

Intercomparison of Mobility Particle Size Spectrometers

Project No.: MPSS-2020-1-1

Principal Investigator: Dr. Luca di Liberto

Home Institution: ISAC-CNR, Italy

Participant: -

Candidate: IT-CNR MPSS
Made by: **TROPOS**
Counter (SN): **TSI CPC 3772 SN: 3772153601**

Location of the quality assurance: TROPOS Leipzig, lab 118

Comparison period: March. 30, 2020 – April. 1, 2020

Last Intercomparison (with Project No.):

Summary of Intercomparison:

The TROPOS MPSS ISAC-CNR participated in the WCCAP Workshop in March 2020. It was not able to do a pre-status of the MPSS against the TROPOS Reference MPSS No.1, because the system did not pass the safety conditions especially in HV. The following problems were found:

1. Check of HV: The MPSS had an offset from 150V. The HV power cable was broken and had to be changed. The HV-power supply was checked by the electronical workshop and had to be recalibrated.

- 1 -

2. Check of electronic box: The electronic box was also checked by the electrical workshop. All connections were checked. There were no problems.
3. Aerosol inlet: The whole aerosol inlet was checked and cleaned. The capillary was taken out and checked as well.
4. Nafion dryer: Both Nafion dryers, in the sheath air and aerosol lines were old had had to be changed.
5. DMA: The DMA was in bad condition. It was necessary to clean and replace things because of liquid inside the DMA that caused burning.



The CPC was operational and passed the CPC-Workshop. More details are given in the CPC-Workshop Report, March 17, 2020. The final intercomparison of the MPSS CNR against the TROPOS Reference MPSS No.1 was done from March 30 to April 01, 2020. The candidate passed the standards of ACTRIS and GAW.

Status March 20, 2020

Table No. 1:

Institute: TROPOS							
Station: ISAC-CNR							
Date of checking list: March 30, 2020							
Instrument/ Components	info	SN	Date/Code	CPC-Status		HV-Status	
MPSS/Classifier:	TROPOS	-		ST	-	OFF	0
Firmware Classifier:	-			CT	-	4mv	5.03
Firmware Software:	TROPOS			OT	-	800mv	1000.1
DMA type:	Hauke medium			CabT	-	200mv	249.9
CPC model:	TSI CPC 3772	3772153601		AP	-	0	0
Firmware CPC:	-		-	OP	-		
radioactive source:	Ni63	-	-	NP	-		
Flow CPC (l/min):	0.995			LC	-		
Flow Inlet (l/min):	0.988						
Sheath air flow (l/min):	5.0						
Zero (#/cm ³):	0						
<i>Maintenance</i>							
Aerosol inlet:	checked and cleaned						
Aerosol Nafion dryer:	Changed						
Sheath Nafion dryer:	Changed						
Source:	Ni63						
HV power supply:	Checked and recalibrated						
DMA:	Cleaned and parts of the DMA had to be replaced						
Aerosol/sheath RH/T- sensor:	okay						
Pressure sensor:	okay						
Filter:	Changed						
NI-card:	Okay						
CPC:	CPC-Workshop March 17, 2020						
Impactor:	No						
Setup settings over night:	Ambient – ACTRIS Workshop						

Institute: TROPOS							
Station: Reference Instrument No.1							
Date of checking list: March 30, 2020							
Instrument/ Components	info	Serial Number	Date/Code	CPC-Status		HV-Status	
MPSS/Classifier:	TROPOS	No.1		ST	39.0	0 V	0
Firmware Classifier:				CT	22.0	5 mV	4.99
Firmware Software:	TROPOS 6.68			OT	40.0	800 mV	999.9
DMA type:	Hauke medium		142	CabT	28	200 mV	250.1
CPC model:	TSI 3772	3772141701		AP	100.1	0 V	0
Firmware CPC:	2.15			OP	78.0		
Radioactive source:	Kr.85	NER 8275	002/13	NP	2.8		
Flow Inlet (l/min):	0.990			LC	50		
Zero (#/cm ³):	0						

Institute: TROPOS							
Station: Reference T-CPC							
Date of checking list: March 20, 2020							
Instrument/ Components	info	Serial Number	Cut off	CPC-Status			
CPC model:	TSI 3772		Dp50 10 nm	ST			
Firmware CPC:	2.15			CT			
Flow Inlet (l/min):	1.024			OT			
Zero (#/cm ³):	0			CabT			
				AP			
				OP			
				NP			
				LC			

