

Interactive comment on “Seasonal patterns of atmospheric mercury in tropical South America as inferred by a TGM continuous record at the Chacaltaya Station (5240 m) in Bolivia” by Alkuin Maximilian Koenig et al.

Alkuin Maximilian Koenig et al.

alkuin-maximilian.koenig@univ-grenoble-alpes.fr

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Authors response to reviewer 2:

We would like to thank the anonymous referee for reviewing this extensive manuscript and are satisfied that the reading experience was pleasant nonetheless. We thank for the positive feedback and appreciate the helpful comments and suggestions. Below, we repeat the referees' observations (**bold**), our comments (normal font) and the according changes made to the manuscript (*italic*):

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lines 77-78: There are also CARIBIC flights to northern South America (Bogota and Caracas)

We changed the sentence slightly to include these destinations as well:

Lastly, some data on South American upper tropospheric TGM concentrations is provided by CARIBIC flights (<https://www.caribic-atmospheric.com/>) for the routes with São Paulo, Santiago de Chile, Bogota, or Caracas as destination (Slemr et al., 2009, 2016).

Section 2.2.1: Given the low pressure at this high altitude site: Did you use the standard Tekran pump? What was the air flow in the Tekran instrument?

At CHC, air flow is indeed something to be careful about. Yes, we used the standard Tekran pump. The air flow in the Tekran was 0.7 L/min (at STP conditions, 273.15 K, 1013.25 hPa) and was permanently checked by an internal mass flowmeter. In addition, every three months we also checked the flow manually with an external volumetric flow meter. We added the following to the text, in the proximity of line 147:

The instrument worked with a flow rate of 0.7 L/mn at STP conditions, which was permanently checked by a Tylan calibrated and certified internal mass flow meter. In addition to that, every three months the flow rate was controlled manually with an external volumetric flow meter.

line 185: Please give abbreviation MAC

Noting that this acronym is only used once in the text, we decided to put it into "written out" form instead. We replaced MAC with:

mass absorption cross section

Section 4.5 Could it be that a significant part of the volcanic Hg is in the form of

PBM and thus not detected by your setup?

Yes, indeed, especially given the certain "affinity" of mercury towards sulfates. To address this, we added the following sentence at the end of the section:

Besides, given that our setup does not detect mercury in particulate form, the magnitude of any volcanic signal received at CHC also depends on the mercury gas-particle partitioning at the time of emission, as well as the transformations it undergoes during the transport.

lines 753-753 I would suggest to add the actual best guess emission factors here oncemore.

We added the following sentence at a convenient place within that paragraph:

*The former allowed us to deduce a TGM/CO emission ratio of $(2.3 + -0.6) * 10^{-7} \text{ ppbv}_{TGM} \text{ ppbv}_{CO_2}^{-1}$, while we used the latter to infer a "best guess" TGM/CO₂ uptake ratio of $0.058 + -0.017 \text{ ngm}^{-3} \text{ TGM ppm}_{CO_2}^{-1}$.*

Do you plan to continue measurements at CHC? As the only downside of this work is the still short data set.

This kind of experimental work is highly demanding in terms of technical support, logistics and expenses. This was only possible thanks to the close collaboration with our Bolivian colleagues. We agree that a longer dataset at CHC would be of great value to the mercury community, and that extending this set is a goal worth pursuing. Although no concrete plans exist in the present, we deeply hope to be able to expand this dataset in the future.

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