THE KARAKUL DEPRESSION IN PAMIRS - THE FIRST IMPACT STRUCTURE IN CENTRAL ASIA

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The Karakul depression was picked out as the possible impact structure by the study of space images of Tadjikistan. Its striking similarity with some complex impact craters such as Dellen and Gosses Bluff is evident. Our investigations of the Karakul depression in 1987 and 1989-1991 years allowed to determine it as the impact crater with the central uplift (1,2).

The target of the crater is presented by slightly metamorphosed sedimentary rocks of Paleozoic, intensively folded and intruded with granites during the Gercynian orogeny. The modern structure of north-eastern Pamirs was formed by Alpinian orogeny; the raise of the area in Neogene was about 4000-7000 m (3,4).

The Karakul crater is presented by the circular depression with the flat floor and uplifted rim. The rim-rim diameter is about 52 km. The bottom of the depression 30 km in diameter is occupied by the Karakul Lake and unconsolidated lakustrine deposites. The central uplift forms an island and peninsula in the lake in the middle part of the depression (fig. 1). The height of the uplift is to 250-300 m above the lake level. The elevation of the rim is about 1000 m above the floor of the depression and about 120-200 m above the surrounding area.

The rocks of the central uplift and of inner slopes of the rim are disturbed. Breccia, brecciated rocks and cataclasites are widespread in the central uplift.The limestones with the gries structures and granites converted to the rock meal were observed in that area. The shock metamorphic effects are distributed in some rock types. In brecciated quartz mosaicism and undulatory extinction are abundant. The planar elements in shocked quartz are represented by the systems $\{10\bar{1}3\}$, $\{10\bar{1}4\}$, $\{10\bar{1}1\}$ and some others (fig.2,3). The system of $\{10\bar{1}2\}$ rare was observed in the biggest part of examined samples. The kink bands are represented in biotite and quartz. The shock pressures determined in quartz are to 15-17 GPa.

The impactites, suevites and allochtonous breccia were newer observed in the depression, but they might be preserved in its deepest part around the base of the central uplift under the Quaternary deposites and below the lake level.

The youngest rocks of the target of the crater are granites with the K-Ar age of about 230-190 m.y. The oldest sediments formed in the depression are represented by the lakustrine deposites of Pliocene-Pleistocene (?). The age of the crater was preliminary estimated as Neogene, probably, Pliocene.

KARAKUL IMPACT CRATER

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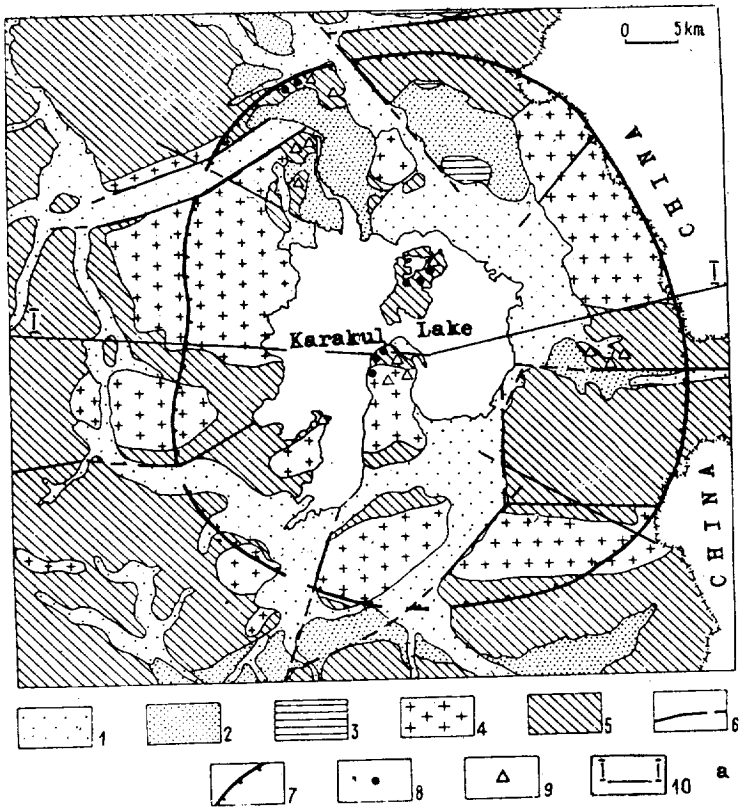

Fig.1. Simplified geological map of the Karakul impact structure (after E.F.Romanko and autors' data)/a/ and its morphological crossection /b/. 1.Quaternary lakustrine and alluvial deposites; 2. Glacial deposites; 3.Pliocene-Pleistocene (?) lakustrine deposites; 4.Karakul granites; 5.Paleozoic sedimentery rocks; 6.Faults; 7.Crater rim; 8. Shock metamorphosed rocks; 9. Breccia, megabreccia; 10.Position of crossection.

Fig.2. Photomicrograph (crossed nicols) of quartz in breccia exposed in the island in the Karalul Lake.

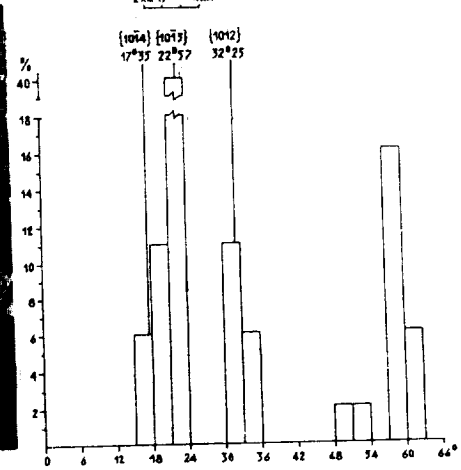

Fig.3. Histogram of the planar elements orientation in quartz from the north-western part of the Karakul depression. 26 measurements of 14 grains.

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