

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2021-290-RC2>, 2021
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Comment on acp-2021-290

Yanxu Zhang (Referee)

Referee comment on "Speciated atmospheric mercury at the Waliguan Global Atmosphere Watch station in the northeastern Tibetan Plateau: implication of dust-related sources for particulate bound mercury" by Hui Zhang et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-290-RC2>, 2021

This paper reports a full-year continuous measurement of speciated atmospheric mercury at Waliguan Baseline Observatory, which is a valuable addition to our understanding of atmospheric mercury cycle especially as this site is an important background site for many contaminants. The data quality reported here is quite high and the related analysis is also appropriate and deep. The paper is generally well written with high-quality figures, and the discussions about PBM and dust levels are also interesting and novel. I suggest publishing this paper after a minor revision.

Specific comments:

Line 26: Can GEM also be adsorbed by aerosols?

Line 280: Not clear what each point in Figure 6a represents, a group of 0.5x0.5 grid cells? How do you aggregate them? Which emission inventory do you use?

Line 285-301: The observed high PBM concentrations are caused by the high dust load? I suggest reporting the dust concentration levels at Waliguan as well, and a comparison with urban sites. Also, the instrument only measures PBM minus than 2.5 micron, but the dust is probably mainly in the coarse mode. How to reconcile this discrepancy?

Line 322-325: It's also important to specify the size range of these dust emission estimates.

Line 325-330: I would also refrain from suggesting an "emission flux" from the suspended dust particles, as the Hg on particles may be from adsorbing from the ambient atmosphere during transport after release.

Line 332-346: Both temperature and particulate matter (PM) load influence the PBM/GOM ratio. Have you checked the relationship between temperature and the PBM/PM/GOM? I guess if you normalize the PBM/GOM ratio by the particulate matter load, you would get a more consistent results with other Tibetan sites.