

Harmonisation of Opalinus Clay descriptions in Northern Switzerland: towards a uniform Subfacies Classification Scheme

Géraldine Zimmerli^{*(1)}, Bruno Lauper⁽¹⁾, Gaudenz Deplazes⁽²⁾, David Jaeggi⁽³⁾, Stephan Wohlwend⁽⁴⁾ & Anneleen Foubert⁽¹⁾

⁽¹⁾ Department of Geosciences, University of Fribourg, 1700 Fribourg, Switzerland

⁽²⁾ Nagra, 5430 Wettingen, Switzerland

⁽³⁾ Federal Office of Topography swisstopo, 3084 Wabern, Switzerland

⁽⁴⁾ Geological Institute, ETH Zurich, 8092 Zürich, Switzerland

*geraldine.zimmerli@unifr.ch

25th May 2022



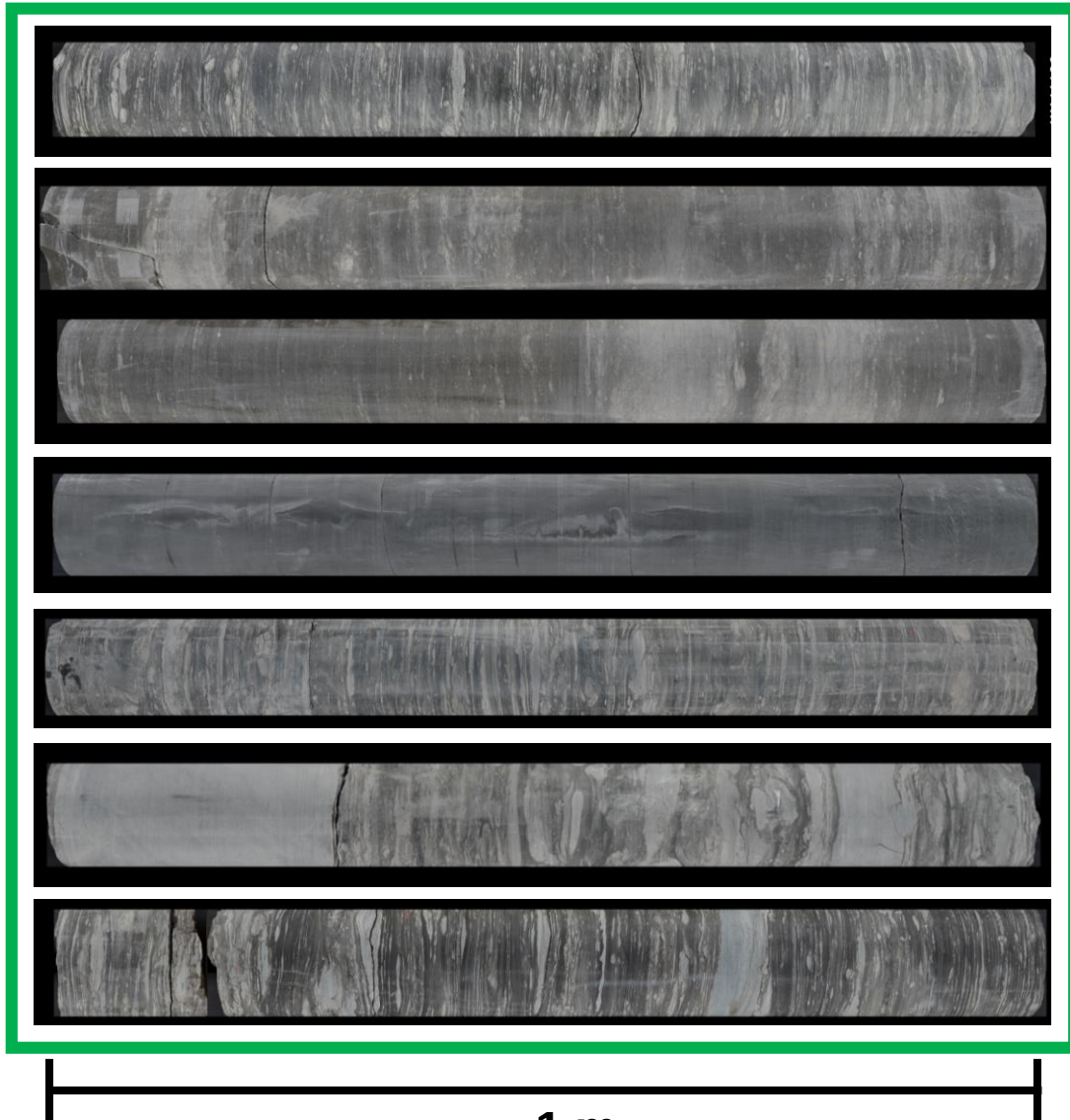


Opalinus Clay

nagra.

radioactive waste disposal

- low permeability
- high retention capacity for radionuclides
- self-sealing of fractures
- assessed as a **safe long-term** storage host rock



