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Meteorological Characteristics Associated to 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 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 public available Romanian National Air Quality Database. Meteorology was complemented with radar products (images, reflectivity, echotops) from the C-band meteorological radar from National Meteorological Administration in Bucharest. Change of aerosol mass concentration during the evolution of the precipitation events was investigated. The aerosol scavenging coefficients were estimated and compared with those in scientific literature. Correlations between meteorological parameters and ambient pollutant levels were analyzed. Connection of meteorological phenomena occurrence and air mass origin was investigated by computing air mass backward trajectories using the HYSPLIT (Hybrid Single-Particle Lagrangian Integrated Trajectory) model for 72 hours back. It was found a good capability of the convective precipitating systems to clear the atmosphere from fine aerosol and gaseous pollutant species. The obtained results are important for modeling of air quality and for investigations of aerosol wet deposition processes.

Keywords: air pollution; radar; meteorology; precipitations



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