



Leibniz Institute for
Tropospheric Research



World Calibration Centre
for Aerosol Physics

Intercomparison of Integrating Nephelometers Project No.: IN-2016-3-1

Basic Information:

Location of the quality assurance: TROPOS

Delivery Date: 13 September, 2017

Principal Investigator	Home Institution	Participant	Instrument
T. Tuch	TROPOS	T. Tuch	Nephelometer, TSI model 3563, SN 70919196

1. Intercomparison summary

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

Noise: The one minute instrumental noise (single standard deviation) was smaller than 0.5 Mm^{-1} for all channels. The noise level conforms to the expected noise.

Span check: The span check before instrument inspection revealed, that the instrument was properly calibrated with a deviations of less than 3.2% for all other channels.

Comparison to a reference instrument:

Before inspection: Comparison to the reference nephelometer (Aurora 4000, SN 14-1408) showed that scattering coefficients agreed with values from the reference instrument with 3% for the blue and red channels. For back scattering the instrument agrees within 6%. The deviations are within the acceptable limits.

Inspection: The cell was inspected through the inlet port. The cell was found to be clean. Since the comparison the reference instrument and the span check indicate that the instrument was in good conditions, it was refrained to open the cell.

Recommendations: No recommendations.

Overall assessment: The instrument meets the requirements.

2. Details

Instrument noise.						
The noise is determined by the standard deviation of a time series of 120 minutes with a temporal resolution of 1 minute. Test aerosol was filtered room air.						
	total scattering in Mm^{-1}			backscattering in Mm^{-1}		
Wavelength in nm	450	550	700	450	550	700
Zero check (average in Mm^{-1})	0.04	0.09	-0.02	-0.32	0.05	0.09
Noise (standard deviation)	0.51	0.20	0.25	0.33	0.14	0.19

Span check						
Percentage deviation to theoretical value. A positive number means that the instrument measure too high values.						
	total scattering			backscattering		
Wavelength [nm]	450	550	700	450	550	700
before recalibration (as instrument arrived) deviation [%]	-1.5	2.3	-3.0	-0.5	2.1	-3.2

Comparison to reference instrument before inspection						
Reference nephelometer: Aurora4000 (SN 14-1408)						
Test aerosol: ambient air						
Measurements were done before inspection and recalibration check.						
(*) See span check results. Scattering coefficients were truncation corrected interpolated to the wavelengths of the reference nephelometer.						
	total scattering			backscattering		
Wavelength in nm	450	525(*)	635(*)	450	525(*)	635(*)
slope	0.995	0.965	0.94	0.98	0.97	0.95
R ²	0.99	0.99	0.99	0.86	0.88	0.84

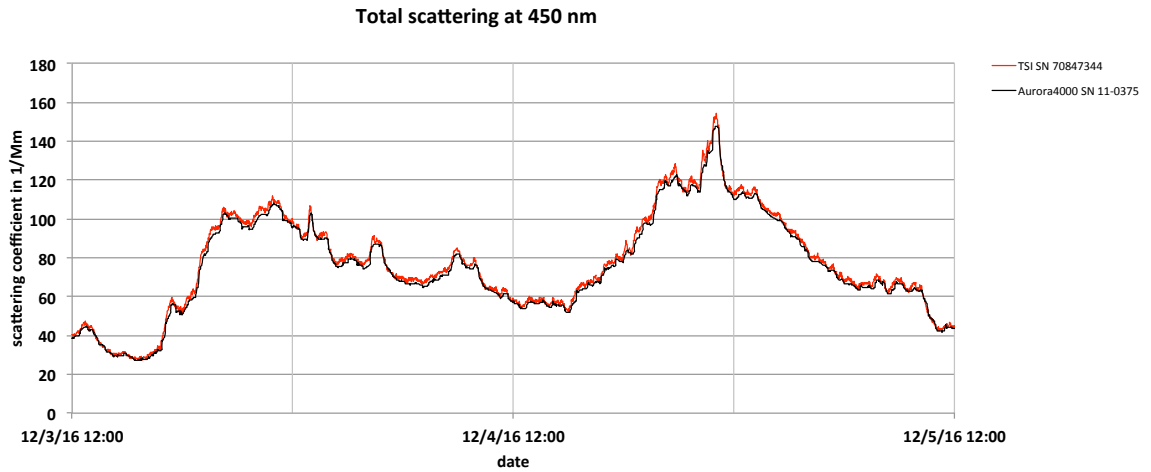


Figure: Raw data (STP corrected) for total scattering at 450 nm.

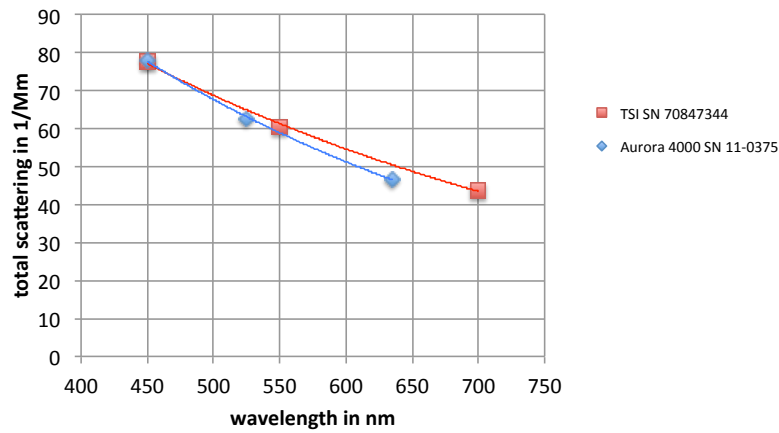


Figure: Wavelength dependence of total scattering for truncation and STP corrected data.

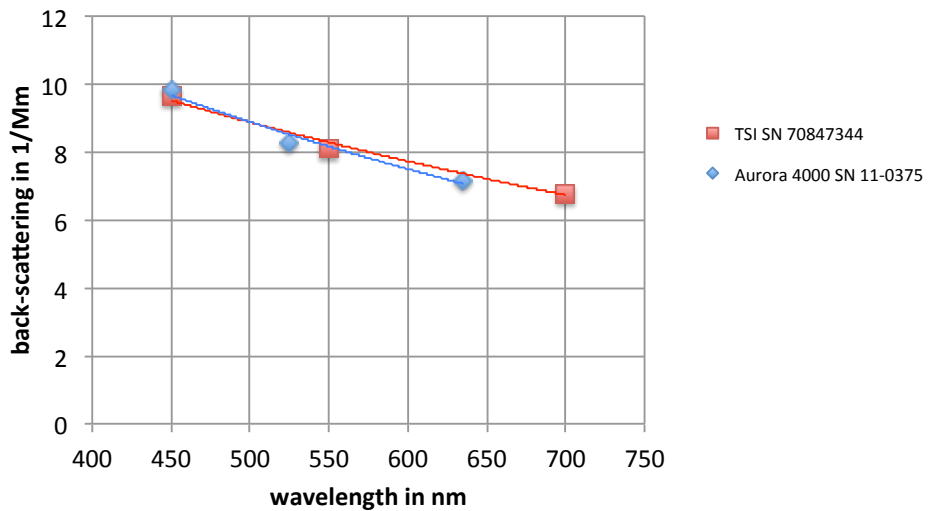


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