Nicole P. Hyslop, Dr., Improve Research

XRF Reanalysis of a 15-year archive of IMPROVE samples

Nicole P. Hyslop, Warren H. White, and Krystyna Trzepla
Crocker Nuclear Laboratory, University of California, One Shields Ave, Davis, CA 95616

Principal contact: Nicole P. Hyslop, Academic Coordinator, Crocker Nuclear Laboratory, University of California, One Shields Ave, Davis, CA 95616, (530)754-8979, nmhyslop@ucdavis.edu

SHORT BIO

Dr. Hyslop is the Operations Manager for the IMPROVE aerosol sampling network at the University of California at Davis. She joined UC-Davis in 2004 as the Quality Assurance Engineer and earned her PhD in Environmental Chemistry from UC-Davis. Her research focuses on new approaches for evaluating data quality. Prior to joining UC-Davis, Dr. Hyslop coordinated air quality studies and data analyses at Sonoma Technologies, Inc. from 1999 to 2004. She earned her BS and MS degrees in Chemical Engineering at the University of Wisconsin at Madison and The University of Texas at Austin.

ABSTRACT

The IMPROVE (Interagency Monitoring of PROtected Visual Environments) network has collected airborne particulate matter (PM) samples at rural locations throughout the United States since 1988. These samples have been analyzed for elemental content using analytical methods that evolved over the years. Changes in analytical methods sometimes introduced shifts in reported concentrations that are evident in the historical record. We sought to illuminate the effects of methodological changes by reanalyzing archived samples with current methods. The 15-year archives of PM samples from Great Smoky Mountains National Park, Point Reyes National Seashore, and Mount Rainier National Park were selected for reanalysis. For each site, the complete historical series of samples was processed as a single analytical batch using a common protocol and calibration. Comparisons of the reanalyses and original analyses indicate that concentrations of all but one measured element, Br, remained stable on the filters over years of storage. The agreement between the two analyses varied with element and original measurement method. For elements measured well above their contemporary detection limits – S, K, Ca, Fe and Zn – the reanalysis established that method changes had limited impacts on reported concentrations, generally <10%. For elements originally measured near their detection limits, reanalysis confirmed the presence of discontinuities in the data record, many of which were previously recognized and documented as method-related.