



# Potential for geological methanation & gas storage in Switzerland

## “Project USC–FlexStore“

Larryn W. Diamond

Daniela Van den Heuvel

Institute of Geological Sciences, University of Bern

[diamond@geo.unibe.ch](mailto:diamond@geo.unibe.ch)



### Project coordinator (EU)



### Project partners

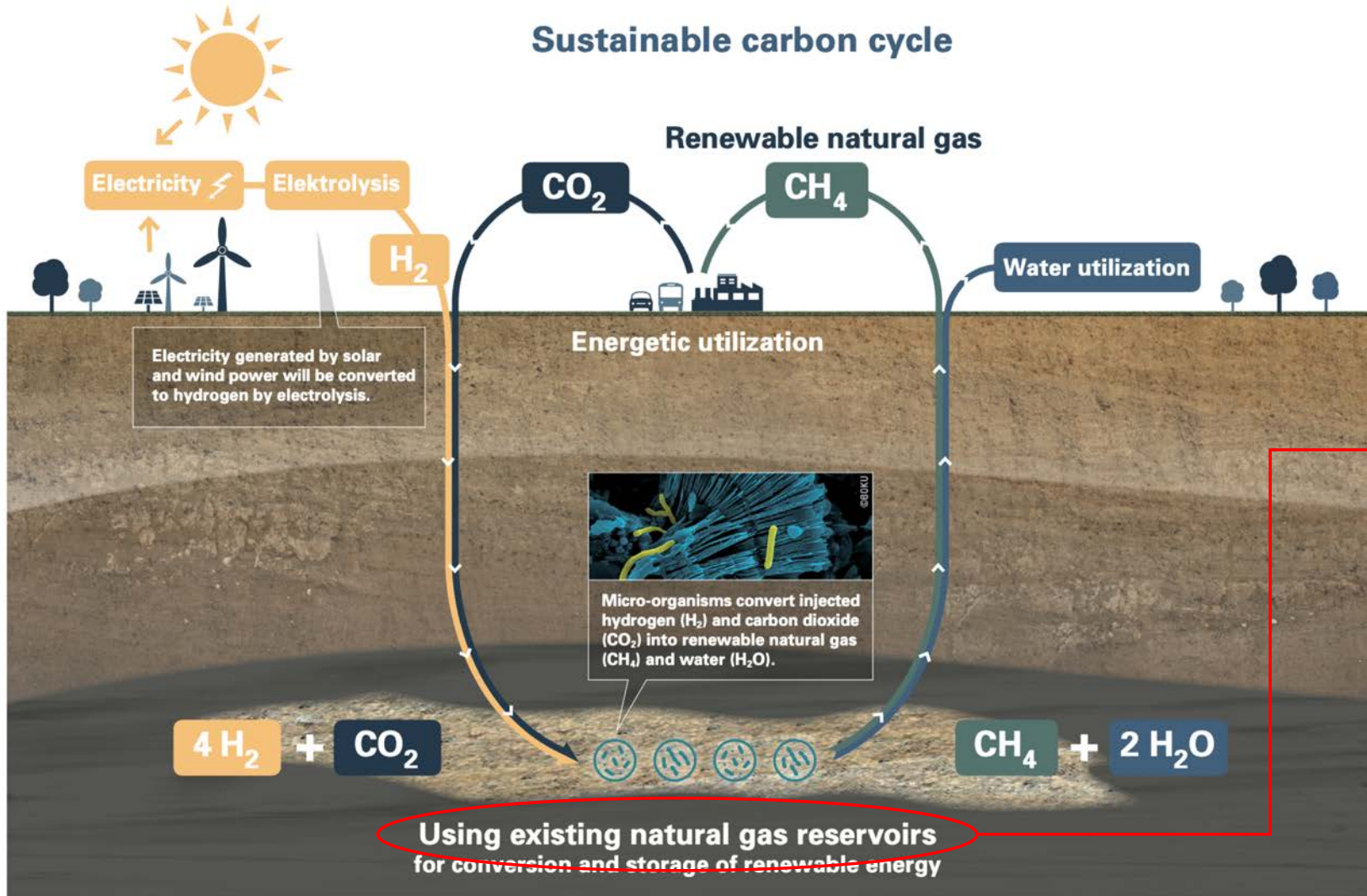
### Project funders

**Bundesamt für Energie**  
 Schweizerische Eidgenossenschaft  
 Confédération suisse  
 Confederazione Svizzera  
 Confederaziun svizra

 **FFG**  
 Forschung wirkt.

Siehe auch ExpertInnengespräche Power-to-X vom 23.09.2021:  
 “Projekt Underground Sun conversion–Flex Store” A. Kunz + Z. Stadler

