DESTRESS

Demonstration of Soft Stimulation Treatments of Geothermal Reservoirs

Task 4.4: Simulation of the coupled processes

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| geothermal sites under investigation

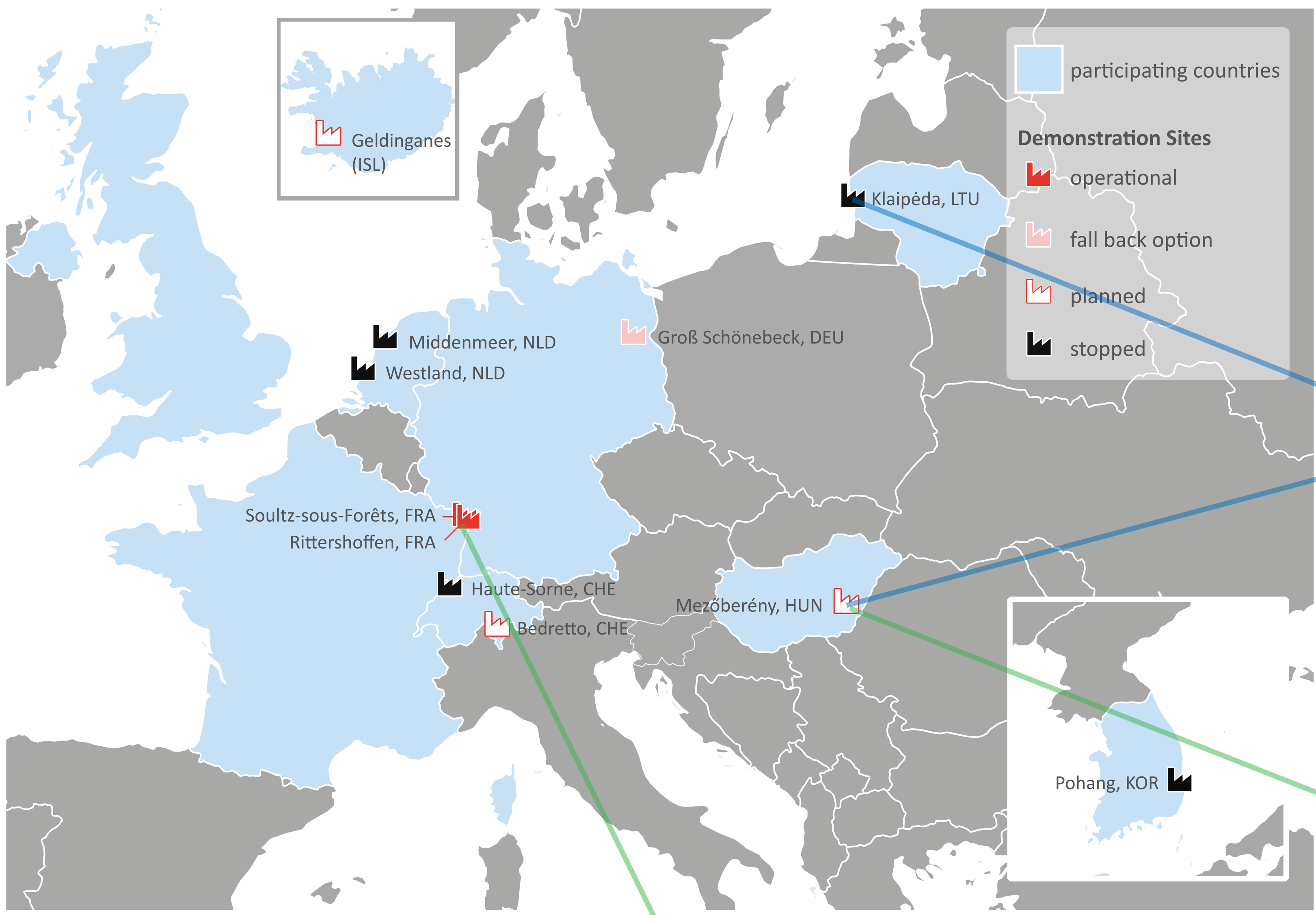
- Klaipėda, LTU
- Westland, NLD
- Soultz-sous-Forêts, FRA
- Mezőberény, HUN

