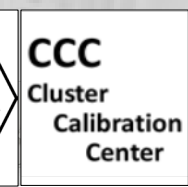


News from OGTAC-CC

Falk Mothes and Hartmut Herrmann

Atmospheric Chemistry Department (ACD),
Leibniz Institute for Tropospheric Research (TROPOS),
Permoserstraße 15, 04318 Leipzig, Germany

Aerosol in situ community meeting within the ACTRIS week 2026



Outline

- Who we are
- Implementation status:
 - Training of scientists and operators
 - Key updates – Technical requirements and measurement guidelines
 - Interlaboratory comparisons as QA/QC measure
 - a) Status 2nd ILC on SOA target compounds modules 4-6
 - b) Planning 2026 ILC BB modules 1+2



(Part of) The TROPOS Atmospheric Chemistry Department (ACD) Team

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(PI OGTAC-CC)

Contact person: Dr. Falk Mothes (mothes@tropos.de)

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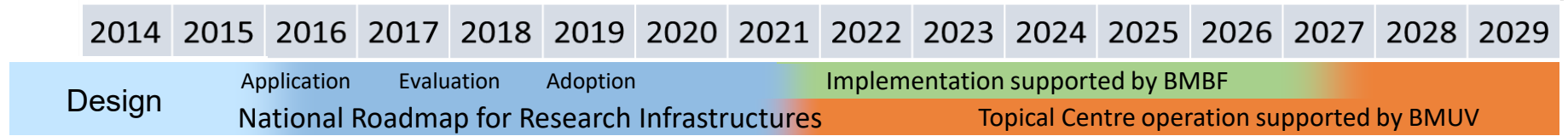


Sylvia Haferkorn



OGTAC-CC @ACTRIS week October 2026

Current status within the implementation phase

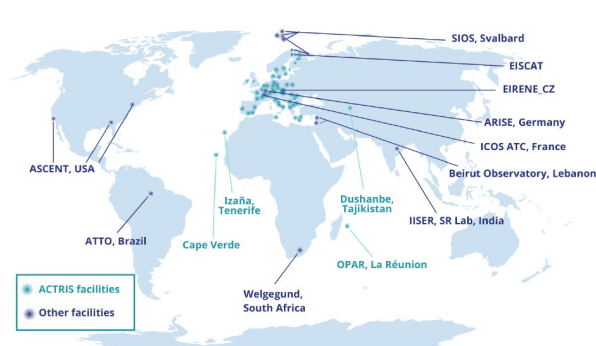
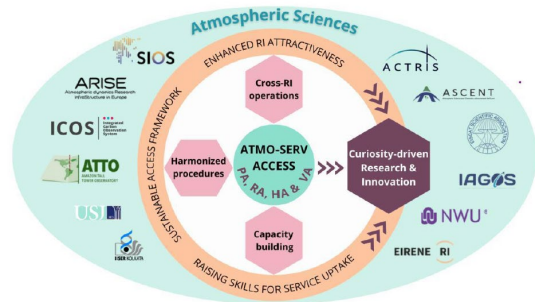


2 main activities:

1) Training of operators and scientists – fully operational

2) Calibration Centre Activities

a) implementation → b) operation



+ Trans National Access (TNA), new project **ATMO-SERV** started September 2026 until 2030, supports curiosity driven science!

Hands-on training workshops @TROPOS ACD, Leipzig (Germany)

Topic: Theory and practice – Offline chromatographic (LC-MS and GC-MS) determination of organic tracer compounds and organic and elemental carbon (OC/EC) measurements in particulate matter collected on filters

**Next course:
Spring 2027**
Pre-registration welcome

The course will be held for 5 days from **Monday 2nd to Friday 6th of November 2026** at TROPOS ACD in Leipzig. The number of participants is limited to 8.

BOOKED

The course is free of charge. Participants have to cover only their travel and accommodation costs.

For any questions contact Dr. Falk Mothes (mothes@tropos.de).



Training on sample collection (chamber and field), filter extraction, analysis and quantification



Training at state-of-the-art analytical instrumentation



Lectures in atmospheric particle related chemical analysis

Course is funded by



The operators of future NFs planning to measure particulate organics from filters should consider the participation at the training course as a part of their QA/QC measures.

