

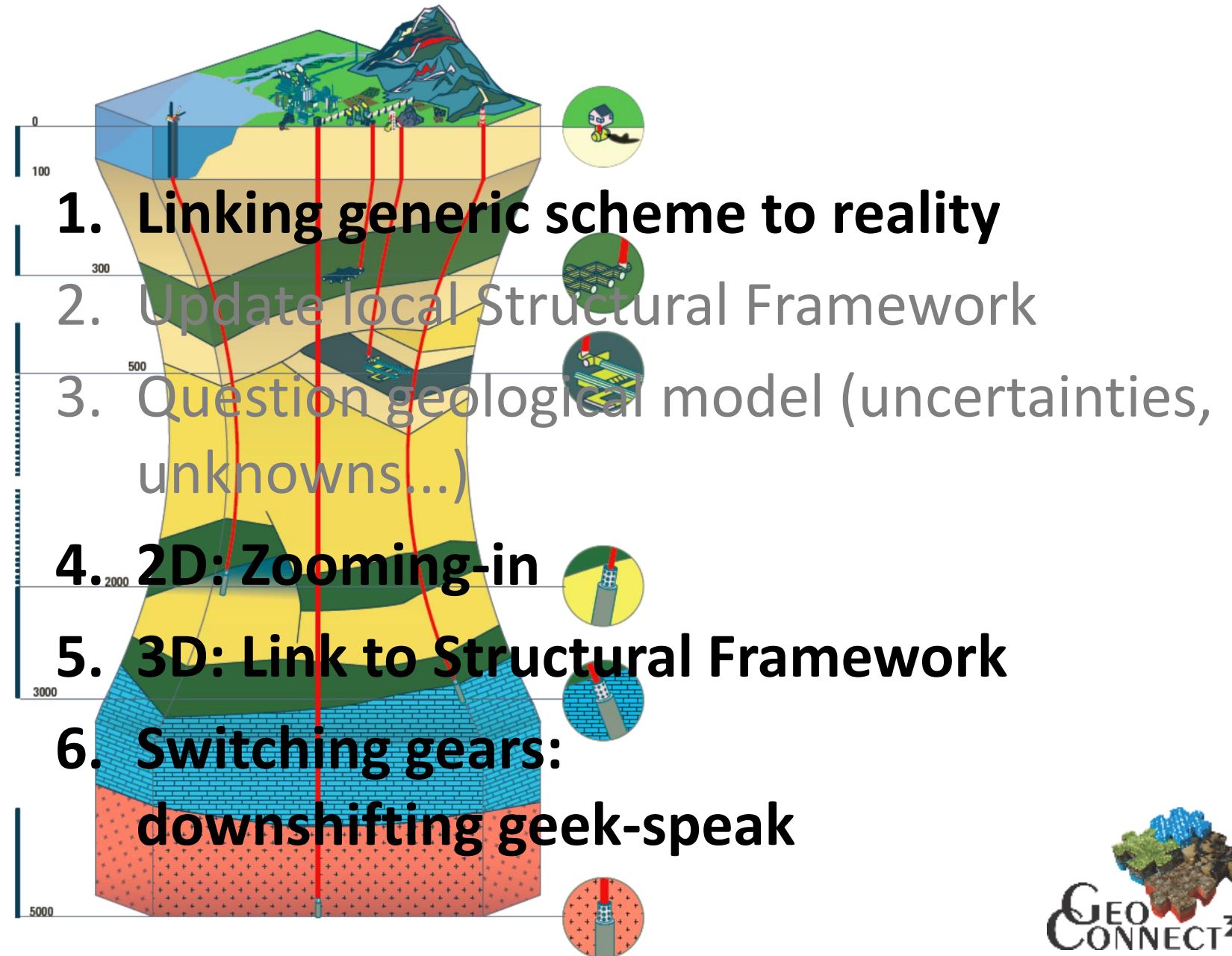
DISCUSSING THE INVISIBLE: FROM GENERIC TO CUSTOM TAILORED UNDERSTANDING



GeoConnect^{3d} is funded under the GeoEnergy theme of GeoERA. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166.

Discussing THE invisible

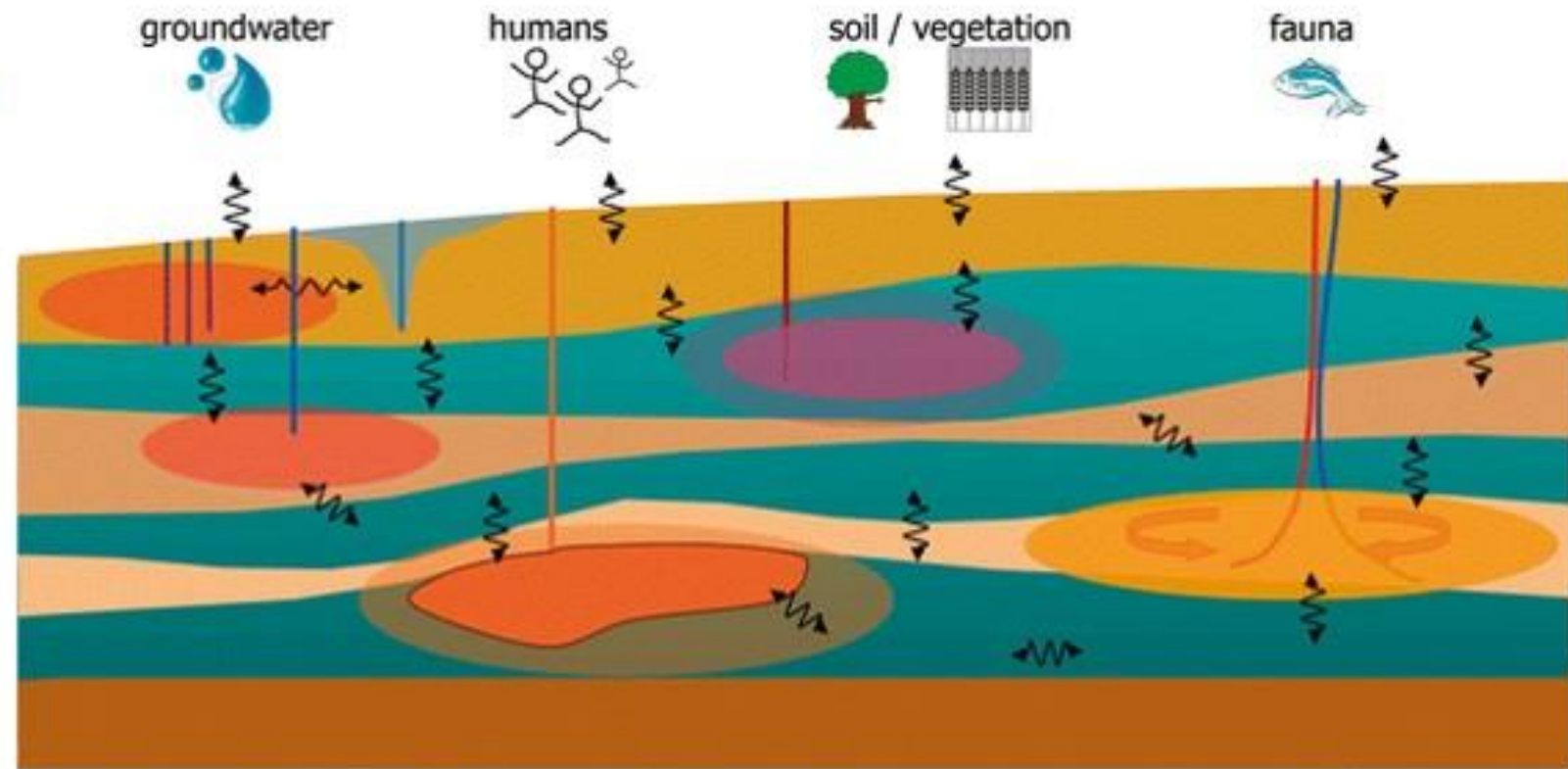




GENERIC SCHEME

From generic to reality

protected goods



type of use

near surface geothermal systems
groundwater abstraction
natural gas and hydrogen storage
heat storage
compressed air storage
deep geothermal energy



