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Neotectonics of the Manych Trough

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Regional and local neotectonic features of the Manych Trough and regulating role of its tresholds in Caspian water overflows to the Black Sea are examined. Various evidence for neotectonic activity, with the maximums in Early and Late Khazarian epochs, of all the local tectonic rises in the Manych Trough, which were thresholds during the existence of the strait in the past, has been found.

The Manych Trough is superimposed on the deep-laid faults of the Scythian Plate and in the sublatitudinal direction, it extends by more than 500 km. Throughout the Cenozoic, the system of narrow longitudinal and transverse structures continued to develop along the faults and some portions of these structures suffered differentiated motions in the Pleistocene as well.

The general regional neotectonic Pleistocene character of the Manych Trough is confidently identified on the basis of coincidence with the large trough, which had been developing during Meso–Cenozoic; the non-altered character of modern relief; and the stable paleogeographic regime throughout the Pleistocene, when the Caspian straits repeatedly existed in the lowland parts of the trough. All these facts unambiguously indicate a general downward tectonic regime of the Manych Trough during the Pleistocene up to 100 m in amplitude. The amplitude of neotectonic motions of the trough over long time periods and within the Pleistocene in general were determined by comparative analysis of the modern and initial positions of reference horizons of the marine Pleistocene in the Manych Trough. The subsequent step-by-step comparison between the hypsometry of the bottom positions of the initial straits and the modern level of the corresponding strata allowed us to specify the value of tectonic deformation of the bottom for any concrete time period.

The structural differentiation of the trough is clearly expressed in its modern relief and configuration of the river network; the former is en echelon sublatitudinal depressions joined by steep short ancons of river valleys, which surely reflect the system of young faults.

The mentioned peculiarities of relief convincingly evidence manifestation of neotectonic activity of local structures in the trough. Assessment of activity was made based on deformations in bases and roofs of the reference horizons within certain structures, relative to adjacent areas of depressions; the value of the hypsometric position of reference layers in the preceding and following stages of evolution and the depth of erosion trenches, which are highly typical for relief of the Manych Depression and its neotectonic rises, have been taken into consideration. It is very interesting that deep trenches at local rises coincide with a higher thickness of deposits, but it also demonstrates certain difficulties in analysis of thicknesses for determination of the character of neotectonic activity for local structures of the Manych Trough. In the epochs when the straits existed, they were thresholds controlling water flow into the Black Sea.