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Henk Droste[1] (1) JVR Centre Carbonate Research, Muscat, Oman

Intra-platform Basins in the Cretaceous Carbonate Platform of Oman

Intra-platform basins are a common feature within extensive carbonate platforms. As they bring source rock prone deeper water sediments in close proximity to reservoir-prone shallow-water carbonates they may lead to prolific hydrocarbon accumulations. At the margin, complex stratal geometries provide stratigraphic trapping opportunities.

The geometry and origin of three intra-platform basins within the Cretaceous Carbonate Platform of Oman were investigated using high-resolution 3-D seismic: the 'e' and 'b' members of the Albian to Turonian Natih Formation and the Aptian Shuaiba Formation. The study aimed at guiding exploratory play evaluation and at the same time field-scale reservoir modelling of carbonate reservoirs along the margin.

The basins are geologically short-lived and their origin is related to differential drowning of platform interior areas during major rises in relative sea level rather than strong variations in subsidence. Following the initial flooding of the platform, scattered, small carbonate buildups develop. These amalgamated into intra-shelf platforms as they prograded out. Distance and direction of progradation of the shallow-water carbonates into the basin is extremely variable and is controlled by high-frequency sea-level changes and orientation of the margin to the predominant wind direction. As a result the margins of the intra-platform basin are highly irregular.

Influx of fine clastic during a regional drop in sea level killed off the carbonate systems and filled in the remaining topography. Though the outline of the intra platform basin is often based on the distribution of this lowstand infill, this only represents a small remnant of an initially much larger basin.