

Channel features in the Upper Cretaceous Hartha Formation, their formation and impact on seismic, the Rumaila Field, Southern Iraq

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ABSTRACT

The Campanian/Maastrichtian Hartha Formation forms part of a shallow carbonate platform system in southern Iraq. It is part of the non-productive overburden of the Rumaila Field and significant drilling losses occur when penetrating the formation. The Lower Hartha contains a channelised interval which generates seismic artefacts in underlying reservoir intervals. Coeval channels are found across the region and are a source of seismic imaging issues (e.g. Fiqa channels in UAE, channel and mass transport deposits in Kuwait, Qatar and Oman). Understanding the depositional mechanism and composition of the channels will aid the development of seismic processing techniques to remove their effects.

A new sequence stratigraphy has been developed from cuttings, wireline/image logs and biostratigraphy to divide the Hartha Formation and provide context for the channels. The Lower Hartha is part of a prograding platform typified by deeper water argillaceous/glaucconitic limestones and shallower benthic foraminiferal shoals. The Upper Hartha is dominated by partially dolomitised and vuggy platform margin and interior facies. As a result, the Upper Hartha is more prone to drilling losses.

The Hartha channels occupy a position within the Lower Hartha above a 3rd order sequence boundary. The channels are up to 30m deep and incise into background argillaceous carbonate facies (related to a 2nd order MFS). Channels have a minimal basal lag and are filled by laminated fine grained carbonates. This suggests that channel fills relate to deeper waters rather than processes linked to shallow platform systems or subaerial exposure. The Hartha channels are well resolved in seismic attribute maps. Channels appear as dim areas whilst residual inter channel areas are bright features. Seismic artefacts are generated by background sedimentation (a zone of sonic slowness) rather than the channel fills. Channel density is variable across the Rumaila field. The deepest incisions are in the centre of the field where channels are linear. In other areas inter-channel areas are lensoid in appearance suggesting more lateral movement or cross-cutting of channels.

Understanding the relationship between the position, composition and seismic response of channels and non-eroded intervals has provided insights into the development of the Lower Hartha platform. It has also offered scope to reprocess the Rumaila seismic volume and remove the impact of the channels on the underlying reservoir intervals.