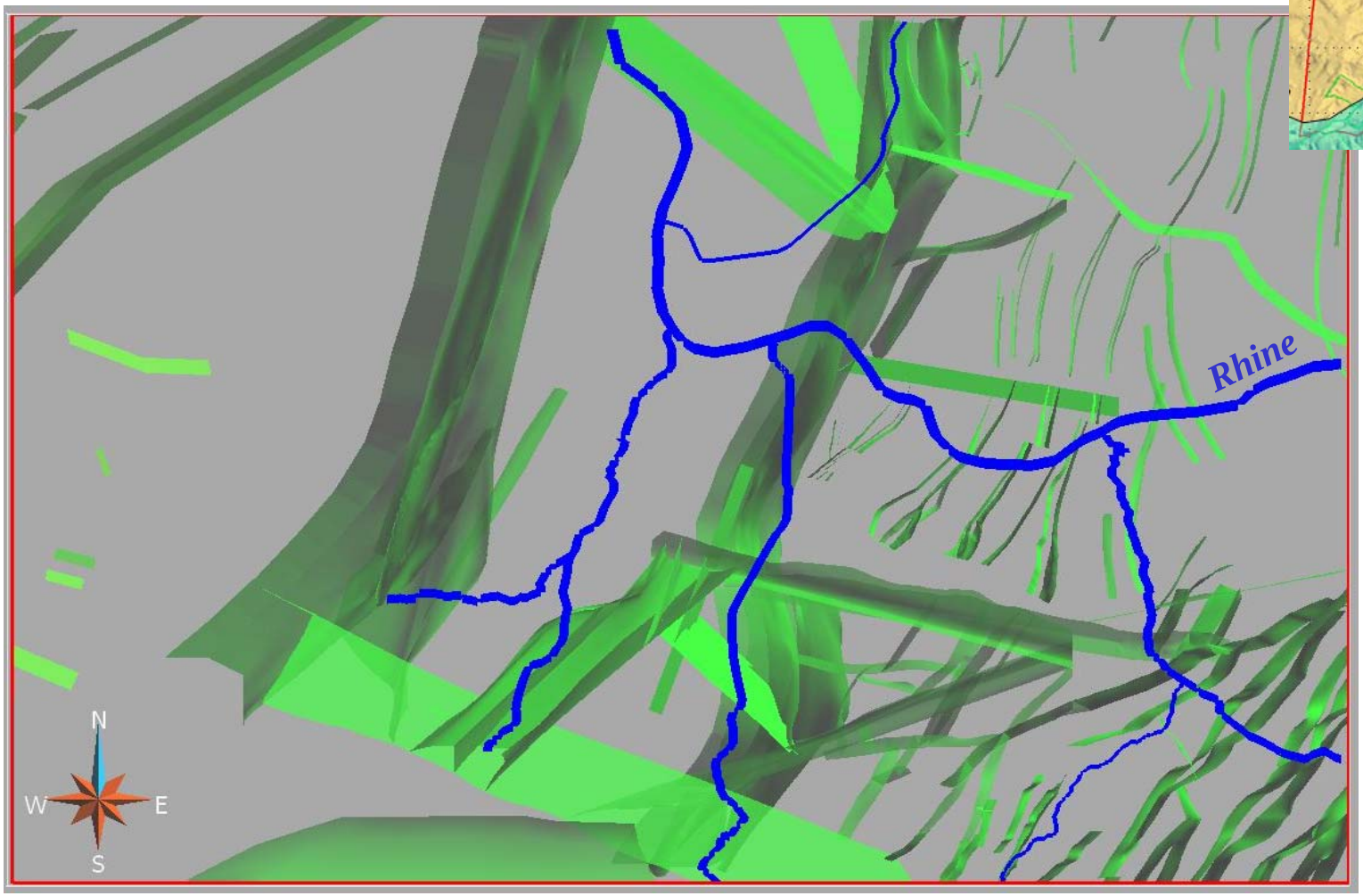
cross sections (*green*)

