Technical Requirements Documentation

instrumental setup and infrastructure
needed to provide data about offline particulate organics
(personnel resources not included)

2nd OGTAC-CC community meeting within the framework of the
CAIS-ECAC CF 04/2026

Leibniz Association

TROPOS
Leibniz Institute for Tropospheric Research

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List of target compounds and minimum requirements

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List of supported target compounds

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

Status:

- 5 Observatory NFs measuring modules 1 and 2 (+3)
- 2 exploratory NFs plan to measure partly module 4-6
- Any new NF interested?

	Module name
Module 1	Biomass burning (Anhydromonosaccharides)
1	Levoglusosan
2	Mannosan
3	Galactosan
Module 2	Primary biogenic (pollen / fungal spores)
1	Erythritol
2	Arabitol
3	Glucose
4	Fructose
5	Mannose
6	Galactose
7	Mannitol
8	Ergosterol
Module 3	Organic ions (inorganic IC mesaurement byproducts)
1	Oxalate
2	Formate
3	Methane sulfonic acid
Module 4	Biogenic SOA - acids
1	Terebic acid
2	Vanillic acid
3	Isovanillic acid
4	MBTCA
5	Norpinonic acid
6	Pinic acid
7	Pinonic acid

Module 5	SOA - aldehydes
1	Vanillin
2	Syringaldehyde
3	Coniferyl aldehyde
4	Acetosyringone (3,5-dimethoxy-4-hydroxyacetophenc
Module 6	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
Module 7	16 EPA PAHs
1	Naphthalene
2	Acenaphthylene
3	Acenapthene
4	Fluorene
5	Phenanthrene
6	Anthracene
7	Fluoranthene
8	Pyrene
9	Benz(a)anthracene
10	Chrysene
11	Benzo[b]fluoranthene
12	Benzo[k]fluoranthene
13	Benzo[a]pyrene
14	Indeno[1,2,3-cd]pyrene
15	Benzo[ghi]perylene
16	Dibenz[a,h]anthracene

Overview active NFs

Module	Name of the module
1	Biomass burning
2	Primary biogenic
3	Organic ions
4	Biogenic SOA – acids
5	SOA – aldehydes
6	SOA – nitroaromatics
7	PAHs

Currently listed NFs (planning to) measuring the variable “mass concentration of organic tracers”:

No.	NF	Country	Target compounds (module)	Measurement performing laboratory	PI
1	Birkenes	Norway	1+2	NILU	Karl Espen Yttri
2	Zeppelin	Sweden	1+2	NILU	Karl Espen Yttri
3	Melpitz	Germany	1+2+3	TROPOS	Laurent Poulain
4	Vielsalm	Belgium	1	ISSeP	Benjamin Bergmans
5	Sonnblick	Austria	1+2	TU Vienna	Anne Kasper-Giebl
6	Lecce	Italy	1+2+3	CNR-ISAC	Antonio Pennetta
7	ACD-C	Germany	4-6	TROPOS	Peter Mettke
8	Euphore	Spain	4-6	CEAM	Amalia Munoz

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Overview potential future NFs

Potential future NFs to measure the variable “mass concentration of organic tracers” because of offline OC/EC measurements (planned):

No.	NF	Country	PI
1	Pic du Midi	France	Véronique Pont
2	Puy de Dome	France	Evelyn Freney
3	Opar La Reunion	France	Valentin Duflot
4	SIRTA	France	Jean Eudes Petit
5	Waldhof	Germany	Maik Schütze
6	Athens NOA	Greece	Eleni liakakou
7	Helmos	Greece	Konstantinos Eleftheriadis
8	Finokalia	Greece	Nikos Kalivitis
9	CIAO Potenza	Italy	Lucia Mona
10	ISPRA	Italy	Jean-Philippe Putaud

No.	NF	Country	PI
11	Barcelona	Spain	Andres Alastuey
12	Montseny	Spain	Andres Alastuey
13	Montsec	Spain	Andres Alastuey
14	Granada	Spain	Lucas Alados
15	4 stations	Sweden	Erik Swietlicki
16	Wroclaw	Poland	Anetta Drzeniecka-Osiadacz
17	NAOK	Czech R.	Jakub Ondracek
18	Suchdol	Czech R.	Jakub Ondracek
19	Risoe Res. St.	Denmark	Andreas Massling
20	Villum	Denmark	Henrik Skov

List of supported target compounds

- 7 modules
- Min. requirement for label: 2 target compounds from one or more modules
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Discussion points:

- Missing targets (urgently needed)?
- …

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Data Quality Objective

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	It is recommended to measure on a continuous basis, minimum requirement is a weekly sample or one sample per week, exceptions, like intensive measurement campaigns 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 31st of March 2) submission to the DC - Deadline 31st 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."

