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Determination of mineralogy and grain size of the magnetic fraction from outdoor and indoor urban dust from several Bulgarian cities

Petar Petrov, Neli Jordanova, and Diana Jordanova
NIGGG-BAS, Bulgaria (petar_petrov76@abv.bg)

Dust is the most important factor determining urban air quality. The identification of magnetic minerals, carriers of magnetic signal of dust samples, is important for a correct interpretation of concentration, domain state and grain-size indicative parameters. The aim of the present study is to characterize magnetically indoor and outdoor dusts from six big cities in Bulgaria and to link them to degree of pollution of the environment. The aim is also to propose the most effective methods for characterization: thermomagnetic analysis of magnetic susceptibility, anhysteretic remanent magnetization (ARM), isothermal remanent magnetization (IRM), hysteresis loops. Dust material was collected monthly during the period May 2009- November 2010. The main magnetic mineral in outdoor and indoor dust, identified by thermomagnetic analysis of magnetic susceptibility, is magnetite (Fe3O4). The dominant role of magnetite in determination of magnetic signal of the studied dusts allows the use of hysteresis parameters as proxies for the effective magnetic grain size of ferrimagnetic grains. The calculated ratios Mrs/Ms and Bcr/Bc vary in the intervals (0.055 – 0.1) and (3.08 – 5.14), respectively. The coercivity of magnetic fraction in indoor dust is lower compared to that of outdoor dust. This dependence probably shows that the main source of dust is the outside pollution with PM10. Higher values typical for outdoor dust in comparison with respective sample from indoor dust show that quantity of the paramagnetic minerals is higher in outdoor dust. Probable source of such particles is dust from erosion of soils in the area.