

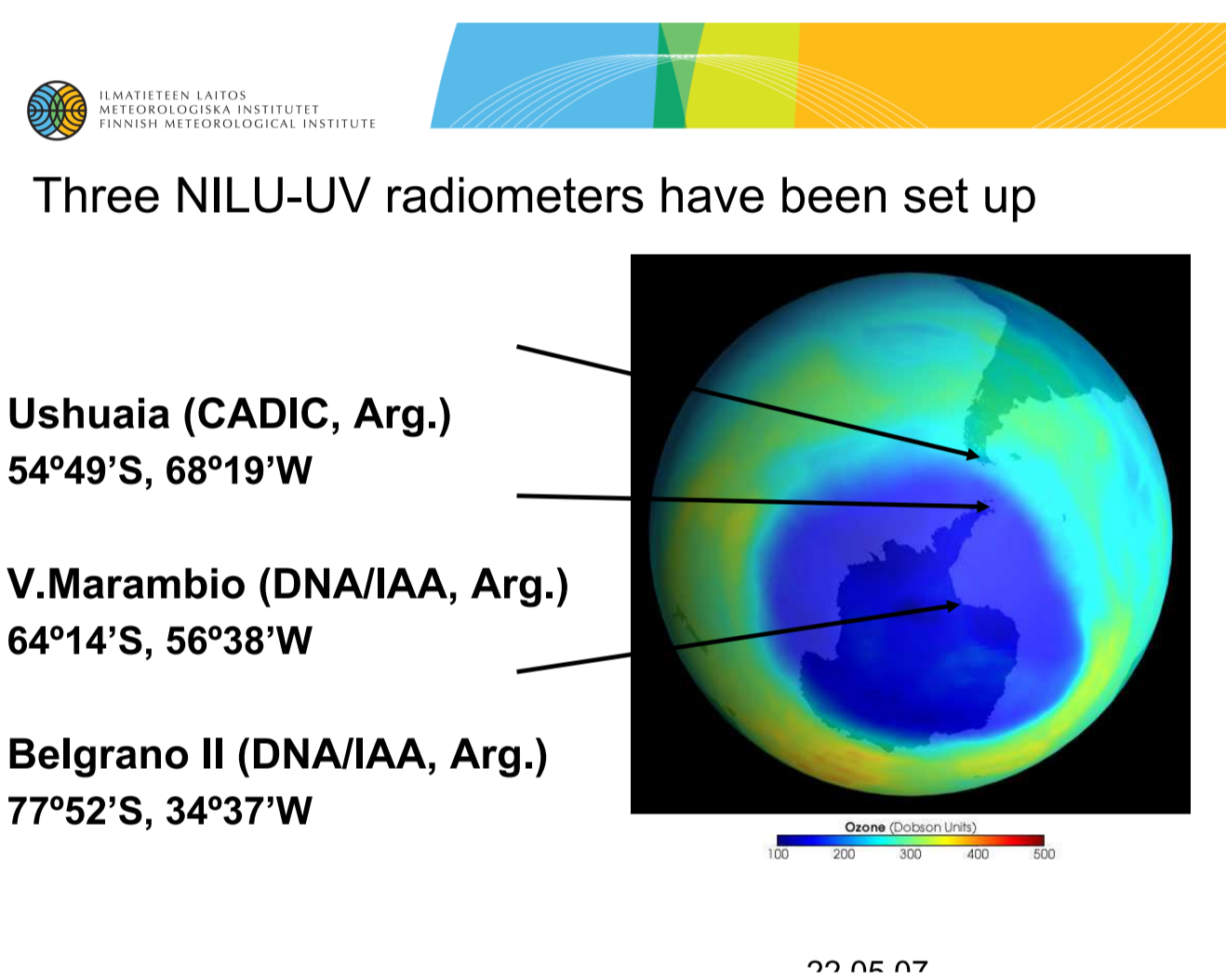
Antarctic UV measurements since 2000

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Abstract

Total ozone and UV measurements have been performed with the NILU-UV radiometer at the station of Ushuaia (54°S), Marambio (64°S) and Belgrano II (77°S) since 2000. The network was established in 1999/2000 by the Spanish Agencia Estatal de Meteorología (AEMET) in collaboration with the Finnish Meteorological Institute (FMI), the Argentinian Dirección Nacional del Antártico-Instituto Antártico (DNA-IAA) and Centro Austral de Investigaciones Científicas (CADIC). This poster show the UV and ozone time series measured in Ushuaia and Marambio during 2000–2010. At present, the instruments of this network have come to the end of their operational life span and need to be replaced by new ones. A multi-filter UV-instrument GUV-2511, manufactured by Biospherical Instruments Inc., will be set up by FMI in collaboration with Servicio Meteorológico Nacional, Argentina (SMNA) in the Antarctic station of Marambio in 2016/2017.



