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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Record high peaks in PCB concentrations in the Arctic atmosphere due to long-range transport of biomass burning emissions" *by* S. Eckhardt et al.

R. Lohmann (Referee)

lohmann@gso.uri.edu

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General comments

The authors have submitted a well-written manuscript linking enhanced PCB concentration in the Arctic atmosphere to long-range transport from biomass burning episodes. This is a rather novel hypothesis, as the main source of PCBs was their industrial production and use, not incomplete combustion. In contrast, the manuscript would have been far less interesting had the authors focused on typical fire-derived pollutants, such as PAHs or dioxins. Instead, volatilization of previously deposited PCBs could cause these observed increases in PCBs in the Arctic atmosphere. While their

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data seems sound, it is surprising that one the of the transport episodes took 3-4 weeks and still managed to significantly increase PCBs at the Arctic site. Several key points should be addressed.

Specific comments

Page 6231, lines 9/10 - 'Finally, a fractionation of a PCB mixture on a regional/global scale are both predicted and observed' - this is not fully accurate - most studies over the open Ocean do not reflect this (e.g., Jaward et al., 2004); further even the soil studies only observed fractionation in the northernmost samples, but not below 60 N (Meijer et al., 2003).

Page 6236, lines 10 ff - The authors used a 20 day retroplume, yet the air took only 4-5 days to reach the Arctic. Why was a 20 day retroplume warranted?

Page 6236, line 24 - how realistic is it to have a transport time of 3-4 week, but still being able to detect enhanced PCBs in the atmosphere from the original source?

Page 6240, line 1 - Low OH-radical concentrations are claimed for the Arctic atmosphere. But what about depletion reactions en route? After all, the authors suggest that PCBs have traveled for 3-4 days before reaching the northern site.

Both fire episodes were in or close to the Arctic summer - what effect would have OH-radical degradation have had on the composition of the PCBs during transport?

Page 6237, lines 18 ff - The authors considered all other PCB measurements as background - how can they be sure that some of these measurements were not affected by long-range transport from biomass burning?

Page 6240 - how do the PCB profiles in the Arctic air compare to measured emissions from wood/biomass burning? How certain can we be that this is really volatilization and not production (e.g., Lee et al., 2006).

Page 6241 - shouldn't this EF be better called a volatilization factor?

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Technical corrections

Page 6213, line 5 ‘ mid-latitudes’ instead of ‘middle latitudes’

Page 6238, line ’quite strongly enhanced’ - this should be rephrased.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 6229, 2007.