Intercomparison of Mobility Particle Size Spectrometers

Project No.:	*MPSS-2022-4-5*
Participant:	*TROPOS MPSS* – DWD Hohenpeißenberg
Software TROPOS:	*V7.0*
Classifier Model:	*TROPOS*
Classifier HV Power Supply:	*Positive*
Neutralizer Model:	*Kr85*
Impactor Model:	*none*
DMA Model:	*TROPOS*
Detector Model:	*TSI 3772*
Detector Model SN:	*70711210*
Detector Model Dp50:	*10nm*
Manuf. Date CPC:	*March 2007*
Firmware:	*2.16*
Location of the quality assurance:	TROPOS Leipzig, WCCAP
Comparison period:	May 02, 2022 – May 06, 2022

Summary of Intercomparison:

The TROPOS MPSS DWD Hohenpeißenberg participated in the WCCAP workshop in May 2022. The candidate showed a PSL peak at 203.8 nm. The candidate used the TSI CPC model 3772.

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Date of arrival of instrument in calibration lab:	*May 02, 2022*
Instrument:	*Size Spectrometer TROPOS*
Model and serial number of instrument:	*TROPOS MPSS*
Result of physical inspection:	*no damages*
Result of functional test:	*functional test successful, no problems*
Internal parameters of instrument:	*nominal flow rate 1.0 l/min*
Model and identification number of	
TROPOS Reference MPSS:	*TROPOS MPSS (positive HV)*
Date of calibration:	*May 02-06, 2022*
Lab temperature and pressure:	*22.0°C, 1003 mbar*
Measured aerosol flow rate of CPC:	*0.99 l/min*
Uncertainty in measured flow rate:	*3%*
Flowmeter used:	*Gilian Gilibrator 3; Basis: 21181001005, cell:21191010004,20491011010, 21191012002; May, 2021*
Particles and gases used for calibration:	*ambient aerosol*
Zero measurement of instrument:	*0 particles/cm³ in 10 minutes*

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	Unit	Status
Model	-	TSI 3772
SN	-	70711210
Firmware	-	2.16
Date	-	2022
last service date	-	-
Saturator Temperature	°C	39
Condenser Temperature	°C	23.5
Optics Temperature	°C	40
Cabinet Temperature	°C	34.0
Ambient Pressure	kPa	99.7
Vaccuum Pressure	kPa	-
Inlet Pressure	kPa	-
Critical Orifice Pressure	hPa	76.8
Aerosol Nozzle Pressure	kPa	2.7
Laser Current	mA	54
Liquid Level	-	full
Aerosol Flow (Gili)	l/min	0.99
Internal Aerosol Flow	l/min	-
Zero	avg 10 min	0

PSL Scan: Latex 203 nm +/- 4 nm

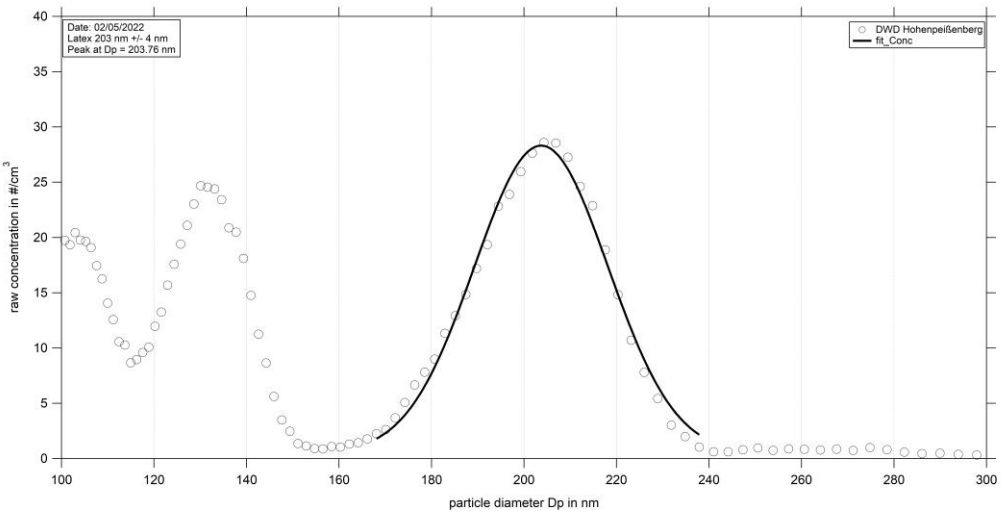

Figure 01: Measurement of latex 203 nm – TROPOS MPSS: Particle size distribution of latex 203 nm on May 02th, 2022. The peak shows at 203.9nm.

