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Interactive comment on “Spatial and temporal distributions of total and methyl mercury in precipitation in core urban areas, Chongqing, China” by Y. M. Wang et al.

Y. M. Wang et al.

dywang@swu.edu.cn

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Response to reviewer 1, The authors present one full year of continuous measurements of precipitation at three typical sites in the urban area of Chongqing city, Southwestern China. The sampling techniques and analytical approaches are good enough and I have no questions for the data sets presented in the manuscript. This manuscript presents comprehensive data sets with respect to atmospheric wet depositions of Hg in a large urban area in Southwestern China, and it is an important addition to the existing atmospheric Hg database in China. Although there are some grammar and words usage errors in the manuscript, I recommend that the manuscript to be published after

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Discussion Paper



revisions of the following issues. The authors appreciate the anonymous reviewer for taking time to read our paper and presenting comments and criticism. The reviewer raises important issues which will definitely help us to improve the manuscript. The comments were correspondingly answered as listed below.

1. Since they measured the precipitation Hg concentrations, I advice the authors to calculate the wet deposition fluxes of the three sampling sites, respectively. This is because this kind of data set is very important to evaluate the regional budget of Hg, and it is also important for the citation of this paper in some other publications. Re: Thanks for your suggestions. Considering the importance of the regional budget of Hg, we have done a detailed presentation in another paper about wet deposition fluxes of Hg. 2. In the presented manuscript, the authors just presented the means and ranges of THg and MeHg concentrations for all the three sampling sites in Figure 1. It is important to make a statistical summary of THg and MeHg at each of the sampling site. They may include the average, median, range, volume-weighted mean values, and precipitation depth. Re: We have done an explanation about the average, median in the Figure 1 which may be unclear, so we add some related explanation under the Fig.1 note this time (Box plot showing median (solid line), mean (small square), 25th and 75th percentiles (box boundary), 10th and 90th percentiles (whiskers)). The volume-weighted mean values, range, precipitation depth were mentioned in the Table 2. Thus, it is unnecessary to make a statistical summary of THg and MeHg at each of the sampling site. 3. Line 6 on page 10246, the citation of Fu et al., 2010a is not correct here. Fu et al. (2010a) does not show any information about the Chinese anthropogenic Hg emission inventory. Re: Sorry for the incorrect citation of Fu et al., 2010a. We referenced this from the paper titled 'Trends in Anthropogenic Mercury Emissions in China from 1995 to 2003' (Wu et al., 2007). Thus, change 'Fu et al. (2010a)' to 'Wu et al., 2007' and add the reference 'Wu, Y., Wang, S. X., Streets, D. G., Hao, F. M., Chan, M., and Jiang, J. K.: Trends in Anthropogenic Mercury Emissions in China from 1995 to 2003, Environ. Sci. Technol., 40, 5312–5318, 2007.' on page 10261. 4. line 10 on page 10247, the sentence of "Three sampling sites. . . .

