Intercomparison of Mobility Particle Size Spectrometers

Project No.:	*OSIA-2016-2-2*
Principal Investigator:	*UBA*
Home Institution:	*UBA*
Participant:	*Andreas Schwerin*
Candidate:	**DE-UBA-Waldhof**
Made by:	TROPOS
Counter (SN):	TSI CPC Model 3772, SN: 7083506
Software:	TROPOS 5.6
Location of the quality assurance:	Station Waldhof
Comparison period:	October 28, 2016 – November 04, 2016
Last Intercomparison (with Project No.):	November 2015

Summary of Intercomparison

Status:
The candidate passed the quality standards of ACTRIS and GAW during the onsite intercomparison. The system is within the range of +/-10% of the TROPOS Reference MPSS.

The candidate was in a good status. It was not necessary to change or repair parts of the inlet, instrument or counter. The zero, high voltage and PSL checks are in the correct range of tolerance.

Information about the instruments:

Date of check: 07.11.2016

List of Components	TROPOS Reference MPSS No.4	Candidate
Position	-	-
Company	TROPOS	TROPOS
Software	TROPOS	TROPOS
CPC-MPSS	TSI CPC, Model 3772	TSI CPC, Model 3772
CPC-total	TSI CPC, Model 3010	-
flow ratio	1.0 : 5.0	1.0 : 5.0
source	Kr85	Kr85
HV power supply	positive	positive
DMA	Hauke medium	Hauke medium
aerosol dryer	✓	✓
aerosol RH- sensor	✓	✓
aerosol T-sensor	✓	✓
sheath RH-sensor	✓	✓
sheath T-sensor	✓	✓
Sheath dryer	✓	✓
pressure sensor	✓	✓

Date of check: 07.11.2016

CPC status	TROPOS-MPSS	TROPOS-total	Candidate-MPSS	Candidate-total
power/status	LED green	LED green	LED green	-
saturator temp	39 °C	-	39 °C	-
condenser temp	22 °C	-	22 °C	-
optics temp	40 °C	-	40.0 °C	-
cabinet temp	33.3 °C	-	37.7 °C	-
ambient pressure	101.5 kPa	-	101.5 kPa	-
orifice pressure	82.2 kPa	-	85.9 kPa	-
nozzle pressure	2.9 kPa	-	2.4 kPa	-
laser current	46 mA	LED green	43 mA	-
liquid level	full	full	full	-

Date of check: 08.11.2016

	TROPOS Reference MPSS		Candidate	
date	**08.11.2016**		**08.11.2016**	
total CPC flow	1.017 l/min		-	
aerosol flow (DMA)	1.023 l/min		1.024 l/min	
aerosol flow (UDMA)	-		-	
aerosol flow (total)	1.017 l/min		1.018 l/min	
zero	0 #/cm³		0 #/cm³	
PSL 203 nm	202.34 nm		202.93 nm	
HV – 0 V	0 V		0.1 V	
HV – 4 mV	5.1 V		4.9 V	
HV – 80 mV	-		-	
HV – 800 mV	999.9 V		1000.1 V	

Special Information regarding to the Candidate:

Was it necessary to:	yes/no (date)	old part (ID/SN)	new part (ID/SN)	information
clean the aerosol inlet	no			
change aerosol Nafion dryer	no			
change sheath Nafion dryer	no			
check source	no			
change HV power supply	no			
clean/change DMA	no			
change aerosol RH/T-sensor	no			
change sheath RH/T-sensor	no			
change pressure sensor	no			