dem *(yellow)*

current stage: fault pattern *(map view,size: 20 x 30 km)*

overview geology

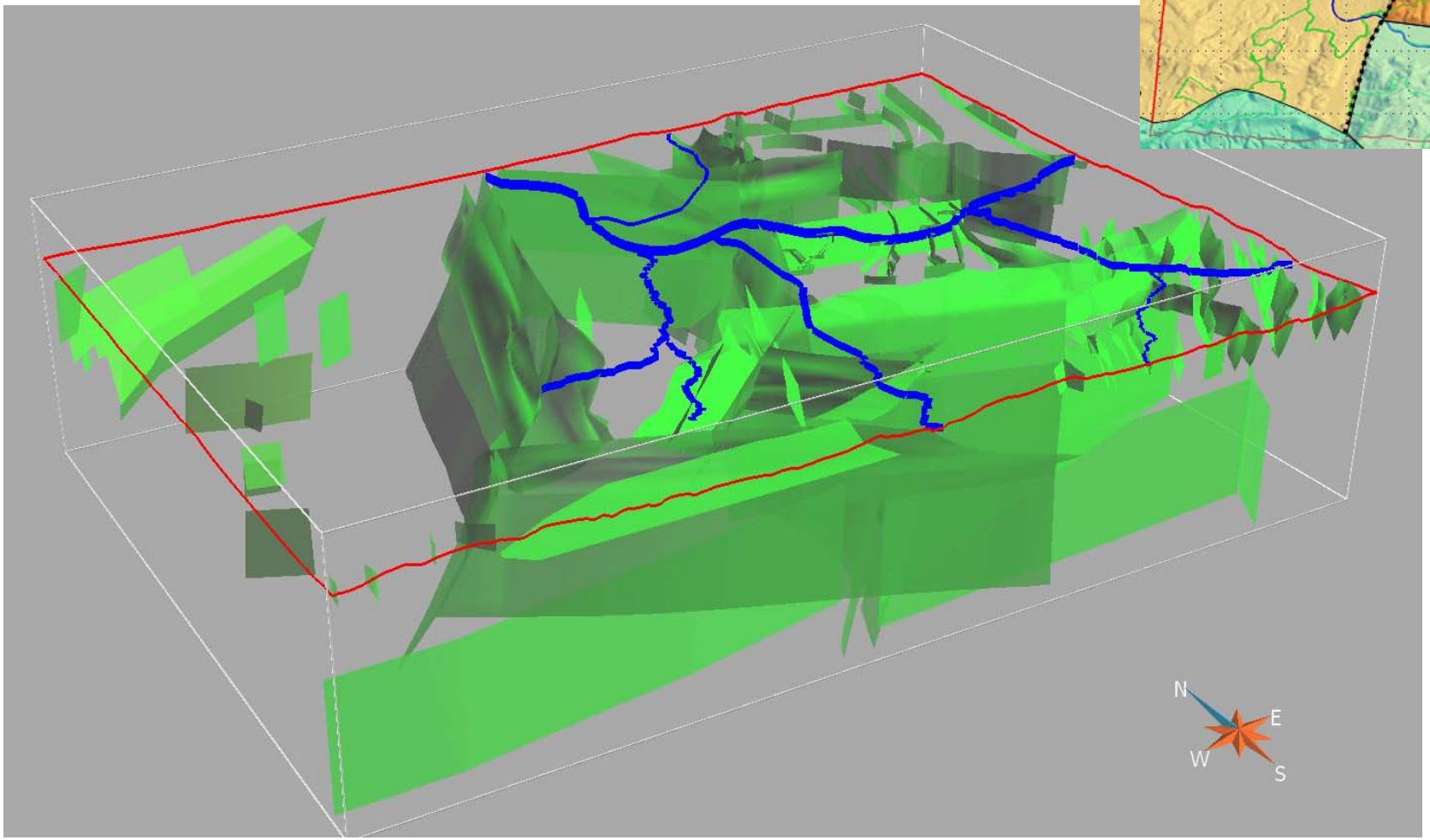




