

Response to Reviewer 1:

- Authors' responses appear in bullet format
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Summary

The authors made many important revisions in response to my comments and another Reviewer. In particular, the figures are much better. Figure 1 is a fascinating map, but the authors made detailed improvements in many of the other figures (and captions) as well. Section 3.4 is very much improved. This Section is the highlight of the paper for me. I have some suggestions below that I would appreciate a response to, but otherwise, I would say the paper is publishable pending minor revisions. My comments are relative to line numbering in acp-2014-562-manuscript-version2.pdf.

- The authors are grateful for the helpful comments in the first round of reviews. Their adaptation has made the paper stronger, more readable, and more cohesive. We have addressed additional comments below in bullet format.
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Specific

Abstract: I would recommend cutting everything from “The urban/industrial...” on pg. 1 line 15 to pg. 2 line 28. Then cut everything from pg. 2 line 32 “Disagreement...” to the end. The Abstract, as it is written, contains more detail than needed and, in my opinion, attribution statements should be largely saved for the longer, more nuanced discussion within the main text of the manuscript.

- We have adopted the reviewer's suggestion, and the abstract is significantly shorter and more directed. The only exception is that we have retained one line about ground particulate air quality at the end of the first abstract paragraph: “Results from ground monitoring indicate that low-income township sites experience by far the worst particulate air quality in South Africa, with seasonally-averaged PM10 concentrations as much as 136% higher in townships than in industrial areas.” There is currently significant debate in South Africa about appropriate methods of improving air quality, and the conversation is centered on whether to focus on industrial point-sources or residential domestic burning emissions. So we feel it is important for the South African context to retain one line in the abstract that addresses the issue. However, the remainder of the abstract mentioned by the reviewer has been removed.

Pg. 3, line 39: Organic is misspelled.

- Fixed

Section 2.5: I would suggest at least mentioning that AERONET evaluations are intended for future research. This could be relevant in Section 2.5, or perhaps in the conclusions. AERONET played a major role in SAFARI 2000 (Eck et al. JGR 2003), so there is legacy in that. But a quick look at the AERONET website suggests Pretoria has an operating site – maybe this is what was referred to as the Johannesburg area AERONET in the reply to review comments. Either way, others may note this as well, or wonder about legacy data from SAFARI-2000 era, and wonder whether AERONET is any better than satellite for surface PM.

- We have mentioned in Section 2.5 that we will present a comparison of ground- and satellite-based measurements of column aerosol properties in a separate publication. As a short preview, there are 3 ground-based AERONET sun photometers with data available for various multi-year periods within the Gauteng satellite grid box studied in this work. We've performed a detailed multi-year comparison of the two datasets and will write it up separately. Basically, AERONET isn't much better, but it does seem to pick up some of the boundary layer particulates that satellites can't resolve.

pg. 9, line 281: I missed this discussion in the first version. Please clarify what "It follows" is actually following from. Also, this statement seems to ignore the very interesting "River of Smoke" event finding from SAFARI 2000. My recollection is that the River of Smoke was a relatively common wintertime meteorological flow pattern such that northern South Africa (i.e. Kruger-Pretoria towards Zambia) AOD was heavily impacted by transported smoke. Can this paragraph discussion be reconciled with a massive smoke transport event like the River of Smoke?

- Good question. We have added reference to the "River of Smoke" phenomenon in this discussion, and clarified the connection between close-proximity fires and transported subtropical biomass burning aerosol. The statements here about the impact of close-proximity fires do not discount the river of smoke, but the two effects are occasionally synergistic in enhancing AOD over eastern South Africa. In reality, the synoptic air flow necessary to set up the "River of Smoke" occurs periodically and can't be considered the norm in the region (it happened to be persistent during SAFARI-2000). But when the meteorology is favorable for "the River," AOD is further enhanced. This has been noted in the text.

Response to Reviewer 2:

The reviewer's assessment was to accept the paper "as is," so no further changes have been made.