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Physical and chemical characteristics of cryoconites, sampled from glaciers of the Central Caucasus (Russia).

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Cryoconites are a dark-colored granular sediments found in glacial landscapes. Cryoconites are known as a dark colored accumulation of various origin material in superficial holed of the glaciers which formed in polar and mountain regions of the Earth. They can significantly accelerate glacier retreating by reducing the albedo of the glacier and play a significant role in the colonization of the territory after its retreat, being an "oasis" for development of microorganisms on an uninhabited glacier surface. The understanding of key cryoconites properties is necessary to understand their impact on the mountain glaciers of the Central Caucasus, especially taking into account their recent rapid retreat.

The aim of this research is to study the physical and chemical characteristics of various cryoconites and cryoconite derived periglacial soils of the Central Caucasus. Eight cryoconite samples and eight soil samples from three soil sections were selected. The following characteristics of the samples were determined in laboratory conditions: total organic carbon (TOC), basal respiration level, pH H₂O and exchangeable soil acidity, solid phase density and particle size distribution.

The results of the analyses showed both differences and some similarities in the physical and chemical characteristics of the cryoconites and soils of periglacial zone which were studied. Cryoconites, on average, are characterized by lower values of basal respiration than more developed soils from this region. The total organic carbon content in most samples was relatively low, but its values increase significantly soils investigated due to accumulation of carbon in fine earth under the influence of primary vegetation. The water extractable acidity values showed a significant similarity between the studied cryoconites and soils, they vary from slightly acidic to slightly alkaline in both groups. At the same time, the variation of exchangeable acidity values between cryoconite samples is significantly greater than in developed soils. Moreover, the density of the solid phase of the studied cryoconites varies in a larger range of values than that of the studied soils due to variety of sources of cryoconite materials. However, the analysis of particle size distribution showed a significant similarity of the studied objects: in almost all samples there is a significant dominance of the sand fraction (d=1-0.05 mm). The obtained data indicate both the difference in the physical and chemical properties of the studied cryoconites among themselves, and the probable influence of cryoconites on soil formation in this region.

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and in the process of soil-like bodies formation”.