

Interactive comment on “A bottom-up quantification of foliar mercury uptake fluxes across Europe” by Lena Wohlgemuth et al.

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Referee Comment: The manuscript “A bottom-up quantification of foliar mercury uptake fluxes across Europe” by Wohlgemuth et al. is a detailed analysis of foliar uptake of mercury at 10 forest sites along a latitudinal gradient in Central Europe. The authors use these data to extrapolate their measurements to values of foliar mercury uptake for Europe and globally. I must say I review a lot of papers and this has be the cleanest manuscript I have ever read. My hat is off to the authors. Thank you for a very well-written, well organized and comprehensive study of foliar mercury uptake by trees including an analysis of how site level data can be used to scale up estimates of this important transfer of mercury to larger spatial scales. The authors’ analysis and results are consistent with less comprehensive studies in the literature. The authors do a great

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job of comparing the results with observations in the literature. I love the Methods, including figure 2. The methods are very clear. I have virtually no comments on this paper. It is well done and a pleasure to read.

Author Response: Thank you very much for this positive comment to our study. We believe that there is more research needed to refine and further quantify foliar Hg uptake fluxes in Europe and in other parts of the world. Your positive feedback highly motivates us to make an effort and reliably validate the bottom-up approach (Fig 2) on a larger spatial scale.

Referee Comment: Just a few comments: 1. The authors use “between” when they should use “among” on lines 07, 243, 395, 403, 406, 409 and 460. 2. Page 2, line 45. ... Earth ... 3. Page 5, line 148. ... dried and ground for ...

Author Response: Thank you, we changed all accordingly and did some grammar revisions of the manuscript.

Referee Comment: 4. Page 15, line 448. I just reviewed another paper by one of the authors of this paper that provides a global estimate of litter mercury deposition from vegetation which is an order of magnitude greater than the guesstimate provided here (1,730 – 2, 070 Mg yr⁻¹). Given that discrepancy the authors may want to rethink their global estimate of litter mercury deposition in this paper.

Author Response: We will certainly keep in mind the flux estimate of the current paper for assessments of global Hg fluxes. Our extrapolation of foliar Hg uptake fluxes (line 448) extends to the global land area of temperate forests only. For the tropics higher foliar Hg concentrations and litterfall Hg fluxes had been reported, which are of an order of magnitude greater (see e.g. Teixeira et al. 2011) than the European Hg uptake flux used for the extrapolation here. Thus, for the entire global forested area we suspect the Hg litterfall flux to be far bigger than the foliar Hg uptake flux reported here. The comparison of the current flux estimate for temperate forests is further complicated by the uncertainty to which extent Hg litterfall deposition fluxes may be equated with foliar

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Hg uptake fluxes.

Referee Comment: 5. Page 16, line 476. The authors could note that the U.S National Atmospheric Deposition program has a litter mercury network that could be cited (<http://nadp.slh.wisc.edu/newissues/litterfall/>).

Author Response: Indeed we consider the litterfall mercury monitoring by the U.S. NADP a highly valuable contribution to global litterfall sampling efforts. We added the following sentence to the introduction to give credit to the network: "Hg dry deposition is usually not routinely monitored, with the Hg litterfall monitoring network of NADP being a notable exception (Risch et al., 2012, 2017)."

This is a terrific paper. I strongly endorse its publication. Kudos to the authors.

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