

Interactive comment on “Patterns of mercury dispersion from local and regional emission sources, rural Central Wisconsin, USA” by A. Kolker et al.

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Comment 1, by Anonymous Referee #1, posted 4 February, 2010

In reviewing Comment 1, it appears two specific points are raised: 1) Explain the reasons for locating sampling stations at 25, 50, and 100 km from an emissions source; and 2) Compare results for RGM, Hgo, and HgPM_{2.5} obtained at these distances with measurements taken closer to emission sources.

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Question 1: With regard to the first question, one of the goals of the study was to document changes in Hg speciation with distance downwind from a large emission source. By positioning the USGS mobile mercury lab at the 50 km site and deploying additional speciation monitors at 25 and 100 km from the large coal-fired emission source, we hoped to document changes in speciation with distance of transport, specifically, conversion of RGM to more longer lived species such as Hgo. The sampling array was oriented to take advantage of one of the prevailing wind directions during the period of study. The results of the study show a more complex interplay of local and regional emission sources. Whereas we were unable to demonstrate the original assumption that speciation changes were measureable over a distance of 100 km, we feel that the resulting variability found is nonetheless an important outcome of the study.

Question 2: With regard to the second question, we agree with Referee #1 that it would have been helpful to obtain Hg speciation data in closer proximity to the contributing emission sources. However, speciated measurements at each emitter were beyond the scope of the study. In a past deployment in an industrial area, the USGS mobile mercury lab was situated much closer one or more large Hg emission sources. These results show much higher peak RGM levels (in the 100's of pg m⁻³) whose timing corresponds with specifics of plant operations, rather than natural cycles. Prior to its conversion to mercury-free technology, surveys in the immediate vicinity of the chlor-alkali facility showed very high levels of Hgo, and importantly, also a fraction of RGM, consistent with our results.

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