GENERIC SCHEME

From generic to reality

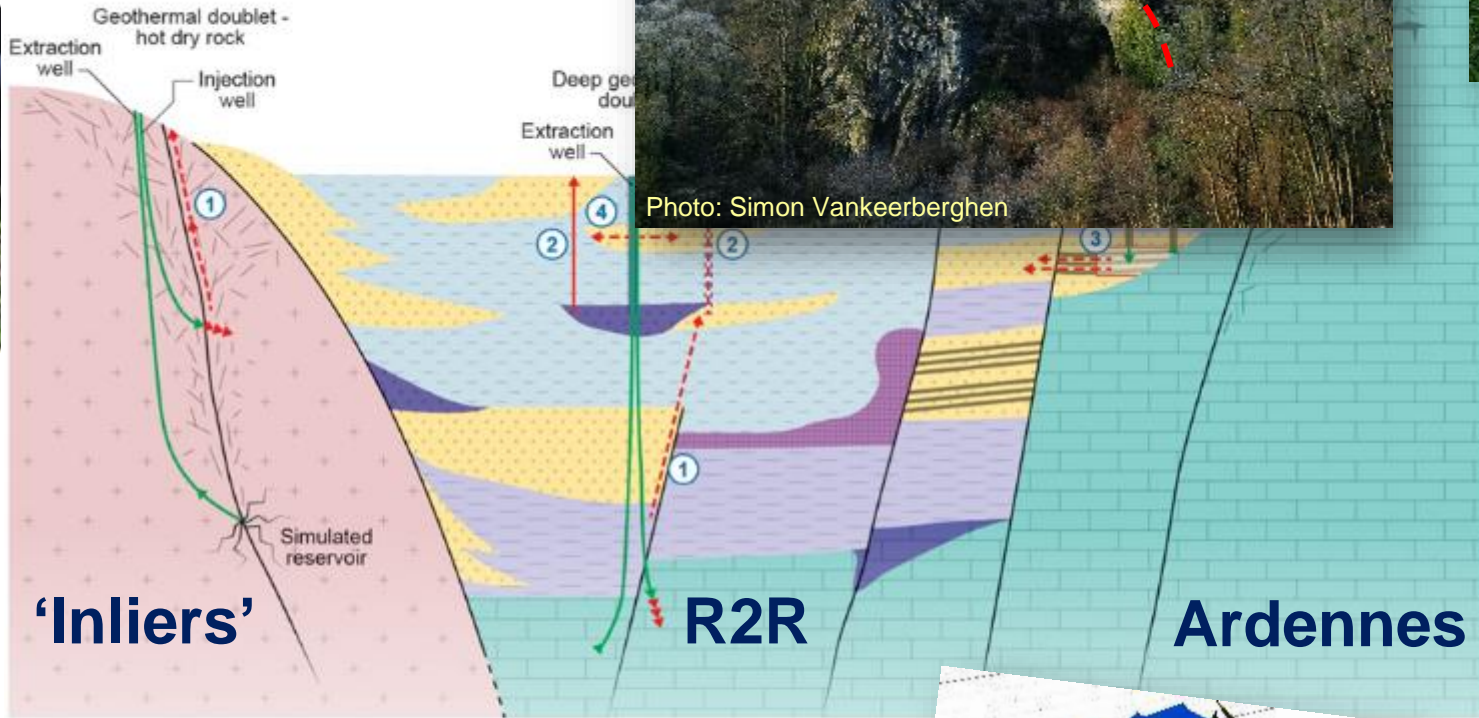
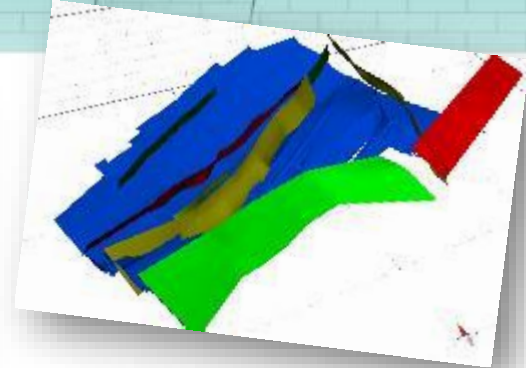
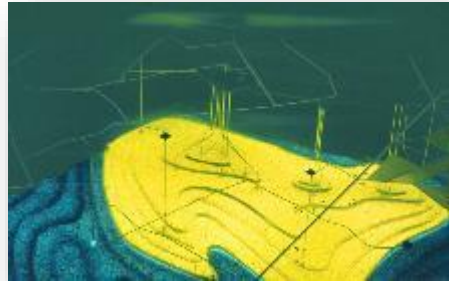


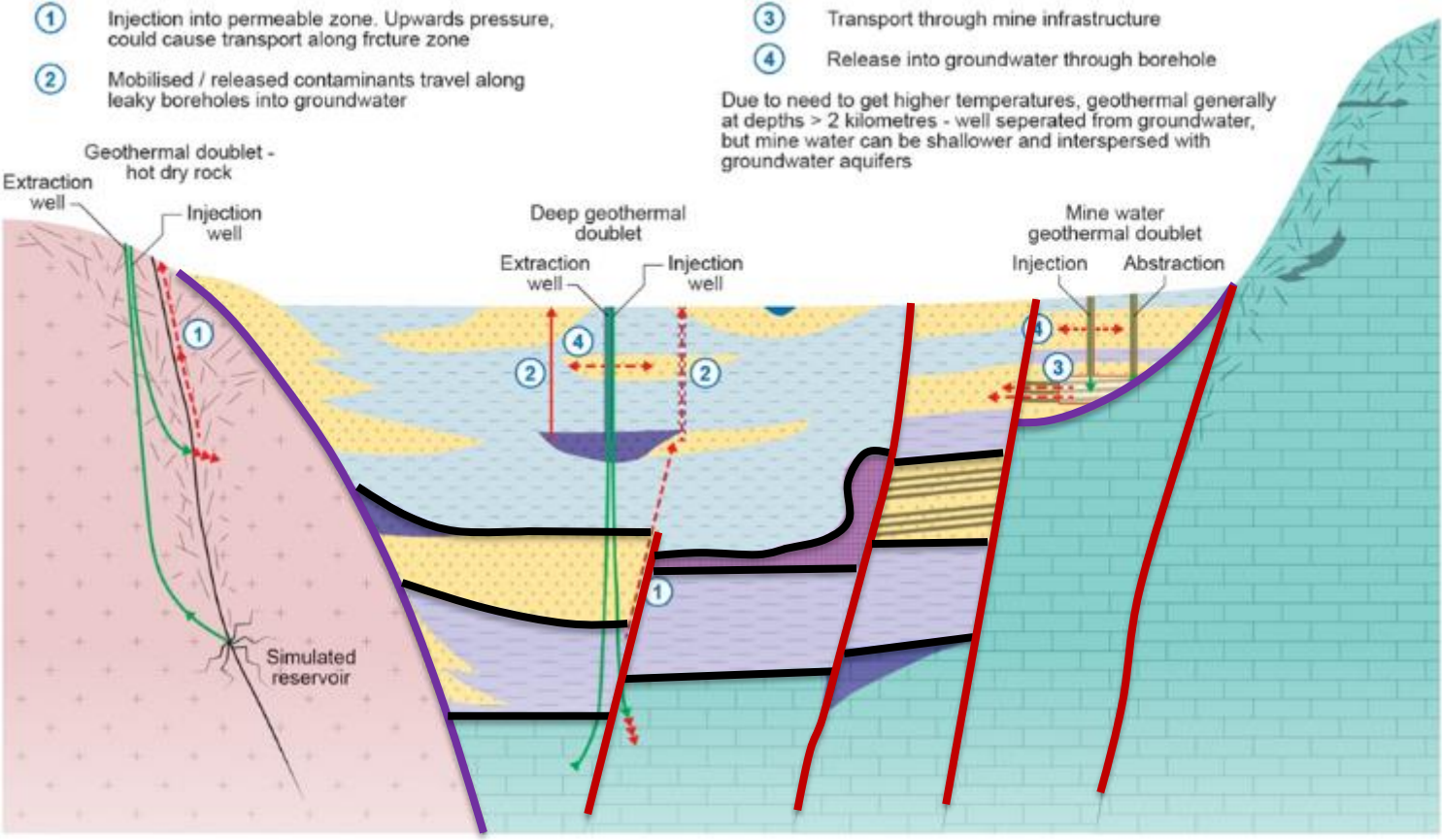
Photo: Simon Vankeerberghen



<https://np-plitvicka-jezera.hr/en/photos/>



From generic to reality



- ① Injection into permeable zone. Upwards pressure, could cause transport along fracture zone
 - ② Mobilised / released contaminants travel along leaky boreholes into groundwater
 - ③ Transport through mine infrastructure
 - ④ Release into groundwater through borehole
- Due to need to get higher temperatures, geothermal generally at depths > 2 kilometres - well separated from groundwater, but mine water can be shallower and interspersed with groundwater aquifers

Contact
Unconformity
Fault

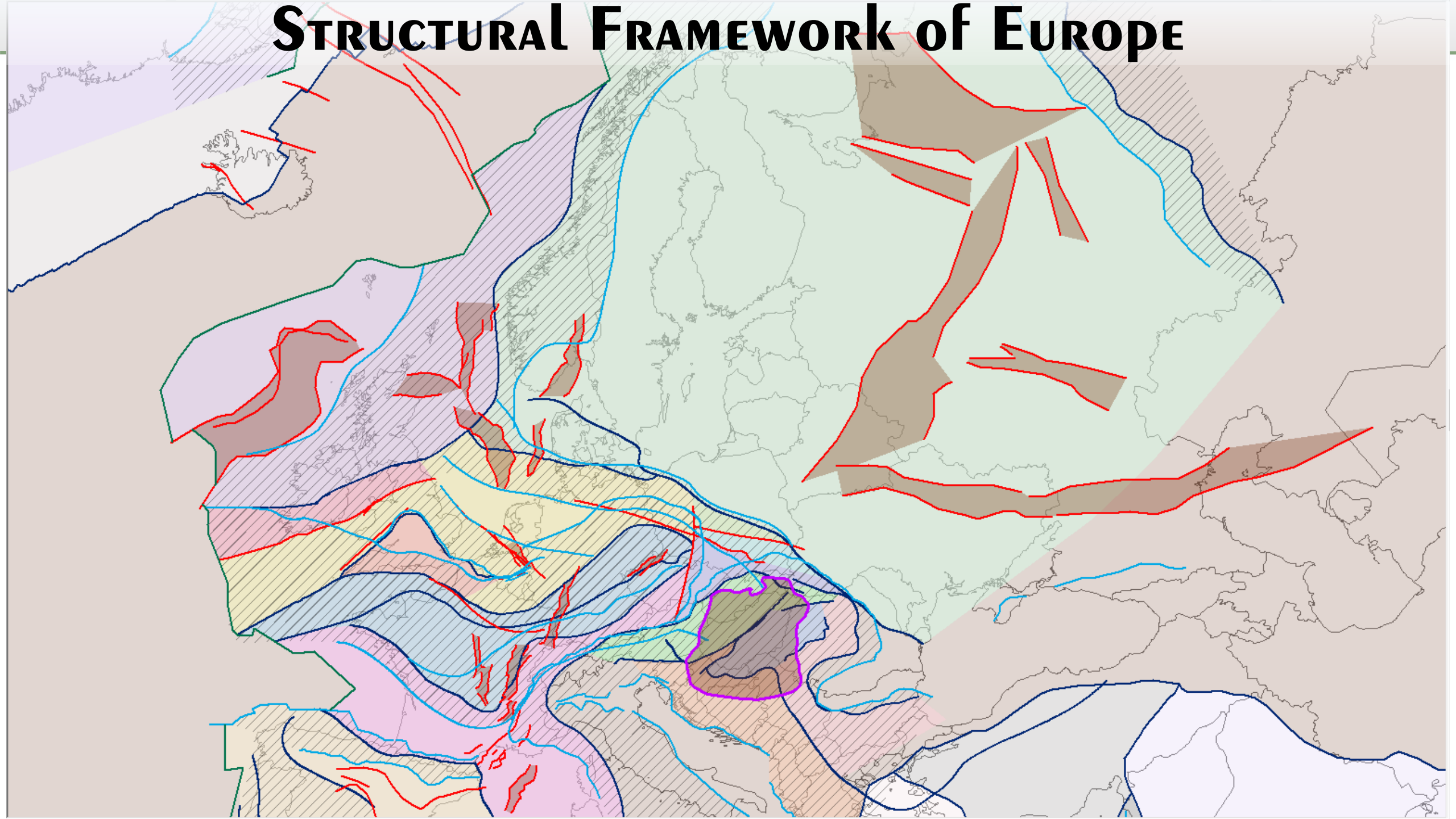
Orogenic front
Crustal boundary
Plate boundary

