

Specifics of geological development of Caspian block structures

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Recent studies of geological structure of the Caspian offshore conducted by all Caspian states resulted in obtaining of new basic data from the junction zone of the southern edge of the Precaspian basin with adjacent tectonic elements. Discovered large fields Kashagan. Kairan, Aktoty, Khvalynsky, Shirotny, Shakh Deniz, Azeri-Chirag-Guneshli, Zhemchuzhny and extensive exploration carried out all over the Caspian call for revision of geological and tectonic setting of the region uniting the East European platform in the north, the Scythian - Turanian plate in the centre and the Alpien orogenic belt in the south to redefine its petroleum potential.

Geographically and geologically the Caspian Sea is divided into three parts: North, Middle and South. North Caspian is the southern edge of the Precaspian basin developing as a starved depression from Middle Devonian through Artinskian. Large atoll-like carbonate masses about 1.5 km high - Astrakhan arch, Tengiz, Korolevsky. Yuzhny, Kashagan. Aktoty, Kairan arose along the edges of the basin. Geodynamic processes by the end of Paleozoic led to collision of the East European Turanian and Kazakh plates and formation of a Eurasian lithospheric plate. The overriding to the west Kazakh plate was raised and became the area of denudation. Thick clastics drifted from its surface and filled-in troughs in the East European Turanian plate in Late Permian and Early Triassic. At the end of Sakmarian and the beginning of Artinskian, moving of the Scythian-Turanian plate westward blocked the connection of the Precaspian basin with Tethys. The process was accompanied by formation of high amplitude folds advancing on the southern edge of the Precaspian basin by fault systems and creating fans. Younger deposits overlapped Paleozoic carbonates by a system of powerful thrusts. Isolation of the Precaspian basin from Tethys led to accumulation of thick evaporites in Kungurian age. Salt strata became an ideal seal for petroleum accumulation in Paleozoic deposits.

Geodynamic conditions changed at the end of Paleozoic: the Scythian- Turanian plate split up and its Turanian part shifted to the south-east. The Caspian plate was formed. This event changed regional bedding: till the end of Paleozoic the source area was in the junction zone of the Precaspian basin and the Scythian-Turanian plate and clastics were carried to the Precaspian basin.

In Late Permian and Early Triassic, due to formation of a Mezotethys ocean geodynamic activity dislocated to the south and extension and plunging towards the South Caspian began. One of key extensional structures was the Mangyshlak system. With brief intervals inland rifting continued till Middle Jurassic. In Middle and Late Jurassic all the southern part of the region subsided, creating inland and over-rift sedimentary basins connected with Mezotethys by Pre-Caucasian – Mangyshlak and Amu-Darya straits. In Cretaceous, Mezotethys closed in the north and the Eurasian plate collided with the African-Arabian. These events resulted in formation of Caucasian and Kopet Dagh folded systems and the South Caspian sedimentary basin.

Geodynamic events in the Caspian region had a different effect on specifics of its petroleum potential and this should be considered in geological modeling of prospects and fields.