

Interactive comment on “Aerosol optical properties in a rural environment near the mega-city Guangzhou, China: implications for regional air pollution and radiative forcing” by R. M. Garland et al.

R. M. Garland et al.

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We would like to thank Referee 3 for their careful reading of the manuscript and for their thoughtful comments. We have addressed their comments below; their original reviews are in italics with our responses following.

This paper reports carefully measured aerosol scattering and absorption coefficients in July 2006 at a rural site in the Pearl River delta in southern China. The authors analyzed the data in terms of overall statistics, diurnal variation, relation to wind and air trajectories, Angstrom curvature, as well as correlation between light absorbing carbon with CO. The high-quality measurements and the careful examination of the dataset

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are the highlights of the paper. However, the scientific values of this work have not been well demonstrated, and thus the paper does not seem to yield significant new results. Some specific comments are given below.

We feel that the paper yields the following new and key results;

1) These are the first outflow aerosol optical property measurements of Guangzhou into a rural site.

2) We have measured and characterized the high level of pollution in a rural area of PRD due to regional pollution, even in the relatively “clean” summer months.

3) These measurements have been analyzed in such a way as to allow easy comparison to other areas and measurement campaigns; additionally, such comparisons have been done in the text in order to put these measurements into perspective (i.e., extensive and intensive properties, diurnal cycles, Ångström curvature and $\Delta CO/\Delta LAC$).

4) The first analysis of impact of coupling the backscattering and single scattering albedo on radiative transfer calculations.

5) First detailed analysis of Ångström curvature using ground-based nephelometer and in situ size distribution measurements and comparison to formulation used in AERONET retrievals.

6) Contrast the aerosol optical properties of a local biomass burning event to the regional background pollution.

1) There have been a large number of studies on ozone, VOC and aerosols in the PRD, including many in the Hong Kong area. The authors should give a more complete review of those studies that are relevant to this present work and identify the key knowledge gaps/issues. This way the author may be able to better demonstrate the scientific values of their measurements/ results.

The Introduction (Section 1) has been expanded to address more previous work.

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2) *The measurements were conducted in July. It is well known that in this time of the year the PRD region is under the impact of the summer monsoons which contribute to the best average air quality in a year, except during rarely occurred episodes as shown in this present study. What is the rationale for selecting the summer season? To study the radiative forcing in maritime air masses?*

We think that the summer is a good time to measure the evolution of PRD regional pollution as the air masses generally come from over the sea and then move over the PRD region to the measurement site. Additionally, one of the goals of this study was to complement the 2004 study when the PRD region had mostly north/northeast winds. This is discussed now at the end of the Introduction and in the Experimental Section (Sections 1 and 2.1). Additionally, no other detailed study of this region has been performed at this time of year. And, while aerosol loadings may be lower in the PRD in summer, they are still comparable to urban areas elsewhere.

3) *The authors made careful analysis of the data from this single site, but the regional representation or uniqueness of the findings is not demonstrated. The authors should discuss their results in the context of the previous studies, in particular the results from the 2004 autumn campaign. Some results from coastal areas (e.g. Hong Kong) may be worth comparing to show the difference/similarity between this inland site and other parts of the PRD.*

We have compared our results to previous campaigns in Table 2 and have now added July 1998 results from a study in southeast Hong Kong (Man and Shih, 2001). These measurements showed very low extensive properties (the “Less polluted” Backgarden values when winds came from the south/southeast and spent < 24 hours over land are up to 13 times larger than the Man and Shih (2001) values). A discussion of these results has been included in the text (Section 3.1.3 and Section 3.3). The aerosol optical property measurements from the complementary 2004 autumn campaign are included in Table 2 and discussed in the text (Section 3.1.3).

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Reference

Man, C. K. and Shih, M. Y.: Light scattering and absorption properties of aerosol particles in Hong Kong, *J. Aerosol Sci.* 32, 795-804 (2001).

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