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Magnetic properties of the soil cover of active arable lands

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Soil formation can last for hundreds or thousands of years, and soil being a renewable resource today, may soon become non-renewable due to the growing population in the world and the gradual transformation of grasslands and forests into arable land and pastures which has been happening over the past few centuries.

The study of the magnetic properties of active arable soils by the method of cappametry, coercive spectrometry, thermomagnetic analysis, will allow to obtain analytical data and assess the degree of anthropogenic load in the studied soils.

The object of the study is arable soils in the Vysokogorsky district of the Republic of Tatarstan.

The aim of the work is to study the magnetic properties of arable soils and changes in magnetic susceptibility depending on the distance of the road.

The most widely studied magnetic property of soils is magnetic susceptibility. According to the results of measuring magnetic susceptibility, it is shown that the studied soil profiles are characterized by both accumulative and eluvial-illuvial type of distribution of mineral components depending on the conditions of soil formation, ongoing microerosion processes, and increased automotive activity in this area.

According to differential thermomagnetic analysis, it was revealed that the main carriers of magnetization of the presented soils are magnetite.

To determine the magnetic rigidity and the domain state of the grains of the magnetic fraction, the parameters of the magnetic hysteresis Bc, Bcr, Js, Jrs, which depend on the composition, concentration of the magnetic fraction, shape and size of the magnetic grains, are analyzed. Judging by the Day-Dunlop diagram (Day et al., 1977), magnetic minerals of the studied soils fall into the region of single and pseudo-single-domain particles.

Estimates of the relative contributions of the dia-/paramagnetic, superparamagnetic and ferromagnetic components obtained from coercive spectra show that the increase in magnetic susceptibility in the organogenic horizons of forest-steppe soils is due to the contribution of the ferromagnetic component.

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