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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Typical distribution of the solar erythemal UV radiation over Slovakia" *by* A. Pribullová and M. Chmelík

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esponse to referee #3

1. Authors accept the recommendations concerning appropriate terminology for the UV-biometers, erythemal UV irradiation (EUV), as well as for usage of the term cmfG or cmfUV instead of the cmf.

2. Priority of the Brewer spectrophotometer MKIV#097 at Poprad-Gánovce is measurement of total ozone. Several UV radiation measurements have been performed with irregular time step during every day. The daily dose obtained by summation of individual spectrophotometer measurements differs from the daily dose of EUV irradiation obtained from continuous measurements performed by UV-biometer, especially under cloudy conditions in spite of good agreement between individual measurements

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performed by both instruments under clear-sky conditions at low solar zenith angles (SZA$< 60°$).

3. The regression parameters determined in framework of the COST-726 action were used for modeling of the EUV in Slovakia. Validation of the model using the Slovak 2002 - 2004 daily EUV data (5 stations) showed following results of the model: coefficient of determination ranged from 0.96 to 0.99, RMS error from 15% to 27% (141 - 190 J.m^{-2}). The largest RMS error (27%) was determined at Stará Lesná were the YES UV radiometer was installed (the Solar Light UV biometers 501 and 501A are installed at other stations).

4. The daily cmfG was calculated at individual stations only. The model (1) was used to determine the daily cmfUV. The mean monthly cloud modification factor for the EUV radiation cmfUVM was calculated at every station. Derived dependence of the cmfUVM on altitude (regression parameters obtained separately in every month) was utilized to calculate the cmfUVM at every grid point of the domain (point 5 of the paper section 2.4).

5. Estimation of measured EUV daily doses precision has several aspects. Four instruments of the Slovak UV-biometer network have operated under every day personal control; one instrument (at Košice) is connected to an automatic data acquisition system (the regular check of e.g., humidity inside the instrument is not possible). The precision of measurements can be affected by abrupt or continuous change of instrumental characteristics. Comparison of site instruments with standard device is organized regularly (1 - 2 times per year) since 2002. Standard instrument has been compared with the Brewer spectrophotometer #097 DUV measurements several times per year. The comparisons did not show abrupt changes of any from five site instrument sensitivities, except of its steep decrease detected at Košice. The differences between standard instrument and operational instruments were less than 3% (for the SZA$< 60°$) in 2002 - 2004 period. Exception is UV-biometer located at Košice where the differences were about 11%. Differences between relative spectral response and angular response of

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instruments manifest by comparison of instruments by large SZA. The next error arises from differences between instrumental relative spectral responses and action spectrum for the human erythema. The matrix for transformation of the measured UV irradiations to EUV obtained under the COST-726 UV-broadband instrument calibration campaign at Davos in 2006 determined for the UV-biometer located at Skalnaté Pleso showed that difference between measured UV irradiations and EUV increases by large total ozone and solar zenith angle (e.g., by the SZA 65° and the total ozone of 320 DU - annual average at Poprad-Gánovce is 325 DU - the difference is 8.7%). The UV irradiations measured by the UV biometers in cold half-year (especially in early spring when the total ozone is the highest at Poprad-Gánovce) significantly differ from the desired EUV irradiation and consequently the daily sums differ from the EUV irradiation daily doses. The transformation matrix between measured irradiation and EUV irradiation is known by one site instrument only.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 5919, 2008.