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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric transport of persistent semi-volatile organic chemicals to the Arctic and cold condensation at the mid-troposphere – Part 2: 3-D modeling of episodic atmospheric transport" *by* Lisheng Zhang et al.

Anonymous Referee #1

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ACP-2009-539 Atmospheric transport of persistent semi-volatile organic chemicals to the Arctic and cold condensation at the mid-troposphere: Part 2. 3D modeling of episodic atmospheric transport

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This paper forms the second part of a detailed modelling study examining the long range transport and tropospheric behavior of persistent organic pollutants. The paper

adequately explains the rationale and approach with good use of the global gridded soils emission inventory to drive chemical emissions to the atmosphere. The model results are fully compared to measured concentrations in air in the Arctic which adds weight to the paper and the authors develop a plausible explanation to account for the discrepancy between measured and modeled results. The concept of mid-tropospheric 'cold condensation' and transport is novel and will be of interest to modellers and contaminant scientists alike. This is a thorough and interesting modelling study and is suitable for publication in ACPD.

Comments:

1)There are no obvious weaknesses or errors found in this manuscript. The authors are directed to the papers of Hansen et al (2006, 2008) with regards to assessing the role of the snow pack in the Arctic for storing and releasing HCHs to the overlying atmosphere. These papers may help the authors account for the differences between their modeled results and the observed concentrations in the high Arctic, which, I suspect, are due to the lack of a seasonal snowpack in the modelled results. The snowpack exerts a significant influence on POP vapor concentrations in the arctic boundary layer and the authors may want to comment on this.

Hansen, K. M.; Halsall, C. J.; Christensen, J.; Brandt, J.; Frohn, L. M.; Geels, C.; Skjøth, C. A. The role of the snowpack on the fate of a-HCH in an atmospheric chemistry-transport model. Environmental Science & Technology (2008) 42: 2943-2948.

Hansen, K.; Halsall, C. J.; Christensen, J. A dynamic model to study the exchange of gas-phase POPs between air and a seasonal snowpack. Environmental Science & Technology (2006) 40: 2644-2652. Addition/correction Environmental Science & Technology (2008) 42: 2205-2206.

2)The authors should carefully check the written English before final publication.

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