

Intercomparison of Mobility Particle Size Spectrometers

Project No.: OSIA-2018-1-13

Principal Investigator: Uta Wolf-Benning

Home Institution: Flughafen Berlin Brandenburg GmbH

Participant:

Candidate: **DE-FBB-SMPS 1**

Made by:

Counter (SN): **GRIMM 5.420 SN: 54201608**

Software: **GRIMM**

Location of the quality assurance: FBB, Berlin

Comparison period: May 29, 2018 – June 11, 2018

Last Intercomparison (with Project No.):

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 1, which was located inside the Airport. Intercomparison with DE-FBB-SMPS 1 was carried out between May 29, 2018 16:01 – May 31, 2018 05:00.

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.

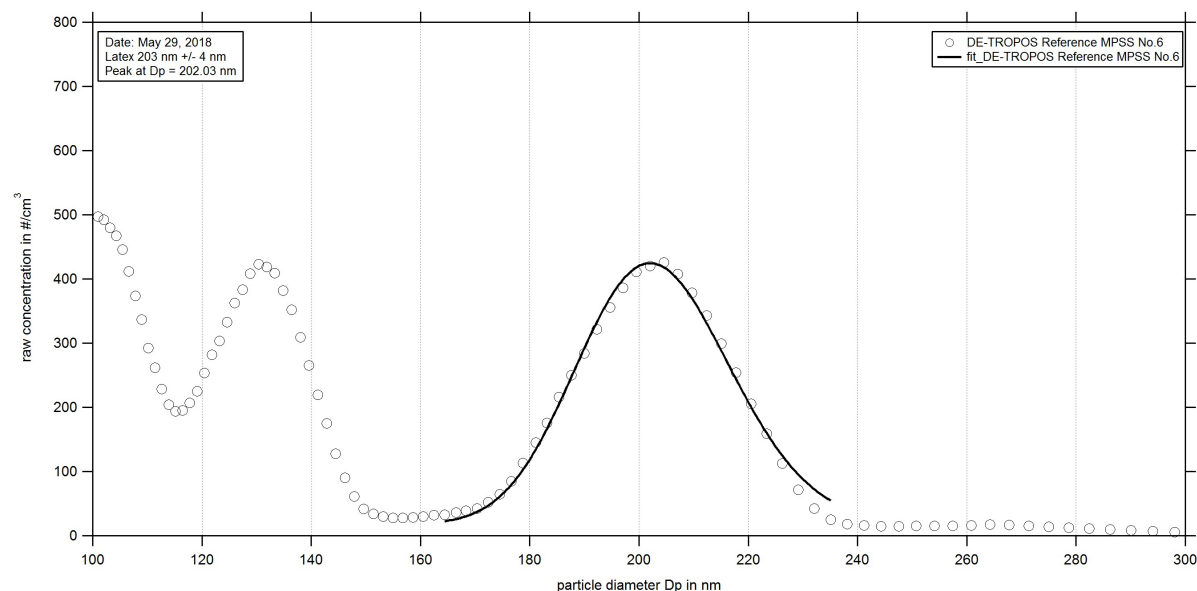
Information about the instruments:

Date of check: May 29, 2018

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

Status of the instruments:**Date of system checks:**

<i>date</i>	29.05.2018	unit
<i>total CPC flow</i>	-	l/min
<i>aerosol flow (DMA)</i>	1.075	l/min
<i>aerosol flow (UDMA)</i>	-	l/min
<i>aerosol flow (total)</i>	1.075	l/min
<i>Zero MPSS</i>	0	#/cm ³
<i>Zero total CPC</i>	-	#/cm ³
<i>PSL 203 nm</i>	211.57	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 May 29th, 2018.

