



CAPS PM_{ssa} Monitor

*Accurate and Precise
Continuous Monitoring of Particle
Extinction, Scattering and
Single Scattering Albedo
(SSA=Scattering/Extinction)*



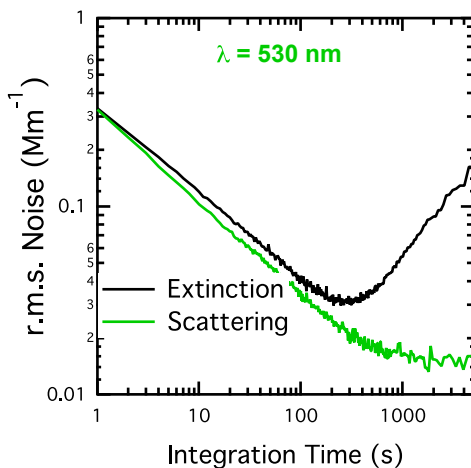
APPLICATIONS

- Climate Change Research
- Optical Properties Closure
- Roadside Monitoring
- Combustion Plume Analysis
- Aircraft Engine Exhaust Monitoring
- Air Quality Monitoring

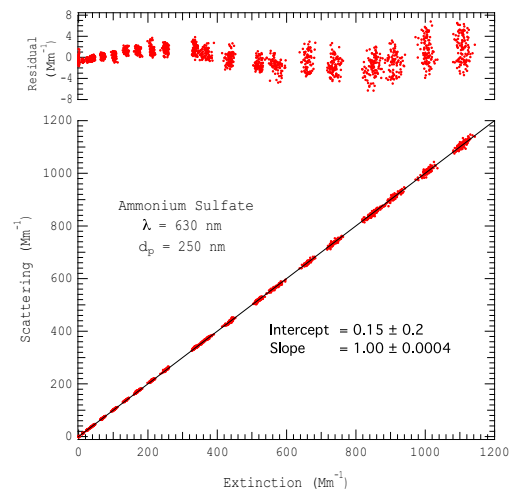
ADVANTAGES

- Inverse nephelometer incorporated into CAPS extinction cell
- Measurement of optical extinction and scattering at the 1 Mm⁻¹ level
- Choice of 1 of 5 Wavelengths:

Far Blue	(405 nm)
Blue	(450 nm)
Green	(525 nm)
Red	(630 nm)
Far Red	(660 nm)
Near IR	(780 nm)
- Autonomous Operation



Allan analysis of monitor noise in both extinction and scattering channels at a wavelength of 530 nm (green). Note that the scattering channel has minimal baseline drift.



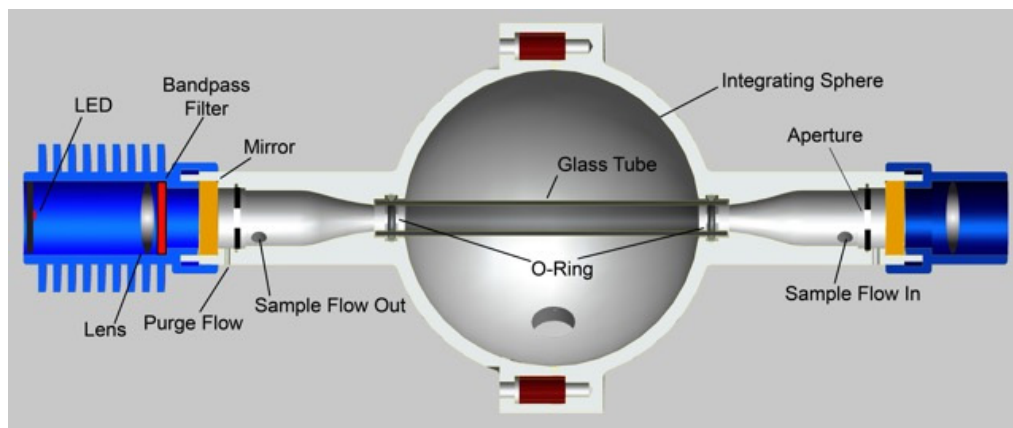
Correlation plot of measured scattering versus extinction for 250 nm diameter ammonium sulfate particles at a wavelength of 630 nm.



CAPS PM_{ssa} Monitor

SPECIFICATIONS:

Sensitivity (S/N =3)	3.0 Mm ⁻¹ (1 s), 0.5 Mm ⁻¹ (60 s) both channels SSA ± 0.03 (30 s)
Response Time (10-90%)	1 s
Sample Flow	0.85 l min ⁻¹ (volumetric flow), Internal Pump
Operating Pressure	Ambient
Materials Exposed to Sample:	Conductive Urethane, Stainless Steel, Conductive Silicone, and Aluminum
Data Output:	RS-232, USB, Ethernet (Data Acquisition Program Included) On-board Data Storage (5 yrs) Front Panel Display
Size/Weight:	24" x 19" x 9" (5U), 35 lbs [61 cm x 43 cm x 23 cm, 16 kg]
Electric Power:	50 W; 100-250 VAC (50-60 Hz)



REFERENCES

“Single Scattering Albedo Monitor for Airborne Particulates”, T. Onasch, P. Massoli, P. Keabian, F. Hills, F. Bacon and A. Freedman, *Aerosol Sci. Technol.*, 49, 267-279, 2015.

“Aerosol light extinction measurements by Cavity Attenuated Phase Shift Spectroscopy (CAPS): laboratory validation and field deployment of a compact aerosol extinction monitor,” P. Massoli, P. Keabian, T. Onasch, F. Hills, and A. Freedman, *Aerosol Sci. Technol.*, 44:428–435 (2010).

“System and Method for Precision Phase Shift Measurement”, P.L. Keabian, U.S. Patent No. 8,364,430 (issued Jan. 29, 2013).

“System and method for trace species detection using cavity attenuated phase shift spectroscopy with an incoherent light source”, P.L. Keabian and A. Freedman, U.S. Patent No. 7,301,639 (issued November 27, 2007).