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Aeolian-Accumulative complex sarykum as a unique geomorphic object Of Russia: Structure, genesis and sands sources

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Abstract

Acolian-accumulativc complcx Sarykum is one of the highest isolated (i.e. formed away from the deserts) sandy land forms in Eurasia, located within the Tcrck-Sulak lowland plain at the north-eastern foothill of the Caucasus Mountains, 16-17 km towards WNW of the Makhachkala City port of Caspian Sea (Republic of Dagestan, Russia). On the basis of particle size distribution and mineralogical analysis of 59 sandy samples, the heterogeneous structure of the complcx is defined. The coarscst sandy material (modal values arc 352 micron and more) composes the central dunc-ridgc segment of Sarykum (of so-called Great (or West) Sarykum). The further from the dune constructions to the periphery, the thinner the average dimension of the sand particles and smaller the modal values (249 micron and less) of their granulomere spectra. This grain size distribution can be explained not only by windy sorting of the sands and further acolian recast of dunc-ridgc segment, but also by spatial features of the facial changes during the period of initial sandy accumulation, and also by the differences in composition of rocks, which were the sources of denudation. In the vertical structure of Sary kum the heterogeneity is also expressed. It is associated with temporary changcs of sandy sedimentation conditions in the region. So, the dunc-ridgc segment of Great Sarykum can be represented as a system of consistently accumulated sandy layers (lenses?) (which includes the gravelly sands), which differ in composition and age, having apparently the coarscst content in the middle part of its vertical geological cross-section. The material of overwhelming majority of the selected samples belongs to mineral group of quartz sands (quartz contcnt is over 90%) and subgroup of quartz subarkosc (quartz contcnt is 80-90%). Moreover, the acolian (deflated) sands of the dunc-ridgc segment and its underlying cross-bcddcd sands of Great Sarykum entirely belong to the first group; the hilly and peripheral sands, which characterized by fine granulomctry, refer to the second mineral subgroup. The Sarykum's structure is due to the combination of gravelly sands, formed by the river Shura-Ozcn' dcltaic accumulation in the Late Quaternary, and sandy (with gravels and pcbbccs) deposits proluvially and dcluvially dislocated to the recent Sarykum massif territory from the slopes of the nearby Narat-Tubc mountain range. The mixing of originally and compositionally different sediments that formed the Sarykum complcx, likely have the complicated history, following by the staged changcs of the periglacial landscape-climatic conditions in the Late Quaternary.

Keywords

Acolian deposits, Acolian landforms, Caucasus, Dagestan, Dune, Granulomere analysis, Sand, Sarykum