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CALIBRATE, VALIDATE, COLLECT PARALLEL DATA WITH BLACK CARBON

AE33

AETHALOMETER® ACCESSORIES

ND Optical Filter validation kit

Weather Station Sensors

CO_2 Sensors

KEY FEATURES

- NIST traceable optical validation of Aethalometer® response
- Temperature, Pressure and Relative Humidity sensor, Wind speed and direction. Wind sensor equipped with electronic compass providing apparenet wind measurements. Quality, lightweight and robust with compact integrated design.
- Determination of the BC Emission Factor of an individual source

APPLICATIONS

- Air Quality monitoring
- Climate Change research
- Health Effects research

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PRODUCT SPECIFICATIONS

AETHALOMETER® AE33 ACCESSORIES

ND OPTICAL FILTER VALIDATION KIT

The Neutral Density Optical Filter Kit consists of four metal holders, each containing two elements of precision optically-absorbing glass. The glass is a stable, broad-spectrum absorbing material whose optical density is traceable back to primary photometric standards offered by national and international standards organizations, e.g. NIST (USA); NPL (UK); etc. Introducing these ND filters into the Aethalometer® light path will reduce the transmitted intensity in a reproducible manner.

The Aethalometer® real-time data is based on measuring the change in optical absorption due to the Black Carbon component of the aerosol collected on the tape spot. The response of the instrument to a difference in optical absorption may be verified by inserting two ND filters, one of zero optical density, the other of a darker density. Since the optically-absorbing glass is stable over time, consistency of the photodetector responses to the ND filters will validate the consistency of the Aethalometer® measurement process. To cover the range of optical absorptions used by the Aethalometer®, the ND Kit contains four units with progressively increasing absorption. Software in the Aethalometer® automatically prompts the user's actions, and calculates the result.

WEATHER STATION SENSORS

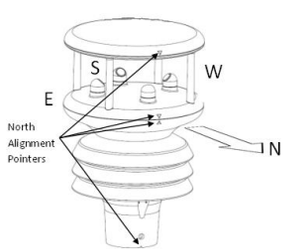
MEASURING PRINCIPLES

- The GMX300 Ambient Meteorological Sensor is a combined instrument mounted inside three doubled louvered, naturally aspirated radiation shields with no moving parts. It measures air temperature, humidity and pressure.
- The GMX200 is a Wind speed and direction ultrasonic sensor and with an addition of an electronic compass it provides apparent wind measurements.
- The GMX500 is a compact weather station (with temperature, pressure, humidity, wind speed and wind direction sensors).

Atmospheric pressure is provided by a solid-state device fitted onto a board inside sensor housing.

Air temperature and humidity is measured with internal solid state sensor circuits contained within the radiation shield that provides digital output signals for Relative Humidity, Temperature and calculated Dewpoint.

Wind speed and direction is measured with ultrasonic wind speed and direction sensor which measures the times taken for an ultrasonic pulse of sound to travel from the north (N) transducer to the south (S) transducer, and compares it with the time for a pulse to travel from S to N transducer. Likewise times are compared between west (W) and east (E), and E and W transducer - see schematics below.



DATA INTEGRATION

All sensors connect to a COM port on the Magee Scientific Aethalometer® model AE33 and AE43 or Total Carbon Analyzer TCA08 via a 10-meter cable. This cable feeds the meteorological data to instrument and also supplies DC power to the sensor from a USB port on the instrument. The meteorological data is integrated into the files and also displayed on the screen.
The Pressure and Temperature data may be used in the Aethalometer calculation of Black Carbon, to report concentrations at "ambient conditions", i.e. per local unit volume of air. Wind speed and wind direction data are used for advanced "pollution rose" charting (for Magee Scientific Aethalometer® model AE43).

CO_2 SENSOR

The CO_2 Sensor measures the CO_2 concentration in the air stream discharged from the AE33 Aethalometer®, and its data is automatically imported and merged with the Black Carbon measurements. Analysis of the relationship between these two species of combustion origin provides valuable information on the BC Emission Factor of the sources impacting the sampled air mass. CO_2 and BC are the First and Second listed leading contributors to forcing for global climate change. While CO_2 emissions may be calculated from fuel-use data, BC emissions are extremely variable and not well known

- High-time-resolution data (1 second) can be used to determine the BC Emission Factor of an individual source, such as a car or truck. This operating mode can also be used in direct testing of combustion sources such as vehicles, engines, and fires.

- Medium-time-resolution data (1 minute) can be used to determine the BC Emission Factor of a group or category of nearby sources, such as traffic on a highway. These in-situ measurements capture real-time data from real sources operating under real conditions: rather than selected sources operating under laboratory conditions. A very large number of data points can be recorded automatically by operation of a single equipment ensemble at a fixed location for a reasonable period of time: thereby acquiring data pertinent to a very large number of candidate sources.

- Low-time-resolution data (>10 minutes) can be used to study the co-relationship of combustion effluents in a variable plume from a distant source, such as a city.

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Keeping an Eye on the Air

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