



Leibniz Institute for
Tropospheric Research



World Calibration Centre
for Aerosol Physics

Intercomparison of Integrating Nephelometers

Project No.: IN-2017-4-5

Basic informations:

Location of the quality assurance: TROPOS, lab 121

Date: 03 November, 2017

Principal Investigator	Home Institution	Participant	Instrument
A. Kristensson	Lund	-	Nephelometer, Ecotech Aurora 3000, SN 07-1541

1 Intercomparison summary

Status on arrival: No issues due to transportation or other damages.

It was noted the internal settings for the wavelengths were wrong: 520 nm instead of 525 nm for green and 700 nm instead of 635 nm for red. The settings has been changed before recalibration.

Noise: The one minute instrumental noise (single standard deviation) for total scattering were in the range of 1.17 for 450 nm to 0.36 for 635 nm. The noise level for the blue is slightly higher than the expected noise.

Span check: The span check before instrument inspection show deviation for total scattering of 0.7% for blue, 4.5% for the green and -47.9% for the red channel. This is a direct result of the wrong settings for the wavelengths.

Comparison to a reference instrument:

Before inspection: Comparison to the reference nephelometer (Aurora 4000, SN 14-1408) showed a deviation of -47.1% for the red and 6.4% for the green channel. The deviation for the blue channel is less than 0.5%.

After inspection and calibration: The deviations reduce to values less equal 2%.

All deviations are in the acceptable range.

Inspection: The instrument was in clean and in a good condition.

Recommendations: Due to the incorrect settings, values measured so far could be systematically wrong.

Overall assessment: The instrument meets the requirements.

2 Details

Instrument noise

The noise is determined by the standard deviation of a time series of 60 minutes with a temporal resolution of 1 minute. Test aerosol was filtered room air.

	total scattering in Mm^{-1}			backscattering in Mm^{-1}		
Wavelength [nm]	450	525	635	450	525	635
Zero check (median in Mm^{-1})	-0.94	0.07	-1.79	-	-	-
Zero check (average in Mm^{-1})	-0.54	0.02	-1.83	-	-	-
Noise (standard deviation)	1.17	0.71	0.36	-	-	-

Span check

Percentage deviation to theoretical value. A positive number means that the instrument measure too high values.

	total scattering			backscattering		
Wavelength [nm]	450	525	635	450	525	635
before recalibration (as instrument arrived) deviation [%]	0.7	4.5	-47.9	-	-	-

Comparison to reference instrument before inspection

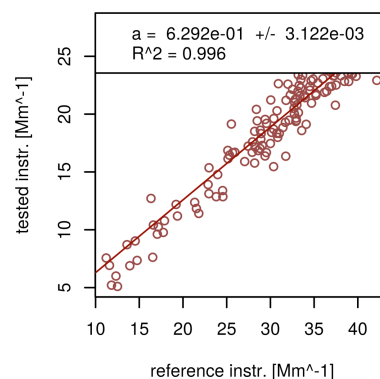
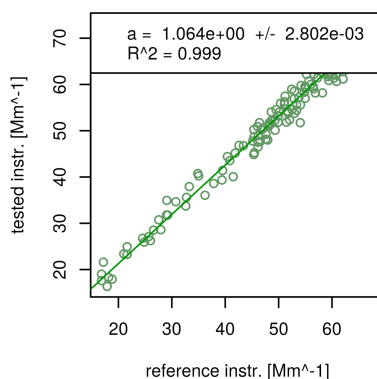
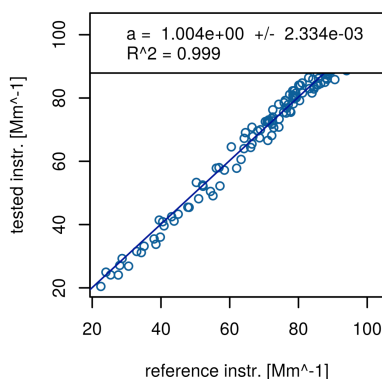
Reference nephelometer: Aurora4000 (SN 14-1408)

Test aerosol: ammonium sulphate

Measurements were done before inspection and recalibration.

(*) See span check results. Scattering coefficients were interpolated to the wavelengths of the reference nephelometer.

	total scattering			backscattering		
Wavelength [nm]	450	525	635	450	525	635
slope	1.004	1.064	0.629	-	-	-
R ²	0.999	0.999	0.999	-	-	-



Comparison to reference instrument before inspection

Reference nephelometer: Aurora4000 (SN 14-1408)

Test aerosol: ammonium sulphate

Measurements were done after inspection and recalibration.

(*) See span check results. Scattering coefficients were interpolated to the wavelengths of the reference nephelometer.

	total scattering			backscattering		
Wavelength [nm]	450	525	635	450	525	635
slope	0.983	1.016	1.006	-	-	-
R ²	0.999	0.998	0.997	-	-	-

