

Meteorological Characteristics Associated with Air Pollution in Bucharest Greater Area, Romania [†]

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Abstract: This study examines how the mass concentrations of gaseous species (NO, NO₂, NO_x, O₃, SO₂, CO, C₆H₆) and particulate matter PM₁₀, PM_{2.5} (particulate matter less than 10 µm and less than 2.5 µm) might be linked with precipitation characteristics using an observational data set for five years (2015–2019) in the Bucharest metropolitan area. Particulate matter data and meteorological parameters at each site (atmospheric pressure, relative humidity, temperature, solar radiation, wind speed and direction) were extracted from the publicly available Romanian National Air Quality Database. Meteorology was complemented with radar products (images, reflectivity, echotops) from the C-band meteorological radar of the National Meteorological Administration in Bucharest. Change in aerosol mass concentration during the evolution of the precipitation events was investigated. The aerosol scavenging coefficients were estimated and compared with those in the scientific literature. Correlations between meteorological parameters and ambient pollutant levels were analyzed. The connection between meteorological phenomena occurrence and air mass origin was investigated by computing air mass backward trajectories for a 72-h period using the HYSPLIT (Hybrid Single-Particle Lagrangian Integrated Trajectory) model. Results demonstrate the good capability of the convective precipitating systems to clear the atmosphere of fine aerosol and gaseous pollutant species. The obtained results are important for the modeling of air quality and for investigations of aerosol wet deposition processes.

Keywords: air pollution; radar; meteorology; precipitations

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