PSL Scan and calibration: Latex 203 nm +/- 4 nm

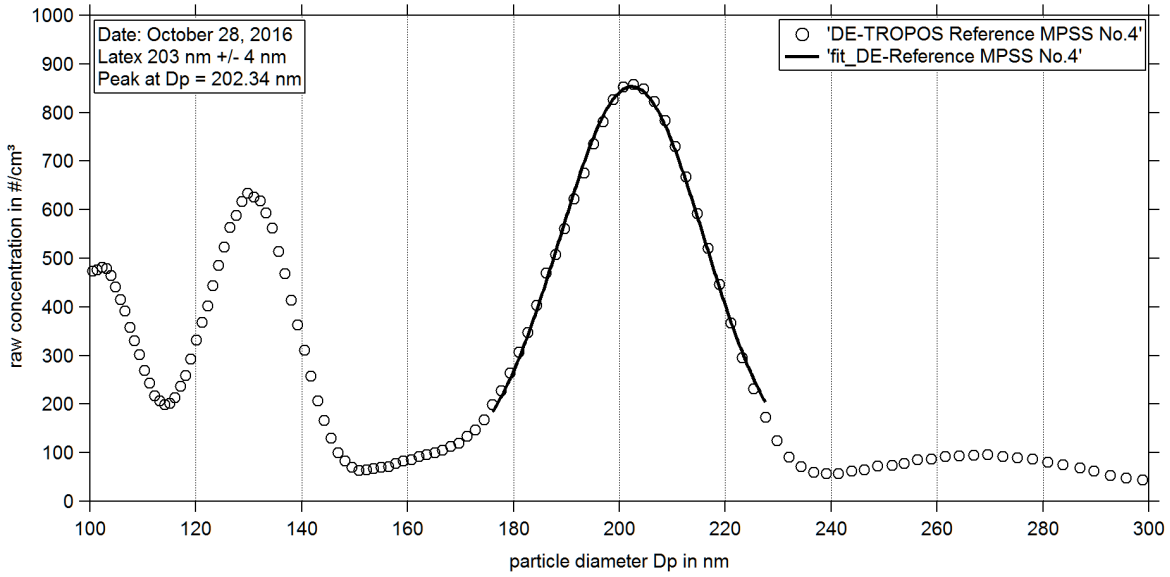

Figure 01: Measurement of latex 203 nm: Particle size distribution (raw concentration) for latex 203 nm on October 28th, 2016.

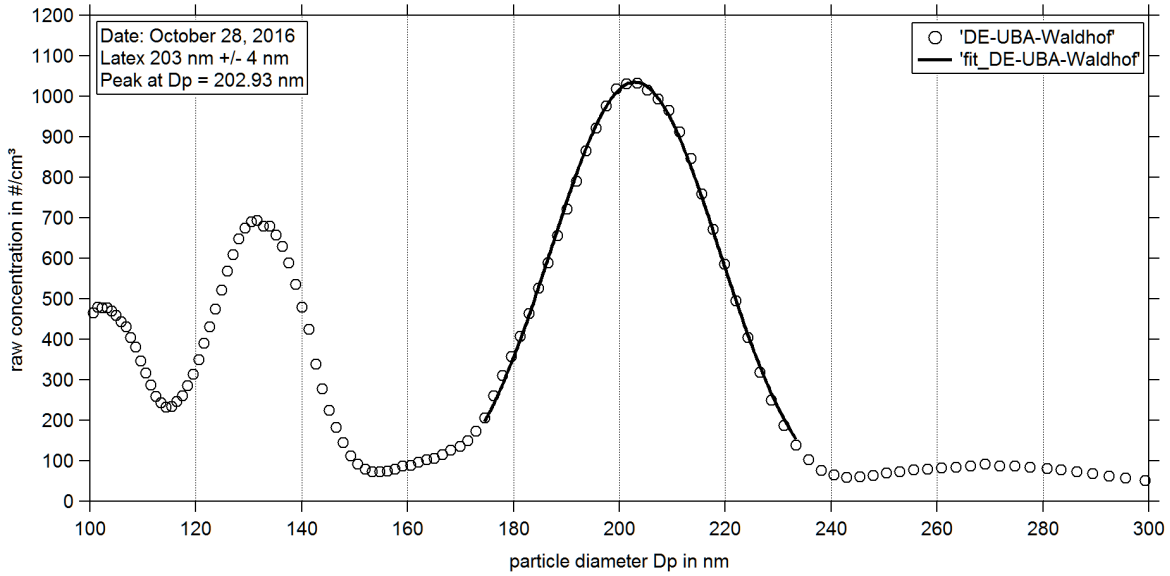

Figure 02: Measurement of latex 203 nm: Particle size distribution (raw concentration) for latex 203 nm on October 28th, 2016.

