Intercomparison of Mobility Particle Size Spectrometers

Project No.:	*OSIA-2018-1-14*
Principal Investigator:	Uta Wolf-Benning
Home Institution:	Flughafen Berlin Brandenburg GmbH
Participant:	
Candidate:	**DE-FBB-SMPS 2**
Made by:	
Counter (SN):	**GRIMM 5.420 SN: 54201607**
Software:	**GRIMM**
Location of the quality assurance:	FBB, Berlin
Comparison period:	May 29, 2018 – June 11, 2018
Last Intercomparison (with Project No.):	

Leibniz-Institut für Troposphärenforschung e.V.
Telefon: +49 341 2717-7060
Telefax: +49 341 2717-99-7060
info@tropos.de
http://www.tropos.de

Summary of Intercomparison:

TROPOS Reference MPSS No.6 and TROPOS Reference TSI CPC Model 3010 Ref 6 were taken to Berlin for intercomparison with GRIMM DE-FBB-SMPS 2, which was located outside. Intercomparison with DE-FBB-SMPS 2 was carried out between June 04, 2018 11:06 – June 06, 2018 09:26.

During the intercomparison LATEX, Zero Check and H/V Test were done. The results obtained are shown below. These results were presented and discussed with the principal investigator and her team from Berlin. These results will also be further discussed by the Berlin team with the GRIMM company for further analysis and explanation.

Information about the instruments:

Date of check: June 01, 2018

List of Components	TROPOS Reference MPSS No.6	Candidate
Position	Outside	Outside
Company	TROPOS	GRIMM
Software	TROPOS V6.68	GRIMM
CPC-MPSS	TSI CPC, Model 3772	GRIMM 5.420
CPC-total	TSI CPC, Model 3010	-
flow ratio	1.0 : 5.0	0.3 : 3.0
source	Ni.63	Ni.63
HV power supply	Positive	Positive
DMA	Hauke medium	GRIMM
aerosol dryer	✓	✓
aerosol RH- sensor	✓	✓
aerosol T-sensor	✓	✓
sheath RH-sensor	✓	✓
sheath T-sensor	✓	✓
Sheath dryer	✓	✓
pressure sensor	✓	✓
info		

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Commerzbank Leipzig
KTO 102 14 50
BLZ 860 400 00
IBAN: DE77 8604 0000 0102 1450 00
SWIFT CODE: COBADEFF 860

Status of the instruments:

Date of system checks:

date	01.06.2018	unit
total CPC flow	-	l/min
aerosol flow (DMA)	0.998	l/min
aerosol flow (UDMA)	-	l/min
aerosol flow (total)	0.998	l/min
Zero MPSS	0	#/cm³
Zero total CPC	-	#/cm³
PSL 203 nm	208.65	nm

