Caprock Integrity & Gas Storage Symposium

24–25 January 2024
St-Ursanne – Switzerland

PROGRAMME

CAPROCK INTEGRITY
& GAS STORAGE
SYMPOSIUM

WELCOME TO THE FIRST CIGSS

In the context of the urgency of climate change and the need to drastically reduce greenhouse gases in the atmosphere, it is essential to capture and store unavoidable CO_2 emissions, alongside other vital emission reduction measures. Indeed, some CCS is essential to achieve the 2050 carbon neutrality targets that industrialised countries have set themselves. The Caprock Integrity & Gas Storage Symposium (CIGSS) aims at providing and establishing a platform for the exchange and discussion of scientific, technological, industrial, and regulatory advances related to the integrity of caprocks in the context of geological storage of CO_2 and gas storage in general. Purposely organised in St-Ursanne, with the support of the Mont Terri underground rock laboratory and its partners, the CIGSS benefits from the invaluable contribution and knowledge of the radioactive waste disposal community. Their experience is indispensable, particularly when it comes to gas migration in low-permeability rocks such as claystone, which is a promising host rock for nuclear waste disposal and caprock for CO_2 storage.

The first day of this 1st CIGSS is devoted to a symposium with academic community, government agencies, industry representatives and invited speakers. The following themes are on the agenda: public acceptance, regulation, site screening and exploration, characterization and behavior of geological reservoirs and caprocks, key research developments of geological storage of CO_2 and other gases like H_2, and expectation of CO_2 producers. The second day is devoted to scientific exchange and discussion during poster sessions, in the field of fault, caprock and borehole integrity, and gas storage in general.

In summary, the 2-day symposium is arranged around five core themes:

- Small-scale laboratory experiments
- Medium-scale rock laboratory experiments toward pilot-scale projects
- Local and regional geological and structural investigations of potential sites
- Numerical studies
- Innovative monitoring systems

The core themes will allow practitioners and researchers from diverse backgrounds to progress beyond current knowledge barriers, and lay out a framework for the evaluation of caprock integrity in claystone and possibly increasing the public acceptance of geological gas storage.

Guided tours of the Mont Terri underground rock laboratory and a symposium dinner complete the CIGSS program. Participants will be able to see for themselves the experiments being carried out in the low permeable Opalinus Clay in the fields of CO_2 storage and radioactive waste with focus on hydrogen migration.

PROGRAMME

24 JAN – CIGSS, DAY 1

Symposium with government agencies, industry representatives and invited speakers

08:30	**Registration opens / Mont Terri Visitor Centre**
09:00	**Welcome address** Christophe Nussbaum (swisstopo)
09:10 – 10:30	**Session 1 | Geological carbon storage in Switzerland: current status and next steps** Chair: Christophe Nussbaum (swisstopo) #101 **Establishing CO_2-Storage in Switzerland** Martin Jiskra (Swiss Federal Office for the Environment) Christian Minnig (Swiss Federal Office of Energy) #102 **Current and planned activities of the Swiss Geological Survey in the context of the geological carbon storage** David Jaeggi (swisstopo) Herfried Madritsch (swisstopo) #103 **Hard to abate sectors – how do we manage the challenge for the net zero target in climate policy on the way to 2050?** Robin Quartier (VBSA) Stefan Vannoni (cemsuisse) #104 **From caprock integrity to system integration. Lessons for siting of CO_2 storage locations** Thomas Flüeler (ETHZ)
10:30	**Coffee break**

