



S10.01-P -8

BIOGENIC TRANSFORMATION OF CLAY MINERALS IN FOREST-STEPPE SOILS

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We studied virgin forest-steppe soils derived from a uniform parent material. By complex of modern methods it is shown, that fixation of organic substance in forms resistant to H₂O₂ treatment is related to change of actual structure of clay aggregates. At interaction of clay minerals with the products of transformation of plant residues in A horizon of forest-steppe soils such organic-mineral complexes as composites are formed. Penetrating into slits between thin particles of layer silicates and between smectite layers, organic molecules output from X-ray-diffraction a considerable part of crystalline substance, breaking a constancy and (or) plane-parallel arrangement of its interlayer distances. Remaining principally crystal phases, these original organic-silicate compositions can not bring the contribution to X-ray-diffraction of the oriented preparations. Formation organic-smectite complexes with hybrid structure, disorder on c axis, is the usual and universal mechanism of clay transformation at soil formation in forest-steppe conditions. It limits possibilities of X-ray-diffraction for smectite quantification in natural organo-clays. Therefore, the labile interlayer spaces should be studied using the independent methods. Smectite quantification by an adsorptive-luminescent method (Eirish et al. 1975) and by thermogravimetric analyses (Nieto et al., 2008) can be the useful tool as a complement to X-ray-diffraction determinations of expandable clay content in soils. The first method is based on ability of smectites to adsorb rhodamine after dispersion and peptization of clay particles by sodium pyrophosphate, the second – on measuring the weight loss between 100 and 450 °C of samples solvated with ethylene glycol and previously saturated in Mg.*