ACTRIS-2 ECAC Workshop 26 to 30 September, 2016

TROPOS
Leibniz Institute for Tropospheric Research

ECAC
European Center for Aerosol Calibration

WCCAP
World Calibration Centre for Aerosol Physics

Intercomparison of Absorption Photometers
Project No.: AP-2016-2-2

Basic Information:

Location of the quality assurance: TROPOS, lab 121

Date: 26/09 to 30/09/2016

Principal Investigator	Home Institution	Participant	Instrument
Andras Hoffer	University of Pannonia	-	CLAP, SN 10.024

1. Intercomparison summary

Flow calibration: The flow of the instrument was found to be 1.5% higher compared to a reference flow meter (Gilibrator, Sensydyne, USA). Correction of the flow error was included in the data evaluation.

Noise and zero: The instrument passed the noise and zero tests. The noise (1σ) for 1 minute averages was 0.094, 0.094 and 0.134 Mm^{-1} at wavelengths 467, 528, and 652 nm, respectively. The zero values, measured with filtered air for three hours were 0.028, 0.009 and 0.022 Mm^{-1} at wavelengths 467, 528, and 652 nm, respectively. The instrument has no leakage.

Sample spot: The edges of the spots are sharp. Spot agree with sizes specified in the configuration file.

Inspection: A visible inspection showed that the instrument was maintained well. The instrument showed no damages and the chamber was clean.

Comparison to reference absorption: Because of low ambient concentrations, the absorption coefficients from the reference systems (EMS=Extinction minus Scattering) couldn't be used. Instead the absorption coefficient was derived from MAAP (SN504). This MAAP is frequently compared against EMS. MAAP and EMS agree within ±10% at wavelength 637 nm. CLAP 10.024 was compared against MAAP. CLAP data were corrected according to Ogren (2010). Wavelengths differences were accounted for using the absorption Ångström exponent from CLAP. The *red* channel of CLAP at 652 nm compares to MAAP within 5.0 ± 10 % (c.f. Figure 1). The uncertainty of 10% reflects the uncertainty of the truncation correction.
A direct comparison for the 467 and 528 nm channels to a reference instruments was not possible. Instead, an Aethalometer (AE33, SN167) acts as reference instrument for the relative spectral run. The Ångström exponents from CALP for wavelength pairs 467 nm/652 nm and 528 nm/652 were higher than the Ångström exponents from Aethalometer calculated from 470 to 860 nm by 13% and 14%, respectively.

Recommendations: None

Overall assessment: The instrument meets the requirements.

2. Tables and Figures

Flow check
[1] A flow correction factor larger 1.0 means that the instrument flow is too high.

Date	System Flow			Reference flow Reference flow meter: Gilibrator 'TROPOS-T'			Flow correction factor[Fehler! Textmarke nicht definiert.]
	Mass flow	Volume reference		Volume flow	Ambient T and P		
	Q_{CLAP} [slpm]	$T_{0,CLAP}$ [°C]	$P_{0,CLAP}$ [hPa]	Q [lpm]	T [°C]	P [hPa]	F_{flow}
28. Sep	0.93	0	1013	1.01	23	995	1.015

Comparison of CLAP to MAAP
CLAP was corrected according to Ogren (2010).