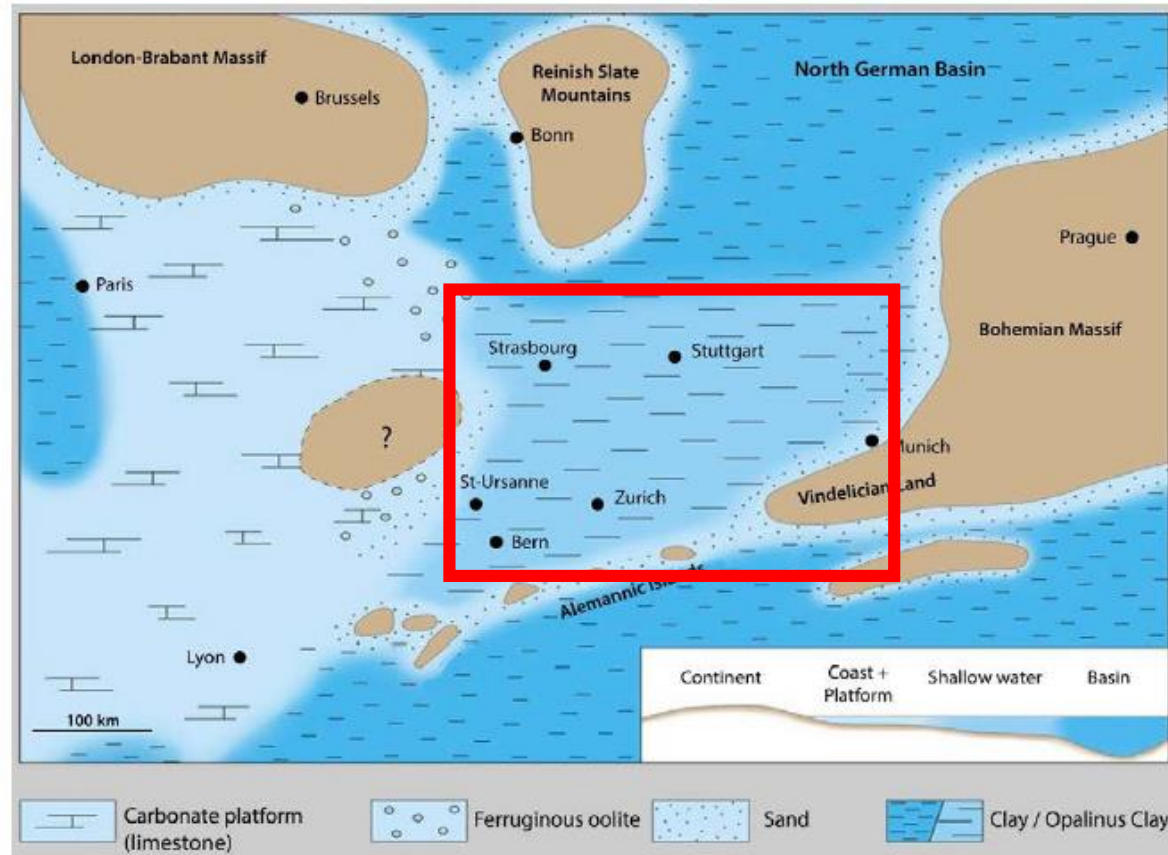
1 m



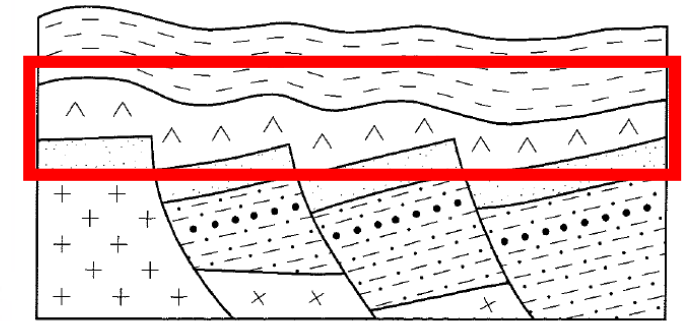
Palaeogeography

Stage	Ammonite zone/subzone	Western Switzerland	Northern Switzerland
Aalenian	Murchisonae	Haugi	Passwang Fm
	Opalinum	Comptum	«Murchisonae-Oolith Fm»
	Opalinum	Opalinum	Opalinus Clay
Toarcian	Aalensis	Torulosum	Staffelegg Fm
