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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Enhanced production of oxidised mercury over the tropical Pacific Ocean: a key missing oxidation pathway" *by* F. Wang et al.

Anonymous Referee #2

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Review of "Enhanced production of oxidized mercury. . ." by Wang et al

This manuscript reports on observations of halogens and mercury species in the tropical Pacific region and attempts to understand these relationships in light of refinements to the chemical oxidation mechanism for GEM. Unfortunately, like many previous Hg publications, we are stuck in a limbo where we don't know how to measure the species correctly and, not surprisingly, we also don't know how to model them! It seems that we either need more solid grounding in the measurements or the chemical mechanisms to move forward.

The authors mention, but mostly brush aside, the challenges in measuring RGM and the recent reports on substantial problems with the existing methods. In addition, the

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authors fail to discuss in any detail the detection limit for RGM, which is fundamental to their analysis. Instead, they quote the detection limit from the manufacturer (Tekran). Given that nearly all instrument manufacturers inflate their specifications, and the apparent problems with the method that have not been acknowledged by the manufacturer, it seems the authors need to present something more convincing to show that they have actually detected RGM. This is especially true since their mean concentrations are just barely above the stated DL.

Potentially, the most useful part of this analysis could be the October event, IF the authors have more information to understand the cause. Here (we think) the RGM measurements are above DL. Even there, 10-15 pg/m3 is not very high above the DL. That said, what QC measures were employed to ensure there were no leaks, contamination, etc that could have caused the high RGM for those days? The Steffen reference, cited in the methods section is relatively old and there are better citations if you are trying to say you used standard Canadian or AMNET procedures.

Overall, I would say, the following issues must get resolved before this ms could or should be published:

1) Discuss implications of errors in RGM on your measurements.

2) Describe how DL was obtained or show tests that prove 4 pg/m3 is above your DL.

3) Describe QC to convince reader that the October events were in fact real.

4) Provide some useful analysis of the October event to help identify the cause for high RGM on these days.

Lacking any of the above, it is not clear to me what new results this paper brings to the topic.

A few other specific comments: Abstract, line 5: I think the statement staring with "Measurements of oxidized mercury in the polar. . ." is way over-stated. This is probably true in the Arctic. In lower latitudes there are perhaps two or three papers that suggest

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this. Line 10-11: “Considerable concentrations. . .” 4 pg/m3 is not what I would call “considerable”.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 21541, 2013.