current stage: fault pattern

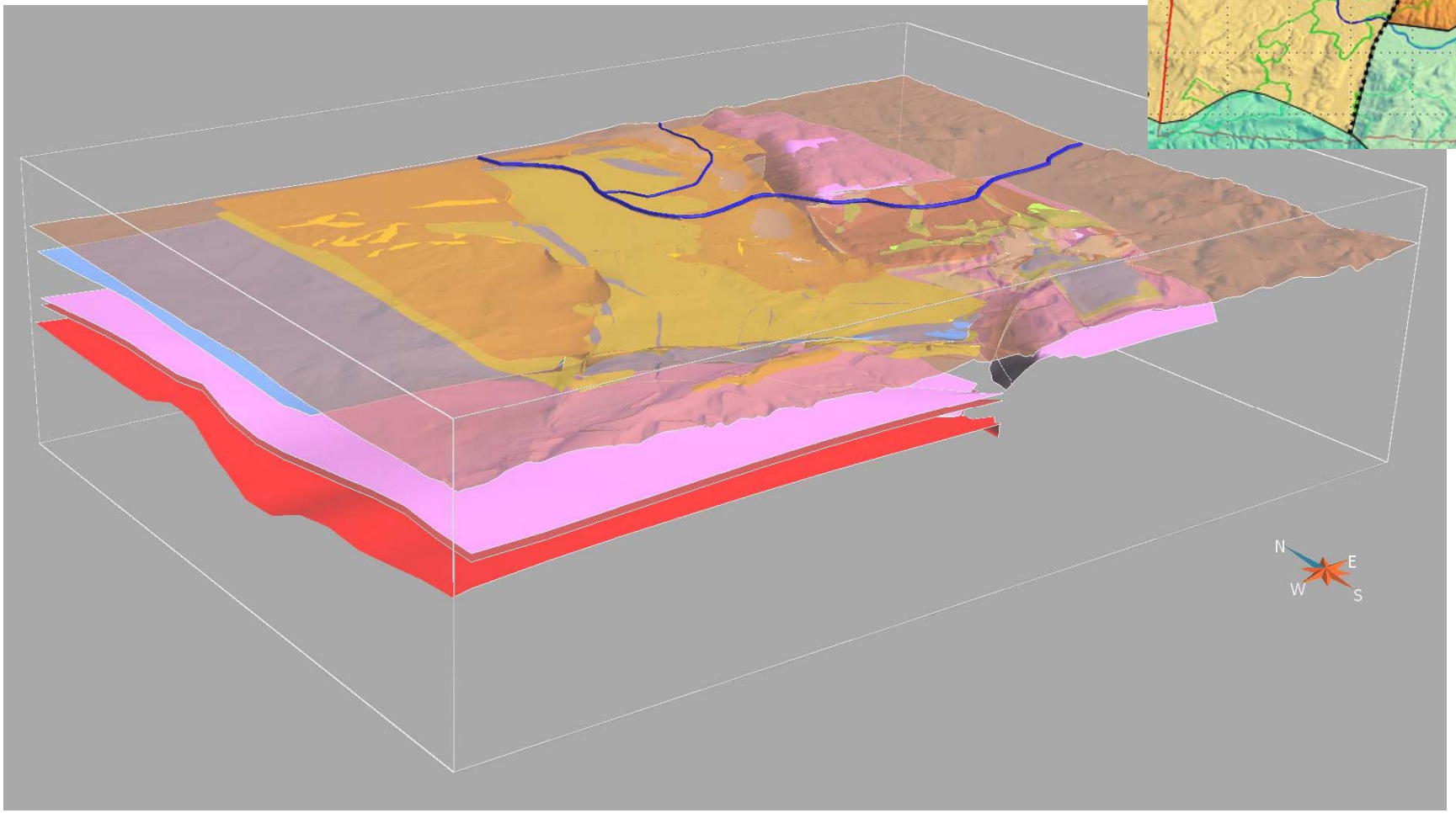
(view from SW, size 20 x 30 km x 6 km)