OGTAC-CC @ACTRIS week October 2026



Current status within the implementation phase

Calibration Centre Activities – task chain

- List of target compounds set up, e.g., biomass burning or secondary organic aerosol constituents of biogenic and anthropogenic origin
- Set up technical requirements, for all steps from sampling to the quantitative result, set Data Quality Objectives (DQO)
- Development of measurement guidelines based on the technical requirements and Interlaboratory Comparisons (ILCs)
- Standard Operating Procedure (SOP) templates needs to be finalized by each NF individually together with the calibration centre
- NF individual SOP will finally need approval by the calibration centre
- QA/QC procedures, e.g., performance test by ILCs
- Develop workflow for offline data submission (delayed, part of ACTRIS NEXT)

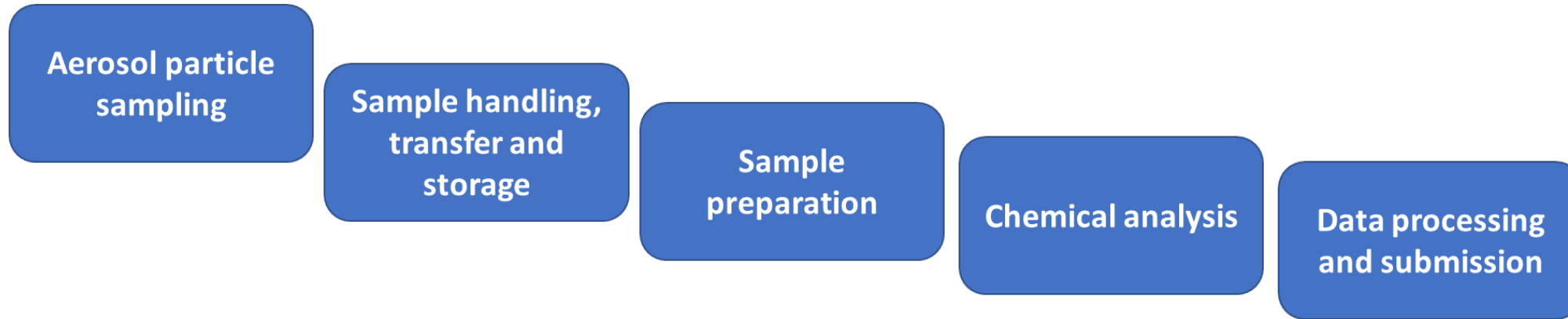


List of target compounds

- Currently 7 modules
- (living document)
- Min. requirement for label: 2 target compounds from one or more modules
- Opt.: Maximum outcome (from one analytical procedure)

