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Salt Tectonics in the Levant Basin

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The Mediterranean Sea as a whole and its southeaster corner (Levant Basin) in particular, provide an opportunity to document the early stage of salt tectonics, which cannot be observed in highly deformed salt giants. The relatively shallow burial depth in the Levant Basin is enough to trigger salt deformation; yet, this deformation is relatively mild and still hasn't erased the internal stratification in the salt sequence. This internal stratification couldn't be imaged until recently due to technical limitations. Now that high resolution 3-D depth-migrated seismic data are available, intra-salt folds and faults are clearly observed.

Analysis of the intra-salt deformation revealed an early phase of folding that occurred within the Messinian salinity crisis before the end of salt deposition. Considering that the entire crisis lasted only about 640 kyr and that halite deposition in the deep basin may have lasted only ∼50 kyr, this deformation event must have been very short. More important, offshore Israel, the syn-Messinian deformation phase was driven by south-westward gliding of a salt layer at the sea floor whereas present deformation is driven by north-eastward motion of salt at the subsurface.

The recent pattern of deformation in the Levant Basin is evident by numerus faults and folds deforming the seabed in the entire basin. Slope-parallel normal faults are common along the foot of the Israeli continental slope. These faults express down slope sliding of the Plio-Quaternary overburden towards the deep basin. The contractional domain in the deep basin is, however, more complex than envisaged by the "up-dip-extension-down-dip-contraction" paradigm. This contractional domain is a part of a circum-Nile deformation belt driven by a far field force related to squeezing of salt away from the Nile delta.

When did the off-Nile tectonic motion begin? Does it correlate with off-Levant system?

A recent study utilizing seismo-, bio-, and chrono-stratigraphy confirms previous estimations that normal faulting along the Levant continental slope mainly began after 2.6 Ma. It further shows that faulting peaked at around 2 Ma and that it decreases ever since. Noteworthy, preliminary results from the deeper basin indicate that the circum-Nile system began significantly after the off Levant system. These results clearly indicate the co-existence of near- and far-field forces driving deformation in the past 2.6 my.

In light of these results at least four major questions arise: (1) what controlled the early syn-Messinian deformation phase at ∼5.5 Ma? (2) Why did deformation cease after salt deposition? (3) What triggered deformation at about 2.6 Ma? (4) Why did the younger deformation increase at the beginning and decreased later? .