# Predicting sub-salt overpressure from salt-sheet topography

*Gang Luo, Maria-Katerina Nikolinakou, Peter Flemings, Mike Hudec*

*Bureau of Economic Geology, The University of Texas at Austin*

## ABSTRACT

We apply finite-element models to simulate base-salt shear stress and base-salt overpressure during salt-sheet advance. In the two-dimensional plane strain models, we use linear viscoelastic salt, poroelastic sediments, and salt-sediment contact described by Coulomb friction coupled with pore pressure. We compare results from finite-element models with those from an analytical model and find that fitting is good. The fitting of results between finite-element models and the analytical model provides some insights into the link between salt-sheet topography, base-salt shear stress and base-salt overpressure. These results show that we may use salt geometry to predict base-salt shear stress and base-salt overpressure.

**CTRL+CLICK ON IMAGE FOR LARGER VIEW**

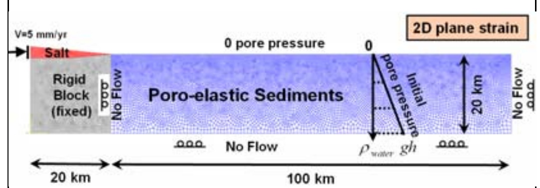


**Fig. 1**: Model setup of finite-element models. Salt is linear viscoelastic and impermeable. Sediments are poroelastic. Contact surface between salt and sediments is defined by Coulomb friction coupled with pore pressure. Initial pore pressure in sediments is hydrostatic.

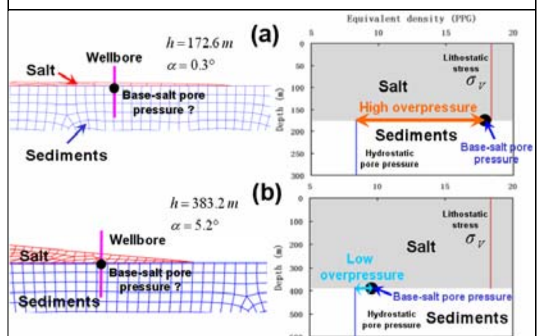


**Fig. 2**: Both finite-element models and the analytical model predict that (a) high base-salt overpressure is related to thin and flat salt geometry, and (b) low base-salt overpressure is related to thick and steep salt geometry.

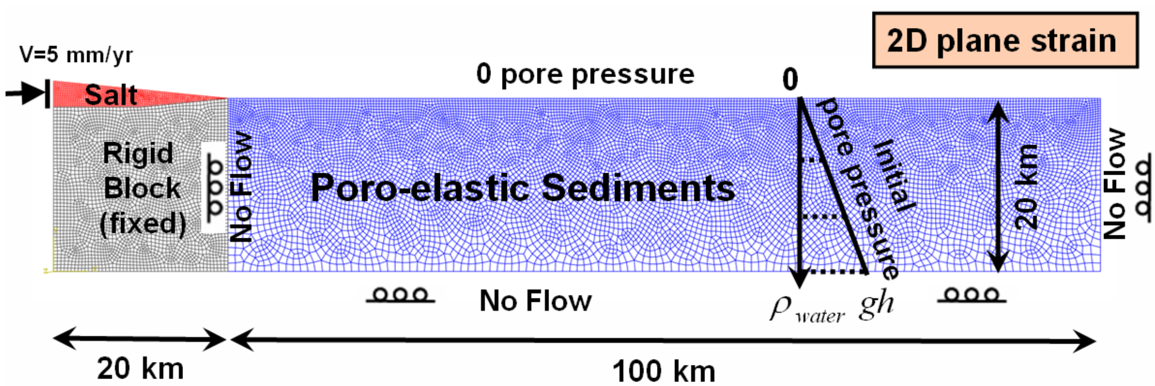


**Fig. 1**: Model setup of finite-element models. Salt is linear viscoelastic and impermeable. Sediments are poroelastic. Contact surface between salt and sediments is defined by Coulomb friction coupled with pore pressure. Initial pore pressure in sediments is hydrostatic. It is roller support at lateral and bottom boundaries and no fluid flow at all of boundaries of porous sediments.

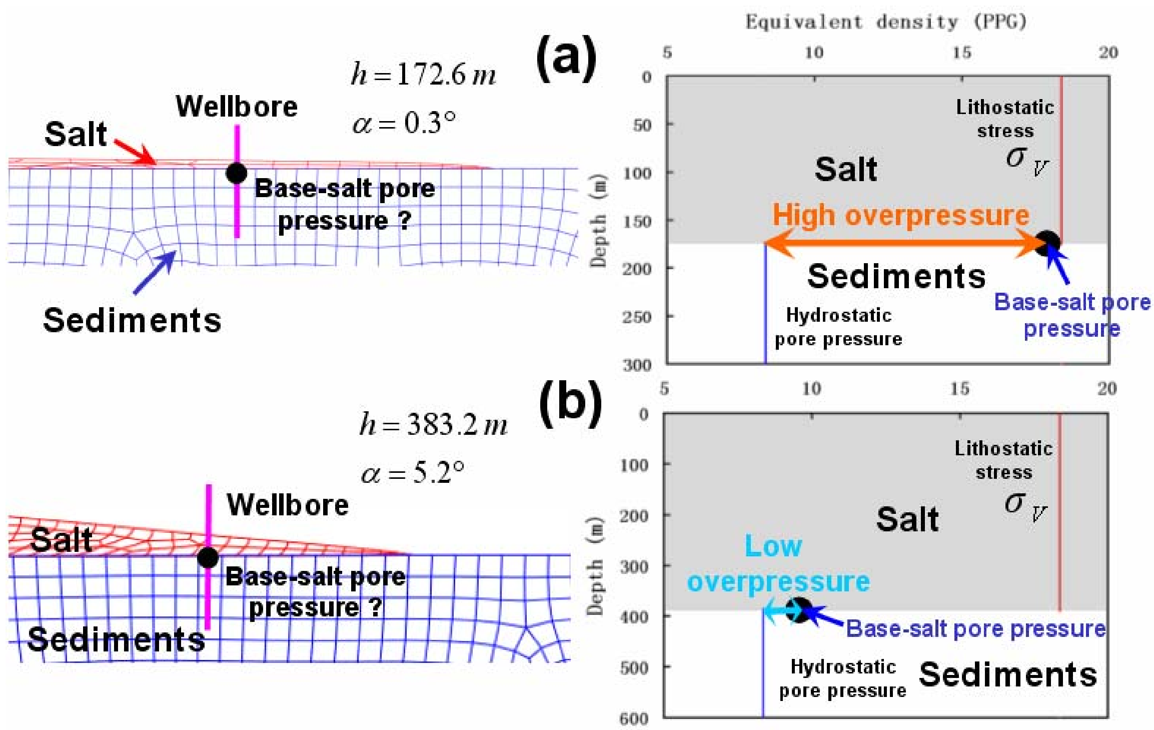


**Fig. 2**: Both finite-element models and the analytical model predict that (a) high base-salt overpressure is related to thin and flat salt geometry, and (b) low base-salt overpressure is related to thick and steep salt geometry. These parameter values in (a) and (b) are from the finite-element model results at this location (pink wellbore). In (a), if a wellbore beneath thin and flat salt sheet is drilled, the analytical model predicts high base-salt overpressure, close to lithostatic stress. In (b), if a wellbore beneath the thicker and steeper salt sheet is drilled, the analytical model predicts low base-salt overpressure, close to hydrostatic pore pressure. Results from finite-element models fit well with results from the analytical model.