Intercomparison of Mobility Particle Size Spectrometers

Project No.:	*MPSS-2018-3-6*
Principal Investigator:	Noemí Pérez
Home Institution:	Institute of Environmental Assessment and Water Research (IDAEA) Consejo Superior de Investigaciones Científicas (CSIC) C/ Jordi Girona 18-26 08034 Barcelona, Spain
Participant:	-
Candidate:	**Barcelona**
Made by:	**TROPOS**
Counter (SN):	**TSI 3772 SN: 3772140203**
Software:	**TROPOS Software V6.68**
Location of the quality assurance:	TROPOS Leipzig, lab 118
Comparison period:	May 14, 2018 – June 4, 2018
Last Intercomparison (with Project No.):	

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Summary of Intercomparison:

Status:
The instrument arrived without participant. The system was updated to the newest version of TROPOS-MPSS. We used all components (e.g., sensor, blower, etc.) from the old instrument. The instrument is running with the TROPOS Software Version 6.68. During the intercomparison, the candidate showed a concentration of 1% above the TROPOS Reference MPSS No.1. The PSL check showed a peak at 204.36 nm. The candidate passed the quality standards of ACTRIS and GAW.

Information about the instruments:
Date of check: May 11, 2018

List of Components	TROPOS Reference MPSS No.1	Candidate
Position	Line 1.1	Line 2.1
Company	TROPOS	TROPOS
Software	TROPOS V6.68	TROPOS V6.68
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	Kr.85	Ni.63
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	✓	✓
info		

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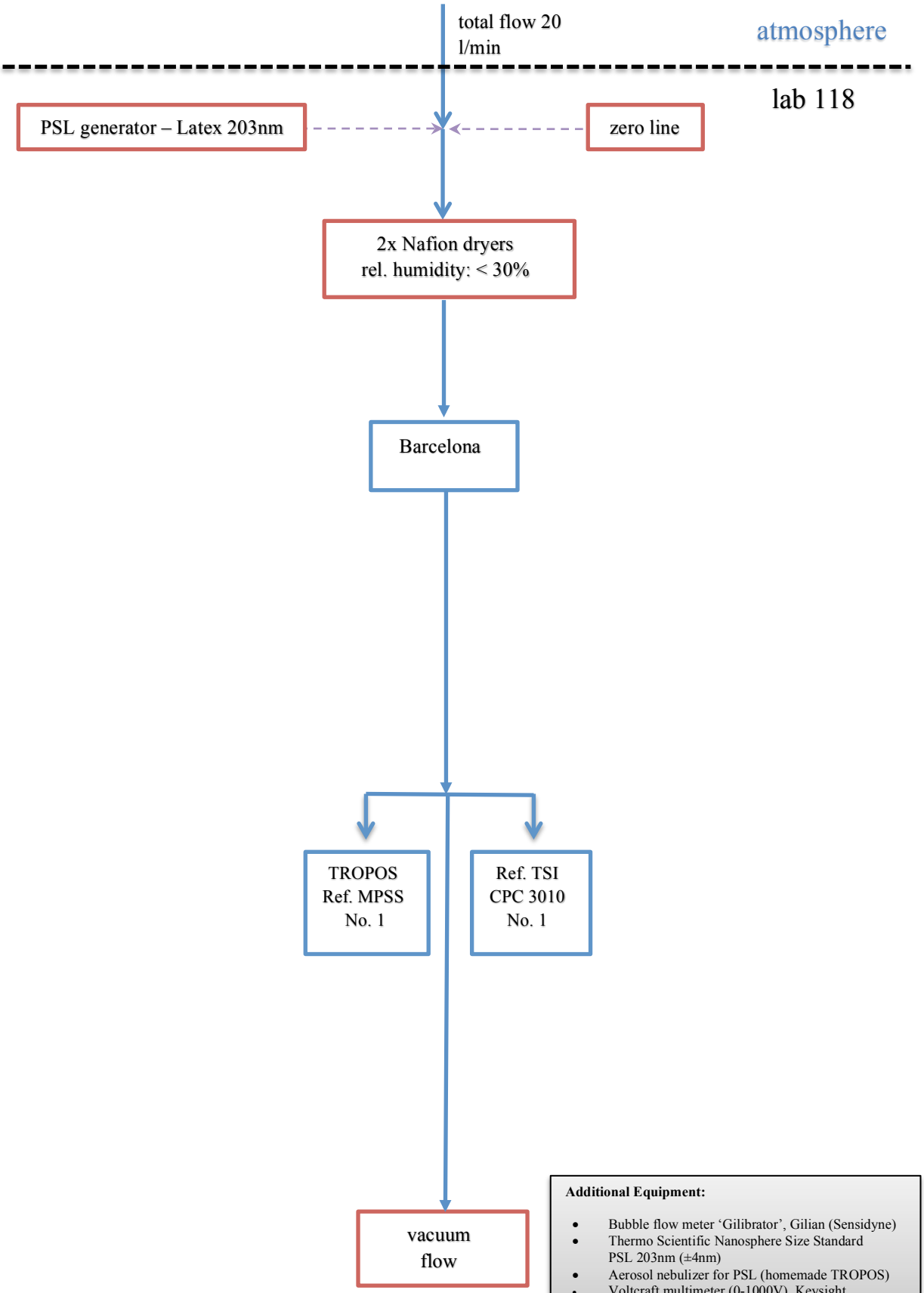
Laboratory setup:



Additional Equipment:

- Bubble flow meter 'Gilibrator', Gilian (Sensidyne)
- Thermo Scientific Nanosphere Size Standard PSL 203nm (±4nm)
- Aerosol nebulizer for PSL (homemade TROPOS)
- Voltcraft multimeter (0-1000V), Keysight Technologies

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Status of the instruments:

Date of system checks:

date	28.05.2018	unit
total CPC flow	-	l/min
aerosol flow (DMA)	1.028	l/min
aerosol flow (UDMA)	-	l/min
aerosol flow (total)	1.028	l/min
Zero MPSS	0	#/cm³
Zero total CPC	-	#/cm³
PSL 203 nm	204.36	nm

Special Information regarding 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	-	-	checked
change sheath Nafion dryer	No		-	checked
check source	No	-	-	Used TROPOS Ni.63
change HV power supply	No	-	-	-
clean/change DMA	No	-	-	Checked/cleaned
change aerosol RH/T-sensor	No	-	-	checked
change sheath RH/T-sensor	No	-	-	checked
change pressure sensor	No	-	-	checked
change inlet Nafion dryer (500)	No	-	-	-
Change Total filter	No	-	-	-
NI-card	No			-

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

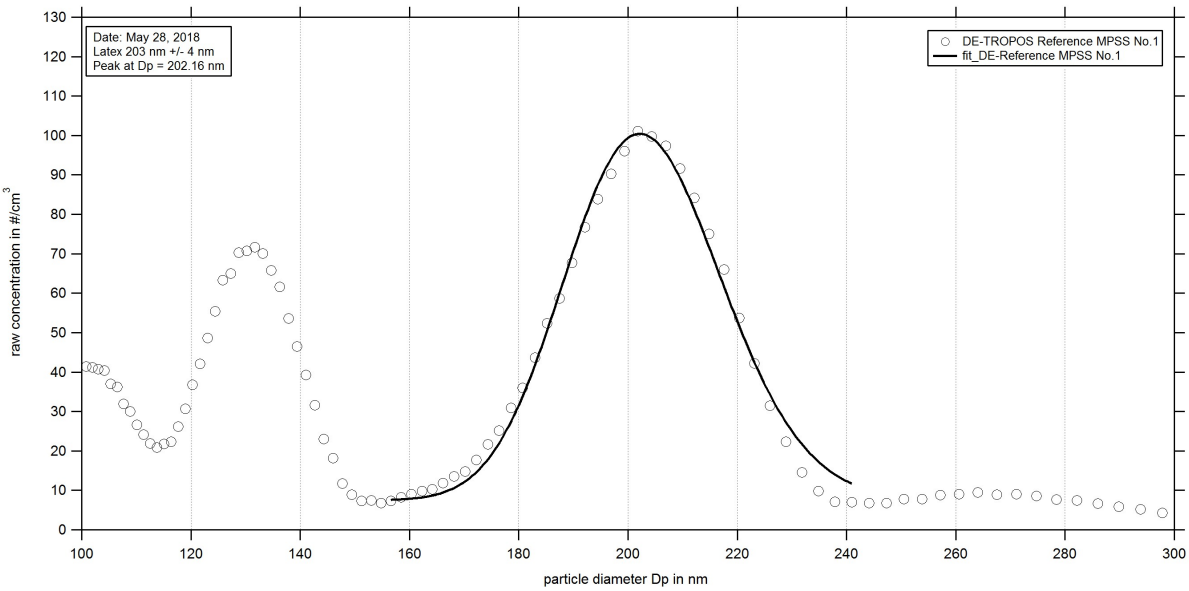

Figure 01: Measurement of latex 203 nm: Particle size distribution (raw concentration) for latex 203 nm on May 14th, 2018

