

GUV 2511 instrument installation in Stara Zagora and first Results

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Introduction

By the development of the spectrometer called today Dobson-spectrometer in 1924 routine observations of ozone were possible with an error less of 1%. Dobson and Brewer spectrometers have a spectral resolution of approximately 1 nm. In the 90-ties broadband filter instruments were developed to increase the global coverage of the measurements. Dahlbeck (1996) has shown that broadband instruments with a few filters also allow to determine the biologically UV dose, the total ozone abundances, and the cloud optical depths.

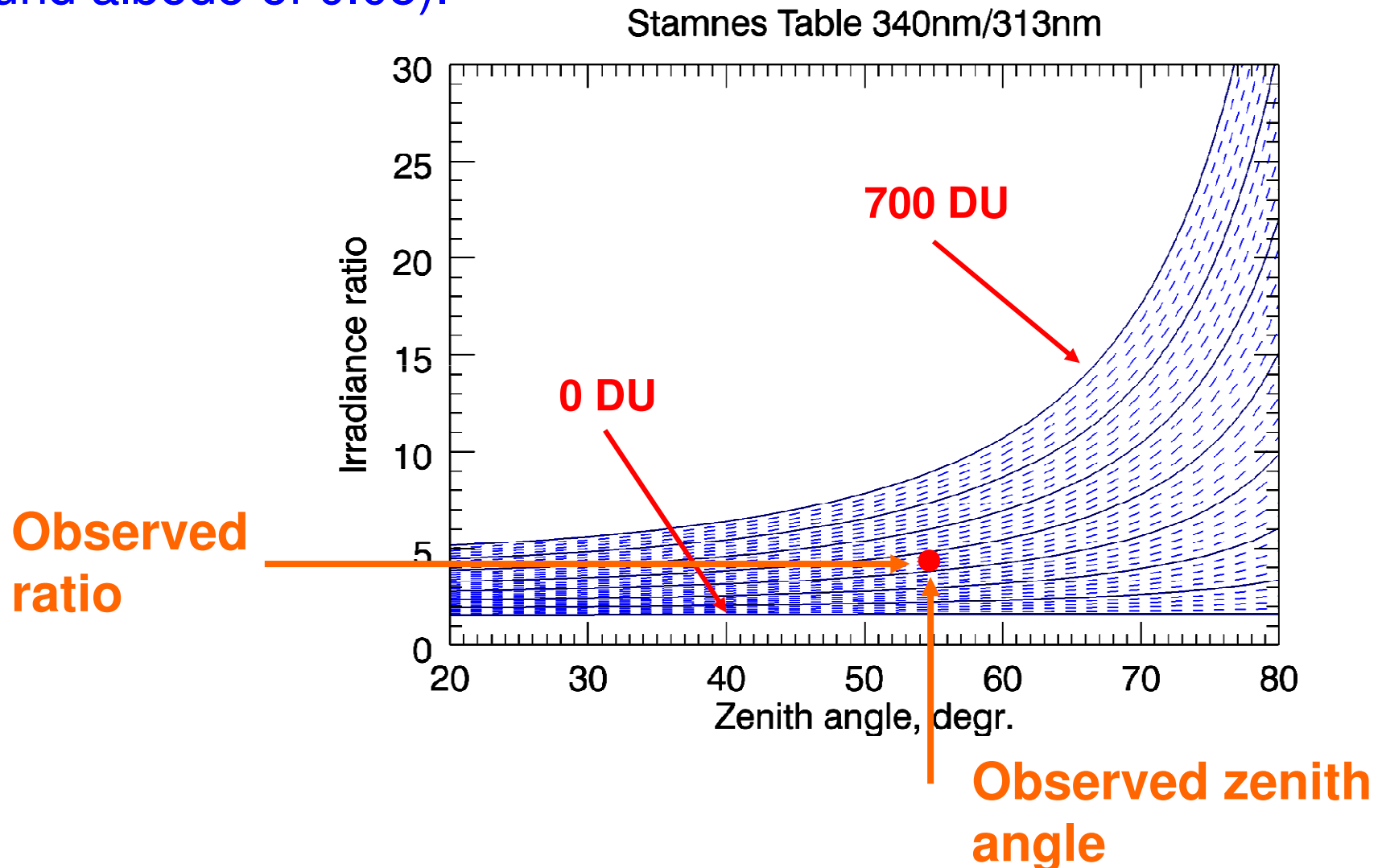
Mail goal: Presentation of the first results related to the measurements and description of the methodology to derive the total column ozone (TCO).