Status of the Candidate: Particle Number Size Distribution

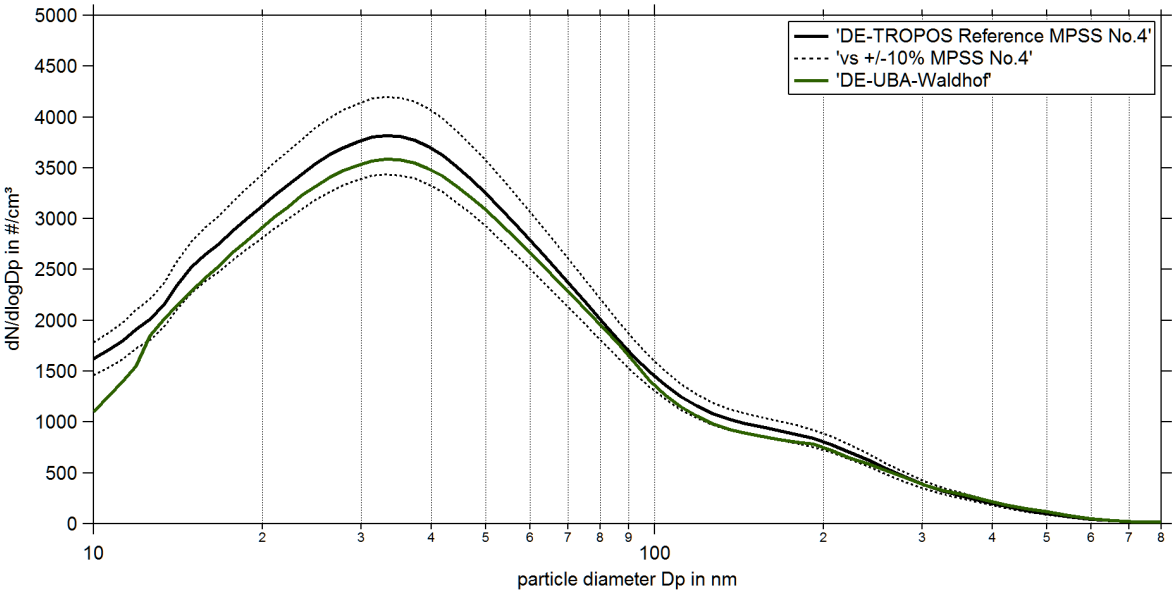

Figure 03: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.4 against DE-UBA-Waldhof from October 28, 2016 06:00 PM until November 04, 2016 06:00 AM. Multiple charge correction, internal diffusion losses and CPC efficiency are included for both of the TROPOS Reference MPSS.