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

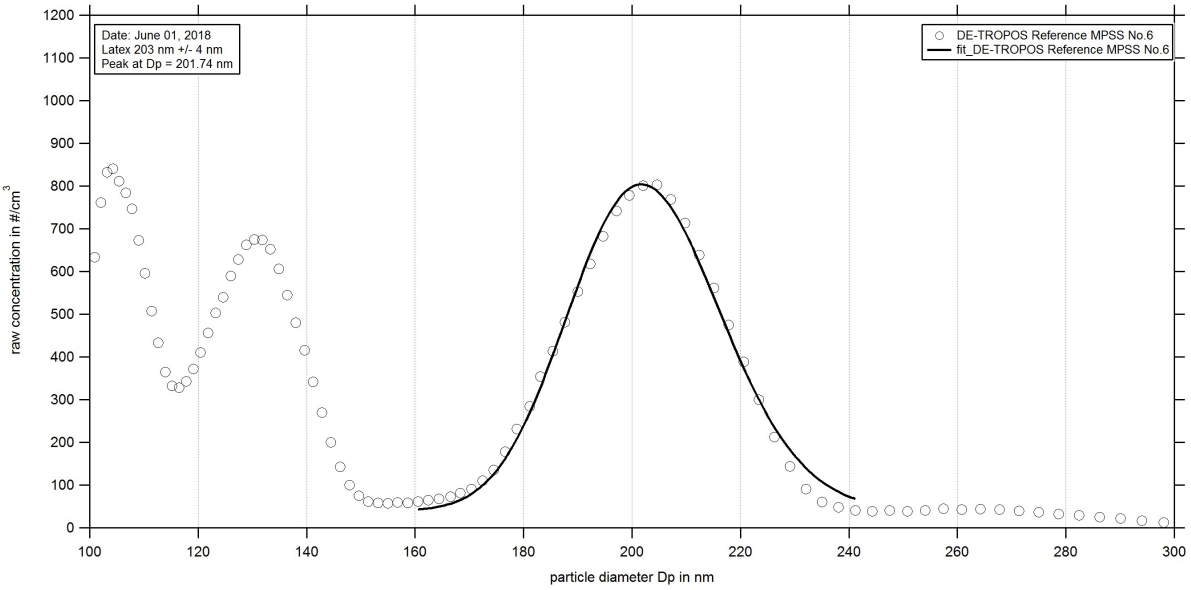

Figure 01: Measurement of latex 203 nm: Particle size distribution (raw concentration) for latex 203 nm on June 01st, 2018.

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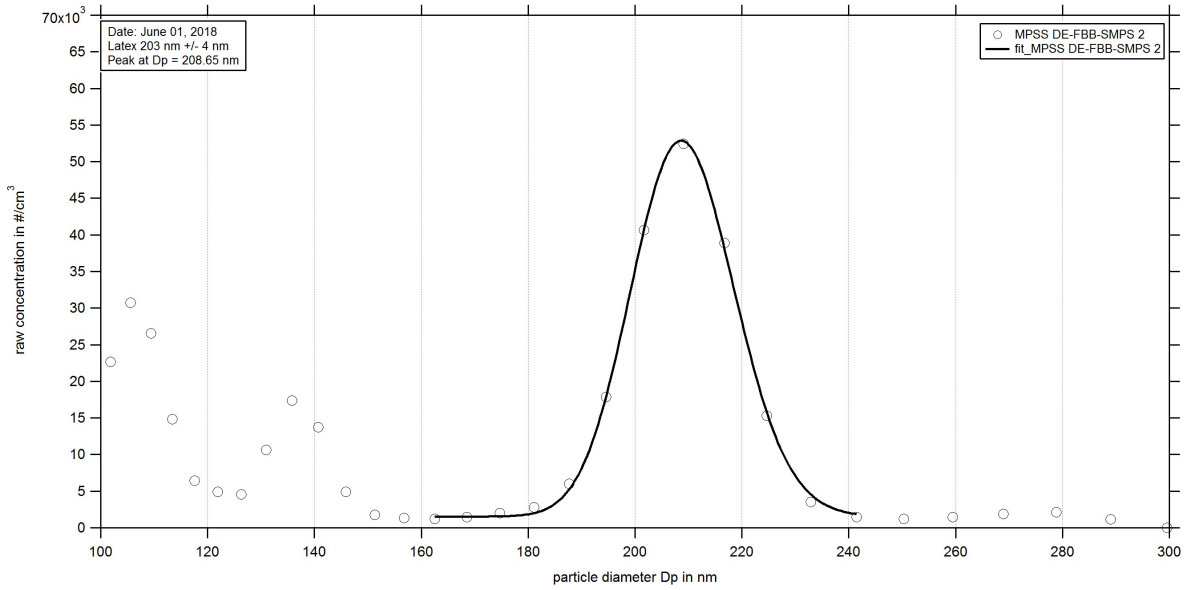

Figure 02: Measurement of latex 203 nm: Particle size distribution (raw concentration) for latex 203 nm on June 01st, 2018.