PSL Scan: Latex 203 nm +/- 4 nm

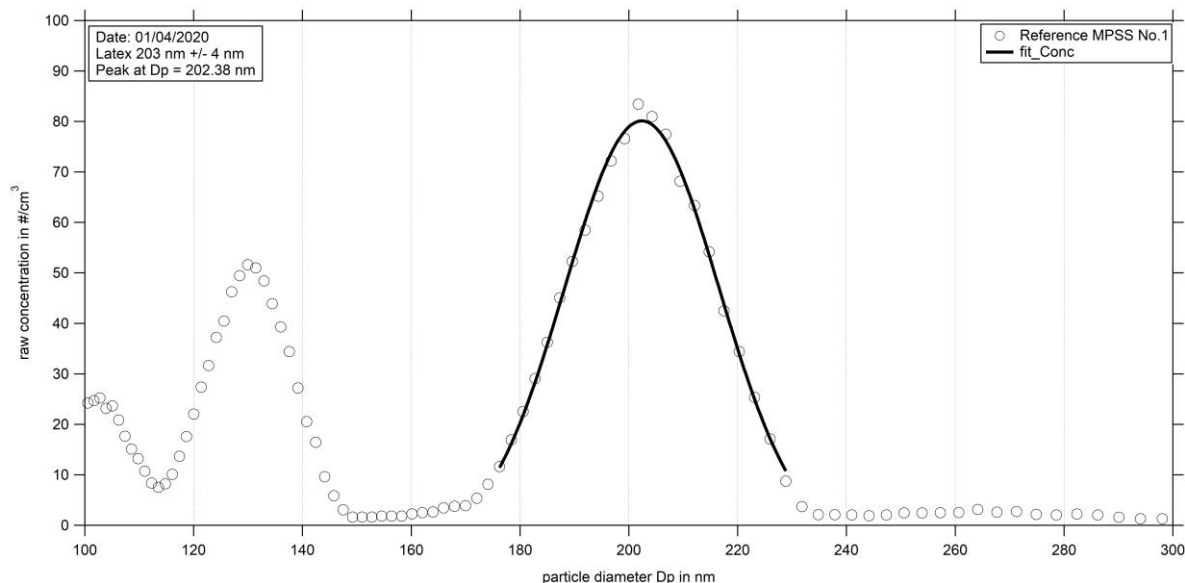


Figure 01: Measurement of latex 203 nm – TROPOS Reference Instrument No. 1: Particle size distribution of latex 203 nm on April 01st, 2020. The peak shows at 202.38nm

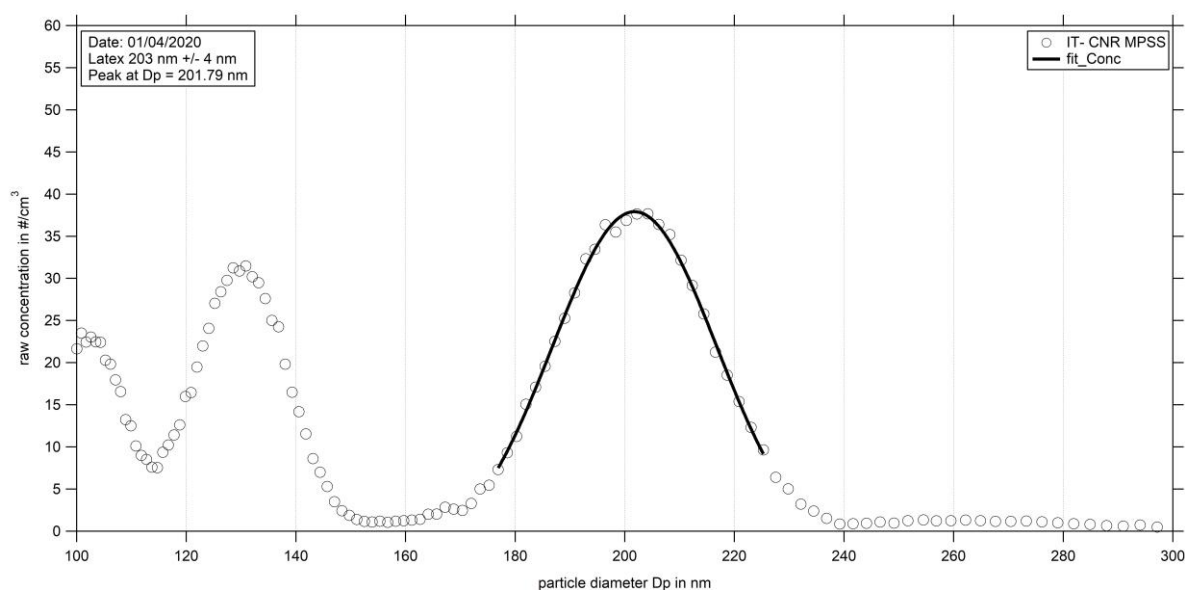


Figure 02: Measurement of latex 203 nm – IT-CNR MPSS: Particle size distribution of latex 203 nm on April 01st, 2020. The peak shows at 201.79nm.

