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[C1.1-1] The Role of Environment on Soil formation: Morphological Indicators

Morphological Properties of Soil Compaction in a Steppe Zone

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Development of the global scientific and technical cooperation in soil science leading to increased demand for universal scientific terminology and data format. One of the main directions in the Global soil cooperation, which was recently adopted by the FAO is «harmonizing methods, measurements and indicators for sustainable management and soil conservation» (Montanarella and Vargas, 2012).

Soil compaction of the steppe zone soils is an actual problem, both agricultural and soil science. Compaction and degradation of the soil structure of the steppe zone soils is caused, as a rule, by processes of compacting (vertic process), alkalinization and mechanical densification, as well as their combinations.

In this work we discussed the structural problem of condition of soils, which is among the main factors determining the fertility of the soil is one of the most important functions of the soil. For highly productive natural soils is typical loose composition and lumpy multi-ordered structure.

Compaction processes of soil structure can be as natural genesis (salinization, compacting), and mechanical densification. Agricultural practices violate the natural structural balance of the soil and leads to the processes of degradation of soil structure. Three-dimensional visualization and quantitative morphological assessment of soil aggregates and then is a topical method of diagnostics, evaluation and monitoring of the physical condition of agricultural soils.

Important methodological problem is poly-component soil mass, because soil contains a lot of various neoplasms and inclusions, which has a great diagnostic value. Such as accumulation and migration of clay components, organic matter, heavy metals, salt, vegetable residues and other, and also pedo- and lithorelicts and anthropogenic inclusion. One significant problem is the all-time dynamics of the soil structure (wetting-drying), which may affect the representativeness of the samples and the reliability of the obtained results. Unlike the pore space many of these structural elements are poorly allocated in the x-ray shadow projections. For contrasting soil tumors and inclusions may need special scene modes and image processing (Ivanov et al., 2013) or a number of additional studies using other methods (micro-morphological analysis, mineralogy etc.).

We successfully applied micro-tomographic method for analysis of the structure of pore space in order to evaluate the degree of degradation of the soil structure and evaluate soil compaction. In our opinion, this method works well because it showed good results comparable with expert judgement, and therefore, it is applicable for this type of task and research and can serve as a method for visualization of results, and also, after more detailed elaboration of mechanisms for the interpretation of digital data, serve the automated method of analysis and evaluation of structural state of soils. To specify and compliment the results we produce micro-morphological and mineralogical analysis.

Keywords：*Micro-morphology, Micro-tomography, Soil compaction, Steppe soils*