| laboratory experiments

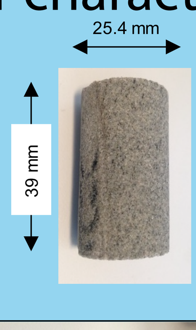
- gas pycnometer (Micromeritics AccuPyc II 1340) with helium
- Pore Size Distribution (PSD) by employing mercury intrusion porosimetry
- reactive flow through experiments

| numerical simulation

- **Klaipėda, LTU:** TH model of the geothermal system (canceled)
- **Westland, NLD:** THM model of the natural state (canceled)
- **Soultz-sous-Forêts, FRA:** HM(C) model of a partly sealed fault
- **Mezőberény, HUN:** H(C) model of the doublet system

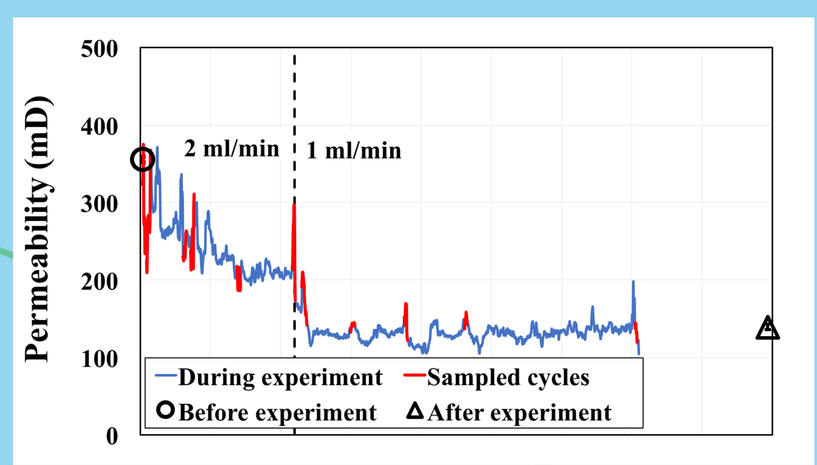


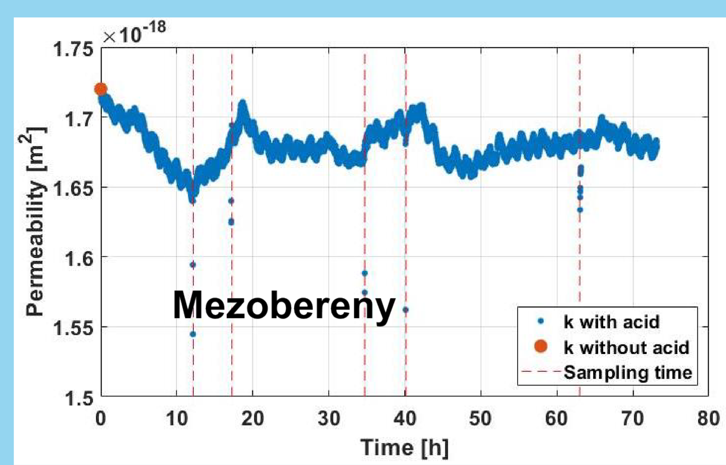
| reservoir characterisation by reactive flow through experiments



