

Intercomparison of Mobility Particle Size Spectrometers

<i>Project No.:</i>	<i>MPSS-2022-4-3</i>
<i>Participant:</i>	<i>TROPOS MPSS – UBA Waldhof</i>
<i>Software TROPOS:</i>	<i>V7.0</i>
<i>Classifier Model:</i>	<i>TROPOS</i>
<i>Classifier HV Power Supply:</i>	<i>Positive</i>
<i>Neutralizer Model:</i>	<i>Kr85</i>
<i>Impactor Model:</i>	<i>none</i>
<i>DMA Model:</i>	<i>TROPOS</i>
<i>Detector Model:</i>	<i>TSI 3772</i>
<i>Detector Model SN:</i>	<i>3772164503</i>
<i>Detector Model Dp50:</i>	<i>10nm</i>
<i>Manuf. Date CPC:</i>	<i>-</i>
<i>Firmware:</i>	<i>-</i>
<i>Location of the quality assurance:</i>	<i>TROPOS Leipzig, WCCAP</i>
<i>Comparison period:</i>	<i>May 02, 2022 – May 06, 2022</i>

Summary of Intercomparison:

The TROPOS MPSS UBA Waldhof participated in the WCCAP workshop in May 2022. The candidate showed a PSL peak at 202.44 nm. The candidate used the TSI CPC model 3772.

<i>Date of arrival of instrument in calibration lab:</i>	<i>May 02, 2022</i>
<i>Instrument:</i>	<i>Size Spectrometer TROPOS</i>
<i>Model and serial number of instrument:</i>	<i>TROPOS MPSS</i>
<i>Result of physical inspection:</i>	<i>no damages</i>
<i>Result of functional test:</i>	<i>functional test successful, no problems</i>
<i>Internal parameters of instrument:</i>	<i>nominal flow rate 1.0 l/min</i>
<i>Model and identification number of TROPOS Reference MPSS:</i>	<i>TROPOS MPSS (positive HV)</i>
<i>Date of calibration:</i>	<i>May 02-06, 2022</i>
<i>Lab temperature and pressure:</i>	<i>22.0°C, 1003 mbar</i>
<i>Measured aerosol flow rate of CPC:</i>	<i>0.96 l/min</i>
<i>Uncertainty in measured flow rate:</i>	<i>3%</i>
<i>Flowmeter used:</i>	<i>Gilian Gilibrator 3; Basis: 21181001005, cell:21191010004,20491011010, 21191012002; May, 2021</i>
<i>Particles and gases used for calibration:</i>	<i>ambient aerosol</i>
<i>Zero measurement of instrument:</i>	<i>0 particles/cm³ in 10 minutes</i>

	Unit	Status
Model	-	TSI 3772
SN	-	3772164503
Firmware	-	2.16
Date	-	2022
last service date	-	-
Saturator Temperature	°C	39
Condenser Temperature	°C	23.3
Optics Temperature	°C	40
Cabinet Temperature	°C	38.6
Ambient Pressure	kPa	99.6
Vacuum Pressure	kPa	-
Inlet Pressure	kPa	-
Critical Orifice Pressure	hPa	78.0
Aerosol Nozzle Pressure	kPa	0.4
Laser Current	mA	42
Liquid Level	-	full
Aerosol Flow (Gili)	l/min	0.96
Internal Aerosol Flow	l/min	-
Zero	avg 10 min	0

PSL Scan: Latex 203 nm +/- 4 nm

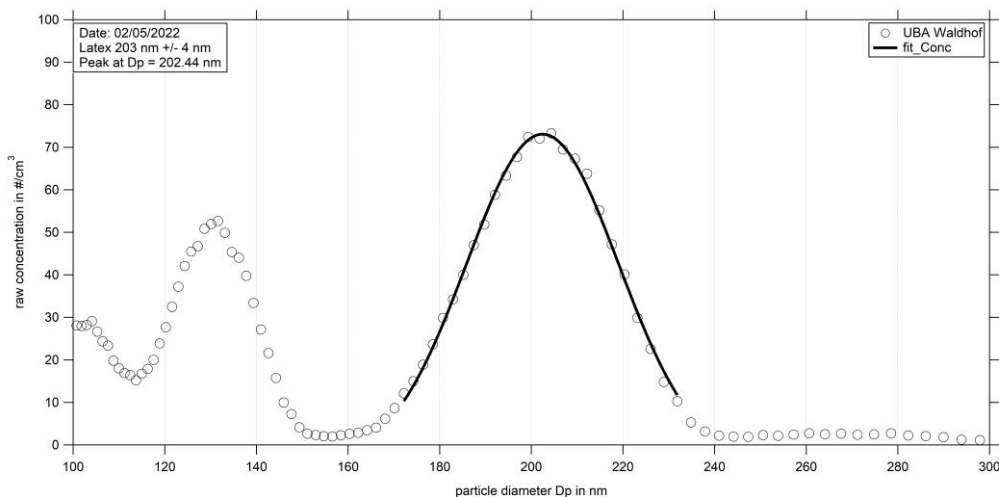


Figure 01: Measurement of latex 203 nm – TROPOS MPSS: Particle size distribution of latex 203 nm on May 02th, 2022. The peak shows at 202.44nm.

