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Comparison of spatial resolution, temporal resolution and measuring uncertainties of the total ozone content as an input parameter to calculate the erythemally effective UV radiation

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Beside the sun elevation angle, the total ozone content of the atmosphere (TOC) is one of the main model input parameters to calculate the erythemally effective UV radiation under clear skies. Therefore the TOC was analysed for the domain of Central Europe. The data contains the area from 9°E to 17°E in longitude and from 46°N to 52°N in latitude. Ground based measurements performed at the Solar and Ozone Observatory in Hradec Kralove (Czech Republic) and at Sonnblick High Mountain Observatory (Austria) were used. Measurements were made by Dobson and Brewer Spectroradiometers. To gain the spatial variability satellite measurements (EPTOMS) were analysed. Comparing measurements from Dobson, Brewer, EPTOMS and GOME and TOVS has allowed to estimate the uncertainties of measured TOC values.

The temporal and spatial variability of TOC was analysed using auto-correlation analysis. The measuring uncertainty was estimated by calculating the correlation coefficients between the measurements from the five different instruments. For correlation analysis the TOC has to be de-trended to eliminate the influence of the strong annual cycle of TOC in this region.

The highest correlation was found for TOC measurements of Brewer and Dobson (0.97). Close to this level are those calculated for Dobson and EPTOMS (0.96) as well as for Brewer and EPTOMS (0.95). Correlation coefficients between all other

instruments are significantly lower at levels of 0.88 to 0.84. The lowest correlation becomes visible for GOME and TOVS (0.79). The temporal correlation decreases rapidly within the first days. A coefficient of 0.97 is reached after 0.2 days, 0.86 after 0.4 days and the lowest level of 0.79 after 0.6 days. Spatial correlation is somewhat different in latitude and longitude. Measurements at a spatial distance less than 10 km posess a correlation coefficient of 0.97, a distance of 30 km is comparable to 0.86 and a distance of 45 km to 0.79.