Status of the Candidate: Time Series

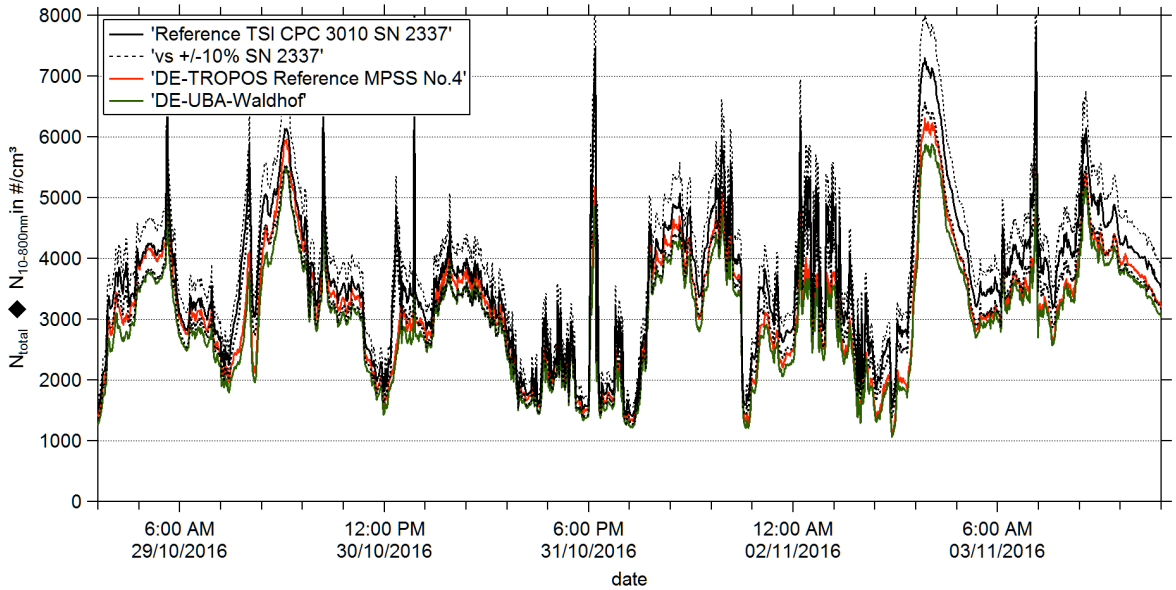

Figure 04: Time series (October 28, 2016 06:00 PM until November 04, 2016 06:00 AM) of the integrated particle number concentration (N10-800nm) of the MPSS and total number concentration (Ntotal) of the reference TSI-CPC Model 3010. The inversion was performed using TROPOS software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

Status of the Candidate: Correlation

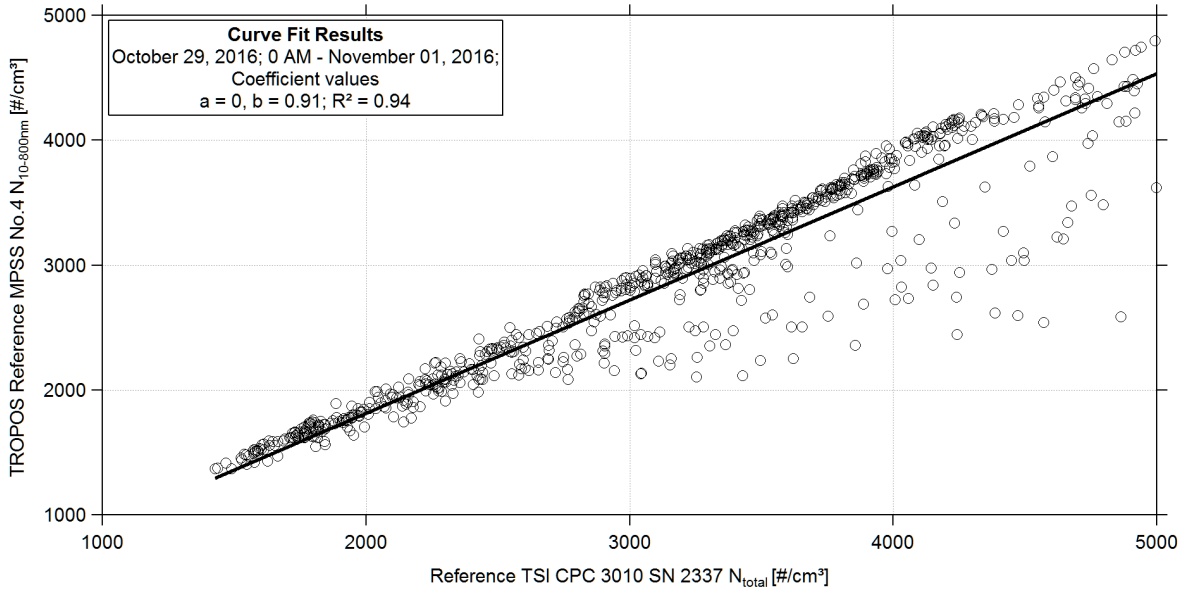

Figure 05: Linear regression between the number concentrations of the TROPOS Reference TSI CPC Model 3010 SN: 2337 and TROPOS Reference MPSS No.4. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

