

Interactive comment on “Observations of atmospheric mercury in China: a critical review” by X. W. Fu et al.

Anonymous Referee #1

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This is an extremely long paper that provides an overview of atmospheric Hg data collected in China and the North South China Sea. This manuscript needs to be more concise. The paper needs to be reconfigured to discuss the limitations of the data. As written it is not really appropriate for ACP because it is a data summary, not a paper that moves science forward. I have some suggestions below for improvement; however, I apologize I just do not have several days to work on this paper so I will just provide some general comments.

First, the title is misleading for the paper is not a critical review, but a long summary of atmospheric data collected in China. I think the summary is useful, but a better discussion of the limitations of the data, a critical review of what is available, and a discussion of what needs to be done to move atmospheric Hg research forward in China given the
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current evolving thinking on atmospheric Hg measurements are needed.

Line21 pg 11928- the authors describe the paper as an integrated synthesis. The authors should describe the data within the limitations of their measurements. For example, discussion of how the GEM/PBM/GOM measurements were made and the limitations of these measurements need to be laid out carefully. They should look carefully at their data and see if results can be explained within knowledge of measurement limitations. When I think of ACP papers I think they should be advancing knowledge not just summarizing data. One way to deal with the length is to move a lot of information to the supplemental information, and then critically review data that is available and what is needed to improve understanding.

Throughout- 1-the paper needs English grammar editing; 2- atmospheric Hg species need to be changed to forms (Species means the chemical compounds are being measured and they are not. The authors are reporting simply on operationally defined forms); and 3- the word level should be replaced with concentration.

A few examples of issues- line 19 pg 11926 fold instead of folds line 20 pg 11926 what is activity data line 23 and 24 pg 11926 remove the line 25 pg 11926 suggesting is speculative language especially since they do not have dry deposition fluxes and only uptake of GEM by vegetation is estimated. Thus, dry deposition is not adequately considered.

line 4 pg 11934 what is significant? No statistics have been done.

Figure 7 These are diel not diurnal trends (diurnal means day; nocturnal means night; diel means 24 hours). Can the authors offer some explanation for the amplitudes of the diel curves? There are no error bars. What happens if this is broken out into seasonal trends? Are there a consistent number of measurements for each location? Were these all measured simultaneously? Why are there no diel patterns for some sites and not for others? Details on the locations are needed as well as the measurements are they standardized? Did these researchers follow a standard protocol?

Figure 8 there does not look like there is a diel trend and the years do not appear to be significantly different. Again there are no statistical analyses.

Section 3.1.2 and 3.1.3 – what are the uncertainties. What are the ozone and relative humidity measured at each location? How were the inlets to the instruments configured? Were the locations in clearings or in the forest?

Line 21 pg 11935 significant figure is not accurate based on the detection limit.

Line 25 pg 11937 fast deposition is speculative. What are the deposition velocities? How long would it take to deposit?

Section 3.2 describe how measurements were made and how they know this is GEM

Section 3.4. This is an interesting section. It would be good to have some trajectory related data to back up their general discussion.

Last sentence pg 11945- very speculative.

Beginning of section 3.6. Data from very limited sites are not adequate for establishing long term global trends, i.e. see limitations discussed of Chinese data page 11947 line 6

Pg 11948 it seems that a detailed discussion of what was used to establish the emission estimates and the limitations of this are warranted.

The authors seem to have left out discussion of natural emissions and the importance of these with respect to air concentrations.

In their list for moving forward I would say that they need to measure dry deposition fluxes and they need to accurately measure GOM and PBM in air.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 11925, 2015.