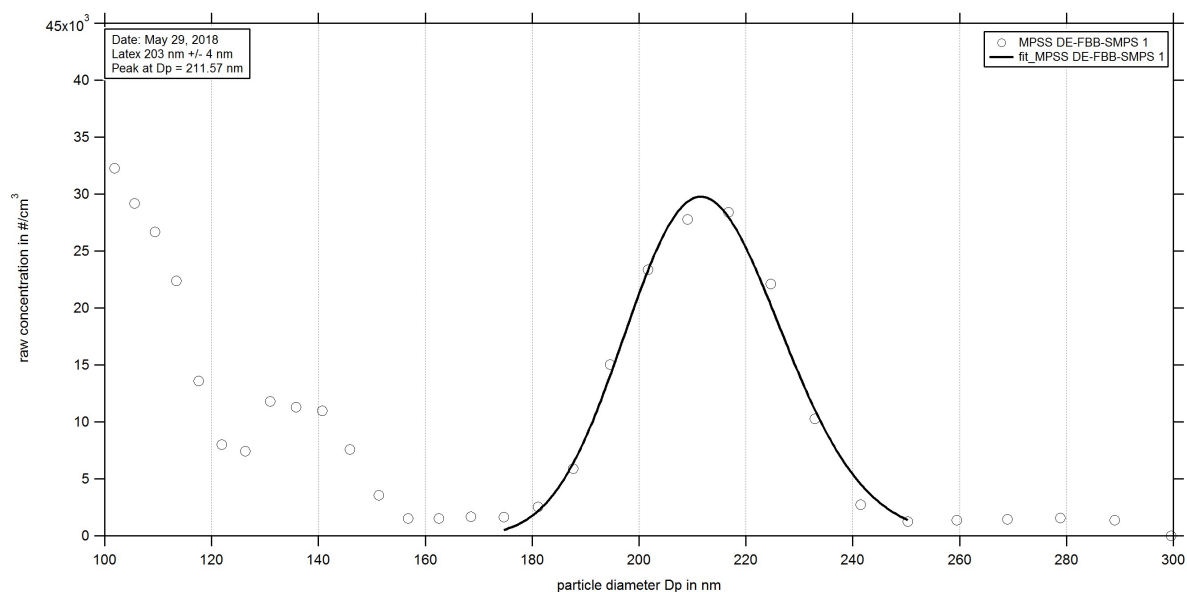


Figure 02: Measurement of latex 203 nm: Particle size distribution (raw concentration) for latex 203 nm on May 29th, 2018.

