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A Quick Approach to Model Fault Leakage during CO2 Storage

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Leakage along faults (pre-existing or reactivated) poses a major risk during CO2 storage. Faults and related structures such as micro cracks, joints, fracture networks, deformation bands, fault core etc., can either act as major structural traps or as a connecting pathway to shallow geological layers. Reservoir simulations with an accurate representation of fault-related properties across all scales will help us understand its consequences during CO2 injection and storage. This holds true specifically at an early stage, when the knowledge of storage reservoirs is limited (Availability of high quality well logs, cores and high-resolution seismic are expensive). This study presents a workflow for ultra-fast screening for fault leakage risk assessment during injection and storage at a concept selection stage. A vertically integrated reservoir model coupled with an upscaled fault leakage function is used for this study. Simulation examples of various injection scenarios in a CO2 storage reservoir with potential for fault leakage are presented in this study. The results show that a good match for CO2 saturation profile is obtained between the fine-scale model and the vertically integrated model at substantially reduced computation time adding confidence for the proposed workflow. Such quick models are extremely helpful in identifying how uncertainties in key fault parameters, reservoir architecture and other constitutive relations affect the storage reservoir behavior and potential fault leakage outcomes for various CO2 injection scenarios.

Participation

In-Person

References

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