

Variability of Aerosol Properties during the 2007-2010 Spring Seasons over Central Europe

Aleksander PIETRUCZUK¹ and Anatoli CHAIKOVSKY²

¹Institute of Geophysics, Polish Academy of Sciences, Warszawa, Poland
e-mail: alek@igf.edu.pl

²Institute of Physics, National Academy of Sciences of Belarus, Minsk, Belarus

A b s t r a c t

Aerosol optical properties have been studied for spring seasons when increased values of PM₁₀ are registered. Measurements of aerosol optical properties were taken by collocated lidar and sun-photometers at Belsk, Poland, and Minsk, Belarus. A significant increase of registered aerosol optical thickness (AOT) was found during episodes with elevated PM₁₀ concentrations. An increase of AOT at 1020 nm amounted to 50% in the case of Minsk and 18% in the case of Belsk, while an increase of AOT at 400 nm was 66% and 33%, respectively. We noted an increase of Ångström exponent by 6% at both stations and no significant increase of single scattering albedo. The LIDAR measurements together with NAAPS model results and backtrajectory analysis suggest that both the biomass burning products and the Saharan dust are responsible for increased PM₁₀ concentrations and large AOT values during spring time. The smoke aerosol is transported over Central Europe mainly in the boundary layer, increasing both PM₁₀ concentration and AOT. The dust aerosol transported in the free troposphere slightly affects the AOT values only. Statistically significant correlation between PM₁₀ concentration and AOT was found during reporting period.

Key words: sun-photometer, LIDAR, PM₁₀, aerosol.