

## Reanalysis of a 15-year archive of IMPROVE samples

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The IMPROVE (Interagency Monitoring of PROtected Visual Environments) network monitors aerosol concentrations at about 170 rural or remote sites throughout the United States. Twenty-four-hour filter samples of fine particulate matter (PM<sub>2.5</sub>) are collected every third day and analyzed for elements, ions, carbon, and total mass. About 30 of these sites have operated continuously since 1988, and the sustained data record (<http://views.cira.colostate.edu/web/>) offers a unique window on regional aerosol trends through a period of changing anthropogenic and natural emissions.

For the elemental measurements, the same sampling conditions have been maintained throughout the program. All elemental analyses have been performed by Crocker Nuclear Laboratory at the University of California in Davis, and all original sample filters collected since 1995 are archived on campus. The suite of reported elements has remained constant, but the analytical methods employed for their determination have evolved. For example, the elements Na – Mn were determined by PIXE through November 2001, by XRF analysis in a He-flushed atmosphere from December 2001 through December 2004, and by XRF analysis in vacuum since January 2005. In addition to these fundamental changes, incompletely-documented operational factors such as detector performance and calibration details have introduced variations in the measurements.

Because the past analytical methods were all non-destructive, the archived filters can be re-analyzed with the current analytical systems and protocols. The 15-year sample archives from Great Smoky Mountains National Park, Mount Rainier National Park, and Point Reyes National Seashore were recently selected to generate such analytically homogeneous data series. For each site, the complete historical series of consistently collected samples was processed in a single analytical batch. The agreement between the new analyses and original determinations varies with element and analytical era.

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