11:00 - 12:40	**Session 2** | Geological carbon storage worldwide: Insights from research organisations Chair: Jens Birkholzer (LBNL/US DOE) #201 **How CCS can benefit from CO_2-Plume Geothermal (CPG)** Martin Saar (ETHZ) #202 **Experiments of Fault Zone Activation in Caprock Analogs: Implications for CO_2 Sequestration** Yves Guglielmi (LBNL/US DOE) #203 **Storing Swiss CO_2 in Iceland and Switzerland – Insights from DemoUpCarma and beyond** Stefan Wiemer (SED-ETHZ) #204 **Multi-disciplinary monitoring of the Ketzin CO_2 pilot site as successful concept for storage integrity assessment** Michael Kühn (GFZ, Helmholtz)
12:40	**Lunch**
13:45 - 15:00	**Session 3** | Geological carbon storage worldwide: Insights from energy companies Chair: Elin Skurtveit (NGI) #301 **Global status of saline aquifer CO_2 storage and key challenges for scale-up** Philip Ringrose (NTNU) #302 **CO_2 storage site feasibility assessment and risk-based monitoring – an industry approach** Marcella Dean (Shell) #303 **Structural geology and fault seal studies in CO_2 storage evaluations** Christopher Wibberley (TotalEnergies)

15:00	**Coffee break**
15:30 - 16:45	**Session 4** | Gas migration in shale and role of hydrogen Chair: Axel Liebscher (BGE) #401 **Current issues on gas in radwaste deep geological repositories: example of Cigeo (France)** Rémi de La Vaissière (ANDRA) #402 **Microbial hydrogen transformations in the deep subsurface** Rizlan Bernier-Latmani (EPFL) #403 **Exploration of natural hydrogen** Eric Gaucher (Lavoisier H_2 Geoconsult)
16:45	**Panel discussion** Jens Birkholzer (LBNL) Marcella Dean (Shell) Martin Jiskra (BAFU) Michael Kühn (GFZ, Helmholtz) Philip Ringrose (NTNU) Martin Saar (ETHZ) Stefan Vannoni (cemsuisse) Moderators: Gabriela von Goerne (BGR) & Christophe Nussbaum (swisstopo)
17:30	**Apéritif**
18:30	**Transfer to dinner**

PROGRAMME

25 JAN – CIGSS, DAY 2

Scientific conference

Only the presenting author is mentioned

09:00 **Registration opens / Mont Terri Visitor Centre**

09:30 **Session 5** | Poster
Small-scale laboratory experiments and transport models

#501
Molecular scale understanding of gas transport in clays
Sergey Churakov (PSI, Switzerland)

#502
CO_2 sealing capacity of sandy and shaly Opalinus Clay
Hyunbin Kim (University of Illinois, United States)

#503
Experimental study of coupled hydro-chemo-mechanical processes of CO_2 injection into a low-permeability sandstone
Iman R. Kivi (Imperial College London, United Kingdom)

#504
Characterizing elastic stiffness, creep, and in-situ stress and their anisotropies of clay shales using pressuremeter testing
Lang Liu (SINTEF, Norway)

#505
Geochemical hydrogen–pore water-Opalinus Clay interactions
Christian Ostertag-Henning (BGR, Germany)

#506
Petrophysical and petrothermal characterization of caprock carbonate stringers: The Upper Muschelkalk in the Estopanyà syncline, South-Central Pyrenees
Pedro Ramirez-Sanchez (University of Barcelona, Spain)

#507
Microbial processes responsible for hydrogen consumption in clay reservoirs
Camille Rolland (EPFL, Switzerland)

#508
Sealing capacity of a pre-fissured caprock to CO_2 injection (CS-C)
Eleni Stavropoulou (EPFL, Switzerland)

#509
Factors controlling acid interactions with carbonate rocks
Atefeh Vafaie (Imperial College London, United Kingdom)

#510
Project BiMiAb_H2: New experimental research to investigate hydrogen migration in reservoir and caprock layers
Philipp Weniger (BGR, Germany)

#511
Seismic and ultrasonic monitoring of a shale seal exposed to CO_2: a laboratory study
Sehrii Lozovyi (SINTEF, Norway)

10:45

Session 6 | Poster
Medium-scale rock laboratory experiments toward pilot-scale projects and associated advances in numerical simulations and sensing technologies

