

Interactive comment on “Source apportionment of atmospheric mercury in the remote marine atmosphere: Mace Head GAW station, Irish west coast” by Danilo Custodio et al.

Anonymous Referee #1

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Mace Head, GAW station provides valuable long-term observational data for atmospheric mercury in a coastal region in middle-latitudes. The data has been extensively interpolated for source appointment and atmospheric trend attribution. In this study, the authors utilized a receptor modeling technique for source apportionment that involves other chemical atmospheric trace species and meteorological data. This is a new addition to mercury trend analysis and the conclusions are generally reasonable. Clearly it merits publishing in ACP, but not in the current form. My major concern is the organization of the article. The authors made conclusions and speculations all through the results and discussion section. But some of them are not fully supported and seem hasty. I suggest reorganizing the paper to separate the result and discussion

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sections. By this mean the author can first present all the results, and then interpret them, especially their interactions as they are so closely associated (e.g. the results of hourly, monthly, and annual cycles and their associations with other chemical tracers and meteorological data). My detailed comments are as follow:

Line 136-137: this conundrum has an explanation in Zhang et al. PNAS, <https://doi.org/10.1073/pnas.1516312113>.

Line 167-169: It's not clear how the standard electrode potential or the kinetic coefficient of reactivity is translated to the conclusion that “Hg0 is quite a stable vapor gas, and a significant daily mass depletion by photooxidation is very unlikely”.

Figure 4: wind direction has no y-axis.

Line 194: A specie with a lifetime of ~ 0.5 yr is not a short-lived one.

Section 3.1. The authors made some conclusions in this section, e.g. line 169-170 and 199-201. These conclusions seem unreliable and hasty. Why not waiting after presenting the PMF results?

Figure 5: The histogram of reconstructed value is not helpful. I suggest showing that of error.

Line 224-233: “atmospheric acidification”? Is it actually “atmospheric oxidation”? Also, this paragraph reads very confusingly with so many turns around.

Line 215-233: I suggest cutting the length of such speculations, they are very long and basically a review of past results. What new information is revealed by the author's own data and analysis?

Line 260: It's risky to call this component as oceanic contribution as i) the fraction is very low; and 2) the baseline fraction may contain a contribution from the global ocean evasion fluxes. I would suggest using the term “nearby ocean contribution”.

Many orphan sentences throughout the article. I suggest combine them with nearby

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paragraphs.

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