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Visibility Measurements Using a Novel Open-Path Optical Extinction Analyzer

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Abstract : Visibility has become a key component of air quality and is regulated in many areas by environmental laws such as the EPA Clean Air Act and Regional Haze Rule. Typically, visibility is calculated by estimating the optical absorption and scattering of both gases and aerosols. A major component of the aerosols' climatic effect is due to their scattering and absorption of solar radiation, which are governed by their optical and physical properties. However, the accurate assessment of this effect on global warming, climate change, and air quality is made difficult due to uncertainties in the calculation of single scattering albedo (SSA). Experimental complications arise in the determination of the single scattering albedo of an aerosol particle since it requires the simultaneous measurement of both scattering and extinction. In fact, aerosol optical absorption, in particular, is a difficult measurement to perform, and it's often associated with large uncertainties when using filter methods or difference methods. In this presentation, we demonstrate the use of a new open-path Optical Extinction Analyzer (OEA) in conjunction with a nephelometer and two particle sizers, emphasizing the benefits that co-employment of the OEA offers to derive the complex refractive index of aerosols and their single scattering albedo parameter. Various use cases, data reproducibility, and instrument calibration will also be presented to highlight the value proposition of this novel Open-Path OEA.

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