	Aalensis	Aalensis	

(Lauper et al., 2021)



(Modified after Allia, 1996; Etter, 1990)



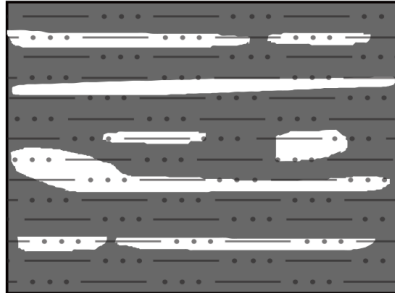
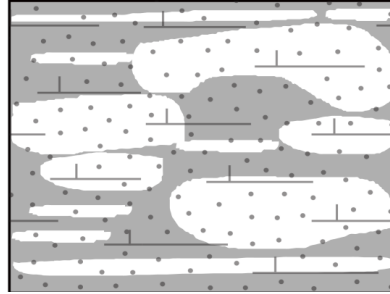
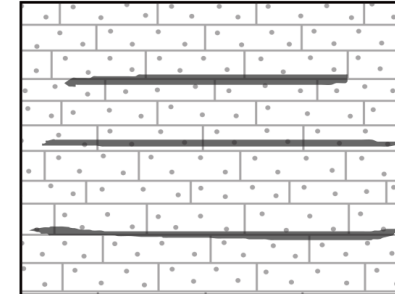
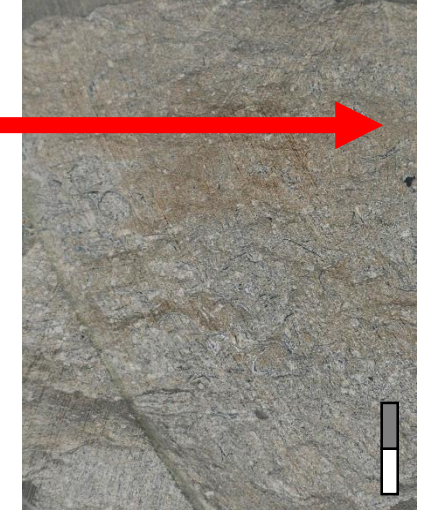
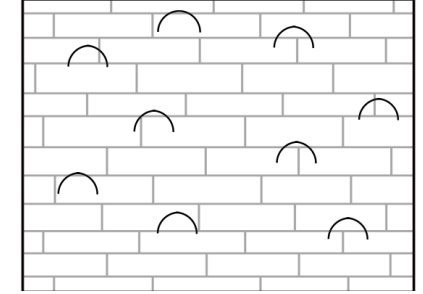
(Modified after Wetzel et al., 2003)

