



Intercomparison of absorption photometer Project No.: AP-2019-4-2

Basic informations:

Location of the quality assurance: TROPOS, Lab 121

Date: 14 October - 18 October 2019

Principal Investigator	Home Institution	Participant	Instrument
R. Sohmer	UBA	R. Sohmer	112

1 Intercomparison summary

Status on arrival

No issues due to transportation or other damages.

Flow calibration

The flow meter of the instrument is set to report flow for conditions of 0 °C and 1013.25 hPa. The flow was 0.5 % too low compared to reference flow meter (TSI 4100). Corrections for the flow deviation and the temperature and pressure (STP correction) were considered in the data evaluation.

Noise

The noise level of the instrument is out of the normal range. The average noise (1σ) for the all wavelengths was less equal 62 ng m^{-3} for one minute averaging time. The background level was acceptable with deviations of less equal 8 ng m^{-3} .

Inspection

The measuring cell and the sensor head were very contaminated with dust. The cell and sensor head were cleaned.

Comparison to reference MAAP

BC concentrations of MAAP are 10.3 % higher than BC concentrations from a reference MAAP.

Comparison to reference absorption

The deviations of the absorption coefficients derived from MAAP relative to the absorption coefficients from the multi-wavelength absorption reference setup is 1.5 %.

Recommendations

No recommendations.

Overall assessment

The instrument meets the requirements.

Spot size check

Table 2: Correction factor for spot sizes F_{spot} .

Nominal spot size [cm ²]	Measured spot size [cm ²]	F_{spot}
2.00	Well defined spot, spot size not measured	1.0

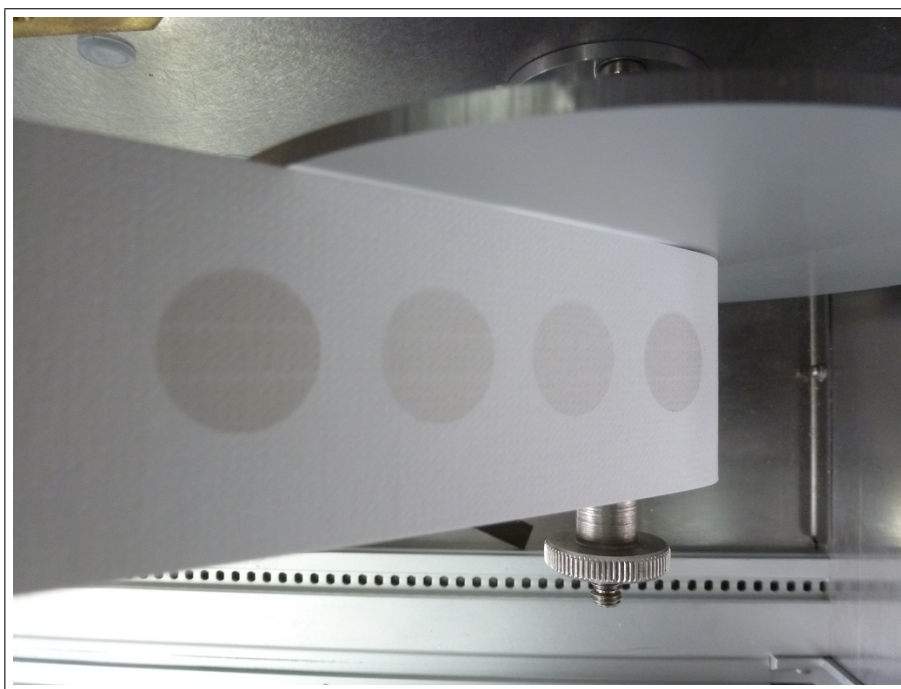


Figure 1: New spot from MAAP (112) on filter tape.

Instrumental Noise

Table 3: Noise parameters of MAAP (112) measured with filtered air.

Wavelength [nm]	Number of data points	Median [ng m ⁻³]	10th percentile [ng m ⁻³]	90th percentile [ng m ⁻³]	Mean [ng m ⁻³]	Std. dev. [ng m ⁻³]	Error of mean [ng m ⁻³]
660	121	8	-121	47	-13	62	6

Comparison to reference MAAP

Table 4: Correlation parameter of eBC coefficients from MAAP (112) and reference MAAP.

