Atmos. Chem. Phys. Discuss., 10, C3213–C3215, 2010
www.atmos-chem-phys-discuss.net/10/C3213/2010/
© Author(s) 2010. This work is distributed under
the Creative Commons Attribute 3.0 License.

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long range transport of mercury to the Arctic and across Canada" *by* D. Durnford et al.

D. Durnford et al.

dorothy.durnford@ec.gc.ca

Received and published: 26 May 2010

Re Figures 3 through 8. I was horrified when I printed the "printer friendly" PDF version of Fig. 3. I had verified the online version of this figure but not the "printer friendly" version. I agree that important details are lost in this version. I'll try to make sure that this does not happen again. Since both reviewers found Figs. 4, 6 and 8 problematic, I divided them up. In Figs. 4 and 6, each transect has been assigned its own page. Similarly, each source region of Fig. 8 has been assigned its own page. I believe that the primary problem with Figs. 3, 5 and 7 is that the "printer-friendly" versions are rather different from the online versions. I thought that the interpretation of the information in the original figures might be aided by the addition of a new figure. The new Fig. 7 represents geographically the numbers of LRT events received at individual stations

from the four source regions over a year, as given in Table 3. Text describing this figure was added to Section 3.1.5.

I agree, I should have used "estimated" or "simulated" instead of "determined" when presenting model results. Instances in the text have been changed. The only exception is for discussions on the ability of the mercury concentration from a source region to determine the variability of the concentration in the base run. Since, in this case, I'm comparing two model simulations, where the concentration from a given source region contributes to the concentration base run, I felt that "determine" is appropriate.

p. 4675, line 3. I adjusted the first paragraph, removing the statement that atmospheric mercury is non-toxic.

p. 4675, line 16. The resistance approach is a method used to simulate dry deposition. I decided to eliminate any reference to resistances in this sentence, as the simulation of dry deposition is discussed in Section 2.1.2.

p. 4677, line 25. We know, as stated in the text (p. 2677, line 22), that the observations at all six Arctic studies, where AMDEs are most active, are of GEM. This is fortunate, as it's at these stations that concentrations of oxidized mercury are at their highest. As for the subarctic and midlatitude stations, I agree that the confusion over this issue is very unfortunate. However, I believe that the only difference it would make to our results if it were, indeed, GEM that is observed, and not TGM as we decided to label it, would be that our base run TGM concentrations would sometimes be elevated over the observed GEM concentrations. I've rewritten this section of the text.

p. 2.1.2 Model: Text has been added to Sections 2.1.2 and 2.2.2 as suggested.

p. 4680, lines 8-9. I've adjusted the sections of text in Sections 2.1.2 and 2.2.2 that discuss the smoothing.

p. 4682, line 6. I've adjusted the description of the identification of an LRT event in Section 2.2.2 in an attempt to clarify the process and answer your questions.

p. 4686, lines 7-10. I've expanded this sentence to try to make it clearer.

p. 4686, lines 12-17. After dividing Figure 4 into separate pages for each transect to reduce the figure's overcrowding, I tried adding in the total contribution from all four source regions. I found that this made the figure considerably more difficult to interpret again, so decided to take it out. I've adjusted the text concerning the interhemispheric mixing.

p. 4687, line 18. Done.

p. 4693, lines 16-17. Agreed. I've added text to indicate this, and to indicate that local sources at Burnt Island and Egbert are also likely masking LRT events at those stations.

Section 3.2.1. I've added a new paragraph at the top of this section to answer your questions.

p. 4697, lines 25-26. I've adjusted the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 4673, 2010.