

# QUALITY ASSURANCE OF A SOLAR UV NETWORK IN THE ANTARCTIC

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## MAR-Project (Measurement of Antarctic Radiance for monitoring the ozone layer)

### General goals:

- Promote observations and research of stratospheric ozone, UV radiation and related physical parameters in the Antarctic region.
- Determine the variations in ozone concentration, spectral UV radiation and photosynthetic active radiation.
- Improve the knowledge of the meteorological and chemical mechanisms that determine the Antarctic atmosphere throughout the winter and its features in summer.

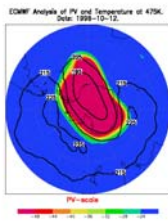
### Cooperation between:

- INM** Instituto Nacional de Meteorología (Spain) Quality control of the network. Official data delivery to the international scientific community.
- FMI** Finnish Meteorological Institute Quality assurance of the network.
- CADIC** Centro Austral de Investigaciones Cientificas (Argentina) Operation of the instruments and data transfer.
- DNA-IAA** Dirección Nacional del Antártico-Instituto Antártico Argentino Operation of the instruments and data transfer.

### Stations

- Belgrano II:** 77°52'S 34°37'W
- Marambio:** 64°14'S 56°37'W
- Ushuaia:** 54°48'S 68°19'W

Possibility to study the impact of the daily changes of the polar vortex on ozone and UV radiation reaching the ground.



### References

Dahlback A., B. Johnsen, B.A.K Hoiskar, K. Lakkala and U. Wester, 2002: Intercomparison of 5 multi-channel filter radiometers. Measurements of UV-doses, total ozone abundances and cloud effects. *Manuscript to be included in the final report of the NOGIC2000 -intercomparison held in Tylösand, Sweden.*

Ylianttila, L., U. Wester, L.E. Paulsson and H. Slaper, 2002: UV dose rates measured with broadband, multichannel and spectral instruments. *Manuscript to be included in the final report of the NOGIC2000 -intercomparison held in Tylösand, Sweden.*

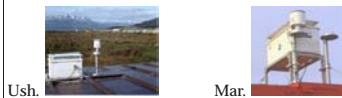
### Acknowledgments

We thank Biospherical Instruments for co-operation and for providing the spectroradiometer data of Ushuaia. We thank Arne Dahlback for the software and help in data processing.

## INSTRUMENTS

### NILU-UV multichannel radiometer

- 5 channels measuring UV radiation
- center wavelengths at around: 302 nm, 312 nm, 320 nm, 340 nm, 380 nm
- bandwidths around 10 nm at FWHM
- 1 channel for photosynthetic active radiation (PAR): 400–700 nm



### Quality control of the NILU-UV of Marambio and Ushuaia

- Stability:** Lamp measurements every second week
- Correction of observed drift ⇒ See poster of Torres et al. in ST010.

### Quality assurance of the network

- Traveling reference NILU-UV:** Transfer of the irradiance absolute scale from the reference spectroradiometer.
- Solar comparisons**

### Stability of the reference NILU-UV

- Lamp tests:** Before and after each solar comparison
- Drift observed in channel n.5

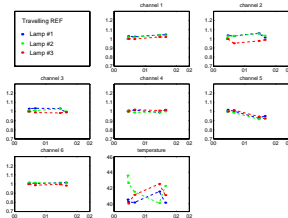
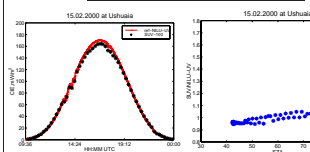


Figure 2. Traveling reference lamp tests.

### Absolute irradiance scale

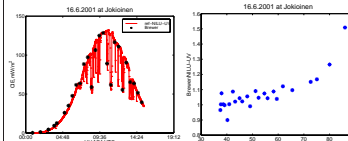
- Bentham double monochromator calibration,** Izaña August 1999.
- Nordic Ozone and UV group **intercomparison** campaign (NOGIC) in 2000, Tylösand Sweden. Ylianttila et al. 2002 ⇒ (REF<sub>NOGIC</sub>/NILU-UV=1.02) Dahlback et al. 2002 ⇒ diff. from ref. Bentham (-0.5±3.1 %)
- Solar comparisons with SUV-100 spectroradiometer** in Ushuaia.

Date	SZA	SUV/NILU-UV
1.12.99	34.4	0.89
15.2.00	43.3	0.96
6.5.00	74.8	1.05
27.10.00	43.0	0.94
9.2.01	51.9	0.98
18.5.01	74.9	1.05
17.10.01	45.7	0.98



### Solar comparisons with Brewer spectrophotometers of FMI.

Date	SZA	REF/NILU-UV
22.10.99	78.9	1.03
10.6.00	34.3	0.98
10.6.00	37.9	0.99
16.6.01	37.7	1.00
15.8.01	53.4	1.05



### Solar comparisons in Marambio and Ushuaia

- Reference NILU-UV stable within ±5%
- Calibration factors for Marambio and Ushuaia

$$CF_{i,t} = \frac{(U_{V_i,t} - U_{V_i,t-1})}{(U_{V_i,t-1} - U_{V_i,t-2})} \quad (1)$$

where  $U_{V_i,t}$  is the CIE-weighted dose rate of the reference NILU-UV and  $U_{V_i}$  is the corresponding UV dose rate of the site  $i$  NILU-UV.

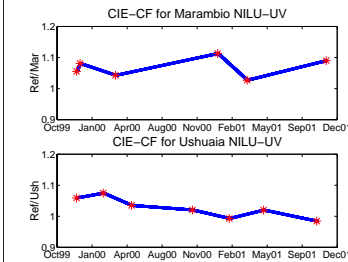


Figure 5. Calibration factors at each solar comparison and linear interpolation between them.

- Corrected CIE UV dose rates

### UV-index time series in Marambio and Ushuaia 2000–2001

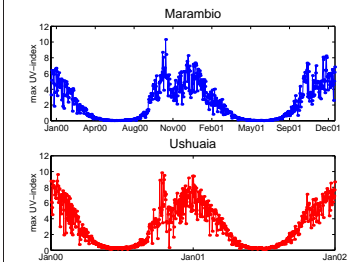


Figure 6. Daily maximum of half hour average UV index in Marambio and Ushuaia.

