"Temperature Dependence of the Brewer Spectrophotometer"

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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 changes 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.

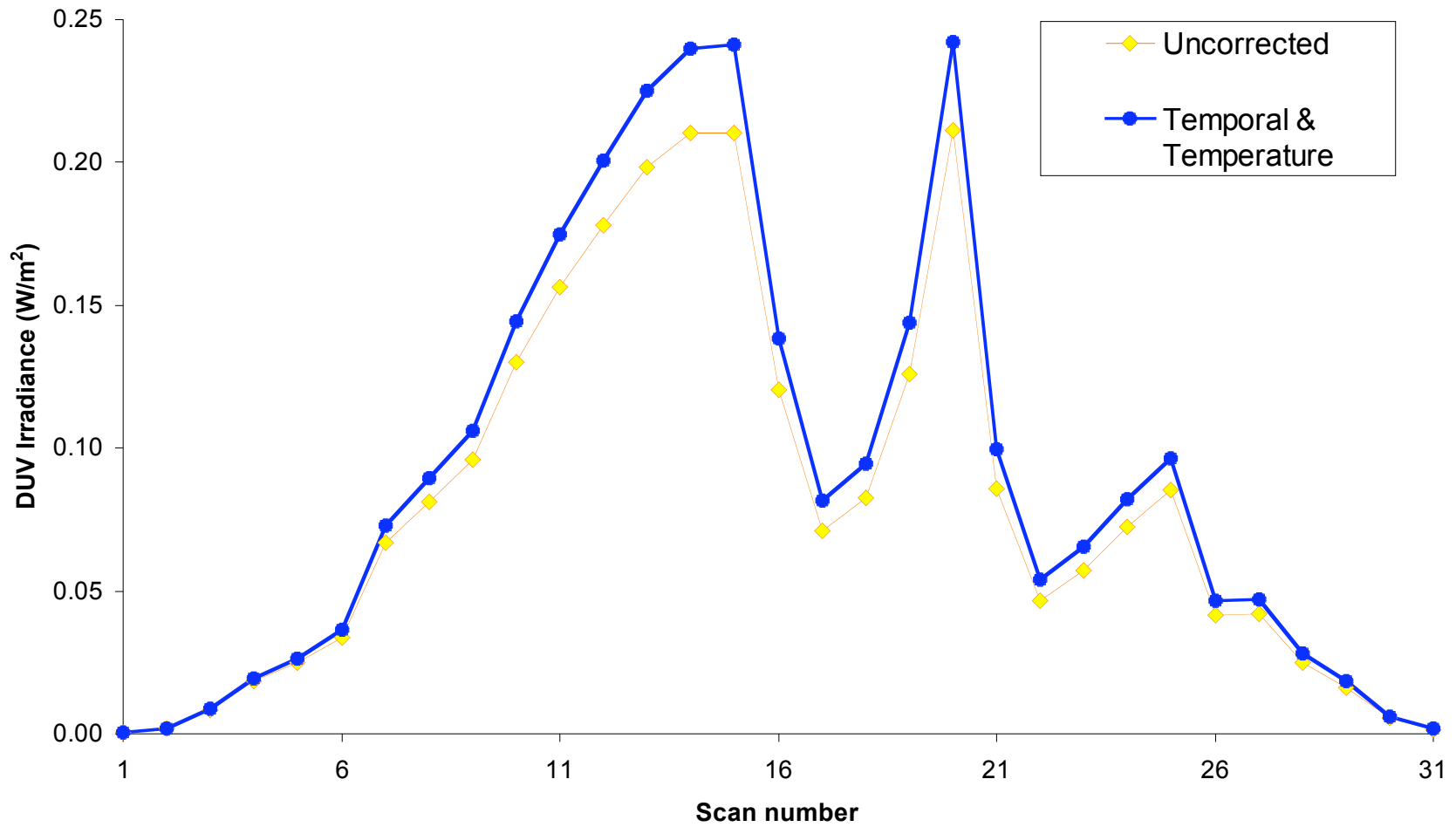# Determination of the Temperature Dependence of the Brewer Spectrophotometer

