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Characterization of the Hontomín Research Facility for Geological Storage of CO_2: 3D Seismic Imaging Results

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A technological research facility dedicated to the underground geological storage of CO_2 is currently being developed by the Spanish research program on Carbon Capture and Storage (CCS) in Hontomin (Burgos). This research program is being developed by the CIUDEN Foundation, an initiative launched by 3 Spanish state departments (Science & Innovation, Environment and Industry). An extensive multidisciplinary site characterization phase has been carried out, including a multiseismic data acquisition experiment. Within this effort, a 36 km2 3D seismic reflection survey was acquired in the summer of 2010. Its aim was to provide high resolution images of the subsurface of the storage complex, as well as to provide a baseline model for all the disciplines involved in the project. The target reservoir is a saline aquifer located at 1400 m, approximately, within Lower Jurassic carbonates (Lias). The main seal is formed by inter-layered marls and marly limestones of Early to Middle Jurassic age (Dogger and Lias). The main acquisition characteristics of the survey included (1) a mixed source of vibroseis and explosives with 74% and 26% of each used, respectively, (2) 5000 source points distributed along 22 source lines (separated 250 m) and (3) 22 lines of receivers (separated 275 m). Shot and receiver spacing along the source and receiver lines was 25 m, resulting in a nominal CDP-fold of 36 for 13 m2 bins. The 3D-data have been fully processed to post stack migration. The most critical processing steps included static correction calculations, time variant frequency filtering, rms velocity analysis, F-XY deconvolution, dip move-out correction, residual statics calculations and post stack migration. The final high-resolution 3D-volume shows the shape and depth of the primary reservoir-seal system, the main faults of the area and the secondary reservoir-seal sequence. It allows us to characterize the main tectonic structure of the dome complex, the fault system of the area and the feasibility of using the reservoir for storage.