

Interactive comment on “Tropospheric mercury vertical profiles between 500 and 10 000 m in central Europe” by A. Weigelt et al.

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Reply to comments of Mae Gustin

Comment of M. Gustin:

With no pyrolyzer in-line they cannot be sure their TGM measurement is TGM. They need to address this significant limitation. Assuming their Teflon inlet does not remove GOM is not a good assumption See Gustin et al 2013 RAMIX EST paper

Reply:

Sections related to GOM have been removed. As described in the reply to the first comment of Referee #1 and the third general comment of Referee #2, in the PTFE

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coated inlet system only the core flow (without any wall contact) was sampled and directed through a PFA sample line towards the instruments. The flow rate in the 2.5 m long 7.7 mm wide (inner diameter) sample line was 25 l min⁻¹ and therefore the residence time below 0.3 seconds. An international field intercomparison (Ebinghaus et al., 1999, Atmos. Env. 33, 3063-3073) has concluded that under these conditions and under consideration of the instrumental limitation (uncertainty 12.5% or ~0.15 ng m⁻³), the measured value represents TGM. Capture of GOM on gold traps and its conversion to GEM during the thermal desorption is discussed by Slemr et al. (2016 AMTD; 1-25; doi:10.5194/amt-2015-376). The manuscript was updated as described in the reply to the corresponding comments of the two other Referees.

Comment of M. Gustin:

The significant limitations of the KCl denuder need to be discussed. See Gustin et al. 2015 ACP paper

Reply:

The reviewer is correct, the section has been removed

Comment of M. Gustin:

A quartz wool trap will not quantitatively collect GOM and will be influenced by relative humidity.

Reply:

This method used by us has been published by Lyman and Jaffe (Nature Geoscience, 2012). We are aware that this has been questioned by recent work (Ambrose et al., 2015). However, since we do not use the difference of TGM and GEM to calculate GOM, we consider this point as not relevant in particular when taking the measurement uncertainty into account that has been explained in detail in the reply to the comments of Referee #1 and #2.

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Comment of M. Gustin:

The authors need to read the recent literature cited in Gustin et al., 2015, and totally rethink their data.

Reply:

Thanks for the valuable advice. Revisions related to TGM and GEM have been made and explained according to the more specific comments and recommendations by the two other referees. All data related to the measurement of GOM by KCl coated denuders has been removed.

Comment of M. Gustin:

I think it is interesting that operationally defined TGM>GEM.

Reply:

We believe that is what should be expected if the inlet and the tubing transmit GOM. Our assumption of GOM transmission thus might be not as bad as claimed by the first comment of this reviewer.

Comment of M. Gustin:

Why do they discuss the Lumex measurement when they do not show data from this instrument?

Reply:

The reviewer is correct; the description of the Lumex instrument has been removed.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 28217, 2015.