# Principle of geo-methanation

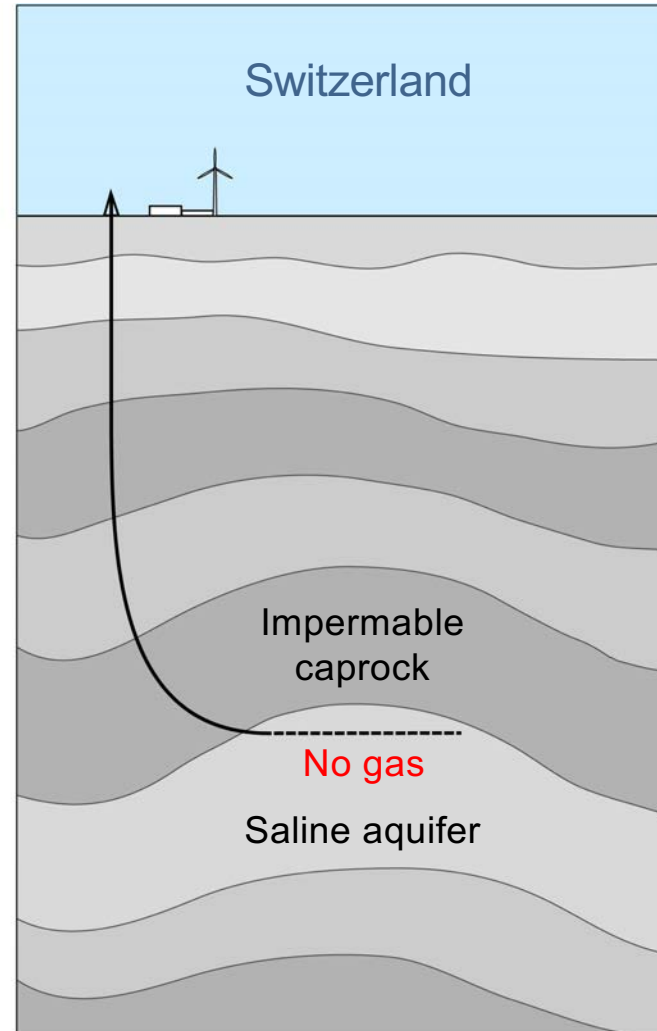
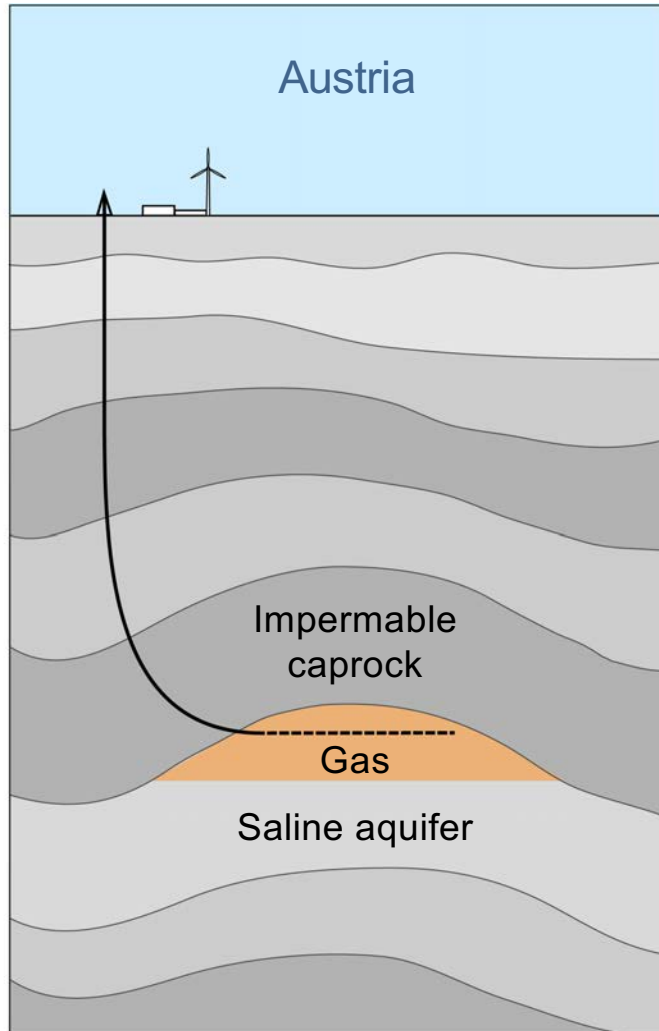


In Austria:  
Numerous & large  
( $\leq 1'300$  Mio.  $\text{sm}^3 \text{CH}_4$ )  
Used for commercial  
gas storage

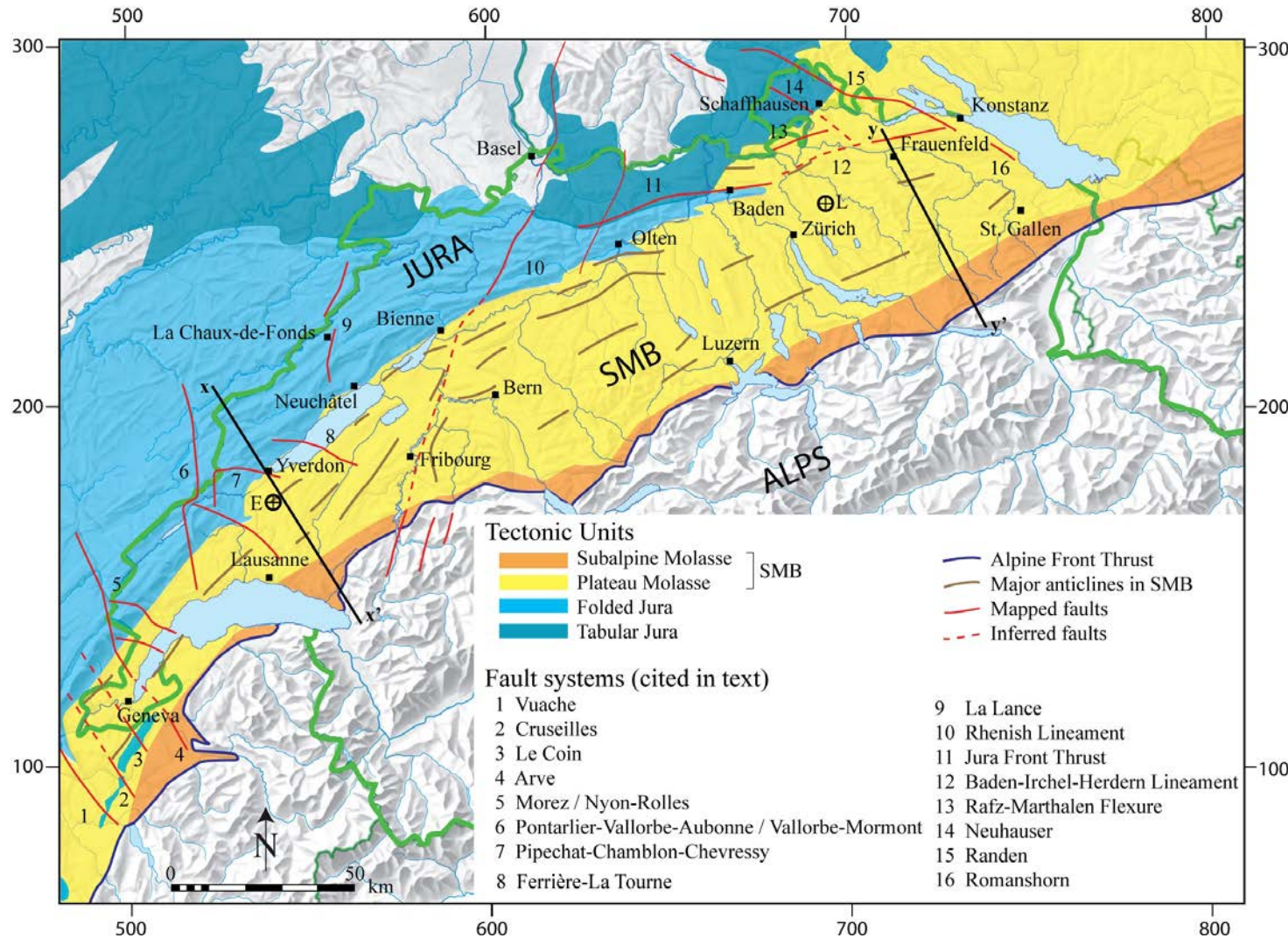
In Switzerland:  
No suitable  
reservoirs known!