General goal

To promote observations and research of stratospheric ozone, UV radiation and related physical parameters in the Antarctic region.

- UV data published on a web page (<http://www.polarvortex.aemet.es/>) and in the WMO Antarctic Ozone Bulletin

Role of FMI

- AEMET was hosting the Antarctic NILU-UV network and maintained the database
- FMI: Quality Assurance (QA) of the UV data
- Traveling reference NILU-UV
- Irradiance scale of the travelling reference:
 - Regular calibration at NILU
 - National and international solar comparison with spectroradiometers
- Solar comparisons with other filter radiometers
- Lamp tests
- Solar comparisons in Ushuaia and Marambio



NILU-UV radiometer

- 5 UV channels, with central wavelengths around 305, 312, 320, 340 and 380 nm
- Bandwidths of around 10 nm at FWHM
- Sixth channel measures PAR in the 400–700 nm wavelength region
- Flat Teflon diffusor, interference filters, silicon detectors
- Temperature stabilized at 40°C

Quality assurance of the UV time series

- Travelling reference (NILU-UV no. 008, FMI) visited three times Ushuaia and twice Marambio during spring-summer-autumn season.
- Two lamps (100 W) were measured every two weeks. A third lamp was measured at every third calibration.

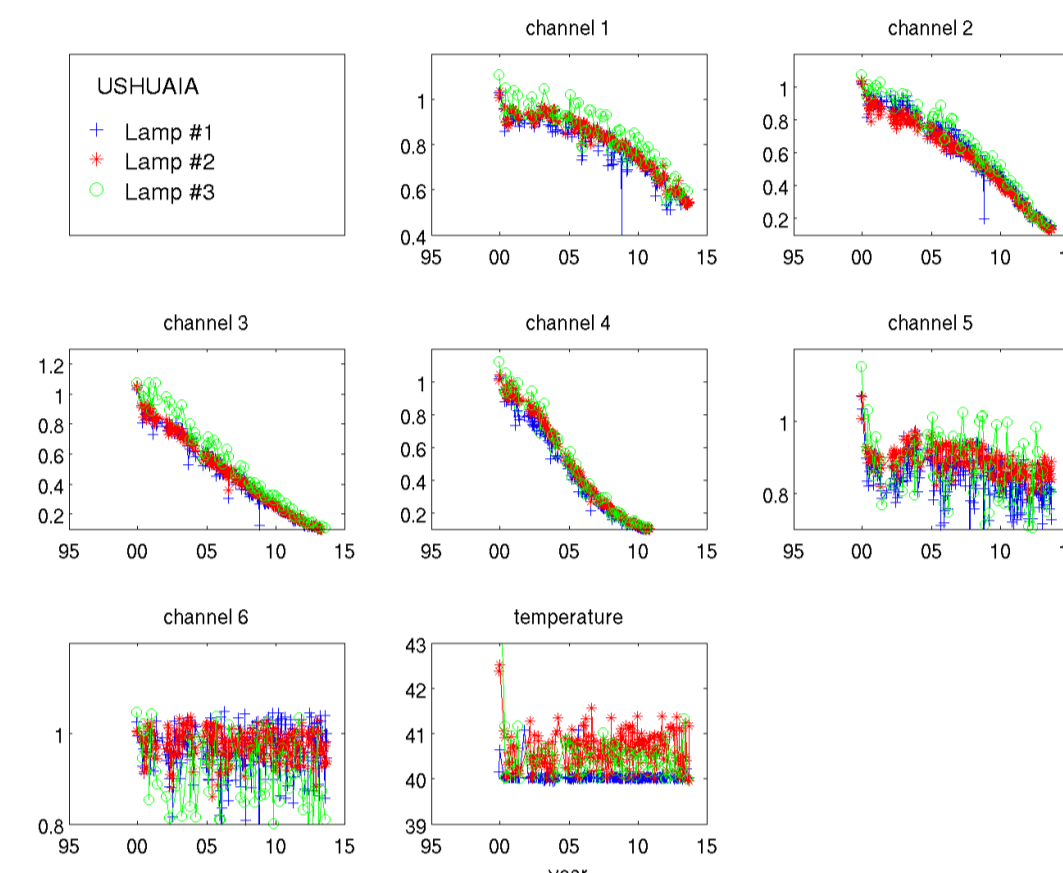


FIG. 1 Time series of lamp measurements at Ushuaia during 2000-2013. The results are scaled to the first three measurements.

