

CZECH REPUBLIC

The Contribution of the Czech Republic to the Detection of the State of the Earth's Ozone Layer and Solar UV-radiation in Antarctica

OBSERVATIONAL ACTIVITIES

Measurements of ozone and UV-radiation

In February of 2010 The Solar and Ozone Observatory of the Czech Hydrometeorological Institute in cooperation with the Argentine Antarctic Institute installed the Brewer ozone spectrophotometer (double MKIII) No. 199 at the Marambio Base - Argentina, Antarctica. The Brewer spectrophotometer (the Brewer) is a fully automated instrument (Fig.1).

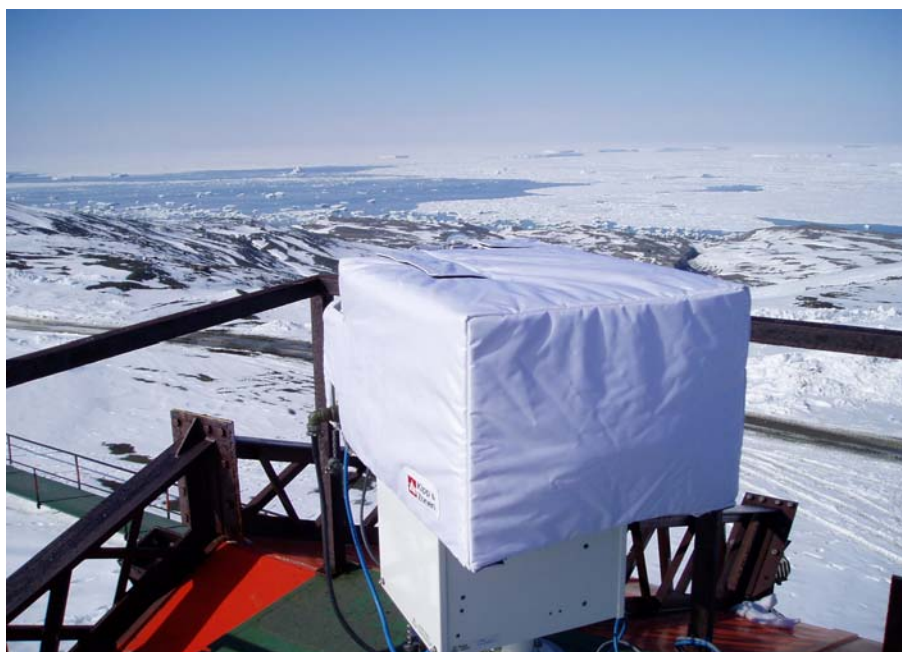


Fig.1: The Brewer spectrophotometer No. 199 - Marambio Base

This activity is part of the VAV project - Ministry of the Environment of the Czech Republic - SPIII 9/23/07 "Contribution of the Czech Republic to detection of the stage of the Ozone layer of the Earth and solar UV radiation in Antarctica, paleoclimate and paleogeographic reconstruction of the selected area of Antarctica and the related geological research studies and mapping."

Cooperation with Argentina is the result of close cooperation in matters relating to the Antarctic between the Government of the Czech Republic and the Government of the Argentina.

The aim of the present work is to improve scientific knowledge for global assessments on ozone depletion and climate change for the Montreal Protocol and the Vienna Convention, better understanding of processes in the upper troposphere and lower stratosphere through modelling and data analysis and studies of the long-term variability in extratropical large scale transport are also being performed to improve long-term predictions of mid and high latitude ozone and UV radiation.

Calibration activities

The Brewer No.199 has been independently calibrated before its deployment at the Marambio Base and the internal tests from the instrument show that the instrument has been stable for the past year (Fig.2,3). In the future instrument will be regularly calibrated towards GAW etalons.

