Geophysical Research Abstracts
Vol. 14, EGU2012-1531, 2012
EGU General Assembly 2012

Abstract: Competing Uses of Underground Systems Related to Energy Supply: Applying Single- and Multiphase Simulations for Site Characterization and Risk-Analysis

A. Kissinger, L. Walter, M. Darcis, B. Flemisch, and H. Class
Germany (alexander.kissinger@iws.uni-stuttgart.de)

Global climate change, shortage of resources and the resulting turn towards renewable sources of energy lead to a growing demand for the utilization of subsurface systems. Among these competing uses are Carbon Capture and Storage (CCS), geothermal energy, nuclear waste disposal, "renewable" methane or hydrogen storage as well as the ongoing production of fossil resources like oil, gas, and coal. Besides competing among themselves, these technologies may also create conflicts with essential public interests like water supply. For example, the injection of CO_2 into the underground causes an increase in pressure reaching far beyond the actual radius of influence of the CO_2 plume, potentially leading to large amounts of displaced salt water.
Finding suitable sites is a demanding task for several reasons. Natural systems as opposed to technical systems are always characterized by heterogeneity. Therefore, parameter uncertainty impedes reliable predictions towards capacity and safety of a site. State of the art numerical simulations combined with stochastic approaches need to be used to obtain a more reliable assessment of the involved risks and the radii of influence of the different processes. These simulations may include the modeling of single- and multiphase non-isothermal flow, geo-chemical and geo-mechanical processes in order to describe all relevant physical processes adequately. Stochastic approaches have the aim to estimate a bandwidth of the key output parameters based on uncertain input parameters. Risks for these different underground uses can then be made comparable with each other. Along with the importance and the urgency of the competing processes this may lead to a more profound basis for a decision.
Communicating risks to stake holders and a concerned public is crucial for the success of finding a suitable site for CCS (or other subsurface utilization).
We present and discuss first steps towards an approach for addressing the issue of competitive utilization of the subsurface and the required process of communication between scientists, engineers, policy makers, and societies.