



Soils of sinkholes: effects of slope aspect and lateral transport of sediments on soil variation

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Karst landscapes are highly fragile and particularly vulnerable to subsidence and soil erosion. In karst region there may be hundreds or even thousands of sinkholes and other karst landforms in a small area so that the flat surface is actually absent. The effect of slope aspect on karst landscapes are resulted in different amount of solar radiation and increase of moisture along slopes. In European Russia semiarid landscapes the wind transport of the snow resulted in addition moistening of the soil situated on the eastern slope of depressions.

Our research is devoted to the investigation of soil catenas on the slopes of subsidence sinkhole in “Bogdo-Baskuntschak” natural reserve (semiarid landscape). It based on field research of 4 soil catenas situated on the slopes of eastern, northern, western and south exposures. The profile of the sinkhole is an inverted cone (elongated from west to east), slope length varies from 8 to 12 meters, slope gradient - between 40-55% (eastern slope is the shortest and steepest). The short slope length and soil diversity that the sinkholes provided are beneficial for investigation of slope aspect and effect of lateral transport on soil formation.

The main feature of sinkhole soil cover is a considerable variety and their high complexity. The lateral transport of sediments resulted in dramatic changes of soil within catenas. Haplic calcisols and arenosols calcareic, situated on the inter-sinkhole flat surface and upper parts of the slopes are substituted by cambisols and leptosols in the middle part of the slopes and colluvic regosols humic in the lower part of the slopes and sinkhole bottom. Soil formation and accumulation of sediments occur simultaneously and lead to the weak soil formation at the middle and lower sections of sinkhole side slopes. The thickness of humus horizon increases from the top to the bottom of sinkhole notably – from 8-12 cm on the upper and middle part of the slopes to 240 cm on the bottom of the sinkhole. The addition moistening of the soil situated on the eastern slope resulted in carbonate leaching from the soil profile. Thus the spatial heterogeneity of soil moisture within sinkhole leads to the replacement of calcareous soil, situated on the of northern, western and south slope exposures by noncalcareous soil of eastern slope.

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