







Intercomparison of Mobility Particle Size Spectrometers

Project No.: Online MPSS-2019-2-2

Principal Investigator: Olaf Bath

Home Institution: Umweltbundesamt

Participant: -

Candidate: MPSS Neuglobsow Made by: TROPOS Homemade Counter (SN): 70944032

Location of the quality assurance: TROPOS Leipzig, lab 118

Comparison period: May 20, 2019 – May 29, 2019

Last Intercomparison (with Project No.):











Summary of Intercomparison:

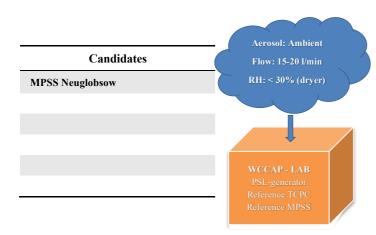
Pre-Status:

The candidate from UBA-Neuglobsow MPSS participated in the ACTRIS workshop from May 20, 2019 to May 21, 2019 without the participant. The setup of the candidate was done on Monday, May 20th, afternoon. During the Pre-Status the candidate was running under the same settings, with their own TSI Kr.85 source, like on the Institute. The performance of the candidate showed a concentration 3% lower than the TROPOS Reference Instrument No.1. On Tuesday, May 21th, after the CPC-Workshop the MPSS was checked and No maintenance was needed. The performance of the CPC is shown in the Report of the CPC-Workshop. The TSI CPC 3772 passed the CPC Workshop. For more information, please look at the CPC-workshop report. During the workshop week, the whole candidate was checked. More details are in the Tables for each night run.

Final-Status:

The final run took place from May 24 to May 27, 2019. Running the candidate using the original source Kr.85 and the TROPOS Reference CPC No.1 the performance showed a concentration 2% lower than the TROPOS Reference Instrument No.1. The candidate passed the standards of ACTRIS and GAW under the conditions, using the TROPOS Reference CPC No.1.

Laboratory Setup and Legend



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

Legend for plots:

- MC = multiple charge correction
- DL = diffusion loss correction
- CE = CPC efficiency curve
- AL = additional loss corrections

Lab setup:













TROPOS Reference Instruments No. 1 and No. 4

May 20 - May 21, 2019: Time Series, Particle Number Size Distribution and Correlation

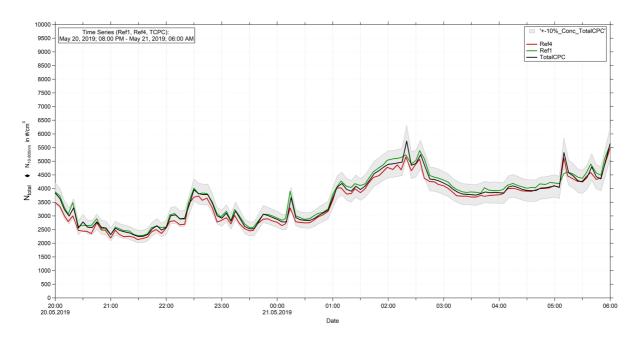


Figure 01: Time series (May 20, 2019 8 PM – May 21, 2019 6 AM) of the integrated particle number concentration (N_{10-800nm}) of the TROPOS Reference MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

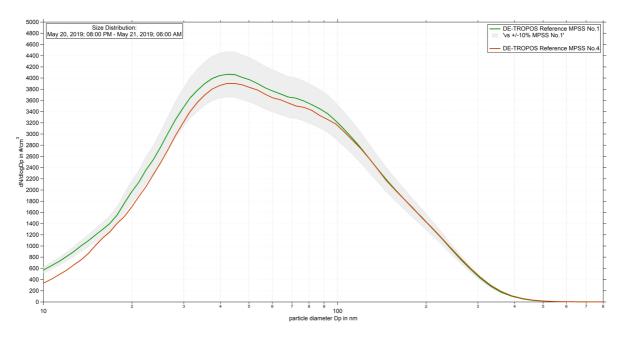


Figure 02: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.1 against TROPOS Reference MPSS No.6 from October 15, 2018 8 PM – October 16, 2018 6 AM. Multiple charge correction, internal diffusion losses and CPC efficiency are included in different steps.









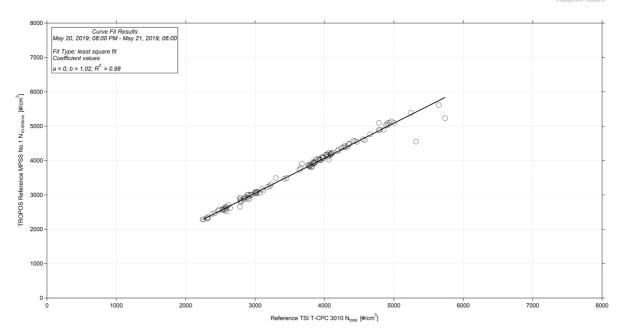


Figure 03: Linear regression between the number concentrations of the TROPOS Reference TSI T-CPC Model 3010 and TROPOS Reference MPSS No.1. Multiple charge correction, internal diffusion losses and CPC efficiency are included.

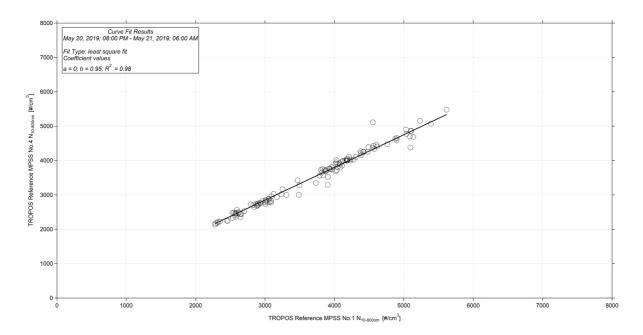


Figure 04: Linear regression between the number concentrations of the TROPOS Reference MPSS No.1 and TROPOS Reference MPSS No.6. Multiple charge correction, internal diffusion losses and CPC efficiency are included.