Module dependent,
→ measurement guidelines

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Aerosol particle sampler / sampling

Current status in the document- Denuder:

“The general application of a denuder system prior the aerosol particle sample inlet is not requested for the determination of the particulate organic marker compounds. The NF only has to document in detail if a denuder system is applied, for example if sampling for the determination of particulate OC/EC is done in parallel.”

- Is any research group on that topic currently active?
- Is there an urgent need from the community to push these activities?
- Measurement campaign planned but funding/organization/dates not yet finalized…

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Impact storage conditions: levoglucosan

- Target compound: levoglucosan
- Test filter (quarz) was a real field sample from Melpitz (high volume, 24h)
- Samples stored either as filter samples or water extracts
- Reference (starting) value = day 0
- All water extracts for storage experiments were prepared at day 0
- 3 different storage conditions tested: freezer vs. fridge vs. lab ambient conditions
- Filter samples were stored in aluminum foil
- Analysis via HPAEC-PAD after water based extraction (2h, shaking)
- All experiments were performed as duplicate
- Testintervall: 7 and 28 days, respectively

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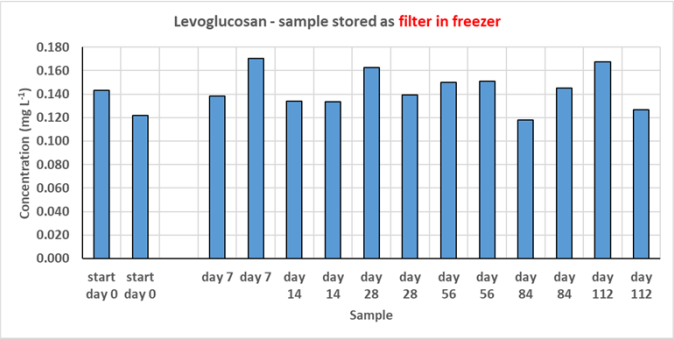
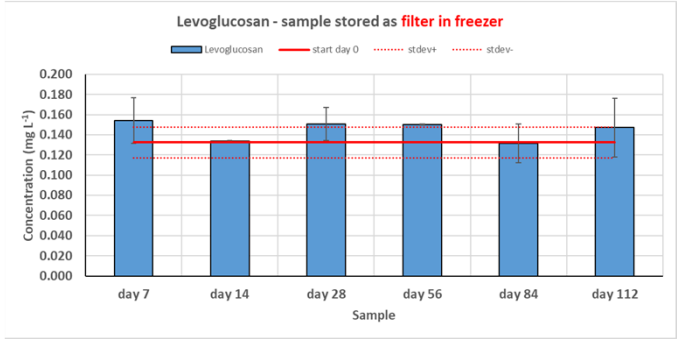
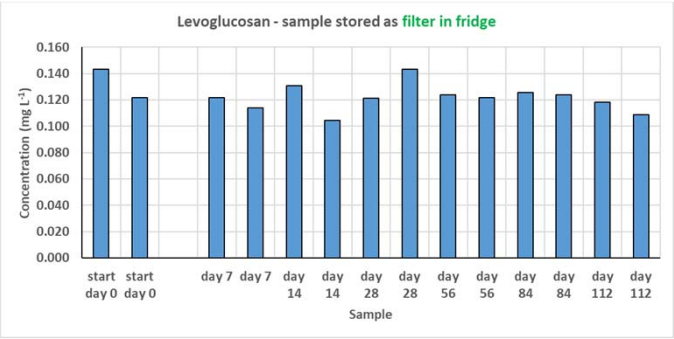
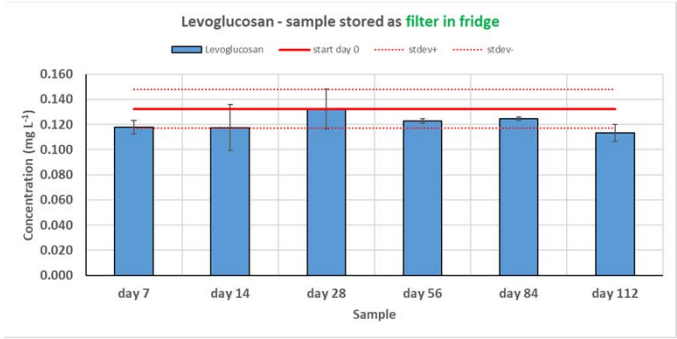
Impact storage conditions for filter samples