Status of the Candidate: Particle Number Size Distribution

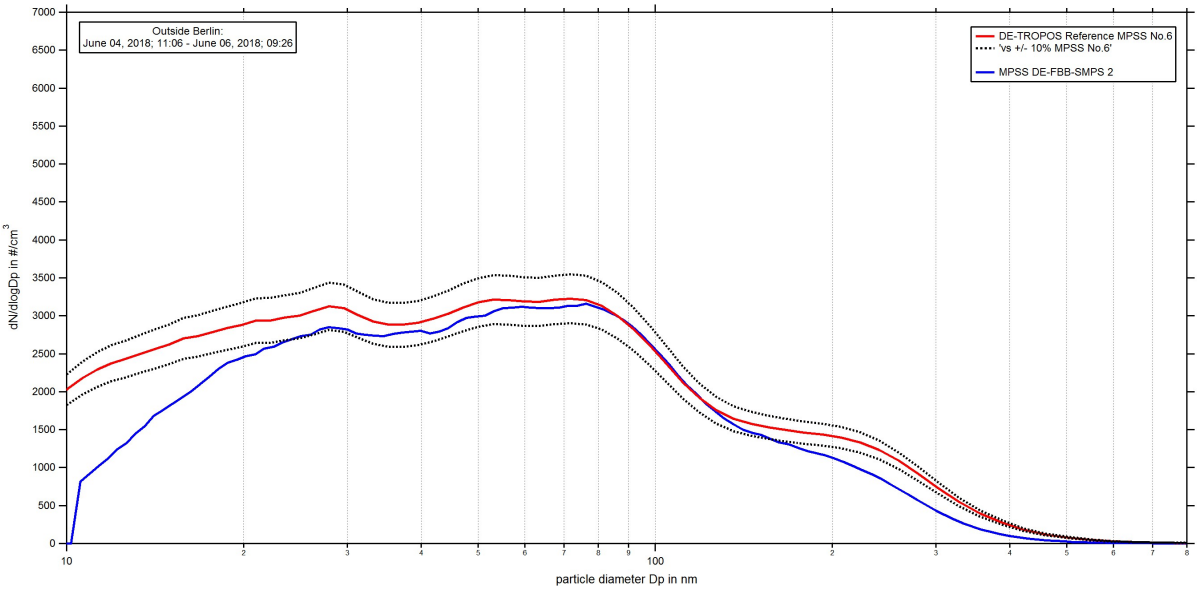

Figure 03: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.6 against MPSS DE-FBB-SMPS 2 from June 04, 2018 11:06 – June 06, 2018 09:26. Multiple charge correction, internal diffusion losses and CPC efficiency are included.

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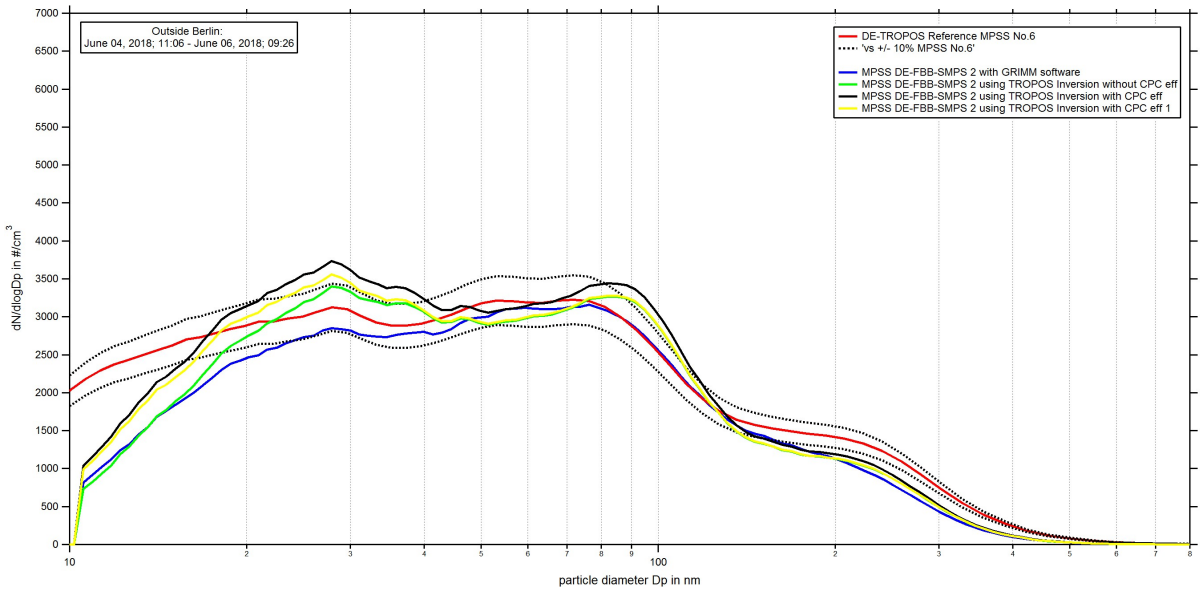

