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Influence of uncertainties in total ozone measurements to conversion factors for erythemally weighted broad band meters

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Progress in measuring technique has lead to the establishment of UV monitoring networks equipped with broadband meter whose spectral sensitivity is similar to the action spectrum of the erythema. However, the spectral sensitivity of such a biometer does not fit exactly the action spectrum. The differences between the measured values and the erythemally effective radiation depend on the spectral changers like TOC, solar height and altitude. To ensure high accuracy, measurements have to be corrected depending on these. In this work we have applied total ozone measurements from different instruments to gain conversion factors for UV biometers (Model 501, SolarLight, Philadelphia, USA). The used total ozone values were received operationally from space by EPTOMS, GOME and TOVS and from the ground by Dobson and Brewer Spectrophotometers for the locations of Hradec Kralove (Czech Republic), Nairobi (Kenya) and Springbok (Rep. of South Africa). Data from each instrument were used to calculate conversion factors in dependence of solar height and total ozone. Using these conversion factors broadband meter readings were converted in UV Index (UVI) units for irradiance at noon and UV Index hours (UVIh) for the daily dose. From TOC of each instrument one value of irradiance and one of daily dose were gained per day. Differences in irradiance and daily dose were calculated between all instruments. These differences were investigated in using the median, the 95% per-

centile (p95) and the maximum difference for each month of the year over a period of at least 3 years. At Hradec Kralove (50°N) monthly medians of differences in irradiance at solar noon are lower than 0.03 UVI. The seasonal course has its maximum between November and March and a second maximum between June and August. The monthly 95% percentiles are found below 0.05 UVI and show a similar seasonal behaviour. The differences in daily dose (0.16UVIh and 0.4UVIh) reach their highest values between October and November and between March and April having no second maximum during summer. Extreme differences reach up to 0.15 UVI respectively 1.00 UVIh. At Springbok (30°S) the monthly medians of differences are lower than 0.05 UVI (0.25 UVIh). The 95% percentiles are lower than 0.08 UVI (0.40 UVIh) and the extremes reach up to 0.18 UVI (0.7 UVIh). All these indicators show highest values from November to February whereby they are 4 times higher than in June and July. Also at Nairobi (1°S) the monthly medians of differences are lower than 0.10 UV (0.3 UVIh). The monthly 95% percentiles however reach up to 0.24 UVI (0.90 UVIh), and maxima up to 0.45 UVI (1.7 UVIh). The differences tend to be highest in March and April while for the rest of the year there is no clear annual course visible. From this analysis it becomes evident that for measurements of the erythemally effective radiation with typical broadband meters for measuring the erythemally effective UV radiation (Model 501) the accuracy is limited to 0.5 UVI in irradiance and 2 UVIh in daily dose.