The Variable Role of Salt Tectonics on Turbidite Channels Along Continental Margins

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Deformation above mobile salt along continental margins results in a complex array of structures that have a profound effect on seafloor geomorphology. Such deformation, typically expressed as up-dip extensional growth faulting, and rafts, that passes down slope into salt walls, diapirs and allochthanous salt sheets and, in lower slope settings, deepwater fold and thrust belts. Although the geometry and timing of individual structures is complex, at the margin scale, deformation is diachronous, with a general basinward-younging in the timing of deformation. This margin-scale down-dip variability of deformation style and timing leads to marked differences in the response of turbidite channel complexes. We use regionally extensive 3D seismic volumes to illustrate the response of Oligo-Miocene turbidite channel complexes to salt-related deformation along the West African margin. These examples are typical of relatively mature stage of salt tectonic once deformation has reached the stage of developing base of slope compressional, salt-cored folds and thrusts.

In upper- to mid-slope settings the relatively young timing of structural development results in a mature array of salt walls and intervening minibasins. Individual segments have grown and linked to from laterally extensive structures orientated sub-parallel to the regional slope strike. As a result channel complexes effectively see pre-existing structures that often have a pronounced and laterally continuous seabed expression. Thus channel complexes are commonly diverted many kilometres along the slope from sediment entry points and either deposit within minibasins or find exit points further down-slope that are usually long-lived salt wall segment boundaries.

In contrast to upper- and mid-slope settings, compressional salt-cored folds at the base-of-slope initiate, grow and link contemporaneously with turbidite channel development. Major channel fairways within the lower slope are often 'pinned' by early-formed structures high on the slope. As folds grow and interact, the channel belts increase in sinuosity and their cross-sectional and long-profile geometry becomes progressively more variable and complex as slope roughness increases. As a result, channel orientations become increasingly variable with channel complex sinuosity mimicking the spacing of the main salt-cored folds. However, channels show only local deviations round individual structures.