

EGU2020-11317

<https://doi.org/10.5194/egusphere-egu2020-11317>

EGU General Assembly 2020

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The agroecological soil quality assessment of Central-Russian upland and Oka-Don lowland of Russia.

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The modern Russian agroecological landscape evaluation is based on identification of areas with specific hydrology, soil and terrain constraints to crop, that are named as agroecological groups of lands. Soil quality of the lands is characterized by a combination of conditions ensuring sustainable crop yields and determining the ecological functions and stability of agrolandscapes. The main differences in soil quality in the forest-steppe of the East European Plain are due to soil erosion and precipitation redistribution by the topography elements. If the erosion processes are comprehensively studied by the world scientific community, then the influence of differences in soil moisture reserves, its spatial heterogeneity and potential impact on the crops productivity is not sufficiently considered by Russian specialists. In this regard, large-scale studies were carried out at two key areas: the Central Russian Upland (Kursk region) and the Oka-Don Lowland (Tambov region). The studies included conventional mapping with identification of agroecological groups of lands and their quality assessment using GIS and statistical analysis. To determine the spatial heterogeneity of the moisture conditions, the SIMWE simulation model was applied. This model calculates the precipitation redistribution by the topography elements using digital elevation model and several input parameters. It was found, that the territory of the Central Russian Upland is characterized by normal moisture conditions, leaching water regime, silty-loamy soil texture. Redistribution of precipitation occurs without delay, as a result of which most of the territory does not experience overmoistening and the soils are highly productive with moisture reserves in the top meter layer up to 150 mm. The spatial structure of soil water capacity in a meter soil layer was determined by the regression analysis method of the measured soil moisture and calculated runoff using the SIMWE model. It was determined that the intra-landscape variation of moisture capacity as an indicator of soil quality for agriculture is associated with the topography of the interfluvial areas and the erosion. The second key area, the Oka-Don Lowland, is characterized by a lowland topography and clay soil texture, and excess of moisture in soils in almost all years. Several agroecological groups of lands with significantly different soil water capacity. To determine the spatial structure of soil water capacity, the SIMWE model was also used, that showed a high intra-landscape soil diversity, that is due to a flat topography of interfluvial areas with lots of depressions. The soils of drained interfluvial areas with a short-term overmoistening and a groundwater level below 6 meters are of the highest quality. In addition, hydromorphic lands with groundwater above 6 meters and average annual moisture reserves in top meter soil layer up to 300 mm are distinguished. They occupy about 72% of the total area of the key site. Such lands are

suitable for cultivation of perennial grasses, winter wheat, soybeans, sunflowers and others.

This study is supported by Russian Foundation for Basic Research, grant №19-29-05277.