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Brewer direct irradiance measurements: polarization effects and model simulation

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Spectral measurements of the direct component of the UV solar radiation have reached more importance recently in the measurement programs of various Brewer spectrophotometer monitoring stations, and are reaching a wide range of applications, such as aerosol optical depth (AOD) retrieval, determination of aerosol properties, measurement of absorbing gases in the atmosphere amount.

The sensitivity of direct-sun measurements from Brewer spectrophotometers changes with the solar zenith angle (SZA) [Cede et al., 2006] due to Fresnel effects on the flat quartz window and polarization by the diffraction grating. To study the effect of the instrument internal polarization with the SZA we have carried out a first group of measurements with a modified Brewer case that allowed us to easily measure direct-sun irradiances with and without the quartz window during the X Regional Brewer Calibration Center for Europe (RBCC-E) intercomparison that was held at El Arenosillo Atmospheric Sounding Station of the "Instituto Nacional de Técnica Aeroespacial" (INTA) joint with EUBREWNET, with the support of the COST ACTION 1207, and a second set of measurements made at the Izaña Atmospheric Research Center (IARC).

In this work we will try to quantify the effect of the window for the range of angles viewed by the Brewer and propose a correction for absolute spectral irradiances for all Brewer marks (MkII, MkIII and MkIV, i.e. single and double monochromator Brewers). We will also try to determine if a non negligible wavelength dependence in the dependence exists.

Cede, A., Kazadzis S., Kowalewski M., Bais A., Kouremeti, N., Blumthaler, M., and Herman, J.. Correction of direct irradiance measurements of Brewer spectrophotometers due to the effect of internal polarization, *Geophysical Research Letters*, VOL. 33, L02806, 2006