overview geology



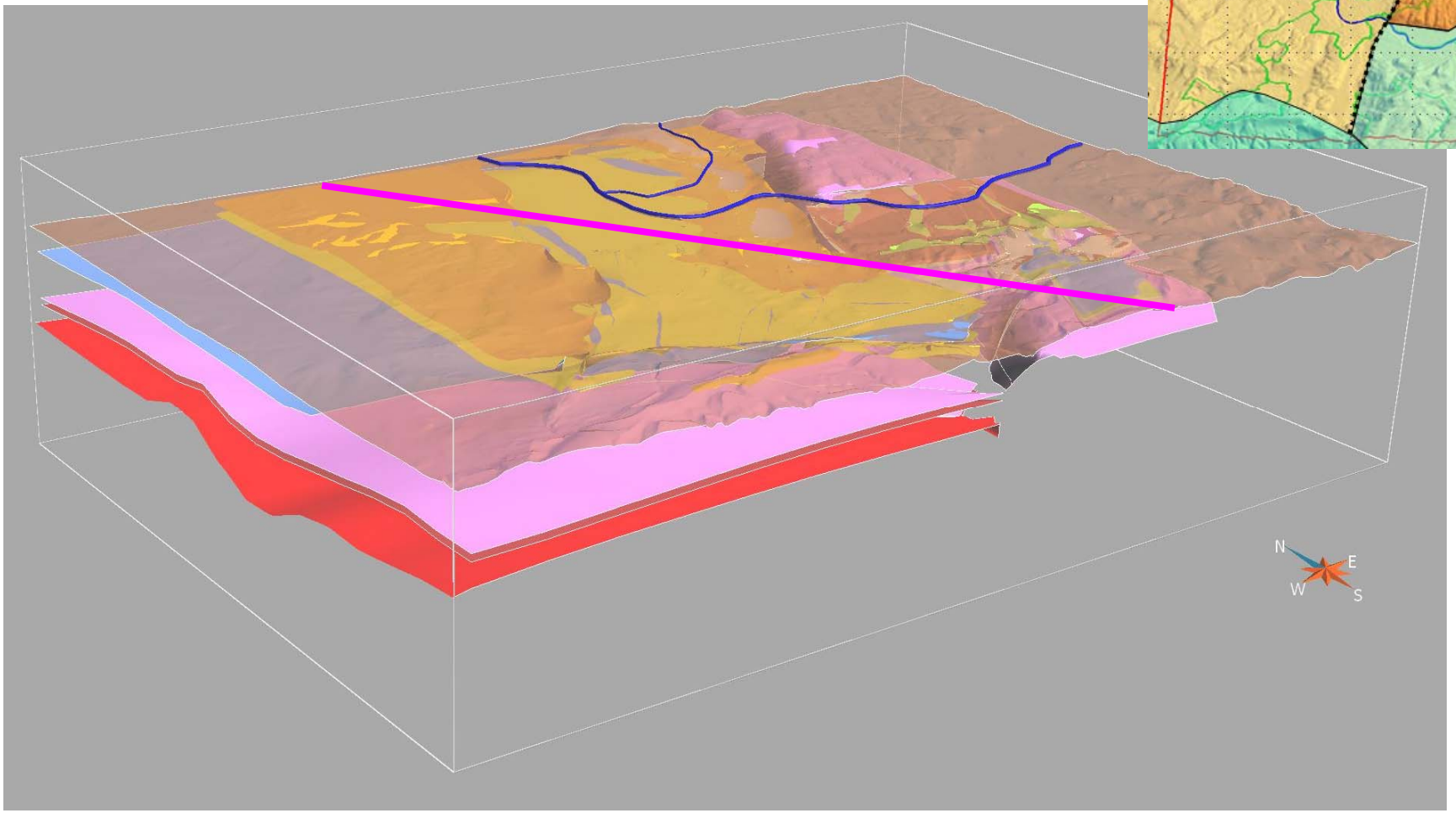
current stage: horizons *(view from SW, size 20 x 30 km x 6 km)*

