Geophysical Research Abstracts
Vol. 12, EGU2010-13147, 2010
EGU General Assembly 2010

Model simulations for guiding the design of the CO2 injection experiment at the Heletz site

Fritjof Fagerlund (1), Auli Niemi (1), Jacob Bensabat (2), Zhibing Yang (1), Vladimir Shtivelman (3), M Gendler (3), and I Goldberg (3)

(1) Department of Earth Sciences, Uppsala University, Uppsala, Sweden (fritjof.fagerlund@geo.uu.se), (2) Environmental & Water Resources Engineering Ltd, Haifa, Israel (jbensabat@ewre.com), (3) Geophysical Institute of Israel, Lod, Israel (vladimir.shtivelman@gmail.com)

The focus of the recently launched EU FP7 project MUSTANG (www.co2mustang.eu) is the development of methods, models and process understanding for site characterization and monitoring of CO2 geological storage in deep saline aquifers. An essential component of the project is a field-scale CO2 injection experiment and associated testing and monitoring program in one of the test sites, the Heletz site in Israel. The general structure of this site is relatively well understood from earlier investigations. For the purpose of the injection experiment, one existing well will be re-entered (injection well) and one new well be drilled (monitoring well) into the target formation, a lower cretaceous sandstone layer at a depth of 1,600 m. CO2 will be injected in this layer that is bounded from above by an impervious claystone layer. A sequence of hydraulic and tracer tests will be carried out as part of the characterization as well. This work presents the progress of the modeling carried out to support the design of the field experiment and to find an optimal test sequence to maximize the amount of information to be gained from the test. Site-specific information of interest includes in-situ dissolution behavior and residual gas saturation, as well as parameters influencing CO2 transport. A model of the CO2 migration during the experiment is built by using geological data from the site and the numerical simulations are carried out with the code TOUGH2/ECO2N. Different injection scenarios are modeled, thereby testing (i) the effects of different test configurations such as alternating CO2 and water injection/withdrawal sequences, the use and rates of pumping in the abstraction well to create a capture zone as well as (ii) the effects of domain characteristics and properties, dip angle of the injection formation and the role of geological heterogeneity.