PSL Scan: Latex 203 nm +/- 4 nm

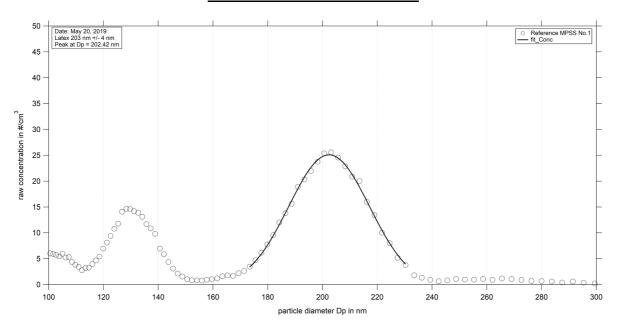


Figure 05: Measurement of latex 203 nm - Reference MPSS No.1: Particle size distribution (raw concentration) for latex 203 nm on May 20th 2019.

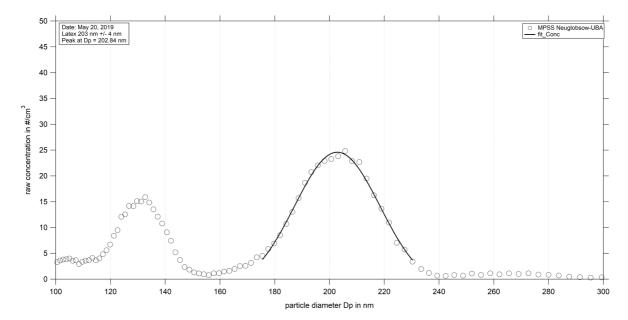


Figure 06: Measurement of latex 203 nm for the candidate UBA-Neuglobsow MPSS: Particle size distribution for latex 203 nm on May 20^{th} 2019 with a peak at 202.84 nm.









Pre-Status May 20 – 21, 2019

Instrument Settings, Time Series, Particle Number Size Distribution and Correlation

Table No. 1:

Station: Neuglobsow Date of checking list: 20.05.2019 Instrument Info SN Date/Code CPC-Status HV-Status Components Info SN Date/Code CPC-Status HV-Status HV-Status Instrument Info SN Date/Code CPC-Status HV-Status Instrument Instrument Info SN Date/Code CPC-Status HV-Status Instrument Info Info	Institute: Umweltbund	esamt						
Instrument								
Instrument	Date of checking list: 2	20.05.2019						
MPSS/Classifier: TROPOS ST 39.0 OFF			SN	Date/Code	CPC-	Status	HV-S	tatus
TROPOS CT 22.0 5 V 5.8	Components	·						
Firmware Software:	MPSS/Classifier:	TROPOS			ST	39.0	OFF	
DMA type: Vienna 178	Firmware Classifier:	TROPOS			CT	22.0	5 V	5.8
CPC model: TSI CPC 3772 70944032 AP 98.9	Firmware Software:	6.68			OT	40.0	1000 V	999.4
Firmware CPC: 2.11	DMA type:	Vienna		178	CabT	29.1	0 V	0
Radioactive source: Kr-85 NP 2.6 1000 V 1000.1 Aerosol Nafion - MD-110-12E-S LC 52 250 V 249.7 Dryer ND0.7-17-06 ND0.7-114d 5 V 5.0 Aerosol inlet dryer ND0.7-153 0 0 Flow CPC (l/min): Flow Inlet (l/min): 1.001 Flow Display (l/min): Aerosol inlet: Aerosol Nafion dryer: Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: Filter: NP 2.6 1000 V 1000.1 LC 52 250 V 249.7 Source Maintenance Aerosol inlet dryer Aerosol inlet dryer Aerosol shaped Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: Flow Display (l/min): Flow Display (l/min): Flow Display (l/min): Flow Display (l/min):	CPC model:	TSI CPC 3772	70944032		AP	98.9		
Aerosol Nafion	Firmware CPC:	2.11			OP	67.4	5 V	5.0
Dryer	radioactive source:	Kr-85			NP	2.6	1000 V	1000.1
Sheath Nafion Dryer	Aerosol Nafion	-	MD-110-12E-S		LC	52	250 V	249.7
Aerosol inlet dryer ND0.7-153 0 0 Flow CPC (l/min): 1.001			072717-17-06					
Flow CPC (l/min):	Sheath Nafion Dryer		ND0.7-114d				5 V	5.0
Flow Inlet (I/min):	Aerosol inlet dryer		ND0.7-153				0	0
Flow Display (/min):	Flow CPC (l/min):							
Cero (#/cm³):	Flow Inlet (l/min):	1.001						
Cero (#/cm³):	Flow Display							
Maintenance Aerosol inlet:	(l/min):							
Aerosol inlet: Aerosol Nafion dryer: Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Zero (#/cm³):							
Aerosol Nafion dryer: Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:			Mainter	nance				
Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Aerosol inlet:							
Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor: Impactor:	Aerosol Nafion dryer:							
HV power supply: DMA: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor: Impactor:	Sheath Nafion dryer:							
DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Source:							
DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	HV power supply:							
Pressure sensor: Filter: NI-card: CPC: Impactor:								
Filter: NI-card: VPC: Impactor:	Aerosol/sheath RH/T- s	sensor:						
NI-card: CPC: Impactor:	Pressure sensor:							
CPC: Impactor:	Filter:							
CPC: Impactor:	NI-card:							
Impactor:								
Some somings over might.	Setup settings over nig	ht:						

