3D geological modelling

at the

Czech Geological Survey

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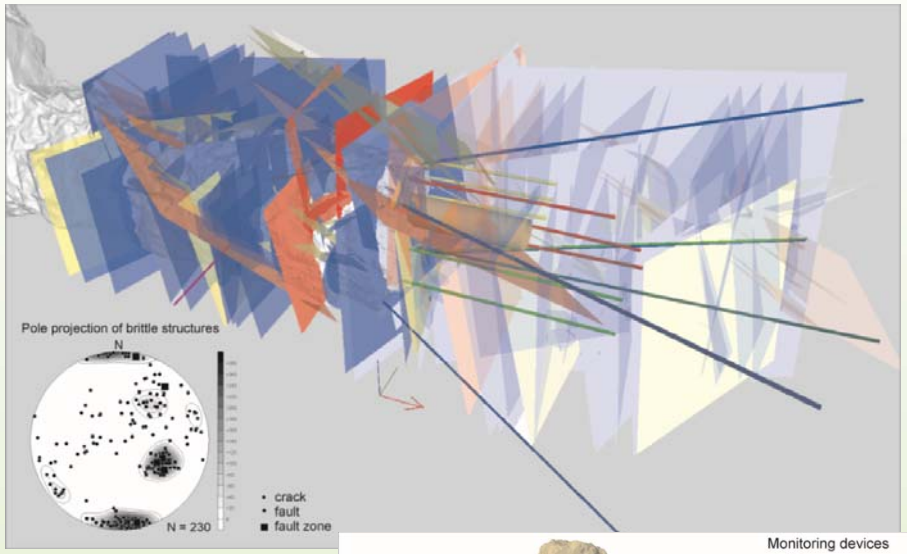
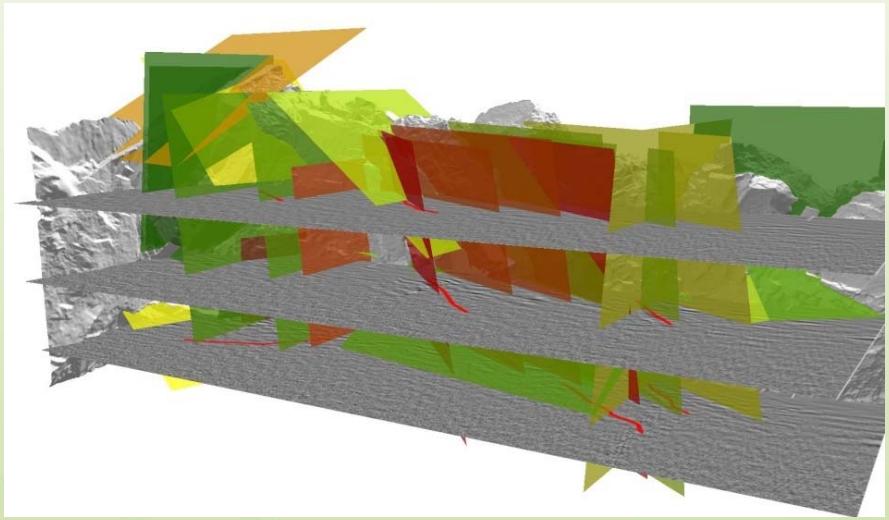
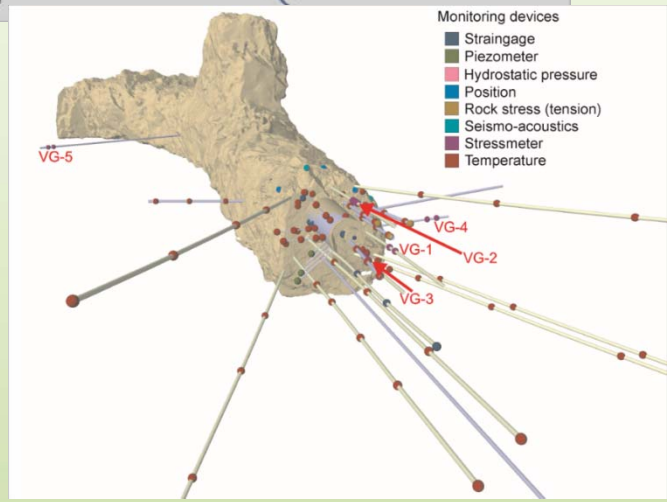
Near past:
Project – related, often simple models