Swells and depressions

Facies diversity and thickness variations

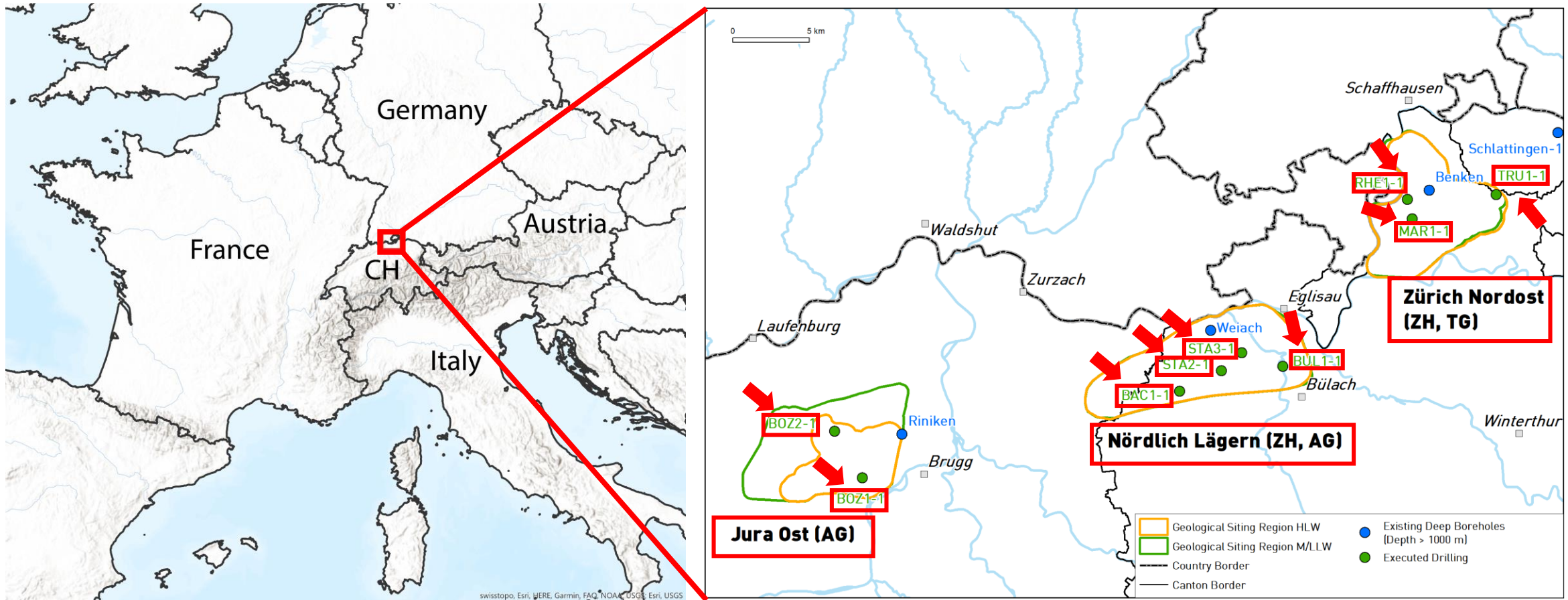


Subfacies classification scheme

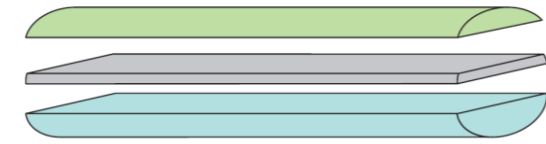
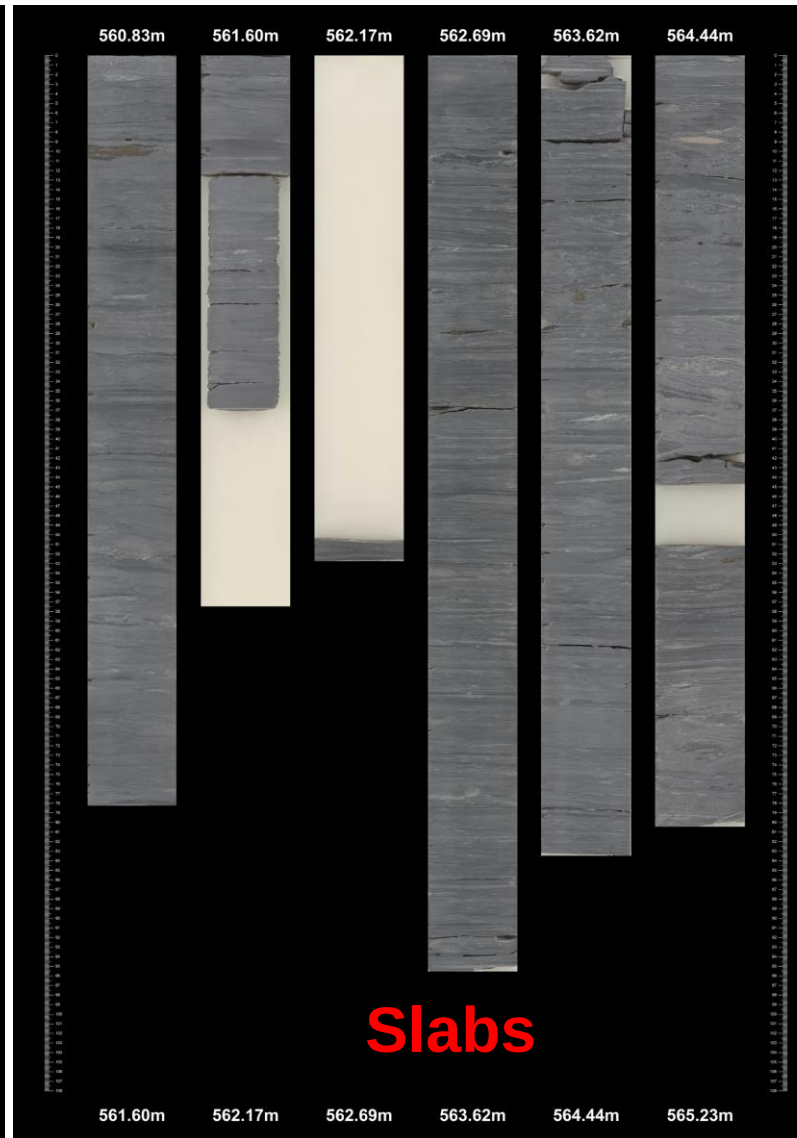