Status of the Candidate: Particle Number Size Distribution

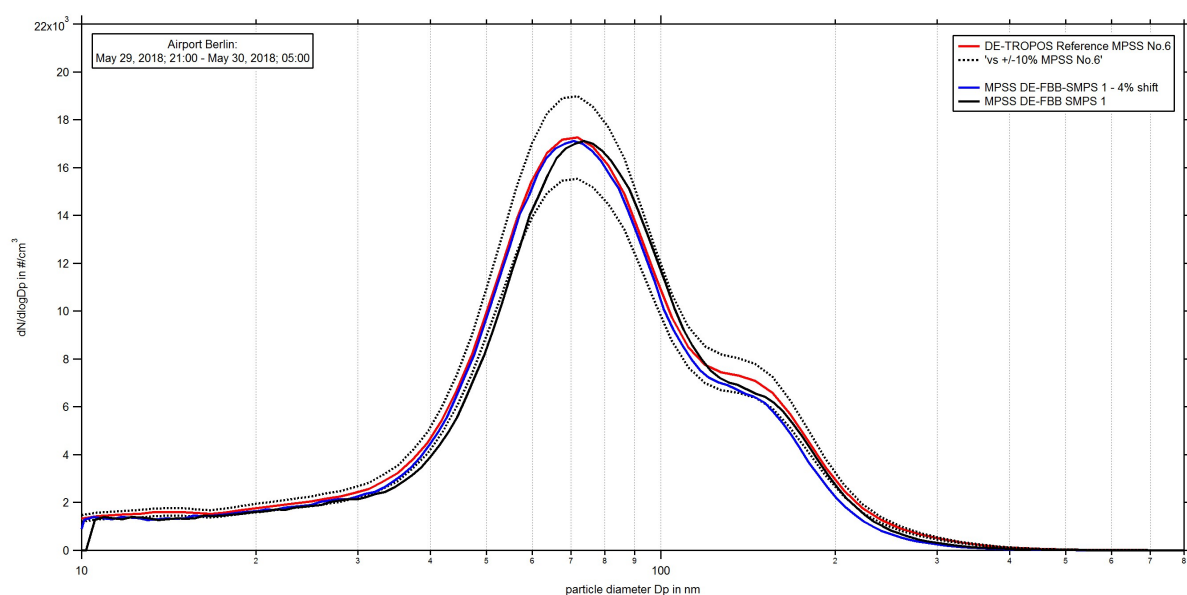


Figure 03: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.6 against MPSS DE-FBB-SMPS 1 from May 29, 2018 21:00 – May 30, 2018 05:00. Multiple charge correction, internal diffusion losses and CPC efficiency are included.

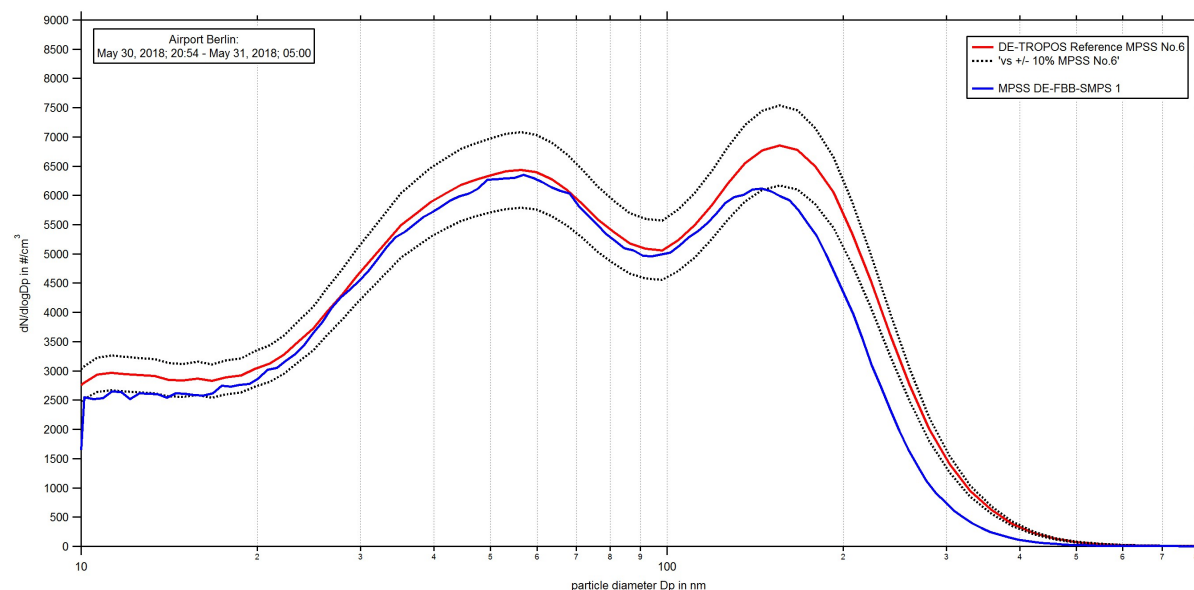


Figure 04: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.6 against MPSS DE-FBB-SMPS 1 from May 30, 2018 20:54 – May 31, 2018 05:00. Multiple charge correction, internal diffusion losses and CPC efficiency are included.

