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The role of fluids overpressure in salt tectonics: insights from analogue models

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Numerous areas worldwide display evaporites, among which halite (salt) dominates. In most deforming systems, salt are the weakest rocks, easily becoming the locus of detachments or decollements. Recent studies indicate that some salt layers slid over other rocks by detaching to their base. Due to low permeability of the salt layers, their substrates may exhibit fluid overpressure. As a consequence, frictional shear strength in the region between salt and underlying rocks may be very low. In this study we want to analyze the effect of fluid overpressure on salt tectonics. To do that, we use analogue modelling. We reproduce four different experimental scenarios: one contractional and one extensional system, a passive margin with a sedimentary wedge, and a continental slope region. In all these cases an analogue of salt layer made of silicone is covered by an analogue of sedimentary rocks made of quartz sand. Since the effect of fluid overpressure at the base of a salt layer is the shear strength reduction, we created a low friction region at the center of experimental box. The results of these experiments have been compared with the same experiments without a low friction area. Our results show that low friction regions affect the kinematics and the geometry of the salt structures in all cases. However, the impact of the simulated overpressure is larger in the contractional case and lower in the analogue of a continental slope region.