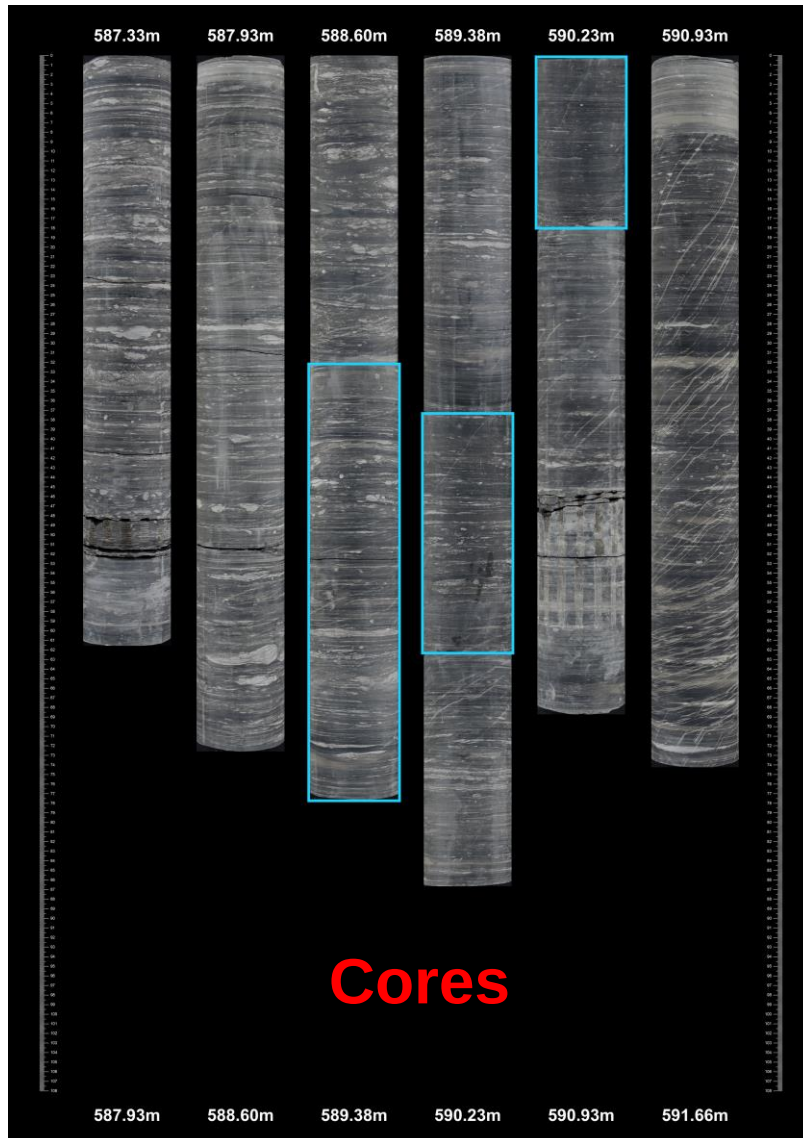
SF1**Argillaceous SF****SF2****Laminated/lenticular SF****SF3****Lenticular SF****SF4****Sandy SF****SF5****Bioclastic SF** = 2 cm**(Lauper et al., 2018, 2021)**