	Igneous rock		Unconsolidated basin till		Fault		Mine
	Carbonate rock		Marginal facies / alluvial fans		Fractures		Oil and gas
	Shale		Coal measures		Existing boreholes		
	Halite / anhydrite diapir		Karst / caves		Abandoned boreholes		



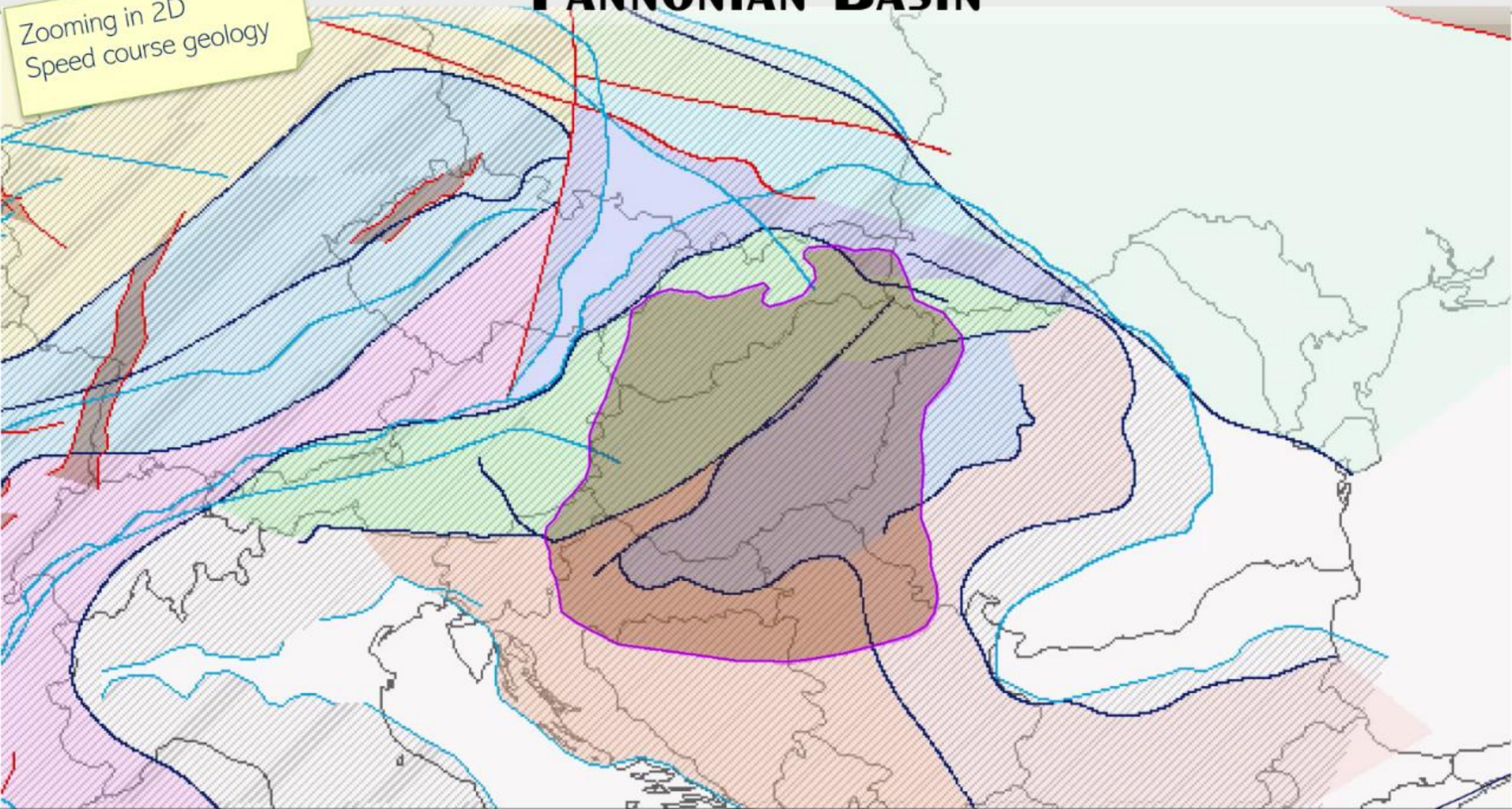


STRUCTURAL FRAMEWORK of EUROPE



PANNONIAN BASIN

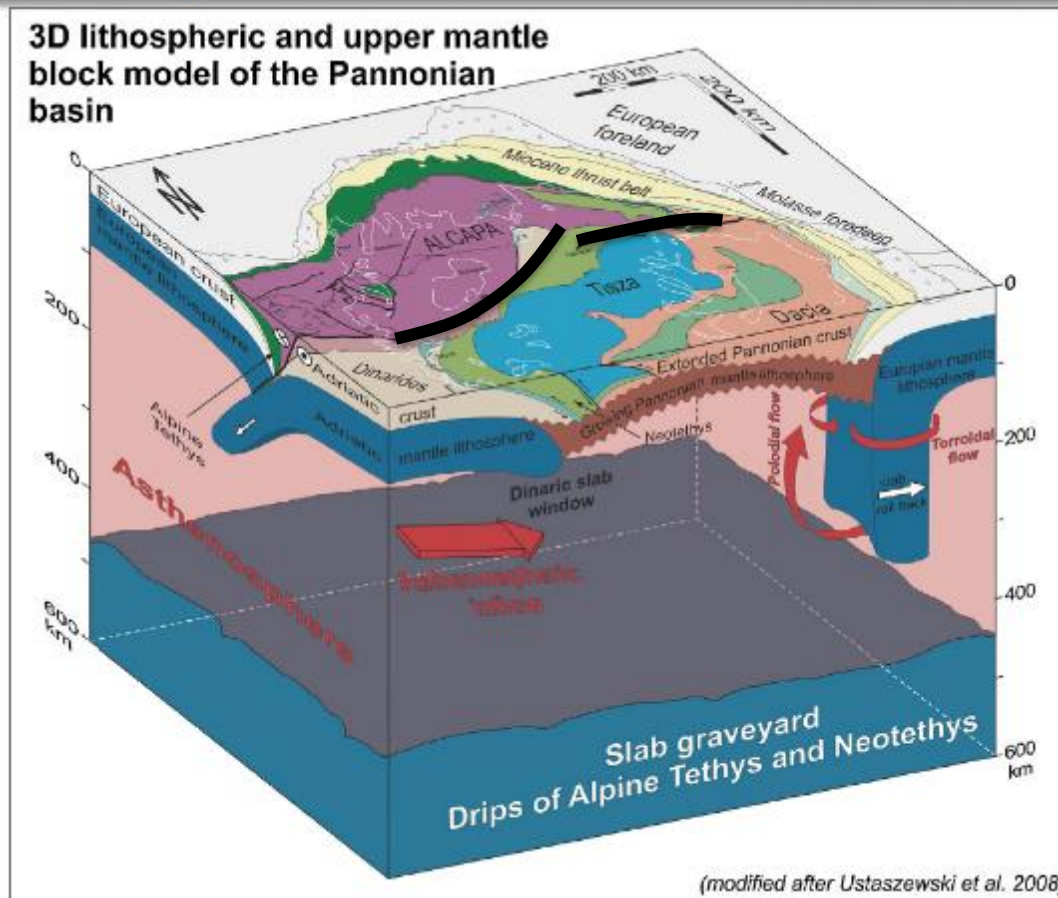
Zooming in 2D
Speed course geology



Switching to 3D
Linking models



3D lithospheric and upper mantle block model of the Pannonian basin

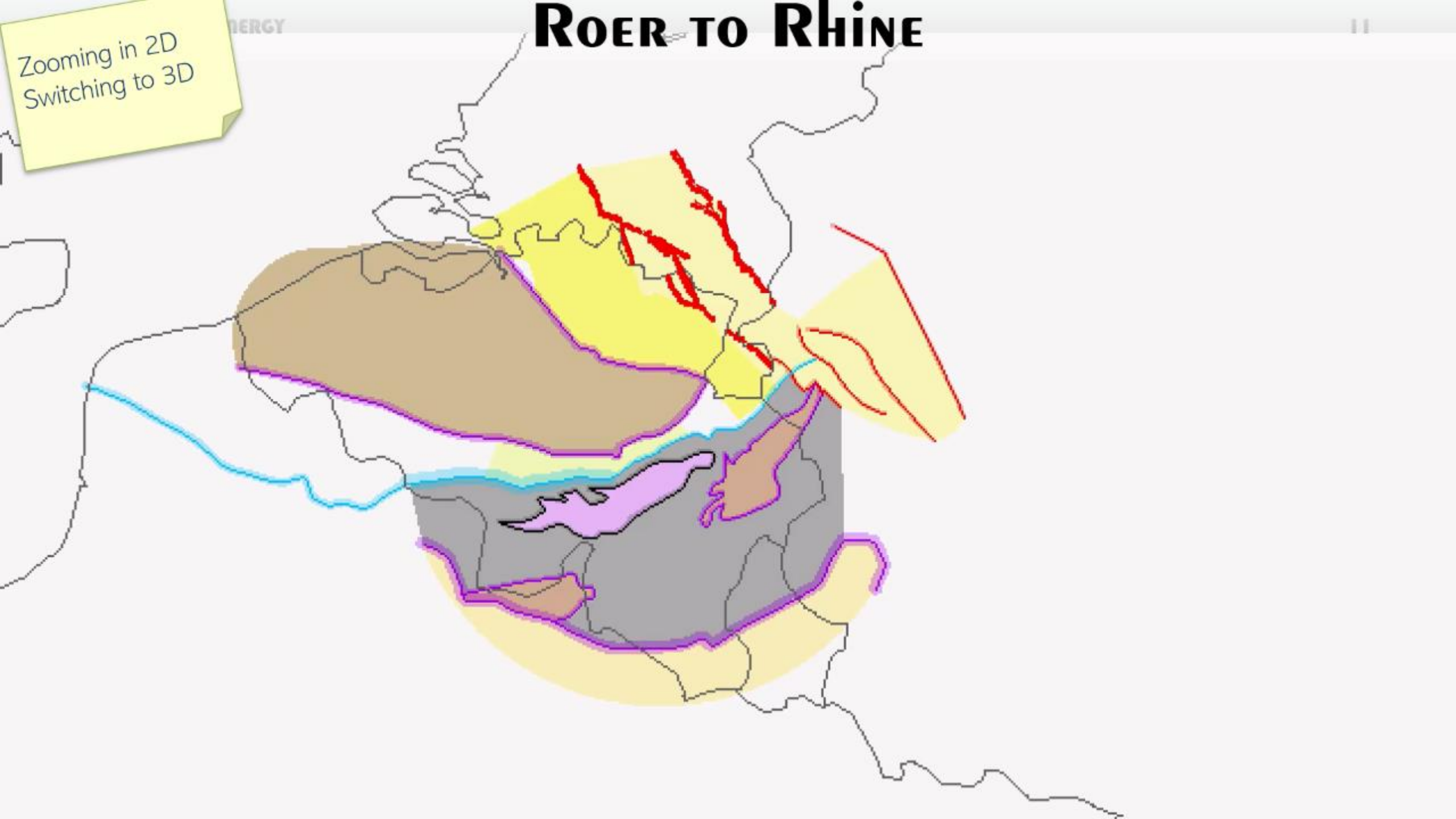


Hovarth et al. (2015), Evolution of the Pannonian basin and its geothermal resources