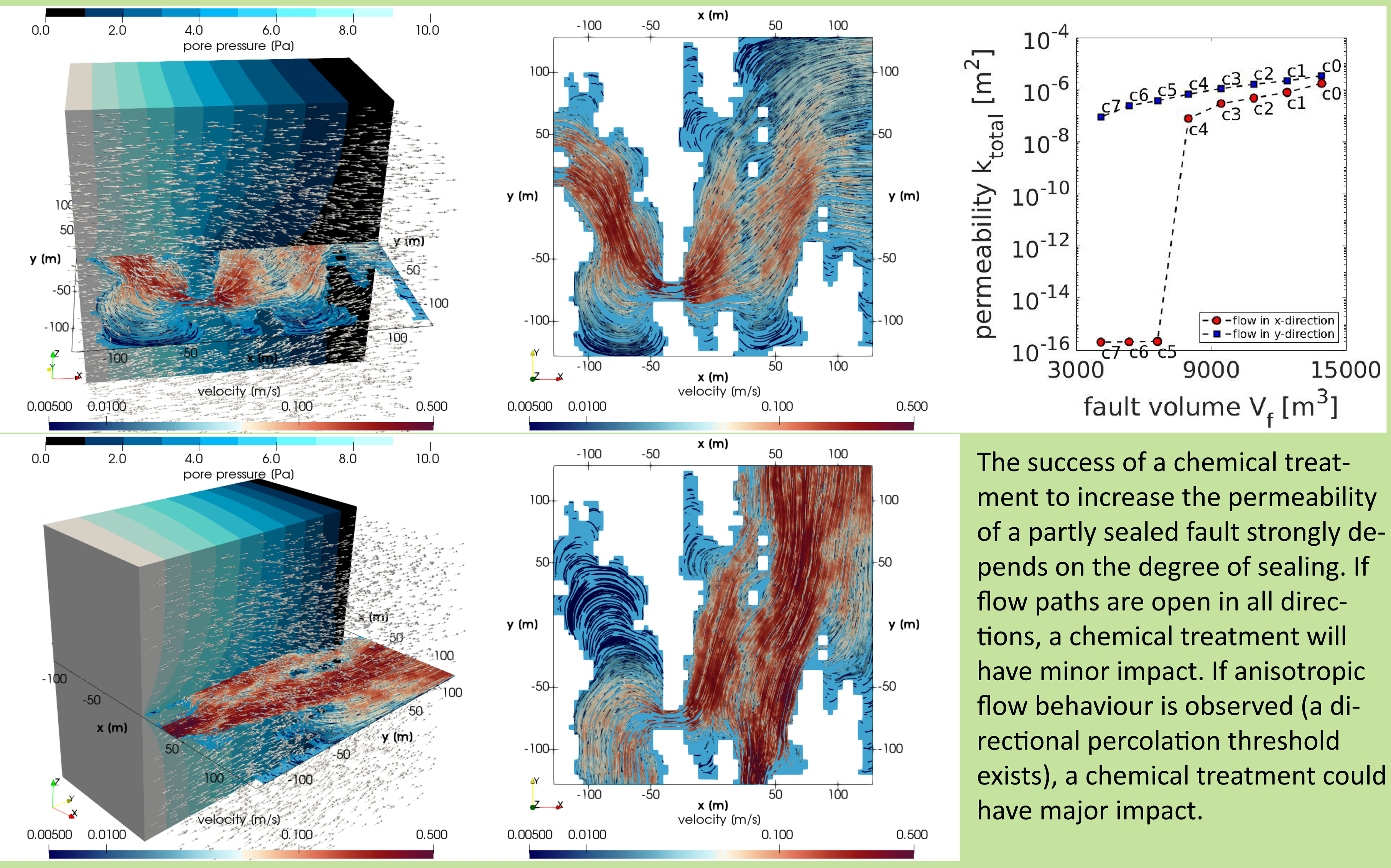
	Vydmantai-1	Palanga-318	Mezobereny
Depth	954.6 m	981 m	1500 m
Reactive phase	Dolomite	Dolomite	Calcite
Dissolved volume	0.16 ml	0.09 ml	0.022 ml
Stimulation fluid	0.8 mol/L CO_2 + 1 mol/L brine	0.8 mol/L CO_2 + 1 mol/L brine	10 mmol/L HCL + 80 mmol/L brine
Injection time	270 h	455 h	250 h
Injection rate	1-2 ml/min	0.01 ml/min	0.01 ml/min
Initial porosity	21.9%	8.76%	9.39%
Final porosity	23.2%	9.73%	9.71%
Initial permeability	356 mD	12 µD	1.72 µD
Final permeability	139 mD	83 µD	1.68 µD

The acid stimulation on M1-1500 bring no increase in its permeability as one would expect. This might be because of the short-duration experiment (~250 hours). In contrast, the potential compaction and the release of fines particle might have caused the decrease in permeability.



