

The Next Generation of Carbonaceous Aerosol Speciation

A comprehensive overview of the TCA09 Total Carbon Analyzer and the CASS Integrated System.



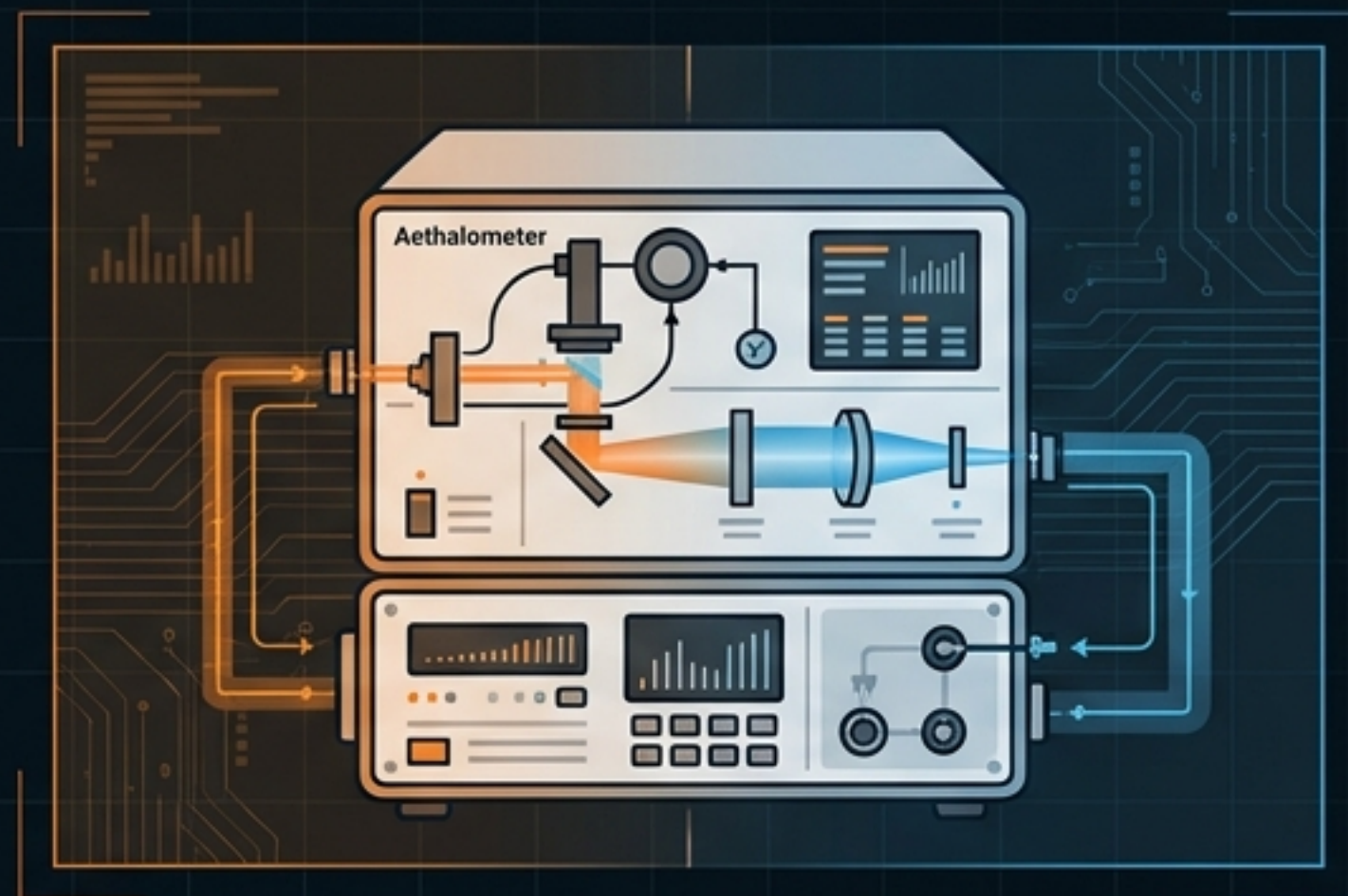
Aerosol Magee Scientific | Keeping an Eye on the Air

Redefining Aerosol Measurement



TCA09: The Foundation

- Continuous, high-resolution Total Carbon (TC) analysis using ambient air.
- Eliminates fragile glass, specialized gases, and complex maintenance.



