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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric mercury concentration and chemical speciation at a rural site in Beijing, China: implication of mercury emission sources" *by* L. Zhang et al.

Anonymous Referee #1

Received and published: 25 July 2013

This paper conducted one-full year's continuous measurements of speciated atmospheric mercury concentrations at a rural site in North China plain, which is an important anthropogenic source region of mercury in China and has not been well studied regarding the atmospheric mercury. I think the dataset presented in the study will help the scientists better understand the mercury distributions, sources, and transport of atmospheric mercury in China. This study also made some interesting discussions on the relationships of atmospheric mercury and criteria pollutants, and stories of the intercept of the trend line as well as the RGM/Ozone ratio are quite new to me. I think this manuscript could be published in the journal of ACP after the following comments

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are addressed.

One general comment is that more discussions regarding the anthropogenic sources of the different atmospheric mercury species are needed. As I leant from the manuscript, anthropogenic sources were an important factor regulating the distributions of mercury species. GEM, GOM, and PBM showed quite different seasonal trends in the study area, and this may imply the three mercury species may have distinct anthropogenic sources. I would like to encourage the authors to make some detailed discussions on the elevated GEM, GOM, and PBM events. They can also compare the ratios of GOM/GEM and PBM/GEM with the published speciation of mercury compounds released from typical anthropogenic sources in China.

Specific comments: Sect. 2.2: please add some relevant information of the field maintenance of the speciated mercury system. How often did you change your denuders, RPF, and impactor plate? The method or reference related to the preparation of denuders should be also addressed.

Line 8 on page 12182: please clarify the method for the calculation of detection limit, or add reference here.

Line 6 on page 12183: Is the ending height of 500 m referred to sea level height or elevation above surface ground. Does the start time mean local time or UTC time?

Line 14 on page 12183: please specify the criterions of GEM, GOM, and PBM in the PSCF simulations;

Line 21 on page 12185: the dominant wind here is inconsistent with Figure 5D, please check it.

Sect. 3.2: the distinct season trends in GEM, GOM, and PBM are very interesting. The authors declare that some of the pollution episodes worked here. Are there some difference in the dominant wind direction and long-range atmospheric transport among the four seasons?

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Line 12-16 on page 12188: the contribution of natural sources to the GEM/CO ratio should be discussed;

Line 22-23 on page 12188: IF the pollution episodes dominated the decreased intercept in Autumn, these episodes may have relatively higher GEM/CO ratios. Can you speculate a little bit of the major sources for these episodes?

Figure 3 on page 12203: please add the mean concentrations of GEM, GOM, and PBM.

Figure 4 on page 12204: why there is a significant difference in PBM concentrations between 23:00 and 0:00?

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 12177, 2013.