



The Systems Mapping of Soils

Alexandra Nikiforova (1), Maria Fleis (2), and Mickail Borisov (2)

(1) Moscow Lomonosov State University, Moscow, Russian Federation (nikifsoil@mail.ru), (2) Institute of Geography, Russian Academy of Science, Moscow (maria@geocnt.geonet.ru)

Soil, together with rocks, waters, air, and living organisms, is one of the natural elements, which make up landscapes. At the same time soil is a unique (derivative) natural element because only it originates from the interaction of all the other (basic) natural elements. Reasoning from this fact, soil maps must be unique too – fundamentally different from geological, geomorphological, natural vegetation, and other thematic maps of the basic natural elements.

It is suggested creating conceptually new soil maps, namely the systems soil maps, which are derived from the systems landscape maps. Legends of such maps are based on hierarchical classification of natural landscapes-systems. The last-mentioned are regarded as elementary structural units of the Earth's landscape envelope comprised of interacting landscape elements. The landscapes-systems step by step are divided into divisions and subdivisions of different hierarchical levels unless reaching separate and isolated landscapes-systems, which can not be divided further because of their homogeneity. Criteria used to differentiate between landscapes-systems include the most prominent properties of natural landscape elements, for instance: sequence of the elements, range of altitudes and slopes, zonal vegetation types associated with effective heat sum and precipitation ratio, the main genetic soil horizons, genetic types and forms of relief, lithology of parent materials, depth of humus horizons, chemical composition of ground waters, and so forth. Levels at which criteria of classification are soil properties are named the "soil" one; they are the lowest one in each scale range. The systems soil maps are produced for "soil" levels and show certain soil properties in connection with those properties of the basic natural elements, which cause these soil properties.

In GIS environment the systems soil maps are produced automatically from an integrated polygon layer created manually on the basis of expert analysis of the maximum possible quantity of thematic, mainly paper, maps, and texts. The hierarchy of the natural landscapes, as well as hierarchy of the properties of their elements, is displayed with the help of an additional line layer containing information about rank-ordered natural boundaries. Currently, polygon systems maps of Saratov oblast in GIS format and paper systems maps of the Nechernozemnaya Zone of the European Russia have been created. Scale of the main topographic maps, which were used, is 1:1,500,000.

The systems soil mapping is regarded as a pathway to development of a global soil data infrastructure and universal soil classification system.