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# Modeling Episodic Fluid Migration in Salt Basins

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Previous studies have documented the presence of migrated hydrocarbons in rock salt suggesting these stratigraphic traps have lost some of their sealing capacity; however, the mechanism for their emplacement is poorly understood. Typically, salt is assumed to undergo a form of visco-elasto-plastic deformation. On geologic timescales; however, salt is expected to behave as a highly viscous non-Newtonian fluid. An important consequence of this viscous nature is the compaction and decompaction in response to differences between pore fluid and solid pressures. These deformations induce significant porosity changes that cannot be neglected and lead to new non-linear phenomena unknown in rigid or elastic porous media.

To understand the conditions under which pore fluids can enter salt on geologic timescales, a numerical model for single-phase flow in porous media is developed. The model is composed of a viscous salt layer sandwiched between overlying and underlying elastic sandstone reservoirs. The entire domain is subjected to compression by continuous sedimentation and results in the consolidation of the elastic reservoirs. This elevates the fluid pressure beneath the salt deposit and can lead to the development of near lithostatic pore fluid pressures. In the scenario where the pore fluid pressure exceeds the lithostatic pressure, the viscous nature of the salt body may allow elevated fluxes in the form of porosity waves. However, when sedimentation alone is considered and no secondary sources of pore fluid pressure generation exists, it is unlikely that the fluid pressure beneath the salt will exceed the lithostatic pressure. Under these conditions, model results suggest there may be an additional hydrodynamic component to the ability of a salt layer to arrest fluid migration.