

## ***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 #2**

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Overall this is a good manuscript. The results and analysis are valuable additions to the scientific community. I have provided some technical suggestions to hopefully improve the manuscript and some editorial suggestions to improve the readers experience. My recommendation is that this manuscript be accepted with revisions.

Technical suggestions: 1. Page 2 line 48. You use data from January 2013 to March 2018. I would suggest that when reporting annual trend data that you do not include 2018 in that data given that you do not have a full year and it may skew the results. Of course monthly reporting works but be mindful with annual reporting. 2. Page 3 line 72 – please add in a description of how the data was quality assured. What is the

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level of completeness of the data used in the analysis. This is very important when the data is compared to other data sets. 3. Page 3 line 75 - please mention whether there was a filter on the outside inlet and if there is a rain shield etc. This is important again for comparison with other data sets. You can refer to other papers as appropriate if described there. 4. Page 3 lines 89-97 – I don't understand this very much. Can you give a small sentence with what this analysis will provide to the data in layman's terms? 5. Page 3 line 101 – it would be interesting to see the information of the accuracy of each of the analytical species to see where the largest error occurs. If doable, a table in supplemental information? 6. Page 3 line 104 – “the method provides a better solutions” – what do you mean by that? Solution to what? Be specific. 7. Page 4 lines 106-120 – The reader would benefit from a short explanation in simple terms on what one gets from this type of analysis 8. Page 4 line 125 – what do you mean “central tendency”? 9. Page 4 line 128 – does this trend include the Jan – march 2018 data and should that be included? 10. Page 4 line 127-128 – any thoughts on why the decline is so consistent? Have you looked to see if there is a change over time (the data from 1995 is available) to see if the rate of decline changes year over year or periodically? Maybe look at the trends in 5 year trends similar to how emissions are reported (i.e. each 5 years)? 11. Page 5 line 164 – in the reported studies of diurnal cycles, were they coastal sites like Mace Head? 12. Page 5 lines 167-169 –Photooxidation may be unlikely but you have to consider the atmospheric conditions that lead to enhanced photooxidation at various locations and not only consider the properties of Hg0 13. Page 7 line 214 - “the PMF results show a statistically significant decrease in the baseline factor” – I am not sure I see that in what is presented. Can you make it clearer please? 14. Page 7 line 220 – you mention the decreases but why not include the increases during that time as well. 15. Page 7 line 221 – I don't think the point about countries being valid signatories is relevant. Initial reporting were only due in December 2019 and full reporting is only due 2021. So, this statement isn't fair under the context of the Minamata Convention. 16. Page 7 lines 224-232 – Maybe have a look at some trend data from speciated Hg monitoring and use that to comment

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on this paragraph. 17. Page 7 line 238 – But you have far more data available from this location. . .why not use that? 18. Page 8 line 244 – CHCl<sub>3</sub> and CO are not mentioned in Figure 7 19. Page 8 lines 244-255 – the explanations are a little all over the place. Perhaps a more organized discussion could be done here so the reader can follow more easily. 20. Page 8 line 264 – “. . .is forcing the atmospheric trends”. Do you mean rather than emissions? If so, please state that so its clear 21. Page 8 line 268 – maybe include the % here to stay consistent with the other 3 factors explained. Line 269, 0.57ngm<sup>-3</sup> is very big! Can you put that in a percent and also offer more insight as to why. Editorial suggestions: 1. Page 2 line 56th. It's a little odd that you don't give this factor an identification as you have done for the others. I would suggest naming it something relevant to what its looking at rather than saying 4th factor which doesn't define it at all. 2. Page 3 line 81 – remove “furthermore” this adverb is not appropriate here. 3. Page 3 lines 102-104 – I would suggest this explanatory sentence be moved closer to the top of the paragraph. 4. Page 5 line 148 – where is the Iberian Peninsula? 5. Page 6 line 208 – The Figure 5 caption does not reflect what this sentence here says 6. Page 6 line 212 – I would like the 4 factors first, describe their relevance and then go into the results. 7. Page 7 line 240 – this should be said above to explain the figure 8. Page 8 line 276 – remove “On the other hand” its not really necessary. 9. Page 9 line 297 – “exploited” I think you mean explored? 10. Figure 1 – its hard to read. I suggest you average the data up to daily and then plot that so you don't have the significant noise 11. Figure 2 – In the figure caption, please include details about each panel. 12. Figure 4 –Do you need to repeat normalized level in each plot? I think more explanation in the figure caption would be appreciated 13. Figure 6 – I am not a fan of acronyms in figure captions without it having been written out. 14. Figure S1 – really hard to read the left hand plots. Is is necessary to have all the information in each plot? If it is maybe put it in a table elsewhere? I think you mean units and not unity.

Please also note the supplement to this comment:

<https://www.atmos-chem-phys-discuss.net/acp-2020-102/acp-2020-102-RC2->

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