

## ***Interactive comment on “Mercury and trace metal wet deposition across five stations in Alaska: controlling factors, spatial patterns, and source regions” by Christopher Pearson et al.***

### **Anonymous Referee #2**

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Here are a few concerns this reviewer has. One problem is their analysis of “precipitation origins/sources”. Precipitation formation is in large part driven by microphysics; it is not like pollutants that can be transported from upwind source regions. This sort of analysis and language is really odd. Hence quite a bit of their “intensive” trajectory analysis for “precipitation origins/sources” is not valid.

Section 2.2 is not necessary. The maps were extrapolated from 5 sites only apparently with too large uncertainties. For instance, the spatial distributions of Hg concentrations can be quite complex. Their results showed that Dutch Harbor saw a similar precipitation amount to that at Glacier but had a median Hg concentration >50% greater, and

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Kodiak had >30% more precipitation and >15% more Hg concentration than those at Glacier. How to reconcile these disparate spatial differences? Why would one expect simplistic linear extrapolation to capture these differences?

Section 3.3 needs to be redone. First the authors conducted a PCA analysis. Usually one uses tracers that represent distinctly different sources, but the metals they used could not seem to do the job. It was not clear why they did a PCA of the metals to begin with. Since Al measurements were not available, the authors decided that Cr and Ni can be used as alternatives of Al, a crustal tracer. Where did they get [xucc]/[Crucc] or [xucc]/[Niucc]? At one point the authors decided that Asian pollution could influence Alaska based on As and Pb (line 489). But there are major anthropogenic sources for Cr and Ni in Asia as well. It was unclear what the authors were trying to do with Figure 6. No interpretation was given but merely description of how the first two components were positively or negatively correlated. What do those correlations really mean?

This manuscript can be shortened significantly, by removing tutorial material, redundancy, repetition, and passages that merely pointed out the obvious. To be specific, Section 2 can be cut down quite a bit by removing the tutorial stuff in the statistics and trajectory sections. In their results and discussion sections they often stated the obvious.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1207>, 2018.

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