Intercomparison between TROPOS Reference MPSS and MPSS Waldhof

03.05.2022 06:00 PM – 04.05.2022 06:00 PM

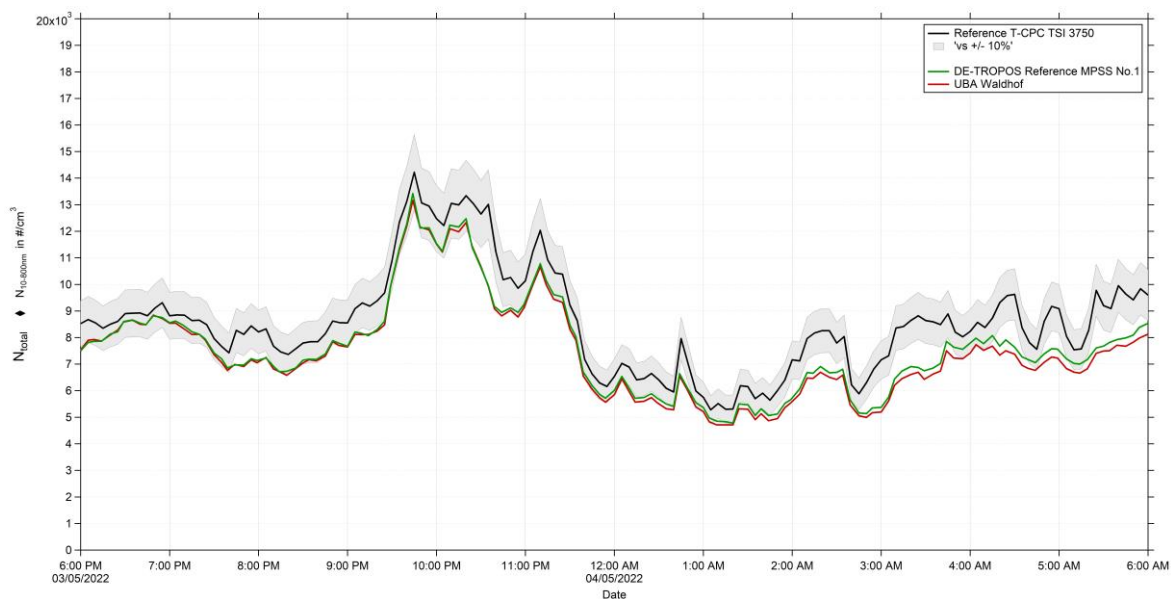


Figure 02: Time series (May 03, 2022 06 PM – May 04, 2022 06 AM) of the integrated particle number concentration ($N_{10-800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3750. Multiple charge correction, internal diffusion losses, CPC flow corrections.

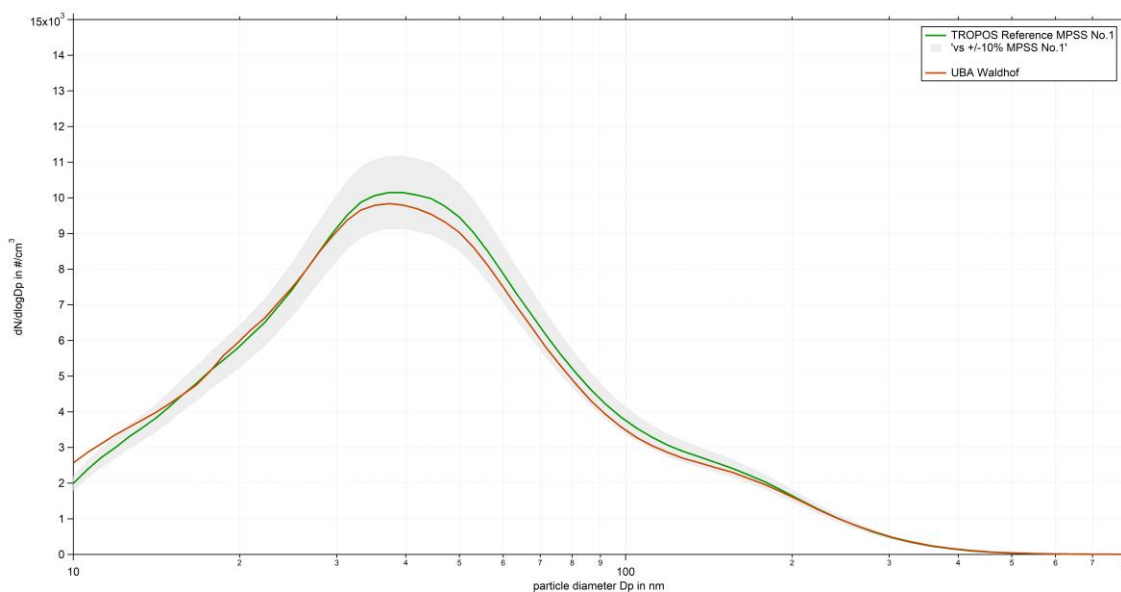


Figure 03: Particle size distribution for TROPOS Reference MPSS and MPSS Waldhof, flow corrections, multiple charge correction and diffusion loss corrections are included.