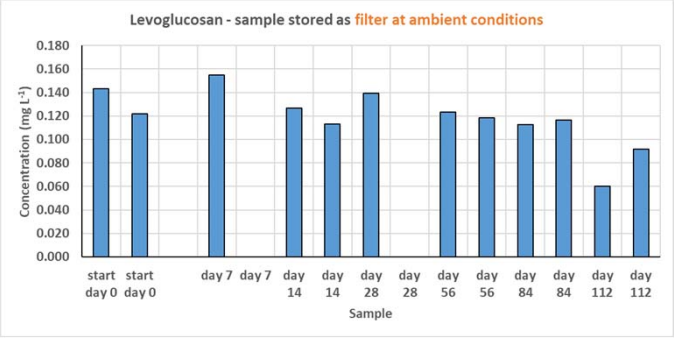


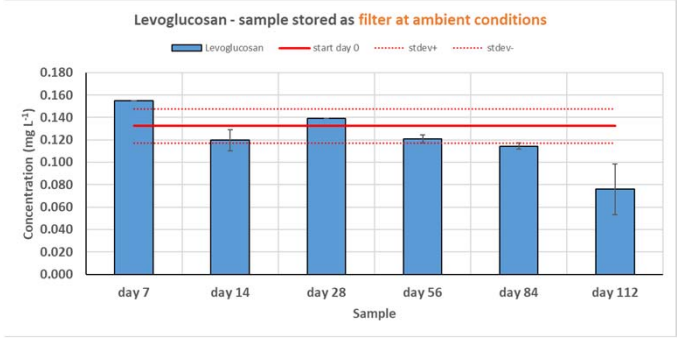
- No significant difference over the entire storage duration





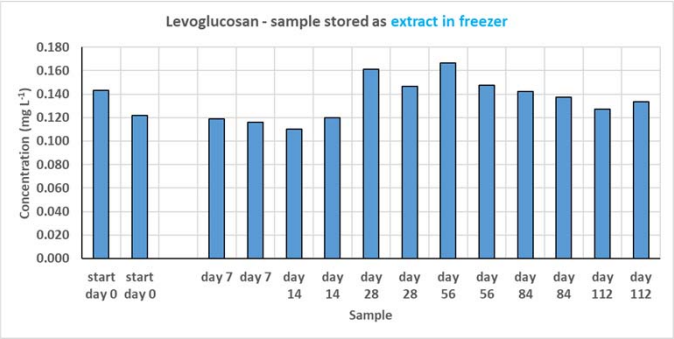
- Only very small decrease after 112 days of storage
- But still within the error of the measurements