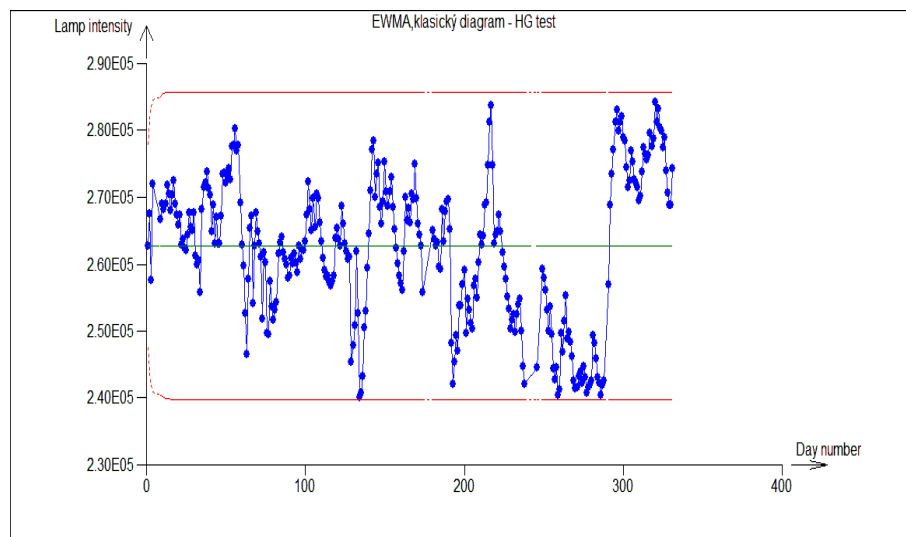


Fig 2: Mercury lamp test (February 2010 – January 2011)

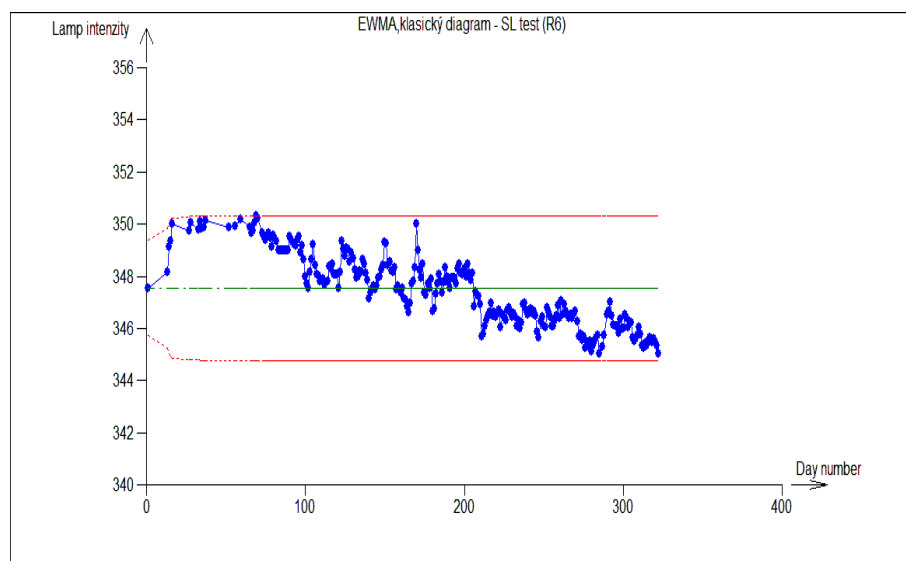


Fig 3: Mercury lamp test (February 2010 – January 2011)

RESULTS FROM OBSERVATIONS AND ANALYSIS

The project consist of three parts.

Part A: The introduction of regular measurements of total ozone and UV-spectral radiation in the area in the north-eastern part of the Antarctic Peninsula (Marambio Base –

Argentina) and on-line transmission of data.

Part B: The use of measurements of total ozone and vertical profile of ozone - Umkehr for the operational assessment of the state of the ozone layer and validation of satellite measurements.

Part C: The use of spectral measurements of UV radiation for operational evaluation of the field UV-index in the Antarctic for validation of satellite measurements.

The result of the correlation between OMI and Brewer total ozone measurements is presented in Figure 4.