Intercomparison between TROPOS Reference Instrument No. 1 and TROPOS CNR MPSS

30.03.2020 18:00PM – 01.04.2020 06:00AM

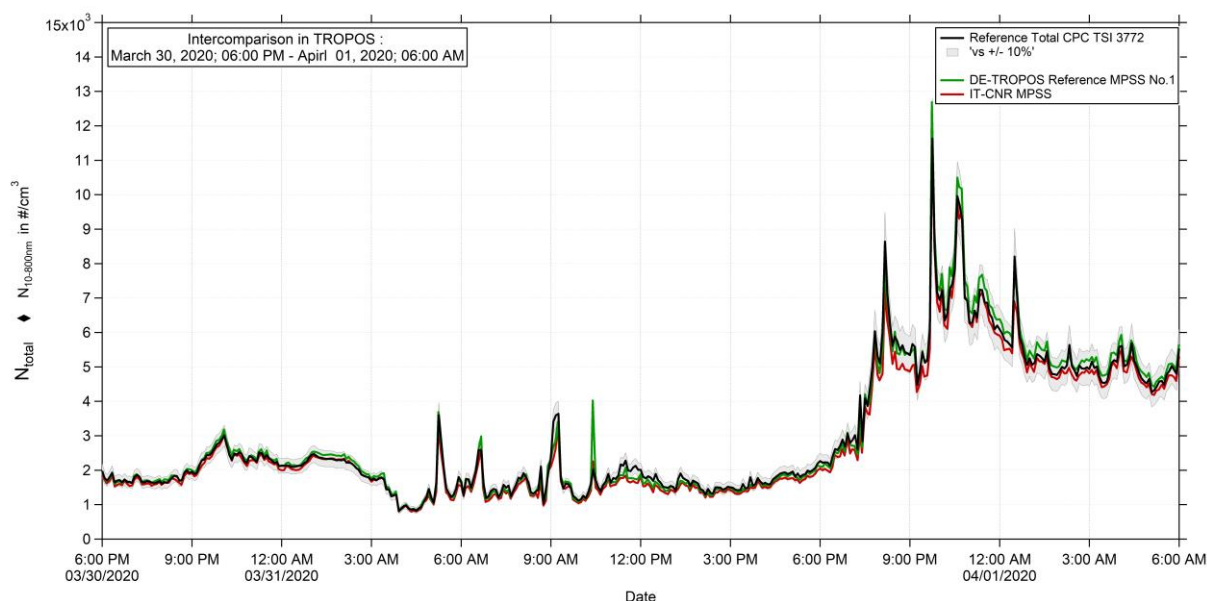


Figure 03: Time series (Mar. 30, 2020 6 PM – April. 01, 2020 6 AM) of the integrated particle number concentration ($N_{10-800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3772. Multiple charge correction, internal diffusion losses, CPC flow corrections. The candidate is running with the TSI Kr.85 source.