# Gas discoveries in Austria vs. Switzerland

Gas trap structure



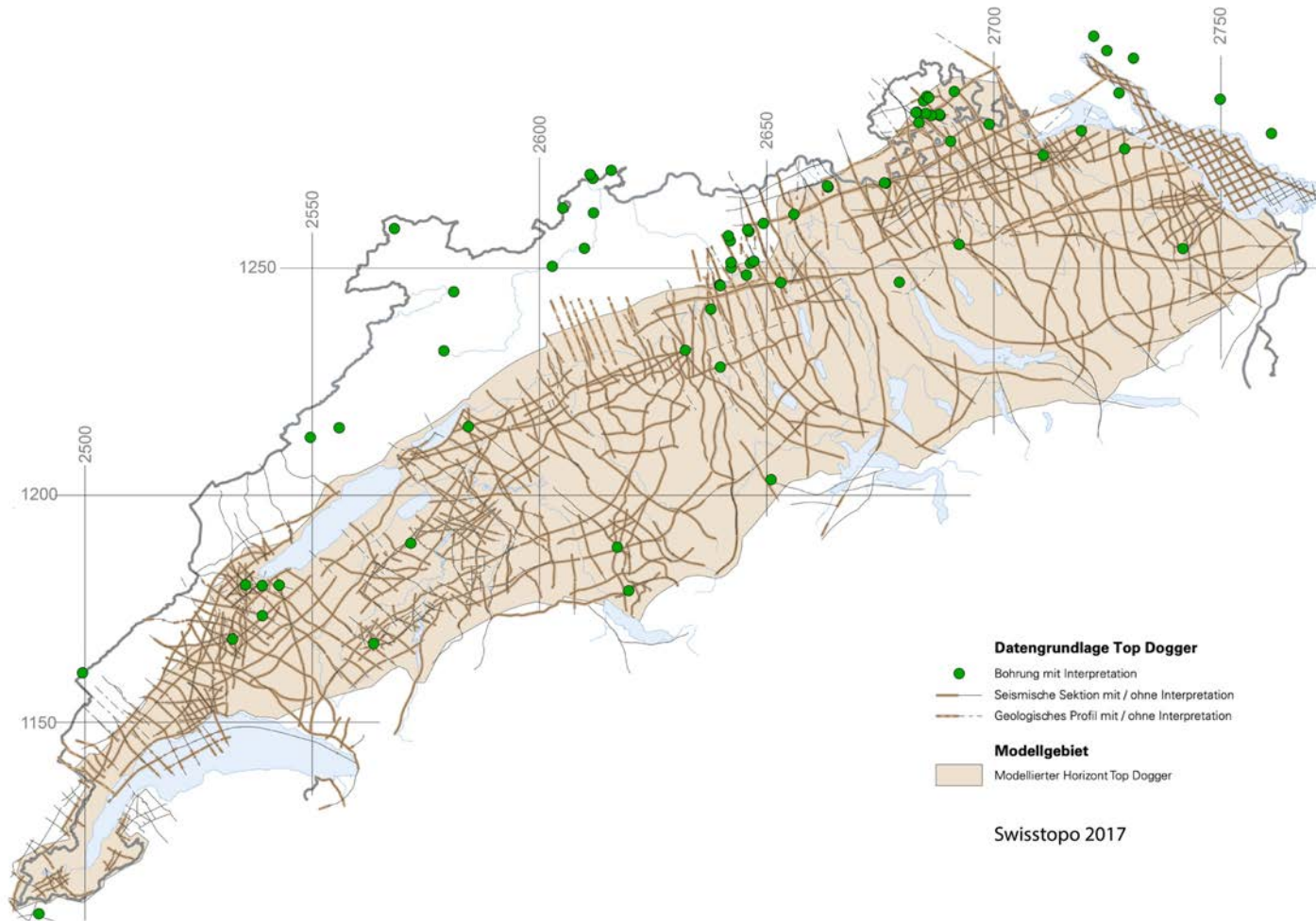
# Where to create gas reservoirs in Switzerland?



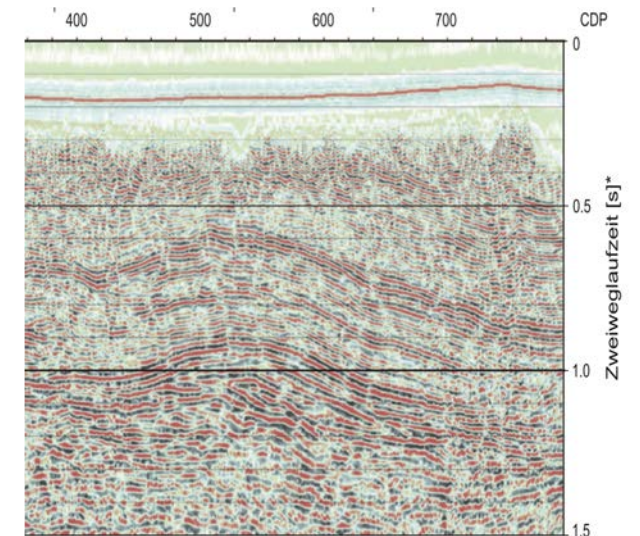
## Geological criteria for methanation

- Aquifer + caprock
- Trap structure
- >600 m deep
- 30 – 60 °C
- >10% porosity
- >50 mD permeab. = >5e-14 m<sup>2</sup>)

