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Magnetic properties of different-aged chernozemic soil profiles

Fattakhova L., Shinkarev A., Kosareva L., Nurgaliev D., Bagautdinova Y.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2006-2016 Asian Research Publishing Network (ARPN).In order to estimate the rate of magnetic susceptibility enhancement in automorphic temperate soils, magnetic properties and mineral weathering degree of different-aged chernozemic soils derived from a uniform parent material have been studied. In this work, layer samples of mature virgin leached chernozem and young chernozemic soils formed on the embankment of an earthy archaeological monument were used. Magnetic, physical and chemical and mineralogical analysis show that magnetic susceptibility enhancement in organogenic soils is associated with increase in loss on ignition, cation exchange capacity, degree of dispersion, as well as with decrease in amphiboles/zircon, amphibole/rutile and amphibole/ilmenite ratios. Magnetic susceptibility enhancement in different-aged chernozemic soils results from maghemite (or maghemite associations) formation. After 750-800 years, magnetic susceptibility in organogenic soils reached only about half of its value in a mature chernozem. These results indicate that the formation of mature magnetic profile in automorphic temperate soils is a very long process. The newly formed chernozemic soils are now at the stage of active formation of secondary magnetic minerals, but the resource of primary ferrous silicates (which are less resistant to weathering) is not exhausted in mature virgin chernozem yet.

Keywords

Magnetic susceptibility, Newly formed chernozemic soils, Soil profile distribution, Soils of earthy archaeological monument, Virgin chernozem