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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterization of photochemical pollution at different elevations in mountainous areas in Hong Kong" *by* H. Guo et al.

Anonymous Referee #1

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Surface ozone has been intensively studied in the Pearl River Delta region in South China in past decades, and many studies showed that mesoscale circulations like sea-land breezes and mountain valley breezes play important roles in air pollution transport in such a region with complex topography and land-use/land cover. However, there were very few works conducting field measurements at mountain site in this region. This study presents latest results from a well-designed field campaign at a mountain site and concurrently at an urban site at foot of the mountain. The measurements were conducted in autumn, a typical period of photochemical pollution in South China. These data are very valuable for improving current understanding of photochemistry and multi-scales air pollution transport in such a region with severe ozone pollution for decades.

Generally speaking, the manuscript is well-written and can be accepted for publication on Atmos. Chem. Phys. in its current form. However, this referee would like to encourage the authors to make some revision according to the following comments:

Major comments.

1)The authors presented data collected at the two sites equally in a comparative way, but the referee thinks that the difference of ozone levels between the two sites doesn't deserved such a long discussion in Section 3.2. The author should focus on the mountain site, which gives more valuable information in regional perspectives of air pollution transport. Section 3.2 can be re-organized by condensing the first half and adding more discussion on the long-range/regional transport issue. Here the long-range transport of air pollutions can influence the Hong Kong's local air quality by downward transport from upper-PBL through valley breezes at night and vertical mixing during the day time.

2)In Fig.2, the authors give some results of MOZAIC measurement to explain the possible difference in the vertical distribution. However, for selected cases, the vertical distribution might also be misled by horizontal difference of plumes as the airplane may fly over different cities in the Pearl River Delta during the ascend/descend stage. A solid result should be averaged with very large number of profiles. In fact, previous studies with relatively large number of MOZAIC aircraft profiles have already made typical PBL ozone patterns, i.e., a higher ozone in upper PBL, in some cities.

3)In Section 2.4, for the Mbox modeling of TMS, problems may be existed if assuming air parcel moved from the foot site TW to TMS, because wind data at TMS generally come from North, i.e. from the Pearl River Delta region. For this case, the model may be initiated by using previous measurements in the inland Pearl River Delta region.

Minor issues.

1)Section 3.1.1, Paragraph 1. The authors tried to put the results of the mountain site into a global picture, however, because those results were obtained during different

seasons, at different latitudes, and in regions with different emission characters. This part could be deleted or kept by adding more information about the experiments.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 29025, 2012.