Methodology of TCO determination

By GUV instruments the global, the diffuse and the direct components of the downwelling irradiation are measured. TCO can not be determined directly by the measured irradiance ratio. To determine TCO from UVA/UVB ratios we used the Tropospheric Ultraviolet and Visible (TUV) model version 4.1. developed by Madronich (1993). Spectra were calculated for the Stara Zagora location (Lat=42.4°N, Long=25.6°E, alt=0.43 km) for different TCO from 0 up to 700 DU in steps of 20 DU and zenith angles from 20° up to 90° with a steps of 1°. The obtained spectra were multiplied with the relative filter response functions, approximated by a Gaussian with 10 nm FWHM. The irradiance ratios for wavelengths 340 nm and 313 nm were used.

Methodology of TCO determination

Stamnes tables calculated for Stara Zagora
(ground albedo of 0.05).

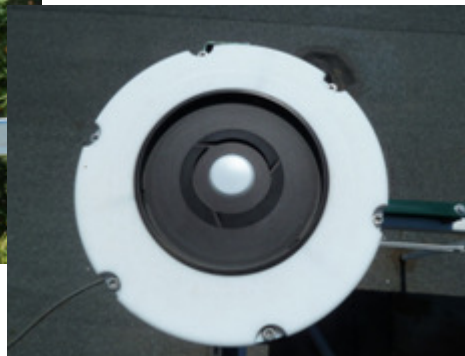


Instrument

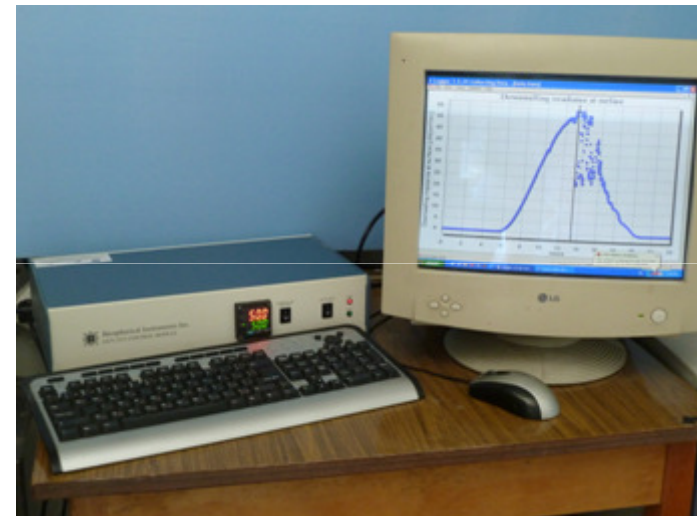


GUV 2511

The GUV instrument was installed in February 2015 on the roof of the Stara Zagora observatory.

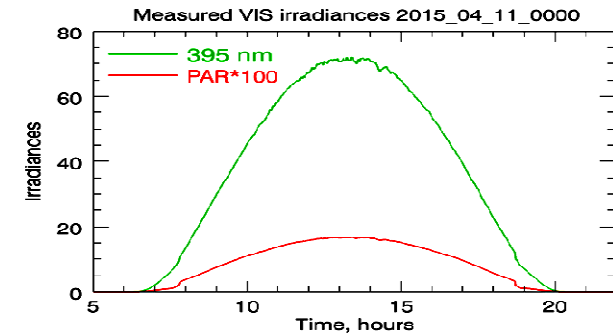
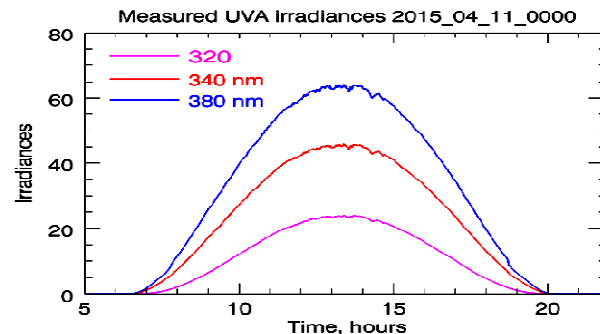
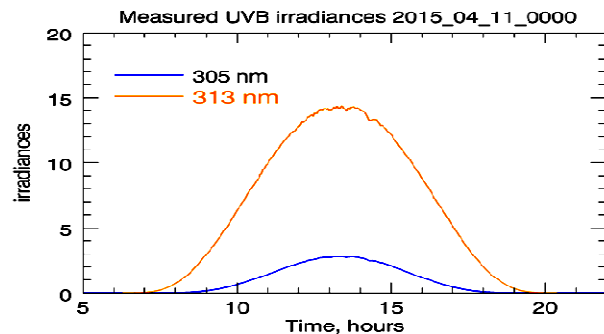


Instrument head



Instrument controller and monitor for control of the measurement progress.