#601
CO_2 leakage through a stimulated fault in a claystone caprock
Prescelli Annan (ETHZ, Switzerland)

#602
Fluid flow driven by rupture growth in low-permeability faults during high-pressure injection in shale caprocks
Frédéric Cappa (Geoazur, France)

#603
Assessing caprock integrity in an acid gas storage project: a Middle East case
Martina Cervelli (Ad Terra Energy, Switzerland)

#604
CO2 storage in salt basins: Influence of salt tectonics on seal integrity and containment risk
Sian Evans (University of Oslo, Norway)

#605
Increasing process understanding in gas migration: investigations using the TH2M modelling approach
Vinay Kumar (BGR, Germany)

#606
Fate of hydrogen gas injected in a clay-rich rock: an in situ experiment
Mélanie Lundy (ANDRA, France)

#607
Hydro-geochemical scoping calculations for the CO_2 Long-term Periodic Injection Experiment (CO_2 LPIE)
Jin Ma (University of Bern, Switzerland)

#608
Storage capacity assessment for CO_2/H_2S in a depleted gas condensate reservoir
Nicolas Rangel Jurado (Ad Terra Energy, Switzerland)

#609
GCS caprock potential of the Triassic Haisborough Group, Southern North Sea: insights from an onshore UK analogue
Simon Schneider (CASP, United Kingdom)

#610
Field-scale hydro-mechanical simulation of a novel monitoring system for the CO_2 Long-Term Periodic Injection Experiment (CO_2 LPIE) at the Mont Terri rock laboratory
Sri Kalyan Tangirala (CSIC-UIB, Spain)

#611
Using the miniRUEDI within the context of the Mont Terri Rock Laboratory – potential and challenges
Yama Tomonaga (Entracers GmbH, Switzerland)

#612
Fault slip in clay-rich rocks – influence of the interaction between water and clay minerals
Markus Rast (ETHZ, Switzerland)

#613
Combined numerical and experimental investigation of injection related effects in the CL experiment
Gesa Ziefle (BGR, Germany)

#614
A borehole modular multi-sensor monitoring system (MMMS)
Martin Ziegler (swisstopo, Switzerland)

#615
CO_2LPIE — CO_2 Long-term Pulse Injection Experiment (CL)
Martin Ziegler (swisstopo, Switzerland)

12:00 **Lunch**

13:00 **Session 7** | Poster
Local and regional geological and structural investigations and monitoring of potential sites

#701
Distributed fibre-optic temperature monitoring in boreholes of a seasonal geothermal energy storage
Matthias Bühler (Marmota Engineering, Switzerland)

#702
Modelling of Factors affecting Fault Stability
Pierre Cerasi (SINTEF, Norway)

#703
Well integrity monitoring for large-scale CO_2 storage – the LEGACY project
Bastien Dupuy (SINTEF, Norway)

#704
Overview of structure, geometry, fluid flow and seismo-mechanical properties of clay-rich fault zones drilled by the International Ocean Discovery Program (IODP) in active subduction margins: insights for gas storage
Jade Dutilleul (TotalEnergies, France)

#705
Evaluation of faulted topseal integrity for CCS: analogues from sub-surface post-mortem well analyses and shale-rich fault outcrops
Maria El Hage Moussa (TotalEnergies, France)

#706
Regional characterization of clay formations for multi-barrier CO_2 storage opportunities in North Germany
Franz May (BGR, Germany)

#707
Workflow to determine the potential of leakage from CO_2 storage reservoirs along fractures and faults triggered by uplift
Rafael F. Mesquita (Heriot-Watt University, United Kingdom)

#708
Targeted CO_2 storage monitoring in a multi-layer stratigraphic system
Geetartha Dutta (University of Trondheim, Norway)

14:30	**Visit of Mont Terri rock laboratory**
16:30	**Back at the visitor centre / End of CIGSS**


GRAINGER
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POMZED.CH

Organizing committee
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