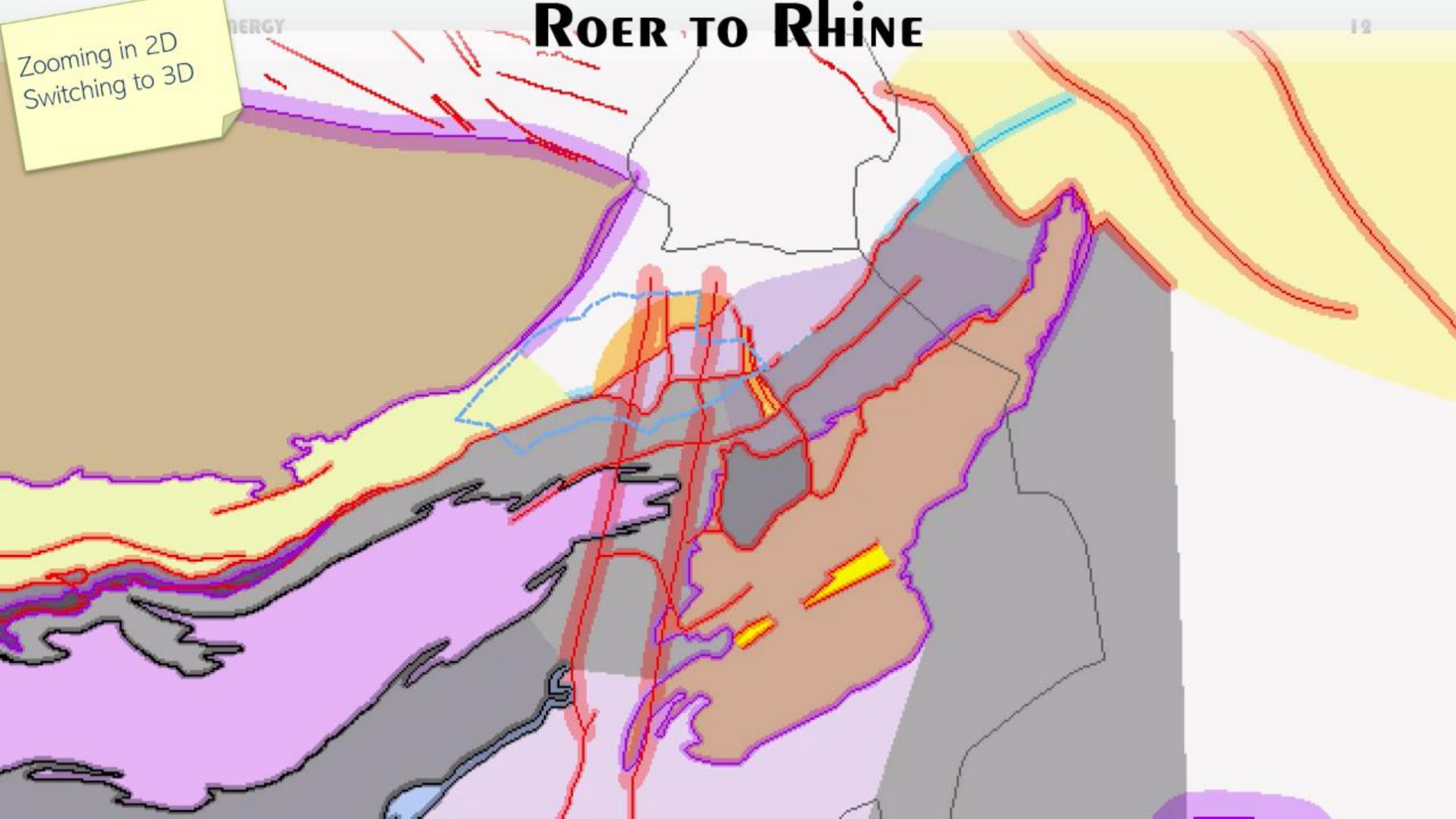


ROER TO RHINE

Zooming in 2D
Switching to 3D



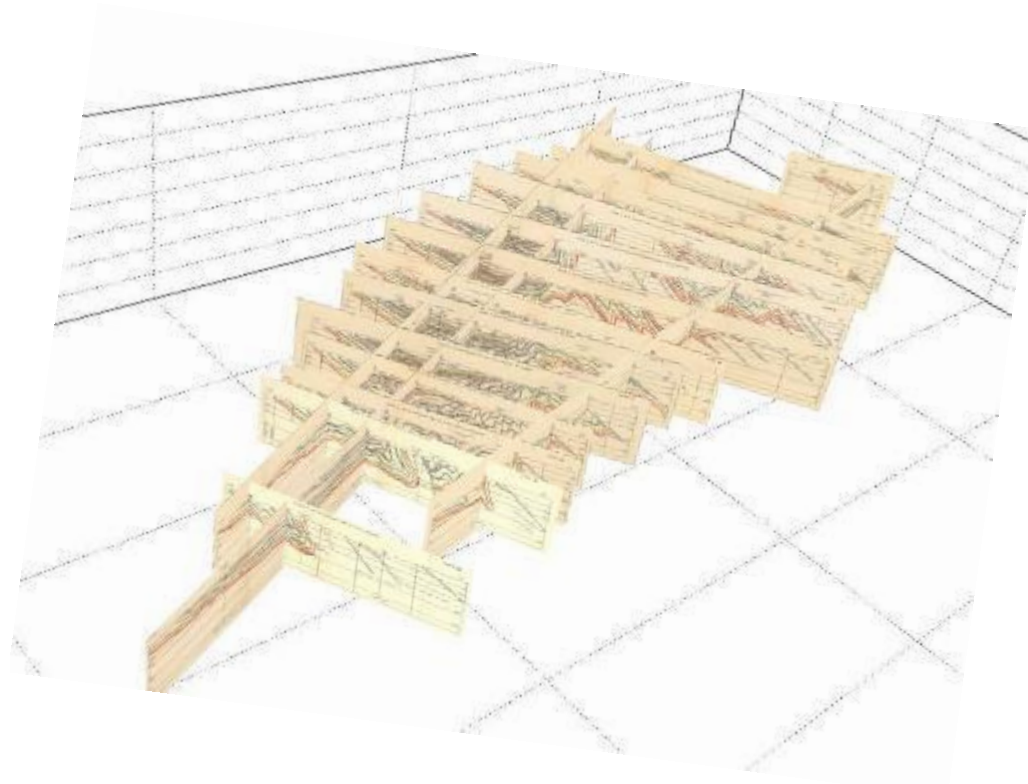
ROER TO RHINE



Zooming in 2D
Switching to 3D

LIÈGE BASIN