Preliminary results

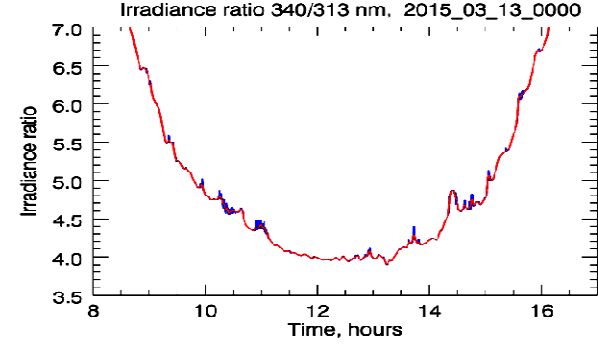
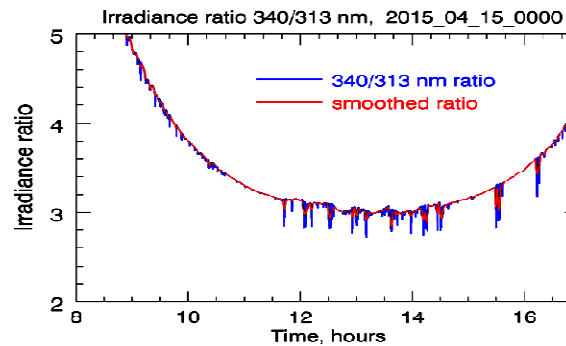
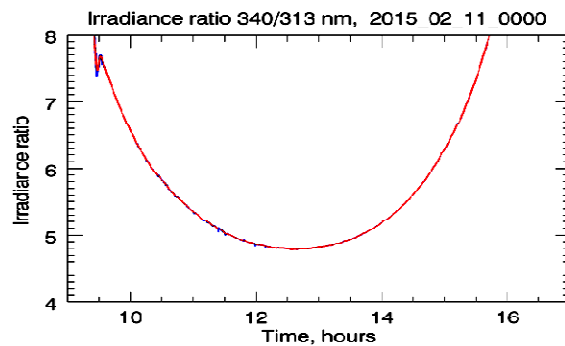
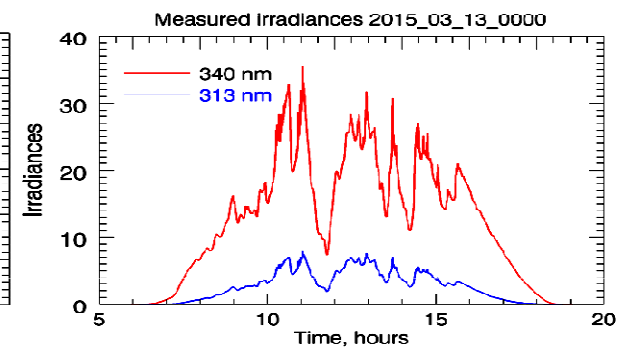
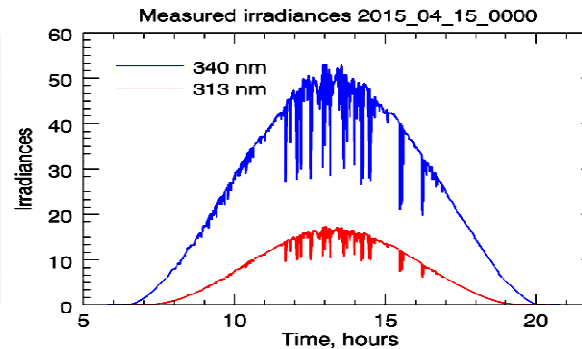
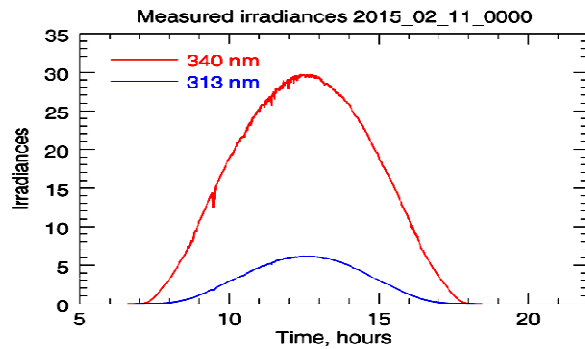


Example for the measurement irradiances in all GUV 2511 channels.

