

06.21: Stresses near a salt wall with a welded source-layer

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ABSTRACT

We estimate the stresses near a salt wall with a welded source-layer by finite element forward modeling of the wall. In our model, sediments are represented as a drained poro-elastic-plastic material and salt is represented as a viscoplastic material. We show that the horizontal stress near a salt dome is higher than regional one (by $\sim 80\%$) primarily because of the salt isostatic stress state ($\sim 70\%$) and secondarily because of salt overpressure ($\sim 10\%$) (“far-source” salt overpressure; Fig 1a). Welding of the source-layer removes only the salt overpressure (“dome” salt overpressure; Fig. 1a); hence, the horizontal stress remains high even after welding of the source-layer (Fig. 1b). Further, the stresses in sediments increase significantly near the weld, particularly at the weld tip (Fig. 2), increasing the compaction and also the potential for shear failure of adjacent rocks. Our results provide insight into the perturbation of the stress field near salt walls and welded source-layers.

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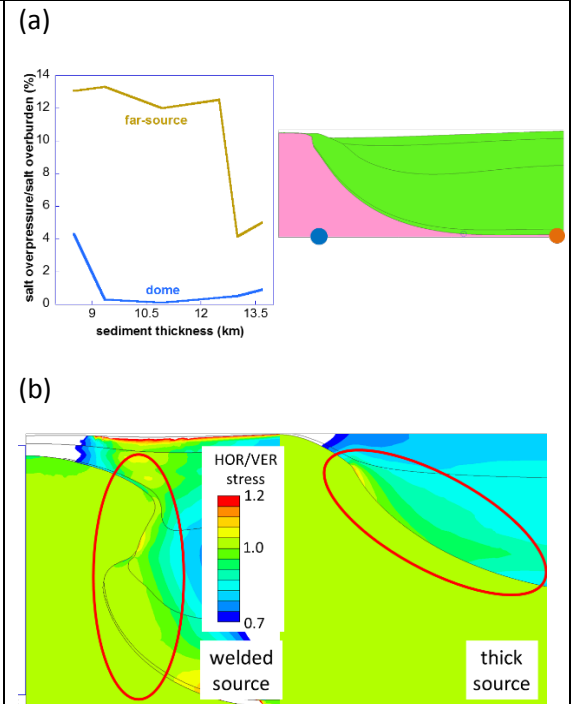


Fig 1: Stresses in and around a salt wall. (a) Dissipation of salt overpressure in welded source-layer. (b) Horizontal stress in sediments near salt wall before and after source-layer welding.

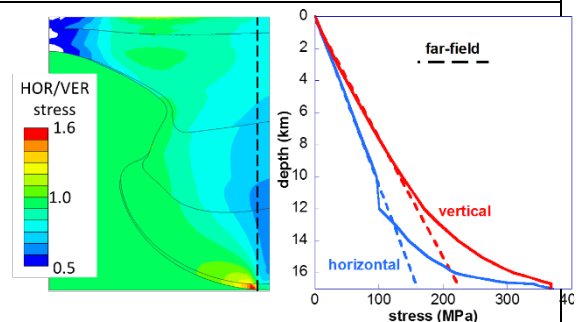


Fig 2: Stress concentration near weld tip.