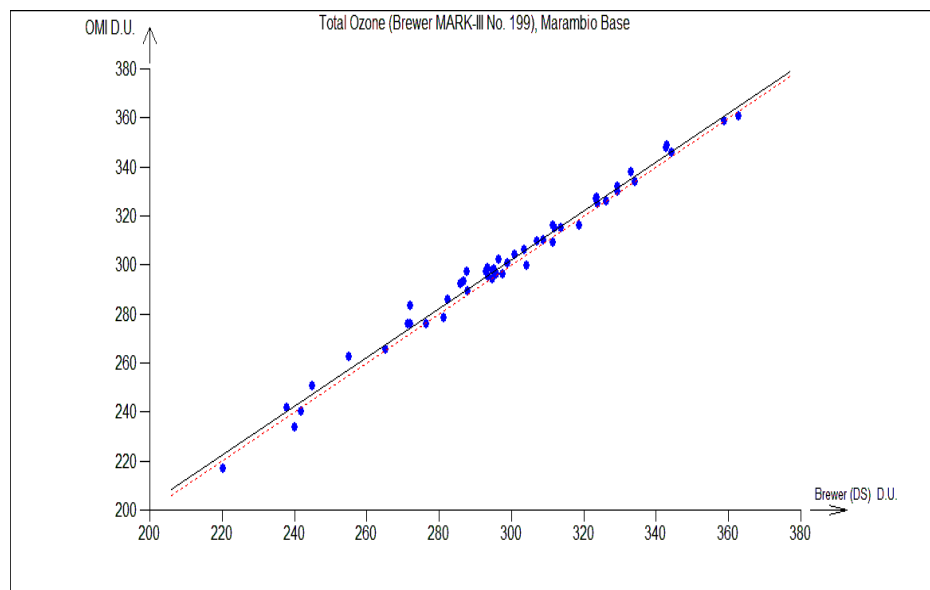


Fig 4: Correlation between OMI and Brewer (direct sun) measurements (November 2010 – February 2011)

THEORY, MODELLING, AND OTHER RESEARCH DISSEMINATION OF RESULTS

Data reporting

Ozone observation will be in 2011 regularly submitted to the World Ozone and Ultraviolet Data Centre (WOUDC), Toronto and also to other partner institutions within projects - e.g. Argentine Antarctic Institute and Argentine National Weather Service.

Information to the public

In turn, over 6 conferences open to the public were given in the different disciplines in the period 2008-2010. Actual data of total ozone are presented NRT at the web page of the project: <http://www.antarktida-ozon.cz>.

Relevant scientific papers

Feister, U., Junk, J., Woldt, M., Bais, A., Helbig, A., Janouch, M., Josefsson, W., Kazantzidis, A., Lindfors, A., den Outer, P. N., and Slaper, H.: Long-term solar UV radiation reconstructed by ANN modelling with emphasis on spatial characteristics of input data, *Atmos. Chem. Phys.*, 8, 3107-3118, doi:10.5194/acp-8-3107-2008, 2008.

Arola, A., S. Kazadzis, A. Lindfors, N. Krotkov, J. Kujanpää, J. Tamminen, A. Bais, A. di Sarra, J. M. Villaplana, C. Brogniez, A. M. Siani, M. Janouch, P. Weihs, T. Koskela, N. Kouremeti, D. Meloni, V. Buchard, F. Auriol, I. Ialongo, M. Staneck, S. Simic, A. Webb, A. Smedley, and S. Kinne, 2009 A new approach to correct for absorbing aerosols in OMI UV Geophys. Res. Lett. 36, L22805.

den Outer, P. N., H. Slaper, J. Kaurola, A. Lindfors, A. Kazantzidis, A. F. Bais, U. Feister, J. Junk, M. Janouch, and W. Josefsson (2010), Reconstructing of erythemal ultraviolet radiation levels in Europe for the past 4 decades, J. Geophys. Res., 115, D10102.

PROJECTS AND COLLABORATION

- With the Argentine Antarctic Institute
- With the Argentine National Weather Service
- With the WOUDC

FUTURE PLANS

- Continuing of measurement at the Marambio Base and publishing of the results (2011-2014).
- Calibration of the spectrophotometer and international comparison

NEEDS AND RECOMMENDATIONS

- Real-time ground base data and validation with the satellite from Antarctica – GTS/WIS

This report was prepared by Michal Janouch.