overview geology



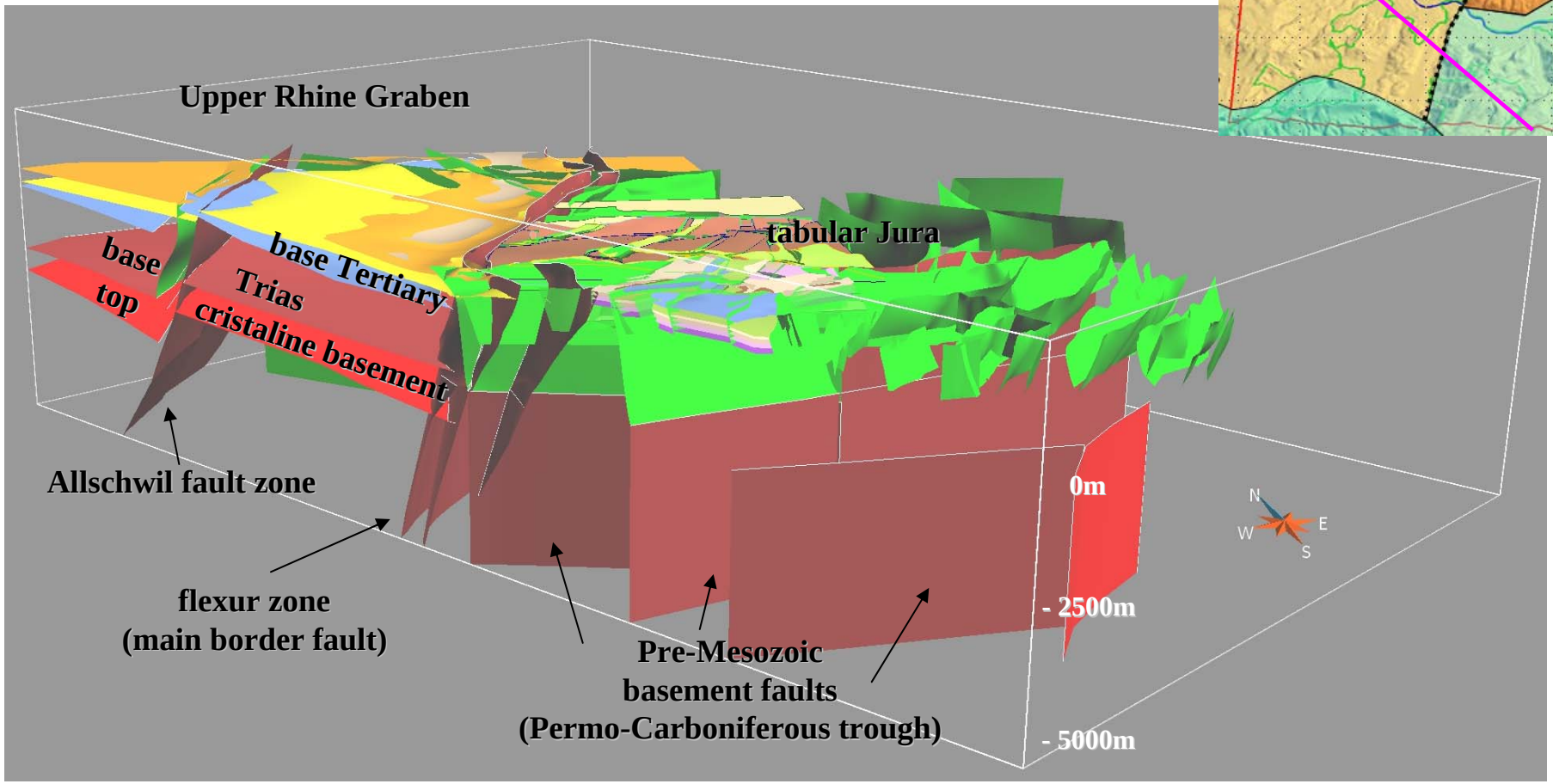
current stage: horizons *(view from SW, size 20 x 30 km x 6 km)*