Wavelength [nm]	Slope	Error	R^2
660	0.897	0.005	0.994

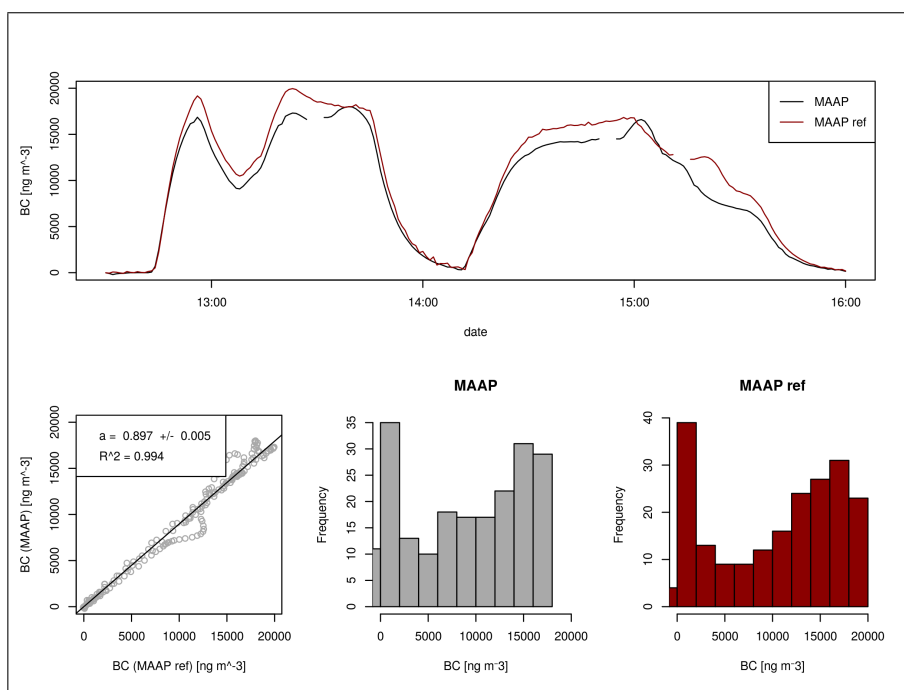


Figure 2: Correlation of eBC coefficient from MAAP (112) and reference MAAP.

Comparison to multi-wavelength absorption

Table 5: Correlation parameter of absorption from MAAP (112) and the multi-wavelength absorption reference.

Wavelength [nm]	Slope	Error	R^2
637	1.015	0.008	0.988

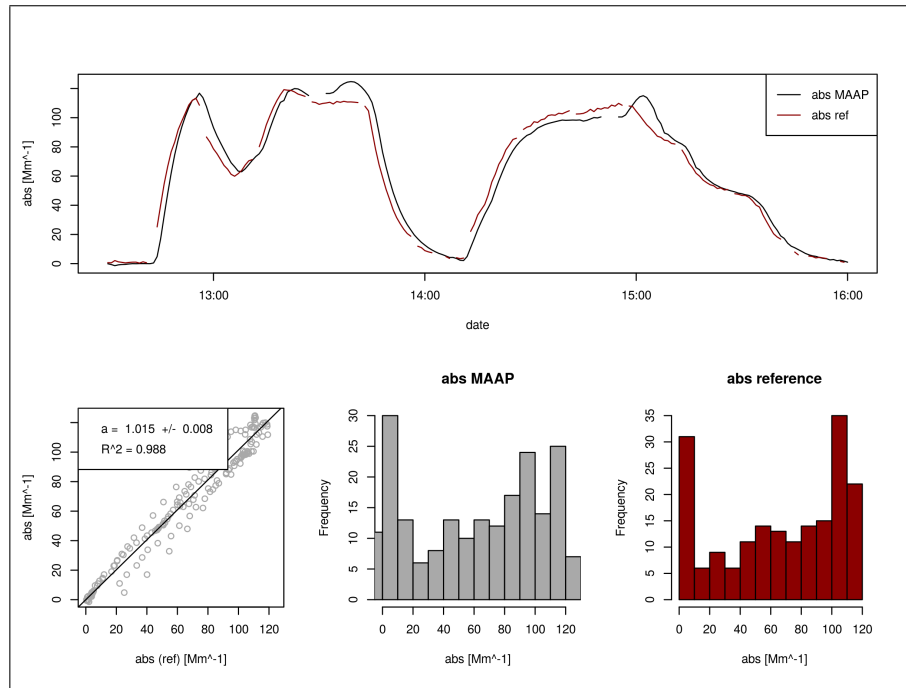


Figure 3: Correlation of absorption from MAAP (112) and the multi-wavelength absorption reference at 660 nm.