Response to query from A. Dommergue

EDITOR COMMENT: The authors should state how the overall uncertainty budget for the measurements made by the samplers are expected to compare with the precision based uncertainties that they have calculated, i.e. is repeatability the dominant factor in the uncertainty or are their contributions that they may have missed or cannot easily estimate.

RESPONSE:
The precision estimate that we report (precision: $3._6 \pm 3._0$ %) is calculated as the average of the standard deviation of the results for replicated deployments of the passive air sampler (PAS). As such it is a measure of random error only. It cannot capture systematic bias.

Quantifying the systematic error would require knowledge of the true gaseous concentration of mercury during a PAS's deployment. Because that concentration is not known, we instead compare the concentrations obtained with the PAS with values obtained with the state-of-the-art measurement technique (Tekran). The Tekran systems do not provide the true value, because (1) they are subject to random and systematic error themselves and (2) only in some cases did they succeed in measuring the concentration continuously during the entire deployment period of the PAS.

Nevertheless we use the discrepancy between the concentration obtained with the PAS and the Tekran (mean normalised difference or MND of $8._7 \pm 5._7$ %, when the "best" SR is applied) as an estimate of the potential systematic uncertainty of the PAS. On the one hand, this MND overestimates the uncertainty of the PAS by attributing all of the discrepancy to it, even though part of the discrepancy is surely attributable to the Tekran. On the other hand, we may underestimate the uncertainty of the PAS, because we use the same TEKRAN data for the calibration of the sampling rate and the calculation of the MND. If all of the Tekrans in our study were biased similarly low (or high), this bias would be "inherited" by the PAS and this uncertainty would not be apparent in the MND.

If, however, some Tekran data are biased high and some are biased low, this would not lead to an underestimation of the uncertainty of the PAS, because we derive a single sampling rate from all data and apply it (after adjustment for wind speed and temperature) to all sites, i.e. we do not use site-specific sampling rates for calibration AND evaluation.

So, in summary, it is likely that there are uncertainties in the PAS-derived values that are not captured in the precision based estimate, i.e. the uncertainty is likely higher than 3.6 %. It is difficult to really quantify this additional uncertainty, but based on the current study we judge the overall uncertainty of the PAS to be on average smaller than 8.7%.