Institute: TROPOS							
Station: Reference Ins	trument No.1						
Date of checking list: N	May 20, 2019						
Instrument/	info	Serial Number	Date/Code	CPC-	-Status	HV-St	atus
Components	•						
MPSS/Classifier:	TROPOS	No.1		ST	39.0	0 V	0
Firmware Classifier:				CT	22.0	5 mV	5.1
Firmware Software:	TROPOS 6.68			OT	40.0	800 mV	999.7
DMA type:	Hauke medium		142	CabT	27.3	200 mV	249.8
CPC model:	TSI 3772	3772141701		AP	98.5	0 V	0
Firmware CPC:	2.15			OP	72.1		
Radioactive source:	Kr.85	NER 8275	002/13	NP	2.8		
Flow Inlet (l/min):	1.009		•	LC	50		
Zero (#/cm³):	0					•	











Institute: TROPOS					
Station: Reference Total	tal CPC				
Date of checking list: N	May 20, 2019				
Instrument/	info	Serial Number	Cut off	CPC	-Status
Components					
CPC model:	TSI 3010	2337	D _{p50} 10 nm	ST	
Firmware CPC:	2.15			CT	
Flow Inlet (l/min):	1.001			OT	
Zero (#/cm³):	0			CabT	
		_		AP	
				OP	
				NP	
				LC	

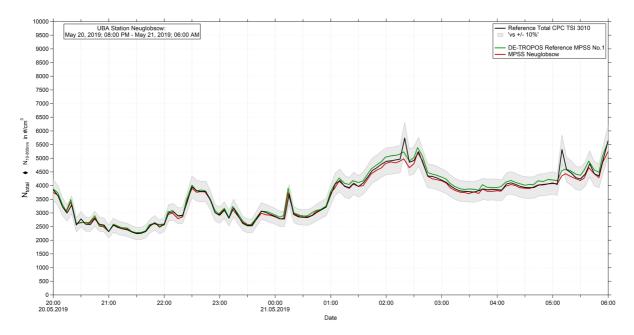


Figure 08: Time series (May 20, 2019 8 PM – May 21, 2019 6 AM) of the integrated particle number concentration (N_{10} . N_{10} source) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. Multiple charge correction, internal diffusion losses and CPC flow corrections are included. The candidate is running with the Kr.85 source.









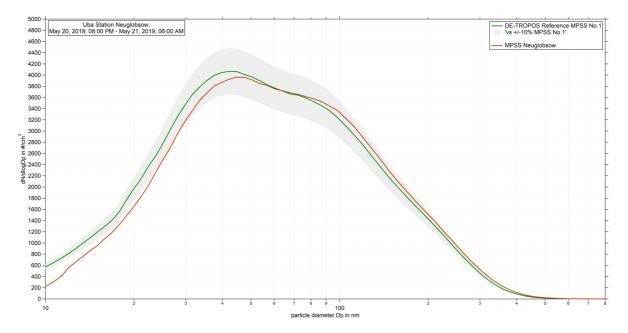


Figure 09: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.1 against UBA-Neuglobsow MPSS from May 20, 2019 8 PM – May 21, 2019 06:00 AM. Multiple charge correction, internal diffusion losses and CPC efficiency are included in different steps.

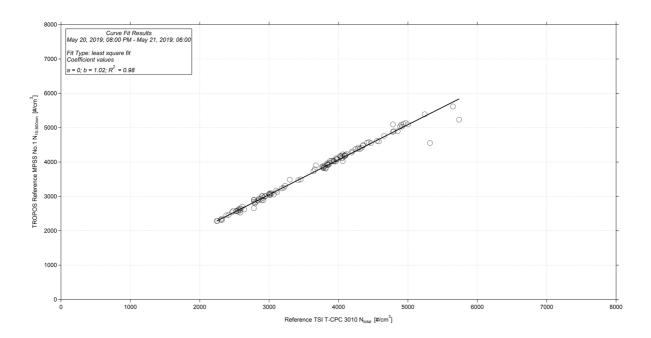


Figure 10: Linear regression between the number concentrations of the TROPOS Reference TSI T-CPC Model 3010 and TROPOS Reference MPSS No.1. Multiple charge correction, internal diffusion losses and CPC efficiency are included.









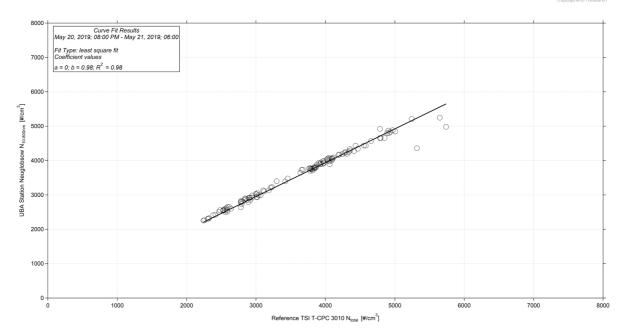


Figure 11: Linear regression between the number concentrations of the TROPOS Reference TSI T-CPC Model 3010 and UBA-Neuglobsow MPSS. Multiple charge correction, internal diffusion losses and CPC efficiency are included.

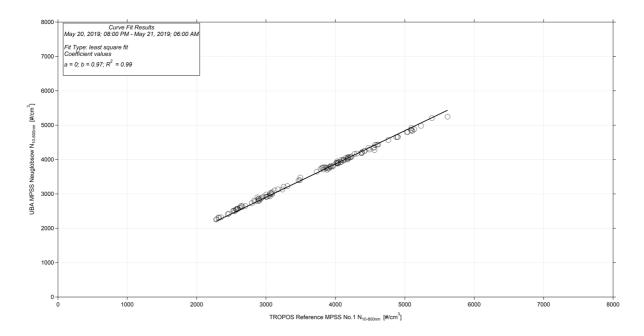


Figure 12: Linear regression between the number concentrations of the TROPOS Reference MPSS No.1 and UBA-Neuglobsow MPSS. Multiple charge correction, internal diffusion losses and CPC efficiency are included.









