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6 Years of Ozone and UV Measurements with Brewer 199 at Marambio, Antarctica

L. Metelka and M. Stanek

Czech Hydrometeorological Institute, Solar and Ozone Observatory, Hradec Kralove, Czech republic(metelka@chmi.cz)

Czech Hydrometeorological Institute operates the Brewer spectrophotometer #199 (MK III) at Marambio Base (Antarctica) in cooperation with DNA (Dirección Nacional del Antártico, Instituto Antártico Argentino), since February 2010. Results of measurements are transmitted to the Solar and Ozone Observatory of CHMI on daily basis via Inmarsat BGAN network. The instrument is maintained every year by IOS specialists, in 2012 and 2016 it has been calibrated (directly at Marambio) with the help of traveling standard B#017.

For high latitude stations, the quality of measurement at large SZA is very important because the Sun reaches only low elevations in some parts of the year. Moreover, in cloudy days, mutual agreement of TOZ values between DS, ZS and GI measurements is important so that results are not dependent on cloudiness.

For B#199 at Marambio, evaluation of ZS/DS and GI/DS ratios for almost concurrent measurements (max. 10 minutes difference) were processed. Good agreement was found between GI and DS at almost all MU and TOZ values. As for ZS/DS relation, it was found that ZS mostly underestimates at $MU > 3$, especially at low TOZ values. The discrepancy between DS and ZS measurements at high MU values may be caused by zenith polynomial. If the range of MU values is too large, zenith polynomial is not able to fit well the relation between TOZ, MU and Zenith Ratio for the whole range of MU values. As the estimation method of polynomial parameters prefers fitting in the region with the most frequent observations (usually at $MU < 3$), the fit for higher MU values may exhibit systematical error. Moreover, ZS underestimation at extremely high MU values may be connected with Umkehr effects that are not taken into account in zenith polynomial. Consequently, GI measurements correspond to DS values better than ZS measurements for $MU > 3$.

Systematical differences between Brewer DS and ZS measurements at high MU values might affect the definition of the “best representative value” (GI should be preferred to ZS at high MU values).

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