overview geology



current stage: faults & horizons *(view from SSW)*

overview geology

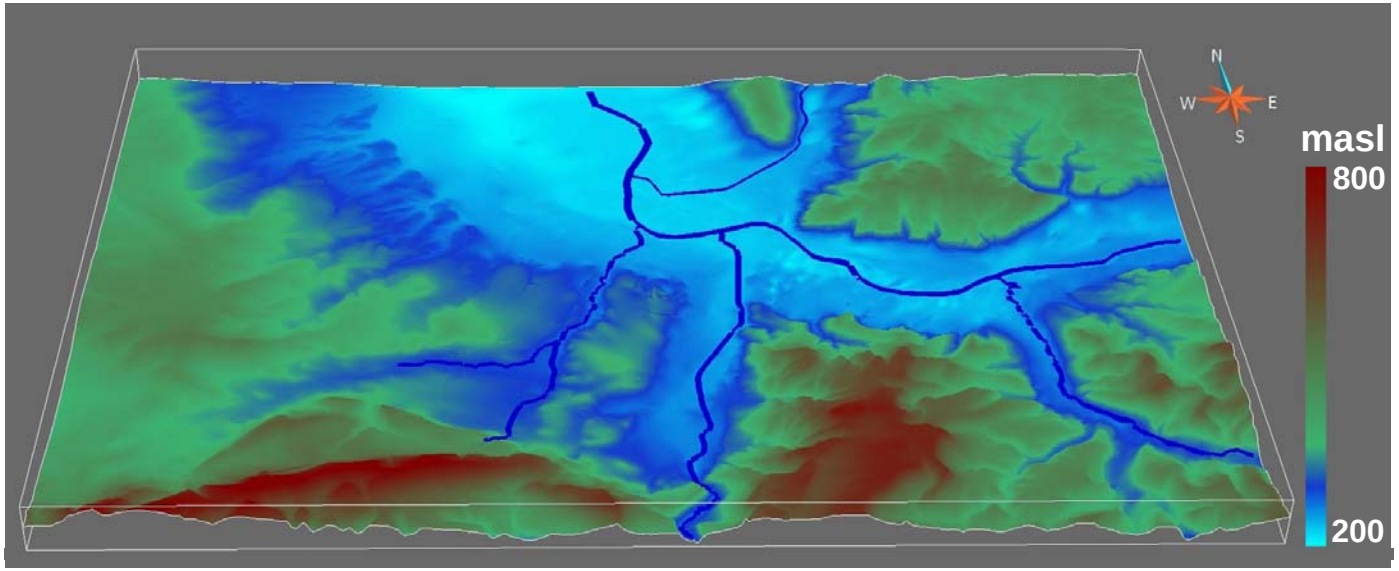


first products: horizon - base unconsolidated rocks

(view from S)

