

06.13: Pore pressure near a rising salt wall

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ABSTRACT

In this study, we estimate the overpressure near a rising salt wall and compare it to uniaxial (1-D) model predictions. We conduct a transient plane strain (2-D) finite element forward modeling of a salt wall. In our model, sediments are represented as poro-elastic-plastic material coupled with pore water and salt is represented as a viscoplastic material. We show that, in addition to the total mean stress, the shear stress also causes overpressure in sediments. Our 2-D model systematically predicts higher overpressure than a uniaxial model near a salt wall (Fig. 1) as it takes into account the loading from the salt wall deformation and its higher rate of application. The salt wall deformation increases the shear stress in a narrow zone adjacent to the salt oblique flank (Fig. 2a) and the total mean stress in sediments farther above (Fig. 2b), in a short period at the end of sedimentation process, when the sediment height (drainage path) is fully developed. Our results illustrate the importance of pore pressure perturbation near salt walls and its underlying mechanisms.

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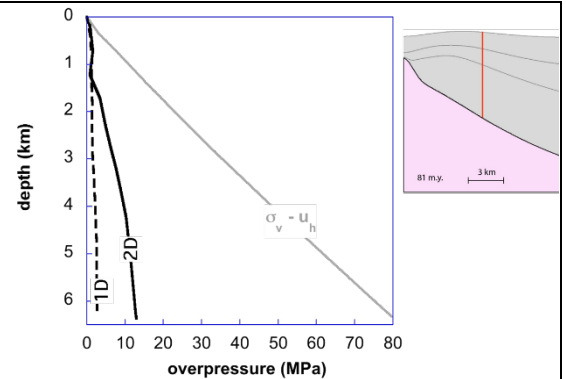


Fig 1: Overpressure predicted by a uniaxial (1-D) and our plane strain model (2-D) along a vertical profile near a salt wall. The 2-D model systematically predicts higher overpressure.

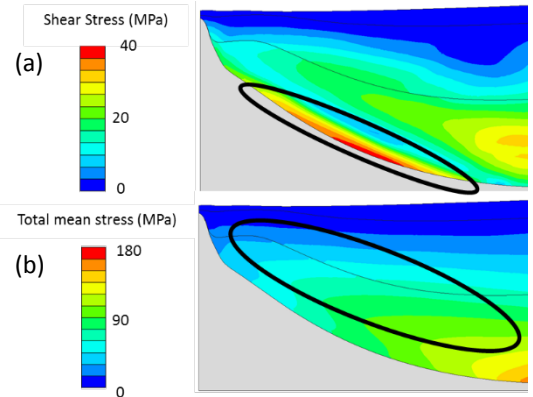


Fig 2: Increased stresses near a salt wall.

(a) shear stress. (b) total mean stress.

