

Calibration Report: Multifilter Rotating Shadowband Radiometer, MFR-7, s/n 378

31 January 2000

Kevin Larman & Fred Denn
Analytical Services & Materials, Inc.
Hampton, Virginia

SUMMARY

Calibration date: 31 January 2000. Next calibration due: 31 January 2002

An analysis of clear sky data from a multifilter shadowband radiometer has been completed. A Harrison Objective Algorithm-Langley Analysis was applied to the data sets. The regressed values are total optical thickness, t , top-of-atmosphere voltage (corrected for Earth-sun distance), $AUVo$, and the regression deviation for each of the 5 sensor channels. Each of these factors is a mean of the sum of the four days yielding Harrison Objective Algorithm-Langley Regression outputs. These data were collected at Mauna Loa Observatory, Hawai'i between 10 and 31 January 2000.

Serial Number: MFR-7 378

Channel, nm	V_o	$AUVo$	t	dev	n	U95
416	9461.13	9165.00	0.21174	0.02303	4	0.033
497	6348.99	6150.24	0.11995	0.00678	4	0.010
613	5943.02	5756.99	0.08209	0.00510	4	0.007
672	10840.10	10500.80	0.05149	0.00580	4	0.008
868	8758.96	8482.66	0.02176	0.00654	4	0.009

Application:

$$t_T = - \left[\frac{\ln(V) - \ln(AUVo)}{m} \right] \quad +/- \text{U95}$$

Where: V = Sensor output, voltage counts.

t_T = Total optical thickness, calibrated.

m = air mass.

V_o = Intercept from regression

t = Slope from regression.

$AUVo$ = $V_o(\text{Earth-sun distance, DU})^2$, solar constant estimate.

dev = The standard deviation of the residual variance from the data to the regression line of the $\ln(\text{voltage output})$.

n = The number of morning or afternoon Langley Regressions.

U95 = $\text{sqrt}(2 \text{ dev}^2)$

