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Interactive comment on “Chemical composition, main sources and temporal variability of PM₁ aerosols in southern African grassland” by P. Tiitta et al.

Anonymous Referee #2

Received and published: 28 October 2013

Review for Tiitta et al., Chemical composition, main sources and temporal variability of PM₁ aerosols in southern African grassland.

Submitted to ACPD

This paper is well written and an appropriate level of technical detail regarding the instrumentation and analysis is given. The geographic area is quite unique and thus this report provides useful information to the community. Availability of nearly one year of data is also favorable and allowed comparison of wet and dry seasons and transport pathways. Still, the breadth of supporting aerosol data is very limited (to a SMPS) and

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thus the actual scientific analysis is lacking.

Major Comments

1. Much was done comparing AMS-derived aerosol properties for dry/wet seasons and between different source regions. Could this comparison be extended to the aerosol acidity, density, and size distributions? Utilizing total particle number concentrations (from the SMPS) may also provide a useful way to compare the different source regions, as the chemical analysis yielded very little separation.

2. The conclusion section should emphasize how these results will contribute to future measurements. What are the next steps for aerosol research in this unique region of the world? Are these results useful for policy makers to guide cleanup and decision making for future industry?

3. Why is equation 5 introduced but not used? Are derived linear fits from this dataset similar? Is there a seasonal dependence of this relationship? Is the relationship different between sites?

Minor Comments

Page - line

15520 - 17 replace 'is' with 'are'

15521 – 2 'particles with diameter less than 10 μm '

15521 – 10 sort = short

15527 – 4 can you provide an example of 'suspicious' data that was removed by visual inspection?

15527 – 11 Potentially, a more direct and transparent method to determine M might be showing two plots: 1.) ACSM+BC (mass) vs. DMPS volume 2.) PM1 (mass) vs. DMPS volume This will allow determination of non-refractory density and total density,

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from which you can calculate M in a similar manner as Equations 1+2.

15531 – 14 Is it possible to compare results to a similar geographic region (it seems that suburban NYC is not a useful comparison)?

15534 – 20 For the wet season, it looks as if the slope is near unity if you exclude data greater than 3 ug/m³ (calculated). Thus the acidic aerosol seems to only exist when concentrations are high, and this is not very frequent. I suggest a comment in the text on this supposition, and potentially multiple linear fits to illustrate this point.

15538 – 17 Can the influence of combustion from automobiles be excluded from the BBOA fraction, given that the diurnal cycle could also be attributed to traffic patterns?

15540 – 12 Can you expand on the causes of m/z43 variability, as this sentence is very vague.

15540 – 17 The hypothesis that oxidation is dependent on acidity is speculative. Can Figure 10 be colored by acidity (SO₄/NH₄ mole balance) to qualitatively address this statement?

Figure 5 Please add linear fits to each plot

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