Simultaneously ascending diapirs from different depths and different positions: a centrifuge study

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Abstract:

In the present experimental study we investigate the diapiric ascent of buoyant material from two source layers situated at different depth rising from protrusions at different positions. A centrifuge has been used in this study for modeling in order to study the kinematics and dynamics during the ascent and emplacement of diapirs. Four experiments were carried out: Each model consisted of two buoyant PDMS layers (one at the bottom stained in blue and one in the center of the model, stained in yellow) and two denser overburdens (above each PDMS layers).
Throughout the experimental runs, we can see the effects of different overburden viscosities and perturbation positions on the number of the diapirs, their pathways and the deformation patterns of the overburden layers. With higher viscosity of the overburden, the number of diapirs decreases. If the perturbations are situated directly above each other, this leads to the formation of one big diapir and not several smaller ones. Hence, both the perturbations take the same pathway during their rise and the overburden layer is less deformed as whit offset perturbations. Furthermore, the modeling results show that two diapirs rising from offset perturbations do not take the same pathway through the overburden layer when rising upward. Each diapir takes then a different pathway. The deeper diapir pierced through its overburden, while rising, regardless if PDMS or denser overburden layers.