

## Interaction Of Petroleum Systems and Stratigraphic Traps in Foreland Basin Settings

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### ABSTRACT

Globally, foreland basin settings form prospective areas for hydrocarbon accumulations. In many cases, source rocks which are either deposited prior to the load based subsidence or during the foreland basin creation are matured during further burial. Expelled hydrocarbons then migrate by buoyancy upwards towards the foreland bulge. This simplistic, yet effective model can account for hydrocarbon accumulations in conventional structural traps in many parts of the world, including the Middle East. Around the margins of the Oman Mountains (Suneinah) Foredeep as well as the Zagros Foredeep, there are hydrocarbons that fall into this category.

However, foreland basins also offer opportunities for the creation of stratigraphic traps in both clastic and carbonate settings as differential subsidence takes place as a result of proximity to loading. The charging mechanism is not dissimilar to the conventional, structural trap equivalent but a degree of focus is still required to maximize the chance of accumulation.

A common feature of foreland basin sediments is that they have the potential to be involved in deformation during and after their deposition. This potential will increase towards the thrust front, and the effect upon source rocks and accumulations can be significant. For source rock units, uplift resulting from inversion can cause cooling of the source rocks and a cessation of hydrocarbon generation. Uplift and partial inversion of pre-existing accumulations will result in tilting and spilling of hydrocarbons as new spill-points form. A secondary effect can be the decompression of gas saturated oil fields resulting in gas cap formation and the spilling of oil from below the trap as the overall volume increases. Physical breaching of hydrocarbon traps close to the thrust front will also result in the re-migration of hydrocarbons during inversion.

The interplay of subtle stratigraphic trapping in foreland basin settings with migration and sometimes complex re-migration history results in a series of play concepts that are potentially overlooked and under-explored.