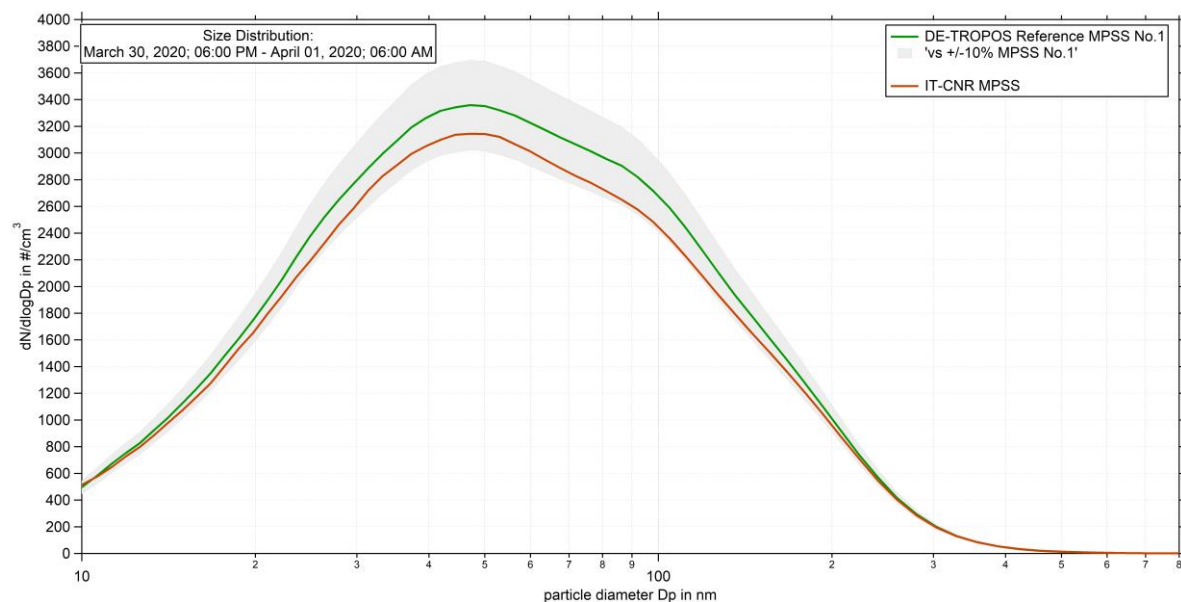


Figure 04: Particle size distribution for TROPOS Reference MPSS No.1 and IT-CNR MPSS, flow corrections, multiple charge correction and diffusion loss corrections are included.

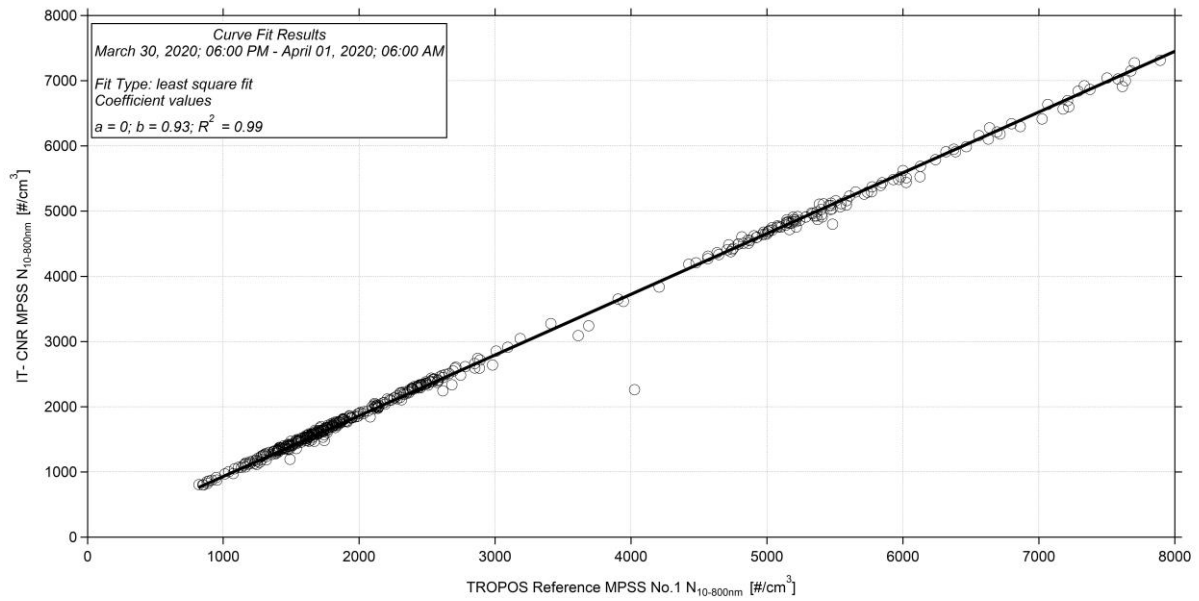


Figure 05: Linear regression between the number concentration of the TROPOS Reference MPSS No. 1 and IT-CNR MPSS.

