

Alteration von Deckgesteinsformationen über CO₂-Speichern

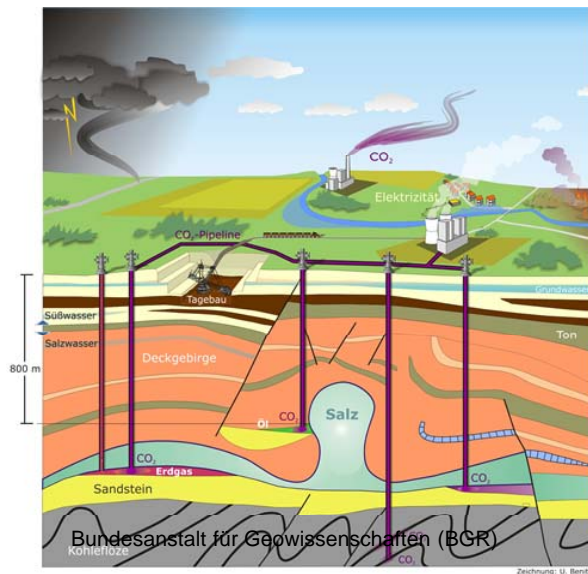
Vorstellung durch
PD Dr. J.-Detlef Eckhardt



Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft



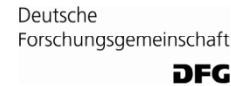
Universität Karlsruhe (TH)
Forschungsuniversität • gegründet 1825



Integrity of sealing rock formations for CO₂ storage



The CO₂Seals project of the GEOTECHNOLOGIEN Special Program



Universität Karlsruhe (TH)
Forschungsuniversität • gegründet 1825



Institute of Applied Geosciences

CO₂Cap

Institute for Mineralogy and
Geochemistry

Institut für Soil Mechanics and
Rock Mechanics



CO₂Trap 2

Institute of Geology and
Geochemistry of Petroleum and
Coal (LEK)

Applied Geophysics and
Geothermal Energy (GGE)

Clay and Interface Mineralogy (CIM)