Interactive
Comment

...exurb." should be revised to "Three sampling sites were selected for monitoring precipitation in Chongqing city, which were located in the downtown, suburban and controlled sites in the city, respectively. Re: Thanks for your comment. We changed the "Three sampling sites.exurb." on page 10247 to 'Three sampling sites were selected for monitoring precipitation in Chongqing city, which were located in the downtown, suburban and controlled sites in the city, respectively.'. Additionally, the relative revisions throughout the manuscript were needed: Line 10~11, page 10244, Change 'from the city center to the suburb, then to the exurb' to 'from the downtown to the suburb, then to the controlled site in the city'; Line 27, page 10246, Change 'the city center, suburb, and exurb' to 'the downtown, suburban and controlled sites in the city'; Line 20, page 10250, Change 'the city center (NA) to suburb (BB) and then to the exurb (JY)' to 'the downtown (NA) to suburban site (BB) and then to the controlled site (JY) in the city'; Line 22, page 10250, Change 'city center' to 'downtown'; Line 24, page 10250, Change 'exurb' to 'controlled site'; Line 18, page 10256, Change 'center' to 'downtown'; Line 19, page 10256, Change 'exurb' to 'controlled site in the city'; Page 10256, Change 'city center' to 'downtown'; Page 10256, Change 'exurb' to 'controlled site' 5. Sampling method: how many samples did you collected from each of the sampling site. Re: We collected 258 samples at the three sampling sites during one year including 92 at NA, 75 at BB, 91 at JY. 6. The second paragraph on page 10250, the authors presented that particulate Hg concentration is dominant in all the samples. I encourage the author to go further in the discussions of this part. Particulate bounded mercury (PBM) and gaseous oxidized mercury (GOM) are the predominant source of Hg in precipitation. The fractions of particulate mercury and dissolved mercury in the precipitation are useful to evaluate the distributions of PBM and GOM in ambient air, which in turn can help to explain the sources of your samples. Re: Thanks for your suggestion. I did a more detailed discussion in the third paragraph on page 10255. 'PHg, generally depicted as regional and local pollutant for shorter atmospheric lifetime, deposits by wet and dry deposition within roughly 50 to 500 miles. Thus, Hg in precipitation at NA site might be related to Hg emissions in the surrounding area.'

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Interactive
Comment

was added after '....., these two power plants greatly influenced the precipitation Hg concentration.' And delete the sentence of 'Both wet and dry Hg deposition can be dominated by PHg removal (Gildemeister et al., 2005; Sakata and Marumoto, 2002).' on page 10250, so the relative reference (Gildemeister, A. E., Graney, J., and Keeler, G. J.: Source proximity reflected in spatial and temporal variability in particle and vapor phase Hg concentrations in Detroit, Mich, *Atmos. Environ.*, 39, 353–358, 2005.) was also needed to be deleted from page 10258. 7. Line 20 on page 10252, 'rain amount' should be "rain depth". Re: 'rain amount' was changed to 'rain depth' in line 20 on page 10252. 8. Line 25 on page 10252, the authors declare that there is a significant negative correlation between THg and rain depth. But the relationship factor (r) of -0.176 indicates that this is just a weak relationship. Re: The correlation depends on both the sampling amounts and the relationship factor (r). We did the correlation analysis between THg and rain depth by SPSS 13.0 software. The statistic analytical result showed that the relationship factor (r) was -0.176 with $p=0.005$ and $p<0.01$, indicating that there was a significant negative correlation between them. 9. Line 3 on page 10253, I am not clear of the item of 'frequent plum rains' Re: Plum rain (intermittent drizzle) is a special phenomenon of the middle and lowland areas of the Yangtze River. The climate during this season is characterized by continuous rain and hot temperatures. Due to the rains, the humidity runs between 80 and 90 per cent. The air flows very slowly during this period, which makes the weather stuffy. 10. Line 18 on page 10253. 'the difference was statistically insignificant' should be 'there is no significant difference observed' Re: 'the difference was statistically insignificant' was changed to 'there is no significant difference observed'. 11. Line 5-7 on page 10254, it is better to draw figures showing the relationship between precipitation THg and SO₄ and NO₃. The relationship factors of r do not show there are significant correlations. Re: The correlation depends on both the sampling amounts and the relationship factor (r). The statistic analytical result by SPSS 13.0 showed that there was a significant correlation between precipitation THg and SO₄²⁻ and NO₃⁻. 12. Line 2 on page 10255, 'house heating using coal' should be 'coal burning in domestic activities'. Re: 'house heating

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using coal' was changed to 'coal burning in domestic activities' in line 2 on page 10255. And change 'house heating' to 'domestic activities' in line 25, page 10254. Besides the above comments and responses, we also found some minor mistakes which were also revised in the manuscript as follows: 1. Line 3, page 10244, Change 'form' to 'from' 2. Line 11, page 10246, Change 'concentrations' to 'concentration' 3. Line 14, page 10251, Change '0.1–.9%' to '0.1–0.9%' 4. Line 19, page 10256, Change 'emission sources' to 'regional and local emission sources'

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