Status May 21 – 22, 2019

Instrument Settings, Time Series, Particle Number Size Distribution and Correlation

Table No. 2:

Institute: Umweltbund	esamt						
Station: Neuglobsow							
Date of checking list: 2	21.05.2019						
Instrument/	info	SN	Date/Code	CPC-	Status .	HV-S	tatus
Components	· ·						
MPSS/Classifier:	TROPOS			ST	39.0	OFF	
Firmware Classifier:	TROPOS			CT	22.0	5 V	5.8
Firmware Software:	6.68			OT	40.0	1000 V	999.4
DMA type:	Vienna		178	CabT	29.1	0 V	0
CPC model:	TSI CPC 3772	70944032		AP	98.9		
Firmware CPC:	2.11			OP	67.4	5 V	5.0
radioactive source:	Kr-85			NP	2.6	1000 V	1000.1
Aerosol Nafion	-	MD-110-12E-S		LC	52	250 V	249.7
Dryer		072717-17-06					
Sheath Nafion Dryer		ND0.7-114d				5 V	5.0
Aerosol inlet dryer	1.001	ND0.7-153				0	0
Flow CPC (l/min):							
Flow Inlet (l/min):							
Flow Display							
(l/min):							
Zero (#/cm ³):							
		Mainter	папсе				
Aerosol inlet:							
Aerosol Nafion dryer:		Instrument is ru	nning without n	afion from	2122.05.1	9. Nafion -	> check
Sheath Nafion dryer:							
Source:							
HV power supply:							
DMA:							
Aerosol/sheath RH/T- s	sensor:						
Pressure sensor:							
Filter:							
NI-card:							
CPC:							
Impactor:							
Setup settings over nig	ht:						

Institute: TROPOS							
Station: Reference Ins	trument No.1						
Date of checking list: N	May 21, 2019						
Instrument/	info	Serial Number	Date/Code	CPC-	-Status	HV-St	atus
Components	•						
MPSS/Classifier:	TROPOS	No.1		ST	39.0	0 V	0
Firmware Classifier:				CT	22.0	5 mV	5.1
Firmware Software:	TROPOS 6.68			OT	40.0	800 mV	999.7
DMA type:	Hauke medium		142	CabT	27.3	200 mV	249.8
CPC model:	TSI 3772	3772141701		AP	98.5	0 V	0
Firmware CPC:	2.15			OP	72.1		
Radioactive source:	Kr.85	NER 8275	002/13	NP	2.8		
Flow Inlet (l/min):	1.009			LC	50		
Zero (#/cm ³):	0					_	











Institute: TROPOS					
Station: Reference Tot	tal CPC				
Date of checking list: N	1 ay 21, 2019				
Instrument/	info	Serial Number	Cut off	CPC-	-Status
Components					
CPC model:	TSI 3010	2337	D _{p50} 10 nm	ST	
Firmware CPC:	2.15			CT	
Flow Inlet (l/min):	1.001			OT	
Zero (#/cm³):	0			CabT	
		_		AP	
				OP	
				NP	
				LC	

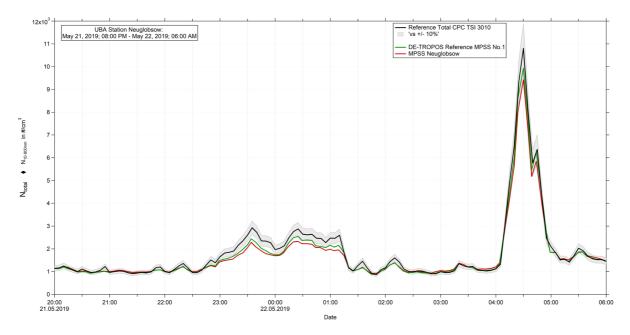


Figure 13: Time series (May 21, 2019 8 PM – May 22, 2019 6 AM) of the integrated particle number concentration (N_{10-800nm}) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.









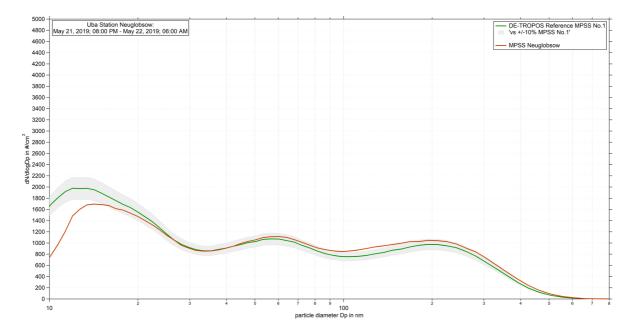


Figure 14: Comparison of median particle number size distribution of TROPOS Reference MPSS No.1 against UBA-Neuglobsow MPSS from May 21, 2019 8 PM – May 22, 2019 6 AM. Multiple charge correction, internal diffusion losses and CPC efficiency are included in different steps.

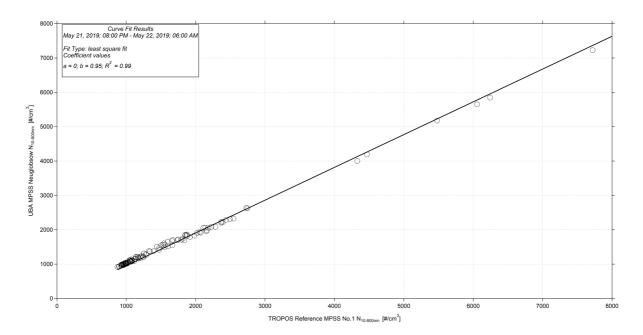


Figure 15: Linear regression between the number concentrations of the TROPOS Reference MPSS No.1 and UBA-Neuglobsow MPSS. Multiple charge correction, internal diffusion losses and CPC efficiency are included.









