

Instrument Inter-Comparison Report

Instrument	
Type	Aurora 3000
Serial Number	12-0932
Institution	
Contact	

Instrument inter-comparison	
Organization	Leibniz Institute for Tropospheric Research (TROPOS) World Calibration Centre for Aerosol Physics (WCCAP)
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Report	
Status	<input type="checkbox"/> preliminary <input checked="" type="checkbox"/> final
Date	

1. Instrument inter-comparison summary

Status on arrival: The instrument did not start in the normal operating mode. The instruments reports 'backscatter shutter driver error'. Inspection of the cell showed that the cell was clean and no obvious damages were found. After some restarts the instrument error disappeared.

Noise: The noise for one minute averages is below 1.3 Mm^{-1} . For the green channel the noise is smaller than 1.0 Mm^{-1} . The noise is in the accepted range.

Span check: An initial span check failed! After recalibration the span check results shows deviations of less then 2%.

Inspection: The cell was clean. Temperature, pressure and humidity sensors are ok.

Comparison to other Nephelometer: Comparison to other instruments was made as the instruments arrived without re-calibration. Test aerosol was Ammonium sulphate. Scattering coefficients for total scattering in the blue and green were higher by up to 15% compared to an average of 4 TSI model 3563 nephelometers. Compare to and Aurora 4000 the values are higher by 11%. For backscattering the values are lower by 10% and 17% compared to the TSI 3563 nephelometers and the Aurora 4000, respectively. The values are out of the acceptable range.

Other observation: None

Recommendations: Instrument needs to be repaired

Overall assessment: The instrument does not meet the requirements.

2. Technical checks

Table: Noise checks for 50 minutes duration.

The noise is determined by the standard deviation of a time series of 30 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	525	635	450	525	635
Zero check (average in Mm^{-1})	1.94	-0.92	-1.59	-1.72	-2.41	-0.95
Noise (standard deviation)	1.23	0.52	1.06	1.07	0.434	0.75

Table: Span check, deviation to theoretical value after recalibration

	total scattering			backscattering		
Wavelength in nm	450	525	635	450	525	635
deviation in %	-1.6	-1.9	-1.5	-0.8	-1.5	-1.4

3. Comparison to other Nephelometers of before inspection and calibration

Table: Comparison to an average of in total four TSI nephelometers model 3563.

Scattering coefficients were corrected for truncation. Values for the TSI nephelometer were adjusted using the Angström equation to match the wavelengths of the Aurora 3000.

	total scattering			backscattering		
Wavelength in nm	450	525	635	450	525	635
slope	1.154	1.117	0.993	0.931	0.933	0.908
intercept	-1.529	-1.613	1.83	0.729	2.419	1.386
R^2	0.971	0.997	0.992	0.99	0.98	0.95