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Reservoir Delineation Using an Integrated Seismic Facies Analysis Approach: the Carboniferous Interval of the Karachaganak Field (Western Kazakhstan)

The giant oil & gas condensate Karachaganak Field is located in northwestern Kazakhstan. The main reservoir section reflects development of an isolated carbonate platform from uppermost Devonian to lowermost Permian along the northern margin of the Pre-Caspian Basin. The reservoir is sealed by Kungurian evaporites.

The conclusions to be presented are based principally on the seismostratigraphic and geological interpretation of 3D Vibroseis seismic and well data. In particular the Late Visean-Serpukhovian (C1-C9) reservoir interval was investigated and an homogeneous seismostratigraphic framework developed by the definition and interpretation of seismic facies, geometries, etc.

This approach enabled the sub-division of the interval into three seismo-stratigraphically defined depositional units (U1, U2 & U3) and highlighted that the platform comprises several structural blocks. Each block has experienced differential tectonic deformation, which influenced both the distribution of depositional facies and geometries.

The study has shown the importance of considering the whole structural and sedimentary platform evolution in relation to Pre-Caspian Geodynamics, from the Devonian-Early Carboniferous rift to the Hercynian compressional phase. In particular, the compressional phases halted previous carbonate platform sedimentation, producing important unconformities.

This study focuses principally on the development of a seismo-depositional sequence interpretation for the Carboniferous of the Karachaganak Field.