Status May 22 – 23, 2019

Instrument Settings, Time Series, Particle Number Size Distribution and Correlation

Table No. 2:

Institute: Umweltbund	esamt						
Station: Neuglobsow							
Date of checking list: 2	22.05.2019						
Instrument/	info	SN	Date/Code	CPC-	Status	HV-Si	tatus
Components	,						
MPSS/Classifier:	TROPOS			ST	39.0	OFF	
Firmware Classifier:	TROPOS			CT	22.0	5 V	5.3
Firmware Software:	6.68			OT	40.0	1000 V	999.8
DMA type:	Vienna		178	CabT	29.1	0 V	0.1
CPC model:	TSI CPC 3772	70944032		AP	98.9		
Firmware CPC:	2.11			OP	67.4	5 V	5.0
radioactive source:	Kr-85			NP	2.6	1000 V	999.9
Aerosol Nafion	-	MD-110-12E-S		LC	52	250 V	249.7
Dryer		072717-17-06					
Sheath Nafion Dryer		ND0.7-114d				5 V	5.0
Aerosol inlet dryer		ND0.7-153				0	0.1
Flow CPC (l/min):							
Flow Inlet (l/min):	1.002						
Flow Display							
(l/min):							
Zero (#/cm³):							
		Mainter	папсе				
Aerosol inlet:							
Aerosol Nafion dryer:		Instrum	ent is running w	ithout nafi	on from 21	22.05.19.	
Sheath Nafion dryer:							
Source:							
HV power supply:							
DMA:							
Aerosol/sheath RH/T- s	sensor:						
Pressure sensor:							
Filter:							
NI-card:							
CPC:							
Impactor:							
Setup settings over nig	ht:						
7							

Institute: TROPOS							
Station: Reference Ins	trument No.1						
Date of checking list: N	May 22, 2019						
Instrument/	info	Serial Number	Date/Code	CPC	-Status	HV-St	atus
Components							
MPSS/Classifier:	TROPOS	No.1		ST		0 V	0.3
Firmware Classifier:				CT		4 mV	4.9
Firmware Software:	TROPOS 6.68			OT		800 mV	999.9
DMA type:	Hauke medium		142	CabT		200 mV	249.8
CPC model:	TSI 3772	3772141701		AP		0 V	0.3
Firmware CPC:	2.15			OP			
Radioactive source:	Kr.85	NER 8275	002/13	NP			
Flow Inlet (l/min):	1.012			LC			
Zero (#/cm ³):	0					_	











Institute: TROPOS					
Station: Reference Tot	tal CPC				
Date of checking list: N	1 ay 22, 2019				
Instrument/	info	Serial Number	Cut off	CPC	-Status
Components					
CPC model:	TSI 3010	2410	D _{p50} 10 nm	ST	
Firmware CPC:	2.15			CT	
Flow Inlet (l/min):	1.008			OT	
Zero (#/cm³):	0			CabT	
		_		AP	
				OP	
				NP	
				LC	

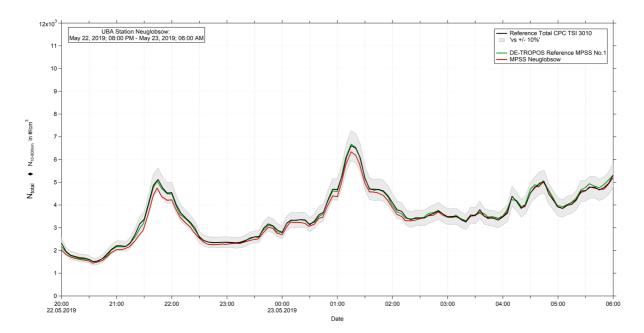


Figure 16: Time series (May 22, 2019 8 PM – May 23, 2019 6 AM) of the integrated particle number concentration (N_{10} - N_{800nm}) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.









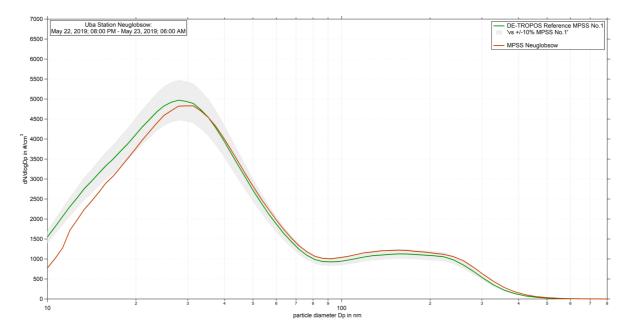


Figure 17: Comparison of median particle number size distribution of TROPOS Reference MPSS No.1 against UBA-Neuglobsow MPSS from May 22, 2019 8 PM – May 23, 2019 6 AM. Multiple charge correction, internal diffusion losses and CPC efficiency are included in different steps.

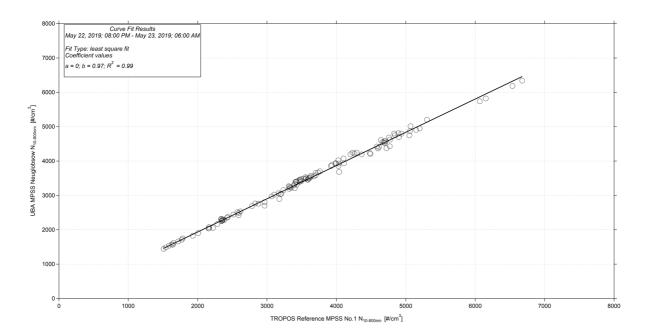


Figure 18: Linear regression between the number concentrations of the TROPOS Reference MPSS No.1 and UBA-Neuglobsow MPSS. Multiple charge correction, internal diffusion losses and CPC efficiency are included.









