Posting type	Informational
Subject	Changed reporting of light absorption
Module/Species	A/ Fabs
Sites	Entire network
Period	Data downloaded after 2014 for all sample years
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Supporting information

Light absorption by the module A polytetrafluorethylene (PTFE) filter sample has been monitored throughout IMPROVE using a He-Ne laser operating at 633 nm. From 1988 through February 1994 filters were analyzed twice, before and after sample collection, with a laser integrating plate (LIPM) system that recorded the decrease in transmission (Campbell et al., 1995, Aerosol Sci. and Technol. 22, 287-292). Samples collected from March 1994 on have been analyzed with a hybrid integrating plate/sphere (HIPS) system (SOP). The newer system records backscattering from the clean side of the exposed filter along with transmission, and thereby eliminates the need for pre-exposure characterization of each filter. Calculation of absorption is now based on a theoretical relationship between the pre-sampling transmission and post-sampling reflectance signals. The parameters of this relationship are determined from field blanks, and represent a calibration of the system.

In 2015, the HIPS calibration was improved and data were reprocessed back to 2003. The new improved calibration provides more accurate absorption values, especially for lightly loaded filters. The revised data are identified as Fabs; the original data are unchanged, but renamed Fabs_LIPM or Fabs_HIPS.

Figure: Absorption according to original and revised HIPS calibrations, illustrated with 2011-2012 network data. The plot to the right illustrates the limited absolute magnitude of the differences over the full range of observed absorption. The paired plots below zoom in on the lightest loadings and illustrate the origin of the need for recalibration. Under the incorrect calibration used before 2015, reported absorption responded – unphysically – to the reflectance of blank PTFE membranes, which varies randomly among individual filters within a manufacturing batch.