

07 February 2016

Review of Jin-Su Han et al. “Total Atmospheric Mercury Deposition in Forest Areas in Korea”

General Comments

Han and co-authors present a site-specific study of mercury deposition to a forested location in Korea. Based on measured fluxes, the authors construct an estimated mass budget for the study site. Measurements in this region of the world are sparse and additional datasets are a welcome contribution to the mercury literature. The analysis in the manuscript, however, needs to be matured. It presently reads like a core dump of numbers and the analysis feels lacking. I recommend the manuscript be revised before publication. The authors should focus on providing more insight to the readers.

Specific Comments

Abstract: It’s just a list of numbers. What’s missing is why the authors did the study and why the results they found matter. The Abstract needs a punch line.

Introduction: Could be greatly improved by including a clearer statement of the problem or scientific question they’re trying to answer with this dataset. The logical progression of the Introduction is a little hard to follow and it doesn’t build a clear storyline for the rest of the paper.

Methods, Site Description: The authors need a clear statement of why this particular location in Korea was selected. Lines 117-120 provided somewhat of an explanation, but it feels too vague. What does this site tell us that other sites don’t?

Section 2.4 QA/QC: Too many acronyms are introduced. Makes the text difficult to follow.

Results and Discussion: A few recommendations here:

- The authors use a knife-edge surrogate surface for PBM and GOM dry deposition measurements (Section 2.2.1). It would be useful to provide some discussion on how this method compares to other surrogate surface methods (e.g., the work done by Mae Gustin’s).
- **Page 8, lines 220-228:** If all of these numbers are important, I suggest condensing into a table. It’s difficult to parse text right now.
- **Page 6, lines 240-243:** The importance of this paragraph is unclear. Could it be deleted?
- **Page 9, lines 260-270:** Which explanation do the authors think is most plausible? The text currently gives the impression the authors are just guessing. A more thoughtful scrutiny of the proposed explanations would be welcome.
- **Page 10, line 282:** “Therefore, all of the Hg deposited...” What fraction is lost? What fraction is retained? This could be really interesting.
- **Page 10, lines 294-296:** “... the rest of the variation is likely due to variations in local...” The “rest” here being >80%, correct? A more rigorous explanation of the majority of the

variability seen in the data would be helpful. Being able to explain less than 20% does not give confidence in the interpretation.

- **Page 10, lines 307-309:** Why is an $r^2=0.59$ ($p<0.05$) “significantly correlated” and $r^2=0.56$ ($p<0.05$) “moderately correlated”?
- **Page 12:** If you are missing data in January and February, the stated assumption that “fluxes were assumed to be equal to the average of the flux of the month before” doesn’t make sense. How are you handling consecutive months of missing data?
- **Page 13, lines 382-383:** It would be useful here to be specific and describe what “both input approaches” are. It’s not that clear what approaches you mean.
- **Section 3.8:** This section is disjointed and lacks cohesion. Revision strongly encouraged, with a focus on building a logical progression.

Conclusions: The manuscript needs a Conclusions section. Without Conclusions, the manuscript incomplete and doesn’t seem mature enough for publication. A couple of strong synthesis statements from the authors about why their results add to our knowledge in the mercury field would really help the paper.

Supporting Information: I encourage the authors to make their data available in the SI. This will make it easier for other interested scientists, especially modelers, to compare against the data in Korea. The mercury community will be excited about this dataset and want to weave it into their comparisons – make it easy for them!