

Visibility Monitoring

Air Resource Specialists, Inc. (ARS) is nationally recognized as a leader in visibility monitoring, modeling, and research.



Aerosols and gases in the atmosphere scatter and absorb light. As the atmospheric scattering and absorbing constituents increase, the visibility decreases. A variety of methods are available to measure the total or individual effects of these scattering and absorbing components.

Air Resource Specialists has extensive experience in the selection and application of the right systems for specific applications.

Optec LPV Transmissometers

Estimate ambient atmospheric extinction coefficient (b_{ext})

- Directly measure the light transmission properties of the atmosphere along a several kilometer sight path
- Estimate total atmospheric extinction coefficient (b_{ext}) along the sight path
- Two primary components: light source of known intensity (transmitter) and light detector (receiver)
- Component placement is 0.5 to 10 kilometers apart
- Low power consumption
- Remote operation from small power supply such as solar
- Self-resetting battery-backup for unattended operation
- Ambient temperature operation, but requires shelter from the elements
- Routine weekly servicing by trained non-technical personnel



Nephelometers

Estimate atmospheric scattering coefficient (b_{scat})

Ambient nephelometers

- Directly measure light scattered by aerosols and gases in sampled air volume
- Optec NGN-2A is the ambient standard

Non-ambient nephelometers

- Variety of size-cut and heated instruments
- Measure dry aerosol scattering
- Surrogate for PM_{10} or $PM_{2.5}$ mass sampling



1901 Sharp Point Drive, Suite E
Fort Collins, CO 80525
Phone: 970-484-7941
Fax: 970-484-3423
Web: www.air-resource.com
E-mail: info@air-resource.com





Aethalometers

Estimate the atmospheric absorption coefficient (b_{abs})

- Continuously measure black carbon absorbing component of light extinction
- Commercially available systems provide continuous, non-ambient measures of black carbon

Visibility-Related Aerosol Samplers

Visibility-related aerosol samples measure aerosols less than 2.5 microns that have the greatest effect on visibility. A variety of filter-based and continuous monitoring systems exist.



Filter-Based Systems

- Collect time-integrated samples on specific filter media to differentiate the types and qualities of scattering and absorbing aerosols in the atmosphere
- Media are laboratory-analyzed to identify specific aerosol species (elements, ions, and carbon species)
- The IMPROVE Modular Aerosol Sampler is an example of a widely used filter-based system

Continuous Systems

- Individual systems measure near real-time concentrations of specific aerosol species such as sulfates, nitrates, and carbon species

Analysis of Data

- Often in conjunction with optical and meteorological measurements
- Provides understanding of the types and quantities of aerosols that cause visibility degradation
- Identifies specific elements, ions, and carbon species or combination of types
- The data can be used to estimate (or reconstruct) the time-integrated atmospheric extinction coefficient
- The type of aerosols present may indicate the source type or types responsible for the measured visibility degradation



Site and Network Management

ARS maintains and supports visibility monitoring networks for operational and research applications in urban, rural, and remote areas. ARS provides site, network, and special studies management through the design, coordination, implementation, and operation of the monitoring tasks:

- Design, fabrication, turnkey installation, operation, and management of monitoring systems
- Site selection and evaluation
- Site preparation for access and utilities
- Instrument procurement and acceptance testing
- Custom fabrication of monitoring and calibration support systems
- Systems and performance audits and quality assurance services
- Quality assurance documentation including preparation of Quality Assurance Project Plans, Quality Management Plans, and supporting standard operating procedures and technical instructions
- Field and laboratory maintenance and calibration of network instrumentation
- Intercomparison studies of new instruments and methods in cooperation with instrument manufacturers
- Operator training and support
- Data collection, review, validation, reporting, analysis, and archive



Instrumentation Calibration and Maintenance

ARS maintains a fully-equipped calibration and maintenance facility that provides electronic, optical, and mechanical systems support for both research and operational visibility monitoring programs. Experienced technicians develop and receive specialized training in techniques unique to the complexities of light measurement.



Calibration and Maintenance

- Factory-authorized repair of Optec transmissometers and nephelometers
- Aerosol samplers
- Meteorological sensors (relative humidity, temperature, wind)
- Datalogger programming
- Specialized monitoring systems
- Remote digital camera systems

Dedicated Field Calibration and Test Facility

- Configured for optical instrument calibration and a wide range of instrument operations and comparison tests that allow both point and path tests and calibrations