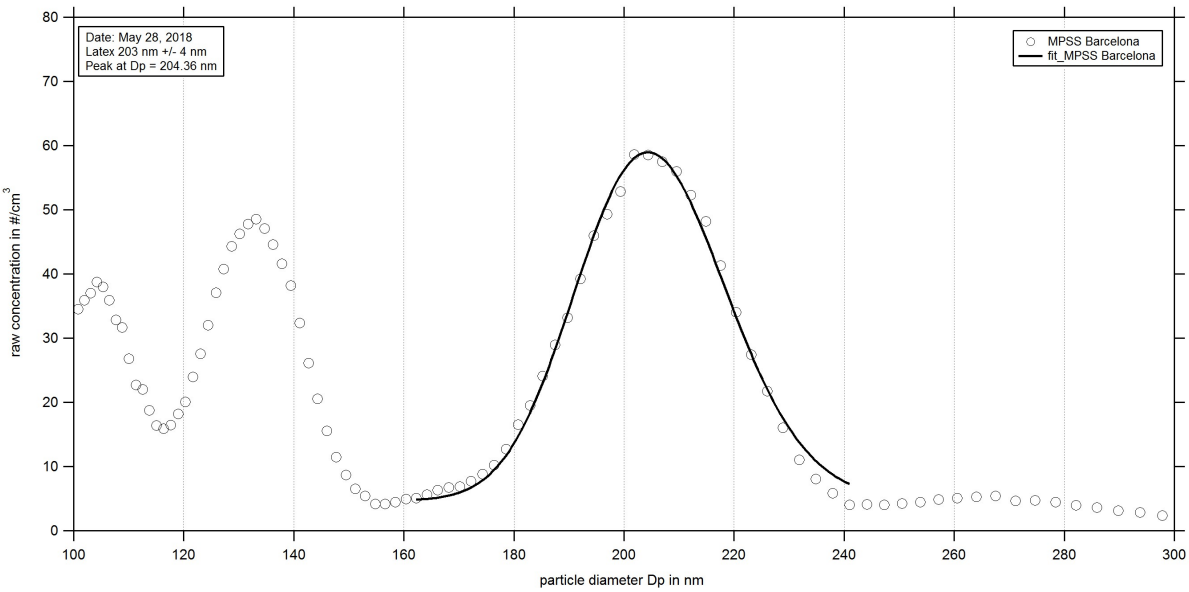

Figure 02: Measurement of latex 203 nm: Particle size distribution (raw concentration) for latex 203 nm on May 14th, 2018.

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Status of the Candidate: Particle Number Size Distribution

