

Innovative plays in previously explored regions: Carboniferous Clastic Reservoir Prediction in the Precaspian Basin

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Increased importance is being placed upon the full extraction of hydrocarbons from previously explored basin systems. The Precaspian basin is synonymous with Devonian/Carboniferous carbonate reef structures charged by a Late Devonian and Carboniferous carbonate source, with a regional Kungurian salt seal. However, there is still potential for other types of new and innovative plays in the Pre-Caspian Basin.

Through an integrated study of public domain literature, including sedimentological, palaeogeographic and seismic and well and outcrop data, a series of Carboniferous clastic turbidite and channel fill plays can be temporally and geographically constrained. The main risks associated with these plays are variations in the geographical location and reservoir composition.

Precaspian Carboniferous clastic systems were fed by three main fluvial sources, located to the east (Urals) and the west/northwest (Russian Platform, Ukrainian Shield and the Voronezh Massif); these sources each have unique reservoir characteristics. Continually exposed regions in the southwest and South Emba High area may have also contributed secondary fluvial systems into the basin.

Sediments from the east were sourced from Uralian Devonian island arcs, accreted to Baltica during the Hercynian Orogeny. These island arcs source a mix of clastics, reworked carbonates and volcanic clays, which have the potential to significantly reduce reservoir quality in the northeastern Precaspian.

To the west of the basin, sedimentary input is generally cleaner. Sources include the Ukrainian Shield and Southern Voronezh Massif, both uplifted granitic basement. The large turbidite and channel fill systems fed by these sources may provide a viable, low risk play.

In the northwest, the Ryazano-Saratov Trough provided a clean clastic input which was fed from the Volga Urals and Northern Voronezh Massive regions of Russia. As with the Ukrainian Shield and Voronezh Massif regions, the Russian Platform has been geo-tectonically stable since the Middle Palaeozoic.

A commercial, globally-relevant sequence stratigraphic model has been developed which allows these sediments to be constrained and times of more extensive lowstand clastic deposition to be predicted. Together with an awareness of regional palaeogeographic context, sequence stratigraphy can be used to reduce exploration risk when assessing new plays in mature basins.