Status of the Candidate: Time Series and Correlation

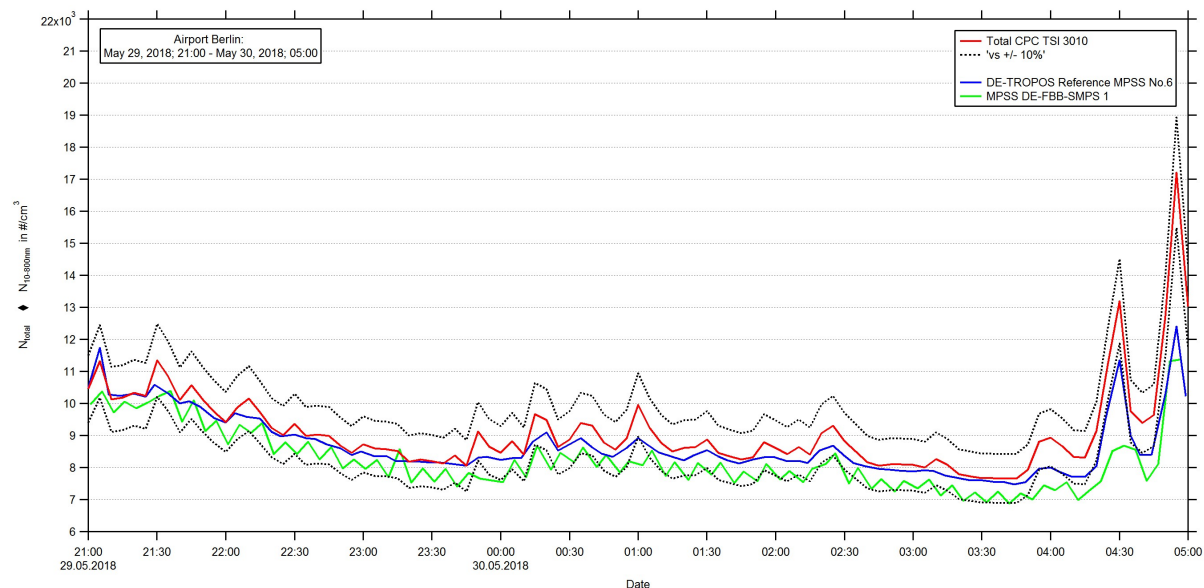


Figure 05: Time series (May 29, 2018 21:00 – May 30, 2018 05:00) of the integrated particle number concentration ($N_{10-800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. The inversion and corrections for the candidate were performed using GRIMM software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

