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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric total gaseous mercury (TGM) concentrations and wet and dry deposition of mercury at a high-altitude mountain peak in south China" *by* X. W. Fu et al.

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The authors are most thankful to the anonymous reviewer for dedicating the time to read our paper and raise some important issues which will definitely improve this manuscript. We revised the manuscript following each of the comment.

1. We totally agree with the reviewer that atmospheric Hg monitored in this study was predominantly in the form of GEM and it may be more suitable to use the item of "GEM" throughout the paper. We changed all the item of "TGM" to "GEM" in the revised manuscript and addressed some reasons for doing this in line 10-13 on page 5.

2. The sampling of precipitation was not based on precipitation events. The sampling

method was developed from Oslo and Paris Commission (1998). The sampling system consists of three borosilicate glass components: (1) a collector (15 cm in diameter), (2) a connecting tube, acting as capillary to prevent loss of Hg from sample, and (3) a sampling bottle ($\sim$ 0.8 L volume) housed in a PVC housing system which could protect the sample from solar exposure and keep the sample at a relatively constant temperature. The collectors were set out manually just prior or within 15 min of the beginning of a precipitation event. After the rain events, the collectors were sealed using Polyethylene bags. The collected samples were stored in the sampling bottles. After one-week sampling, the samples in sampling bottles were then translocated to 250-mL Teflon bottles and taken to lab for analysis. Therefore, the sampling systems could collect samples from all the rain events. Since we collected samples from most of the rain events (except for the three weeks during which samples were lost during transport from field to the lab), the estimation of annual wet deposition could be made herein. The positive linear correlation between wet deposition flux and rain depth did not indicate the THg concentrations would increase with the time of precipitation events. Since the wet deposition flux was calculated by using weekly precipitation THg concentration and rain depth, the correlation between deposition flux and rain depth might indicate rain depth was more responsible to the weekly variations of wet deposition flux compared to THg concentration.

3. The estimation of dry deposition could be practicable in this study because we collected most of the throughfall and precipitation samples. Throughfall would probably carry more Hg after a long period without precipitation. However, we speculate other factors also played important roles. For example, THg concentrations in throughfall might increase with rain intensity because higher rain intensity could drive more PHg and RGM to be washed off during rain event. In this study, we found the discrepancy of THg concentrations between throughfall and precipitation was more pronounced in rainy season compared to dry season, which was probably effected by rain intensity.

4. The estimation of depletion of Hg by the uptake of forest canopy has a lot of uncer-

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tainties due to the paucity of empirical data. Therefore, we deleted this speculation in the revised manuscript. Specific comments:

1. The item of 'TGM' is somewhat awkward and it is replaced by 'GEM'.

2. The acronym TPM' is changed to 'PHg

3. 'Knowledge' is changed to 'knowledge'

4. The item of 'China' is removed

5. Yes, we referred to Figure 1 here

6. The sampling site was located at the summit of Mt. Leigong which is the highest mountain in the study area. The mixing height in the study area might be lower than those in other areas which were generally 1000-1500 m above ground level. Therefore, the ended height of 500 above ground level might be enough to minimize the friction effect from the Earth's surface and represent wind in the lower boundary layer. Besides, relatively low ended height might be better to closely reflect the origins of air masses at the study area.

7. Clarify was made in line 7-8 on page 13

8. This sentence was deleted

9. The scavenge process including direct deposition and physical-chemical transformation of GEM to RGM and PHg followed by deposition.

10. Scale was added to Figure 1

11. Throughall was changed to Throughfall in Figure 4.

References:

Oslo and Paris Commission: JAMP guidelines for the sampling and analysis of mercury in air and precipitation, Joint assessment and monitoring programme, pp. 1-20, 1998.

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Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/9/C9175/2010/acpd-9-C9175-2010-supplement.pdf

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 23465, 2009.