

## ***Response to Anonymous Referee #2***

We thank the reviewer for the constructive suggestions/comments. Below we provide a point-by-point response to individual comments (comments in italics, responses in plain font; page numbers refer to the ACPD version; figures used in the response are labeled as Fig. R1, Fig. R2,... ).

### ***Comments and suggestions:***

*Minor issues Line 40: “and” should be placed between “spring, summer”.*

### **Responses and Revisions:**

Corrected.

### ***Comments and suggestions:***

*Line 55 and all other lines: Several years ago, the atmospheric mercury community stopped using the term “reactive gaseous mercury”. This term was replaced with “GOM”, gaseous oxidized mercury. I suggest you change all of your RGM to GOM.*

### **Responses and Revisions:**

Agreed and corrections have been made in the text and figures.

### ***Comments and suggestions:***

*Line 148: change “limits” to “limit”.*

### **Responses and Revisions:**

Corrected.

### ***Comments and suggestions:***

*Line 187: you mentioned an arbitrarily set criterion of 4 ng m<sup>-3</sup>. I really don't know much about PSCF, but why do you use arbitrary criteria. How will different arbitrary criteria affect your results?*

### **Responses and Revisions:**

The “arbitrarily set criterion” was used in the definition of  $M_{ij}$  in the PSCF analysis (see TrajStat\_Help\_v1.2). The definition of  $M_{ij}$  as follows: The number of endpoints for the same cell having arrival times at the sampling site corresponding to pollutant

concentration higher than an arbitrarily set criterion is defined to be  $M_{ij}$ . In this study, pollutant concentration refers to atmospheric mercury concentration (GEM concentration). The words “arbitrarily set criterion” were used in PSCF method introduction and could also be found in (Fu et al., 2012). However, in the actual operation, we use a fixed GEM value as criterion. In this study, mean GEM concentration of  $4 \text{ ng m}^{-3}$  during the whole study period was used as fixed criterion (refer to Fu et al., 2012). We split the sentence in Lines 192-195 (ACPD version) to describe clearly in the revised manuscript.

***Comments and suggestions:***

*Line 241: “folds” should be fold or two-fold.*

**Responses and Revisions:**

Corrected

***Comments and suggestions:***

*Line 296: change “sources region” to “source region”.*

**Responses and Revisions:**

Corrected.

***Comments and suggestions:***

*Line 333: change “condition” to “conditions”.*

**Responses and Revisions:**

Corrected.

***Comments and suggestions:***

*Line 391: remove (and) from you reference (Sommar et al. 2001).*

**Responses and Revisions:**

Corrected

***Comments and suggestions:***

*Line 454: change “may plays” to “may play”*

**Responses and Revisions:**

Corrected.

***Comments and suggestions:***

*Line 456: change “greatly” to “great”*

**Responses and Revisions:**

Corrected.

***Comments and suggestions:***

*Table 2 should be updated to include mercury speciation studies conducted in the US over the past few years. There are several studies in the peer-reviewed literature that can be cited in this table, bring it up to date.*

**Responses and Revisions:**

Agreed. We have added (Peterson et al., 2012) and (Ren et al., 2016) in Table 2.

***Comments and suggestions:***

*Figure 3. Can you eliminate this figure? These data on already in Table 1.*

**Responses and Revisions:**

We assume the reviewer meant Figure 4 in the ACPD version. The only overlap of data between this figure and Table 1 are GEM, RGM and PBM mean concentrations. This figure also provides further information such as various percentiles. We agree with the reviewer’s comment and move this figure into the supplement.

***Comments and suggestions:***

*Figures 4 and 5. Can you merge these two figures into a single figure?*

**Responses and Revisions:**

We assume the reviewer meant Figures 5 and 6. We have merged PSCF results for potential source areas analysis of GEM in the revised manuscript. Two seasonal data sets have presented, one for haze days and another one for non-haze days.

## References

- Fu, X. W., Feng, X., Shang, L. H., Wang, S. F., and Zhang, H.: Two years of measurements of atmospheric total gaseous mercury (TGM) at a remote site in Mt. Changbai area, Northeastern China, *Atmospheric Chemistry and Physics*, 12, 4215-4226, doi:10.5194/acp-12-4215-2012, 2012.
- Peterson, C., Alishahi, M., and Gustin, M. S.: Testing the use of passive sampling systems for understanding air mercury concentrations and dry deposition across Florida, USA, *Science of the Total Environment*, 424, 297-307, 2012.
- Ren, X., Luke, W. T., Kelley, P., Cohen, M. D., Artz, R., Olson, M. L., Schmeltz, D., Goldberg, D. L., Ring, A., and Mazzuca, G. M.: Atmospheric mercury measurements at a suburban site in the Mid-Atlantic United States: Inter-annual, seasonal and diurnal variations and source-receptor relationships, *Atmospheric Environment*, 2016.