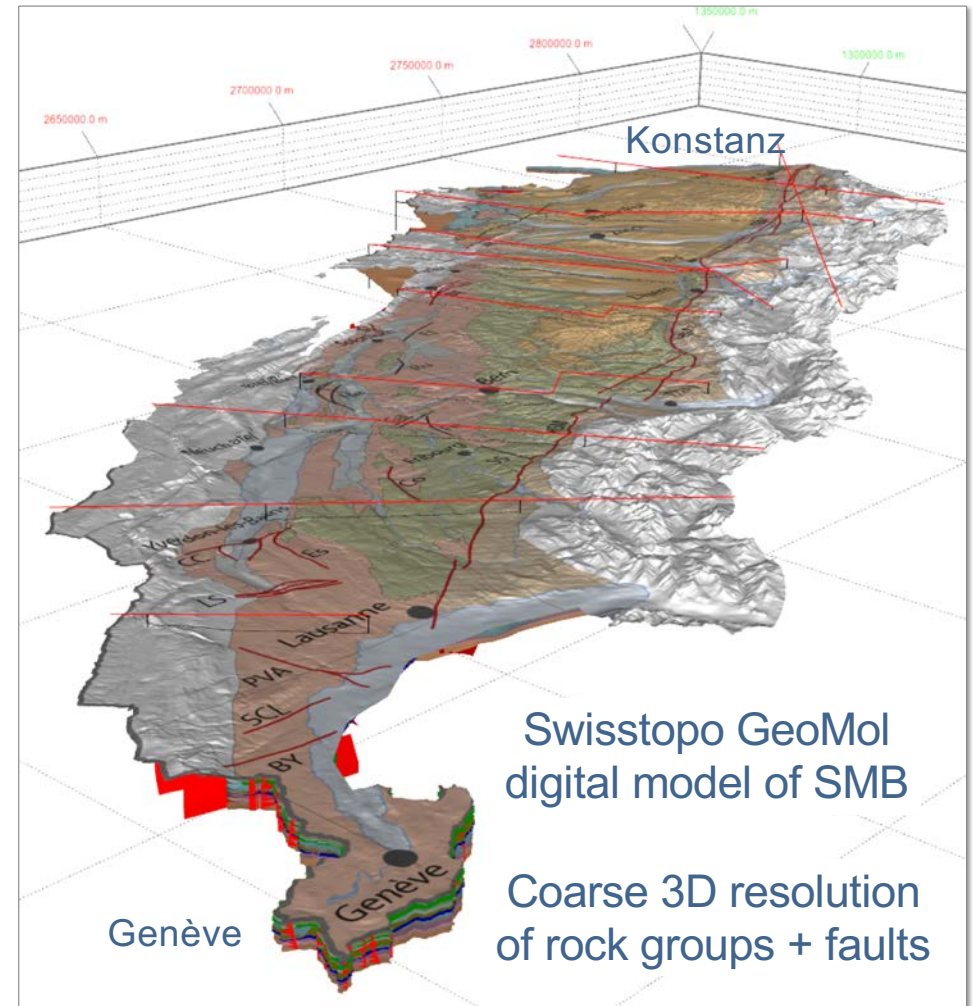
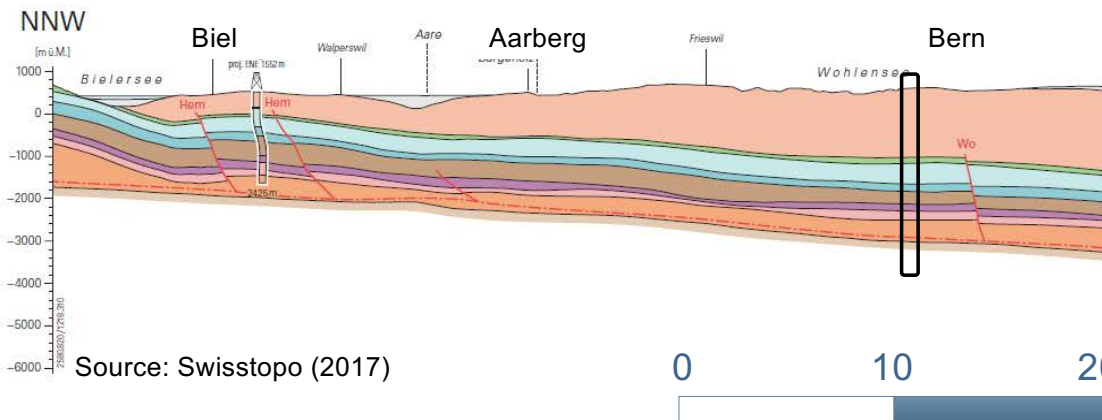
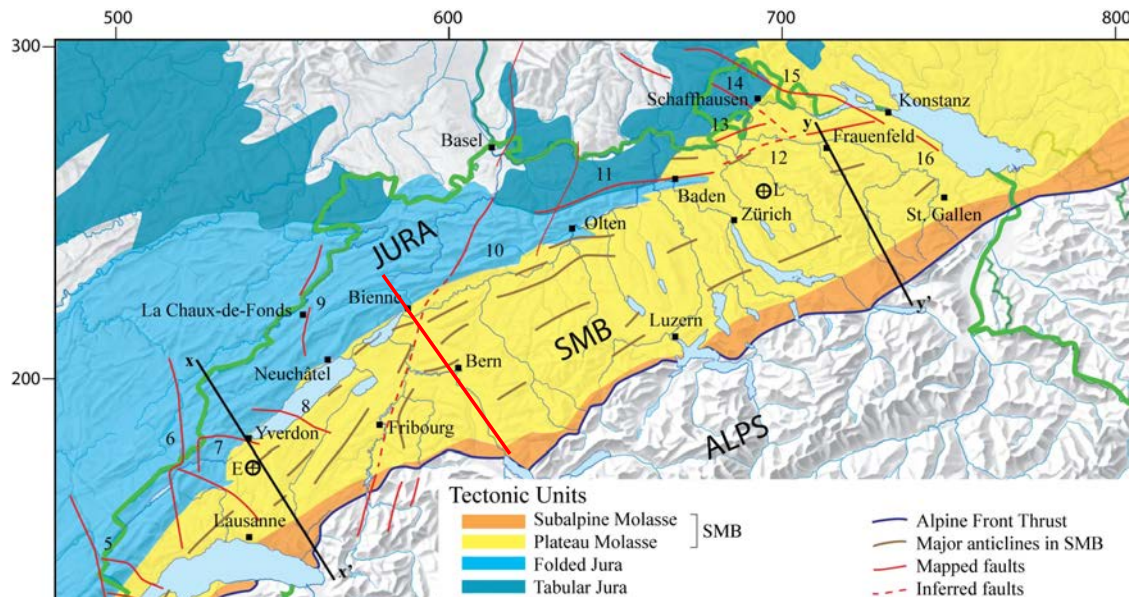
# Database: seismics + boreholes



