The Preliminary finite-element models of salt-sheet advance: basal shear and overpressure development

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ABSTRACT

We apply finite-element models with linear viscoelastic salt, poroelastic sediments and salt-sediment contact surface coupled with pore pressure, to simulate salt basal shear and overpressure development in sediments. Previous finite-element models simulated overpressure by reducing internal friction angle in sediments, so they are not able to model pore pressure development and the salt-sediment contact surface coupled with pore pressure. In this preliminary study, we compare the two extreme cases: drained and undrained cases, and find that 1) overpressure in undrained case causes lower salt basal shear, faster salt-sheet advance rate, and more stretched salt-sheet geometry; 2) no overpressure in drained case casuses higher shear stress, slower salt-sheet advance rate, and less stretched salt-sheet geometry.

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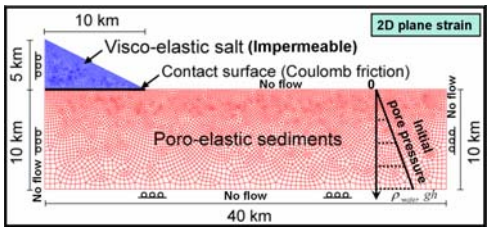


Fig. 1: Model setup of finite-element models. Salt is linear viscoelastic and impermeable. Sediments are poroelastic. Contact surface between salt and sediments is defined by Coulomb friction coupled with pore pressure. Initial pore pressure in sediments is hydrostatic.

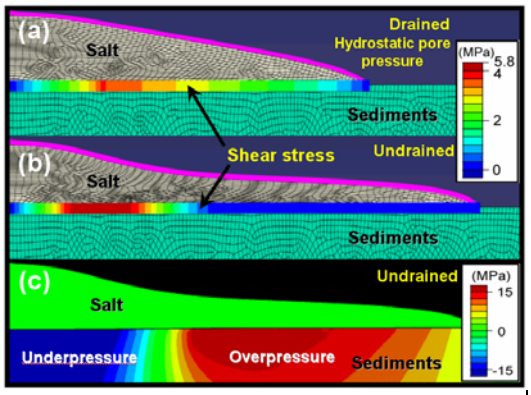
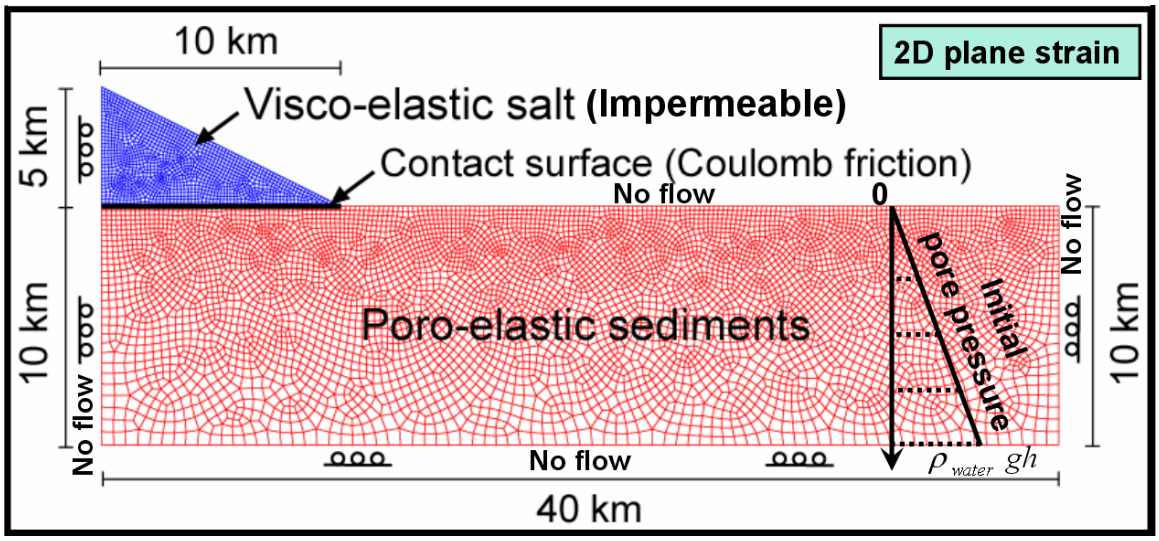