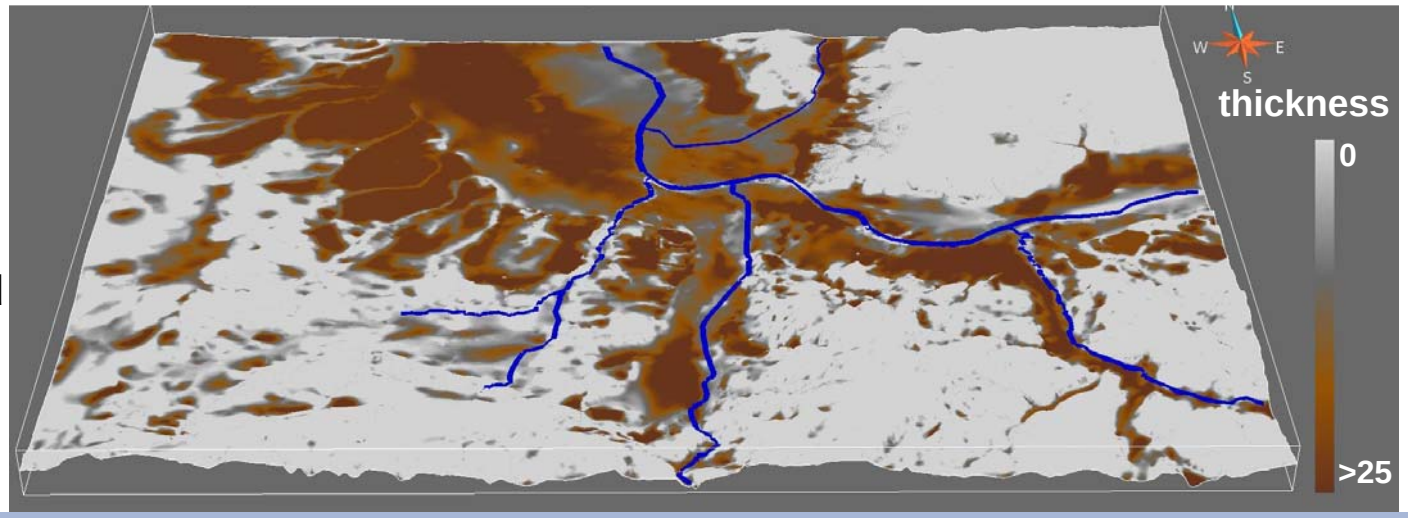
elevation map

unconsolidated rocks



thickness distribiution

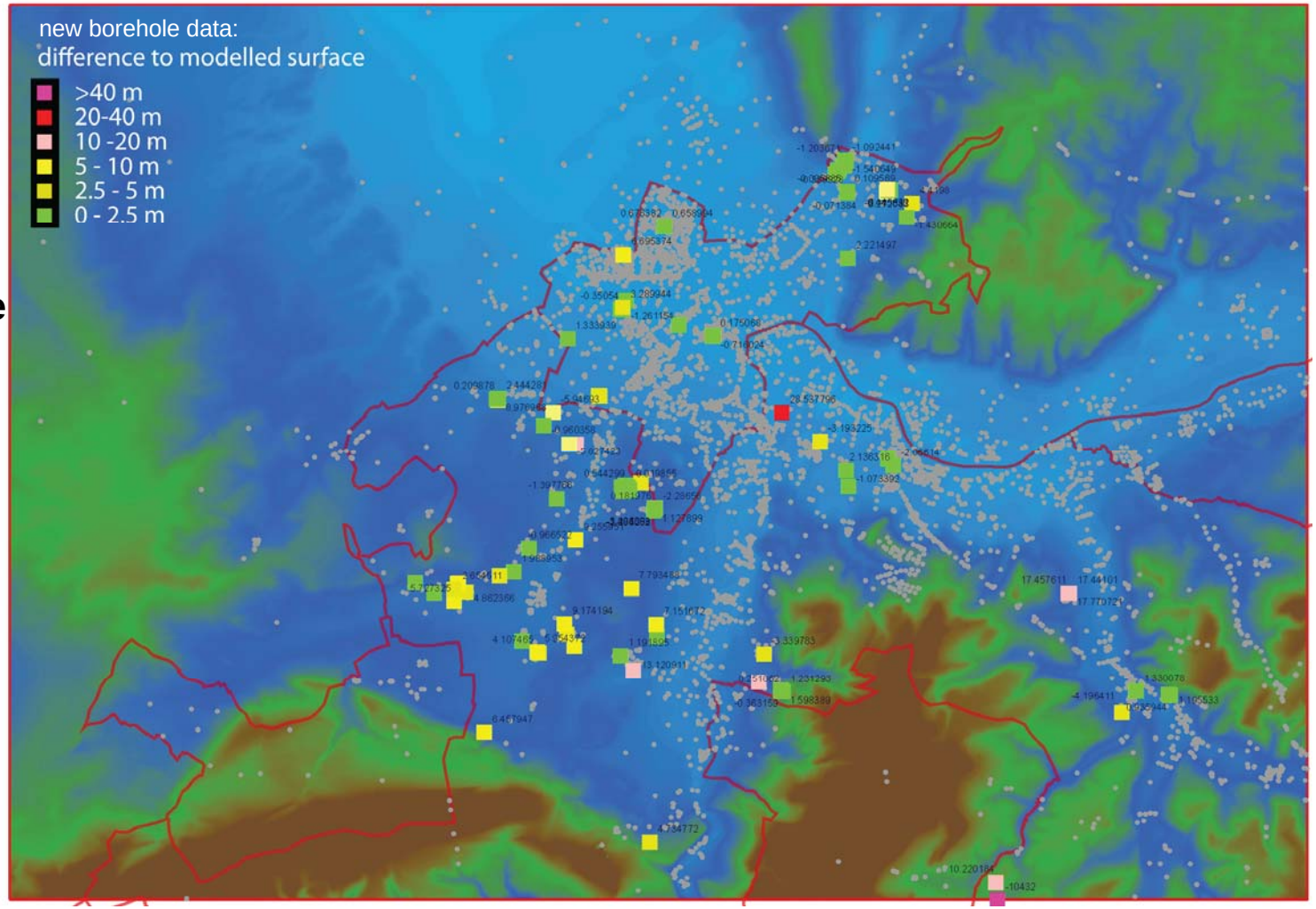
unconsolidated rocks



first products: horizon - base unconsolidated rocks vs. new data

back in Arc GIS

comparison between modelled surface and new borehole data

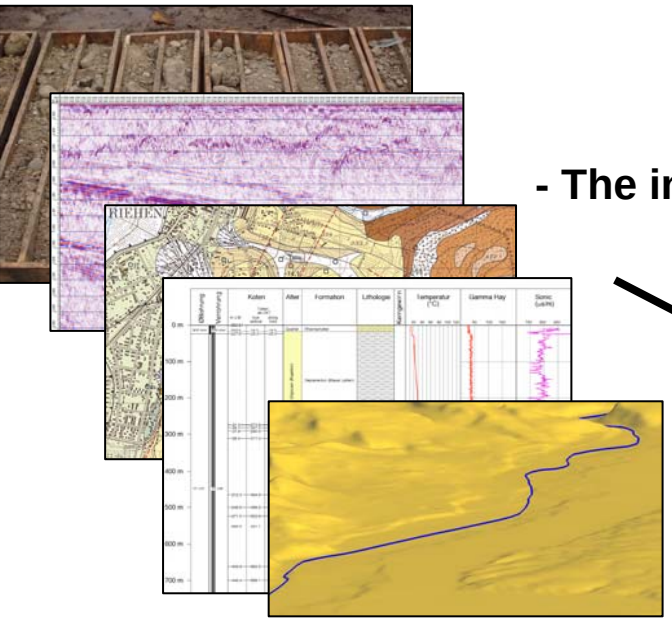


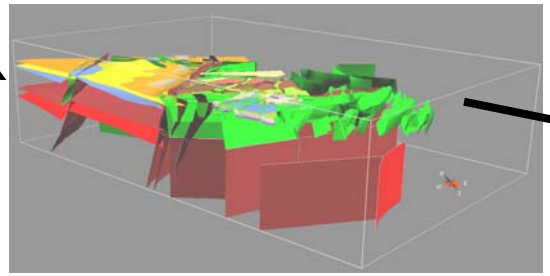
Summary

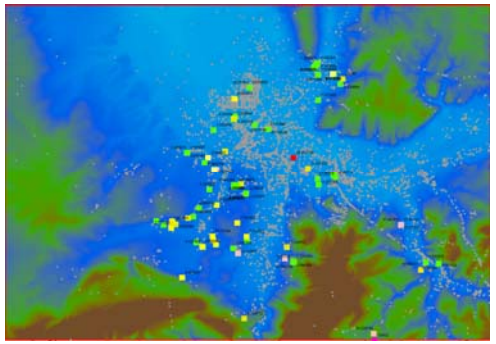
- A tool is needed to handle the data and knowledge.

- The data management and modelling should be flexible:
  - ~ to handle diverse requests
  - ~ in- & export of data
  - ~ adjustable & extendable
  - ~ resolution & scale
  - ~ open for different kinds of data

- The influence of new data should be visible.







Outlook

- continuation of the 3D-modeling

- further development of the data management (e.g. improvement of communication between database, GIS and 3D-modeling)

- integration of the urban 3D subsurface (e.g. tunnels, water supply channels, house cellars, sites using thermal energy and more)

- studies on the geological evolution of the area (rifting, thrusting, palaeo-geography)

Thanks for your attention !