CASS: The Complete Picture

- Integrates thermal and optical analysis for real-time, 5-component aerosol speciation (TC, BC, EC, OC, and BrC).

TCA09: Setting the Standard for Total Carbon

High-Time Resolution

10-minute time base captures dynamic, short-term pollution events.

Rugged Autonomy

Up to 30 days of continuous, unattended operation on a single set of 47-mm quartz filters.

Standard Compliant

Built-in sucrose calibration (EN 16909) and automated VOC artifact correction via Clean Air Test (CEN/TR 18076).



Simplified Operation. Robust Reliability.



NO GAS

Uses ambient air as an analytical carrier gas at a low flow rate (16.7 LPM). Completely eliminates the need for specialized, expensive gas cylinders.



NO GLASS

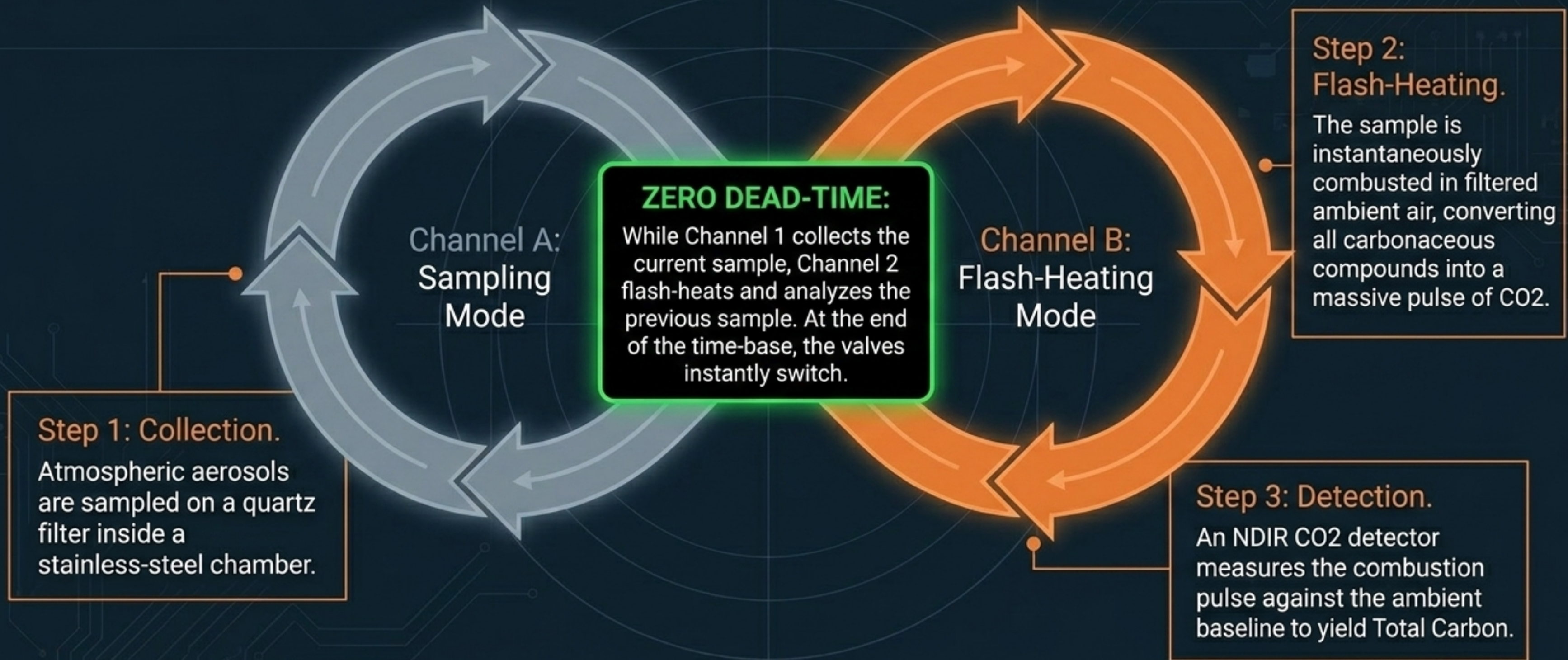
Analytical chambers are constructed entirely from durable stainless steel. Eliminates fragile, proprietary quartz glass components and associated downtime.



