

## ***Interactive comment on “Global deposition of speciated atmospheric mercury to terrestrial surfaces: an overview” by Lei Zhang et al.***

**Anonymous Referee #3**

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Overall comments:

This is a review paper discussing global Hg deposition. This discussion is very important for Hg research community; however, the authors are not doing a very good job to deliver key messages from the review process. A review paper is to summarize findings from previous related studies and provide approaches/methods/concepts to help the research community moving forward. However, I did not see the authors clearly made all these points in their article.

In general, this paper is not easy to follow, the authors jump from one topic to another. They did not do advanced discussion. In more paragraphs, they only described methods and data, and probably two/three sentences to summarize/discuss what they learn from these methods/data. There is nothing inspiring readers. A review paper should

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do better than that.

Their conclusions/summaries are not new. Gustin's group has published couple review articles discussing the first three aspects in 2015, and the 4th aspect has been mentioned in multiple previous articles. I really do not find any new concepts in this article, and how can we solve the difficulties that the Hg research community is facing. For example, do the authors have any suggestion to understand behaviors of various GOM compounds in the atmosphere?

I agree this is an important research field and there are gaps which make scientists cannot fully understand global Hg cycle. A review paper related to this topic should be published to draw attention from environmental research groups. However, the way that this paper is done cannot provide useful information to scientists.

I suggest the authors re-think about the article structure and put more efforts on advanced discussions.

Specific comments: Abstract is read more like a summary than an abstract. I suggest to re-write the abstract and focus on your key aspects. Moreover, the authors must provide some potential solutions/suggests for each gap that are discussed in their conclusions.

Introduction is fine, but this is a review paper. There are more previous Hg review articles, such as Selin et al., 2007, and some key finding paper are not included in this review paper, such as Moore et al., 2014 Nature. These articles might not be directly linked to Hg deposition, but they do have indirect impacts on Hg deposition. After reading this article, I feel the authors focus on the measuring methods and numeric models, but do not discuss in advance about global deposition processes.

Methods section: A summary table or multiple summary tables would help the readers to read through this section.

- Surrogate surface: the key point of this method is the surface affinity and fluent con-

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ditions near surface, but I did not see the authors discuss these here. Huang et al., 2011 published a paper discussing fluent conditions near KSS surface, and how this impacts mass transfer.

- Enclosure methods: Choi and Holsen 2008/2009 articles are also important, and the authors did not discuss about the bio-process/photo-process related to Hg reduction in DFC.

- Micrometeorological methods: This method has been used to understand GOM flux as well, but no discussion here.

- In forests: Choi and Holsen 2009, and there are more articles from Driscoll's group discussing Hg cycle in forests.

GOM resistance: page 10 line 299-310, Gustin et al., 2015 has summarized this, this is not a new idea. I just feel, the authors are writing a review article, but they are repeating the concepts from the summaries in other's review articles without adding their new thoughts.

Page 13 line 401-402, is ambient concentrations not important?

Line 404-405, figure 2 indicates ambient concentrations could be important.

Page 14, line 412-414, Europe has . . . . ., any ambient data to support this argument?

Line 427, deposition fluxes concentrations, what does "fluxes concentrations" mean?

Line 435-439, the authors should explain why they are showing significantly different? Different surface affinity?

Page 17, line 537-540, different surface (eg forest vs grassland), there are many differences between these two surface types, such as leaf area index, but the authors just simply summarized all these difference depositions based on chemistry and not talking about the characteristic of surfaces.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-347>, 2019.

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