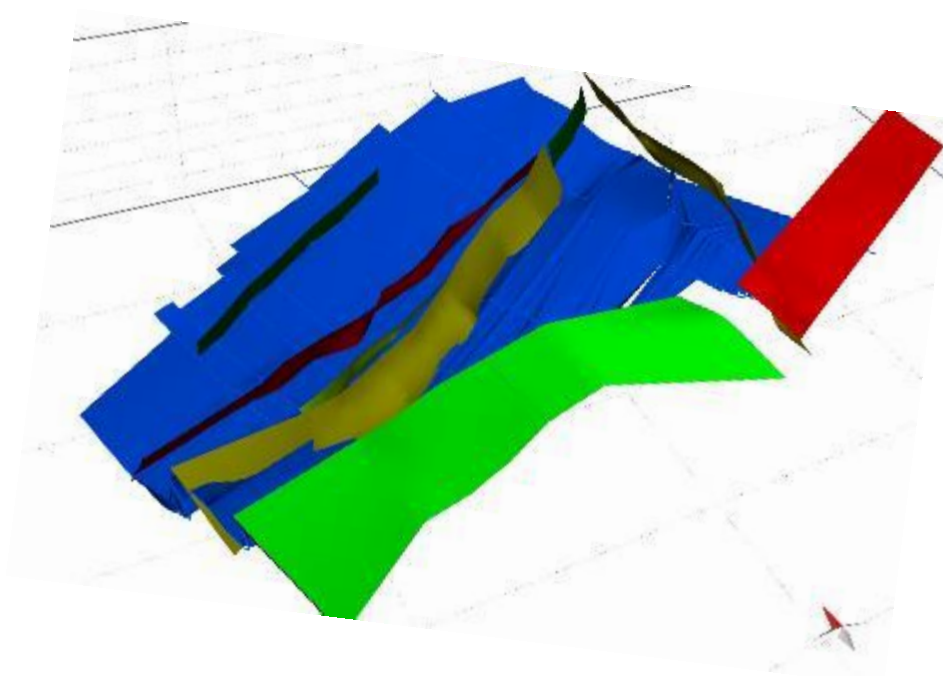
Zooming in 2D
Switching to 3D



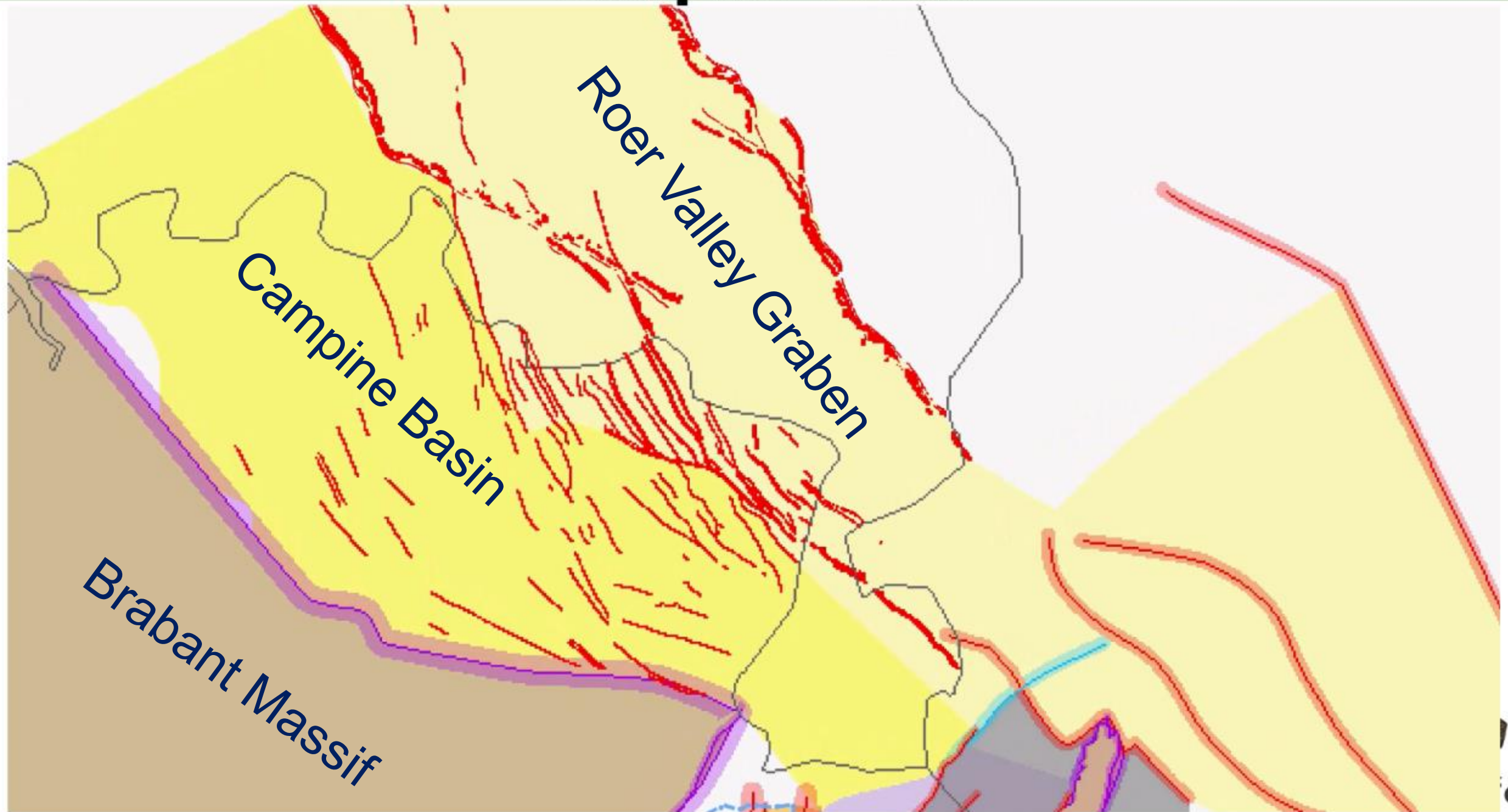
LIÈGE BASIN



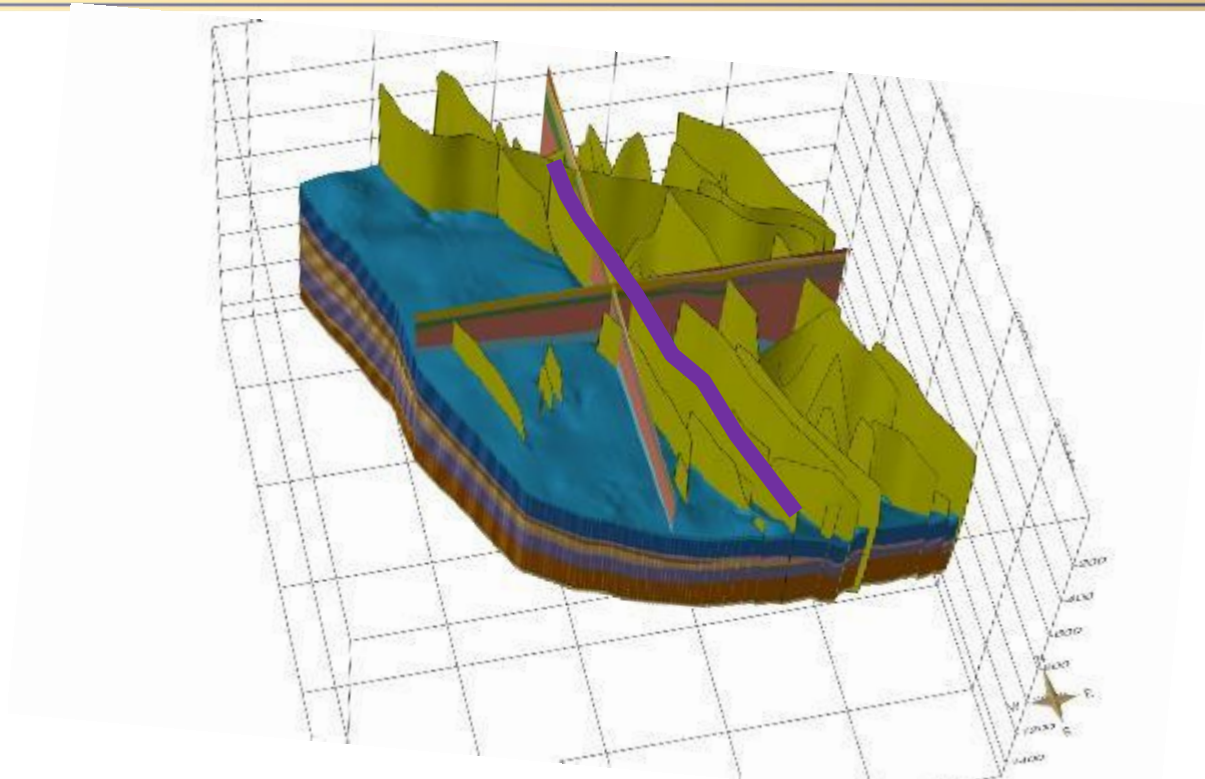
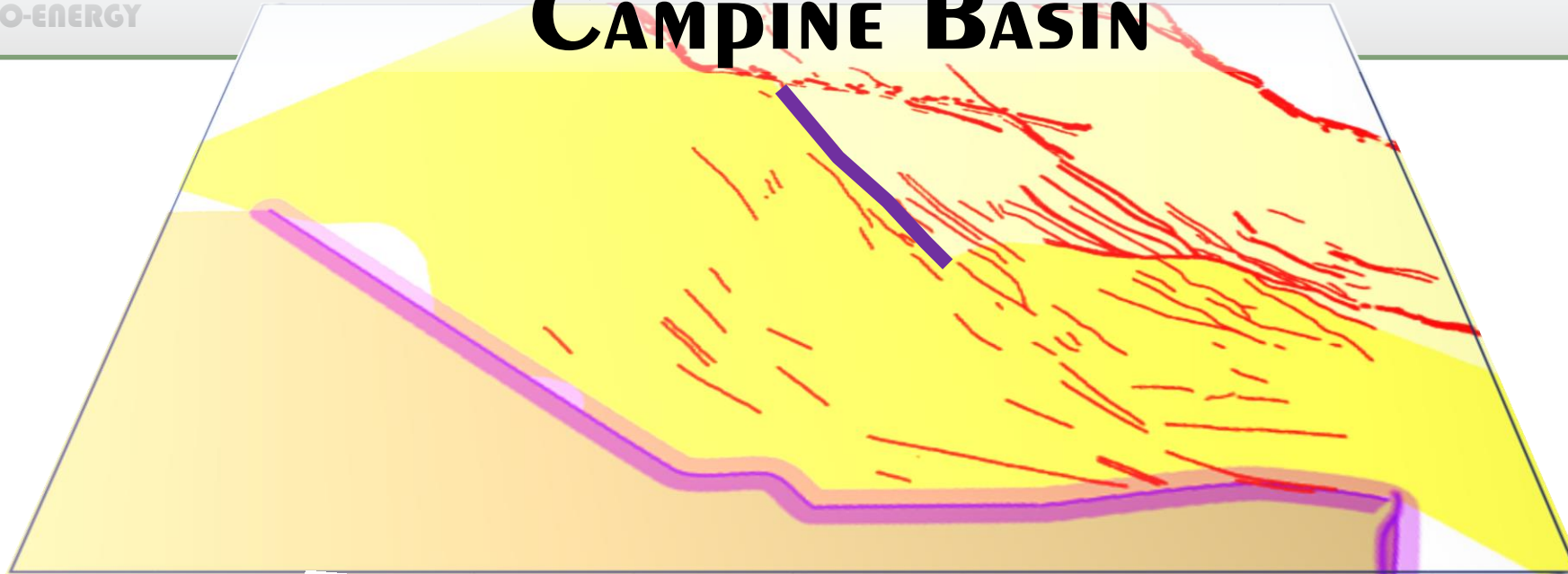
LIÈGE BASIN