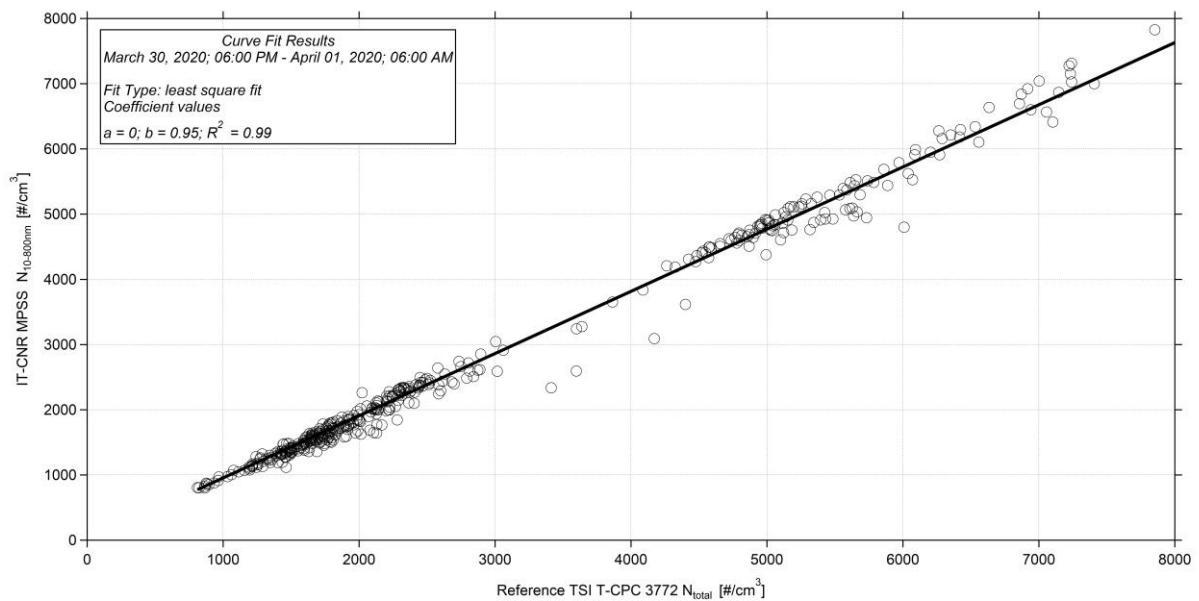


Figure 06: Linear regression between the number concentration of the TROPOS Reference T-CPC Model 3772 and IT-CNR MPSS.

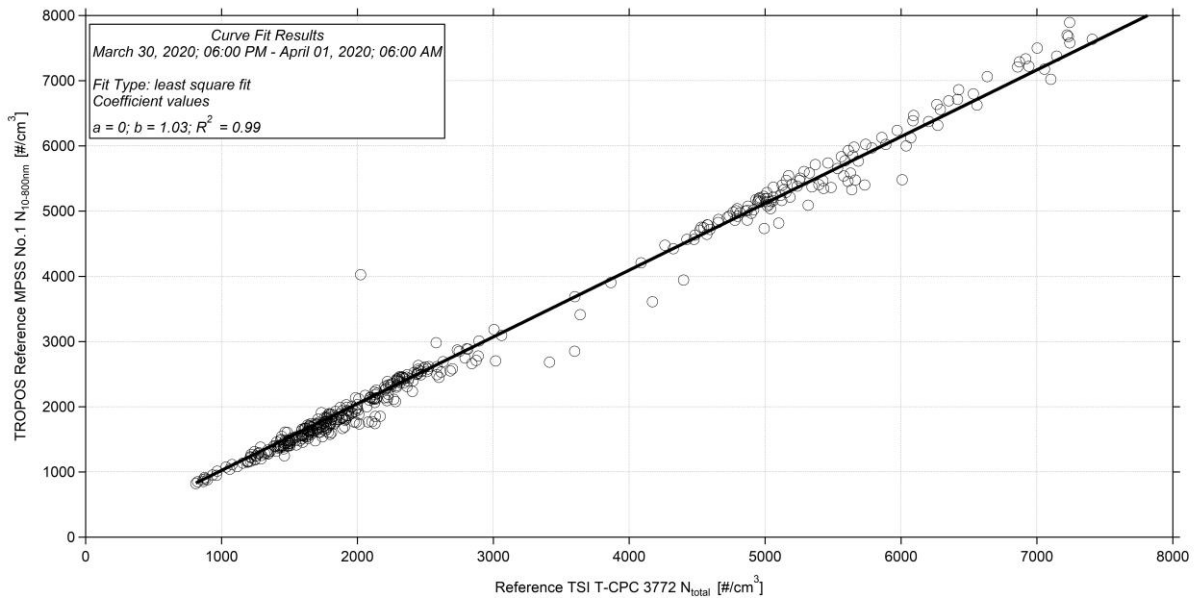


Figure 07: Linear regression between the number concentration of the TROPOS Reference T-CPC Model 3772 and TROPOS Reference Instrument No. 1.