Figure 04: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.6 against MPSS DE-FBB-SMPS 2 from June 04, 2018 11:06 – June 06, 2018 09:26. The inversion and corrections for the candidate were performed using GRIMM software and also TROPOS software for comparison. Multiple charge correction, internal diffusion losses and CPC efficiency are included.

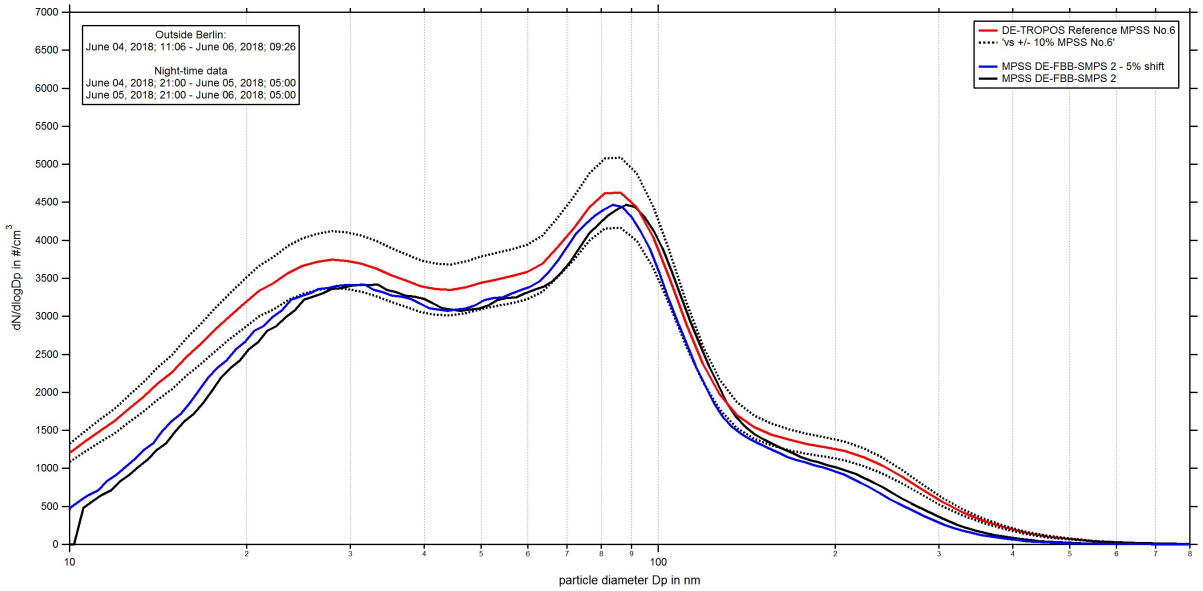

Figure 05: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.6 against MPSS DE-FBB-SMPS 2 from June 04, 2018 11:06 – June 06, 2018 09:26 (night-time data). Multiple charge correction, internal diffusion losses and CPC efficiency are included.

