Atmos. Chem. Phys. Discuss., 15, C3861–C3863, 2015
www.atmos-chem-phys-discuss.net/15/C3861/2015/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Source attribution and process analysis for atmospheric mercury in East China simulated by CMAQ-Hg" *by* J. Zhu et al.

Anonymous Referee #1

Received and published: 21 June 2015

The manuscript presents findings from a modeling study of atmospheric mercury deposition in eastern China. This study offers a valuable addition to the scientific literature by providing detailed information on mercury source attribution in a highly polluted region using a fine resolution regional photochemical model. The results will be potentially useful in the prioritization of mercury control measures for different industries in the region. Technical and editorial comments are provided below. I recommend acceptance subject to these minor revisions.

The modeling results are strongly dependent on the mercury chemistry applied in CMAQ. Also, there is considerable uncertainty regarding which mercury transformations actually happen in the atmosphere. Therefore, it would be helpful to provide the details of the chemical mechanism applied in this study.

The authors appear to have not applied the algorithm for bidirectional mercury in CMAQ but instead included "re-emissions" in the natural mercury emissions. This should be qualitatively discussed.

The basis for the mercury speciation in the anthropogenic source categories should be discussed as this has a strong influence on the predicted impacts. For example, CEM is mostly GEM and thus affects GEM concentrations but has little effect on deposition, whereas IND has a strong effect on deposition.

The work of Zhang et al. regarding mercury in the Beijing area is relevant and should be cited (Atmos. Chem. Phys., 13, 10505–10516, 2013)

"Domestic life" is not a common source category; the basis for the sources including in this category needs to be explained.

In Table 1, Figure 1 and elsewhere in the manuscript: yrˆ-1 is not scientific notation, suggest using either aˆ-1 or spell out "year"

How are wildfire emissions of mercury treated? If they are in the natural source category, there should be a non-zero TPM fraction in Table 1. Also, see line 16 on p. 10399.

Caption for Figure 2 is inaccurate and needs to be re-worded.

Clarify the averaging time period used for evaluation of mercury air concentrations

p. 10393: Line 6: Provide resolution of the parent grid in the nested grid configuration

p. 10395: Line 20: Provide citation for GEOS-Chem results

p. 10402-10406 The discussion of process analysis results is very long-winded and could use some truncation in the interest of clarity.

The grammar and style of writing needs to be checked throughout the manuscript. For example, I recommend the following changes. p. 10391: Lines 9-10: Atmospheric

ACPD

15, C3861–C3863, 2015

mercury is divided into three species according to various physical and chemical properties Line 12: GEM is the predominant form (> 95 %) in atmosphere; it is very stable ...

p. 10395-10396: Last line: A comparison was made of characteristics of processes influencing atmospheric mercury species in urban and non-urban areas

p. 10399: Line 1: "NAT was still an important contributor to ..." p. 10396: Line 14: "are shown in Fig. 2"

p. 10399: Line 9: "The effect from NAT was decreasing ..." Abstract: Re-phrase "made gain of mercury"

The notes presented above are just some examples. It would be helpful to proofread the entire manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 10389, 2015.