- **Arc Scene** (Heat storage, hydrogeology in crystalline)
- **PetroMod** (sediments of SE Moravia incl. oil fields)
- **Petrel** (CO_2 storage)



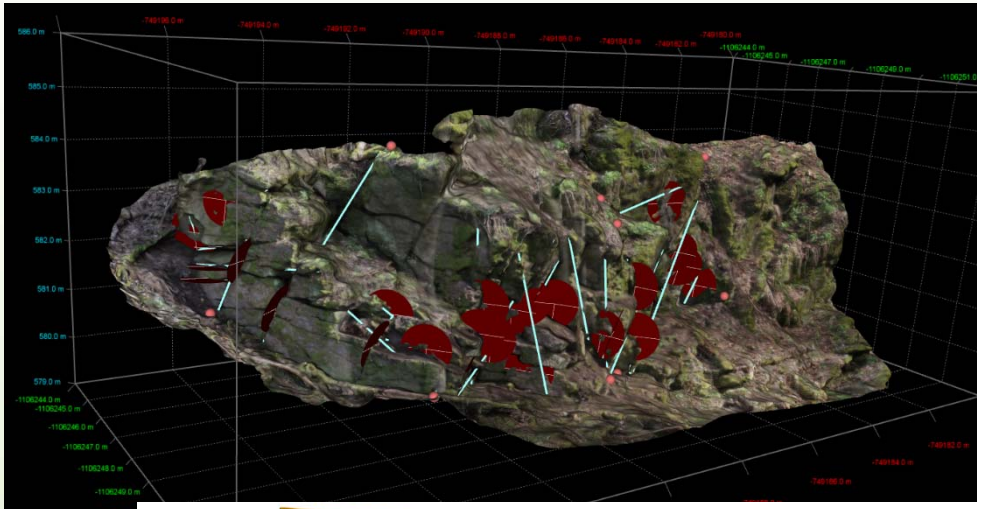


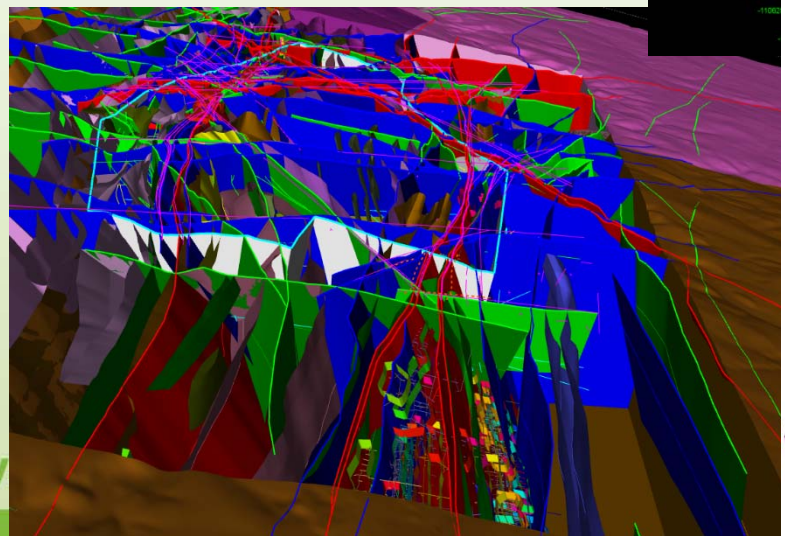


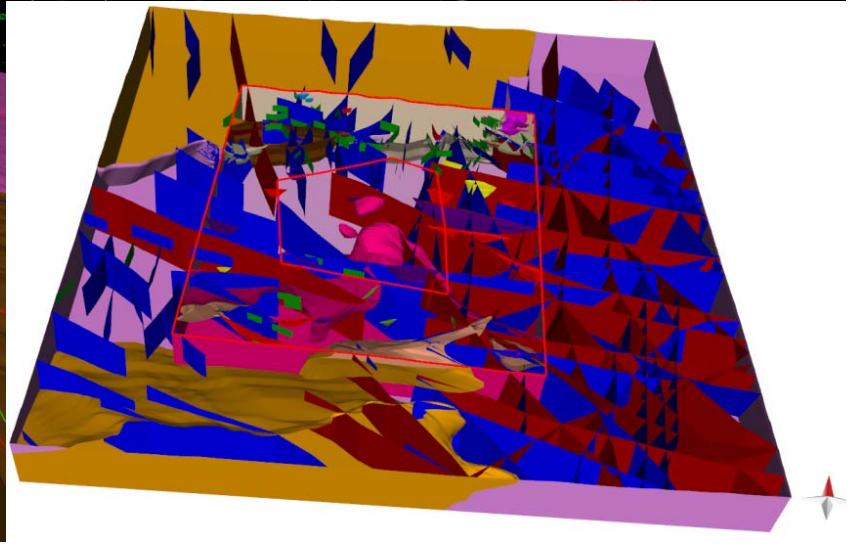
Present:
3D models at various scales

- Still project-related, but tendency to unify inputs, methodics and outputs

- **MOVE modelling sw.**
  - Suitable for complex crystalline geology of the Bohemian massif
  - Easy import and export in various formats
  - Not volumes, only surfaces of rock bodies and faults





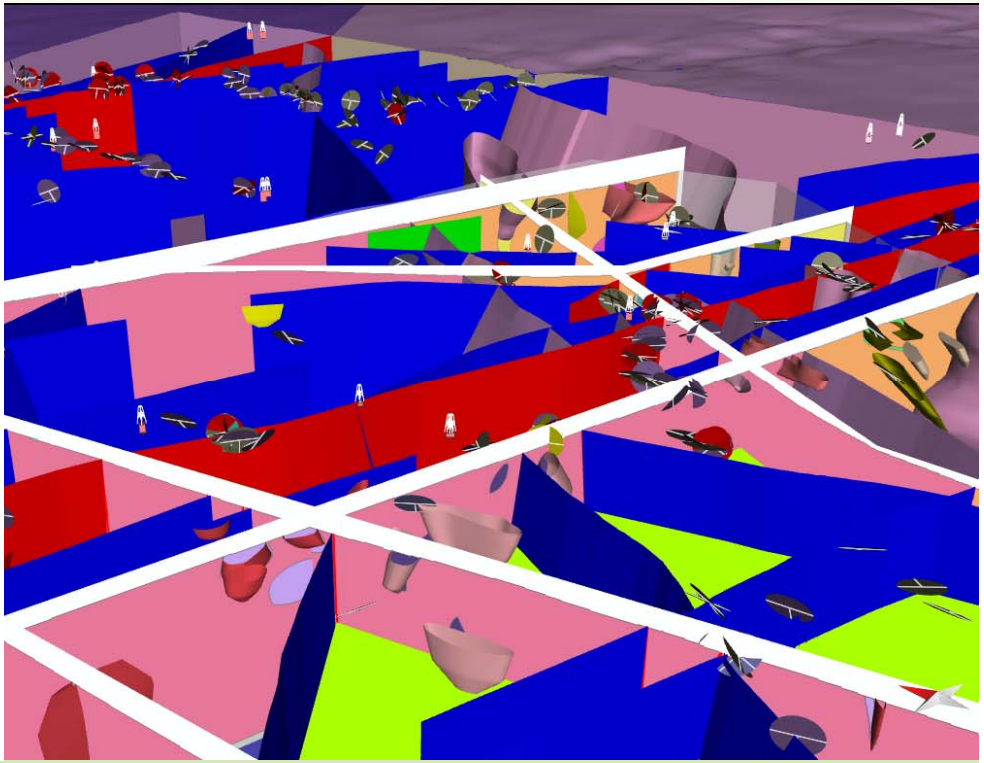


Present:
3D models at various scales

Mainly crystalline regions. Models are simple and based on geol. interpretations because of general lack of data from depth (only shallow boreholes, only 2D gravi profiles, ...).

Various purposes of the geological models:

- Hydrogeology + hydraulic modelling
- Geotechnical modelling
- Evaluation of mineral resources
- Designer and engineering work on underground buildings, tunnels, HLW storage
- Geothermal energy
- Design of in-stu geological / geotechnical / hydrochemical experiments
- Data compilation for further statistical processing and DFN modelling