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Status of the Candidate: Time Series and Correlation

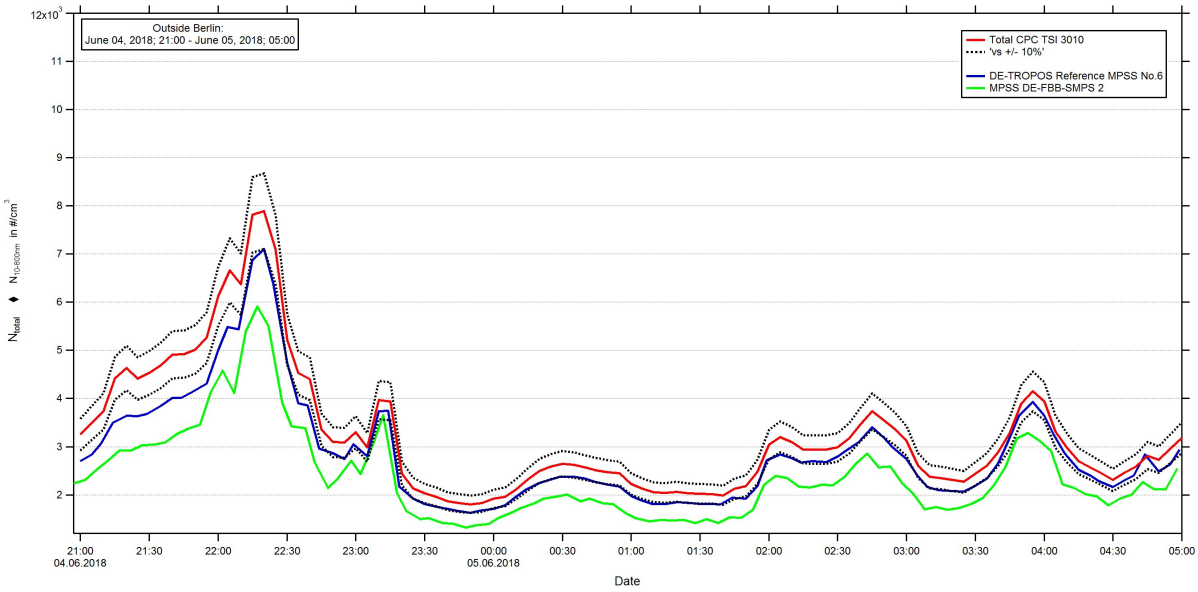

Figure 06: Time series (June 04, 2018 21:00 – June 05, 2018 05:00) of the integrated particle number concentration ($N_{10\text{-}800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. The inversion and corrections for the candidate were performed using GRIMM software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

