



## Variations in PM<sub>10</sub> particle matter levels in three urban areas in Romania-comparative study 2020-2019

George-Bogdan Burghilea<sup>1,2</sup>, Sabina Stefan<sup>1</sup>, Luminita Marmureanu<sup>3</sup>, and Gabriela Iorga<sup>1,4</sup>

<sup>1</sup>University of Bucharest, Faculty of Physics, P.O.Box MG-11, 077125 Bucharest-Magurele, Romania

<sup>2</sup>"Horia Hulubei" National Institute for R&D in Physics and Nuclear Engineering, Reactorului 30, 077125, Magurele, Romania  
([george.burghilea@nipne.ro](mailto:george.burghilea@nipne.ro))

<sup>3</sup>National Institute for R&D in Optoelectronics INOE 2000 Atomistilor 409, 077125, Magurele, Romania

<sup>4</sup>University of Bucharest, Dept. of Physical Chemistry, Bd. Regina Elisabeta 4-12, 030018 Bucharest, Romania

The year 2020 was marked by the start of SARS-COV2 virus pandemic. As globally, in Romania the social, economic and transport activities were also restricted at various levels during the year. There were many restrictions and even blockages of some activities at national level. This has led to mass concentrations of air pollutants considerably lower and the improvement of the air quality. was easily noticed. For present study, three metropolitan areas of Bucharest (population 2,161,347 inhabitants), Brasov (population 289,502 inhabitants) and Iasi (population 376,180 inhabitants) were analysed for the period 01. January 2019- 31. December 2020. These cities often face problems of exceeding the air quality limit values imposed by the European legislation. Bucharest is constantly monitored by eight stations (type: traffic, urban, regional, suburban, industrial), Brasov is monitored by five stations (type: traffic, urban, industrial, suburban, regional) and Iasi is monitored by six stations (type: traffic, urban, industrial, rural, suburban). The air pollution monitoring data are those provided by the National Air Quality Monitoring Network (RNMCA). Using RNMCA observations, a synthetic data base consisting of daily time series of mass concentrations of major traffic pollutants, NO and PM<sub>10</sub>, was created and analysed for traffic stations and reference stations of each city. Data were analysed statistically over four time intervals: Business as Usual (01.01-15.03), Lockdown (16.03-15.05), Alert status with traffic restrictions (Alert 1) (16.05-15.08) and Alert status with normal traffic (Alert 2) (16.08- 31.12). Information about the inhabitants was taken from the website of the National Institute of Statistics.

The study shows that in 2020 the pollution levels in the Bucharest metropolitan area were considerably lower for the whole year than in 2019, and during the state of emergency (Lockdown) and the state of alert the pollution levels with PM<sub>10</sub> were the lowest in the year. The same observations are valid for the metropolitan areas of Brasov and Iasi. With the relaxation of the restrictions and the entry into the fourth time interval (Alert 2), it was observed that the levels have started to increase by the year 2020. After analysing the NO data according to PM<sub>10</sub> at the traffic stations in Bucharest, we determined a lower Pearson's coefficient in 2020 compared to 2019. For the other cities the data cannot be concrete because there are no enough data to draw a firm

conclusion for the entire year 2019.

Acknowledgements:

GBB was supported by the University of Bucharest, PhD research grant. SS and GI thanks the support from NO Grants 2014-2021, EEA-RO-NO-0423 project, contract no 31/2020.

Ground-based air pollutant data and meteorology by site were extracted from the public available Romanian National Air Quality Database, [www.calitateaer.ro](http://www.calitateaer.ro).

Data on the number of inhabitants were extracted from the database of the National Institute of Statistics, [www.insse.ro](http://www.insse.ro)