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A three-dimensional static reservoir model of the Nagaoka CCS Site and to simulate a carbon dioxide plume migration

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Authors constructed a three-dimensional static reservoir model of the Nagaoka CCS Pilot Site and to simulate a carbon dioxide (CO2) plum migration for 10,000 t injected. The scope of work included incorporating all available geological and geophysical data (well logs, seismic, core, and cuttings data, as well as previously observed depositional and structural trends) to create a geological model of formations from the Haitsume sandstone near the Minami Nagaoka Natural Gas Field, Niigata, Japan. The injection well is to be located in the immediate vicinity of Nagaoka city, Niigata. The boundaries of the static reservoir model span a geographical area of approximately two square km around the Iwanohara base of INPEX.

Several phases static and dynamic modeling were conducted, each with successively greater geoscience data support. Static model was constructed a reservoir from the Zone2 to Zone5 bottoms included 3D seismic data for Stratigraphic control as well as well log petrophysical data. Petrophysical properties in the Zone2 and Zone5 were supported by data from 4 wells and attributed data from 3D seismic. Simulation modeling explored the impact of stochastic uncertainty in static model properties on injection performance using the Nagaoka data (Sato et al., 2011). Petrophysical properties (porosity and permieability) were computed from well logs of Injection Well-1 (IW-1), Observation Well (OB-2), OB-3, and OB-4, 3D seismic data, and core analyses. The amount of well log based petrophysical property control diminishes with depth. Petrophysical property were interpolated throughout the static model using seismic attribution, stochastic method, and upscaled into the simulation grids.