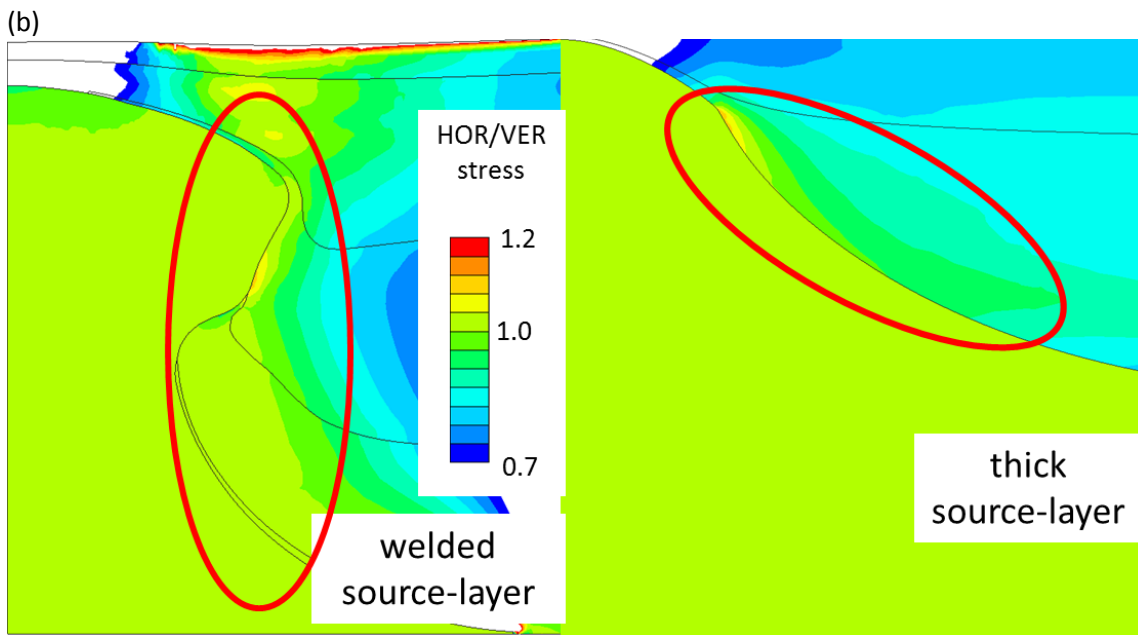
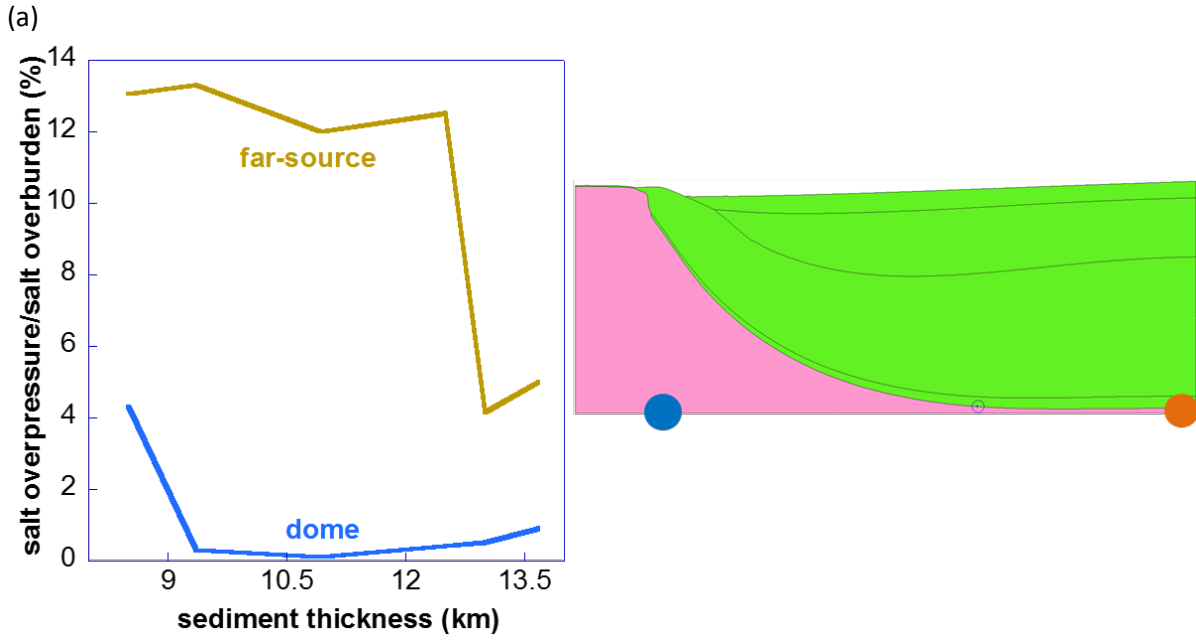


Fig. 1: Stresses near a salt wall before and after welding of the source-layer. (a) Salt overpressure dissipation in welded (thinned-out) source-layer. (b)

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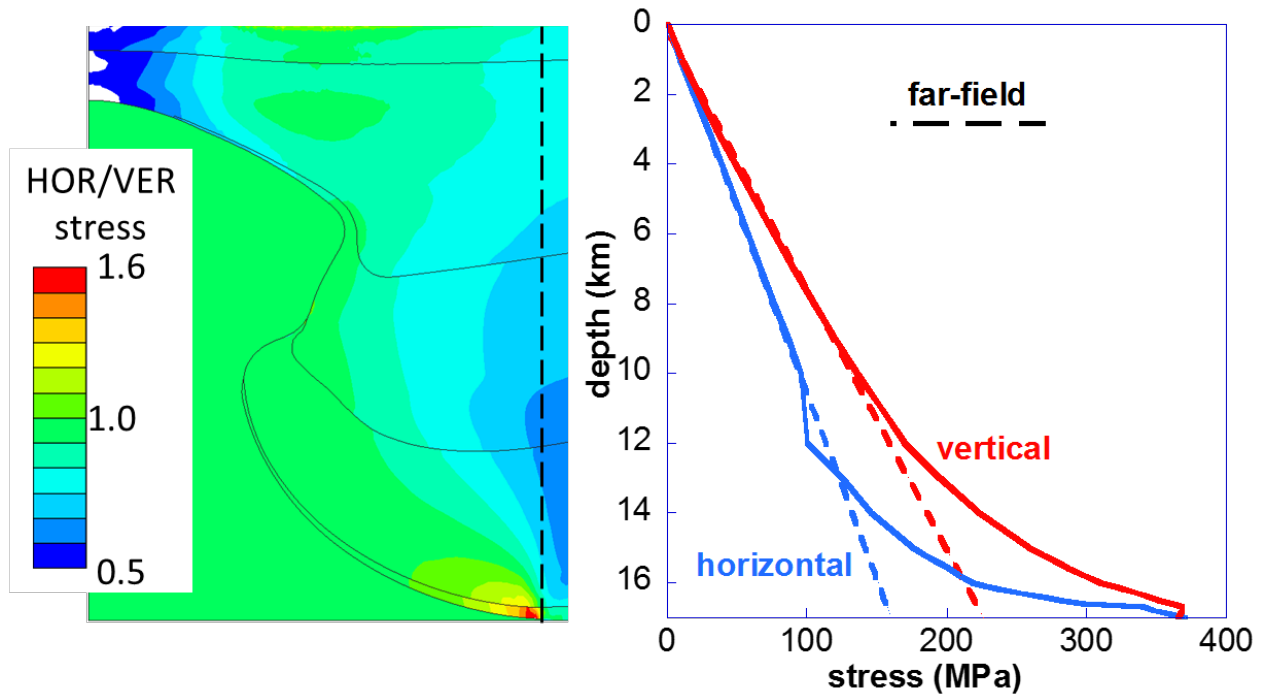


Fig. 2: Stresses near the weld zone.

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