CAMPINE BASIN



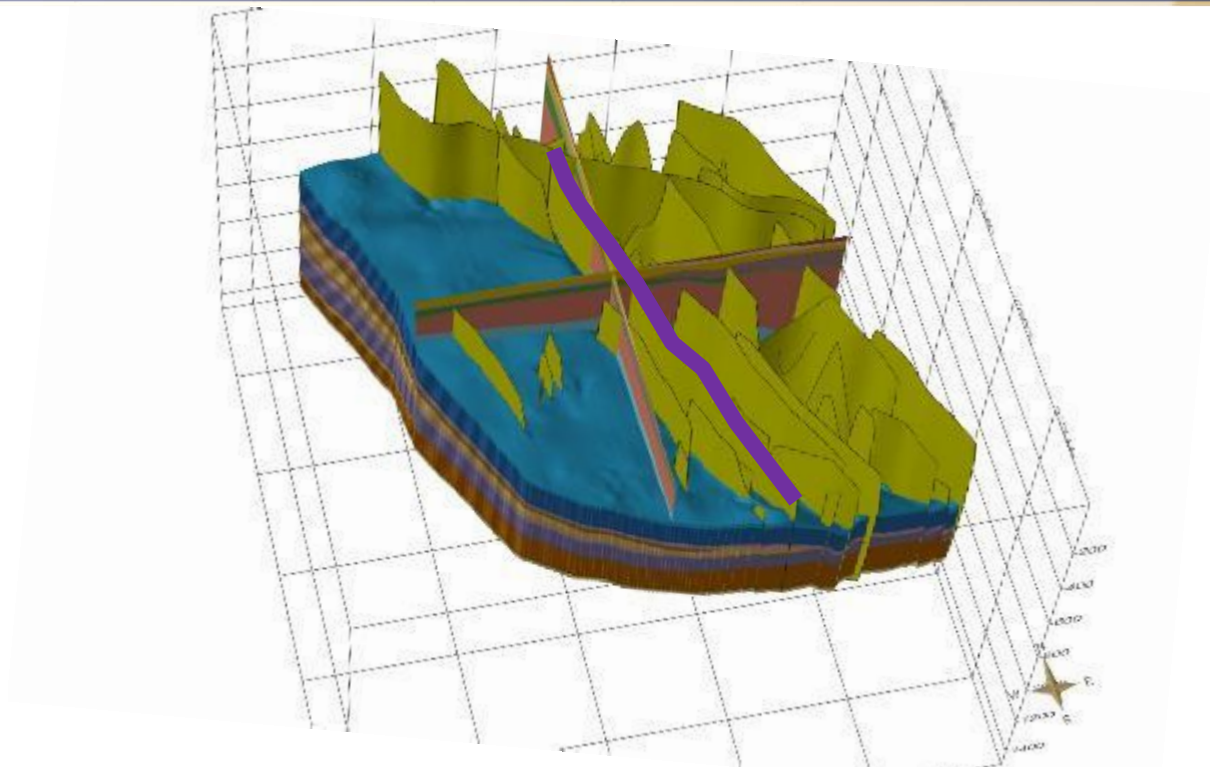
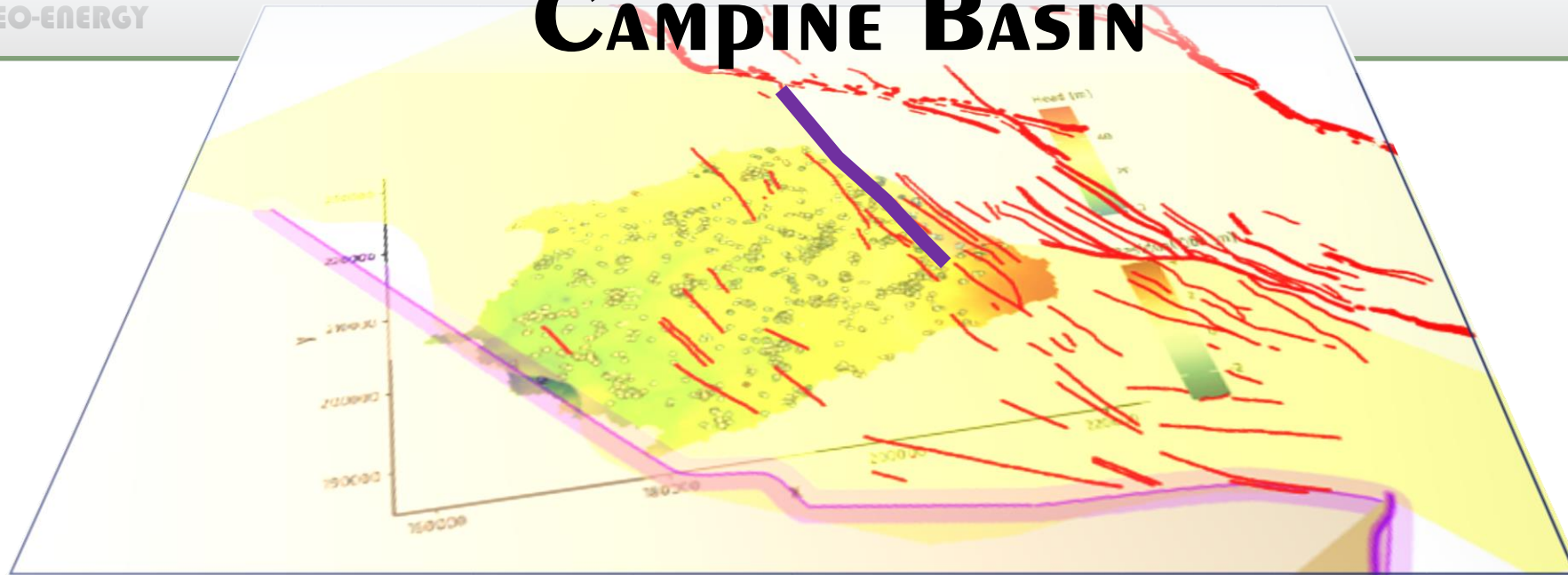
CAMPINE BASIN



Source: H30 – De Kempen,
Databank Ondergrond Vlaanderen.
<https://www.dov.vlaanderen.be>

