Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2018-360-RC1, 2019

Atmospheric Measurement Techniques Discussions

Interactive comment on "Reactive mercury flux measurements using cation exchange membranes" *by* Matthieu B. Miller et al.

Anonymous Referee #1

Received and published: 11 January 2019

This work addresses a significant research gap and provides a new, and seemingly improved methodology for measuring gaseous oxidized Hg fluxes from source material to air. This work has wide-ranging applicability in estimating Hg fluxes from contaminated materials, surface waters, Arctic permafrost, etc. Because it has such a wide applicability, it would be beneficial to researchers if the authors included in the discussion how their findings of both the method's abilities and limitations apply to other environmental settings. For instance, providing information on estimated sample time based on Hg substrate concentration, and detection limits in context of background Hg concentrations would be extremely useful. Overall the manuscript is well written, however it would greatly benefit from a streamlining of the discussion around methodology. Most of the information provided in Sections 2.4 and 2.5 is interesting but distracts

from the scientific findings and would be better suited as supplementary material or moved to other parts of the discussion. Finally, it can be hard to keep track of all the abbreviations/acronyms used in this study, a legend of sorts would be helpful.

Specific comments:

L54: add a couple sentences regarding the reactivity of GOM and how this relates to its residence time in the air compared to GEM, and how this relates to the need for accurate active sampling of GOM in a variety of environments

L84: it would be beneficial here to briefly discuss limitation to passive CEM sampling and what gap in understanding measuring fluxes could fill – make it clear to the reader how this method could be applied

L99: include Hg content of source material

LL114-L116: discussion of chamber footprint is confusing here, suggest moving this sentence to where you discuss need to place the flux chamber directly on the surface conditions (∼L240)

L163: How did you determine how often filters would be changed? This is later mentioned in the discussion, however it is unclear whether sampling time was determined based on previous measurements or purely based on substrate Hg concentrations.

L201: define 'high' ambient GOM concentrations

LL208-214: "All fluxes were measured in . . .." This section should be with the experimental set-up.

L260: what's accounting for the 21.4% variation in mean GOM flux measured from the TCL material? Could changing conditions in greenhouse explain any of this variability?

L265: what's considered 'good agreement' - how does this compare to other methods (i.e. KCl denuders or other membranes)

LL281-285: A summer flux figure (similar to Figure 7b,c) would be helpful for comparing summer to winter values

L325: this would be a good place to discuss how CEM GOM measurements are affected by temperature and humidity, and what accompanying physiochemical and meteorological measurements should be taken with GOM and GEM measurements

L331: define small difference

LL342-362: this seems out of place here, and should be moved to methodology section where defining GOM and discussing sample inlet and filter size (L163)

Technical corrections:

L214: (see below) - Is this referring to a figure or text?

L290: include reference to Table 1

L300: should this reference Figure 8?

L319: word choice, suggest using 'observation' instead of 'point'

Figure 2: it is not clear where the filter packs are located in the schematic. Also remove double period in figure caption '..'

Table 1: is substrate concentration total Hg conc.? If so, use the same units as reported in the text (μg g-1) and label as Hg. If not Hg, then please include Hg conc.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-360, 2018.