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Hydrogeochemical characterization and monitoring at the Hontomin site (Spain) for geological storage of CO2

Tobias Roetting (1), Jesus Carrera (2,3), and Orlando Silva (3)

(1) Technical University of Catalonia (Brcelona Tech), Barcelona, Spain (tobias.roetting@upc.edu), (2) Institute of Environmental Assessment and Water Research (IDAEA), CSIC, Barcelona, Spain (jesus.carrera.ramirez@gmail.com), (3) Energy City Foundation (CIUDEN), Spanish Government CO2 Geological Storage Programme, Ponferrada, Spain (orlando.silva@ciuden.es)

This abstract describes the monitoring equipment and characterization tests planned at the Hontomin site, Northern Spain, where the Energy City Foundation (CIUDEN) of the Spanish Government CO2 Geological Storage Programme is installing a technological demonstration plant for geological CO2 storage.
The Hontomin storage structure is located in formations of lower Jurassic age: marls as the upper seal, calcites and dolomites as the storage formation, and anhydrites as lower seal.
The borehole setup at Hontomin will consist of three wells: One injection well, one geophysical monitoring well, and one multilevel fluid monitoring well, in a triangular setting. The geophysical monitoring well will be located 100 m from the injection well, and the multilevel fluid monitoring well 40 m from the injection well.
The injection well will be equipped with ERT electrodes, a fiber optic Distributed Temperature Sensing (DTS) system with a heating element, extensometers, and fluid pressure sensors. The geophysical monitoring well will be equipped with the same sensors plus an array of geophones. The multilevel fluid sampling well will be equipped with sampling ports for multiphase fluid sampling, a DTS with heating element, extensometers and fluid pressure sensors.
The DTS will be used to measure temperature profiles, and, in combination with the heating element, to determine changes in heat conductivity and heat capacity induced by CO2 injection. The extensometers will measure deformation of the storage and seal formations.
Hydrogeochemical characterization will comprise the following tests:
• Several injection and pumping tests using water and acid in combination with conservative and reactive tracers in order to measure the transport parameters and chemical properties of the porous medium.
• Injection and recovery of supercritical CO2 in combination with conservative and reactive gaseous tracers, in order to study the trapping mechanisms for CO2.
After the characterization phase, up to 100.000 tons of supercritical CO2 will be injected into the storage formation. Continuous and intermittent injection regimes will be applied to optimize injectivity and CO2 dissolution in the brine.
Before, during and after these tests, fluid sampling, pressure and deformation measurements, geophysical logs, ERT and passive and active seismic monitoring will determine how the storage and sealing formations react to the stimulations.
Drilling of the wells will start in mid-2011, and hydrogeochemical characterization will start in early 2012.
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