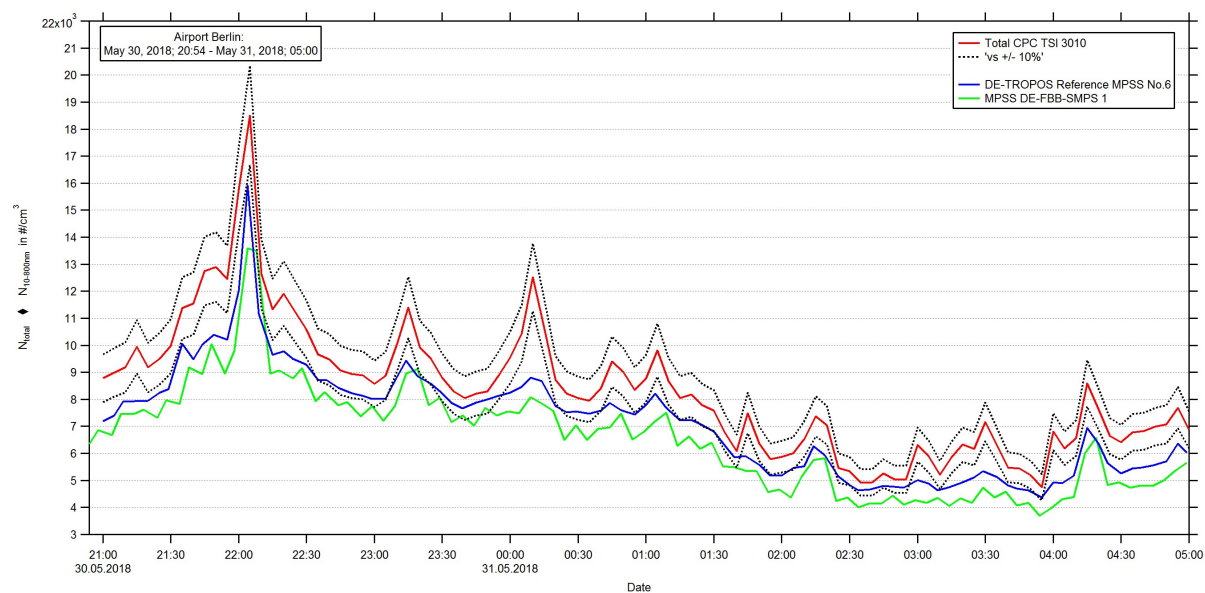


Figure 06: Time series (May 30, 2018 20:54 – May 31, 2018 05:00) of the integrated particle number concentration ($N_{10-800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. The inversion and corrections for the candidate were performed using GRIMM software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

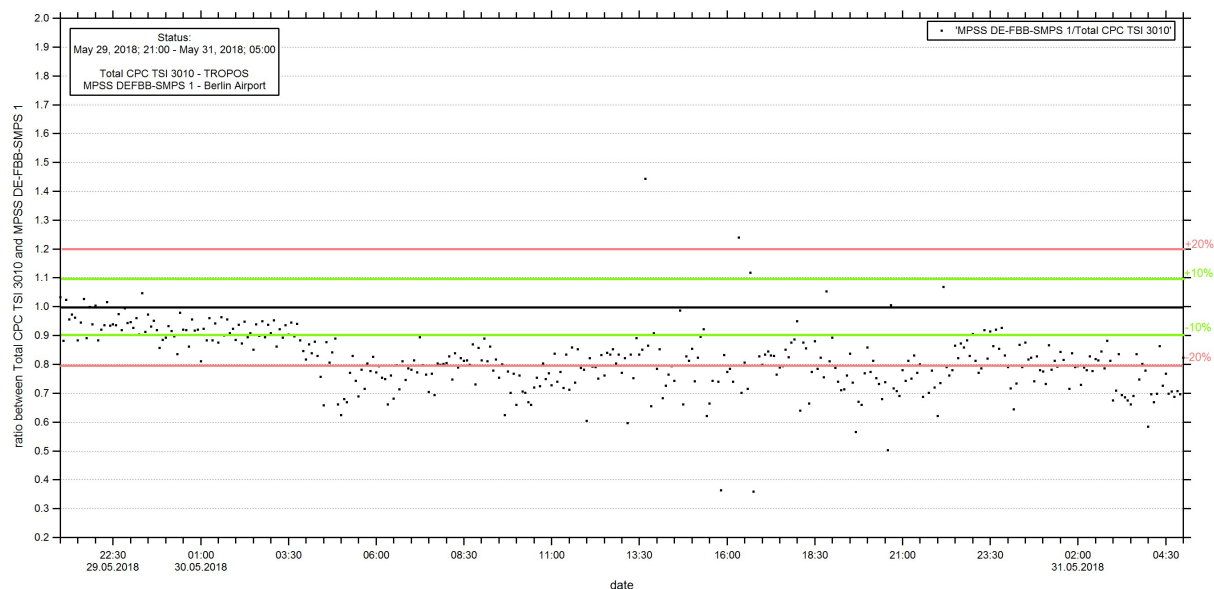


Figure 07: Ratio between TSI CPC 3010 and MPSS DE-FBB-SMPS 1 during the intercomparison from May 29, 2018 21:00 – May 31, 2018 05:00. The ratio can vary between +/- 20% depending on the peak of the concentration maximum in the nucleation- or aiten mode.

