

Mid-Devonian to Carboniferous ocean-margin and carbonate-platform development across the East Turan Platform, West Kazakhstan Plateau and Western Tien Shan

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During the Devonian the western part of the Kazakh continent comprised a passive margin bounded in the east by the Devonian Volcanic Belt – arc volcanics associated with subduction of the Junggar-Balkhash ocean farther east – and in the west and south by the Uralian and Turkestan oceans respectively. Clastic deposition gave way during the Late Devonian to carbonates, forming an extensive platform over 1500 km long and 400 km across, with deepwater siliciclastics and carbonates to the west beyond the shelf edge.

Early Carboniferous onset of subduction of the Uralian and Turkestan oceans beneath Western Kazakhstan created an active margin, with development of the Valerianovsk and Chatkal-Kurama arcs. Carbonate-platform growth continued until mid-Carboniferous closure of both oceans led to uplift, with development of a fold-thrust belt in the west now forming basement to the East Aral, Syr Dar'ya and part of the South Turgai basins. An east-west deepwater trough that had crossed the north of the shelf was inverted, creating the Sarysu-Teniz uplift zone which now separates the carbonates of the Teniz and Chu-Sarysu basins.

Superb exposures of Devonian-Carboniferous carbonate-platform and associated facies in the Bolshoi Karatau on the south-central zone of the shelf edge have been described by Cook, Zhemchuzhnikov, Zempolich and others as analogues of Precaspian Basin reservoirs (e.g. Tengiz field). The chief aim of this study however was to understand the development of the margin as a whole, which forms a component of many known and prospective hydrocarbon basins in the region. Although often regarded as “basement”, the carbonate platform and associated deposits are known to host hydrocarbons within the Chu-Sarysu and Fergana basins, and have been regarded as an exploration target in the East Aral and Teniz basins. They occur within prospective intermontane basins of Tien Shan, including the Naryn Basin, and as far east as the Issyk-Kul Basin. In places, including the Teniz Basin and Chu-Sarysu basins, the limestones are bituminous and may have source potential.

The nature of the succession in these diverse areas, once covered by the same depositional system, will be discussed, together with implications for hydrocarbon prospectivity.