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Modeling polyphased deformation in salt tectonics

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Hundreds of seismic lines along passive margins display the same scenario: an extensional upslope domain, a transitional domain, and a compressional downslope domain. The upslope extensional domain is characterised by huge depocenters, growth fault rollover/systems and associated rollers either on regional or counter regional faults, turtleback structure. The transitional domain consists in rafts and extensional diapirs and the compressional downslope domain is characterised by fold, thrusts and squeezed diapirs. The width of these deformed zones can greatly vary, depending on the basal slope and the width of the margin. As a result, the compressional zones can be very close or deep offshore. All gravity driven structures result from brittle/ductile coupling between the décollement layer (salt or shale) and the cover. This is true in extensional settings as well as in compressional.

Deltas and passive margins present several sedimentation jumps toward the basin. This means that the above scenario is repeated at increasing orders of magnitude through time. The overburden, then undergo polyphased deformation raising the following question: what are the relationships between initial and late structures? Does the wavelength of the first structures control the following generation of structures? What, if any, is the relationship between the types of compressional features and the younger overlying extensional structures?

Answering all these questions has an impact in every margin. We are presenting here the first model realised to understand polyphased deformation in gravity driven environment.