

Validation of Cosine Error Determination

Since appropriate laboratory data are not available, we calculated the cosine error of the SUV-100 spectroradiometer from measurements with a test apparatus and by comparing measured and modeled spectral irradiance at 600 nm. The procedure is described in detail by *Bernhard et al.* [2004] using data of the SUV-100 instrument at the South Pole. Here we present a comparison of results of the test apparatus and the model-based parameterization for the instrument at Palmer Station. The measurements with the test apparatus were performed in March 2000 after upgrading the instrument's cosine collector. This upgrade mostly eliminated the dependence of instrument's cosine error on azimuth angle and wavelength.

Figure 1 shows the cosine error of the instrument derived from the model-based parameterization and measurements with the test apparatus, averaged over all available azimuth angles. The data set marked with black dots was calculated from the comparison of measured and modeled spectral irradiance at 600 nm. The open squares indicate the average of this data set over 1-degree zenith angle intervals. The data set marked with open circles was derived from measurements of the test apparatus and the solid line indicates the final parameterization of the cosine error. Measurements of the test apparatus are higher than this parameterization by 0.4% at 45°, 1.3% at 60°, and 1.8% at 70°. This is a good level of agreement considering the uncertainties of the measurement and the assumptions underlying the parameterization.

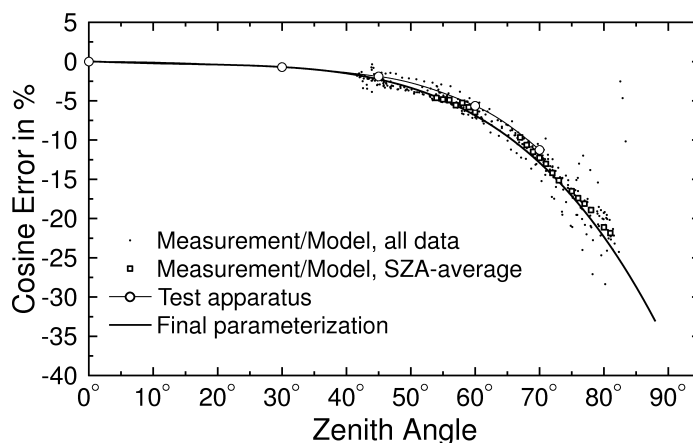


Figure 1. Cosine error of the SUV-100 spectroradiometer at Palmer Station determined from a comparison of measured and modeled spectral irradiance at 600 nm and measurements with a test apparatus. Data is from Volume 10, covering the years 2000-2001. The cosine error of other volumes may be different.

References

[Bernhard, G., C.R. Booth, and J.C. Ebrahimian \(2004\), Version 2 data of the National Science Foundation's Ultraviolet Radiation Monitoring Network: South Pole, *J. Geophys. Res.*, *109*, D21207, doi:10.1029/2004JD004937.](#)