CO_2RINA „A new Approach for an integrated Risk Analysis for CO_2 Storage”

Aim of the research project

CCS (**C**arbon **C**apture and **S**torage) is one of the promising options to reduce the amount of greenhouse gas emissions into the atmosphere. Due to this technology CO_2 shall be separated from the exhaust of power plants and be deposited in deep geological formations. Therefore a suitable risk assessment of CO_2 storage in deep geological formations is needed. Within the CO_2RINA project which is funded by the „BMBF-/DFG GEOTECHNOLOGIEN“ programme, three institutes of RWTH-Aachen University and the companies GEOS, GFZ and DMT determine a new universal approach for an integrated risk analysis for CO_2 storage. The challange of this project is to implement single relevant processes into the risk assessment software „GoldSim“ and to evaluate its risk for CO_2 discharge from reservoir in a probabilistic manner. Therefore a high degree of decoupling of the relevant interacting processes from each other is necessary. The focus of our institute is on the investigation of an approach for a modular hydro-mechanical (H-M) coupling for multiphase flow.

Approach and Results

As a consequence of the high pressure after injection of CO_2, the initial stress equilibrium will be influenced significantly. The module „Geomechanics“ deals with the reactivation of fault zones and cap rock integrity.

Based on a synthetic model, existing out of six stratigraphic layers and a 40m wide fault zone, a parametric study of 25 scenarios with a H-M-multiphase flow one-way coupling and an extended parametric study for single-phase flow considering an inclined fault zone with reduced transmissivity, have been executed.
It could be shown, that plastification of the fault zone is inherent for a significant increase of its permeability (see reverse). Furthermore a criterion of the necessity of a H-M two-way coupling could be defined and a new time independent principle between the volumetric strain of the fault zone and the pore pressure in a reference point could be derived.

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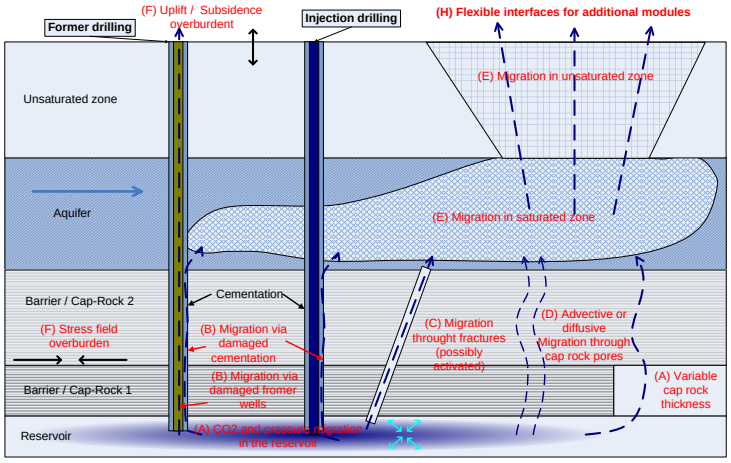

Schematic overview of relevant processes

for a discharge of CO_2 from reservoir

Projectpartners and sponsors:

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