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Compressional Salt Tectonics in Nature and Experiments

The deepest part of the Angolan Margin undergoes since more than 100 MY a gravity driven compression as demonstrated by a large variety of compressional synsedimentary structures including folds with different wavelengths, thrust faults, and squeezed diapirs. They are either of purely compressional origin or result from inversion of earlier extensional structures.

Laboratory scale models are used to study their progressive development as a function of the initial geometry of the salt basin, the thickness of the prekinematic sedimentary layer, the synkinematic rate of sedimentation and the basal slope angle. Two frontal boundary conditions are tested: (1) external buttress or (2) salt layer wedging. In both cases a compressional wave migrates upslope during gravity gliding. In type 2 models an additional frontward migration of compression occurs. Type 1 models favor the inversion of extensional structures, diapirs and grabens. Type 2 models are more generally characterized by newly formed compressional structures. Comparison with seismic data indicates a better fit of type 2 models with the Ultradeep Angolan Margin.

Of special interest is the sediment incorporation within the salt layer demonstrated by the models. During compression some of the synclines are progressively pinched and detached giving birth to encapsulated pods within the salt layer. This could possibly explain some of the seismic reflectors observed in massive salt areas at the toe of the compressional domain.