Exploring for subtle stratigraphic carbonate traps within the Upper Shuaiba of Oman
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Since mid-2003, Petroleum Development Oman has been successfully exploring the stratigraphic Upper Shuaiba play in North Oman. Play understanding has significantly evolved and to date three discoveries have been made.

Prograding Aptian shoals and mounds into the Bab Basin interfinger with argillaceous limestones and are truncated by Nahr-Umr shales.

Individual reservoirs, in the clinoform apex, are too thin to be resolved on seismic. Stacked clinoform geometries can be observed directly in seismic sections. Delineating these geometries, attribute maps and particularly spectral decomposition maps are used enabling visualisation of tuning bands of the inclined sequences terminating against Nahr-Umr. Frequency slice analyses determine the potential location of reservoir belts or prospects. Spectral decomposition is used to predict reservoir thickness using calibrated analogues.

Sequence based geological modelling has resulted in facies distributions over the Bab Basin and the carbonate platforms beyond. The detailed 3D model enables to constrain general trends of the tuning belts observed in seismic. As seismic artefacts are interfering with the actual primary reflections, false trends not aligning with the geological model may be discarded.

Seismic modelling shows that porous reservoirs have similar impedance as the Nahr-Umr. The clinoforms present imply that Top Shuaiba is not a uniform hard-kick pick; phase is depending on reservoir thickness and manual picking is necessary.

Well placement and geosteering are key factors in increasing success and maximising the value of discoveries. Facies demands a vertical pilot hole placed downdip of an expected sequence and a horizontal sidetrack is designed to follow an individual clinoform stratigraphically updip where reservoir is only a few metres thick. PeriScope (Schlumberger) has added value, enabling to maximise the extent of producible reservoir without unwanted exits and converting a discovery into a producer within a period of one month.