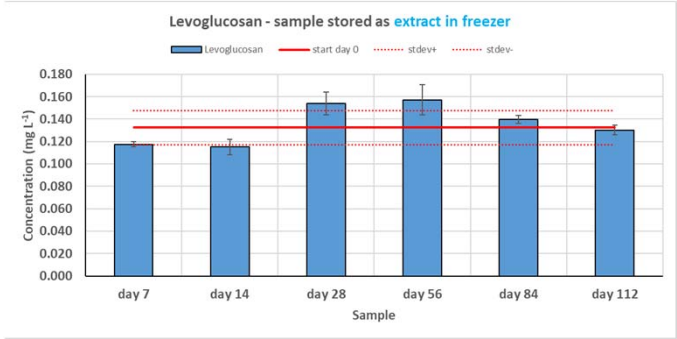




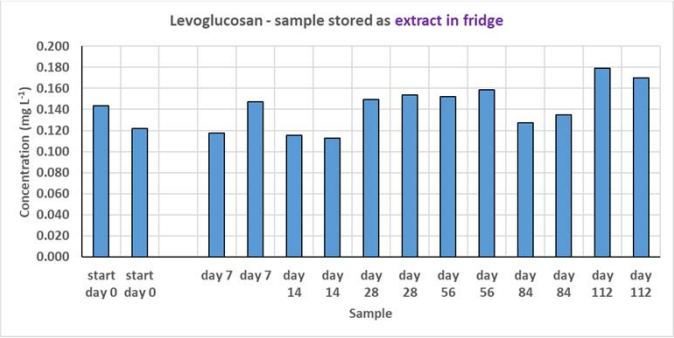
- Decrease observed after 112 days of storage
- First indication of a negative impact visible from day 84

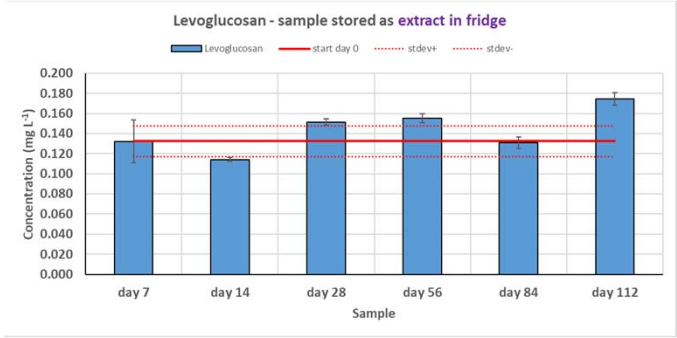
Impact storage conditions for water extracts



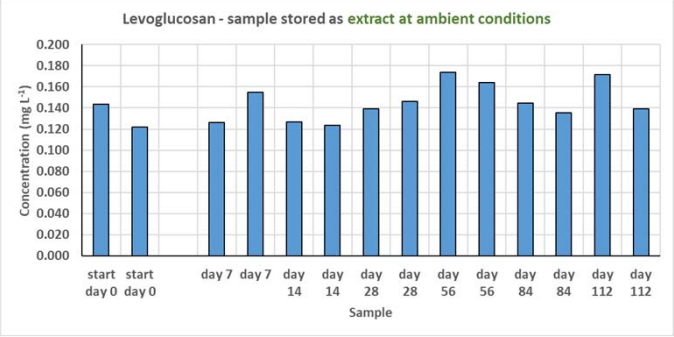


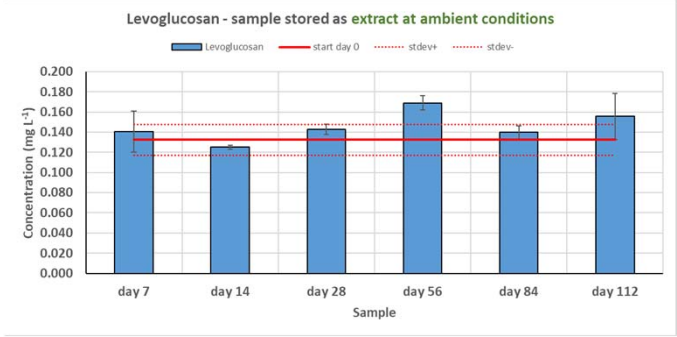
- No significant difference over the entire storage duration





- Small increase after 112 days of storage
- Potential impact of the extraction step





- No significant difference over the entire storage duration
- Different to the filter samples

Summary and 1st conclusions impact storage conditions on levoglucosan

- Almost no impact of the storage conditions on the levoglucosan concentration for all tested scenarios using filter samples and water extracts
- Best option and our recommendation is (still) to store the filter (or the extract) in a freezer (to prevent also biological activity)
- Storage in fridge is no problem, tested for min 112 days
- Storage at ambient conditions is no problem if the samples are stored as extracts
- Avoid to store the filter at ambient conditions (at least not longer than 84 days)
- Transport at ambient conditions (T<23°C) is temporarily ok

Outlook: We will repeat this with filters containing the other compounds from the ILC, plus more target compounds from the other modules!

