Instrument Inter-Comparison Report

Instrument	
Type	TSI, model 3563 ,
Serial Number	70539059
Institution	University of Helsinki
Contact	Aki Virkkula

Instrument inter-comparison	
Organization	Leibniz Institute for Tropospheric Research (TROPOS) World Calibration Centre for Aerosol Physics (WCCAP)
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Workshop, etc.	WCCAP-2015-6, 23-28 Nov. 2015

Report	
Status	☐ preliminary ☑ final
Date	

1. Instrument inter-comparison summary

Status on arrival: ok

Noise: The on minute instrumental noise tested using filtered ambient air was 0.7 and 0.67 $Mm^{-}1$ for the red channel total- and backscattering, respectively. These are high, indicating a photomultiplier with high noise. The noise levels for the green and blue are ok.

Span check: Span check using CO2 revealed good results for total scattering (all three wavelengths) and backscattering (red channel) with deviation lower then 3%. Deviations for backscattering for the blue and green channels are 4.1 and 3.9%, respectively.

Inspection: Temperature and pressure sensors are ok. The cell was very little dirty. It was not necessary to clean the cell.

Comparison to other Nephelometer: Comparison of four nephelometers using ammonium sulphate showed that this instrument was between %3 and 6% higher than the average. After span gas correction the deviation was about 5% for all channels.

Other observation: None

Recommendations: Observe span check results for long time periods.

Overall assessment: The instrument meets the requirements?

2. Technical checks

Table: Noise checks for 30 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	550	700	450	550	700
Zero check (average in Mm^{-1})	0.21	0.14	-0.27	0.15	0.01	-0.25
Noise (standard deviation)	0.42	0.22	0.7	0.29	0.13	0.67

Table: Span check, deviation to theoretical value

	total scattering			backscattering		
Wavelength in nm	450	550	700	450	550	700
deviation in %	1.19	1.32	-0.01	4.13	3.96	0.00

3. Comparison to other Nephelometers of same type before inspection and calibration

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

	total scattering			backscattering		
Wavelength in nm	450	550	700	450	550	700
slope	1.05	1.04	1.04	1.06	1.05	1.03
intercept	-0.65	0.38	-0.4	-0.1	-0.27	-0.34
R^2	0.998	0.995	0.984	0.886	0.945	0.982

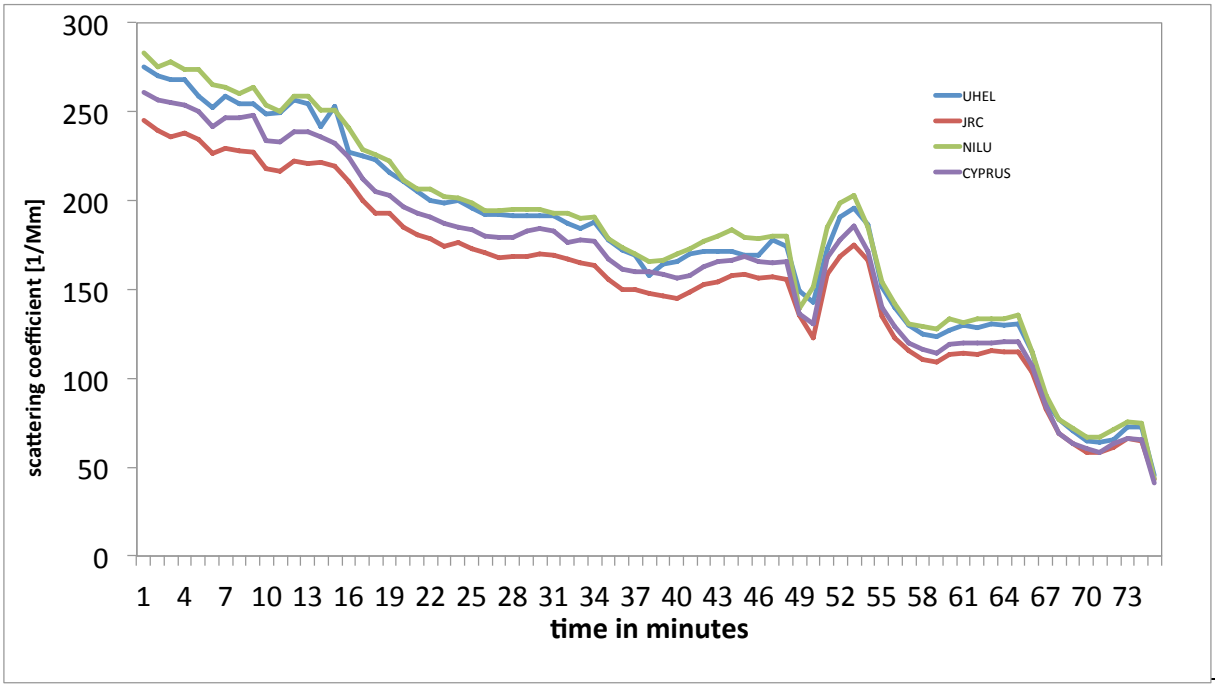

Figure 1: Comparison of four TSI nephelometers as arrived to at workshop.

4. Comparison to other Nephelometers of same type after inspection and span gas correction

Table: Comparison to an average of in total four TSI nephelometers model 3563						
	total scattering			backscattering		
Wavelength in nm	450	550	700	450	550	700
Slope	1.05	1.05	1.06	1.05	1.05	1.07
intercept	-0.65	0.37	-0.40	-0.09	-0.26	-0.33
R^2	0.987	0.983	0.975	0.835	0.921	0.977