“Temperature Dependence of the Brewer Spectrophotometer”

Tommy Taylor and Michael Kimlin

Department of Physics and Astronomy
University of Georgia
Athens, GA 30602 USA
THE PRIMARY FUNCTION OF THE NETWORK IS TO:

*Ensure that the absolute values of the UV irradiance obtained from the Brewer UV network is of the highest possible accuracy.*

This is achieved through a variety of Quality Assurance (QA) procedures that have been discussed (Dr Kimlin) but I will focus on the temperature dependence of the Brewer Instrument.

I will overview:

1. Temperature dependence of the Brewer;
2. Determination of the temperature dependence;
3. Other researchers work;
Temperature Dependence of the Brewer Spectrophotometer

- The Brewer internal temperature fluctuates with the ambient at the various locations from 0 to +50 °C;

- This temperature change causes the instrument’s response to also change;

- There is a significant wavelength dependence of the temperature coefficient below 325 nm;

- This is primarily due to the temperature dependence of the transmission of a nickel sulfate filter.
Determination of the Temperature Dependence of the Brewer Spectrophotometer

• The Brewer in placed into a sealed cooling unit and the temperature is reduced to 0°C (?). The cooling unit is then switched off and scans are taken with the instrument heating up to 35°C (?)

• Plots of the photon counts versus temperature at each wavelength were used to determine a temperature coefficient, $\Delta R/\Delta T$, which is the slope of the response versus temperature.
CONCLUSIONS

• The UGA method of temperature dependence determination compares well to other researchers (Weatherhead et al, 2002)

• Errors in the reported UV irradiances can occur if the temperature effect is not taken into consideration

• This temperature correction is applied at the level 1 corrected UV dataset from the Brewer network.