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Modeling of "Drag" Folds Bordering Salt Diapirs

Sharply upturned strata, termed drag folds, commonly border salt diapirs. Finite-element models show that these folds depend on more than contact drag (shear) from the rising salt. For prekinematic overburden, substantial drag-induced folds only form in exceedingly weak rock. Even then, most folding develops by near-surface upward and outward rotation. Protrusions of overburden into a diapir, where the contact dips shallowly outward, are most susceptible to folding. Synkinematic sedimentation, however, is much more likely to engender large and broad folds because onlapping wedges may be continually produced during downbuilding. These syndepositional folds can even form in strong layers. Folding of onlaps over rising salt is really drape folding, so "drag" folds is a misnomer. Episodically deposited layers further enhance the potential for onlap folding. For the same average aggradation rate, pulsed deposition of thick layers generates larger folds than do continuously deposited thin layers. Variation in thickness and timing of deposition increases the likelihood of multiple wide onlaps that evolve into substantial folds. Older layers tend to form the broadest and tallest folds because those layers prograded farthest across the diapir crest. As the salt contact steepens, the folded zone narrows as younger layers onlap onto older folds or the salt. Onlap folds can only form for a limited range of relative salt rise and deposition rates. Deposition much faster than the net rate of salt rise buries the diapir. Deposition too slow creates steep contacts or salt spilling onto the sediment surface, both of which result in little folding.