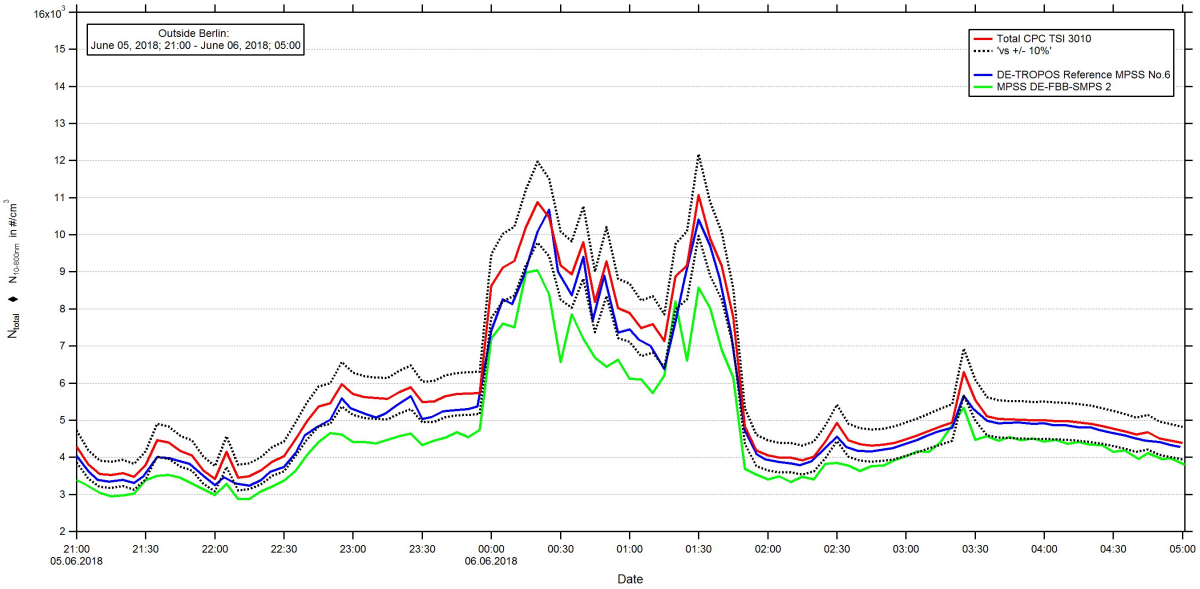

Figure 07: Time series (June 05, 2018 21:00 – June 06, 2018 05:00) of the integrated particle number concentration ($N_{10\text{-}800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. The inversion and corrections for the candidate were performed using GRIMM software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

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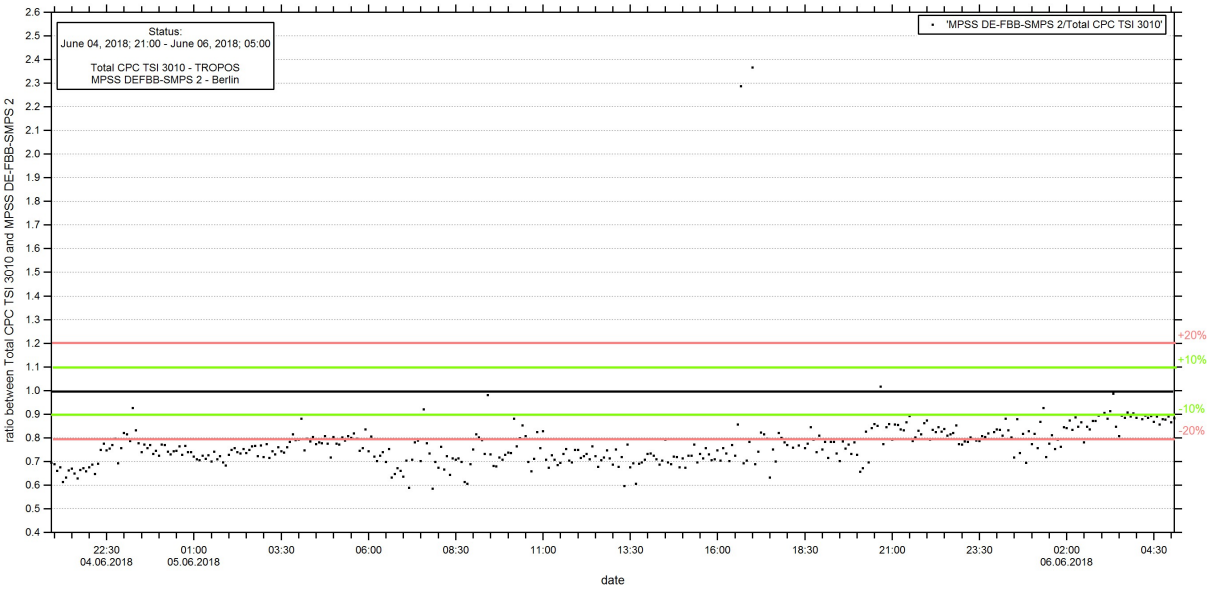

Figure 08: Ratio between TSI CPC 3010 and MPSS DE-FBB-SMPS 2 during the intercomparison from June 04, 2018 21:00 – June 06, 2018 05:00. The ratio can vary between +/- 20% depending on the peak of the concentration maximum in the nucleation- or aitken mode.