Swisstopo 2017

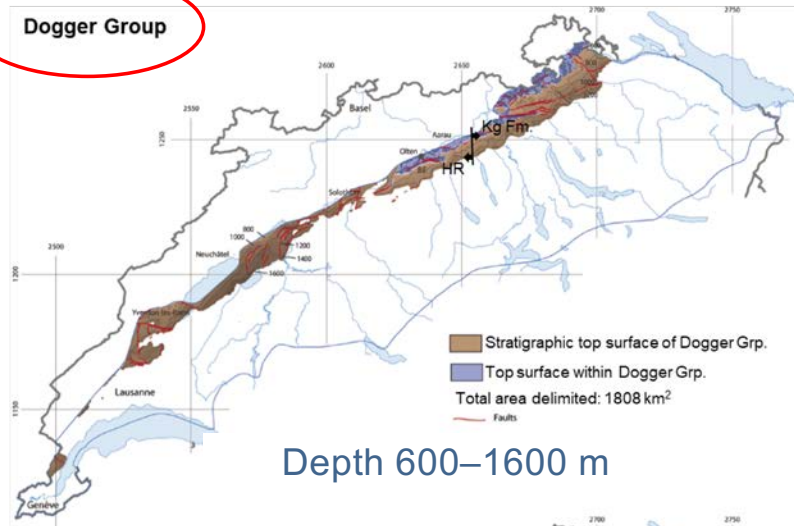


# Database: Swisstopo 3D digital model of SMB

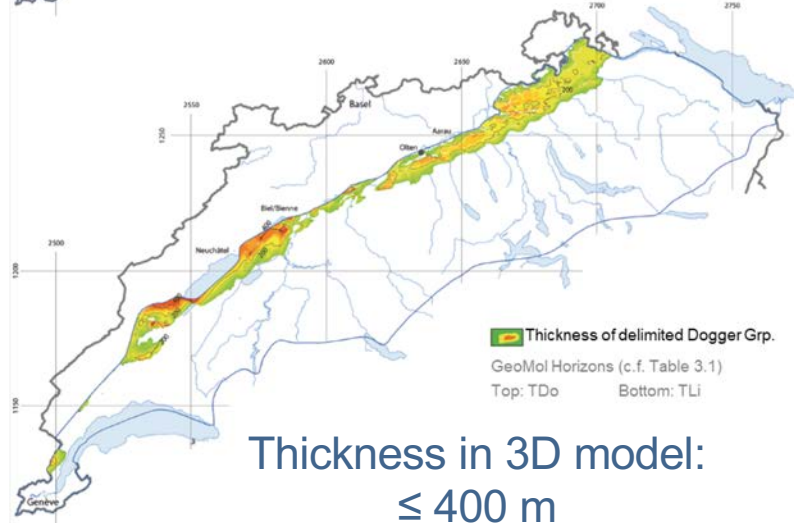


# Examples: Aquif./caprock pairs, 30–60°C, >600 m deep

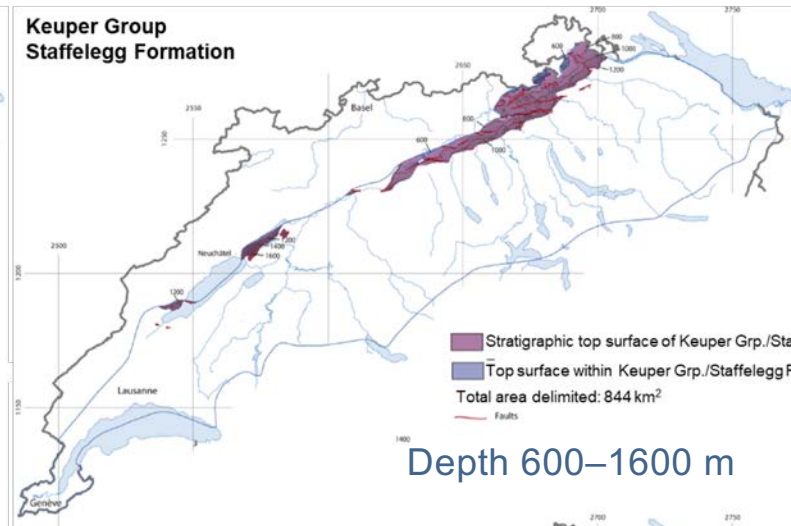
**Dogger Group**



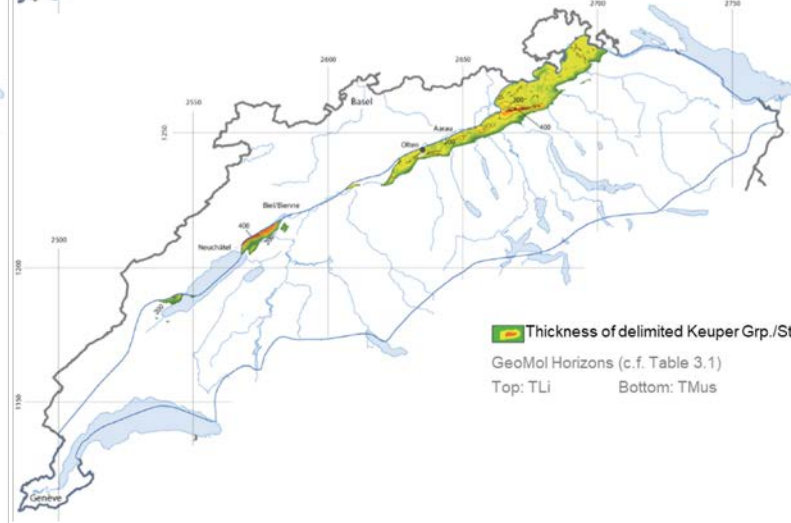
Depth 600–1600 m



**Keuper Group  
Staffelegg Formation**



Depth 600–1600 m

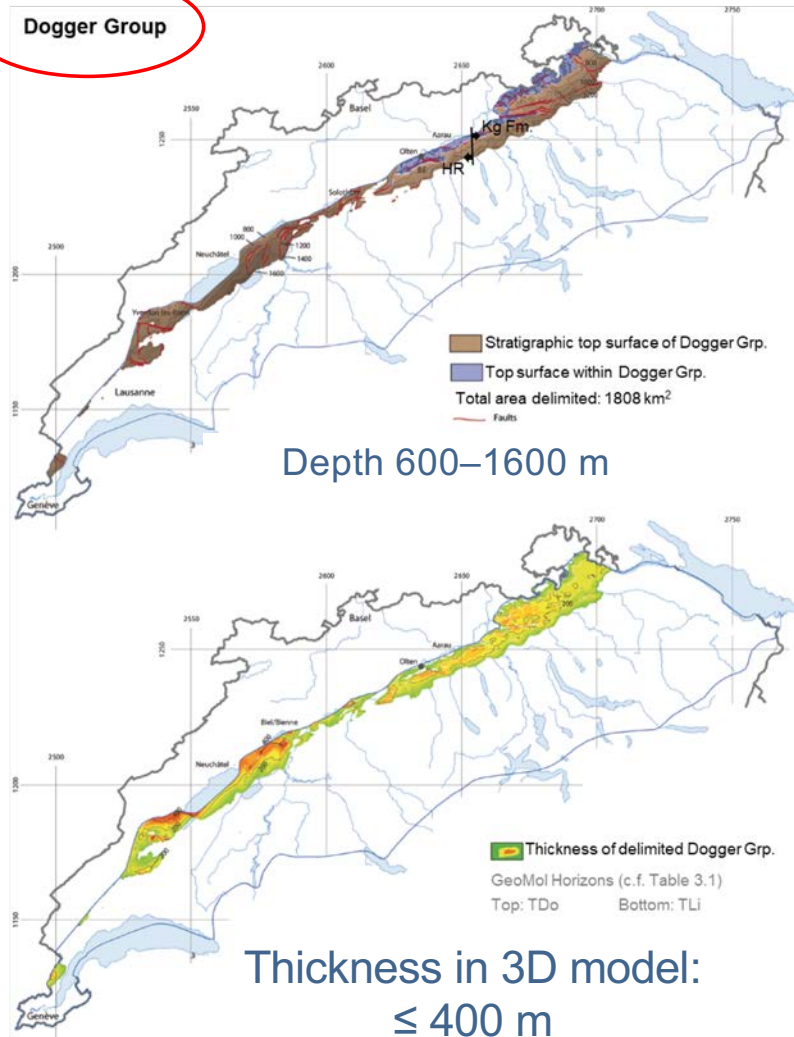


Lithology	Formation/ Group	Stratigr. column	
		Seal	Aquifer
Conglomerate, channel sandstone, marl	OSM	near Burgdorf near Lausanne	N S
Sandstone, silt	OMM		
Conglomerate, channel sandstone, marl, fresh-water carbonate, gypsum	USM	W E	E
Turbidite sandstone, shale	UMM		
Bioclastic limestone, calc. mudstone, marl	E. Cretac. limestones		
Micritic limestone, occasionally dolomitic	L. Jurassic limestones	W E	E