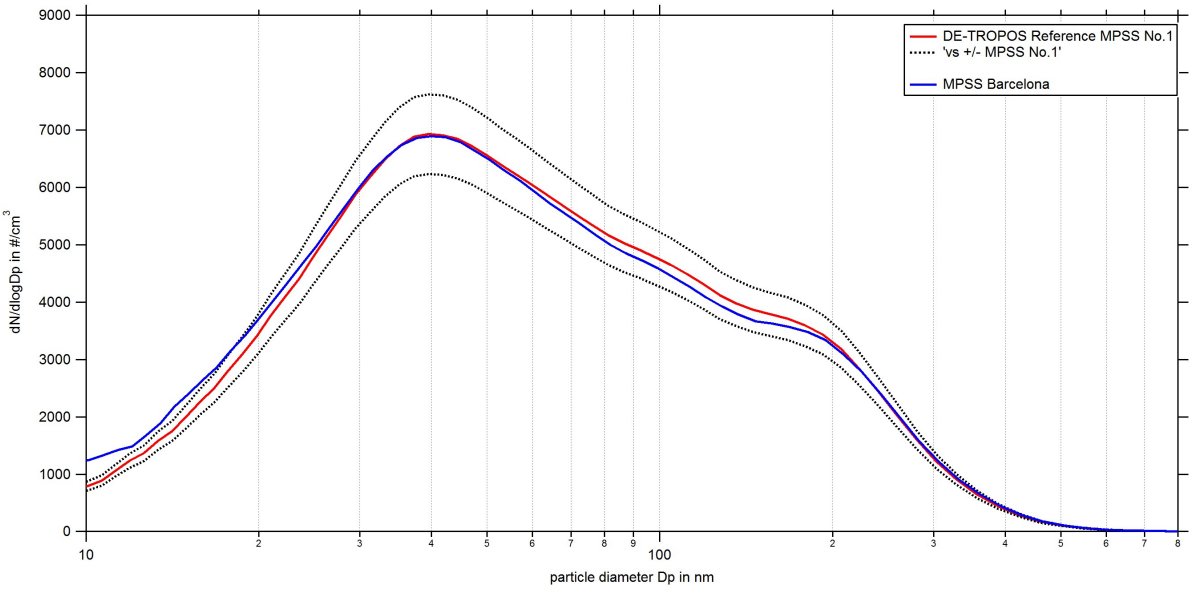

Figure 03: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.1 against MPSS Barcelona from May 14, 2018 20:00 – June 04, 2018 06:00. Multiple charge correction, internal diffusion losses and CPC efficiency are included.

Status of the Candidate: Time Series and Correlation

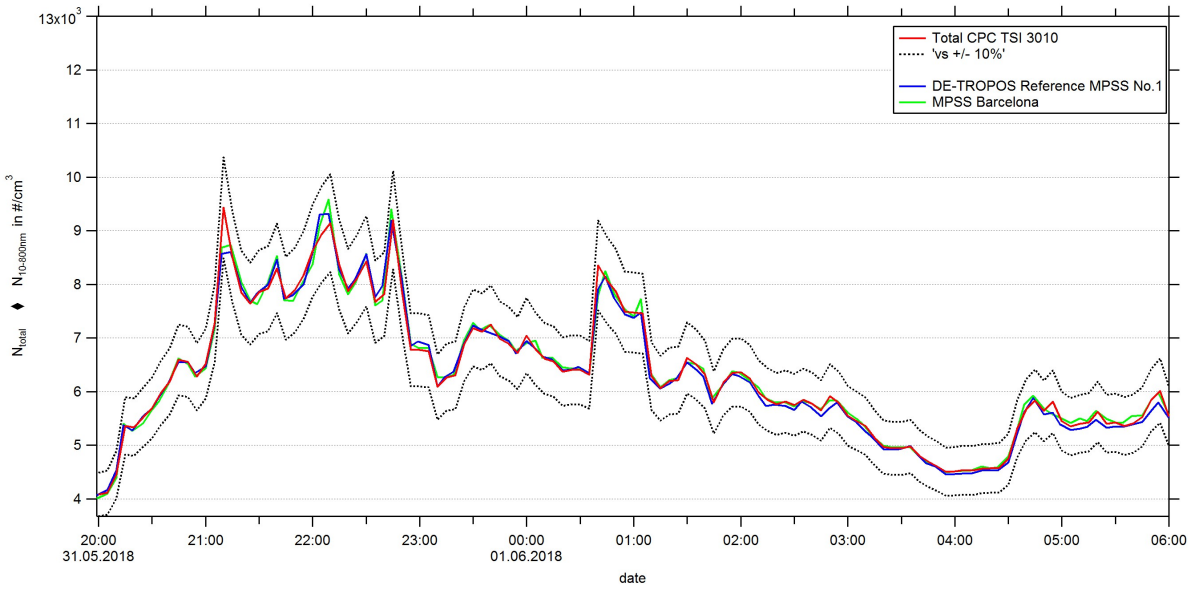

Figure 04: Time series (May 14, 2018 20:00 – June 04, 2018 06:00) of the integrated particle number concentration ($N_{10-800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. The inversion and correction for the candidate were performed using TROPOS software. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