Examples of representative individual projects

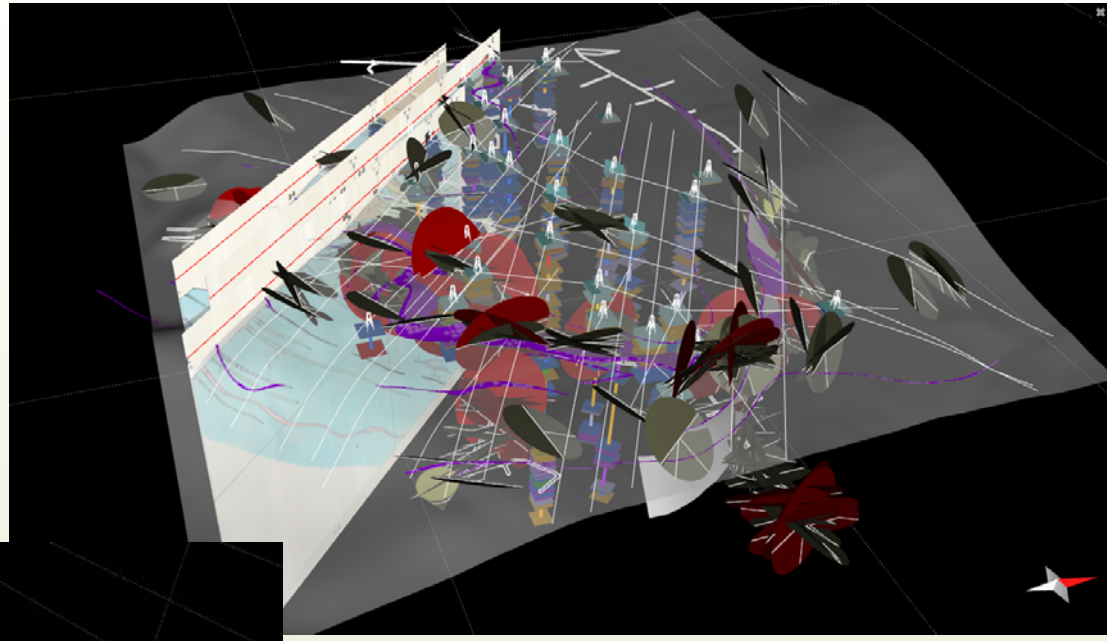
RAWRA - 9 localities of HLW

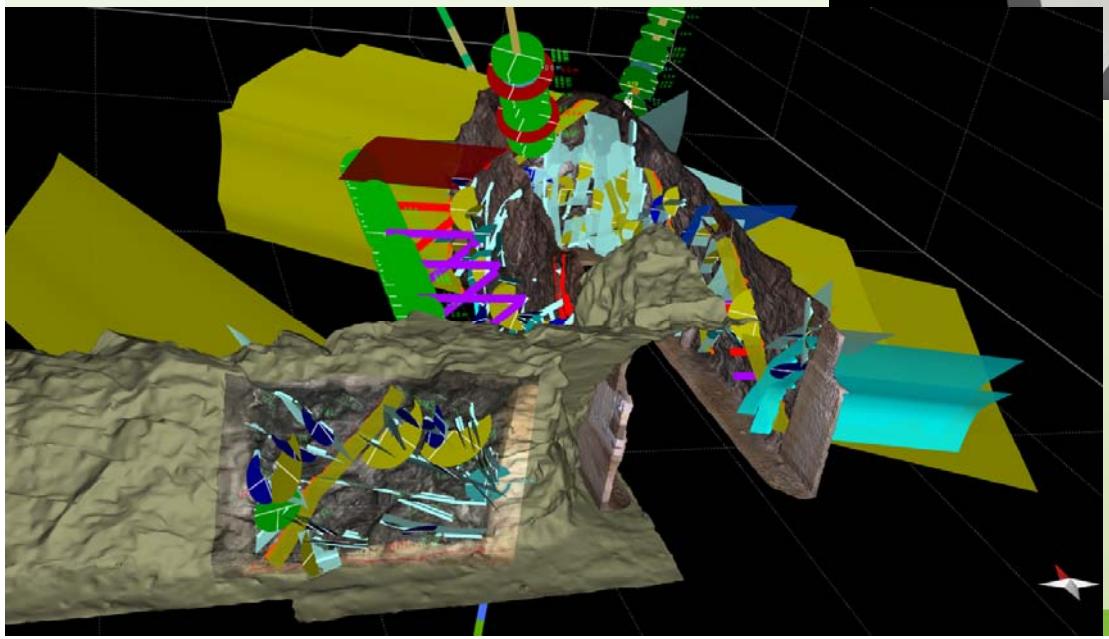
Erzgebirge high-speed railway tunnel

GEOPLASMA – shalow geothermal energy

CEEMIR – re-evaluation of a graphite deposit

DFN – photogrammetry and data acquisition for DFN modelling





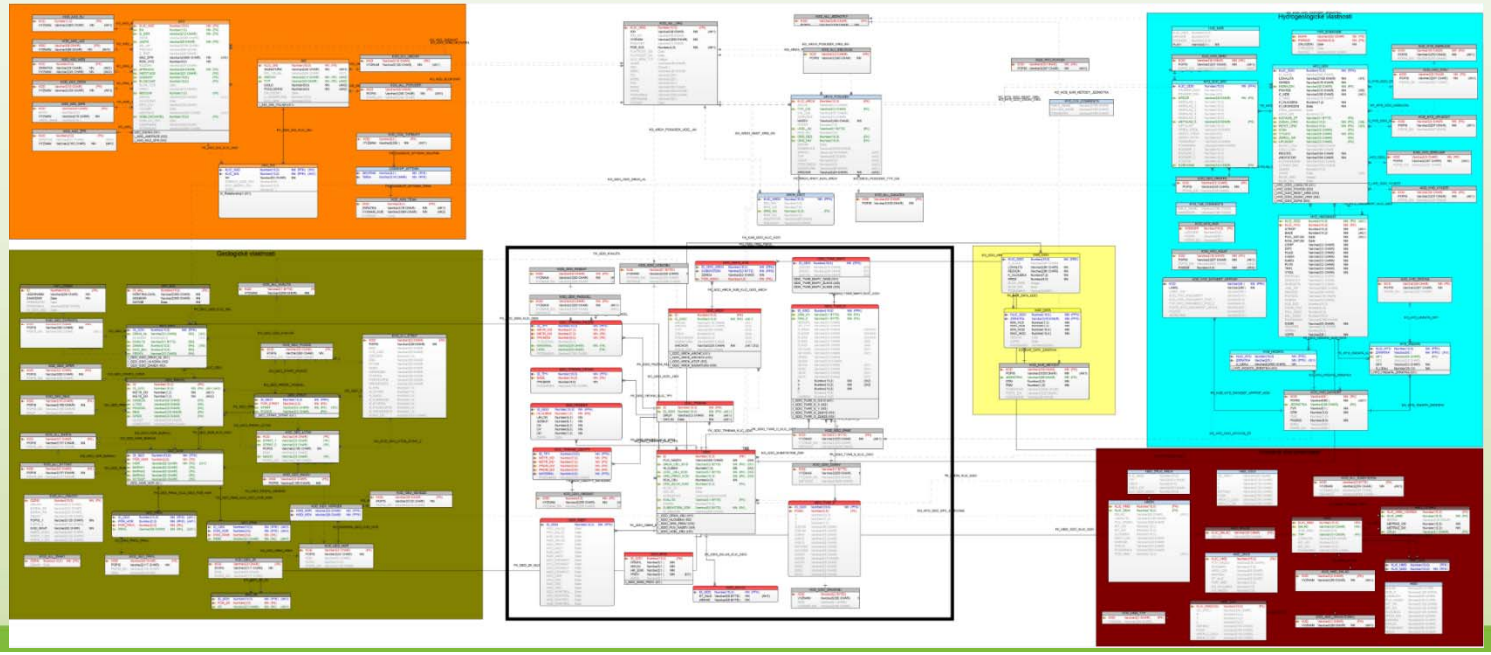
Near future

- Extend modelling to usage of old underground mines as e.g. sources of warm water for heat pumps
- Extend modelling to urban areas in cooperation with local authorities

Main issues "behind the curtain"

... that are presently solved in 3D modelling at the CGS :

- Renovation of an obsolete **database of borehole and well data**
- Creation of new user-interfaces for such a database(s) of borehole data
- Renovation of obsolete **database of field documentation** points (geological, structural, hydrogeological and engineering geology) and its accessibility via ArcMap GIS
- Development and standardization of **model presentation tools** - mainly on web pages



Metadata description of 3D models

- Discussions with other geological surveys
- Test version of the metadata profile implemented – will be finalized in 2018 → publication of a map application with links to metadata description of individual models
- More complex tasks remain – how to describe the model parameters, use of controlled vocabularies to describe the modelled geological layers, …

Web Visualization of 3D models

- Development of plugin-free tools for web visualization of 3D models
- Models in OBJ/MTL format
- The viewer is based on javascript library Three.js, use of WebGL
- Will be available for public in 2018