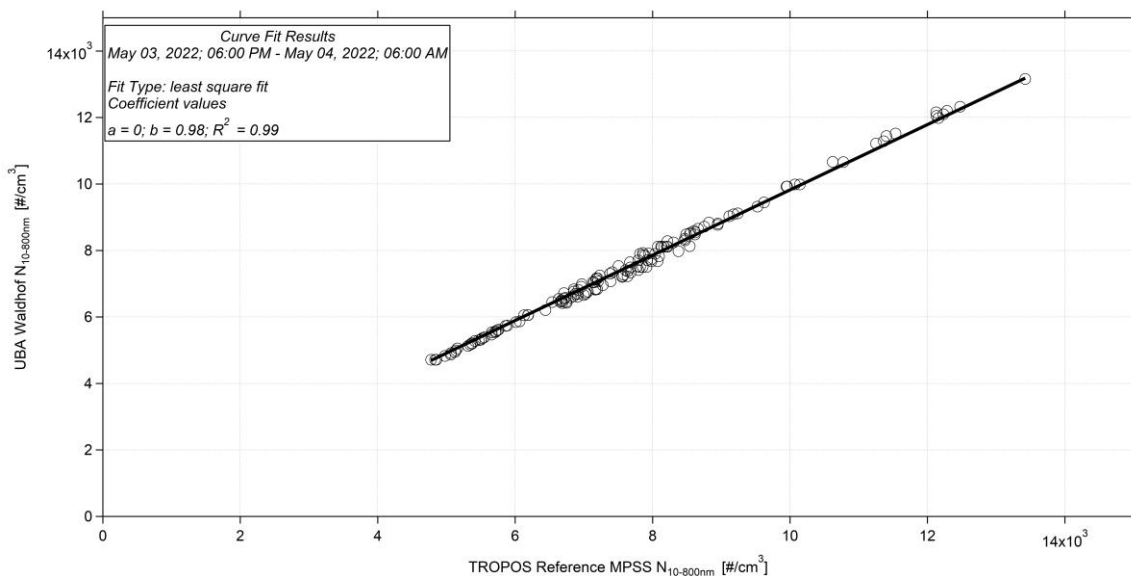


Figure 04: Linear regression between TROPOS Reference MPSS and MPSS Waldhof.

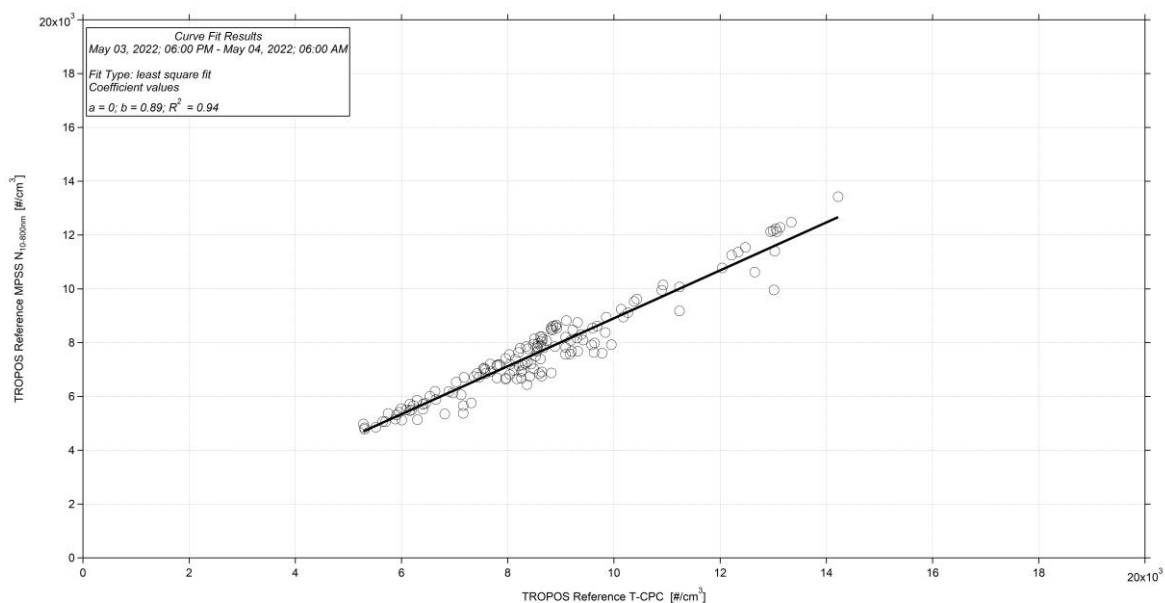


Figure 05: Linear regression between TROPOS Reference T-CPC and TROPOS Reference MPSS.

Date of issue: May, 2022

Reviewed: TROPOS / WCCAP