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Intercomparison between TROPOS Reference MPSS and MPSS

03.05.2022 06:00 PM – 04.05.2022 06:00 PM

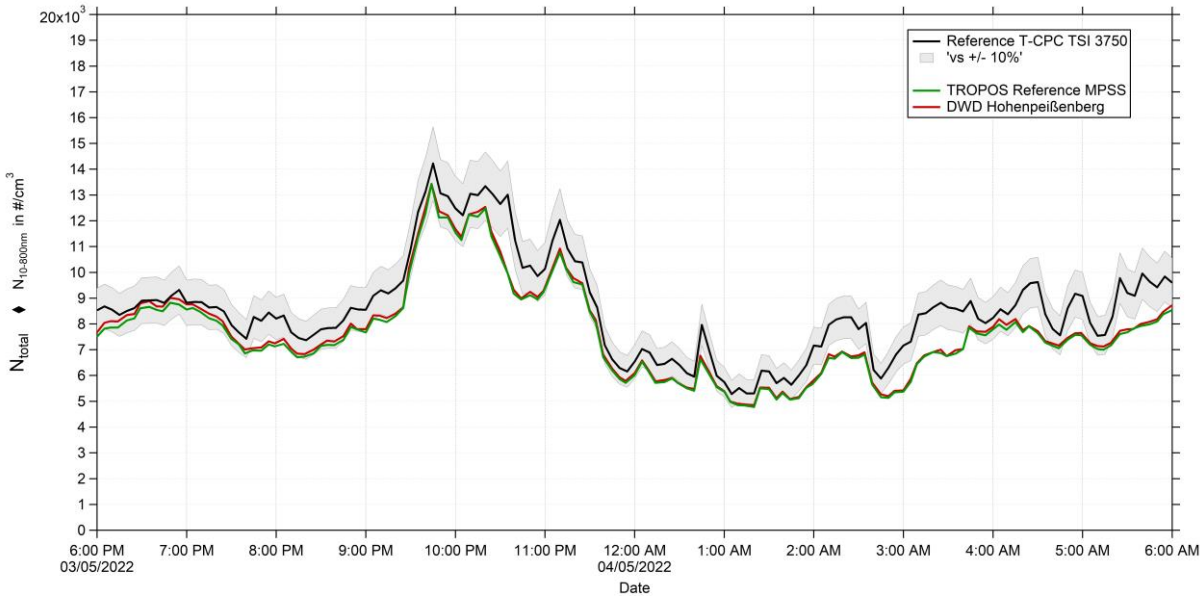

Figure 02: Time series (May 03, 2022 06 PM – May 04, 2022 06 AM) of the integrated particle number concentration ($N_{10\text{-}800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3750. Multiple charge correction, internal diffusion losses, CPC flow corrections.

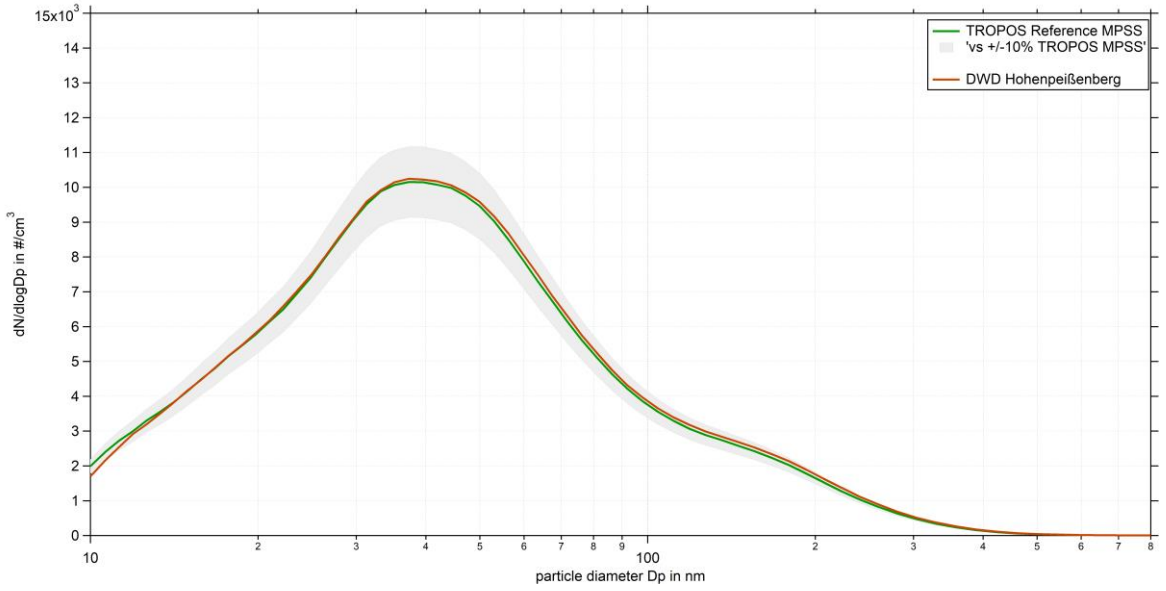

Figure 03: Particle size distribution for TROPOS Reference MPSS and MPSS Hohenpeißenberg, flow corrections, multiple charge correction and diffusion loss corrections are included.