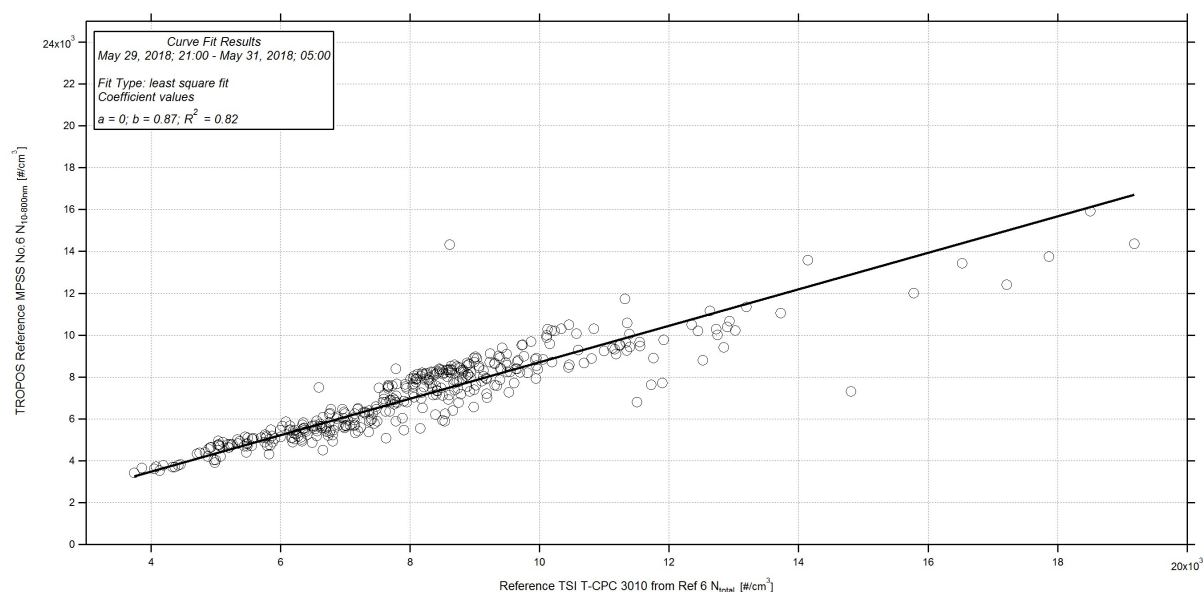


Figure 08: Linear regression between the number concentrations of the TROPOS Reference TSI CPC Model 3010 Ref 6 and TROPOS Reference MPSS No.6. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

