



Leibniz Institute for
Tropospheric Research



World Calibration Centre
for Aerosol Physics

Intercomparison of Integrating Nephelometers Project No.: IN-2016-2-5

Basic Information:

Location of the quality assurance: TROPOS

Delivery Date: 3 August, 2017

Principal Investigator	Home Institution	Participant	Instrument
Valerie Gros	LSCE	François Truong	Nephelometer, M9003, 450 nm, with external pump SN 03-0382

1. Intercomparison summary

Status on arrival: The instrument arrived in proper shape without any visual damages.

Noise: The one minute instrumental noise (single standard deviation) was 0.83. The value is about two to three times higher than it should be.

Span check:

Before inspection: The initial span check showed that the instrument measured lower values of 28% (See section on inspection for possible reason). A drifting background during a previous calibration could have caused the deviation of about -30%.

After inspection: Span check after inspection and calibration showed an underestimation of scattering values of 5%.

Comparison to a reference instrument:

Before inspection: The values from the instrument were found to be about 30% lower compared to the reference nephelometer (Aurora4000, SN 14-1408). This result is consistent with the initial span check.

After inspection and calibration: Comparison to the reference instrument showed that the scattering is about 4% lower

Inspection:

A change of the zero value from one to the next zero checks/adjust was observed. After changing the filters for zero air and zero pump the problem was solved. The instrument passed the leak test and the cell was clean. The O-ring between cell and light source was cut to have the right length and glue. The O-ring should be replaced by the proper ring recommended from the manufacturer.

Recommendations: Regular check of consistency of zero measurement and replacing filters. The O-ring between cell and light source should be replaced.

Overall assessment: The instrument meets the requirements after replacing filters. Quality of data before the workshop was not sufficient. It is not clear if data for just one calibration or for a longer period are affected.

2. Details

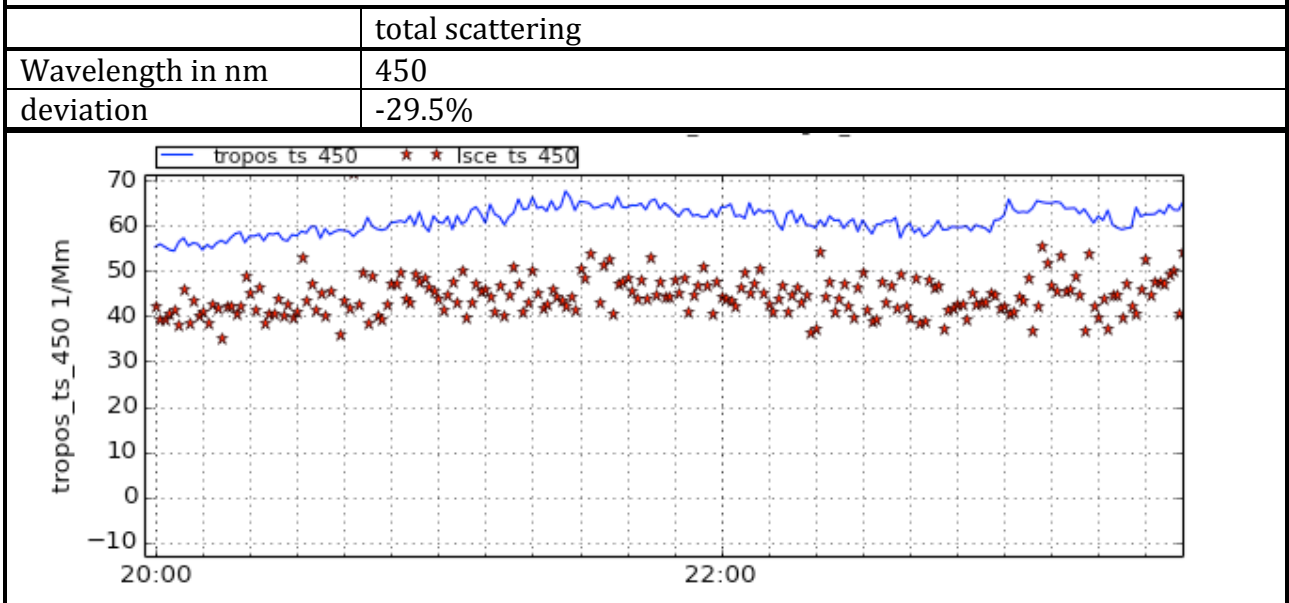
Instrument noise.	
The zero and noise was determined by the standard deviation of a merged series of five zero adjusts. Each series last 30 minutes with a temporal resolution of 1 minute.	
	total scattering in Mm^{-1}
Wavelength in nm	450
Zero check (average in Mm^{-1})	0.10
Noise (standard deviation in Mm^{-1})	0.83

Span check	
Percentage deviation to theoretical value. A positive number means that the instrument measure too high values.	
	total scattering
Wavelength [nm]	450
before recalibration (as instrument arrived) deviation in percentage	-28%
after recalibration deviation in percentage	-5%

Comparison to reference instrument before inspection

Reference nephelometer: Aurora4000 (SN 14-1408)

Test aerosol: ambient air



Comparison to reference instrument after inspection

Reference nephelometer: Aurora4000 (SN 14-1408)

Test aerosol: ammonium sulfate