Dark calc. mudstone to shaly limestone	Wildegg Fm.		
Dark silty marl, oolitic limestone, bioclastic limestone, shale	Dogger Grp.	W E	E
Shale, siltstone, marl, limestone	Staffelegg Fm.		
Sandy shale, dolomite, marl, sandstone	Klettgau Fm.	W E	E
Alternating shale & gypsum/anhydrite	Keuper Grp.		
Limestone, dolomite (porous)	Muschelkalk Grp.	W E	E
Alternating shale & anhydrite, rock salt, sandstone	Buntsst. Grp.		
Siltstones, sandstones, breccias, bituminous shale, coal seams	(Pre-)Wei-tenau Fm.	W E	E
Gneisses with Variscan granitoid intrusions			



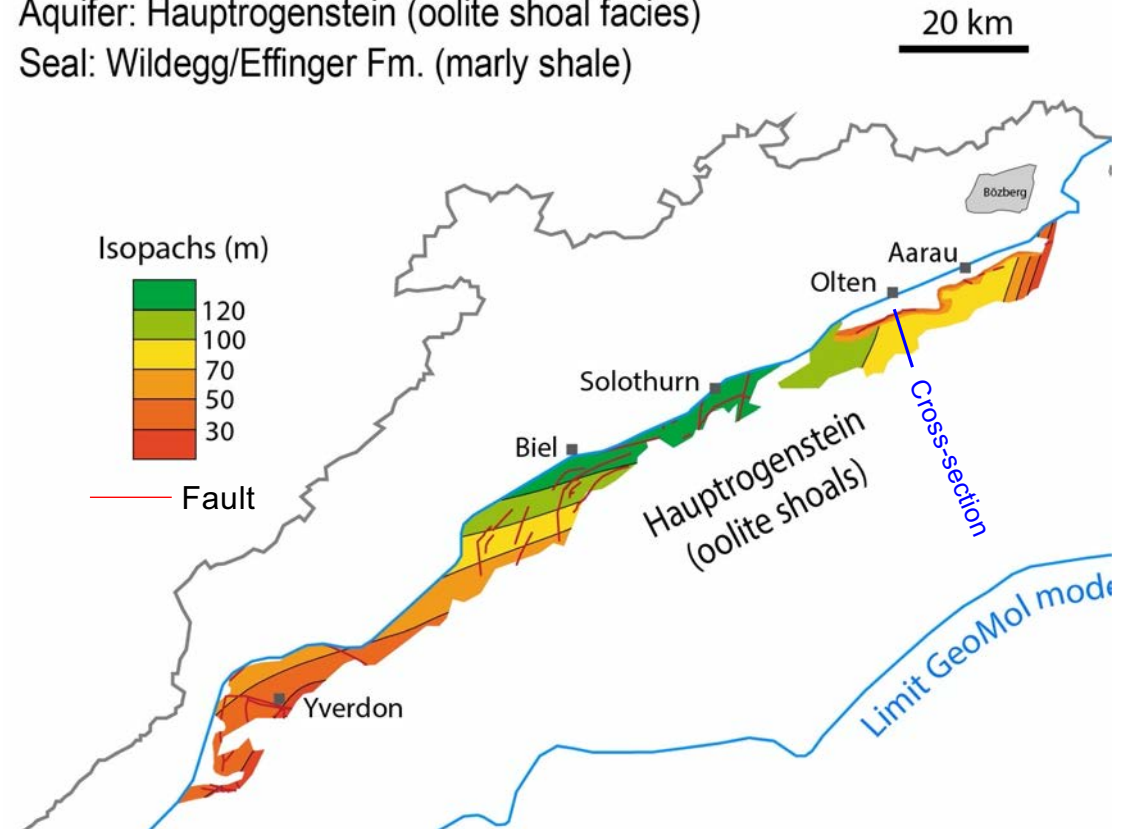
# Examples: Aquif./caprock pairs, 30–60 °C, >600 m deep

Dogger Group



Formation within Dogger Group: ≤ 130 m thick

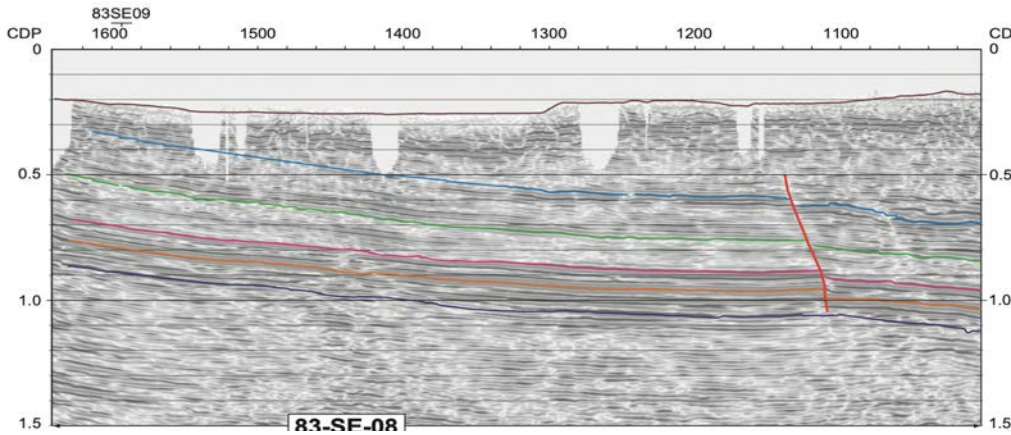
Aquifer: Hauptrogenstein (oolite shoal facies)  
 Seal: Wildegg/Effinger Fm. (marly shale)



