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Interactive comment on "Particulate-Phase Mercury Emissions during Biomass Burning and Impact on Resulting Deposition: a Modelling Assessment" *by* Francesco De Simone et al.

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Review of "Particulate-Phase Mercury Emissions during Biomass Burning and Impact on Resulting Deposition: a Modelling Assesment" by Francisco De Simone et al.

General Comments:

De Simone et al. present a detailed assessment of the impact of mercury emissions from biomass burning on resulting atmospheric mercury deposition. The assessment is completed through utilization of an updated emissions database and an updated global mercury chemical transport model. Within this framework, the authors investigate a variety of model parameterizations and the role of other uncertainties on re-

sulting magnitudes and spatial distributions of mercury deposition. Overall, this work represents a sizable effort and further informs the scientific community regarding speciation of mercury emissions, chemical oxidation mechanisms, and spatial and temporal variations, all within the specific context of biomass burning and with relevance to the implementation of mercury policy.

This manuscript represents a substantial contribution to the field, and is very much with the scope of ACP. However, there are several items that could be addressed by the authors and incorporated into revisions that would likely strengthen the manuscript overall.

Specific Comments:

1. Much of the manuscript focuses on the potential impact of Hg P emissions. However, the issue of particle size is not discussed in the paper. Certainly, there have been assumptions made within the model regarding particle size, with direct implications to the potential transport distance prior to Hg P removal from the atmosphere (via either dry or wet processes). The manuscript would benefit from added discussion specific to particle size.

2. Table 5 presents summary statistics regarding comparison of model output with available observations from measurement networks. However, there is little text in the body of the manuscript in support of the inclusion of Table 5. The manuscript would benefit from added discussion to characterize and specify how well the model performed in comparison to observations.

3. No explanation or justification is provided on the selection of 2013 as the model time period. This rationale should be provided in the revisions, along with some indication of the representativeness of 2013 compared to other recent years.

4. Figures 1, 2, 5, & 9 seem to be very instructive. However, they are not easily legible. The size/resolution of these figures should be improved for the benefit of the reader.

Technical/Editorial Comments:

The units reported in Table 3 need additional clarification (Mg and %).

Page 1 - line 13, “71% to 62%”. . .of total deposition? Seems this sentence is missing some needed context.

Page 2 - line 7, should be “fraction of Hg emitted” (add “of”).

Page 2 – line 24, period needed after “(Randerson et al., 2012)”.

Page 3 – line 8, “equal to the 15%” (remove “the”).

Page 4 – line 2, “Hg emissions is of great importance” (add “of”).

Page 5 – line 18, “first model level level leads to” (remove “level”).

Page 5 – line 19, “approx” should be “approximately”.

Page 7 – line 1, instead of “have no influence”, perhaps “have little influence”?

Page 8 – line 14, “between the the measurement” (remove “the”).

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