NO CATALYST

Utilizes advanced, rugged FeCrAl alloy heating elements. No requirements for using MnO₂ during OC/EC analysis.

Continuous Data via Dual-Channel Operation



High-Confidence, Regulation-Ready Data

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CARBON CALIBRATION PROCEDURE

The new Carbon constant value is in the expected range.

Do you want to save this new Carbon constant value?

Sucrose solution: 1800 PPM

The newly calculated Carbon constant in Chamber 1 - Left chamber is 8.75, and the last saved Carbon constant is 8.47.

N	Sample Name	TC counts (raw value)	Reference TC mass (ng)
1	SU_5	1032	9000
2	SU_10	2036	18000
3	SU_20	4123	36000

The graph displays three calibration points: SU_9 (TC counts: 1032, Reference TC mass: 9000 ng), SU_10 (TC counts: 2036, Reference TC mass: 18000 ng), and SU_20 (TC counts: 4123, Reference TC mass: 36000 ng). A dashed line represents the fitted line with a Carbon Constant (CS) of 8.75.

YES NO Cancel

Primary Calibration (EN 16909)

Automated, traceable calibration of the carbon constant using sucrose. Additional flexibility provided by potassium hydrogen phthalate (KHP) or proprietary calibration filters.

Automated Clean Air Test (CEN/TR 18076)

The system automatically quantifies and corrects for volatile organic compound (VOC) interferences without manual intervention, ensuring artifact-free measurement.

CASS: The Complete Carbonaceous Aerosol Speciation System



CASS physically and mathematically integrates the thermal Total Carbon power of the TCA09 with the multi-wavelength optical analysis of an Aethalometer (AE36 or AE36s) into a single, automated powerhouse.

