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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Total gaseous mercury depletion events observed at Cape Point during 2007–2008" *by* E.-G. Brunke et al.

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The general concern of the referee # 1 about the validity of our measurements and possibility of analytical artifacts producing the depletion events (DEs) observed at Cape Point has already been addressed by our responses to J. Fritsche and to reviewer #2 who shared the same concern.

In summary, we can definitively rule out the possibility of temporary deactivation of the gold traps in the Tekran instrument (documented by almost constant response of the instrument to standard additions from the internal permeation source). As the tests by the internal standard addition do not encompass the inlet tubing and we have not made standard additions at the inlet so far, we cannot rule out the possibility of temporary transmission loss of GEM in the inlet tubing. Although permanent transmission losses

of the inlet tubing have been observed, to the best of our knowledge, no temporary transmission losses of GEM have been reported so far. Consequently, we consider this possibility very unlikely. As already mentioned, the issue can be definitively resolved by standard additions at the inlet, but this is not easy for so far an unpredictably occurring phenomenon at a remotely operated station. A paragraph summarizing this discussion has been added to the experimental section.

Another paragraph about observations of DEs of the same or similar type at other places has also been added to the section "Conclusions and summary". In this paragraph we refer to the observations of DEs in the marine boundary layer of the northern and southern Atlantic Ocean (Joachim Kuss, unpublished data) and two DEs observed by Temme et al. (2003) in austral summer at the Neumayer station on the Antarctic coast. The speciated mercury measurements by Temme et al. (2003) during these DEs, which were not accompanied by simultaneous ozone depletion, demonstrate clearly that there were real chemical transformations behind them. Although no speciation measurements are available at Cape Point, the similar characteristic of the DEs observed at Cape Point support further our contention that they are result of real chemical transformation of GEM into other mercury species.

Specific comments

The abstract has been reworded in respect to the mentioning of the Polar Regions. Adhering to the rule that references should be kept out of an abstract we have not added the references here. They can be found in the text.

To avoid the confusion concerning the TGM and GEM we now refer only to GEM in the title and throughout the text.

Information about the backward trajectories has been added.

The referee is right that the gold refining industry in South Africa is using cyanid leaching technology which does not lead to large mercury emissions. The power stations

are the major source of GEM in South Africa. The text has been modified accordingly.

Winds with speeds below 5 m s^{-1} have not been considered because they are unreliable due to the complex topography of the station. This is now mentioned in the text.

The word “quantitative” was replaced by “complete”.

The reference list has been modified and the book by Pirrone and Mason (eds.) is now cited.

Hg^0 is now used consistently.

The sentence with “appropriate” has been modified.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 20979, 2009.