Module name			Module	SOA - aldehydes	
Module	Biomass burning (Anhydromonosaccharides)		1	Vanillin	C8H8O3
1	Levoglusosan	C6H5O10	2	Syringaldehyde	C9H10O4
2	Mannosan	C6H5O10	3	Coniferyl aldehyde	C10H10O3
3	Galactosan	C6H5O10	4	Acetosyringone (3,5-dimethoxy-4-hydroxyacetophenone)	C10H12O4
Module			Module		
Primary biogenic (pollen / fungal spores)			SOA - nitroaromatics		
1	Erythritol	C4H10O4	1	2-Nitrophenol	C6H5NO3
2	Arabitol	C5H12O5	2	4-nitrophenol	C6H5NO3
3	Glucose	C6H12O6	3	2,4 Dinitrophenol	C6H4N2O5
4	Fructose	C6H12O6	4	3-Nitrocatechol	C6H5NO4
5	Mannose	C6H12O6	5	4-nitrocatechol	C6H5NO4
6	Galactose	C6H12O6	6	2-methyl-4-nitrophenol	C7H7NO3
7	Mannitol	C6H14O6	7	4-Nitroguaiacol	C7H7NO4
8	Ergosterol	C28H44O	8	4-Methyl-5-nitrocatechol	C7H7NO4
Module			9	3-methyl-5-nitrocatechol	C7H7NO4
Organic ions (inorganic IC measurement byproducts)			Module		
1	Oxalate	C2O4 ²⁻	16 EPA PAHs		
2	Formate	CHO2 ⁻	1	Naphthalene	C10H8
3	Methane sulfonic acid	CH4O3S ⁻	2	Acenaphthylene	C12H8
Module			3	Acenaphthene	C12H10
Biogenic SOA - acids			4	Fluorene	C13H10
1	Terebic acid	C7H10O4	5	Phenanthrene	C14H10
2	Vanillic acid	C8H8O4	6	Anthracene	C14H10
3	Isovanillic acid	C8H8O4	7	Fluoranthene	C16H10
4	MBTCA	C8H12O6	8	Pyrene	C16H10
5	Norpinonic acid	C9H14O3	9	Benz(a)anthracene	C18H12
6	Pinic acid	C9H14O4	10	Chrysene	C18H12
7	Pinonic acid	C10H16O3	11	Benzo[b]fluoranthene	C20H12
			12	Benzo[k]fluoranthene	C20H12
			13	Benzo[a]pyrene	C20H12
			14	Indeno[1,2,3-cd]pyrene	C22H12
			15	Benzo[ghi]perylene	C22H12
			16	Dibenz[a,h]anthracene	C22H14

Technical requirements and measurement guidelines - status



- a) Technical requirements documentation (general instrumental setup and infrastructure needed to provide data about particulate organics, personnel resources not included)
- b) Measurement guidelines documentation (module-specific)
 - Up to now 13 NFs (11 observatories and 2 atmospheric simulation chambers) announced to measure particulate organic tracers collected on filters (offline)

Status „technical requirements“ documentation

- General information about instrumental setup and infrastructure needed to provide data about particulate organics
- Document available on the cais-ecac website:
<https://www.actris-ecac.eu/>

Technical requirements for the ACTRIS Aerosol In-Situ variable “Mass concentration of particulate organics”

Centre for Aerosol In-Situ – European Centre for Aerosol
Calibration and Characterization (CAIS-ECAC)

OrGanic Tracers and Aerosol Constituents - Calibration
Centre (OGTAC-CC)

Falk Mothes and Hartmut Herrmann

Atmospheric Chemistry Department (ACD), Leibniz Institute for Tropospheric Research (TROPOS),
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Status „technical requirements“ documentation

- Overview about general Data Quality Objectives
- Recommended and supported analytical techniques set for module 1, other modules pending (Tbd.) (associated ILCs ongoing/planned)

3 Data Quality Objectives

Data quality objectives (DQOs) define the type, quality and quantity required of primary data and derived parameters to yield information that can be used to support decisions. In particular, DQOs specify tolerable levels of uncertainty in the data, required completeness, comparability and representativeness based on the decisions to be made.¹

The DQOs in the present document are a compromise between the scientific need, the chemical (and physical) properties of interest of the target compounds and the existing instrumentation. The main general DQOs are summarized in Table 2, whereas module specific figures of merit are listed in Table 3.

Table 2: General Data Quality Objectives (DQOs) for organic tracers and aerosol constituents.

DQO	Description
Sampler	High- or Low-volume sampler and cascade impactors according to DIN EN 12341:2023-10. ²
Field blank sampling	Minimum number shall correspond to 5% of the number of real measurement samples or minimum once a month.
Measurement time (data resolution)	It is recommended to measure on a continuous basis, minimum requirement is a weekly sample or one sample per week. Exceptions: intensive measurement campaigns with a minimum requirement of 5 samples per campaign with two campaigns per year (ideally in two different seasons), need to be individually discussed with the calibration centre (CC).
Analytical instrument calibration	5 concentration levels, measured as triplicate
Maximum laboratory bias	Module dependent – see the measurement guidelines documentation
Limit of detection	Module dependent – see the measurement guidelines documentation
Data coverage	≥ 80% of the planned yearly activity. Technical issues and maintenance to be done by the manufacturer are excluded.
Data provision	Beginning of the next year for the full year before: 1) submission to the CC - Deadline 31 st of March 2) submission to the DC - Deadline 31 st of May
Interlaboratory comparisons	Participation in biennial module-specific ILCs and stay within the maximum laboratory bias, the ILC data is discussed with the participants in a workshop after the data is assessed.