Status May 23 – 24, 2019

Instrument Settings, Time Series, Particle Number Size Distribution and Correlation

Table No. 3:

Date of checking list: 23.05.2019 Instrument	Institute: Umweltbund	esamt				
Date of checking list: 23.05.2019 Instrument	Station: Neuglobsow					
Instrument		23.05.2019				
MPSS/Classifier: TROPOS ST OFF	Instrument/		SN	Date/Code	CPC-Status	HV-Status
TROPOS CT 5 V	Components	, and the second				
Firmware Software:	MPSS/Classifier:	TROPOS			ST	OFF
DMA type: Vienna CabT 1000 V	Firmware Classifier:	TROPOS			CT	5 V
TSI CPC 3772 70944032 AP 250 V	Firmware Software:	6.68			OT	10 V
Firmware CPC: 2.11 OP 5 V radioactive source: Kr-85 MD-110-12E-S Aerosol Nafton Dryer O72717-17-06 O72717-17-	DMA type:	Vienna			CabT	1000 V
radioactive source: Kr-85 MD-110-12E-S Aerosol Nafion Dryer ND0.7-114d M-Aerosol inlet dryer Flow CPC (l/min): LC 600 V Flow Display (l/min): Series (l/min): Maintenance Aerosol inlet: Aerosol inlet: Aerosol inlet: Sheath Nafion dryer: System running with nafion dryer reinstalled Sheath Nafion dryer: System running with nafion dryer reinstalled Sheath Nafion dryer: Space: Source: Source: Sheath RH/T- sensor: Pressure sensor; Filter: NI-card: CPC: Impactor: Sheath Sheath CPC: Sheath Sheath CPC: Sheath Sheath RH/T- sensor: Pressure sensor; Filter: NI-card: CPC: Impactor: Sheath	CPC model:	TSI CPC 3772	70944032		AP	250 V
Aerosol Nafion Dryer Sheath Nafion Dryer ND0.7-114d ND0.7-153 ND0.	Firmware CPC:	2.11			OP	5 V
Dryer 072717-17-06 ND0.7-114d ND0.7-114d ND0.7-153 EC 600 V Flow CPC (l/min): LC 600 V Flow Display (l/min): Rerosol inlet: Aerosol inlet: Aerosol inlet: Aerosol inlet: Aerosol Nafion dryer: System running with nafion dryer- Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	radioactive source:	Kr-85			NP	400 V
Sheath Nafion Dryer ND0.7-114d ND0.7-153	Aerosol Nafion		MD-110-12E-S			
Aerosol inlet dryer ND0.7-153 LC 600 V Flow CPC (l/min):	Dryer		072717-17-06			
Flow CPC (I/min): Flow Inlet (I/min): 1.008 Flow Display (I/min): Zero (#/cm³): Maintenance Merosol inlet: Merosol Nafion dryer: System running with nafion dryer-Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Merosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Sheath Nafion Dryer					
Flow Inlet (I/min): Flow Display (I/min): Zero (#/cm³): Maintenance Merosol inlet: Merosol Nafion dryer: System running with nafion dryer- Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Merosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Aerosol inlet dryer		ND0.7-153			
Flow Display (I/min): Zero (#/cm³): Maintenance Aerosol inlet: Aerosol Nafion dryer: System running with nafion dryer- Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Flow CPC (l/min):				LC	600 V
(I/min): 650 V Maintenance Maintenance Maintenance Maintenance Maintenance System running with nafion dryer- Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Flow Inlet (l/min):	1.008				800 V
Zero (#/cm³): Maintenance Aerosol inlet: Aerosol Nafion dryer: System running with nafion dryer-Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Flow Display					700 V
Maintenance Aerosol inlet: Aerosol Nafion dryer: System running with nafion dryer- Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	(l/min):					
Aerosol inlet: Aerosol Nafion dryer: System running with nafion dryer- Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Zero (#/cm³):					650 V
Aerosol Nafion dryer: System running with nafion dryer-Nafion dryer reinstalled Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:			Mainter	папсе		
Sheath Nafion dryer: Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Aerosol inlet:					
Source: HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Aerosol Nafion dryer:		System ru	nning with nafio	on dryer- Nafion dry	er reinstalled
HV power supply: DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Sheath Nafion dryer:	<u>-</u>				
DMA: Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	Source:					
Aerosol/sheath RH/T- sensor: Pressure sensor: Filter: NI-card: CPC: Impactor:	HV power supply:					
Pressure sensor: Filter: NI-card: CPC: Impactor:	DMA:					
Filter: NI-card: CPC: Impactor:	Aerosol/sheath RH/T- s	sensor:				
NI-card: CPC: Impactor:	Pressure sensor:					
CPC: Impactor:	Filter:					
Impactor:	NI-card:					
	CPC:					
	Impactor:					
Setup settings over night:	Setup settings over nigi	ht:				

Institute: TROPOS							
Station: Reference Ins	trument No.1						
Date of checking list: 2	3.05.2019						
Instrument/	info	Serial Number	Date/Code	CPC	-Status	HV-St	atus
Components							
MPSS/Classifier:	TROPOS	No.1		ST		0 V	
Firmware Classifier:				CT		5 mV	
Firmware Software:	TROPOS 6.68			OT		800 mV	
DMA type:	Hauke medium		142	CabT		200 mV	
CPC model:	TSI 3772	3772141701		AP		0 V	
Firmware CPC:	2.15			OP			
Radioactive source:	Kr.85	NER 8275	002/13	NP			
Flow Inlet (l/min):	1.02			LC			
Zero (#/cm³):	0]					











