



Palaeosol-microbiological approach for reconstructing intra-annual precipitation pattern in the past

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Comparative analysis of chemical and microbiological properties of the palaeosols hidden beneath burial mounds (kurgans) in desert-steppe zone of Russia gives an opportunity to elucidate the peculiarities of intra-annual course of precipitation in different historical periods. Soil salinity in desert steppes depends on the amount of precipitation during cold season. Snow melting provides deep drenching of soil and leaching toxic salts downward the profile. Summer precipitations moisturize several upper inches of soil and do not affect its general chemical properties. At same time, the state of soil microbial communities is under the influence of spring-summer moisture. The more precipitation is during vegetation period, the greater phytomass develops and more plant residues enter the soil causing an increase of microbial biomass that decompose it. The results of study of paleosols buried beneath burial mounds (kurgans) of the Bronze age in the desert-steppe zone of the South-East of the Russian Plain shows that in the second half of the III mil. BC the increased soil salinity with a simultaneous increase of microbial biomass and number of cells, decomposing plant residues is observed. The hypothesis of a reduce of winter precipitations and their increase during warm season is forwarded. It explains the fact that in the second half and at the end of III mil. BC a bloom of archaeological cultures is observed in the desert steppes. The lack of snow and increased precipitation during vegetation season affected the productivity of phytocenoses and prevented spring burnouts that provided more favorable conditions for early pastoralists of the catacomb Bronze age population. The work is supported by Russian Science Foundation (project 17-18-01406)