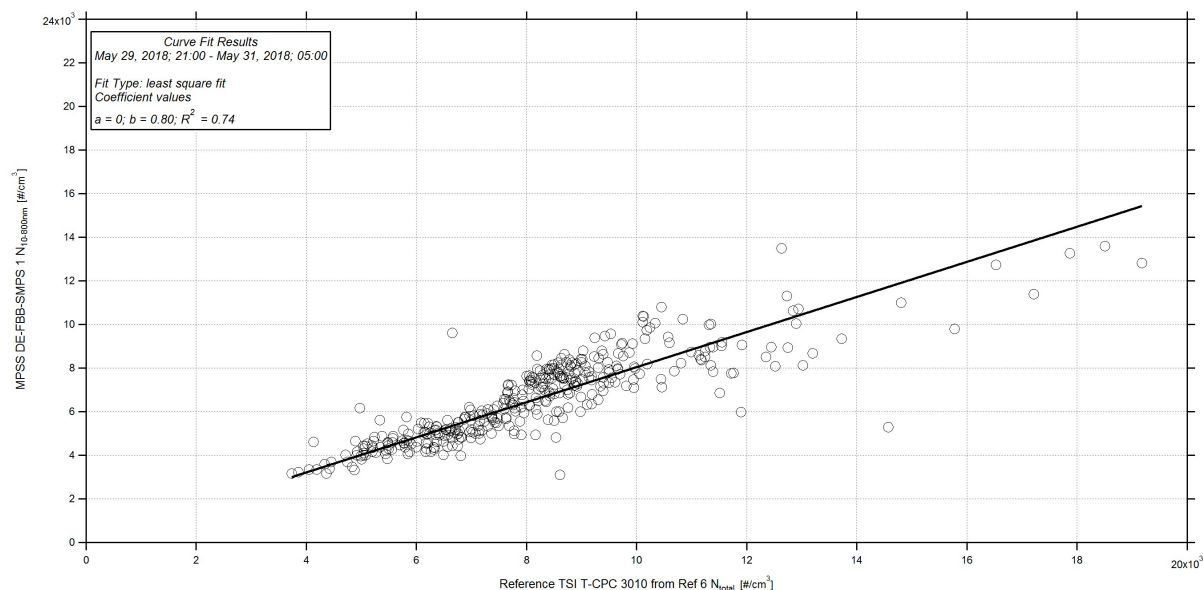


Figure 09: Linear regression between the number concentrations of the TROPOS Reference TSI CPC Model 3010 Ref 6 and MPSS DE-FBB-SMPS 1. The inversion and corrections for the candidate were performed using GRIMM software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

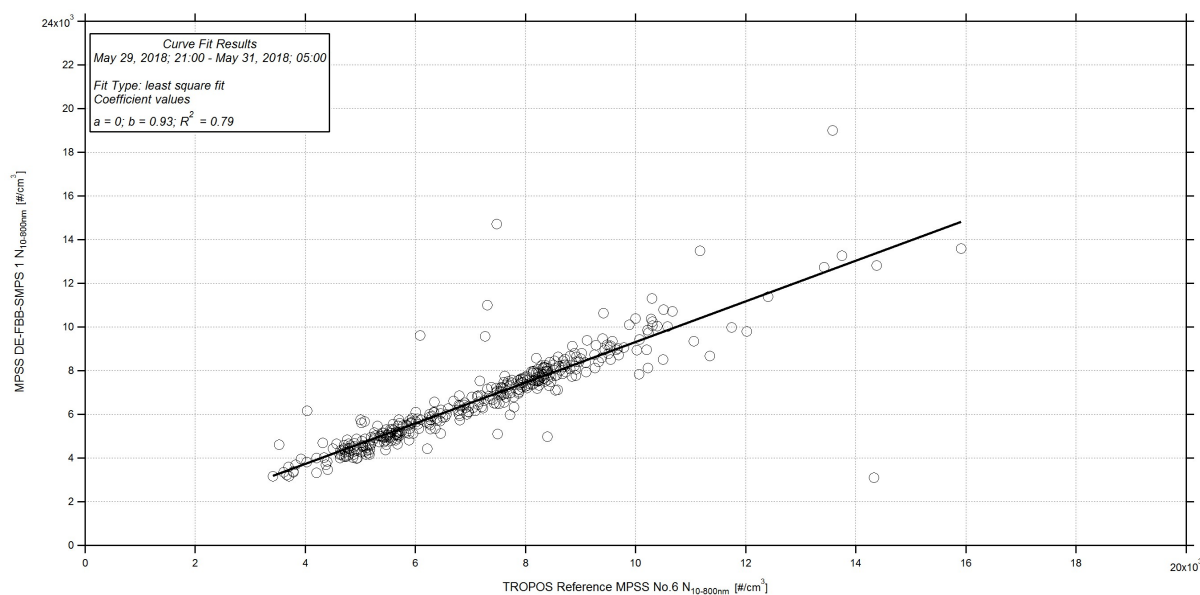


Figure 10: Linear regression between the number concentrations of the TROPOS Reference MPSS No.6 and MPSS DE-FBB-SMPS 1. The inversion and corrections for the candidate were performed using GRIMM software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.