Structural Geological and Salt Tectonic processes in the south-eastern Zagros, Iran

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OMV Upstream and the National Iranian Oil Company are currently working on a joint study focussed on the prospectivity of the South Fars region of Iran. The study area encompasses the offshore Persian Gulf foreland basin along with the simply folded belt of the Zagros, famous for its whaleback folds and salt glaciers. The Zagros formed as a consequence of the collision between the Arabian shield, Eurasia and associated microcontinents. In this presentation we will show key results from two field work campaigns in this region and aim to give some insight into the formation of this spectacular landscape.

Based on field observations, a complex history of halokinetic movements associated with salt diapirism can be inferred and elaborated upon. Salt diapirs, likely present near the surface since the early Palaeozoic, were repeatedly reactivated, generating islands which dispersed any exposed salt derived material into the surrounding sediments. In addition, buried salt diapirs lifted up their sedimentary overburden, generating mass wasting events along the uplifted flanks. The halokinetic movements can be partially linked to the main regional tectonic events such as the Upper Cretaceous ophiolite obduction and Arabian shield–Eurasia continent to continent collision, which has been continual since the Miocene.

In this major Cenozoic event, faults beneath the salt are interpreted as having undergone inversion/reactivation and play a primary role in localizing the thin-skinned deformation above the salt. The Palaeozoic to Cenozoic sediments are detached on the Eocambrian aged Hormuz salt and folded into large scale detachment folds. Folding is controlled by the mechanical stratigraphy, the detachment properties and the basment geometries (faults, paleo-highs) as well as the results of the earlier halokinetic evolution (i.e. heterogeneous sediment thicknesses and presence of salt diapirs). All these factors combined are responsible for the complex present day pattern of folds with its apparently erratic distributed salt diapirs and glaciers in-between. This pattern of diapir distribution is suggested to be inherited from the extensional phase that initiated diapirism and modified by the young contractional deformation.