

Interactive comment on “Bimodal variation in mercury wet deposition to the coastal zone of the southern Baltic” by P. Siudek et al.

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We would like to thank the reviewer for helpful comments, particularly for those critical ones, which induce us to reconsider and deepen some issues mentioned by us. While correcting the paper, we have taken under consideration all the suggestions. We hope that all the answers below are sufficient.

The introduction has been shortened and the aim of this paper has been specified.

The information on the lowest deposition (with AMDE), quoted after Ariya et al. (2004), has been checked.

In Materials and Methods, a question about the Hg detection limit araised. An automatic analyzer of total gaseous mercury Gardis3 has the detection limit of 0.5 pg. This

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value refers to the volume of gas. The detection limit given by us refers to the volume of a blank (0.5 ml) which undergoes the reduction in SnCl₂, so to make it more precise: the LOD value obtained as three standard deviations was 1ng L⁻¹. The necessary changes have been made to the manuscript.

Many questions and comments refer to part 3.3 concerning the influence of distant and nearby sources of mercury on its deposition through precipitation to the coastal zone of the southern Baltic. In Review No. 1 it was suggested to describe that issue putting emphasis on characteristics of total and ionic mercury concentrations in continental and marine air masses on the basis of detailed analysis of air mass trajectories or 8 basic wind directions. We agree that the suggested in Review No. 1 way of discussing the data would lead to better understanding of the problem. So we decided to make some changes. The corrected manuscript includes the subchapter on quantitative analysis of THg and HgII concentrations and depositions (in the form of a table) and the statistics of Hg²⁺/THg (%) dependences for individual precipitation events occurring in marine and continental air masses.

The information on monthly precipitation over the measurement site has been added to Fig. 2 and the annual precipitation value of 655.6 mm obtained for the whole measurement cycle (2008) is now included in the text.

2. Clarify the bimodal characteristic in the main text whether it is in Hg concentration or wet deposition rate of Hg. Has been clarified.

3. Discussion on seasonal and monthly distribution of Hg(II) was recommended to be included. We agree with this suggestion. Discussion on seasonal and monthly distribution of the second analyzed parameter Hg(II) should be conducted in a similar way as it was done for the first parameter – total Hg.

4. Is there any difference of total Hg concentration (and Hg(II)) in precipitation between snowfall and rainfall? In other words, different Hg chemistry?

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On average, concentrations of THg reported during individual rainfall or mixed rain and snowfall events which occurred in winter were two times higher ($0.264 \mu\text{g m}^{-2}$) than during only snowfall events (average: $0.149 \mu\text{g m}^{-2}$). In winter, elevated depositions of Hg in rainfalls and mixed falls (rain and snow) over the southern Baltic were the result of both high concentrations of Hg (an average level: 52.7 ng L^{-1}) and the depth of precipitation. Additionally, for the significance level of $p < 0.05$, a lack of statistically significant differences for THg concentrations in mixed falls over the coastal zone of the southern Baltic for the same period was reported (non-parametric U Mann-Whitney test). The similar dependence was observed for reactive forms of Hg (significance level of $p < 0.05$). On the basis of study carried out by us for different types of precipitation (rainfall and snowfall), we can conclude on different effectiveness of scavenging mercury from the coastal atmosphere.

5. In Figs 3 and 4, information on relative fraction of Hg(II) to total Hg can provide valuable analysis of Hg chemistry such as Hg transformation in aqueous chemistry of Hg. The information on the relative proportion of Hg(II) to total Hg was included in the characteristics of THg and ionic Hg concentrations in two separate air masses.

6. In Figs 5 and 6, Hg(II) concentration is recommended to be included. It has been included.

Page 22777, line 13: what is difference between sea salts and marine aerosols? We meant sea-salt aerosols. It has been corrected.

Page 22787, line 20: Table 3 is omitted. We are sorry for the mistake which sends the reader to Table 3 (does not exist), it should be Table 2 instead.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 22773, 2009.