

Standardisation of Black Carbon aerosol metrics for air quality and climate modelling

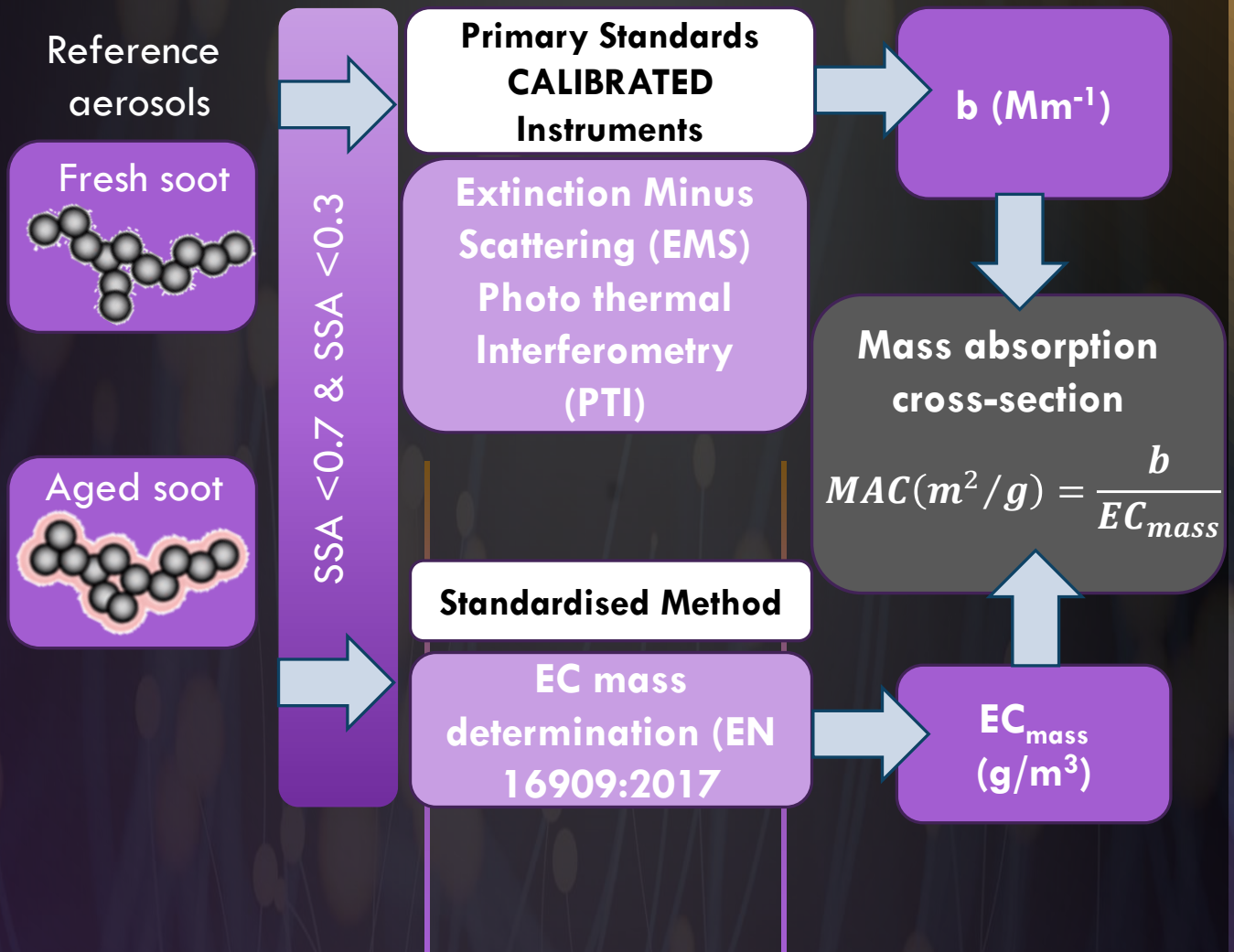
Introducing the STANBC project

Black carbon (BC) is an air pollutant that contributes to climate forcing, reduced crop yields, and adverse impacts on human health. Produced by incomplete combustion of transport and other fossil fuels, air quality networks have been set-up to monitor its mass concentration and legally binding procedures are in place to identify and treat emission sources. Networks measure equivalent Black Carbon (eBC) mass concentrations in real time with light absorption photometers, but traceability is incomplete, uncertainties are poorly understood, and robust documentary standards are lacking.

