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Optical and microphysical properties of atmospheric aerosols in Moldova

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Measurements of aerosol properties in Kishinev, Moldova are being carried out within the framework of the international AERONET program managed by NASA/GSFC since 1999. Direct solar and sky diffuse radiances are measured by using of sunphotometer Cimel-318. Aerosol optical properties are retrieved from measured radiances by using of smart computational procedures developed by the AERONET's team. The instrument is situated at the ground-based solar radiation monitoring station giving the opportunity to make simultaneous spectral (win sunphotometer) and broadband (with the set of sensors from radiometric complex) solar radiation. Detailed description of the station and investigations in progress can be found at the http://arg.phys.asm.md. Ground station is placed in an urban environment of Kishinev city (47.00N; 28.56E; 205 m a.s.l).

Summary of aerosol optical and microphysical properties retrieved from direct solar and diffuse sky radiance observations at Moldova site from September 1999 to June 2009 are presented below.

Number of measurements (total): 1695

Number of measurements (for ω_o, n, k): 223

Range of aerosol optical depth (AOD) @440 nm: 0.03 $<$ $\tau(440) < 2.30$, $< \tau(440) >$=0.25

Range of Ångström parameter $< \alpha_{440\_870} >$: 0.14 $< \alpha <$ 2.28

Asymmetry factor <g>(440/670/870/1020): 0.70/0.63/0.59/0.58 $\pm$0.04

Refraction (n) and absorption (k) indices@440 nm: 1.41 $\pm$ 0.06; 0.009 $\pm$ 0.005

Single scattering albedo $< \omega_o >$(440/670/870/1020): 0.93/0.92/0.90/0.89 $\pm$0.04

Parameters of volume particle size distribution function:

(fine mode) volume median radius r $_{v,f}$, μm: 0.17 $\pm$ 0.06

particle volume concentration $C_{v,f}$, $\mu m^3/\mu m^2$: 0.04 $\pm$ 0.03

(coarse mode) volume median radius $r_{v,c}$, μm: 3.08 $\pm$ 0.64

particle volume concentration $C_{v,c}$, $\mu m^3/\mu m^2$: 0.03 $\pm$ 0.03

Climatic norms of AOD@500 nm and Ångström parameter $< \alpha_{440\_870} >$ at the site of observation are equal to 0.21 $\pm$ 0.06 and 1.45 $\pm$ 0.14, respectively.

The aerosol type in Moldova may be considered as "urban-industrial and mixed" in accordance with the classification of aerosol type models systematized and developed by AERONET team (O.Dubovik et al., 2002, J. Atmosph. Sci., 59, 590-608) on the basis of datasets acquired from worldwide observations at the network of sunphotometers. It should be noted the presence of increased value of absorption index and reduced values of albedo. This may be due to influence of absorptive aerosols (soot). These aerosols are originated from local dust sources and exhausts from intensive urban traffic, from sources of biomass and household garbage burning both in and around the city, and from long-range transport over regions with high loading of aerosols (dust, smoke).