

## Architecture and evolution of Lower Cretaceous carbonate platform margin deposits in North Oman; correlation of seismics and well data

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The Lower Cretaceous Habshan Carbonate Platform in North Oman prograded some 200 km to the north over a period of 15 my, i.e., with an average rate of 1 m/50 yr. The Habshan Fm crops out in the Jebel Akhdar area, and is well recognizable in the subsurface on the basis of its striking clinoformal seismic reflectors. The platform-to-slope depositional setting shows strong variations in slope angle associated with the lithological composition of the slope units. Coarse-grained oolites form the steeper slopes and fine-grained carbonates the lesser slopes.

The clinoformal belt was traced by seismic interpretation of 2D and 3D datasets and by amplitude extractions on a regional scale. The seismic mapping reveals 5 subsurface clinoform zones characterised by a dominance of either concave high-angle or convex low-angle slopes (Fig 1).

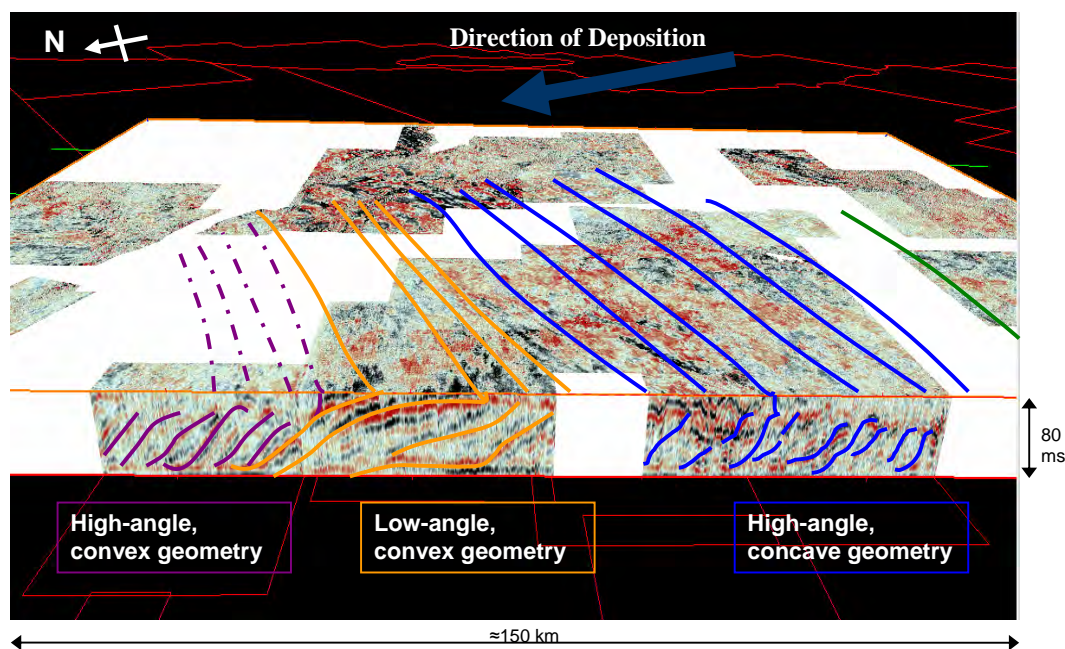


Figure 1. Architectural variations in the Habshan Formation containing the slope and edge deposits as seen on seismics with a flattened window.

Detailed petrophysical well-log analysis and core data of the Habshan formation were used to calibrate well data to the seismic zones. Well calibrations show that the low-angle clinoforms correspond to high gamma-ray and low porosity logs, indicating a higher mud content. The steeper dipping zones are characterised by overall low gamma values and a high porosity, and represent the typical coarse-grained, redeposited shallow water Habshan deposits.

Core data indicate that these low-angle belts correspond to mud-dominated, low energy marine deposits, formed along the platform slope. The depositional model for the low-angle mud-dominated clinoforms is that of a carbonate ramp (Fig. 2).