Institute: TROPOS					
Station: Reference Total	tal CPC				
Date of checking list: 2	3.05.2019				
Instrument/	info	Serial Number	Cut off	CPC	-Status
Components					
CPC model:	TSI 3010	2410	D _{p50} 10 nm	ST	
Firmware CPC:	2.15			CT	
Flow Inlet (l/min):	1.01			OT	
Zero (#/cm³):	0			CabT	
		_		AP	
				OP	
				NP	
				LC	

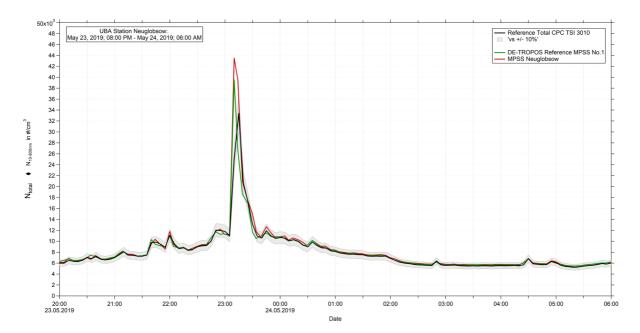


Figure 19: Time series (May 23, 2019 8 PM - May 24, 2019 6 AM) of the integrated particle number concentration ($N_{10-800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.









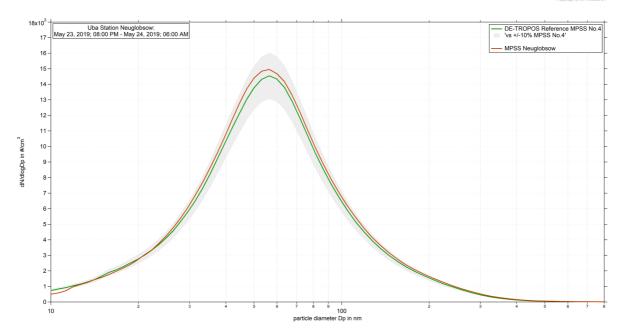


Figure 20: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.1 against UBA-Neuglobsow MPSS from May 23, 2019 8 PM – May 24, 2019 6 AM. Multiple charge correction, internal diffusion losses and CPC efficiency are included in different steps.

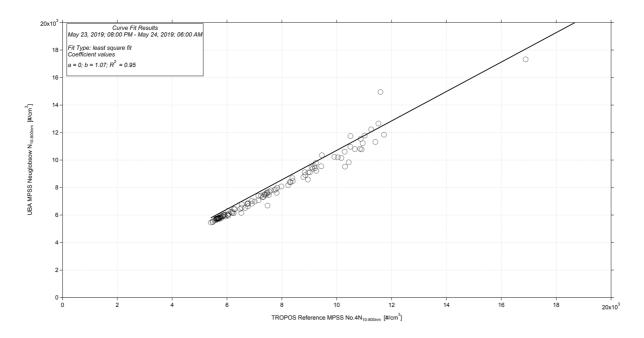


Figure 23: Linear regression between the number concentrations of the TROPOS Reference MPSS No.1 and UBA-Neuglobsow MPSS. Multiple charge correction, internal diffusion losses and CPC efficiency are included.









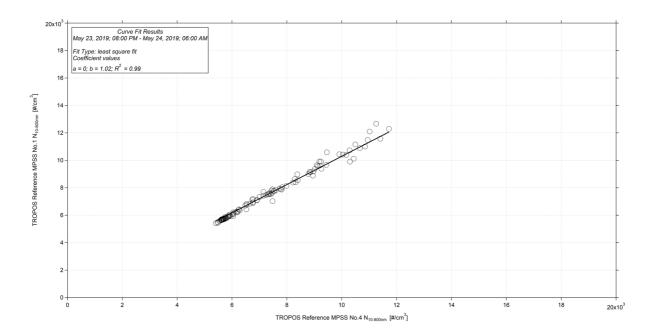


Figure 24: Linear regression between the number concentrations of the TROPOS Reference MPSS No.4 and TROPOS Reference MPSS No.1. Multiple charge correction, internal diffusion losses and CPC efficiency are included









Final-Status May 24 – 27, 2019

Instrument Settings, Time Series, Particle Number Size Distribution and Correlation

Table No. 3:

Institute: Umweltbund	esamt				
Station: Neuglobsow					
Date of checking list: 2	24.05.2019				
Instrument/	info	SN	Date/Code	CPC-Statu	s HV-Status
Components					
MPSS/Classifier:	TROPOS			ST	OFF
Firmware Classifier:	TROPOS			CT	5 V
Firmware Software:	6.68			OT	10 V
DMA type:	Vienna			CabT	1000 V
CPC model:	TSI CPC 3772	70944032		AP	250 V
Firmware CPC:	2.11			OP	5 V
radioactive source:	Kr-85			NP	400 V
Aerosol Nafion		MD-110-12E-S			
Dryer		072717-17-06			
Sheath Nafion Dryer		ND0.7-114d			
Aerosol inlet dryer		ND0.7-153			
Flow CPC (l/min):				LC	600 V
Flow Inlet (l/min):	1.008				800 V
Flow Display					700 V
(l/min):					
Zero (#/cm³):					650 V

