

Biogeosciences Discuss., referee comment RC2  
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## **Comment on bg-2021-239**

Frank Wania (Referee)

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Referee comment on "Physiological and climate controls on foliar mercury uptake by European tree species" by Lena Wohlgemuth et al., Biogeosciences Discuss.,  
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A well written paper on an important subject, based on a large new dataset that is analyzed thoroughly and rigorously. I particularly like the practical conclusions on how foliar uptake of mercury could be practically implemented in mercury fate models. I find little to criticise.

Line 49: Delete comma before "during" and add "the water" before "vapor".

Line 51: Delete comma before "during".

Line 52: Delete "corresponding".

Line 54: This sentence appears somewhat unmotivated in the abstract. Finding a proxy for stomatal conductance during an entire growing season was probably not among the original objectives of this study and is too hypothetical at this stage to merit inclusion in the abstract. It distracts from the main message. It also only merits a single sentence in the entire main body of the paper (line 480).

Line 65: use "exposure" instead of "exposition".

Line 110 and line 122: 3515 foliage samples versus 3569 foliage samples. What is the reason for that discrepancy? Does either of these numbers include the outliers identified in line 165?

Line 137 to 138: Brandenburg and Baden-Wuerttemberg are not countries.

Line 200: The text prior to here makes reference to multiple needle year classes (Line 117/141, line 127-130). The sentence "by normalizing foliar Hg concentrations of samples to their respective life period in days from the beginning of the growing season (leaf flushing) to date of harvest" raises the question of how was this done for needles older than 1 season. (Judging from page 18 and figure 7, it appears that older needles were not subjected to the normalisation procedure and were used in an entirely separate analysis.)

Line 216: Make it clear that you refer to water vapour here. This is advisable as there could in principle also be a mercury vapor pressure deficit.

Line 250: Use "example" instead of "exemplary"

Figure S5: Maybe state that current-season needles are displayed.

Section 3.2 The comparison of foliar uptake rates across space suggests that variations in GEM concentrations in the atmosphere (in space and time) are deemed not to be important. That is likely correct, but should still be stated explicitly.

This is also important as some of the parameters explored later (soil dryness, VPD) could have a geographic component. You have to exclude the possibility that some of the observed relationships with these parameters are not artefact caused by a correlation of the parameters with atmospheric GEM concentrations (e.g. lower atmospheric GEM levels in the more water-stressed southern parts of Europe).

Line 345: Figure 4 not 44

Figure 4: Either use empty space at lower right for figure legend or vertically stack all three panels of the figure.

Line 414: "In the future"

Line 417: "gravel" is a soil parameter?

Line 424: When performing 54 linear regressions with a p value of 0.05, you would randomly expect 2 to 3 "significant" ones, even if there aren't any. Therefore, not too much should be made of the findings described on lines 423 to 427.

Line 463: "foliage takes up Hg(0) over the entire life time". Should this not be rephrased as "over the entire growing season" as the text earlier admits that mercury uptake during winter is poorly understood?

Line 464: Again, I think it is necessary to state here that normalisation by the prevailing GEM concentration in the atmosphere is required when comparing foliar Hg uptake rates from different sites. That could be relevant when comparing between foliage from different hemispheres, and between foliage from areas with large differences in mercury source strength.