STANBC aims to establish a sound measurement framework for both aerosol light absorption coefficient and its conversion to eBC mass concentration bringing traceability and consistency to both, and consequently making measurements across different air quality monitoring networks in Europe (and worldwide) more accurate and comparable.



Schematic framework for standardising methods for the measurement of mass absorption cross-section (MAC)



STANBC Technical update



The STANBC project was officially kicked off on June 1st 2023. The kick-off meeting was held on 6th September 2024, during the European Aerosol Conference in Malaga, Spain.

Intercomparison for the standardisation of BC mass measurements

TROPOS, supported by STANBC partners, organized an intercomparison for the standardization (mid October - end of 2023) of BC mass measurements. Existing and developing standard methods were tested, taking into consideration manufacturer instrument operating procedures. During the intercomparison, all the instruments (i.e. EC/OC analyzers, aethalometers, Single Particle Soot Photometers (SP2), Dual-wavelength Photothermal Aerosol Absorption Monitor (PTAAM-2 λ), Cavity Attenuated Phase Shift monitors (CAPS), Photothermal interferometry (PTI)) were exposed to the same aerosols at the same time via ducting pipes to an aerosol mixing chamber.



Size-resolved rBC particle mass and core thickness measurements were performed during the intercomparison, using two types of synthetic aerosols:

- a) "Fresh" soot particles were generated by a miniCAST burner and were subsequently mass- and size-selected by CPMA and DMA. Monodisperse (i.e. size selected) soot aerosols were produced with a mobility diameter in the range 70 – 400 nm.
- b) Soot aerosols produced by the miniCAST burner were coated with secondary organic matter using the OCU oxidation flow reactor developed within the 18HLT02 AeroToX project. These "aged" soot aerosols were also size-selected by CPMA and DMA to produce different monodisperse (i.e. size selected) aged soot in the range 70 – 400 nm.

Communication and Dissemination highlights

“Standardisation of Black Carbon aerosol metrics for air quality and climate modelling. The STANBC project.”

European Aerosol Conference 2023

Poster presentation by Dr K. Eleftheriadis on the methodology for the establishment of a sound measurement framework for both aerosol light absorption coefficient and its conversion to eBC mass concentration. Dr K. Ciupek presented the study “Urban and roadside increments in eBCmass concentrations observed in three major urban conurbations of the UK: London, Birmingham and Glasgow”. For further details, please visit our website.

13th ICCPA International Conference on Carbonaceous Particles in the Atmosphere

Dr. K. Eleftheriadis from the project partner NCSR Demokritos provided an oral presentation at the “13th ICCPA International Conference on Carbonaceous Particles in the Atmosphere” in Berkeley, California, outlining the basic concept of the project, means of implementation, expected outcomes and broader implications.



<https://www.dfmf.uned.es/EAC2023/>

13th ICCPA International Conference on Carbonaceous Particles in the Atmosphere

July 9–12, 2023 | Lawrence Berkeley National Laboratory
Berkeley, California, USA

<https://iccpa.lbl.gov/>



Upcoming Events



Calibration Workshop at METAS (May 2024)

"A calibration workshop focusing on the comparison of filter-based absorption photometers using different types of aerosols, such as bare soot, coated soot, mixtures of salt and soot, and ambient-like aerosols, will be organized on April 24th, 2024. During the workshop, a 1-day training workshop will take place at METAS. The training focus on the generation of reference carbonaceous aerosols with emphasis in the use of the OCU oxidation flow reactor.

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