

Interactive comment on “Consistency of long-term elemental carbon trends from thermal and optical measurements in the IMPROVE network” by L.-W. A. Chen et al.

Anonymous Referee #2

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This MS follows a neat idea to check whether changes in measured EC concentrations are due to the changes in instrumentation or whether they reflect real-world trends. Using optical filter reflectance is one way to circumvent the changes in analysis temperatures and carrier gas, as initial filter reflectance should not be sensitive to changes in the thermal analysis.

The paper addresses a relevant scientific question within the scope of AMT, that has true significance for analysis of EC trends in the United States and elsewhere, where a change in instrumentation leads to questions of comparability of data measured before

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and after the change. The conclusions are based on an in-depth statistical analysis which is clearly presented and outlined and gives a solid basis for the interpretations and conclusions. Abstract and title are clear and the paper is easy to read and well written.

There are only two points that should be changed and/or considered. Aethalometers and PSAPs are briefly mentioned, but only a review paper (Watson et al and references therein) are given. The original references should be given for these instruments (Hansen et al., Bond et al.). The other point concerns the filter reflectance itself. As the changes in the instruments are not described fully in this paper (the reader is referred to other papers) it is not instantly obvious whether there was also a change in the optical setup or in the scattering geometry. There may well have been (“the replacement analyzer allows for a more precise sample positioning. ...”). Thermal EC/OC analyzers are not meant to determine b_{abs} accurately. A simple reflectance measurement may suffer from losses of scattered light, so changes in scattering geometry could influence τ_{R} .

A further comment: it is not surprising that the outliers are the stations with highest and lowest EC concentrations. At high EC concentration, the reflectance signal may be in the saturation region, and at very low EC concentrations, measurement uncertainties will influence τ_{R} unduly.

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