Results

- Severe drift in sensitivity of the channels was seen after a couple of years of measurements.
- Time series could be corrected until 2010.

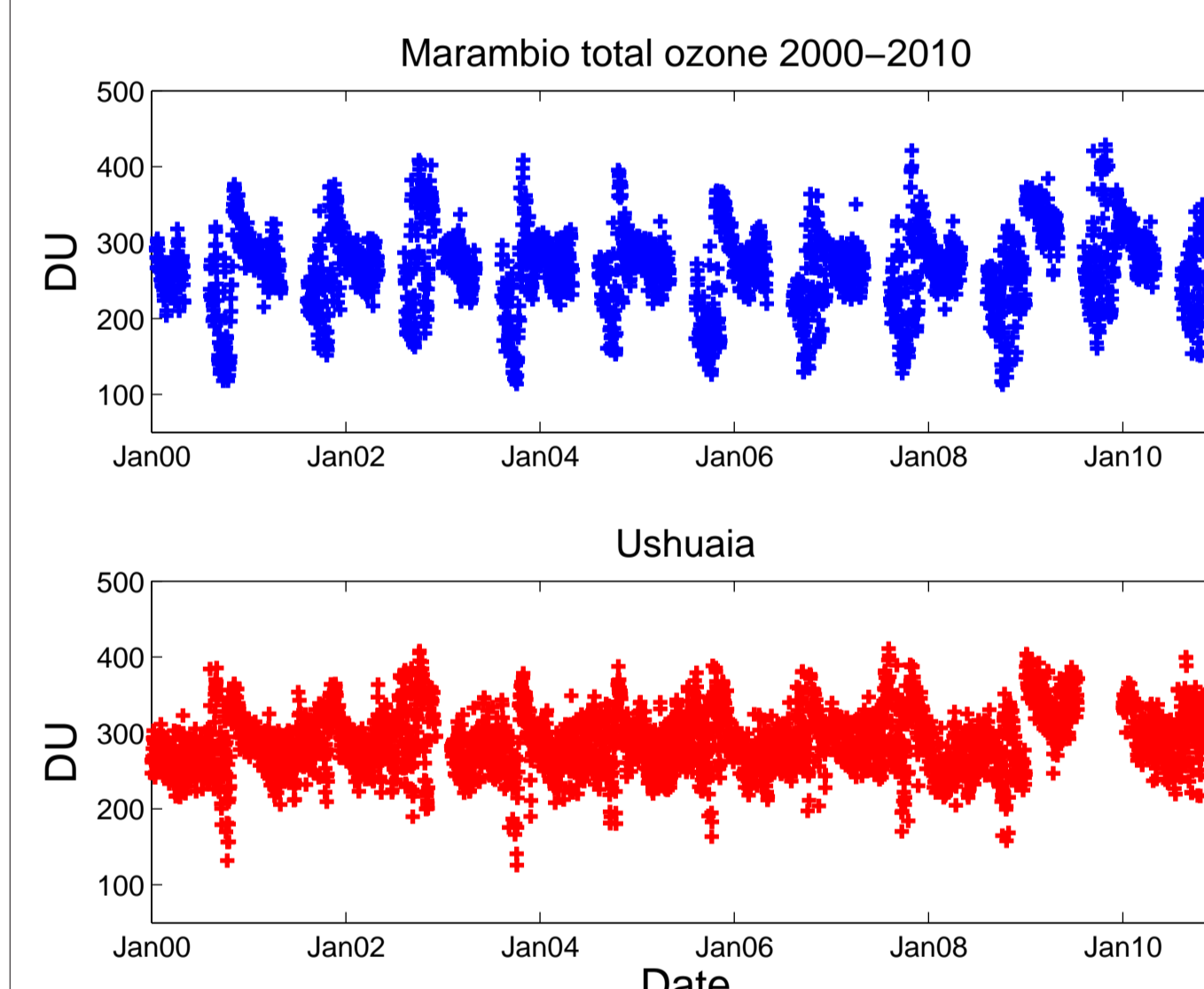


FIG 3. Total ozone at Ushuaia and Marambio during 2000-2010.