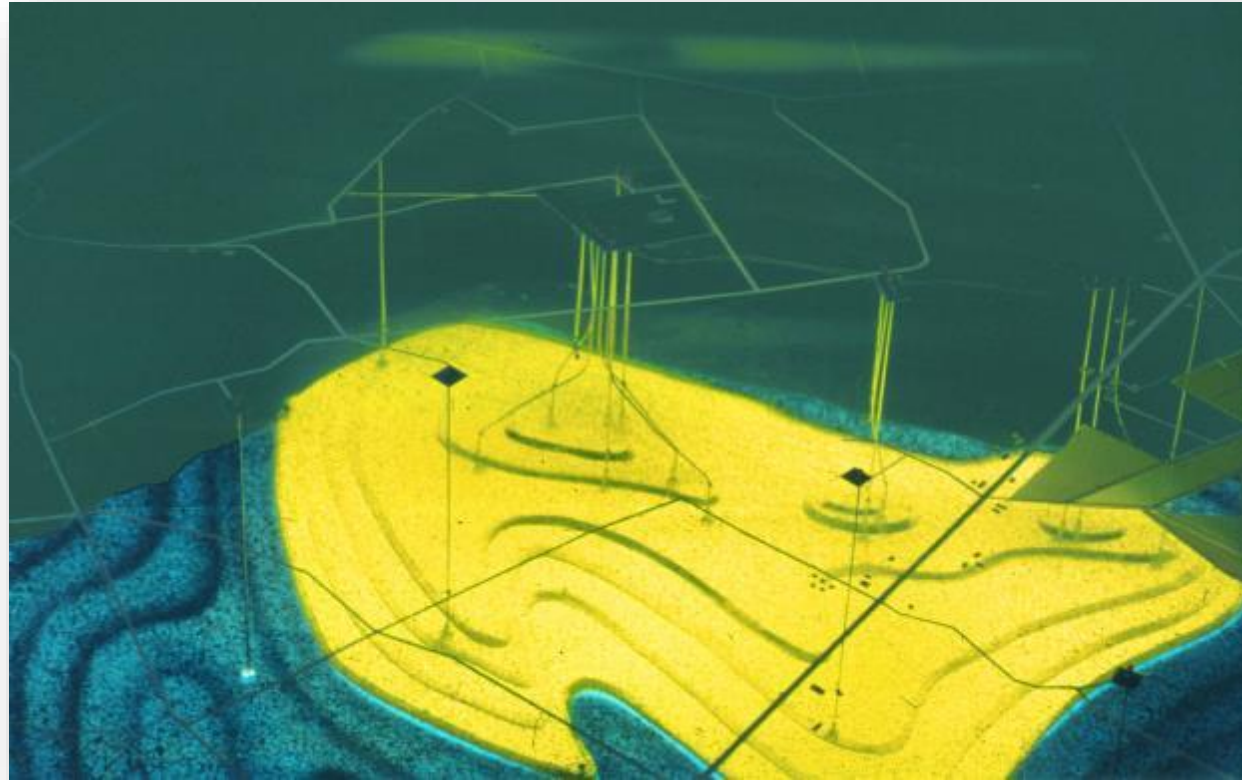


CAMPINE BASIN

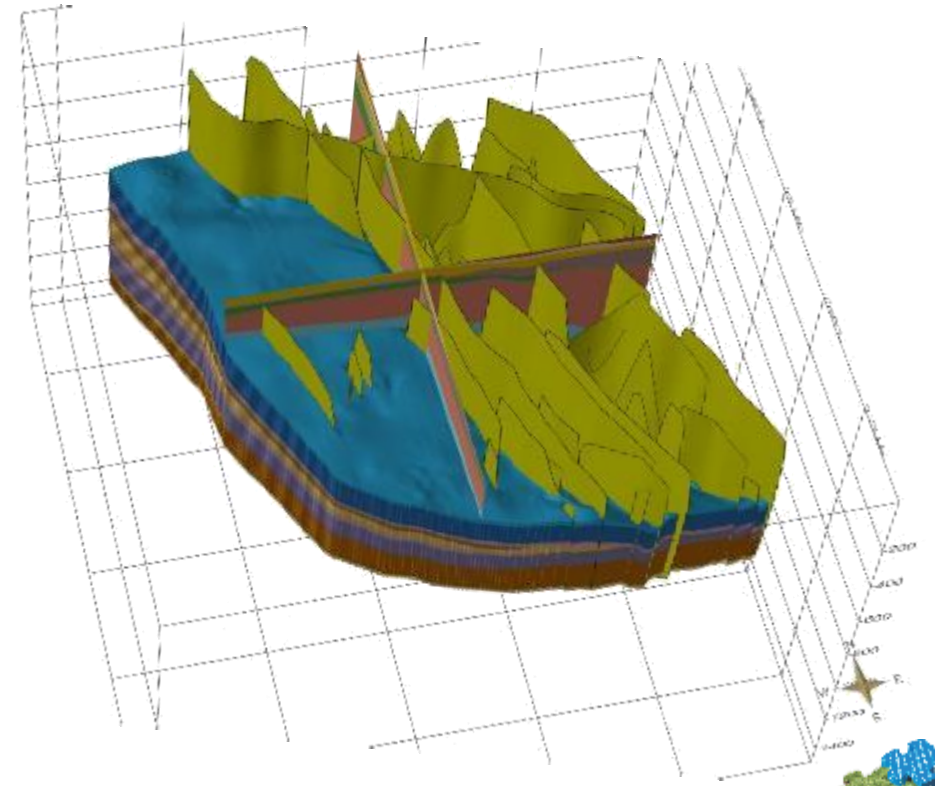


Source: Unpublished work: PhD of Alberto Casillas-Trasvina

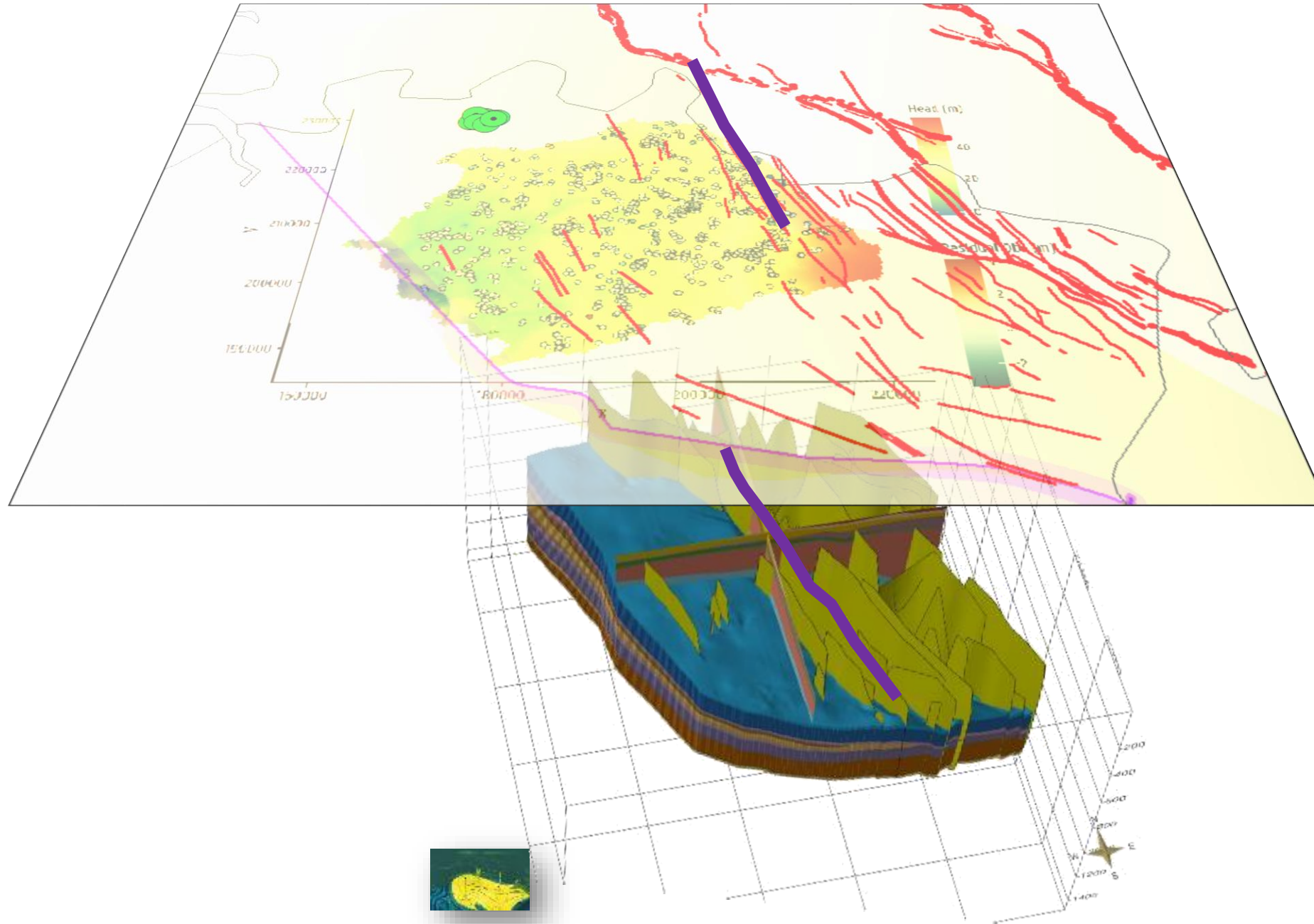




**Natural gas storage site
Loenhout**



CAMPINE BASIN



Contact

Unconformity

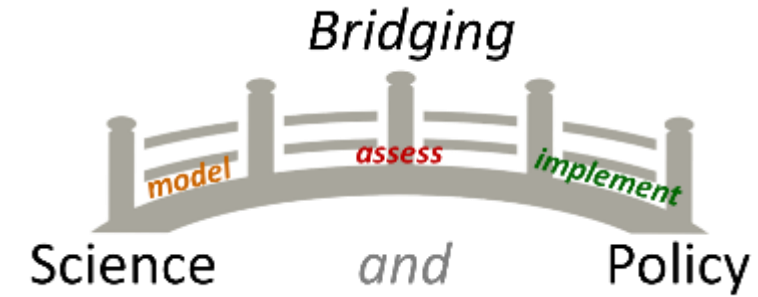
Fault

Orogenic front

Crustal boundary

Plate boundary

Normal fault
 Reverse fault
 Strike slip fault
 Thrust fault
 Detachment fault
 Horizontal fault
 Extraction fault
 Pure extraction fault
 Mixed extraction fault
 Oblique slip fault
 Scissor fault
 Wrench fault
 Shear zone
 etc.