The Mathematical Elegance of Real-Time Derivation



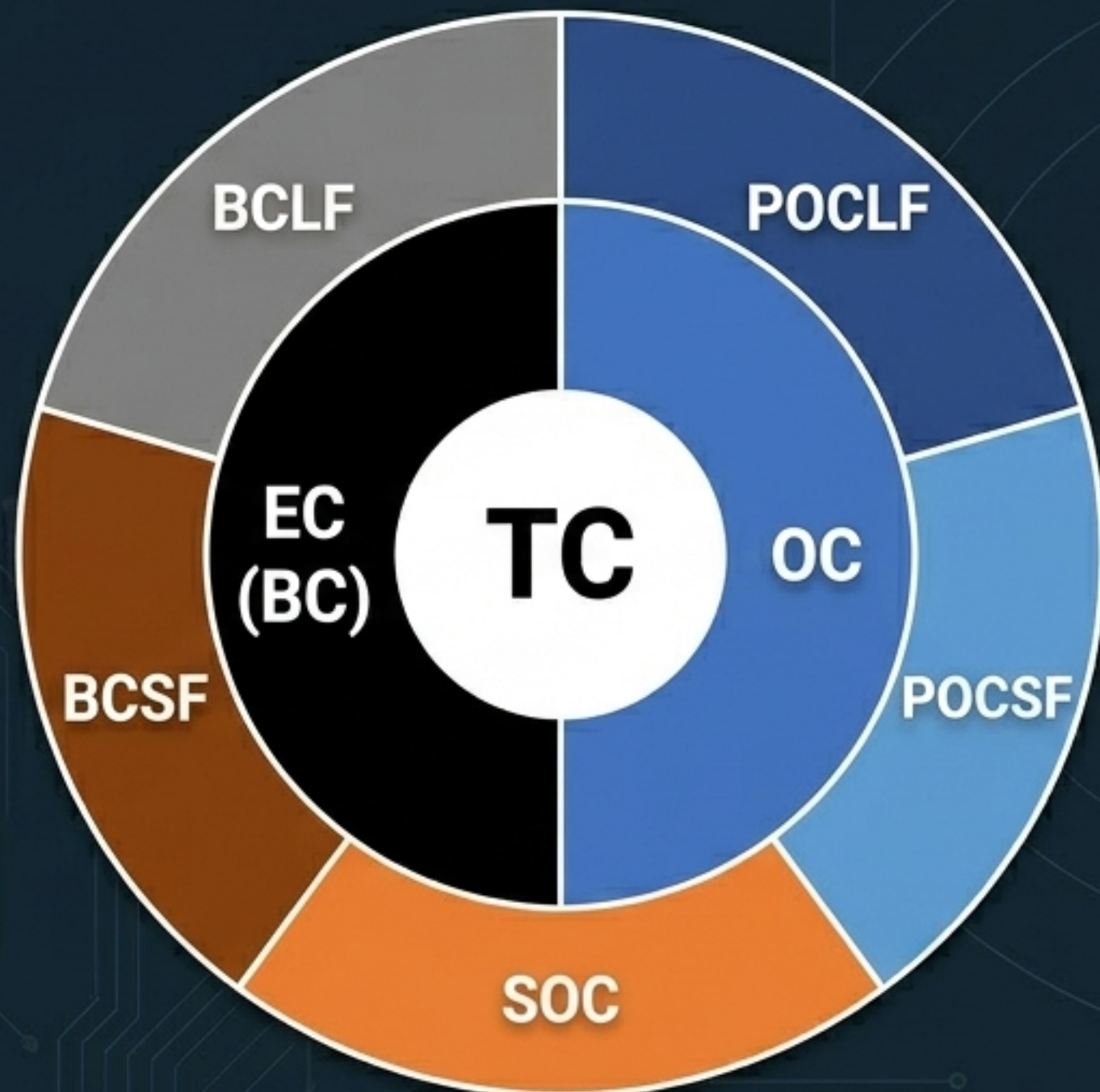
Total Carbon: Measured via continuous thermal flash-heating and NDIR detection in the TCA09.

Black/Elemental Carbon: Measured via multi-wavelength optical attenuation (UV to IR) using Aethalometer DualSpot® technology.

Organic Carbon: Derived continuously in near-real-time by simultaneously controlling both instruments on the exact same 10-minute time base.