Daily measurements with an integration time of 10 sec. were carried out from February to May 2015 with some interrupts for technical reasons.

Preliminary results

Measured irradiances, given in $\mu\text{mW}/(\text{cm}^2\text{nm})$, during days with different cloudiness and the irradiance ratios for the same days. By the red line the ratios averaged by a boxcar over 13 values, e.g. over 130 sec are marked.



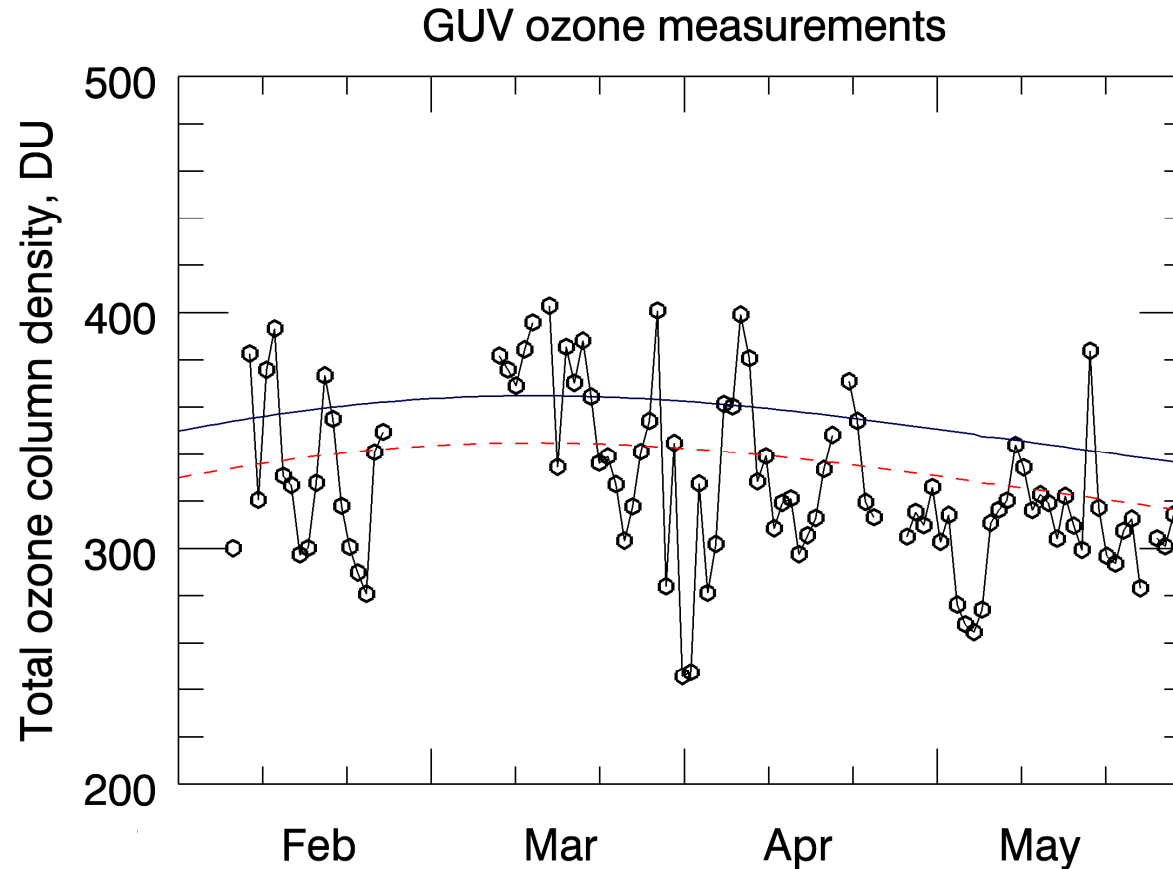
almost clear day

day with fast changing of the clouds covering the solar disc

day with large cloud fraction

Preliminary results

Results for the ozone determination by the 340/313 nm ratios



TCO for Stara Zagora determined for the observation period February-May 2015 (black line) and the TOMS annual means (thick line) and the same line shifted down by 20 DU (dashed line).

Conclusions and Acknowledgement

Conclusions:

- ✓ More detailed analyses are necessary to improve the quality of the TCO data.
- ✓ The first results show, that in the future good ozone data for the Stara Zagora location are to expect.

Acknowledement:

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