Paleogeography of the South Caspian Upper Productive Series and reservoir properties changes

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Landlocked Caspian Sea was separated from the ancient ocean Paratethys in Messinian due to the collision of Arabian and European plates. Dramatic Sea level fall initiated deposition of 8 km thick Lower Pliocene Productive Series- the major HC producing unit in the South Caspian basin. Since that time the South Caspian basin turned into depocenter of several large river systems such as Palaeo Volga, PalaeoKura, Palaeo Uzboy, PalaeoAmuDarya supplying terrigenous material from different sources - Russian platform, Lesser, Greater Caucasus, Kopet Dag. Interplay of these rivers was one of the major factors controlling reservoir quality of the Productive Series sediments.

Analysis of huge mineralogical data set from many South Caspian onshore and offshore fields shows that the biggest progradation of PalaeoVolga took place during sedimentation of the lower portion of Horizon VII(Fasila Suite). Abundant quartz content, presence of staurolite, sillimanite, low feldspar and low rock fragments content and absence of effusives have been recorded in the sediments of the lower portion of Horizon VII in Pirsagat, Khamamdag, Garasu, Bulla-deniz, Bahar, Umid fields. However, increasing feldspar content, appearance of effusives together with the high amount of quartz (around 70%) southward in the fields like Sabail-Dashli, Nakhchivan, Sangi-Mugan, Aran-deniz testify to the mixed nature of the lower portion of Horizon VII here which was sourced from both sources- Russian Platform (PalaeoVolga) and Lesser Caucasus (PalaeoKura). Further to south the data display dominating PaleoKura terrigenous supply.

Sedimentation of the upper portion of the Horizon VII is characterized by the expansion of the mixed zone due to the progradation of Kura river. The mixed zone now shifted to the north and covered Pirsagat, Sangachal-deniz, Khara Zira fields which were previously sourced by paleoVolga. Due to progradation of paleoKura upper portion of Horizon VII in the Southern fields (from Bulla-deniz) is entirely composed of Kura river sediments.

Since that time the gradual progradation of PalaeoKura and domination of Kura sediments in the northern Baku archipelago took place. Only limited evidence of the Volga influence in the southern fields (Umid) has been recorded in the lowers of Horizon V (analogoue to Balakhany VIII). Change in sediment provenance is reflected on reservoir properties as well. The best reservoir properties (porosity above 15%) have been recorded in the northern Baku archipelago in the lowers of Horizon VII. Good reservoir properties (porosity 10-15%) are related to sediments of the mixed zone and distal Volga facies -Sabail-dashly, Umid, Sangi-Mugan, Aran-deniz, Garasu fields. Expansion of Kura sediment zone led to the worsening of the porosity which is below 10% in the fields south from Nakchivan.