We thank the referee for a detailed review of our manuscript. The referee comments were very valuable and we believe that addressing the issues raised by the referee will considerably improve the manuscript.

Referee #2: Major Comment 1

The complete SMPS dataset will be published in another paper which will be submitted soon. Furthermore, we wanted to make density calculations based only on large dataset (10 881 data points) to verify good quality calculations.

We extended the comparison between the regions to include the aerosol acidity, as suggested by the reviewer. Also spatial variability of OA, sulfate, nitrate, ammonium, BC and chloride for both the dry and the wet seasons were calculated and added to supplementary material (see plots at the end of text).

Referee #2: Major Comment 2

As previously mentioned, South Africa has a large number of anthropogenic activities and biomass burning events (wild fires) that contribute significantly to increased levels of atmospheric aerosols. The results presented in this paper are important for this unique region for which limited long-term aerosol measurements exist at present. This was the first ever real-time continuous measurements relating to the chemical composition of atmospheric aerosols conducted in this region. South Africa has well-defined legislation with regard to general air quality and the reduction of emissions from anthropogenic sources. Climate change related issues are also receiving increased attention from the South African government. The South African government has declared three national air priority areas, indicating that air quality in these areas need to be improved. Results presented in this paper have already led to a joint project between the authors and the South African Department of Environmental Affairs (DEA) that will be used to determine the load of secondary pollutants (e.g. SO_4^{2-}) on the relatively newly declared Waterberg Priority Area due to primary pollutants (e.g. SO_2) being aged and transported from the other two priority areas (Highveld Priority Area

and Vaal Triangle Airshed Priority Area). Therefore, the results will directly assist policy makers in South Africa.

We will add the following text to the end of conclusions:

The results will directly assist policy makers in South Africa to implement the correct procedures to address current levels of atmospheric aerosols, as well as with their decision making for future industrial developments. Furthermore, the measurements conducted in this study signify the importance of these types of measurements in this region. The next step for aerosol research in this region would entail the implementation of long-term continuous chemical composition measurements with instruments such as the AMS.

