Application of Thermal response test to distributed fiber-optic temperature sensor (DTS) for CO₂ storage at Hontomín Technological Development Plant

B. Cubillo (1), L. Martínez (3), J. Carrera (1,2), T. Roetting (3), and O. Silva (1)

(1) Fundación Ciudad de la Energía (CIUDEN), Programa de Almacenamiento Geológico de CO₂, Ponferrada (León, España), (3) GHS, Department of Geotechnical Engineering and Geosciences, Technical University of Catalonia (UPC-Barcelona Tech), Barcelona, España., (2) Instituto de Diagnóstico Ambiental y Estudios del Agua (ID/EA, CSIC), Barcelona, España.

Thermal response tests will be performed at Hontomín as part of site characterization and CO₂ injection monitoring. These types of tests have been developed to determine the presence of CO₂ in the reservoir. It consists of heating an electrical cable and monitoring the temperature response by optical fiber DTS (Distributed Thermal Sensing) parallel to the heater along the well casing. Here we perform numerical simulations to analyze the effect of perturbing factors on Jacob’s analytical interpretation, such as thermal convection or the presence of the casing. We find that the method is rather robust in the sense that it is possible to detect the movement of the CO₂ in the reservoir, estimate the CO₂ saturation and also the leakage through the cement. However, it is unclear whether small residual saturations of CO₂ can be identified. These require very long tests. The interpretation is improved by the use of diagnostic plots.