

# **A model comparison initiative for a CO<sub>2</sub> injection field test: an introduction to Sim-SEQ**

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**Abstract:**

Because of the complex nature of subsurface flow and transport processes at geologic carbon storage (GCS) sites, modelers often need to implement a number of simplifying choices while building their conceptual models. Such simplifications may lead to a wide range in the predictions made by different modeling teams, even when they are modeling the same injection scenario at the same GCS site. Sim-SEQ is a new model comparison initiative with the objective to understand and quantify uncertainties arising from conceptual model choices. While code verification and benchmarking efforts have been undertaken in the past with regards to GCS, Sim-SEQ is different, in that it engages in model comparison in a broader and comprehensive sense, allowing modelers the choice of interpretation of site characterization data, boundary conditions, rock and fluid properties, etc., in addition to their choice of simulator. In Sim-SEQ, 15 different modeling teams, nine of which are from outside the USA, are engaged in building their own models for one specific CO<sub>2</sub> injection field test site located in the southwestern part of Mississippi. The complex geology of the site, its location in the water leg of a CO<sub>2</sub>-EOR field with a strong water drive, and the presence of methane in the reservoir brine make this a challenging task, requiring the modelers to make a large number of choices about how to model various processes and properties of the system. Each model team starts with the same characterization data provided to them but uses its own conceptual models and simulators to come up with model predictions, which can be iteratively refined with the observation data provided to them at later stages. Model predictions will be compared with one another and with the observation data, allowing us to understand and quantify the model uncertainties.

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