

## ***Interactive comment on “Decreases in elemental carbon and fine particle mass in the United States” by D. M. Murphy et al.***

### **Anonymous Referee #1**

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The manuscript describes analysis of particle data from Interagency Monitoring of Protected Visual Environments (IMPROVE) sampling from 1990–2004. The authors conclude that there has been an average 25% decrease in the PM<sub>2.5</sub> mass and black carbon (BC) concentration over this period. The net result of the combined decreases is an overall positive radiative forcing because the change in negative forcing of decreases in non-absorbing particles is greater than the change in positive forcing from BC decreases. The authors carefully correct for various potential biases in the IMPROVE data by excluding certain sites or data years using well-documented criteria. The manuscript is well written and the work well documented. The authors should be commended for concise presentation of analysis, results and conclusion. The topic is

appropriate for publication in ACP. I recommend publication with very minor changes.

Technical improvements: I find a few areas where I believe the authors could improve the manuscript.

1) There is no list of sites used in the data analysis. Since only data from a subset of all IMPROVE sites were used, a table with site name and location would help identify which sites ultimately ended up in the analysis.

2) The authors gloss over explanation of the reasons for increases in PM and BC at sites where increases are noted. Line 12 on 2062 says: “Only a handful of sites exhibit increases. These are most likely due to local sources or wildfire influence.” While I’m curious what additional analysis focused on the increases might reveal, that is beyond the scope of the manuscript. Instead, I suggest Changing line 12 on 2062 to: “Only a handful of sites exhibit increases. We do not investigate the causes of the increases here, however some of the increase may be explained by greater wildfire influence (Fig. 6).” Or something similar.

3) I’m unclear about the point that the authors are trying to make about 2005 vs. 1990 for a baseline year for climate relevant emission reductions on line 3 of 2066. My confusion may arise from the use of “also” on line 8 of 2066. Is this related to the reference to Molina et al., 2009 on line 16-17 of 2058? Please clarify this conclusion.

4) Line 3 of 2066 relies on a press release from Copenhagen when discussing 2005 vs. 1990 as a baseline year for climate action. Perhaps using reference to Federal congressional proposals (which also use 2005 as the base year) is more relevant.

5) The URL on line 4-5 of 2066 for the Copenhagen press release has a typo (a dash before 2009). The correct link is: <http://www.state.gov/g/oes/rls/remarks/2009/121010.htm>

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