TRAVELING REFERENCE NILU-UV AT THE ANTARCTIC REGION: solar UV comparisons at Ushuaia and Marambio in 2002

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The Antarctic UV-monitoring network

(MAR-Project, http://www.inm.es/mar/ **)**

- established by INM in collaboration with FMI, DNA-IAA (Dirección Nacional del Antártico – Instituto Antártico Argentino, Argentina) and CADIC.
- three multichannel moderate bandwidth filter NILU-UV radiometers: at Belgrano II (77.52S, 34.37W), Marambio (64.14S, 56.37W), and Ushuaia (54.48S, 68.19W)

NILU-UV radiometers

- measure UV radiation at 5 channels
- centre wavelengths at 302, 312, 320, 340, and 380 nm
- bandwidth of about 10 nm FWHM

Figure 1. Photograph of the NILU-UV.

Quality assurance and Quality control

- biweekly lamp tests
- solar comparisons with the traveling reference NILU-UV #008 and the NILU-UV radiometers at Marambio and Ushuaia

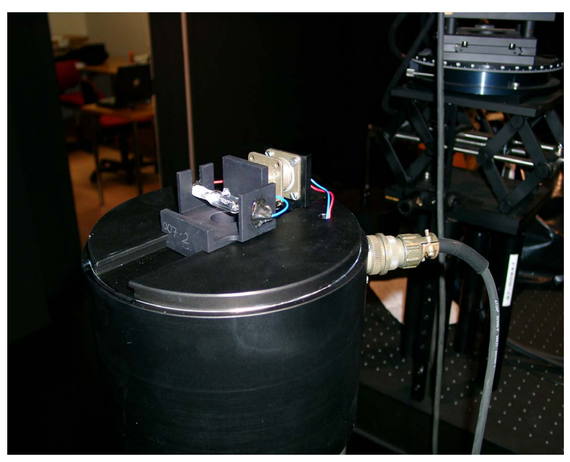

Figure 2. Installing a lamp for a NILU-UV lamp measurement in a dark room of the Finnish Meteorological Institute.

Solar comparison procedure

- **since 1999**, the reference NILU-UV #008 travels between Marambio and Ushuaia during the sunny period of the year (October-May)
-**after one-week measurements** at one site, the reference travels to the next site, until 2-3 solar comparisons at both sites
-**lamp tests** are made before and after each solar comparison to study the stability of #008
-**at the end of the seasonal measurement** period, #008 returns to FMI for maintenance

Earlier the calibration factors CF for Marambio and Ushuaia have been calculated (Lakkala et al. 2002) for each solar comparison as a three minutes average (t-1:t+1) of the ratio of the traveling reference (ref = #008) and the site NILU-UV (i = Marambio #011 or Ushuaia #012) **for CIE or UV-B or UV-A doserates**

CF=[ave(UVref,t-1:t+1)] / [ave(UVi,t-1:t+1)] (1)

These calibration coefficients are variable according to SZA etc. as the doserates are calculated prior to calculating calibration coefficients.

In addition to using solar comparison data, the lamp test data can be used to correct and calibrate the site instruments. For this purpose, the method described earlier in Torres et al. 2002 has been applied (Fig. 5).

New preferable method to calculate the calibration coefficients for the solar UV comparison data

- here we present a new more preferable way to calculate the calibration coefficients using solar UV comparison data

- as the three NILU-UV instruments in question (traveling reference #008, #011 at Marambio and #012 at Ushuaia) have filters originating from the same big filter batches, we can directly utilize the measured raw voltage values channel by channel to calculate channel specific calibration coefficients C prior to calculating any products:

$$Ci = Vi / vi \qquad (2)$$

where i = channels from 1 to 5, V = raw voltage signal for the traveling reference #008, and v = raw voltage signal for the NILU-UV to be calibrated.

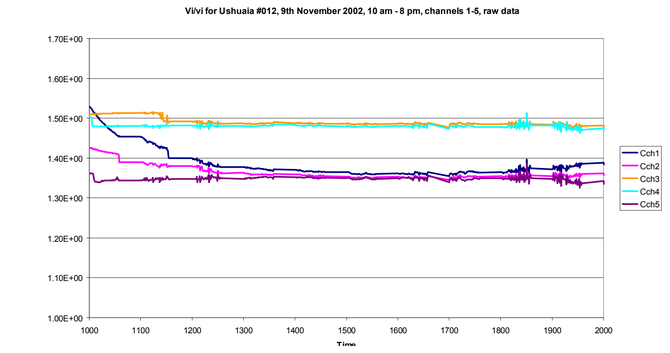

Figure 3. An example of channel specific calibration factors for raw data, more stable throughout the day.

Results from 2002: Daily CIE doses measured at Marambio and Ushuaia

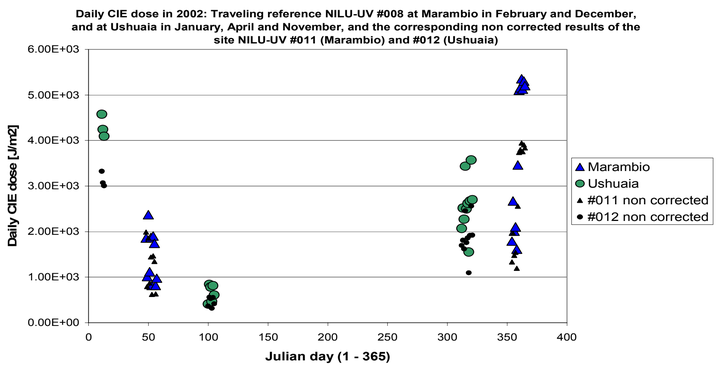

Figure 4. The results of the solar UV comparisons at the Antarctic region in 2002. Daily CIE doses measured by the traveling reference NILU-UV #008 in 2002 and the non corrected data of the site NILU-UV instruments.

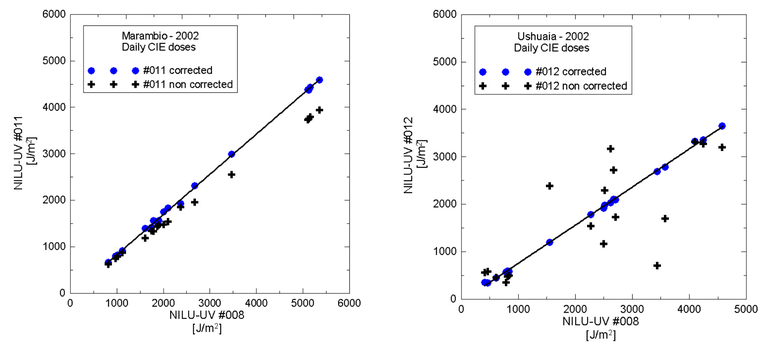

Figure 5. Corrected and uncorrected data for 2002 using lamp test data.

References

- Lakkala K, Redondas A, Koskela T, Taalas P, Torres C, Cuevas E and Deferrari G 2002. Quality assurance of a solar UV network in the Antarctic, 27th General Assembly of the European Geophysical Society (Nice-France), 21-26 April.
-Torres C, Redondas A, Cuevas E, Lakkala K, Taalas P, Yela M, Ochoa H and Deferrari G 2002. Correction and validation of total ozone data series from an Antarctic multichannel filter radiometer solar UV network, 27th General Assembly of the European Geophysical Society (Nice-France), 21-26 April.

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