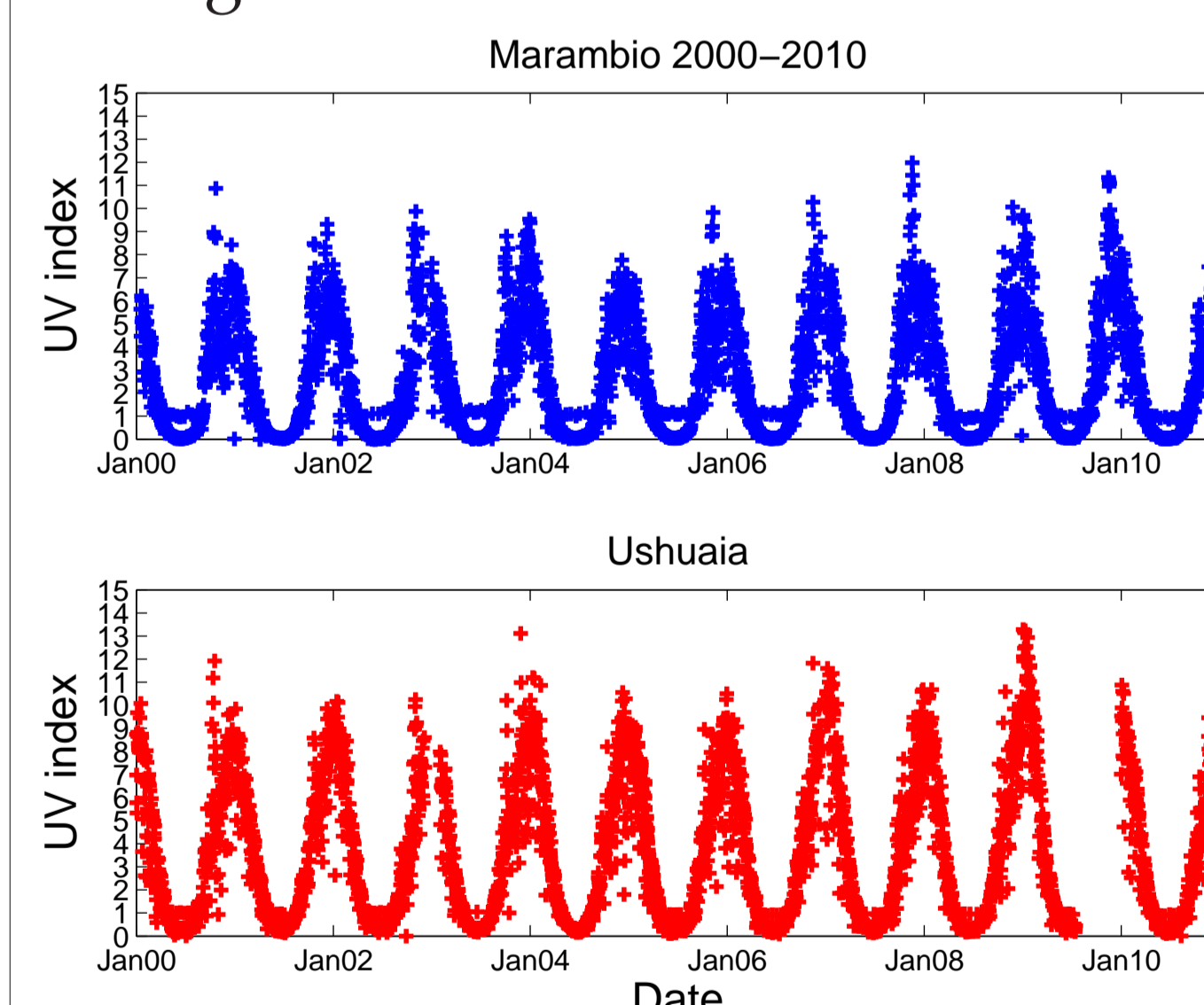


FIG 4. Daily maximum UV index at Ushuaia and Marambio during 2000-2010.

- Conclusions: Instruments need to be upgraded or replaced

SL501A radiometer measurements



- Two broadband radiometers in Marambio
- Measures incoming and outgoing irradiance
- Data can be used to fill the gap between the NILU-UV time series and the planned new GUV measurements.

