THE CHEMICAL COMPOSITION AND MICROPHYSICAL CHARACTERISTICS OF AEROSOL OVER MOSCOW AND ITS VICINITY IN JUNE 2009 AND DURING THE FIRE PEAK OF 2010

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Abstract. The microphysical characteristic of aerosol were simultaneously measured in the atmospheric surface layer over the center of Moscow and its vicinity (Zvenigorod Scientific Station of the Obukhov Institute of Atmospheric Physics, RAS) from June 15 to 30, 2009. Aerosol samples were taken and their elemental composition was determined to compare aerosol parameters (mass concentration, particle-size distribution, and elemental composition). During the fire peak of 2010, on August 8, aerosol samples were taken in the center of Moscow, and their chemical composition was determined. Comparing results obtained from the simultaneous measurements of the concentrations of aerosol and its elemental composition made it possible to establish their interdiurnal variability which suggests that the features of time variations are of regional character and they are determined mainly by the dynamics of synoptical processes of air-mass exchange. The chemical composition of obtained samples was determined using the method of atomic absorption spectrometry.

The measurement results obtained in June 2009 revealed an increase in the content of anthropogenic elements in the atmosphere over Moscow when compared to their content in the atmosphere over the background zone. In Moscow, during the summer fires of 2010, the mass concentration of sulfur increased by an order of magnitude, and the mass concentrations of Na, Mg, Al, Si, K, Ca, and Fe increased by several times. The mass concentration of aerosol over Moscow amounted to 917 μ g · m⁻³ during the extensive summer fires of August 2010 in European Russia and, on average, 50–70 μ g · m⁻³ in June 2009.

Keywords: aerosol particles, atmospheric pollution elemental composition, size distribution, mass concentration, enrichment factor, megapolis, human health.