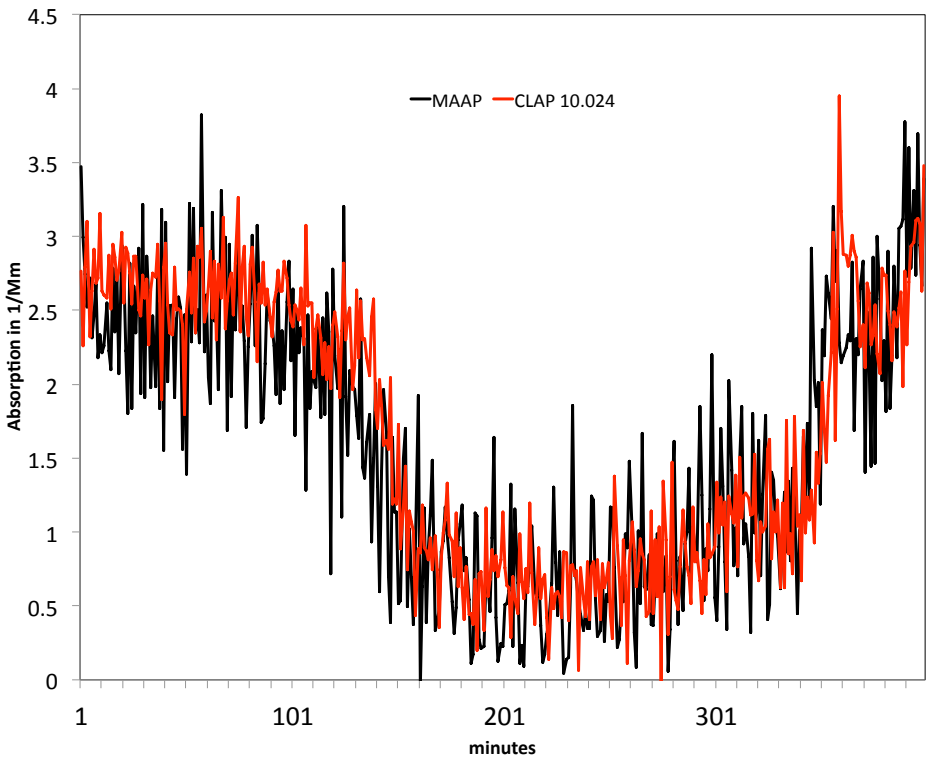

Figure 1: CLAP compared to MAAP at 637 nm. CLAP data at 652 nm were adjusted to 637 nm using the Ångström exponent from CALP between 652 and 528 nm.

Comparison of Absorption Ångström Exponents (AAE)

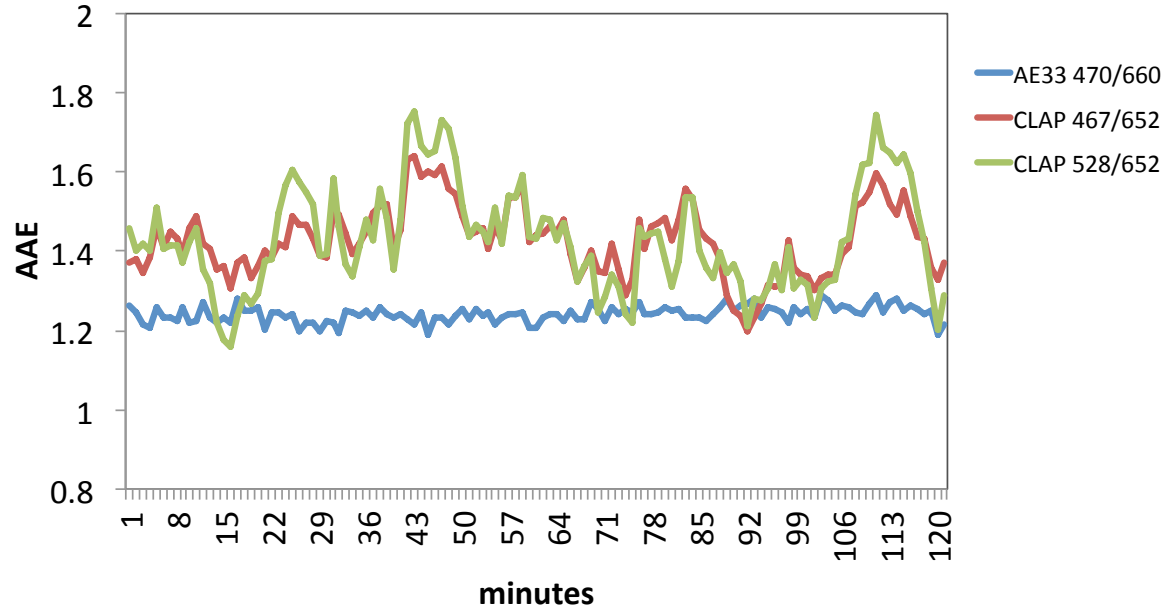

Figure 2: Absorption Ångström exponents from the AE33 at wavelength pairs 470nm/660 nm, and from CALP at wavelength pairs at 467 nm/652 nm and 528 nm/652 nm.