In any case, the NF must ensure that the operation of the technical part is organized in that way, that everything impacting the quality of the data is well monitored, documented and considered in the data control process.



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7.2 Recommended and supported analytical techniques

Table 3 summarizes the recommended and supported analytical techniques by OGTAC-CC and the corresponding figures of merit to be met for the determination of particulate organics.

Table 3: Recommended and supported analytical techniques and analytical figures of merit to be met for the determination of particulate organic tracers.

Module and target compounds	CAS number	Recommended and supported analytical technique	Maximum laboratory bias	Analytical limit of detection [mg L ⁻¹]
1) Biomass burning				
Levoglucosan	498-07-7	HPAEC-PAD	20%	0.05
Mannosan	14168-65-1		20%	0.05
Galactosan	644-76-8		20%	0.1
2) Primary biogenic				
Erythritol	149-32-6	Tbd.	Tbd.	Tbd.
Arabitol	D=488-82-4; L=7643-75-6	Tbd.	Tbd.	Tbd.
Glucose	D=50-99-7; L=921-60-8	Tbd.	Tbd.	Tbd.
Fructose	D=57-48-7; L=7776-48-9	Tbd.	Tbd.	Tbd.
Mannose	D=3458-28-4; L=10030-80-5	Tbd.	Tbd.	Tbd.
Galactose	D=59-23-4; L=15572-79-9	Tbd.	Tbd.	Tbd.
Mannitol	D=69-65-8; L=643-01-6	Tbd.	Tbd.	Tbd.
Ergosterol	57-87-4	Tbd.	Tbd.	Tbd.
3) Organic ions				

Status „measurement guidelines“ documentation

- Module-specific information
- Document for Biomass Burning tracer compounds from module 1 available on the cais-ecac website: <https://www.actris-ecac.eu/>
- Feedback welcome

Measurement guidelines for the ACTRIS Aerosol In-Situ variable “Mass concentration of particulate organics” <u>Module 1</u> Centre for Aerosol In-Situ – European Centre for Aerosol Calibration and Characterization (CAIS-ECAC) OrGanic Tracers and Aerosol Constituents - Calibration Centre (OGTAC-CC) Falk Mothes and Hartmut Herrmann Atmospheric Chemistry Department (ACD), Leibniz Institute for Tropospheric Research (TROPOS), Permoserstraße 15, 04318 Leipzig, Germany  actris.eu 1	Content 1 About this document 4 2 Data quality objectives – module 1 6 3 Terms and definitions 7 4 Symbols and abbreviations 8 5 Particle sampling protocol 8 5.1 General considerations 9 5.2 Documentation of the procedure 9 5.3 Handling of aerosol particle sampling devices 9 5.4 Sample pretreatment, storage and transport 9 5.5 Control, cleaning and maintenance 11 5.6 Data resolution, coverage and provision 11 6 Laboratory analysis protocol – module 1 13 6.1 Biomass Burning module 13 6.1.1 Documentation 13 6.1.2 Sample preparation 13 6.1.3 Analytical procedure 14 7 Data quality control and quality assurance 18 7.1 Particle sampling protocol 18 7.2 Laboratory analysis protocol 18 7.3 Data submission and data products 19 8 References 19 9 Annex 21 9.1 Example of a particle sampling protocol 21 9.2 Application example HPAEC-PAD for the compounds of the Biomass Burning module 1: levoglucosan, mannosan and galactosan 23 9.2.1 Apparatus 23 9.2.2 Operating parameters 23  actris.eu 2	9.2.3 Chemicals and accessories 23 9.2.4 Procedure 24 9.2.4.1 Calibration standards 24 9.2.4.2 Eluent preparation 25 9.2.4.3 Sample preparation 25 9.2.4.4 Preparation of instrumentation 25 9.2.4.5 Separation and detection conditions 25 9.2.4.6 Analysis 26 9.2.4.7 Limits of detection 26 9.2.4.8 Chromatograms 27 9.3 Draft offline data workflow OGTAC-CC for metadata provision 28  actris.eu 3
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Interlaboratory comparisons (ILCs) as QA/QC measure

