

Evolution of Fluvial-Deltaic System Recorded in Accumulation of Organic Material: From the Example of the Kura River in the South Caspian Basin

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Abstract : The study of organic material in bottom sediments together with lithologic and biostratigraphic data improves our understanding of the evolution of fluvial and deltaic systems. The modern Kura River delta is located in the Southwest Caspian Sea and is fluvial-dominated. The river distributes its sediment load through three channels oriented North-East, South-East, and South-West. The offshore modern delta consists of thinly bedded or laminated silty clays and dark grey clays. Locally sand and shell-rich horizons occur. Onshore delta is composed of channel-levee sands and floodplain silts and clays. Overall sedimentation rates in the delta determined by the ^{210}Pb method range between 1.5-3.0 cm/yr. We investigated the distribution of organic material in the deltaic sediments in 300 samples selected from 3m deep piston cores. The studies of transparent sections demonstrate that deltaic sediments are enriched in terrestrial debris. It is non-transparent and has an irregular, isometric, or elongated shape, angular edges, black or dark-brown colour, and a clearly expressed fabric. Partially it is dissolved at the edges and is replaced by iron sulphides. Fragments of marine algae have more smooth edges, brown colour. They are transparent; the fabric is rarely preserved. The evidences of dissolution and gelification are well observed. Iron sulphides are common. The recorded third type of organic material has a round, drop-like, or oval shape and belongs to planktonic organisms. Their initial organic material is strongly transformed or replaced by dark organic compounds, probably, neoplasms. The particles are red-brown and transparent. The iron sulphides are not observed. The amount of Corg in the uppermost portion of sediments accumulated in the offshore Kura River delta varies from 0.2 to 1.22%, with median values of 0.6-0.8%. In poorly sorted sediments Corg content changes from 0.24 to 0.97% (average 0.69%), silty-sandy clay - 0.45 to 1.22% (average 0.77%), sandy-silty clay - 0.5 to 0.97% (average 0.67%), silty clay - 0.52 to 0.95% (average 0.70%). The data demonstrate that in sediments deposited during Caspian Sea high stand in 1929, the minimum of Corg content is localised near the mouth of the main south-eastern distributary channel and coincides with the minimum of the clay fraction. At the same time, the maximum of organic matter content locates near the mouth of the eastern channel, which was inactive at that time. In sediments accumulated during the last Caspian Sea low stand in 1977, the area of Corg minimum is attached to the north-eastern distributary's mouth. It indicates the high activity of this distributary during the Caspian Sea fall. The area of Corg minimum is also recorded around the mouth of the main channel and eastern part of the delta. Maximums of Corg and clay fraction shift towards the basin. During the Caspian high stand in 1995, the minimum of Corg content is again observed in the mouth of the main south-eastern channel. The distribution of organic matter in the modern sediments of the Kura river delta displays the strong time dependence and reflects progradational-retrogradational cycles of evolution of this fluvial-deltaic system.

Keywords : high and low stands, Kura River delta, South Caspian Sea, organic matter

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