Project start: 1.8.2008



Co-funded by Shell



Universität Karlsruhe (TH)
Forschungsuniversität • gegründet 1825

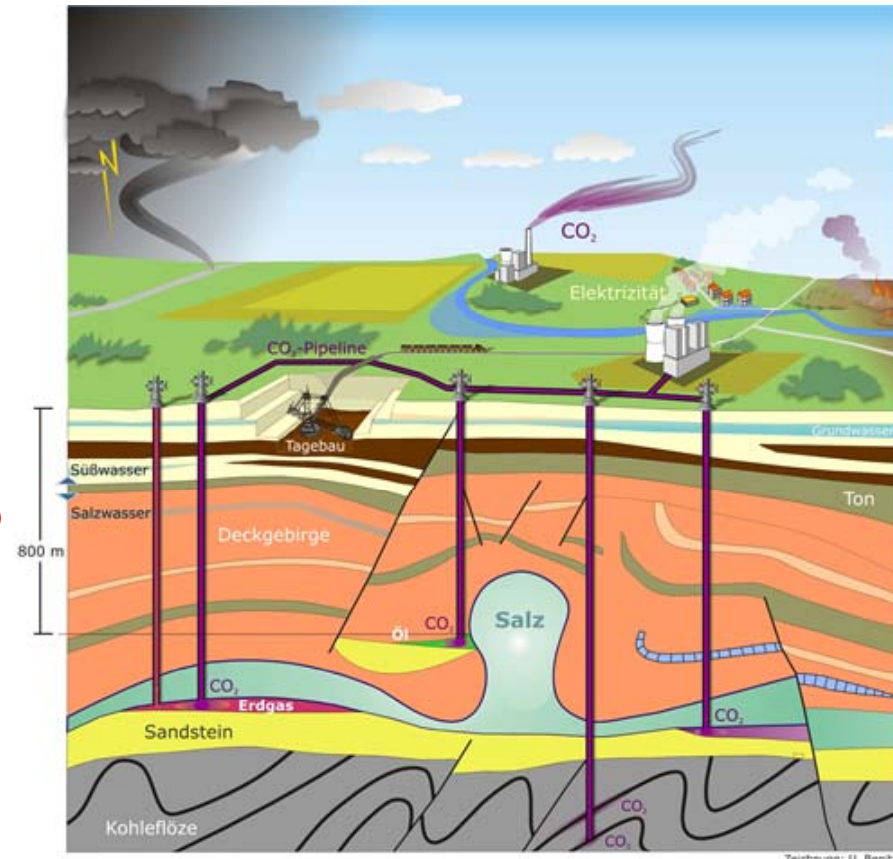
Potential CO₂ storage reservoirs

Focus: Sealing properties of cap rocks

➔ **Criteria for selection of long-term safe reservoirs**

Clay-rich lithologies

- Cap rocks
- CO₂
- Sand stone
- Coal seams

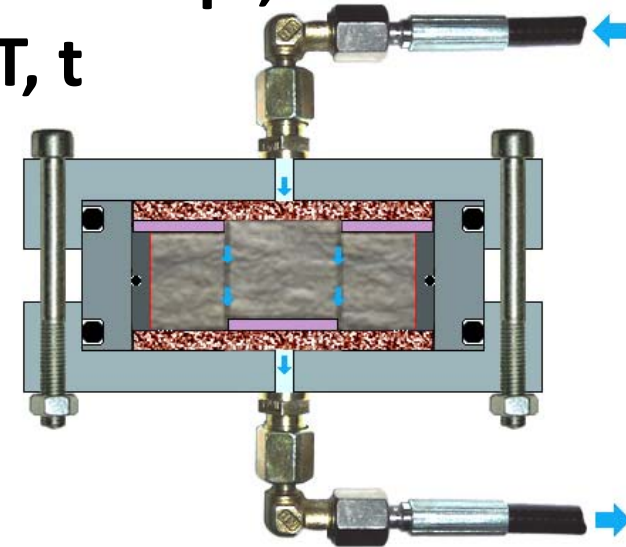


Bundesanstalt für Geowissenschaften (BGR)

Reactivity of cap rocks and alteration of shear zones

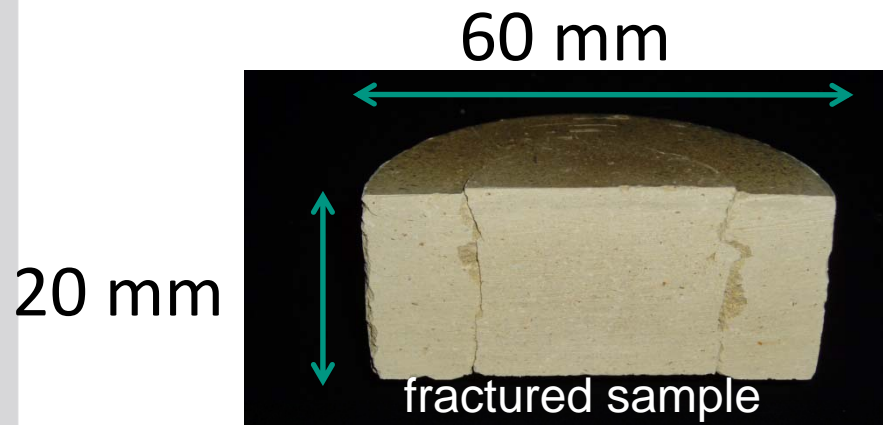
- perfusion with CO₂-saturated brine
- determination of permeability
- chemical changes, kinetics
- mineralogical alterations
- mechanical properties

Fluid comp.,
 p, T, t



Reaction vessel

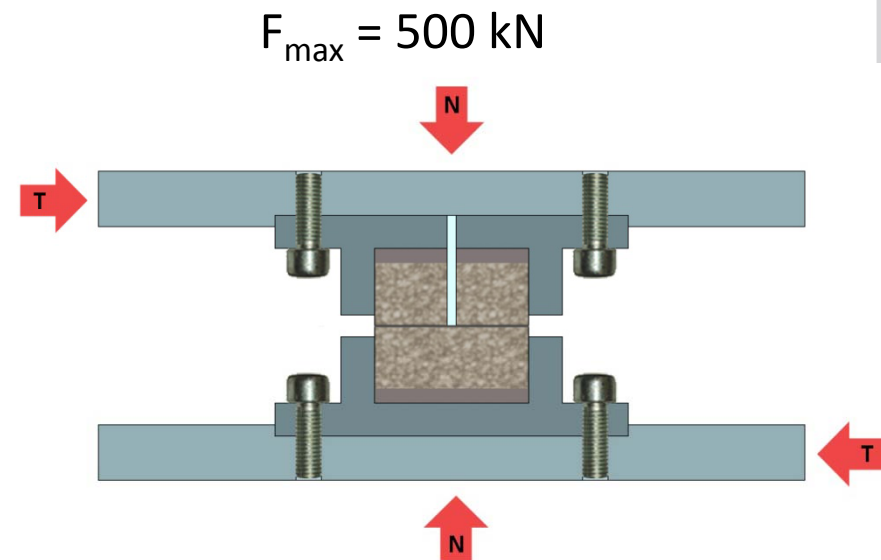
to carry out flow experiments on samples with circular shear zones, application in separate heating chambers