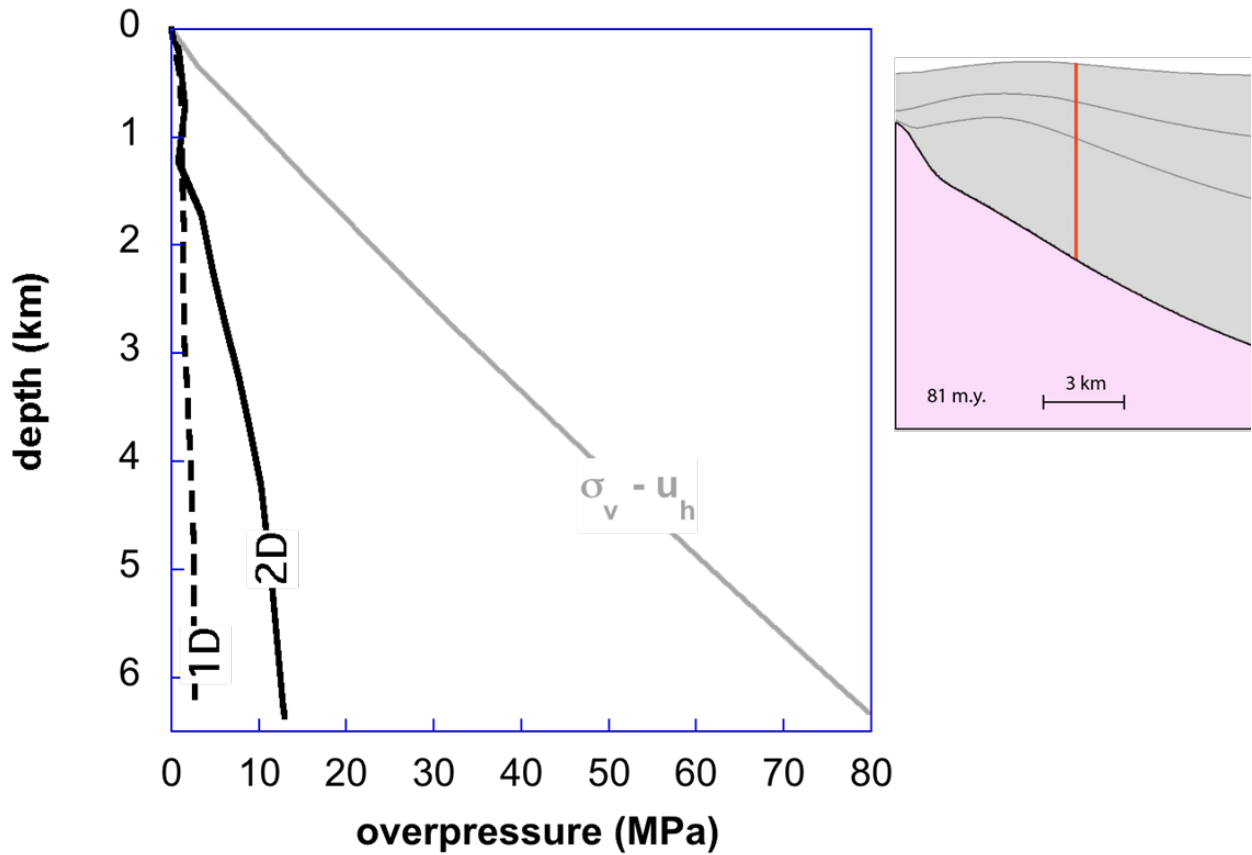


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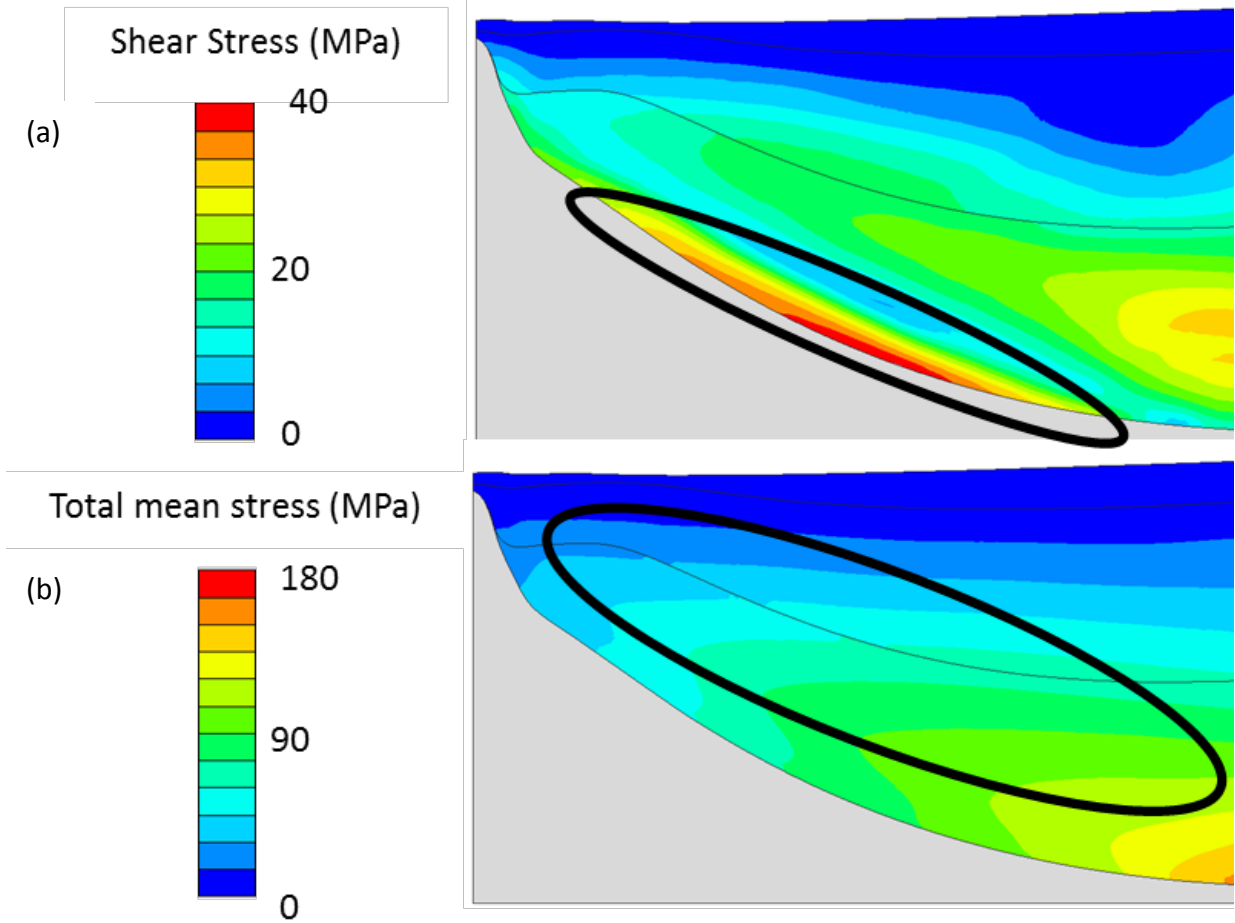


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