Atmos. Chem. Phys. Discuss., 12, C9772–C9774, 2012
www.atmos-chem-phys-discuss.net/12/C9772/2012/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long-term observations of aerosol size distributions in semi-clean and polluted savannah in South Africa" *by* V. Vakkari et al.

Anonymous Referee #1

Received and published: 25 November 2012

This work presents four year data of submicron aerosol particle number size distributions for two different locations in southern African Savvanah. Similar observations in the southern hemisphere are scarce and of great significance for the atmospheric community. The manuscript is well written and presents data illustrating the effect of anthropogenic activities, incomplete burning and nucleation processes to the aerosol size distributions in the area. However the presentation of the results can be made more effectively. Therefore, it should be accepted after the authors have made some minor changes

General comments

The two sites under study are presented in a way, so that at some points the reader gets the feeling that the authors refer to a single location representative for the whole southern Africa. However, it should be made even more pronounced in the manuscript that the aerosol populations in the two locations are significantly different. Nevertheless, these differences are of great importance since the comparison between the two sites can give a more detailed picture of heavily polluted and semi- clean conditions in S. Africa, and thus valuable information for modelers about the parameterization of aerosols in the region. It is recommended that the comparisons between all the different sites refered in the manuscript to be summarized and given in two separate paragraphs, one for polluted and one for semi-clean conditions.

Mineral dust originating from the Kalahari region can be present and play some role in the area, however it is not included in the analysis. The Kalahari sector in Figure 11 (N100 panel), the Kalahari distribution in Fig.12 perhaps indicate the presence of large particles. The mobilization of the Kalahari region, is maybe not very signiïňĄcant on a global scale, however can be regionally important. It would be a great improvement to include some analysis on the dust contribution, using some satellite or AERONET data (available for the region) if no other means are available.

Specific Comments

Figure 2: Please use different colour or/and marker for the different sites

Paragraph 3.1, Line 5: The numbers given in the table are 1856 and 7805 respectively.

Figure 4: The contour plots are dominated by the nucleation events, suppressing the rest of the regional characteristics. Same plot separated in event and non-event days will be more enlightening for both the nucleation processes and the size distributions diurnal cycle the rest of the days.

Figure 5, 7. There is a conflict here with the determination of what a mode is. To my opinion the evolution of a mode with time is dynamic, modes interact to each other.

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Therefore the growth of particles to larger diameters does not reflect just the growth of the mode mean diameter but the contribution of the growth processes to the number of the next mode. For instance, in Fig. 5 mode mean diameter panel, Mode 3 stops to exist at 18:00, but the mode diameter of Mode 2 can be attributed after 18:00 to Mode 3.

Paragraph 3.3 Information about the frequency of occurrence on an annual base of each particle mode described earlier in a figure or in plain text would be very interesting.

Figure 9: The secondary maximum of CO at Marikana probably attributed to the maximum of fire observations in the area as shown in Fig 10 is not represented in the N100 anual variation. Please explain.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 24043, 2012.