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

Anonymous Referee #2

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Interactive comment on "Patterns of mercury dispersion from local and regional emission sources, rural Central Wisconsin, UAS" by A. Kolker et al. The investigation of A. Kolker et al. about the "patterns of mercury dispersion from local and regional emission sources, rural Central Wisconsin, USA", is very useful for environmental pollution monitoring and protection. The investigation about the transportation of mercury species also help to evaluate the effect of wind on the Hg delivery. The finding in RGM peaks (on 23 September) and the highest amount of RGM at furthest monitoring site (100km) were very interesting. The authors named some reasons to explain the results, however, they were not clear. For instance: in page 1830, line 28, the authors insisted that "RGM was being generated within the plume through oxidation of Hgo", but there was

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not explanation how the Hgo oxidized to generate RGM. Furthermore, the appearance of RGM peaks was not clarified yet. Was that due to the effect of wind from the south? If it was true, then how about other RGM peaks on different days? The measurements of mercury species at emission sources ((1) 1114MW coal-burning utility power station; (2) mercury-bed process chlor-alkali facility; (3) 465MW coal-burning utility power station) and the direction, and the speed of wind may help to explain the transportation of mercury. In addition, the measurements of mercury species at emission sources can also help to investigate the changes in mercury speciation (conversion) during transportation. The finding in delay in RGM peak arrival time (Fig. 3, and table 1) on 23 September was also interesting and worth to consider. If the contribution of RGM from 1114MW utility was highest then the peak arrival time was earliest at 25km site followed by 50 km and 100km sites (due to the downwind from 1114MW utility), but the results were reverse. Those indicated that the conclusion "Hg from the 111MW utility is carried over the 25km site at a high altitude as a result of its stack design parameter" was not corrected. Note that the wind speed plays an importance role on the Hg delivery rate, which affect on the time achieving RGM peaks (on 23 September). If knowing the wind speed and starting time of wind, we can explain the delay in peak arrival time. It is difficult to distinguish the date in Fig 3 because even in one graph the plot was in different colors (Fig. 3, 50 km and 100 km sites). The data would be easily to distinguish and compare if Fig. 3 was plotted in one graph with different colors. If possible, introduction of some treatment methods to reduce the contamination mercury (RGM, Hgo, Hg-PM2.5) in environment, especially for RGM and Hgo should be presented in the manuscript.

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