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Technical requirements for laboratory analysis – general remarks

"The ACTRIS variable "organic tracers" is measured offline from aliquots filter or impactor substrate samples. For the quantification of organic tracers there are several analytical techniques with different suitable configurations, including detectors or chromatography columns from various suppliers available. OGTAC-CC does not explicitly specify which manufacturers, instruments or chromatographic columns are to be used for laboratory analysis. However, data quality objectives for each analyte (group) are defined that must be achieved in order to ensure NFs capabilities to measure typical organic tracer concentrations with appropriate analytical quality. Regular interlaboratory comparisons (ILCs) will be conducted to identify potential methodological deviations between NFs as a measure of quality control."

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Sample handling and preparation in the laboratory

6.3. Sample handling and sample preparation in the laboratory

This paragraph lists necessary equipment for all steps after the sample arrival at the laboratory until its chemical analysis, including storage, transfer and filtration. The calibration centre requests that all applied hardware can be clearly identified by the documentation provided by the NF. Additionally, details about the respective procedure have to be provided. The CC requested content is part of the measurement guidelines. The following equipment is required:

- Clean laboratory rooms for trace level chemical analysis.
- Laboratory equipment and workplaces to avoid cross contamination with potentially highly concentrated substances.
- Space in a fridge or preferably freezer for sample storage. Samples must not be stored together with volatile substances or samples that may contain such components to avoid cross contamination.
- Laboratory gloves to protect samples from contamination.
- Filter punch
- Disposable laboratory items, e.g. syringes, filtering equipment, extraction vessels, sample vials, caps, pipette tips.
- Laboratory shaker and/ or an ultrasonic bath
- Filtration equipment or centrifugation
- Enrichment methods like evaporation until dryness and resolvation or the application of a solid phase extraction, also for cleaning purposes (optional)
- A supply of pure deionized water (R ≥ 18.2 MΩ cm) is recommended for cleaning of equipment, sample containers and preparation of blank samples.
- Oven for the drying of cleaned equipment (optional).

The following chemicals are required:

- Ultrapure water (R ≥ 18.2 MΩ cm)
- Extraction solvents with sufficient purity according to the applied analytical procedure
- Derivatization agents with sufficient purity according to the applied analytical procedure
- Commercially available standards (labelled or non-labelled) are recommended for calibration or as internal standard solution, self-synthesized standards need to be approved by the CC

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6.4. Analytical equipment

The full analytical procedure in general needs a chromatographic separation system consisting of an autosampler, an injection device, a mobile phase, a separation column and a detection unit. Details about the needed analytical equipment can be found in the respective module section within the "measurement guidelines document".

Chemicals and accessories:

- Laboratory space with respective safety requirements for trace level chemical analysis
- Ultrapure water, specific resistance ≥ 18.2 MΩ cm
- Solvents and/or gases with sufficient purity according to the applied analytical procedure
- Pure standard compounds with sufficient purity according to the recommended analytical procedure
- Technical accessories according to the applied analytical procedure, e.g. filtration devices for the mobile phase in LC

Summary

The technical requirements document provides a comprehensive summary about the necessary hardware to determine organic tracers from filters following the requirements of the CC providing ACTRIS compliant data

- Sampler / Sampling unit
- Filter / impactor substrate
- Sample handling and transport
- Dedicated laboratory workplace, equipment and consumables
- Dedicated space in a fridge or freezer for sample storage
- Analytical measurement setup consisting of separation and detection unit
- Sufficient IT power for data storage and processing
- Careful documentation → Any changes have to be announced to the CC!

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Agenda

2nd OGTAC-CC community meeting 2026 (online) – Agenda Tuesday April 28	
13:00 - 13:10	Welcome
13:10 - 13:30	General overview / status of OGTAC-CC
13:30 - 14:00	Current status of the Technical Requirements documentation
14:00 - 14:15	Current status of the measurement guidelines documentation
14:15 - 14:30	Instrument data base, offline data workflow, labelling status
14:30 - 14:45	Coffee break
14:45 - 15:00	Review 1st ILC on BB tracer compounds (*modules 1+2*)
15:00 - 15:15	Presentation of the latest ILC on SOA tracer compounds (*modules 4-6*)
15:15 - 15:45	Information about the next ILCs
	a) Biennial ILC on *modules 1+2* autumn 2026
	b) 1st ILC on PAHs (*module 7*) spring 2027
15:45 – 16:00	Open discussion

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