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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Identification of potential regional sources of atmospheric total gaseous mercury in Windsor, Ontario, Canada using hybrid receptor modeling" *by* X. Xu and U. S. Akhtar

Anonymous Referee #2

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The subject manuscript address the sources of elemental mercury measured in Windsor, Ontario and the use of a potential source contribution function (PSCF) to provide insight into the sources of mercury measured at the Windsor receptor site. The measurements used in the study are becoming relatively routine and appear to be of high quality data. However, the receptor modeling approach that uses PSCF is simplistic and has considerable assumptions that undermine the utility and conclusions of the manuscript. As described in more detail, the manuscript the data analysis tools are not robust and the manuscript is not suitable for publication in ACP in the current form. Before further consideration for publication, the following issues need to be addressed:

1) The use of 72 hour back trajectories to identify the source region has significant assumptions that are unlikely to be valid. How can the authors determine that the air masses did not pick up mercury in transport to the receptor site from the 72 hour back trajectory? Likewise, how do the authors know that the mercury was not in the air mass before 72 hours? Clearly, there are mercury sources along these trajectories that need to be considered in the analysis. I agree that the analysis provides a very blunt assessment of source region but I think the potential biases in the analysis due to assuming the sources were located at 72 hour back trajectories in very significant and not justified. Although the authors cite prior publications that use this approach, I do not think that this approach is widely accepted as a good receptor modeling approach given current receptor modeling tools.

2) The authors suggest on page 24856, lines 8-9, that Windsor has moderate local sources. What is the implication of these sources to the analysis? Could mercury be picked up by air masses close to the receptor site biasing the results?

3) The Tekran instrument reports concentration data in units of mass per standard cubic meter of air, and therefore concentrations per actual cubic meter of air that are the same are very different at different temperatures and pressures. What is the implication of reporting data on this basis when comparing summer and winter data in Windsor and when comparing Windsor to other sites.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24847, 2009.