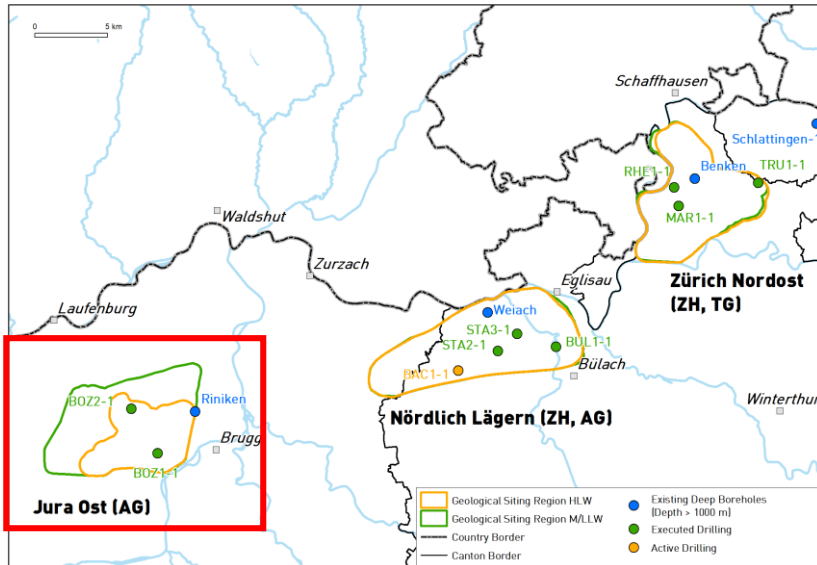
Potential storage sites



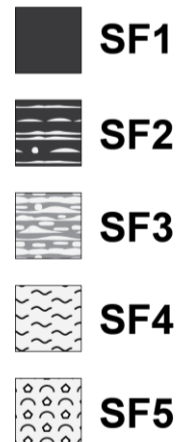
(With courtesy of NAGRA)



- Unique
- High-quality
- Fresh
- Unaltered
- Test vertical and lateral facies variability at much smaller regional scale



(With courtesy of NAGRA)