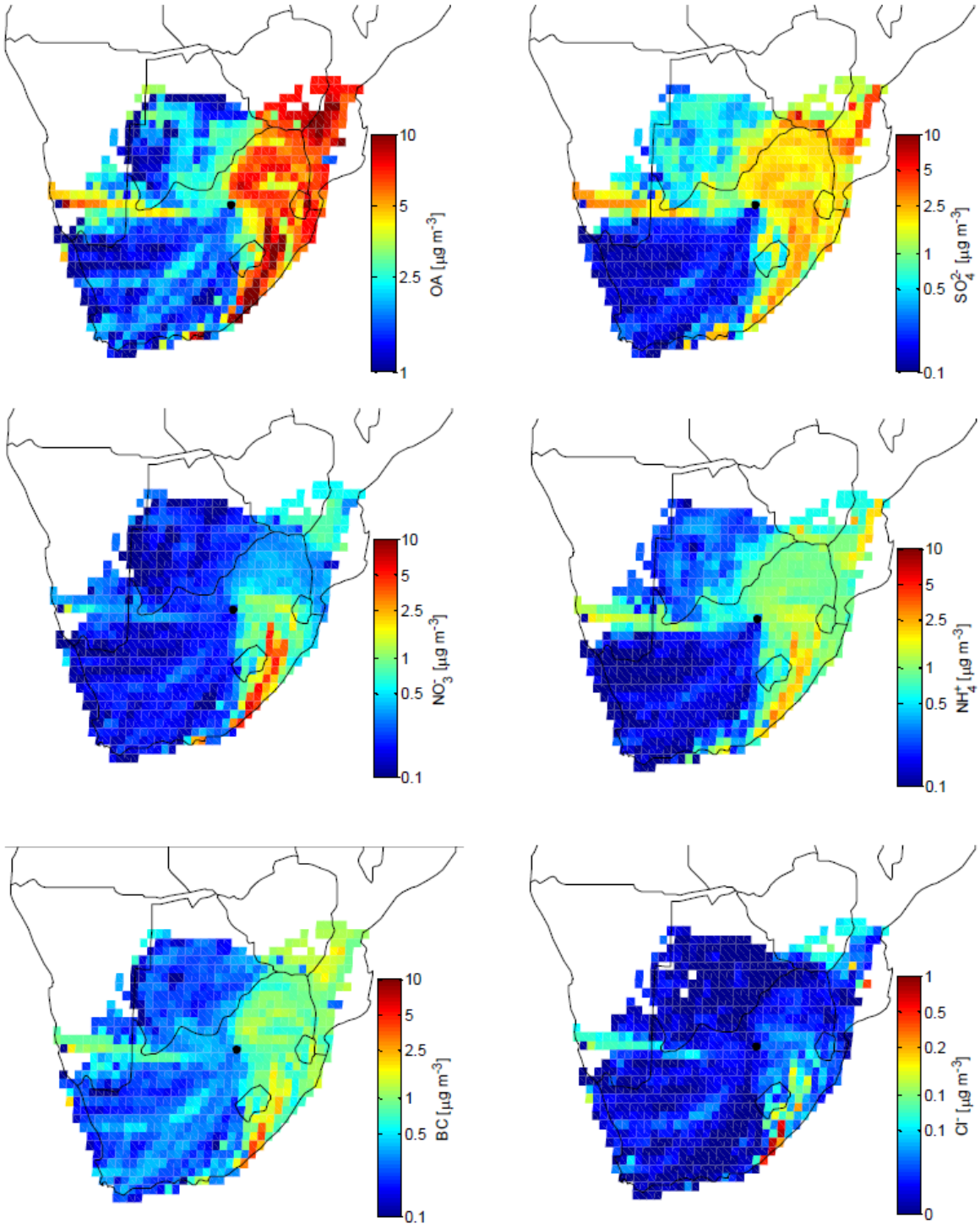
Referee #2: Major Comment 3

Equation 5 was used to calculate average O:C ratios (page 15540: lines 21-22). Similar to density calculations, we wanted to apply a large dataset for O:C estimations. Equation 5 was derived from the ambient measurements conducted in Mexico City and provide an estimation of the O:C ratio of the average OA. Unfortunately, because of technical limitations of ACSM, direct calculations of O:C ratio from mass spectra were not possible.