Status 2nd OGTAC-CC ILC within ACTRIS

- Results provide important input for the measurement guidelines of target compounds from module 4 - 6

Module	Biogenic SOA - acids			
1	Terebic acid	C7H10O4	2,2-dimethyl-5-oxoxolane-3-carboxylic acid	79-91-4
2	Vanillic acid	C8H8O4	4-hydroxy-3-methoxybenzoic acid	121-34-6
3	Isovanillic acid	C8H8O4	3-hydroxy-4-methoxybenzoic acid	645-08-9
4	MBTCA	C8H12O6	3-methylbutane-1,2,3-tricarboxylic acid	77370-41-3
5	Norpinonic acid	C9H14O3	3-Acetyl-2,2-dimethylcyclobutane-1-carboxylic acid	473-68-7
6	Pinic acid	C9H14O4	3-(carboxymethyl)-2,2-dimethylcyclobutane-1-carboxylic acid	473-73-4
7	Pinonic acid	C10H16O3	2-(3-acetyl-2,2-dimethylcyclobutyl)acetic acid	473-72-3
Module	SOA - aldehydes			
1	Vanillin	C8H8O3	4-hydroxy-3-methoxybenzaldehyde	121-33-5
2	Syringaldehyde	C9H10O4	4-hydroxy-3,5-dimethoxybenzaldehyde	134-96-3
3	Coniferyl aldehyde	C10H10O3	(E)-3-(4-hydroxy-3-methoxyphenyl)prop-2-enal	458-36-6
4	Acetosyringone (3,5-dimethoxy-4-hydroxyacetophenone)	C10H12O4	1-(4-hydroxy-3,5-dimethoxyphenyl)ethanone	2478-38-8
Module	SOA - nitroaromatics			
1	2-Nitrophenol	C6H5NO3	2-nitrophenol	88-75-5
2	4-nitrophenol	C6H5NO3	4-nitrophenol	100-02-7
3	2,4-Dinitrophenol	C6H4N2O5	2,4-dinitrophenol	51-28-5
4	3-Nitrocatechol	C6H5NO4	3-nitrobenzene-1,2-diol	6665-98-1
5	4-nitrocatechol	C6H5NO4	4-nitrobenzene-1,2-diol	3316-09-4
6	2-methyl-4-nitrophenol	C7H7NO3	2-methyl-4-nitrophenol	99-53-6
7	4-Nitroguaiacol	C7H7NO4	2-methoxy-4-nitrophenol	3251-56-7
8	4-Methyl-5-nitrocatechol	C7H7NO4	4-methyl-5-nitrobenzene-1,2-diol	68906-21-8
9	3-methyl-5-nitrocatechol	C7H7NO4	3-methyl-5-nitrobenzene-1,2-diol	5378-76-7

2nd OGTAC-CC ILC: general overview

- Planned duration was 3 months (March – June 2026) for the full program:
 - Send around the test samples + analysis + provision of results
- **Participants shall use their individual analytical measurement setup** but need to follow some specific guidelines given by the CC

Measurement program:

- Each laboratory received 3 spots (Ø 2cm) from 3 real ambient filter samples and 1 blank filter, where each spot should be extracted and analyzed individually (→ 12 individual results)
- 2 standard solution samples to be measured as triplicate

2nd OGTAC-CC ILC: general overview

- 8 European laboratories participated
- 3 different analytical procedures applied (GC-MS, LC-MS, IC-MS)
- Each laboratory was asked to provide as much as possible target compounds based on their analytical protocol
- Still 2 data sets missing → data treatment still pending
- Obvious problem: number of “participants” per compound is low (range: 1 – 5)