Effect of CO₂-saturated brine on the shear behaviour of clay stone with discontinuities

- discontinuity will be seeped through with CO₂-saturated brine
 - shear tests will be performed under varied shear velocities and using multi-stage-technique
- ⇒ possible viscous behaviour of the shear planes. Friction angle and cohesion can be determined
- ⇒ mineralogical-geochemical and structural alterations

shear testing machine



Two-piece shear-box
adapter for samples with
shear areas of $7 \times 7 \text{ cm}^2$,
height 3 cm

Part of RWTH Aachen

- Permeability of intact caprock samples
(high pressure triaxial flow cell)
- Gas break through experiments
- Percolation experiments large scale samples
- Modelling

Summary

Focus: Sealing properties of cap rocks above potential CO₂ storage reservoirs

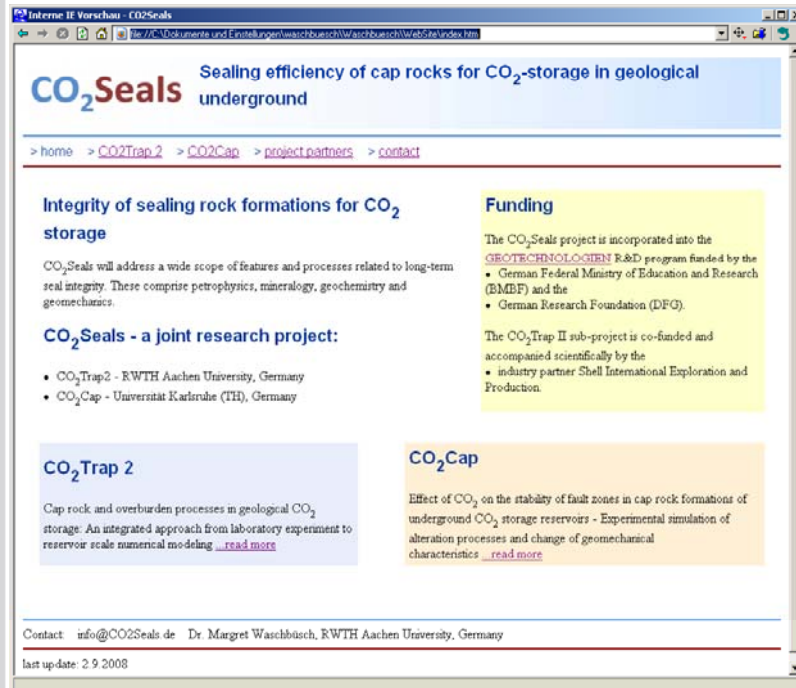
Method: Interaction of rock / CO₂ / brine

- Flow exp. with intact and fractured rock samples
- Numer. model of laboratory experiments
- Upscaling to reservoir dimensions and on long-term

➡ Understanding of kinetics

➡ Criteria for selection of long-term safe CO₂ storage reservoirs

Visit our WebSite www.co2seals.de



Start-up meeting, Sept. 2008 in Aachen

hintere Reihe: Christoph Clauser, Andreas Busch, Thomas Neumann, Thomas Mutschler, Heinz-Günter Stosch, Helge Stanjek, Detlef Eckhardt
vordere Reihe: Rick Wentinck, Bernd Krooss, Alexandra Amann, Margret Waschbüsch, Jennifer Blume, Ines Draeger

Focus of the Mineralogical-Petrological Group Institute of Applied Geosciences

- Understanding of mineral reactions in natural and technical processes
- Transfer of this knowledge into improved and new applications
- Recent and forthcoming projects:
 - Genesis of Gold deposits in Iran
 - Safety of CO₂-storage (described above)
 - Geothermics
 - New technologies in the application gypsum in moulding industrie