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Study of atmospheric pollen and major air pollutant concentrations in relation with meteorological conditions in Bucharest, Romania

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Abstract

Pollen levels in rapidly developing urban areas are of particular interest due to their negative impact on human health, being responsible for the increasing prevalence of seasonal allergic diseases. The objective of present work is to analyze the potential links through correlations or anti-correlations between variations of pollen concentrations and the major atmospheric pollutant concentrations PM₁₀, PM_{2.5}, NO_x, CO, VOCs, O₃, SO₂ and/or meteorological conditions. The research was carried out in the city of Bucharest, in the largest urban agglomeration (Bucharest-Ilfov) in Romania. The main allergenic plants in Bucharest are trees, grasses and weeds species, which pollinate from early spring to late summer-fall. Mass concentrations of air pollutants PM₁₀, PM_{2.5}, NO_x, CO, VOCs, O₃, SO₂ were extracted from the Bucharest air quality database, monitoring belonging to the Bucharest Air Quality Monitoring Network. Hourly data were converted to daily means. Computations, graphs and statistical analysis were performed using R software with the Openair package [1]. The present study confirms the seasonal pattern of the main allergenic pollen in Bucharest area. Fluctuations between maximum and minimum values of the observed pollen concentration correspond to the bi-annual sequence of the flowering. The dominant presence of tree pollen particles is observed in spring, of grass pollen particles mainly in summer, and pollen particles from weeds appear in late summer and early autumn. Weather conditions significantly influence pollen concentration, with temperature, solar radiation and relative humidity being the most influencing factors. The positive correlation was observed between pollen and particulate matter PM₁₀ and PM_{2.5}, nitrogen oxides and volatile organic compounds [2].

Key words: allergenic pollen, meteorological parameters, urban air pollution

[1] D.C. Carslaw and K. Ropkins, Environ. Model. Softw. 27-28, 52-61 (2012).

[2] A.-M. Rosianu, P.M. Leru, S. Stefan, G. Iorga, L. Marmureanu, Rom.Rep.Phys. 2021, in press

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