		Laboratory code							
Target compound		1+10	2	3	4	5	6	7	8
Module	Biogenic SOA - acids								
1	Terebic acid								
2	Vanillic acid								
3	Isovanillic acid								
4	MBTCA								
5	Norpinonic acid								
6	Pinic acid								
7	Pinonic acid								
Module	SOA - aldehydes								
1	Vanillin								
2	Syringaldehyde								
3	Coniferyl aldehyde								
4	Acetosyringone (3,5-dimethoxy-4-hydroxyacetophenone)								
Module	SOA - nitroaromatics								
1	2-Nitrophenol								
2	4-nitrophenol								
3	2,4 Dinitrophenol								
4	3-Nitrocatechol								
5	4-nitrocatechol								
6	2-methyl-4-nitrophenol								
7	4-Nitroguaiacol								
8	4-Methyl-5-nitrocatechol								
9	3-methyl-5-nitrocatechol								

Interlaboratory comparisons (ILCs)

Status 2026 ILC BB module 1+2

- 2nd ILC for the BB tracer compounds from module 1 (1st was 2024)

	Module name	sum formula	IUPAC	CAS number
Module 1	Biomass burning (Anhydromonosaccharides)			
1	Levoglusosan	C6H5O10	(1R,2S,3S,4R,5R)-6,8-dioxabicyclo[3.2.1]octane-2,3,4-triol	498-07-7
2	Mannosan	C6H5O10	(1R,2S,3S,4S,5R)-6,8-dioxabicyclo[3.2.1]octane-2,3,4-triol	14168-65-1
3	Galactosan	C6H5O10	(1R,2R,3S,4R,5R)-6,8-dioxabicyclo[3.2.1]octane-2,3,4-triol	644-76-8
Module 2	Primary biogenic (pollen / fungal spores)			
1	Erythritol	C4H10O4	(2S,3R)-butane-1,2,3,4-tetrol	149-32-6
2	Arabitol	C5H12O5	(2R,4R)-pentane-1,2,3,4,5-pentol	D=488-82-4; L=7643-75-6
3	Glucose	C6H12O6	(3R,4S,5S,6R)-6-(hydroxymethyl)oxane-2,3,4,5-tetrol	D=50-99-7; L=921-60-8
4	Fructose	C6H12O6	(3S,4R,5R)-1,3,4,5,6-pentahydroxyhexan-2-one	D=57-48-7; L=7776-48-9
5	Mannose	C6H12O6	(3S,4S,5S,6R)-6-(hydroxymethyl)oxane-2,3,4,5-tetrol	D=3458-28-4; L=10030-80-5
6	Galactose	C6H12O6	(3R,4S,5R,6R)-6-(hydroxymethyl)oxane-2,3,4,5-tetrol	D=59-23-4; L=15572-79-9
7	Mannitol	C6H14O6	(2R,3R,4R,5R)-hexane-1,2,3,4,5,6-hexol	D=69-65-8; L=643-01-6
8	Ergosterol	C28H44O	(3S,9S,10R,13R,14R,17R)-17-[(E,2R,5R)-5,6-dimethylhept-3-en-2-yl]-10,13-dimethyl-2,3,4,9,11,12,14,15,16,17-decahydro-1H-cyclopenta[a]phenanthren-3-ol	57-87-4

2026 ILC BB module 1+2 - status

Now	Official announcement of the 2026 ILC BB module 1+2 within ACTRIS
10 th of November 2026	Send out the filter samples and standard solutions
November to January 2027	Time for the measurements
29 th of January 2027	Deadline for data submission to the calibration centre

- Each laboratory will receive 3 spots ($\varnothing$ 2cm) from 7 filter samples, where each spot should be extracted and analyzed individually ($\rightarrow$ 21 individual results + 1 blank filter punch as control)
- 2 water based standard solution samples, where each standard sample should be measured as triplicate



17 participating laboratories

Last minute interested? contact me via: mothes@tropos.de

Summary

- Technical requirements online
- Measurement guidelines for module 1 online
- ILCs as QA/QC measure ongoing, next regarding PAHs foreseen in 2027
- Community meetings will continue, **next meeting in spring 2028 (or earlier on request)**
- Training activities on state of the art instrumentation for particulate organics always two times per year



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Thanks for your attention!

Surplus