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Temporal Variation of Total Carbon Content and Magnetic Susceptibility of PM10 Samples Collected in Bucharest Region of Romania

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The aim of this research was the study of temporal variations of total carbon (TC) content and magnetic susceptibility of PM10 (aerodynamic diameter $\leq$ 10 μm) samples collected in Bucharest region of Romania.
Our study was conducted at 3 representative sites (two urban sites and one rural site) from Bucharest area over one-year (2009) period. The rural sampling site (RS) is situated at approximately 35 km from Bucharest being surrounded by farming land and a small forest. First urban site (US1) is located in centre of Bucharest (relatively at 500 m from "zero kilometers" site) and is surrounded on all directions by high buildings and is influenced mainly by road traffic emissions. The second urban site (US2) is situated at a distance of 50 m from a busy road and 200 m from a gyrator crossroad with no high buildings around. US2 site is more exposed to traffic emissions than US1 because is situated in one of the most high traffic area of Bucharest.
In every month, ten 24 hours-samples were collected simultaneously on weekdays at each site using three medium-volume samplers on 47 mm fiberglass filters. The mass concentration, TC content and the magnetic susceptibility of PM10 samples were determined.
The mass concentration results revealed that in RS average mass concentration was much lower (14.87 μg/m3) than in US1 (28.37 μg/m3) and US2 (37.33 μg/m3). Also, TC content associated to PM10 was highest in urban sites (US1- US2) than in RS, and it was observed that TC content varied proportionally with mass concentration in all locations, but for 0-60 μg/m3 mass concentration range, TC content was no higher than 0.5 μg C /m3.
The magnetic susceptibility (k (10-5 SI)) values were different at rural site than at urban sites. For each site, we derived an empirical linear correlation linking magnetic susceptibility to the concentration of PM10.The obtained results show that in RS, at higher mass concentrations ($\sim$30-60 μg/m3), k presents relatively low values ($\sim$0.1•10-5 SI) compared with urban sites where k varied independently from mass concentrations.
The final results of this study suggest that magnetic measurements may serve as an efficient complementary tool for the routinely employed geochemical methods to map the heavy metal pollution and TC content variation might be related to traffic in urban environments.