Structural Control of Central Caspian Petroleum Systems: Dagestan and Kazakhstan
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The hydrocarbon charge in the Central Caspian region is generated from Upper Triassic-Lower Jurassic, Middle Jurassic, and Oligocene-Miocene source rocks. The Mesozoic source rocks are restricted to extensional basin troughs, whereas those of the Tertiary are more regional. Subsequent compressional and/or transpressional deformation had a strong influence on the orientation of migration pathways for hydrocarbon charge into the resultant structural traps, as illustrated in each hydrocarbon province. The Dagestan fold-belt hanging wall anticline structural traps are charged with hydrocarbons sourced from the Oligocene-Miocene source rocks through migration pathways facilitated by thrust faults and fracture systems. The Terek-Caspian foredeep traps are charged from Triassic-Jurassic source rocks within the Permo-Triassic East Manych trough, and migration occurs upsection along relatively young fault and fracture systems that developed as a result of thrust loading to the south. The hydrocarbon charge for structures in the Mangyshlak basin is correlated to similar Triassic-Jurassic source rocks that formed in the southward deepening half-graben. These hydrocarbons accumulate within folds on the northern margin as a result of early (?) Miocene south-vergent compressional deformation along its northern flank as a result of tectonic inversion and transpressional reactivation along a north-dipping normal fault. Understanding the petroleum systems of the hydrocarbon provinces of Dagestan and Western Kazakhstan will be critical to reducing exploration risk in the relatively unexplored Central Caspian Sea.