Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Climatic factors contributing to long-term variations of fine dust concentration in the United States" *by* Bing Pu and Paul Ginoux

Anonymous Referee #1

This is a well-conceived, well-written, careful, and thorough study that furthers previous work into the investigation of increased dust concentrations in the United States, especially in the Great Plains region. Summertime dust has increased in this region and the authors address the underlying meteorological and large scale climate variability associated with this increase. The work is important for understanding future dust activity in a fairly under-studied region in the U.S. (relative to the Southwest) and provides a needed investigation to address and further our understanding of dust emission and loading. I recommend publication after addressing minor comments below.

Line 101: Technically IMPROVE didn't start sampling every third day until after ∼2000

when the network expanded in support of the Regional Haze Rule. Before this it sampled Wed and Sat.

Line 104: How were data below the minimum detection limit treated?

Line 110: Did the authors apply completeness criteria to compute monthly means? Were there any data requirements for long term site sampling so that the interpolations were not affected by missing sites from year to year? I note on line 209 that 23 consecutive years were required for trend analyses; was this also true for interpolations?

Line 209: Add a short description (perhaps earlier- around line 114?) of how trend analyses were performed- OLS? Theil?.

Line 209, Figure 1: Can the authors comment on the interpolated trends over regions with no sites? Were these calculated using sites that were not consecutively sampling? (e.g., over the central US)? Including some sites for only some years could obviously bias the spatial variability in the trends in the interpolated values.

Line 213: How is the "climatological" value computed? (Over which years)

Line 317: Change "Figure 3a show" to "Figure 3a shows"

Line 449: Change "transports" to "transport"

Line 464: Figure 7 and 8: In 3 of the cases, but especially 7/2/12, concentrations near Everglades increase also, which might suggest African dust influence especially with the 4km dust level? Did authors investigate the elemental composition on these days to rule out that influence?

Line 525: Change "prevent" to "prevents"

Line 1031: Figure 5 Caption: can the authors add a statement describing the black box in figure 5b?

Line 1049, Figure 6 Caption: Change "data is" to "data are"

Line 1082, Figure 7 Caption: can the authors add a statement describing the black box in figure 7?

Line 1130, Line 1137 Figure 9 and 11 Caption: Same comment as above

Supplemental Information, Figure S5: Change "liner fitting" to "linear fitting"

C3