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Carbonate pedofeatures in soils of crio-arid landscapes of Altai Mountains as a proxy of paleoenvironment

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The key-site is situated in the highland basin of the Ak-Khol lake (southeastern Altai Mountains). This area was studied in detail by M.A.Bronnikova with colleagues (Bronnikova et al, 2012, 2014). In order to examine geochemical variations of carbonates in soils of crio-arid landscapes two catenas with the same summit have been studied. Haplic Cambisols Pisocalcic Skeletic present the majority of soils along both catenas, they are characterized by carbonate coatings on the stones within the profile and diffused carbonate material as well. The toeslope that refers to the first catena coincides the floodplain of the freshwater Ak-Khol lake. The lowest member of the second catena is a floodplain of perched brackish water lake, its water contains sodium hydrocarbonates, while the Ak-Khol lake water's composition is calcium hydrocarbonate. These two lakes have different sources that is shown by $\delta^{18}\text{O}$ values: -15.19‰ (the Ak-Khol lake) and -6.13‰ (perched lake). Fluvisols of Ak-Khol lake floodplain do not contain carbonates, while soils of a perched lake are alkaline (pH = 8.9...10.0). Carbonate coatings consist of 38% of SiO_2 and 16% of CaO . The content of carbonates in soils varies from 2% to 8-10%. Total alkalinity value is significantly higher than carbonate one everywhere along catenas. Parent material is presented by gneiss and granite. Shorelines of previous Ak-Khol lake levels, surrounding perched lakes, chemical composition of lakes' water and soils as well as distribution of carbonates in the profile show that the presence of carbonates in soils is connected with lake impact in the late Quaternary. Field study was funded by Russian Foundation for Basic Researches (grant № 13-04-01829), analytical work was funded by Russian Science Foundation (grant №14-27-00083).