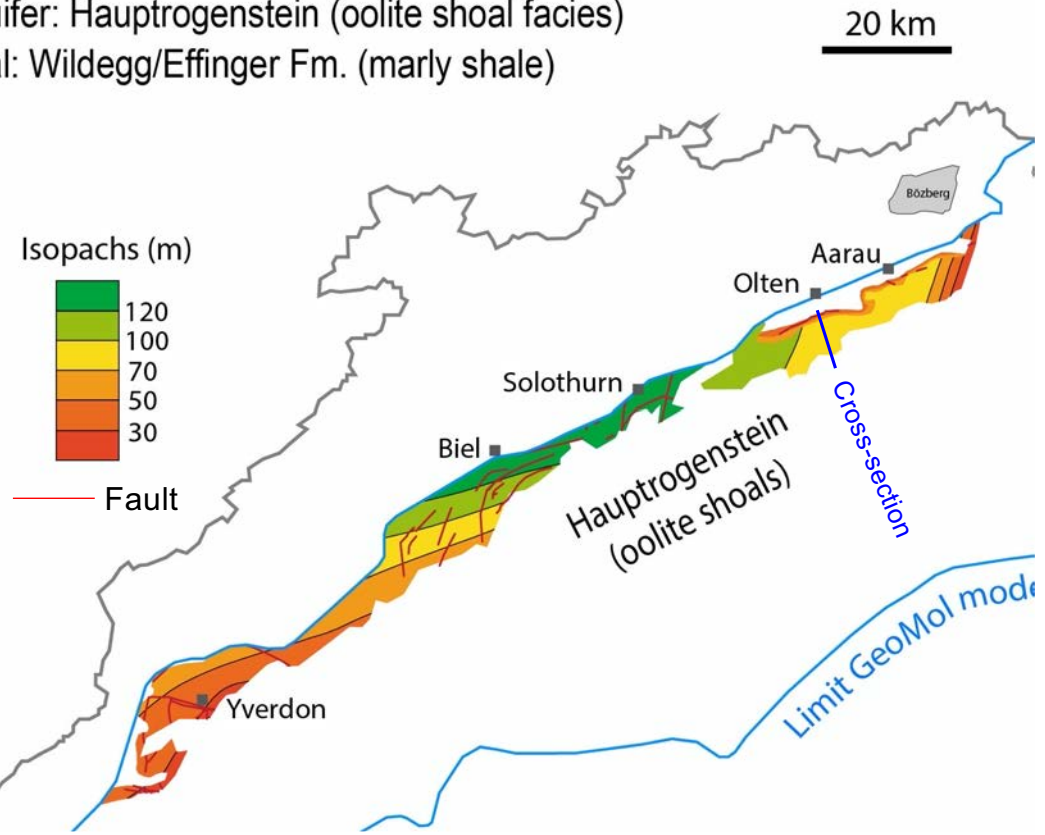
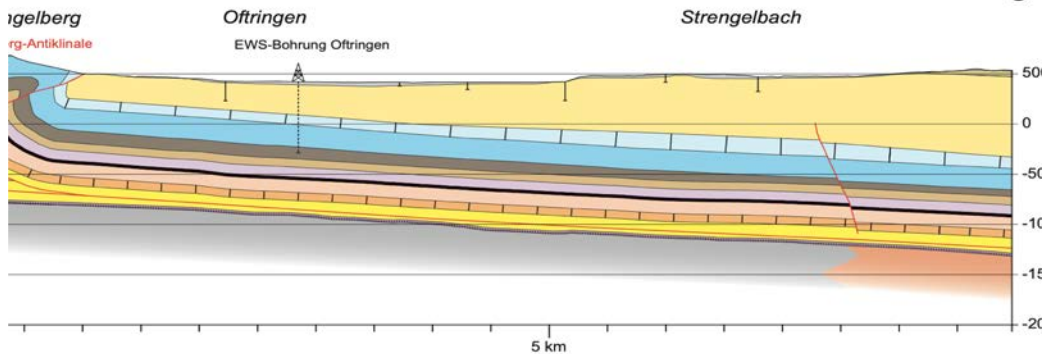
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## NNW–SSE cross-section (rare information!)

Formation within Dogger Group: ≤ 130 m thick



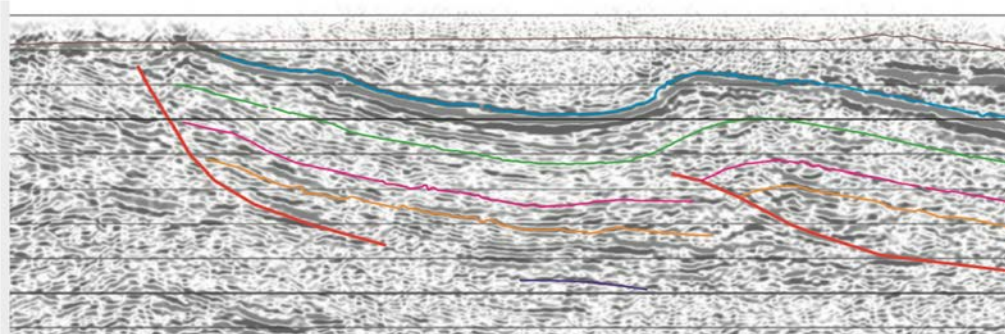
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Formations dip to S: injected gas will migrate to N and leak to surface

