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Fluvial Sedimentology of the Neogene Productive Series, Azerbaijan: Implications for Reservoir Quality and Exploration in the South Caspian Basin

Productive Series sediments are well exposed across the Apsheron Peninsula and are thought for the most part to be analogous to their offshore equivalents facilitating the direct application of outcrop derived depositional models to reservoir successions in the subsurface.

The succession comprises regularly alternating fluvial sandstone reservoirs and sealing overbank and lacustrine mudstones. Fluvial sandstones display a range of architectural styles comprising channelised and non-channelised, single- and multi-story sheets, and ribbon type sandbodies. Internal heterogeneity includes grain size variation, influencing the distribution of calcite cement, the abundance of intraformational mudclast conglomerate, and the distribution of channel abandonment facies.

Cyclic (on a variety of scales) climatic mediation of sediment supply and discharge is thought to have been the dominant control during deposition of the Productive Series. Periods of sediment starvation and desiccation and/or evaporite deposition during phases of increased aridity were followed by phases of increased humidity and precipitation leading to initial increased sediment supply and rapid basinward progradation of fluvial systems, with subsequent increase in lake-level and inundation of the floodplain. Returning to a more arid climate, evaporation exceeds discharge and lake level is reduced once more exposing a desiccated floodplain.

Tectonic controls were most likely limited to rejuvenation of source lands as reflected in changing sandstone provenance. The Productive Series displays an overall fining-upwards in grain size that may similarly be attributed to source land evolution and not to large-scale transgression.