

Interactive comment on “Seasonal and diurnal variations of atmospheric mercury across the US determined from AMNet monitoring data” by X. Lan et al.

Anonymous Referee #3

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General Comments:

The manuscript describes the seasonal and diurnal patterns of three chemical forms of atmospheric mercury at eleven monitoring sites across the United States. These data are analyzed together in order to provide a comprehensive overview of the spatial and temporal variation of mercury concentrations to inform regional and global models.

The manuscript describes similarities and differences among the sites in great detail; however, a “large-scale picture of speciated mercury” is not clearly developed. In many sections, observations are listed for each site and each season (e.g. Sections 4 & 5), and seem to lack focus. As a result of this organization, it is often difficult to extract

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the important points. Additionally, while the authors attempt to provide explanations for the observations, their conclusions are generally not dissimilar to those found in previous studies (many of which are from co-authors) that analyzed temporal variation at fewer sites. Without a continental-scale picture of mercury, it is unclear what new contributions are provided by this work.

For these reasons, and because the manuscript is often difficult to follow and would require significant additional copy editing to address typos, run-on sentences, and tense problems, I recommend rejecting the manuscript in its current form.

Specific Comments:

- 1) P10846: Abstract should be condensed to emphasize the main, important points.
- 2) P10851 L11-12: Are you referring to local emissions or total emissions with 150km? A reference is needed when attributing observations to transport of Asian emissions.
- 3) P10852 L4: How do you distinguish the contribution of halogen chemistry converting GEM to GOM and low GEM emissions at coastal sites?
- 4) P10859 L13: It is unclear why the sampling sites were divided into the two groups for analysis and what interesting results were found by using this method.
- 5) P10855 L11-15: More information concerning this fire event is needed. When exactly did the fire occur? Need to better explain Figure 4.
- 6) P10859: Observations are described for spring and summer but no analysis or explanations are provided.
- 7) Figures presented in both the manuscript and supplementary material seem to lack focus and their organization into sub-figures is difficult to follow. I think the paper would benefit from condensing a lot of material (including figures) into fewer important points.
- 8) The role of natural mercury emissions should be addressed further.

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Technical Corrections:

The manuscript would benefit from additional copy editing. Some major concerns follow.

- 1) Table 1: Elevations for UT96 and NH06 are missing along with the units.
- 2) Units should be consistent throughout (ppqv or ng m⁻³)
- 3) When time of day results are reported, AM or PM should be indicated and local standard time (LST) could be used instead of PST, EST, MST, etc
- 4) P10850 L4-5: Tense should be consistent
- 5) P10851 L11-14: References are needed. Also, it is unclear whether the emissions sources being similar at UT97 and UT96 is referring to emissions within 10 or 150 km
- 6) P10854 L16: Why is this “interesting and surprising”? Isn’t this what we’d expect based on emission sources?
- 7) P10857 L24-27: References are needed.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 10845, 2012.