Fig. 2: Comparison of model results between the drained and undrained cases. (a) Salt basal shear and salt topography in drained case. (b) Salt basal shear and salt topography in undrained case. (c) Excess pore pressure in undrained case. Vertical dimension is exaggerated 1.8 times.



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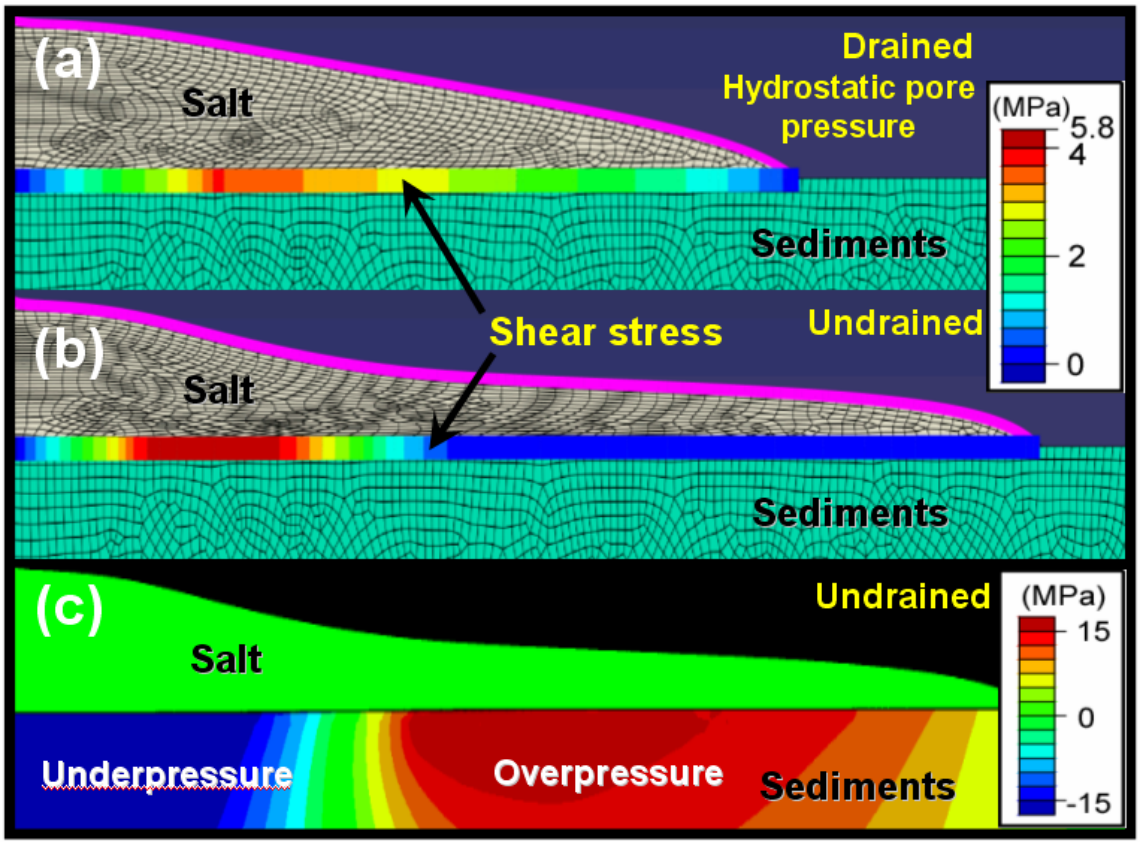

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