ACTRIS-2 ECAC Workshop 09-13 October, 2017







## Intercomparison of Absorption Photometers Project No.: AP-2017-3-3

Location of the quality assurance:

TROPOS, lab 121

Date:

15 October, 2017

Principal Investigator	Home Institution	Participant	Instrument	
S. Rodriguez	AEMET	S. Rodriguez	MAAP, SN 101	

- 1. Intercomparison summary
- **Flow calibration**: The flow meter of the instrument is set to report flow for conditions of 21.11°C and 1013.25 hPa. The flow was 3% too high compared to reference flow meter (Gilibrator). 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 was as expected from the MAAP specification sheet. The average noise  $(1\sigma)$  was 18.1 ng·m<sup>-3</sup> for 1 min averaging time.
- **Inspection:** Measurement cell was contaminated with dust. The black coating has peeled off in a small spot, which results in a showing effect of the sample spot.
- **Comparison to a reference MAAP**: BC concentrations are about 6.9% lower than BC concentrations from reference MAAP.
- **Comparison to reference absorption:** The absorption coefficients derived from MAAP are 19.5% lower than absorption coefficients from the multi-wavelength absorption reference setup. The uncertainty of the reference absorption for the present concentrations is about 10% to 15%.

Recommendations: None.

**Overall assessment:** The instrument meets the requirements.

2. Details

Configuration parameters						
SIGMA BC: 6.6 m2/g						
AIR FLOW: 480						
STORE AVERAGES: 10 min						
VOLUME REFERENCE STANDARD TEMPERATURE STANDARD TEMPERATURE 25_C						
PRINTFORMAT: COM1 8 PRINTCYCLE: 30 min BAUDRATE: Bd COM1 9600						
BAUDRATE: Bd COM2 9600 DEVICE-ADDRESS: 0						
FILTER CHANGE TRANSM. < % 50 CYCLE h 0 HOUR: 0						
CALIBRATION OF SENS. T1 T2 T3 T4 P1 P2 P3 -17 28 -22 58 -36 -155 -104 AIR FLOW 98.5						
HEATER PARAMETERS Diff. T2-T1 nominal 0 _C Max. Heating Temp. 45 _C Min. Heating Power 10 %						
ANALOG OUTPUTS OUTPUT ZERO: 4mA CBC 0 10 MBC 0 2400						
GESYTEC-PROTOKOL STATUS VERSION STANDARD NUMBER OF VARIABLES 1 CBC						

Flow check <sup>1</sup> Correction factors $F_{flow}$ and $F_{STP}$ for correcting eBC concentrations. $F_{flow}$ corrects for inlet flow errors considering leakage. $F_{STP}$ is used to adjust concentrations to STP conditions (0°C, 1013.25 hPa).								
Date	System Flow			Reference flow meter: Gilibrator 'TROPOS-T'			Flow correctio n factor <sup>1</sup> Fe hler! Textmar ke nicht definiert.	STP correction factor <sup>1</sup> Feh ler! Textmarke nicht definiert.
	Mass flow	Volume reference		Volume flow	Ambient $T$ and $P$	D		
	$Q_{MAAP}$ [slpm]	Т <sub>0,МААР</sub> [°C]	P <sub>0,MAAP</sub> [hPa]	Q [lpm]	7 [°C]	P [hPa]	F <sub>flow</sub>	F <sub>STP</sub>
2017- 09-06	16.67	0	1013.25	17.70	22	1001	1.030	1.000

Spot size check Correction factor for spot sizes $F_{spot}$ .						
Date	Nominal spot size [cm <sup>2</sup> ]	F <sub>spot</sub>				
2017-09-06	0.785	Well defined spot, spot size not measured	1.0			

Instrumental Noise Noise in units of eBC concentration measured with filtered air.									
Date	Avg. time	Wave- length [nm]	Num data points	Median [ng]	10 <sup>th</sup> percentile [ng/m <sup>3</sup> ]	90 <sup>th</sup> percentile [ng/m <sup>3</sup> ]	Mean [ng/m <sup>3</sup> ]	Standard deviation [ng/m <sup>3</sup> ]	Error of the mean [ng/m <sup>3</sup> ]
2016- 09-30	1 min	637	287	-10.0	-40	20	-12.02	26.81	1.58