- 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 (?)
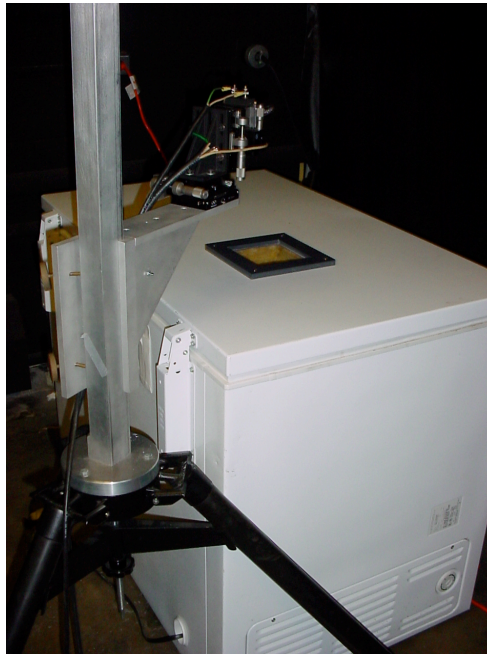
- Plots of the photon counts versus temperature at each wavelength were used to determine a temperature coefficient, $\Delta R/\Delta T$, which is the slope of the response versus temperature.
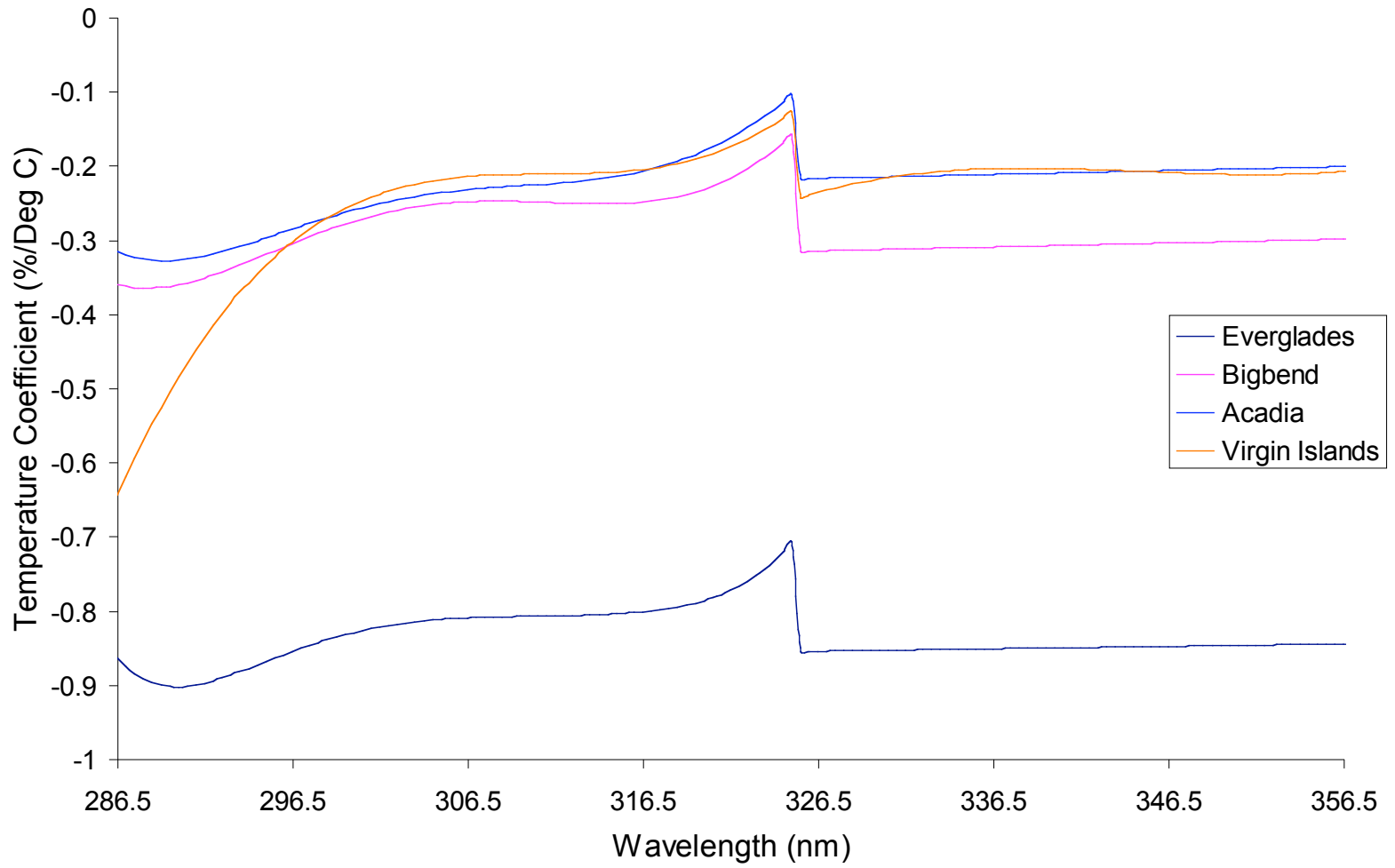
DUV versus Scan number for day 150, 1999 at Boulder, Brewer #101

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.

National Ultraviolet Monitoring Center