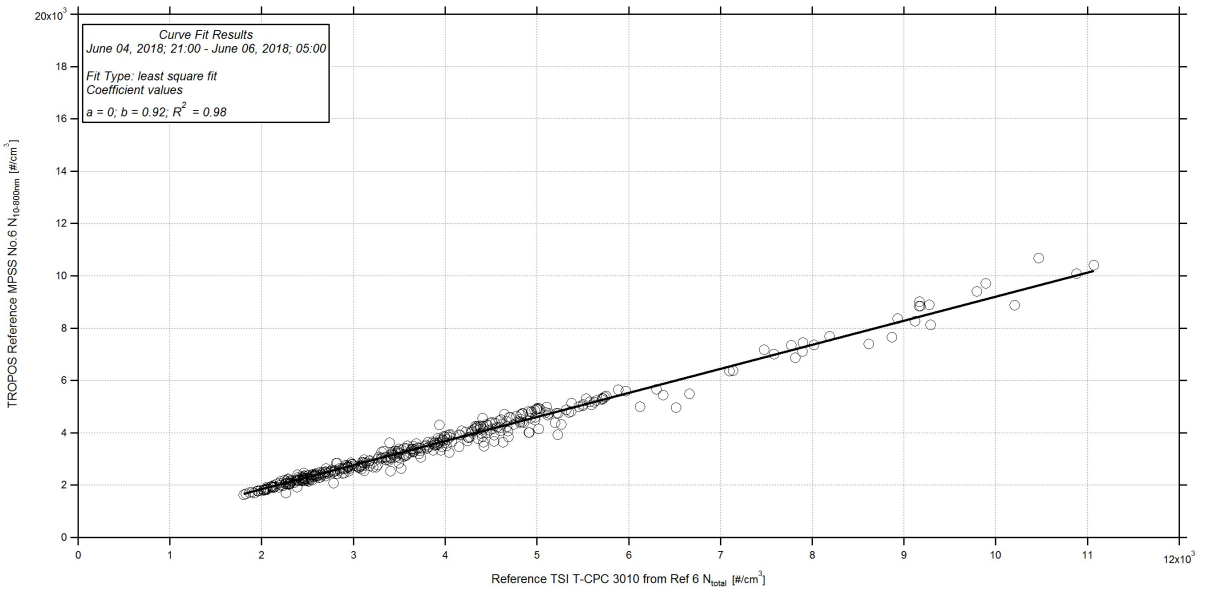

Figure 09: Linear regression between the number concentrations of the TROPOS Reference TSI CPC Model 3010 Ref 6 and the TROPOS Reference MPSS No.6. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

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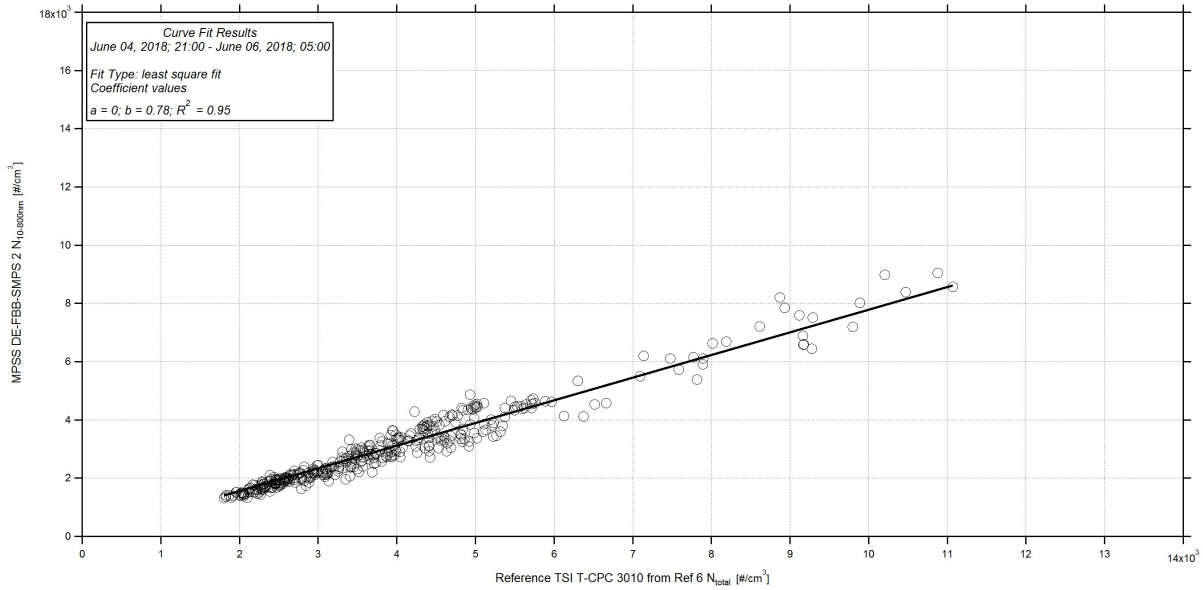