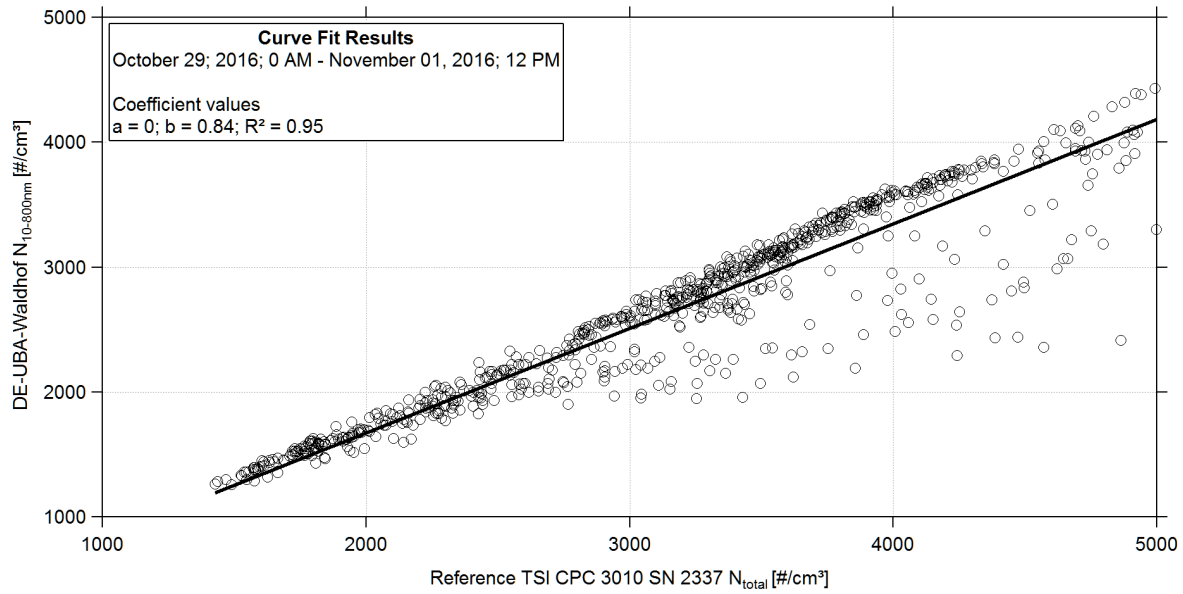

Figure 06: Linear regression between the number concentrations of the TROPOS Reference TSI CPC Model 3010 SN: 2337 and DE-UBA-Waldhof. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

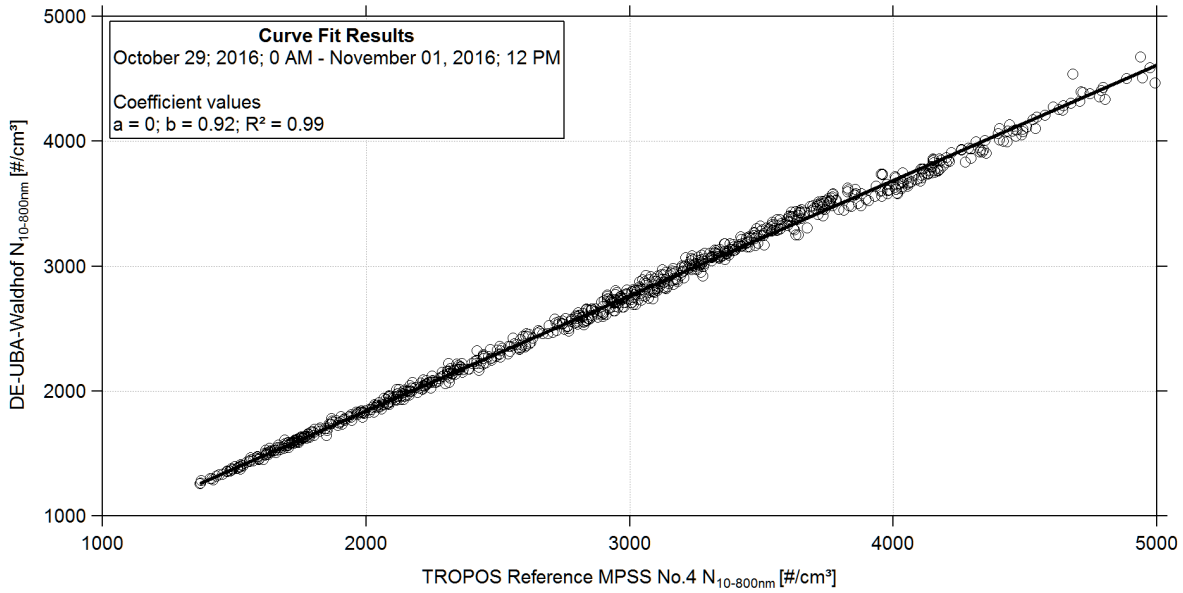

Figure 07: Linear regression between the number concentrations of the TROPOS Reference MPSS No.4 and DE-UBA-Waldhof. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.