Atmos. Chem. Phys. Discuss., 11, C13318–C13320, 2011
www.atmos-chem-phys-discuss.net/11/C13318/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Speciated mercury at marine, coastal, and inland sites in New England – Part 2: Relationships with atmospheric physical parameters" *by* H. Mao et al.

Anonymous Referee #2

Received and published: 16 December 2011

This paper presents an extensive amount of data at three different sites, over a long time period, for Hg(0), RGM and Hg(P). This is an extraordinary and unique data set, and as such eventually warrants publication. The authors have done a considerable amount of work in analysing this data with respect to meteorological and atmospheric physical parameters. This work is reflected in the draft, and the quality of this work is high.

Despite this rich data set, however, the scientific conclusions and insights drawn from the paper are weak at best. This to some extent reflects the state of the field – we don't understand the variation of mercury species with meteorology – and this extensive data

set and analytical work proves the point. At best, the authors nibble around the edges of this question, listing tentative associations.

I struggled even as an expert reader to glean scientific insights that might be broadly relevant from this paper, which raises the question of whether there is enough content here to be of broader interest to the ACP reader. In a revision, I would like to see the authors be a bit more ambitious in identifying the key take-home messages from this rich data set. Perhaps given the uncertainty these can be presented as hypotheses to be tested. But as is, the interpretation of the associations presented is almost totally missing. To this end, the authors also need to dramatically improve the presentation and writing of the paper (and limit the number of figures to n«17).

Specific comments follow:

general: Would it help to look at multivariate correlations (ie temp and precip together) using more advanced statistical methods?

p 28402 line 15: This sort of structure – where a tentative insight is presented, then methods for follow up, then another insight – contributes to confusion in reading this paper. I would suggest that data analysis methods would be appropriately placed in methods, results in results, and discussion in discussion.

p 28403 line 15-20: is there any way to go beyond this speculation and quantitatively assess these differing conditions? Filtering the data? etc.

p 28404 line 14: Another possibility is that deposition via sea salt aerosols is a) reversible or b) slow.

p 29404 line 24: Is there any quantitative basis (back-trajectory modeling, for example) that could back this up? As is, it reads as if the authors are just guessing. It would be easy to check, for example, for the days in question using HYSPLIT.

Section 3.2 solar radiation: what impact does potential emission from the surface (either land or sea) have?

p 28406 line 23-25: these are very low r2 values. Is this significant?

p 28408, line 8-10: doesn't the fact that it ranks 104/116 mean that it was an exceptionally cold, dry February? I'm not exactly sure what point is being made here.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 28395, 2011.