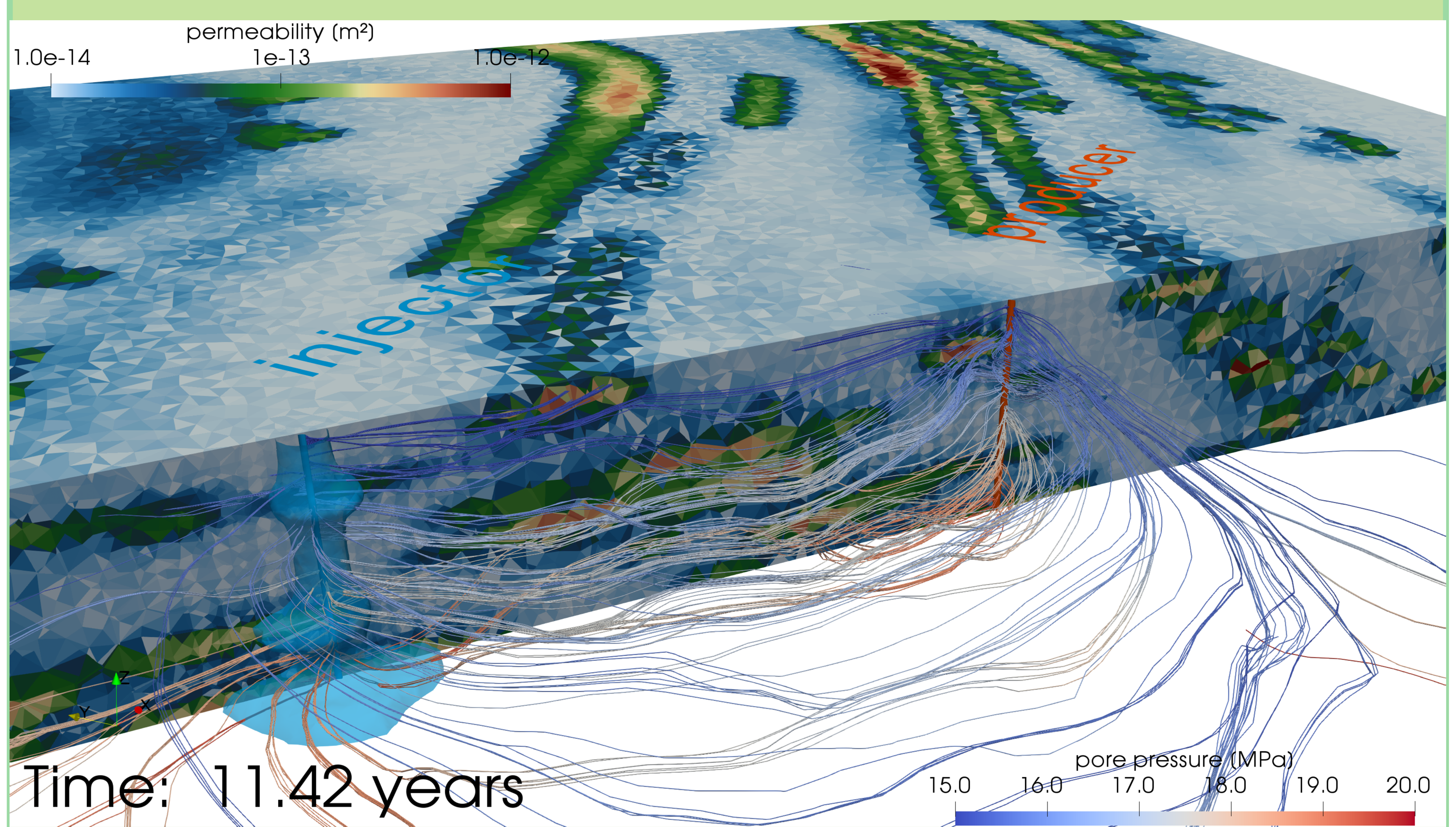


| Impact of a partly sealed fault on hydraulic properties of a granite reservoir



The success of a chemical treatment to increase the permeability of a partly sealed fault strongly depends on the degree of sealing. If flow paths are open in all directions, a chemical treatment will have minor impact. If anisotropic flow behaviour is observed (a directional percolation threshold exists), a chemical treatment could have major impact.

| Simulation of heterogeneous geothermal reservoirs



Results
- Flow pattern strongly influenced by porosity and permeability distribution
- Injection/production mainly in/from areas of high conductive layers

Potential
- Estimation of well performance in heterogeneous reservoirs
- Evaluation of doublet performance change due to chemical stimulation

| References

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