Contact

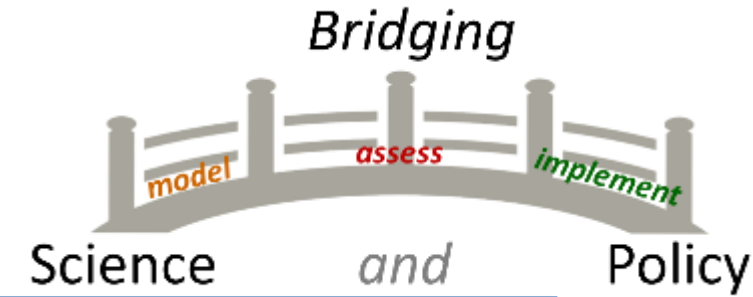
Unconformity

Fault

Orogenic front

Crustal boundary

Plate boundary



Westernmost limit of the Feldbiss fault system active during the Kimmerian phase and the Cenozoic extension. Influenced Pleistocene fluvial patterns, leading to Holocene relief inversion. (Deckers et al., 2019)

RVG large-scale fault system

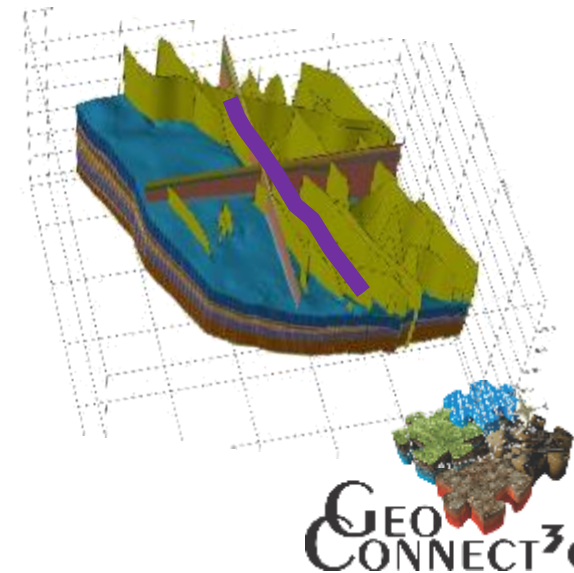


Feldbiss fault system

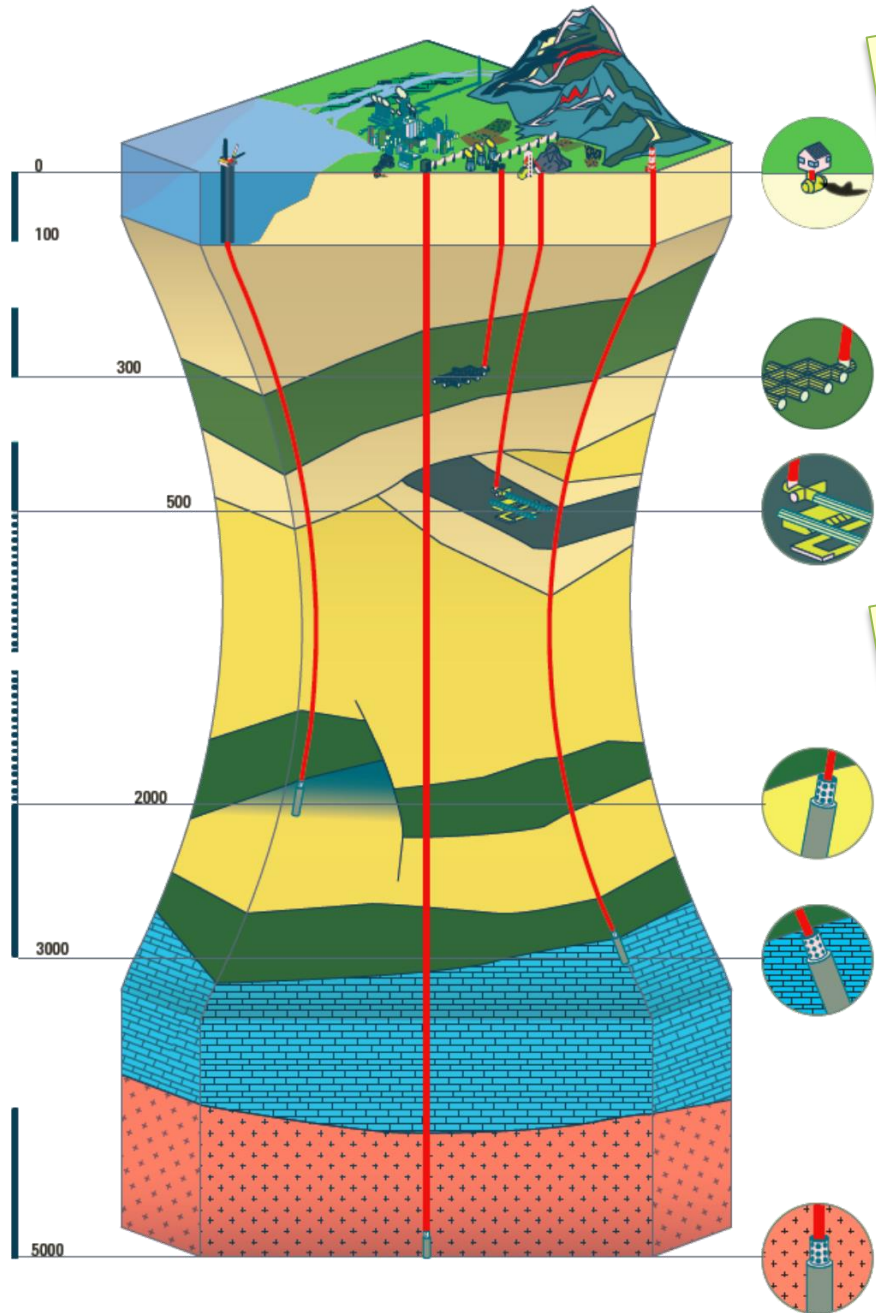


Rauw fault

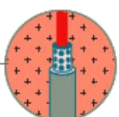
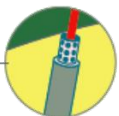
Discrete deforming interface separating two rock masses along which one mass has slid past the other (Neuendorf et al., 2005).



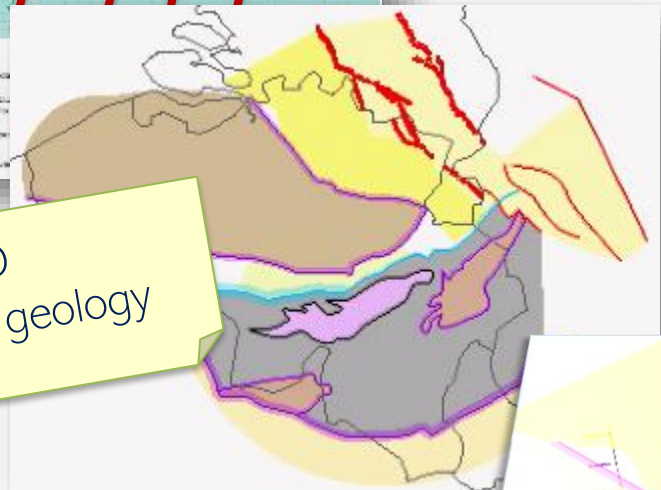
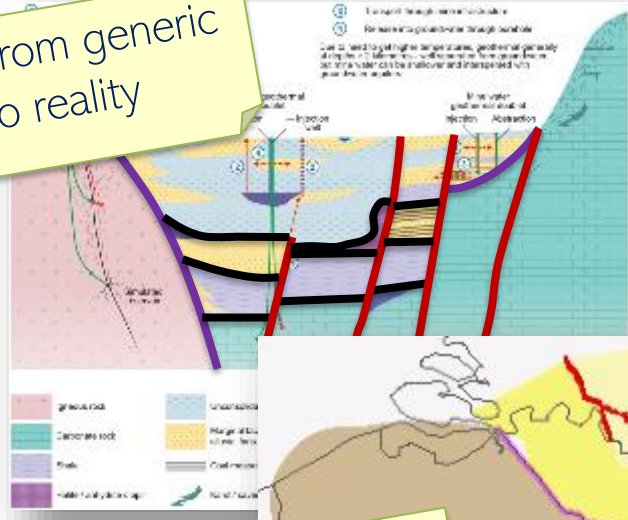
IN A NUTSHELL



From generic to reality



Zooming in 2D
Speed course geology



Geek speak control
Documenting

Contact
Unconformity
Fault

Orogenic front
Crustal boundary
Plate boundary

Switching to 3D
Linking models

