Atmos. Chem. Phys. Discuss., 9, C12387–C12390, 2010
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Temporal variation of elemental carbon in Guangzhou, China, in summer 2006" *by* R. L. Verma et al.

R. L. Verma et al.

verma@atmos.rcast.u-tokyo.ac.jp

Received and published: 23 June 2010

Reply to Referee#2

I and all the co-authors have appreciated the thorough and constructive comments by the Referee#2, which helped us to improve the manuscript. We have taken into account all comments while revising the manuscript. Here we reply the comments raised by Referee#2

Since a good agreement can be seen between the methodologies use to measure EC(thermal) and BC(optical). We have used EC instead BC in the revised manuscript, and also in present reply to referee#2.

General comments:

The paper presents results of elemental carbon, carbon monoxide and carbon dioxide and their ratios measured in one of the most polluted regions on the Earth. These are important data and should be published. Although the work has been done with care and with good instruments there are a couple of points that I wish the authors would do. (1) You have had an OC/EC analyzer but use only the EC data. You write " Previous studies of anthropogenic aerosols and gaseous pollutants at Guangzhou and the surrounding urban areas mostly focused on the relationships of OC and EC and their seasonal variations" ... "However, none of the previous studies have reported the relationship of EC to other combustion tracers (e.g., CO, CO2), particularly in light of their emission inventories from different sources. These relationships can be used to characterize sources and also to validate the existing emission inventories of these species." I think this is a good goal for the paper. However, I would suggest that you use also the OC data. One interesting point would be to compare also the OC/EC ratios (or EC/OC, just choose) with the CO and CO2 data. OC is very much formed by condensation of organics on the surface of existing particles, for example EC from incomplete burning, and the ratio grows with distance from the burning sources, so the OC/EC ratio is smallest very close to the sources. On the other hand, CO gets oxidized into CO2 and so the ratio CO/CO2 ratio should grow with distance from the burning sources. Some study of these two ratios might potentially make this paper stronger – if some interesting results are obtained. Why don't you try that?.

Reply: Based on the suggestion we have added diurnal variations of OC/BC ratios conjunction with BC, CO, and CO2, as OC/BC ratio is an indicator of fresh or primary emissions. Observed lower ratios (about 1.0 – 2.0 μgC m-3/ μgC m-3) during morning and evening peak hours suggest dominance of fresh emissions from sources existing in the region.

1) I wish you would make more references to the other published, related work done in the region, for instance: Cheng et al., 2006. Mixing state of elemental carbon and non-light-absorbing components derived from in situ particle optical properties at

Xinken in Pearl River Delta of China. Journal of Geophysical Research 111, D20204, doi:10.1029/2005JD00692. Garland et al. 2008. Aerosol optical properties in a rural environment near the megacity Guangzhou, China: implications for regional air pollution, radiative forcing and remote sensing. Atmos. Chem. Phys., 8, 5161-5186, 2008. Gnauk et al, Size-segregated particulate chemical composition in Xinken, Pearl River Delta, China: OC/EC and organic compounds. Atmospheric Environment, Volume 42, Issue 25, August 2008, Pages 6296-6309. Xiao et al. Formation of submicron sulfate and organic aerosols in the outflow from the urban region of the Pearl River Delta in China. Atmospheric Environment, Volume 43, Issue 24, August 2009, Pages 3754-3763. Zhang et al. 2008. Regional Integrated Experiments on Air Quality over Pearl River Delta 2004 (PRIDE-PRD2004): Overview. Atmospheric Environment, Volume 42, Issue 25, August 2008, Pages 6157-6173. And show also in the text what are the new results in the present paper compared with those. And also, are there common results that would support each others' conclusions? Were the measurements in this work made in a very different location compared to the other PRIDE-PRD2006 or PRIDE-PRD2004 measurements? Mention that also in the text. If they were made in different locations, how do they differ?

Reply: These papers have been cited in relevant sections of the revised manuscript.

Small detailed comments:

P. 24633 L 29 " The accuracy and precession of..." Instead of the word precession use the word precision. Reply: Correction is made in revised manuscript.

P. 24636 L 25. You have calculated trajectories only for midnight. Why? Are the daytime ones very different? Reply: We have calculated the back trajectories for day and night, however we do not find any major differences for starting time at midnight and midday.

Figure 3. A very small thing: the time series of EC and CO2 are plotted with blue and black lines that are hardly distinguishable from each other, at least I cannot see which

is which in a printed version of the paper. Using colors that differ more clearly and also different thickness would help.

Reply: Separate figure for CO2 is included in revised manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24629, 2009.