12.08: Pore pressure and stress near a vertical salt weld

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ABSTRACT

We run an evolutionary hydro-mechanical finite-element model to investigate how pore pressure and stresses change as a salt wall welds vertically along its feeder. Welding elevates the horizontal stress to values above the overburden stress. As a result, the least principal stress is almost vertical and equal to overburden stress in mudrocks near the weld. The increase in horizontal stress also elevates pore pressure near the weld (Fig. 1), which causes 1) downdip remigration of water in a reservoir bed cresting near the weld, 2) decrease of the hydrocarbon-column capacity of the reservoir, and 3) decrease of the drilling window in front of the weld (Fig. 2). Vertical welding of a salt wall significantly affects pressure, stresses, and consequently hydrocarbon drilling and exploration near the weld.

CLICK ON IMAGE FOR LARGER VIEW

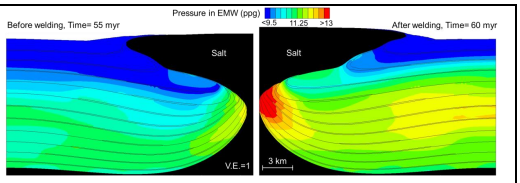


Fig 1: Pore pressure in equivalent mud weight before (left) and after (right) welding.

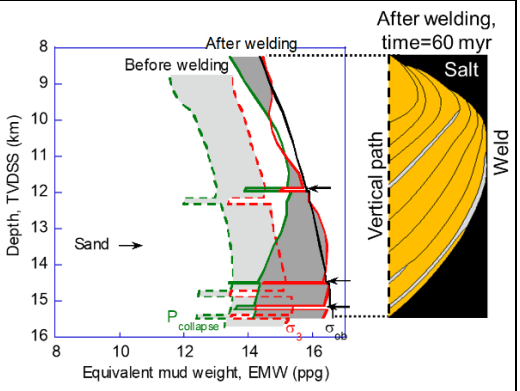
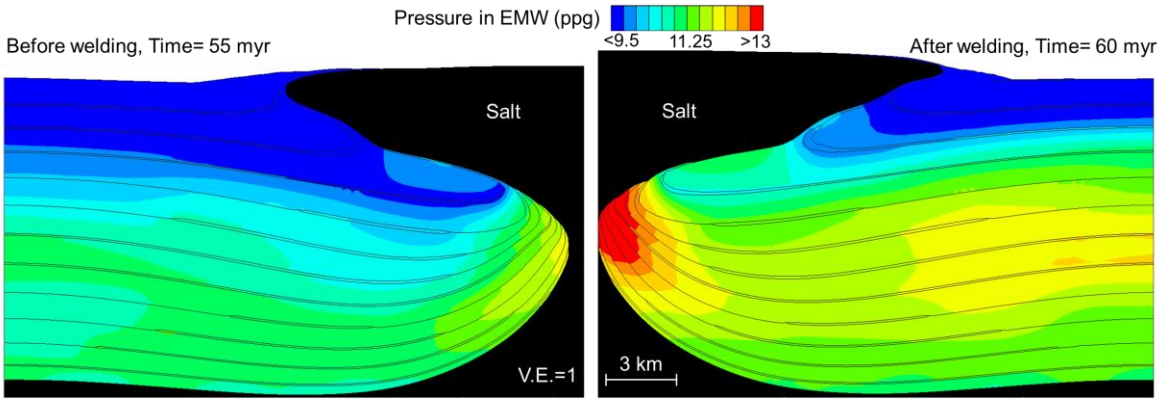


Fig 2: Drilling windows for a vertical wellbore near the weld before (light gray shades) and after (dark gray shades) welding.



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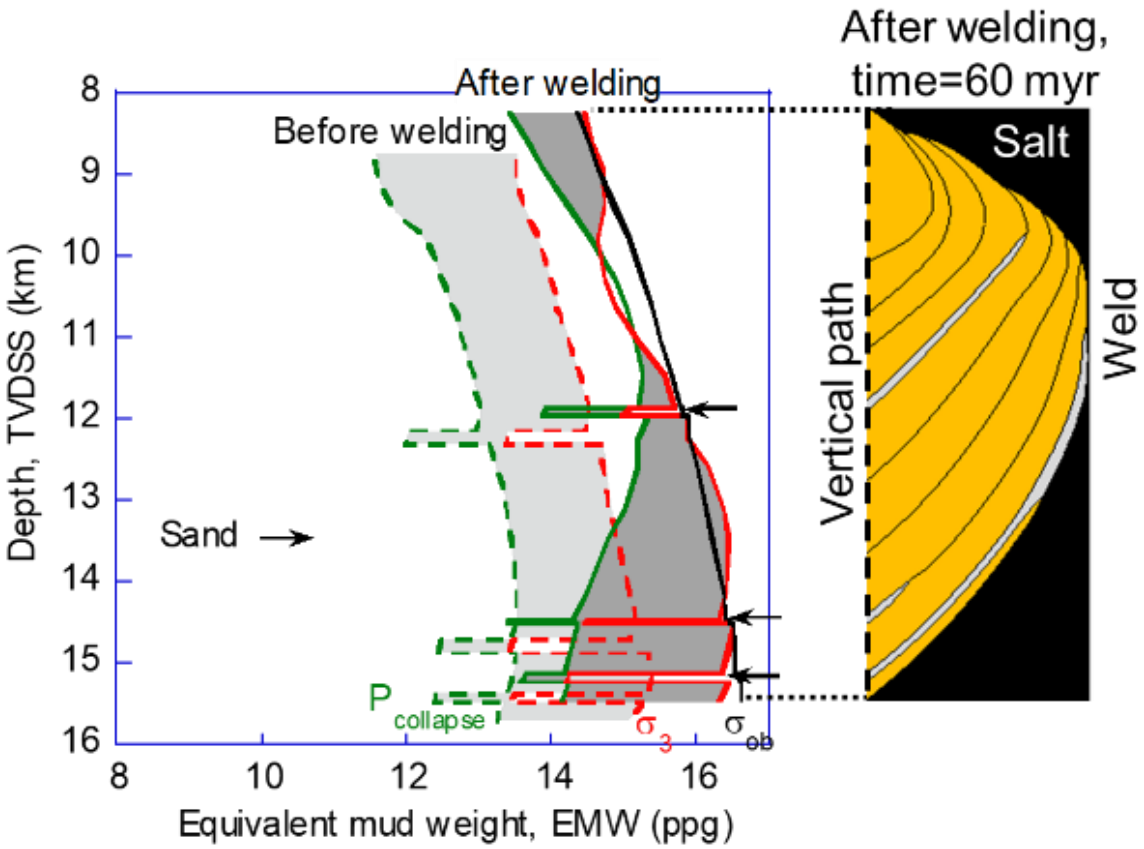

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