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Coastal dynamics of Garabogazköl bay of Caspian Sea

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Garabogazköl is extremely interesting object for the study of coastal evolution and Caspian sea paleogeography. Bay plays an important role in evolution of the Caspian basin, as a major area of permanent loss of sea water, the volume of which varies in different years from 17 to 23 km3/year, averaging about 20.3 km3/year. Termination of runoff into the bay would provide annual Caspian Sea level rise of about 3 cm.
Despite the large-scale research of the coast of the Caspian Sea during the Soviet era, Garabogazköl was generally poorly studied, mostly describing sedimentation patterns of salt deposits (associated with the production of sulfates). The basis of our study was the materials of remote sensing (satellite imagery), supported by field research, description of geomorphological structure of coasts.
As known, the Caspian Sea level was at the lowest elevations from 1970 to 1985, ranging from -28.6 to -29.01 m. The creation of the dam in 1980 completely blocked Caspian water inflow into the Gulf, resulting even more drastic reduction in its area, which decreased by 3 times (from 18 to 6 thousand. km2), with depth less than 50 cm. In mid-1992, when the level of the Caspian Sea has risen by more than 2 meters over the level of 1978, the dam was destroyed.
The obtained data allowed characterizing the peculiarities of the coast of the Gulf in these conditions. During the start of the coastal retreat first appeared drained relatively shallow northern and western parts. During this period the processes of accumulation were predominate. There was the deposition of thick (up to 1 m) salt horizon. Dominating wind-surge processes resulted relatively smoothed surface, filling rugged topography by terrigenous material and salt. After the explosion of the dam in 1992, the bay was quickly filled with water and in the next 3-4 years is completely covered the Gara-Bogaz depression.
In general, a high stability of the coastline of the Gulf observed through analysis of the last 50 years history. We can state that the modern relief of the coast is largely inherited. During the various phases of Late Pleistocene history kept its main morphological features. The types of coasts also only slightly changed during the level fluctuations. This is explained by repetitive rhythmic fluctuations of the basin level. For a period of transgression abrasion process are predominate, increasing at the approach to the peak of transgression. Since the beginning of the regressive phase accumulation possesses growing. In the context of repetitive cycles the accumulative formation can be eroded completely, but sometimes sand and shell material is cementing. Such lithified accumulative forms can withstand abrasion and thus partially saved.
In the era of Late Quaternary transgressions of the Caspian Sea level raised significantly above its present position. According to modern concepts, the morphology of the Garabogazköl in its current position was shape at the end of the Late Hazarian stage, when a large bar, the foundation of modern Kara-Bogaz spit was formed.
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