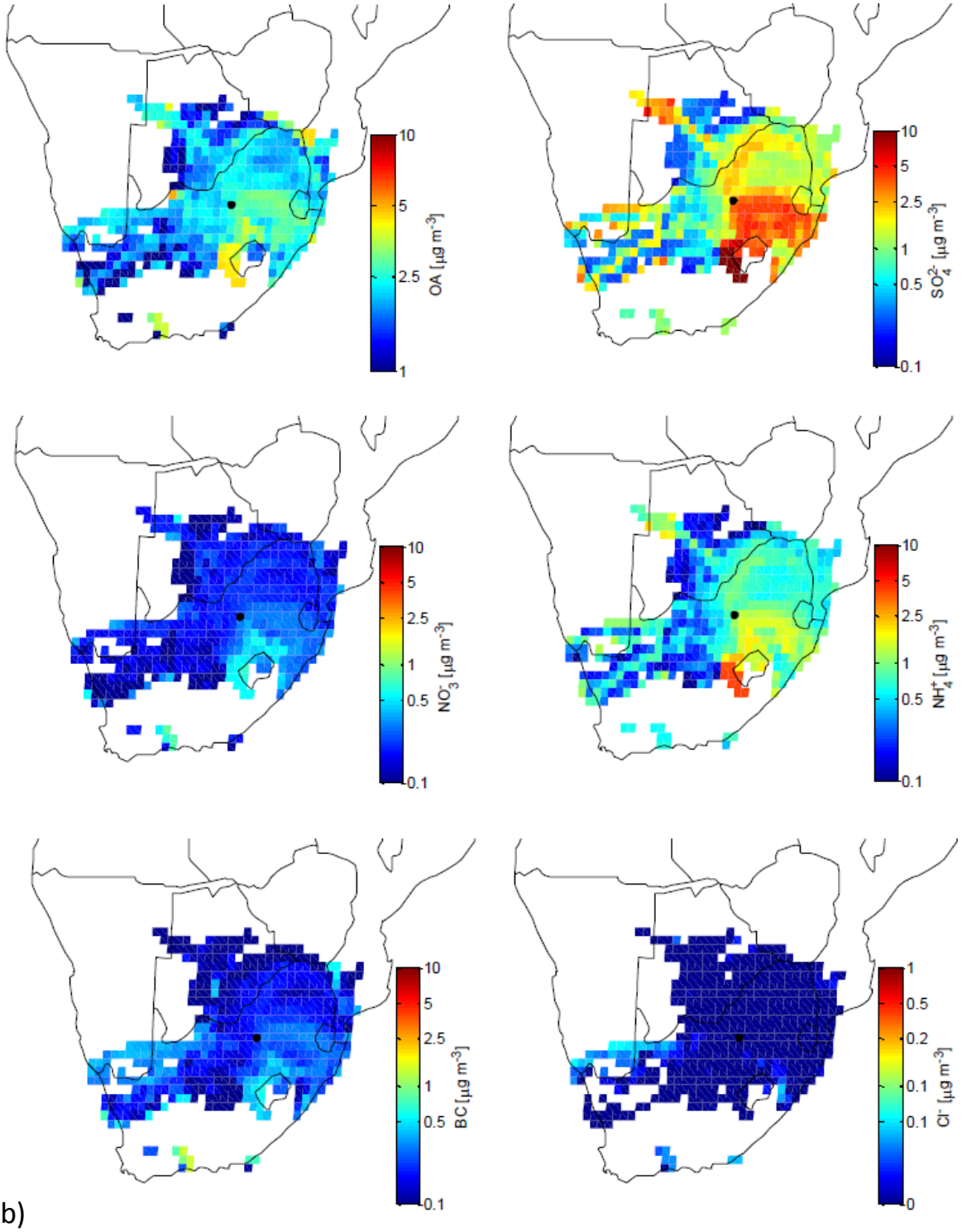
Here are the referee minor comments, followed by our replies:

- P15520, line 17: We replaced ‘is’ with ‘are’
- P15521, line 2: This line was corrected to “…PM_{10} – particles with a diameter smaller than 10 µm”
- P15521, line 10: This line was corrected to “…or data from comprehensive equipment sets are operated only for short campaigns.”
- P15527, line 4: We added example and line was corrected to “ Periods and size intervals 5 when data was noisy or otherwise suspicious were removed from the dataset e.g. periods right after power break before ACSM performance was fully stabilized”
- P15527, line 11: In this work, we wanted to have an equation for calculating the refractory material mass rather than to compare densities.
- P15531, line 14: This work was the first measurement campaign in southern Africa conducted with the aerosol mass spectrometer technique, so comparison with a similar geographic region was not possible. We wanted to use concentration data from diverse locations to make a global comparison.
- P15534, line 20: We added colors that indicate sulfate concentrations to Fig 5b to confirm that acidic aerosols were observed only at relatively high (sulfate) concentrations.
- P15538, line 20: Unfortunately the HOA factor, the main indicator of traffic exhaust, was not possible to separate with PMF in this work.

- P15540, line 12: We changed the text to "Since f_{43} (*m/z* 43 divided by total OA) is indicative of less oxidized and photochemically younger organics than f_{44}, the variability in f_{43} arises from differences in OOA components arising from different sources and chemical pathways."
- P15540, line 17: Acidity is not the only factor that influences the value of f_{44} in Fig. 10, so the SO_4/NH_4 mole balance would not help very much in the interpretation. However, we made acidity comparison between regions and these new results are presented in Paragraph 3.5.2.
- Figure 5: We added linear fits to all the plots



a)



b)

Fig 1: The spatial variability of OA, sulfate, nitrate, ammonium, chloride and BC concentrations (median values). Concentrations were calculated applying air mass history from back-trajectories similarly to Vakkari et al. (2011) and (2013) both for the dry (a) and the wet (b) seasons.