

Interactive comment on “Long-term monitoring of atmospheric TGM at a remote high altitude site (Nam Co, 4730 m a.s.l.) in the inland Tibetan Plateau” by Xiufeng Yin et al.

Anonymous Referee #2

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General comments Yin et al. present total gaseous mercury measurements from an extraordinary environment in “Long-term monitoring of atmospheric TGM at a remote high altitude site (Nam Co, 4730 m a.s.l.) in the inland Tibetan Plateau”. The results are important as mercury data from a remote site are interpreted that is located between two major mercury emission regions the Indo-Gangetic plain in southern Asia and China in the west. With a box model and a relatively small set of parameters, the major seasonal and diurnal changes could be reproduced. The results fill an important gap in understanding atmospheric background concentrations of gaseous mercury in an especially important part of Asia. A slight drawback might be that only TGM as chemical parameter is measured during the study, despite others are mentioned

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(ozone, black carbon, RGM ...). However, the data set is concisely analyzed and the findings are supported by box model simulations. Trajectories and potential source contribution functions were calculated and used for source allocation. I suggest publication in ACP after a few comments have been addressed.

I agree with Referee #1 that the expression “Long-term” for the study is not appropriate. Moreover, the number of Figures should be restricted to about 10: Figure 2 could be moved to the supplementary material. Figures 11-14 have a large overlap regarding the displayed information. Either one should be selected or a combination of two of them might be displayed in the main text, the others can be moved to the supplementary material.

Specific comments Lines 79-81. The importance of background measurements between two major mercury source areas should be explained in more detail. Is the change in the background or the actual deviations from the background the important information, i.e., the episodic events? Lines 85-86. Similarly, as the previous comment. Be more explicit: Tibetan plateau is an important part of the global mercury cycle Is it an ideal place to monitor TGM or an important sink? Line 180-185. This appears to be an important result and should be mentioned in the conclusions. Line 184. “... constant TGM deposition” – how is this justified considering diurnal soil temperature change and the major fraction of TGM being volatile GEM? Line 281-282. As before: “... constant TGM deposition” – please support this by a mechanism, and further on, “... TGM emissions in the early evening . . . “. - This statement seems to be in contradiction to what is said before. To clarify the contributions a modified Figure 8 as stacked bar plot would help. Lines 294-300. Mixing versus oxidation: as TGM (GEM + RGM) is measured this explanation is vague. Lines 346-347. This part also reflects an important finding which could be emphasized in the conclusions. Line 370. What is the new finding compared to the Beiluhe site study {Ci, 2016 #16007}, Line 426. The average of 1.33 ng m⁻³ is almost in agreement with Ci et al. {, 2016 #16007} Lines 430-431. What is stated? Currently it sounds self-evident. Lines 436-437. It appears

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to be in contradiction to a previous interpretation (comment on statement in Lines 281-282). Line 442. The transformation GEM -> RGM was analyzed in detail by de Foy et al. {, 2016 #16006}, but it does not reflect an important fraction. Line 443. Due to insolubility of TGM . . . – less soluble GEM? At least the RGM part should be better soluble. Please, be more specific. Figure 9. Pink line, what does q (kg^{-1}), Please give more information in the figure caption.

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