

Soil modern evolution impact on the C fluxes in Chernozems at the Middle Volga Region

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There are results of long-term stationary field research on the aridization impact on the carbon fluxes in the topsoil of Chernozemic soils in the representative agricultural and native forest-steppe landscapes in conditions of the Middle Volga region of Russia (educational-experimental farm "Mummovskoe", Saratov region).

Especially attention is dedicated to the water-soluble organic substances (WSOS) which are better available for soil microorganisms that utilize them, enhancing CO₂ emission. Dominated in the Middle-Volga natural and agro-landscapes soil conditions are unfavorable for mobile humic acid production and accumulation: organic acids and polyphenols gradually mobilized into solution from root excretions and crop residues or woody plant litter are quickly neutralized by calcium, magnesium or sodium ions in topsoil.

Most arable Chernozems of the Middle-Volga region are actively degraded due to both topsoil CO₂ emission and water-soluble organic substances fluxes in form of sodium and calcium humates and fulvates, as evidenced by sorption lysimetry data on the WSOS fluxes in 15-21 g/m² over the vegetation period.

Additional researches are necessary to evaluate the ratio between soil organic carbon losses through soil erosion processes, topsoil CO₂ emission and WSOS profile and lateral fluxes in conditions of different land-use practice and climate conditions to develop the modern climate-smart farming systems in the Middle-Volga region agrolandscapes with potentially very prolific Chernozemic soils.