New GUV multifilter measurements

- Planned to be installed in 2016/2017 in **Marambio**:
 - Collaboration between FMI and Servicio Meteorológico Nacional, Argentina
- Model GUV-2511, manufactured by Biospherical Instrument Inc. (BSI)
- 5 UV channels, with central wavelengths at 305, 313, 320, 340 and 380 nm
- visible channel, with central wavelengths at 555 nm
- Bandwidths of around 10 nm at FWHM
- Seventh channel measures PAR in the 400–700 nm wavelength region
- Possibility for retrieval of cloud optical thickness and total column ozone.
- Environmentally sealed and temperature-stabilized
- Cosine Collector: Teflon-covered quartz
- Two GUVs rotate: GUV in Marambio is replaced each year by a calibrated one.



FIG 6. First comparison of the two GUVs in Sodankylä August 26, 2016.

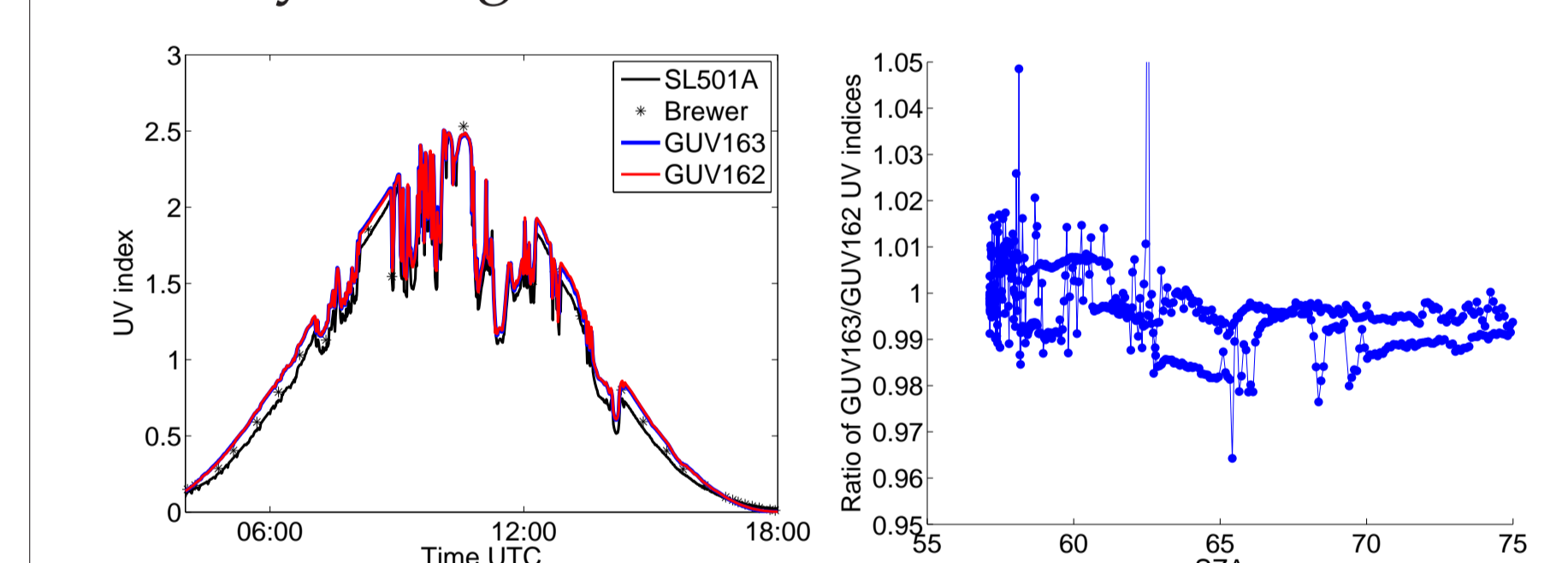


FIG 7. Preliminary results from the first comparison of the two GUVs in Sodankylä August 26, 2016. The corresponding measurements of the Brewer and SL501A instruments are also plotted.

Transfer of Irradiance scale

- Calibration traceable to NIST via 1kW FEL lamps or the SUV-100 spectroradiometer of BSI.
- Comparisons with the spectroradiometers of FMI in Sodankylä, traceability to Aalto-MIKES.
- Possibility to compare measurements made in Antarctic with measurements in Arctic (North America, Europe)

References

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Acknowledgments

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