Figure 10: Linear regression between the number concentrations of the the TROPOS Reference TSI CPC Model 3010 Ref 6 and MPSS DE-FBB-SMPS 2. The inversion and corrections for the candidate were performed using GRIMM software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

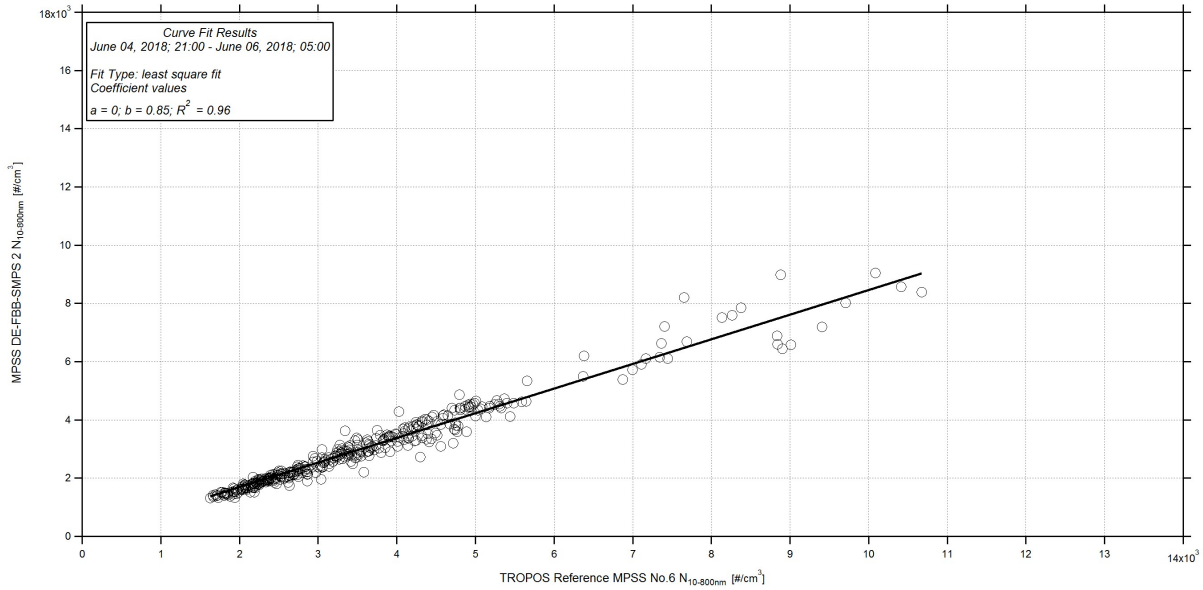

Figure 11: Linear regression between the number concentrations of the TROPOS Reference MPSS No.6 and MPSS DE-FBB-SMPS 2. The inversion and corrections for the candidate were performed using GRIMM software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

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