

***Interactive comment on* “Effects of temperature and other atmospheric conditions on long-term gaseous mercury observations in the Arctic” by A. S. Cole and A. Steffen**

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Received and published: 26 April 2010

Reply to Anonymous Referee #1

"The article present analyses of a GEM time series from Alert Canada and can be considered as an update of previous findings. Finally data from Amderma Russia is included in the discussion. The data are interpreted using good solid statistics and as such the article is straight forward. For the first time a time trend in GEM has been documented which is very important for the understanding the dynamics of GEM and to constrain Atmospheric transport models. However the interpretation in is too tendentious in 1 case, see below. Page 27168 line 6 and page 27170 line 15: It should

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be 13 years both places?"

– 13 years of data were used for this analysis (1995-2007 inclusive) but the measurements are ongoing. This has been clarified in the text.

"Section 3.2: In the discussion of the data from the two sites a map of the locations should be included and the geographical difference included in the discussion etc."

– We have added more detail about the geography of the two sites to this section, but believe that a map, while somewhat useful, would add unnecessary length to the manuscript. We've attached a simple map as a supplement to this comment for reference.

"Page 27181 line 20 and the rest of the section: Here is discussed the R2 of GEM concentrations and various parameters. T and Julian day could account for 22% of the variance. This is a very minor part it and great care should be taken in using this for prediction. First the correlation could be incidental and second it is therefore too tendentious use the correlation for predictions even with the statement indicates. Temperature increase in the period and GEM concentrations decrease is not the same as they are connected? This has to be proven before it indicates anything. So either remove from conclusion or come with further weakening of the statement. I will prefer the first."

– I think we are in agreement that correlation does not equal causation, as we are careful to point out in the Conclusions section. Based on comments from you and two other reviewers, we have decided that it is somewhat misleading to include Figure 5 and the associated discussion in the paper. It was not our intention to suggest that temperature and date alone could predict GEM concentrations at Alert (or even that any set of local variables could do so), since there is so much information missing. Therefore we have removed this figure from the paper. We have also added a note in the manuscript that $p < 0.0001$ for the correlation (i.e. it is not coincidental).

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Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/9/C12260/2010/acpd-9-C12260-2010-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 27167, 2009.

ACPD

9, C12260–C12262,
2010

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