TCAM5: Immediate Source Apportionment

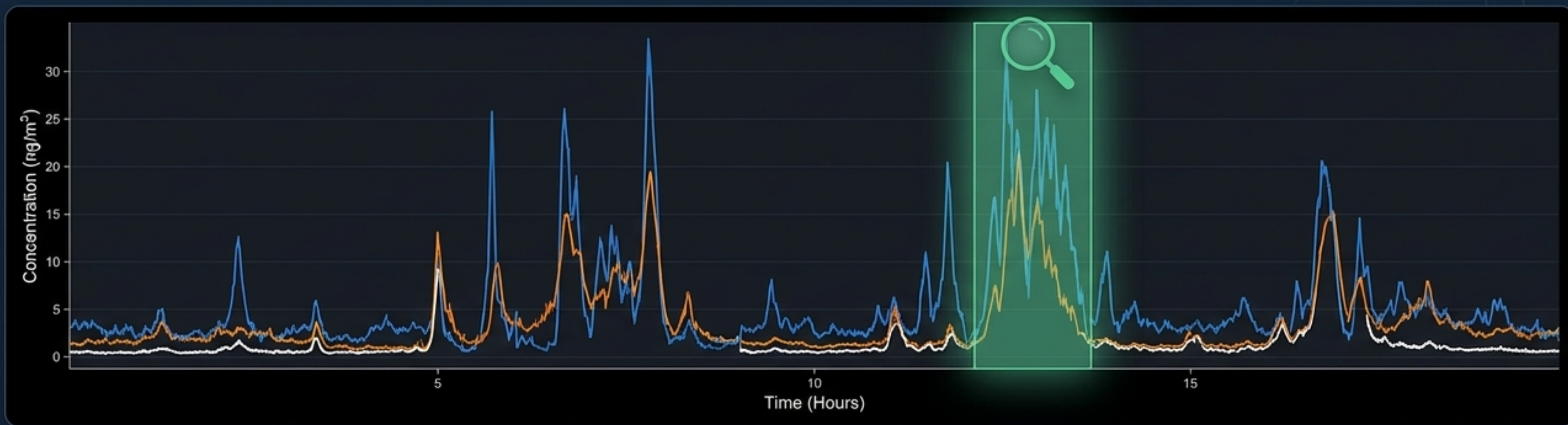
The 5-Component Total Carbon Apportionment Model visualizes source contributions directly on-screen.



- **BCLF & BCSF:** Black carbon apportioned into liquid vs. solid fuel sources.
- **POCLF & POCSF:** Primary organic carbon apportioned into liquid vs. solid fuels.
- **SOC:** Secondary organic carbon.

The Aethalometer also identifies Brown Carbon (BrC) and separates biomass smoke from diesel emissions.

The Power of 10-Minute Resolution



Legacy systems rely on hourly or daily averages, smoothing over critical pollution events. Both TCA09 and CASS capture dynamic changes on a 10-minute time scale with zero dead time.

IMPACT: Gain immediate, actionable insight into rapid emission spikes, exhaust testing, and dynamic atmospheric processes that other systems miss.

Diagnostic Matrix: Choosing the Right Instrument

Features	TCA09	CASS
Primary Target	Total Carbon (TC)	Complete Speciation (TC, BC, OC)
Measures Black Carbon (BC)?	—	✓ Yes (via Aethalometer)
Derives Organic Carbon (OC)?	—	✓ Yes (TC - BC = OC)
TCAM5 Source Apportionment?	—	✓ Yes
Consumables/Gases Required?	✓ None (Ambient Air)	✓ None (Ambient Air)
Hardware Footprint	Single Unit (38 kg)	Stacked Dual Unit (74 kg)

Built for Demanding Environments



Technical Specifications at a Glance

Performance & Sampling

Detection Range (TCA09): 100 ng C/m³ to
1,000,000 ng C/m³

Sampling Flow (TCA09): 16.7 LPM (1 m³/h)

Sampling Flow (AE36s): Adjustable 2 to 5 LPM

Time Resolution: 10 min to 24 h (TC/OC);
1s to 5 min (BC/EC)

Physical & Output

Interface:
10.1'' color touch-screens with
Graphical User Interface

Data Connectivity:
RS-232 COM port, Ethernet, USB
(Network ready for Remote Access System)

Dimensions (CASS):
62 x 48 x 52 cm (19'' rack-mount chassis)

Operating Environment:
5°C - 45°C, up to 3000m altitude



Good Data. Good Science. Good Policy.

Whether deploying the standalone TCA09 for rugged total carbon measurement or the integrated CASS for unparalleled real-time speciation, Aerosol Magee Scientific provides the most reliable, low-maintenance, and advanced tools for understanding our atmosphere.