Role of Precursor Faults in The Growth of Anticlinal Reservoirs in The Middle East

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Anticlinal reservoirs in the Middle East (Oman, Zagros) are related to faults and fractures. While outer parts of most of these anticlines are relatively well known and understood through either 2D or 3D seismic data, and recent analogue studies, their internal architecture remains poorly studied and understood despite their hydrocarbon potential. On one hand, seismological studies in the Zagros suggest that deep and relatively steep master faults underlie many giant Zagros folds and are somehow linked to them. On the other hand, many models of these folds still favour thin-skinned interpretations and exclude the contribution from deep-seated faults in fold growth. Seismological data is unfortunately at best patchy and confined to the parts of active orogens such as the Zagros and it does not provide a complete dataset on the deeper fault geometries underneath all folds. More data is needed to better constrain balanced and restored cross sections and also to construct realistic reservoir models of the deep targets in anticlinal structures. Our field investigations focus on large, dissected, anticlines in the Iranian Zagros, the Iraqi Zagros/Taurus Mountains and in the Oman foothills for which the contribution of underlying deep-seated faults in folding cannot be ruled out. Our studies focus on the role played by pre- and syn-folding faulting on fold seeding, inception and growth. Our observations suggest that in some cases pre-folding basement faulting, as well as mechanical stratigraphy, largely controls the ways syn- and post-fold faults develop and link. This has key implications for the possible internal geometries of less accessible, neighbouring buried Middle East carbonate anticlinal reservoirs, either prospective or already producing hydrocarbons.