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Mitglied der Leibniz-Gemeinschaft

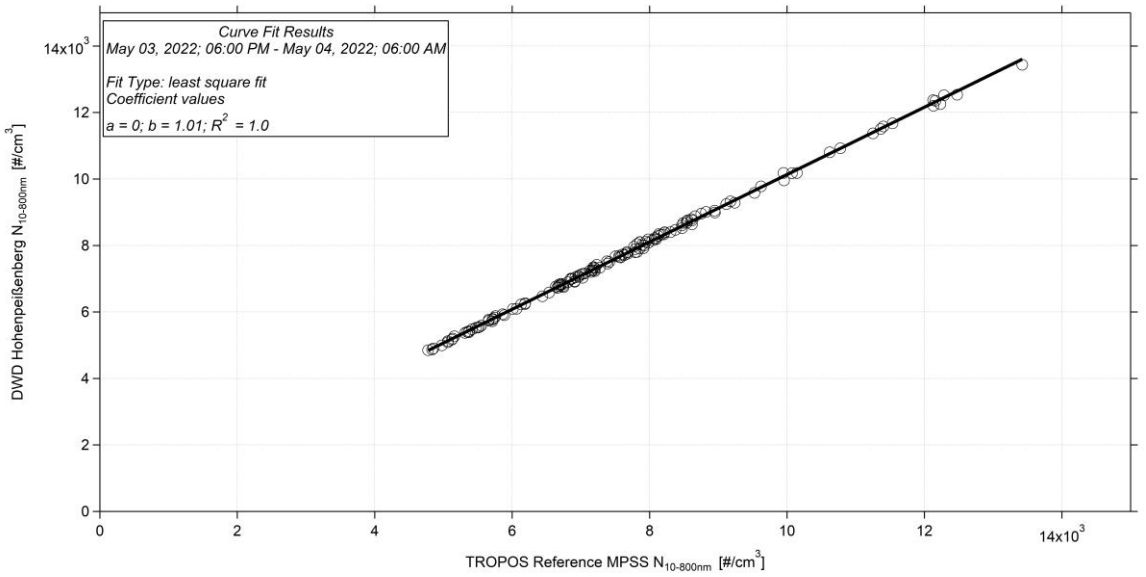

Figure 04: Linear regression between TROPOS Reference MPSS and MPSS Hohenpeißenberg.

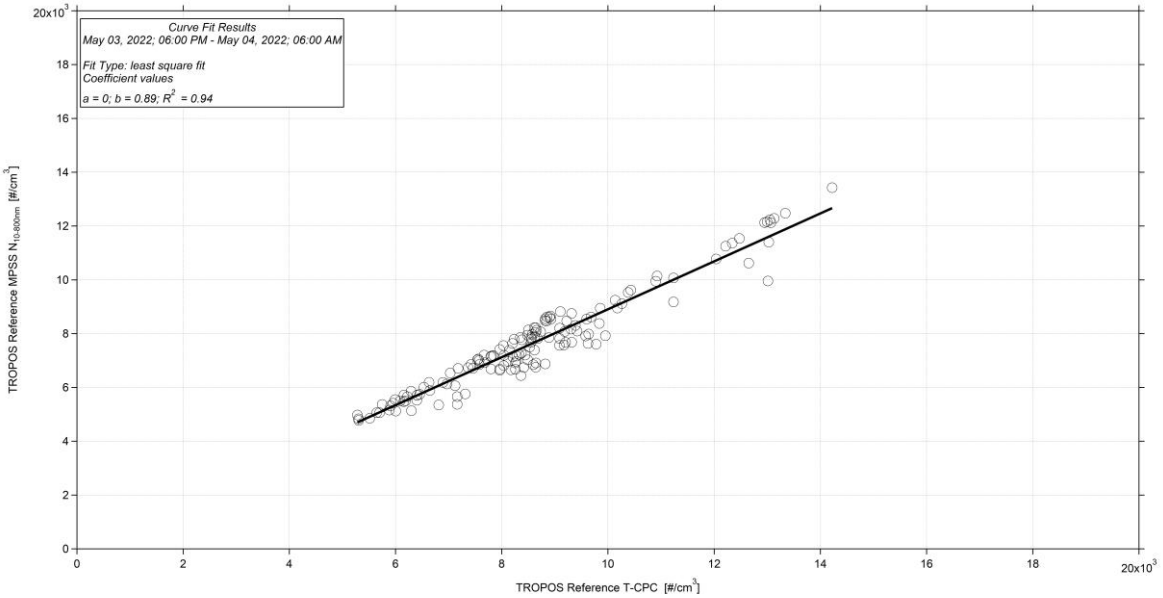

Figure 05: Linear regression between TROPOS Reference T-CPC and TROPOS Reference MPSS.

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Reviewed: TROPOS / WCCAP

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