# Examples: Aquif./caprock pairs, 30–60 °C, >600 m deep

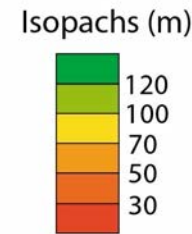
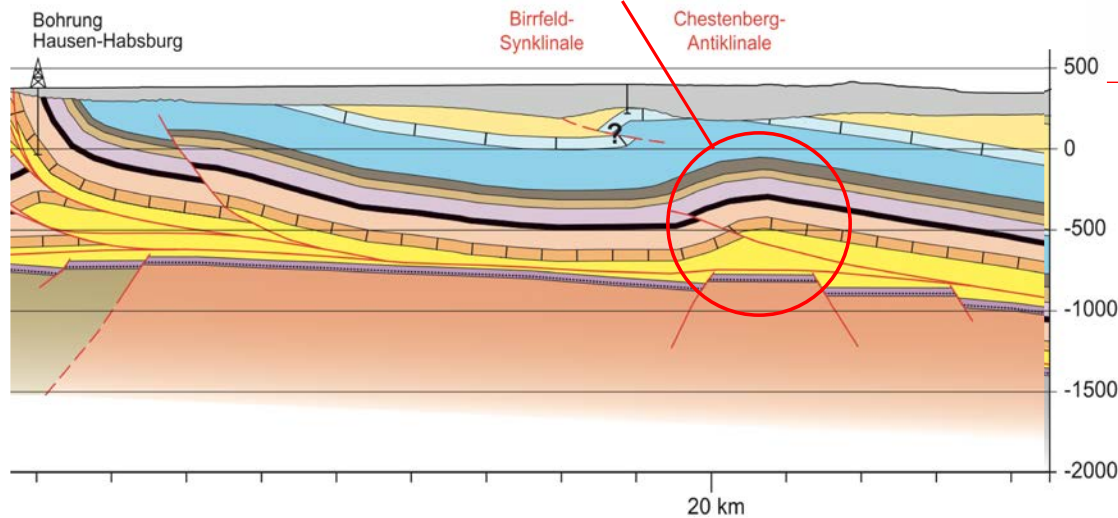
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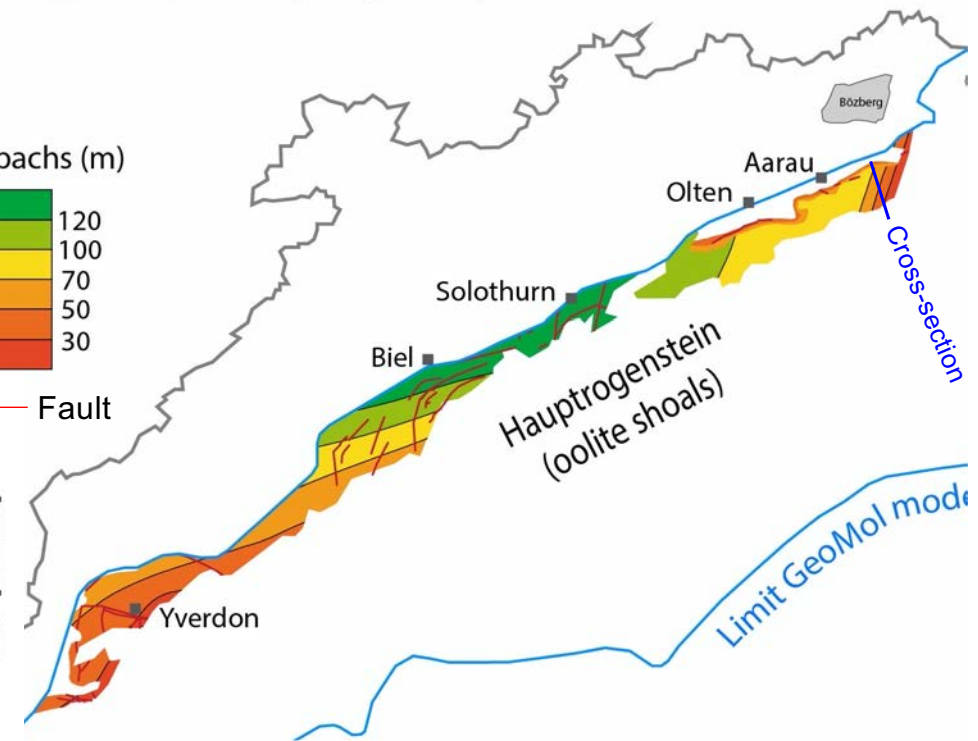
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## Formations locally folded = gas trap structure



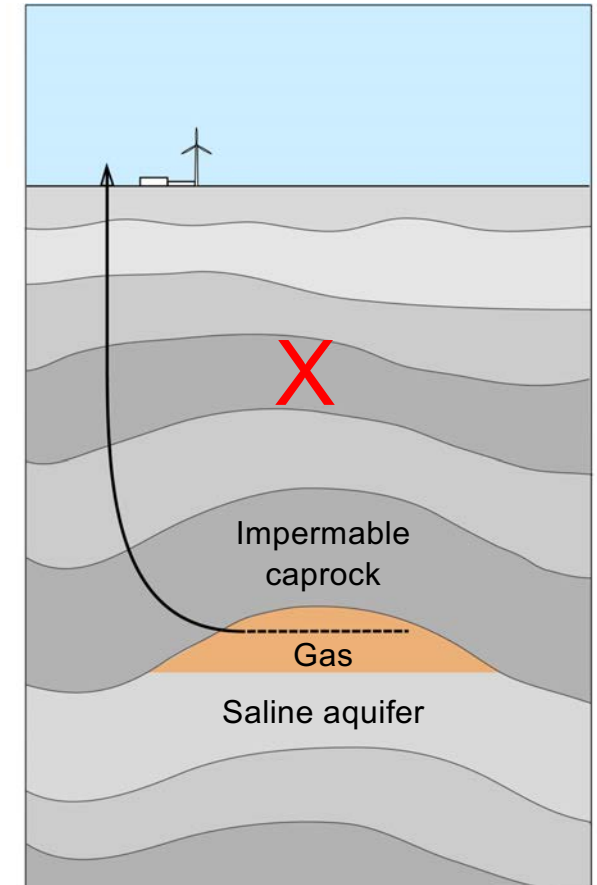
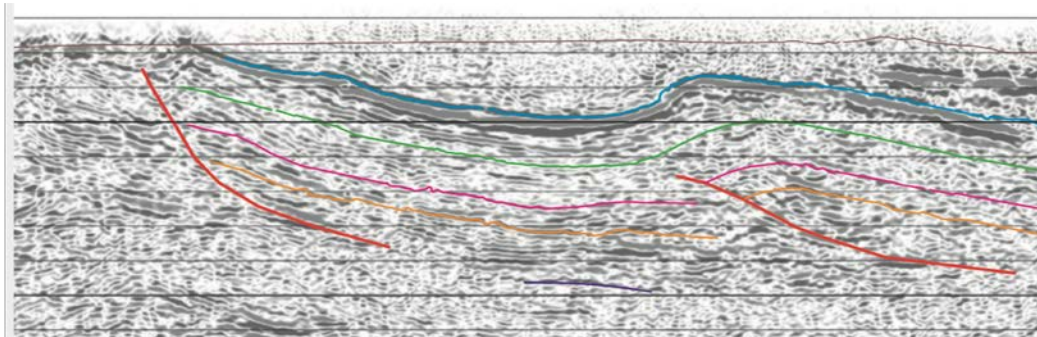
Fault


Tiefe [m ü.M.]



## Next project steps (by April 2023)

- Finalize map of formations fulfilling geo-methanation criteria →
- Assess conflicts of use of subsurface (e.g. Nagra)
- Estimate costs (seismic survey + drilling + hydraulic tests)



→ energie360°  Bundesamt für Energie  
Business case?  
Capital for exploration?