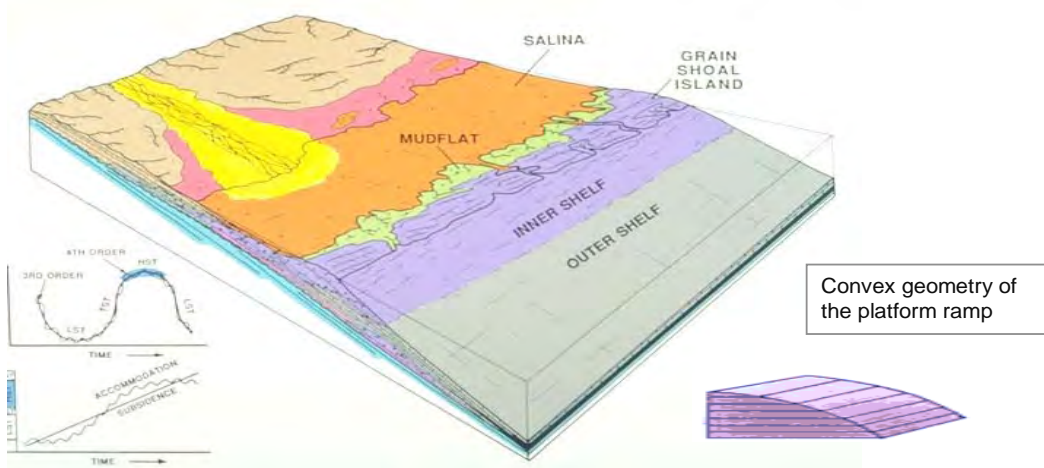


Figure 2. Depositional model for the low-slope, convex clinoformal reflectors, as seen on seismics (Fig. 1). Source: Hanford and Loucks, 1993.

The steeper dipping belts, dominated by the typical Habshan shallow-water-derived, coarse-grained deposits, are associated with the carbonate-platform edge. The depositional model for these high-angle grain-dominated clinoform deposits is that of a carbonate shelf (Fig. 3).

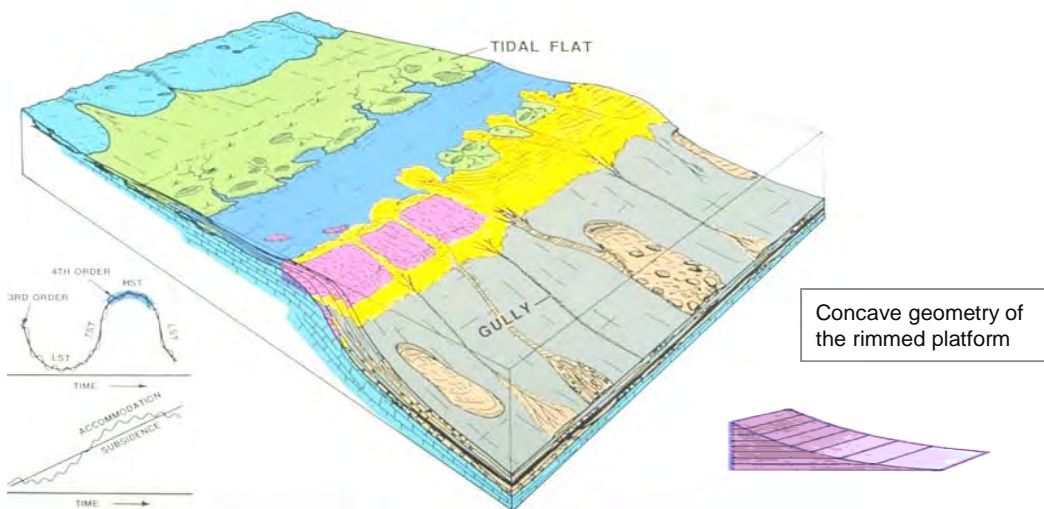


Figure 3. Depositional model for the high-angle, concave clinoformal reflectors. Source: Hanford and Loucks, 1993.

Geometrical analysis and seismic interpretation show no relations between the variations in the depositional system and any major structural features. The varying deposition angles and the lithology of the Habshan deposits thus must have been controlled largely by sediment influx and relative sea-level fluctuations.