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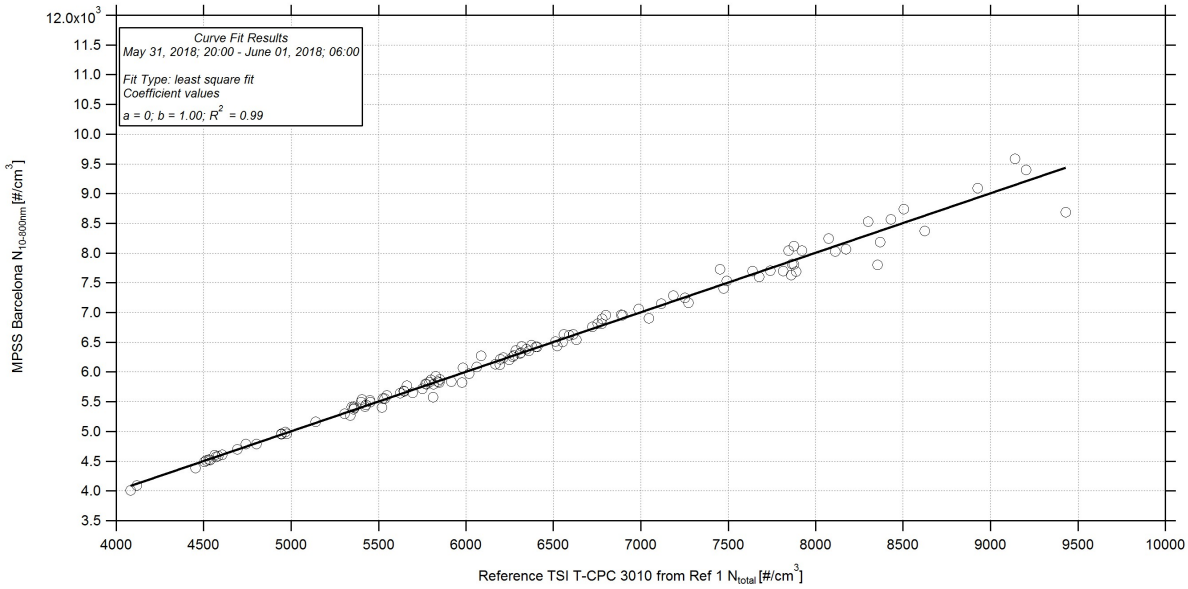

Figure 05: Linear regression between the number concentrations of the TROPOS Reference TSI CPC Model 3010 Ref 1 and MPSS Barcelona (May 14, 2018 20:00 – June 04, 2018 06:00). All corrections are included.

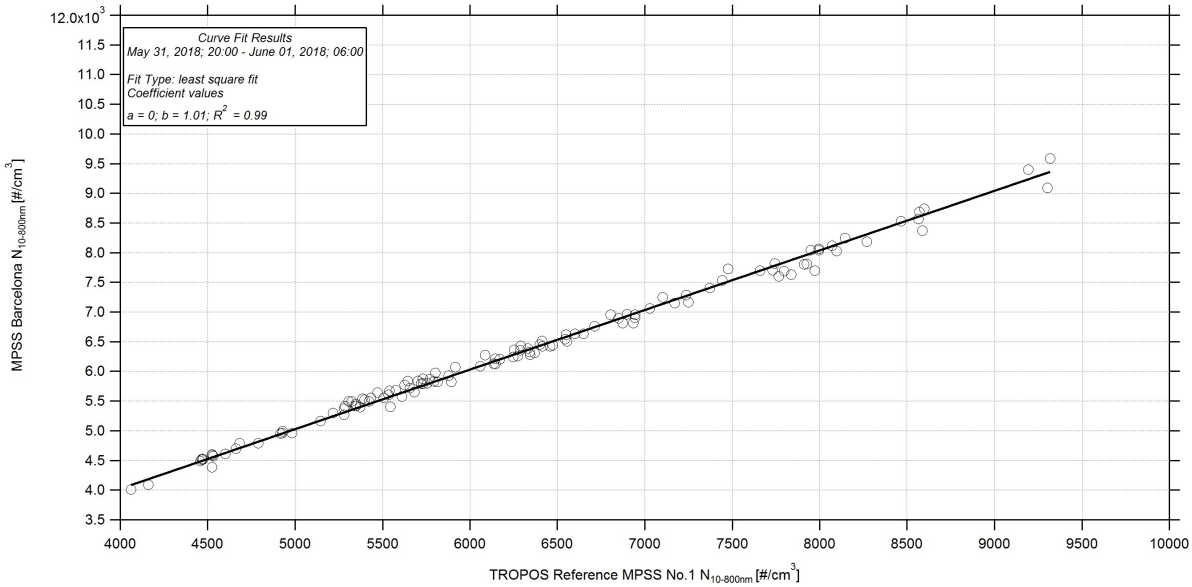

Figure 06: Linear regression between the number concentrations of the TROPOS Reference MPSS No.1 and MPSS Barcelona (May 14, 2018 20:00 – June 04, 2018 06:00). All corrections are included.

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