Bözberg-2 Bözberg-1



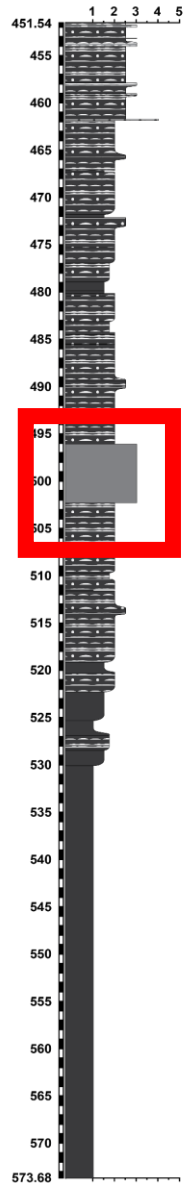
SF2 & SF3

SF2

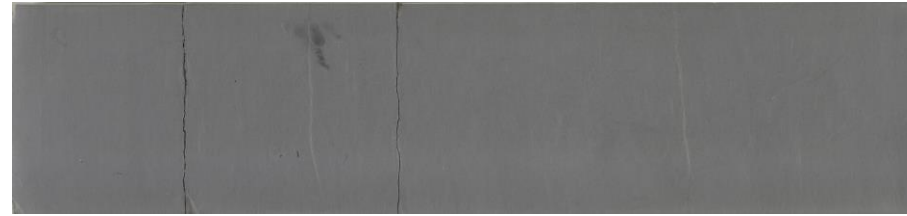
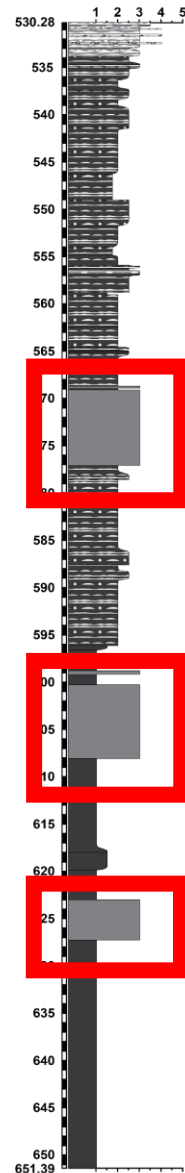
SF1



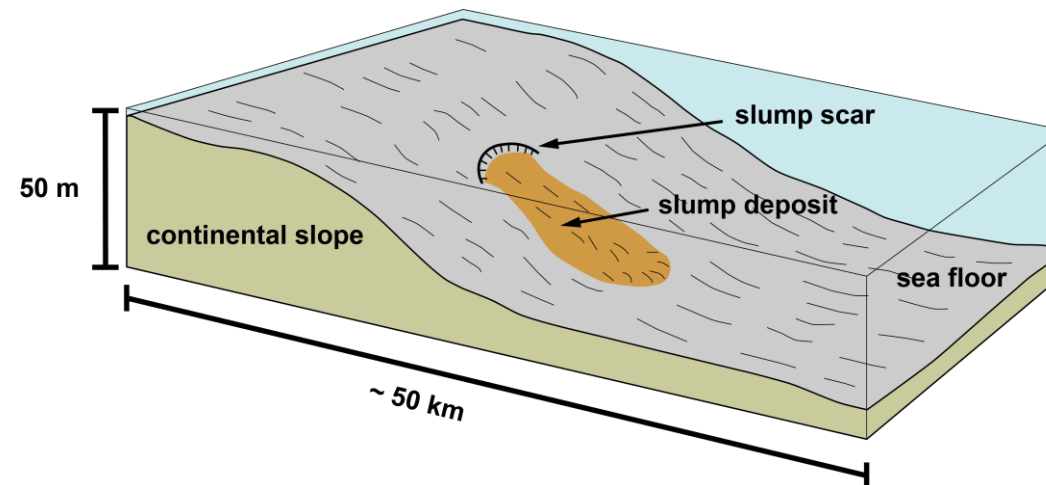
Bözberg-2



Bözberg-1



Bözberg-1: 574.50-574.91



(Vertical exaggeration: 200x; modified after Nichols, 2009)

**Base for the revision of a depositional
model for the Opalinus Clay**

Thank you !



Géraldine Nicole Zimmerli

Department of Geosciences, University of Fribourg

geraldine.zimmerli@unifr.ch

website: <https://www.unifr.ch/geo/carbonatesedimentology/en/>