



Geographic distribution of Vertisols and Vertic soils in Russia: diversity of soils and landscapes

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There is a little information about geographic distribution of Vertisols and Vertic soils in Russia. Large areas of these soils (known in Russia as slitozem) are described in the Northern Caucasus Region (Bistrizkaya, Tyuryukanov, 1971; Khitrov, 2003). Swelling clay alluvial soils with microrelief gilgai were studied within the Volga-Akhtuba floodplain (Kozlovskyi, Kornblum, 1972). These and some other regions with slitozem in Russia are between latitudes 45 N and 48 N. For the north from latitude 48 N these soils have not been noted until 2006. Recently a lot of new areas of Vertisols and Vertic soils were identified in the Central Chernozemic Region of Russia (Khitrov, 2012) and in the Middle and the Lower Volga Region between latitudes 48 N and 54 N on the basis of soil studies along routes and on key plots. The portion of these soils in the soil cover patterns varies from 0,5 to 15-30%. Some areas of Vertisols and/or Vertic soils are up to 40-200 ha and more. With that their portion in the soil cover of the entire landscape is much less than 1%. All the delineated areas of vertic soils are confined to the outcrops of swelling clay sediments of different origins (marine, lacustrine, glacial, colluvial and alluvial materials) and ages (Jurassic, Cretaceous, Paleogene, Neogene, Quaternary). Mineral composition of clay fraction consists of smectites, irregular stratified illite-smectite, chlorite-smectite, hydromicas, chlorite and kaolinite in different proportions. Vertisols and Vertic soils may be found in different landscape positions that provide contrast water regime of soil including alternate periods of intense wetting and drying. The landscape positions are: (1) the step-like interfluvial surfaces and/or different concave slopes with swelling clay outcrops; (2) the deep closed depressions within vast flat watersheds; (3) the bottoms of wide hollows on interfluvial slopes; (4) different geomorphic positions in hydromorphic solonetzic complexes; (5) the river terraces; (6) the closed depressions within inland drainage lowlands; (7) the central parts of wide floodplains. The diversity of Vertisols and Vertic soils in Russia is governed by the intensity of vertigenesis and combination of different soil forming processes such as humus accumulation, salt, carbonates and gypsum migration and accumulation, solonetz process, redox, eluvial and illuvial processes, biogenic activity and soilurbation. Therefore these soils belong to the type of dark vertic soils proper and to vertic subtypes of different soil types according to the Russian soil classification system. According to the WRB system, they belong to Vertisols proper and to reference soil units with Vertic prefix in the groups of Chernozems, Kastanozem, Phaeozems, Solonetz, Stagnosols, Luvisols, Fluvisols, Cambisols. Statistical data on the morphological indices of vertic properties are analyzed. The study was carried out at the support of Russian Foundation for Basic Research, projects no. 06-04-08323, 08-04-01195, 11-04-00710.