Institute: TROPOS							
Station: Reference Ins	trument No.1						
Date of checking list: 2	4.05.2019						
Instrument/	info	Serial Number	Date/Code	CPC-Status HV-Statu		atus	
Components							
MPSS/Classifier:	TROPOS	No.1		ST		0 V	
Firmware Classifier:				CT		5 mV	
Firmware Software:	TROPOS 6.68			OT		800 mV	
DMA type:	Hauke medium		142	CabT		200 mV	
CPC model:	TSI 3772	3772141701		AP		0 V	
Firmware CPC:	2.15			OP			
Radioactive source:	Kr.85	NER 8275	002/13	NP			
Flow Inlet (l/min):	1.02			LC			
Zero (#/cm ³):	0					<u> </u>	

Institute: TROPOS						
Station: Reference Total	tal CPC					
Date of checking list: 2	4.05.2019					
Instrument/	info	Serial Number	Cut off	CPC-Status		
Components						
CPC model:	TSI 3010	2410	D _{p50} 10 nm	ST		
Firmware CPC:	2.15			CT		
Flow Inlet (l/min):	1.01			OT		
Zero (#/cm³):	0			CabT		
				AP		
				OP		
				NP		
				LC		











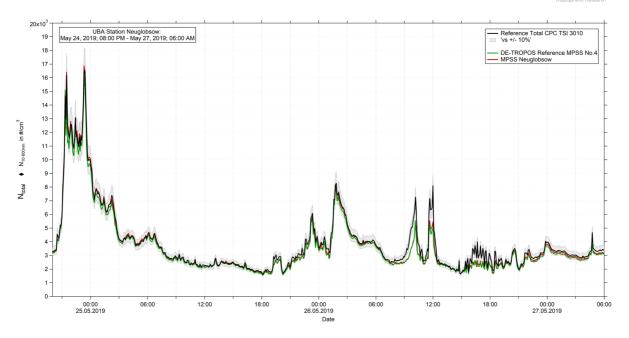


Figure 25: Time series (May 23, 2019 8 PM - May 24, 2019 6 AM) of the integrated particle number concentration ($N_{10-800nm}$) of the MPSS and total number concentration (N_{total}) of the Reference TSI-CPC Model 3010. Multiple charge correction, internal diffusion losses and CPC flow corrections are included.

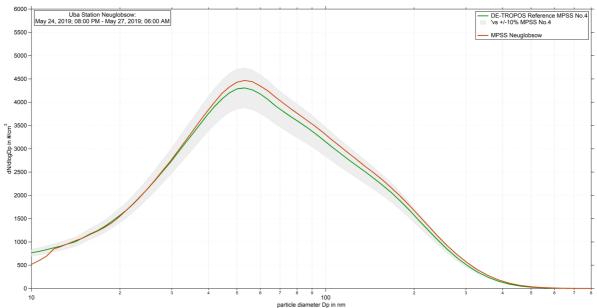


Figure 26: Comparison of mean particle number size distribution of TROPOS Reference MPSS No.4 against UBA-Neuglobsow MPSS from May 24, 2019 8 PM – May 27, 2019 6 AM. Multiple charge correction, internal diffusion losses and CPC efficiency are included in different steps.









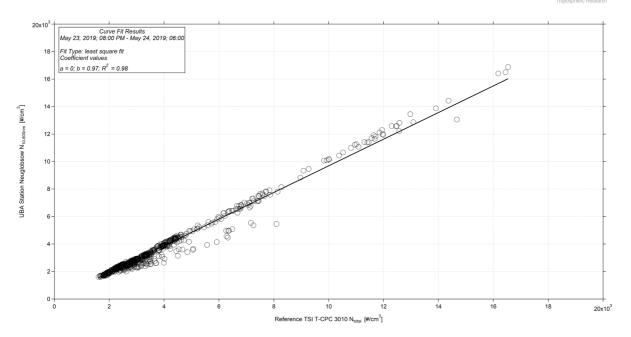


Figure 27: Linear regression between the number concentrations of the TROPOS Reference TSI T-CPC Model 3010 and UBA-Neuglobsow MPSS. Multiple charge correction, internal diffusion losses and CPC efficiency are included.

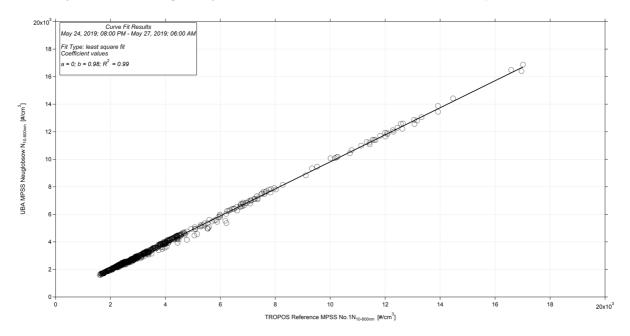


Figure 28: Linear regression between the number concentrations of the TROPOS Reference MPSS No.1 and UBA-Neuglobsow MPSS. Multiple charge correction, internal diffusion losses and CPC efficiency are included.









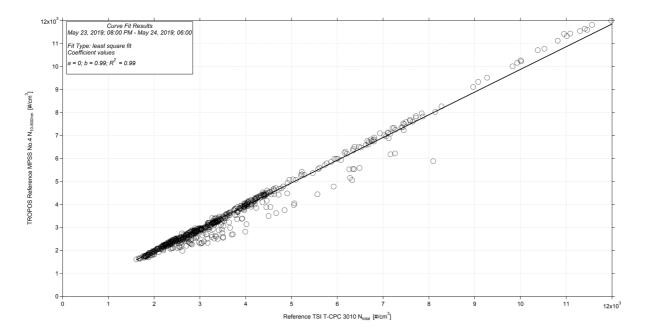


Figure 29: Linear regression between the number concentrations of the TROPOS Reference MPSS No.4 and TROPOS Reference T-CPC 3010. Multiple charge correction, internal diffusion losses and CPC efficiency are included.