

Spectral UV aerosol optical thickness determined from the Poprad–Gánovce Brewer spectrophotometer observations

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Abstract: The direct solar radiation (DS) observations of the Poprad–Gánovce Brewer spectrophotometer Nr. 097 at five channels 306.3 nm, 310.1 nm, 313.5 nm, 316.8 nm and 320.1 nm differently affected by Rayleigh scattering and atmospheric ozone (O₃) and sulphur dioxide (SO₂) absorption were used for the spectral total optical depth (TOD) and aerosol optical depth (AOD) calculation. The 1993–2001 morning half days were selected for this purpose. The results were derived graphically (correcting every DS measurement for actual total ozone and SO₂ content) and mathematically, subtracting the average Rayleigh, O₃ and SO₂ optical depth of the total optical depth obtained from Langley plots. The calculated intercept of the Langley plots (ETC) of the Poprad–Gánovce instrument for every day of year will enable to obtain daily AOD information from the Brewer instrument if at least one DS observation is performed. The AOD values do not manifest significant trend in period 1993–2001. The average TOD and AOD for wavelengths 320.1 nm - 306.3 nm varies from 1.41–2.56 and 0.29–0.40, respectively. The aerosol share on total direct solar UV radiation attenuation varies from 11.4% at 306.3 nm to 26.2% at 320.1 nm. Between examined parameters significantly affecting the direct clear sky UV radiation in the atmosphere, the total aerosol content is the most variable. The SO₂ absorption, with respect to its very low concentrations in Poprad–Gánovce, contributes to total attenuation of direct UV radiation negligibly.

Key words: Total optical depth, aerosol optical depth, Langley plots, Brewer spectrophotometer, direct solar radiation, total ozone, Rayleigh scattering, sulphur dioxide

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