**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Source regions of some Persistent Organic Pollutants measured in the atmosphere at Birkenes, Norway" *by* S. Eckhardt et al.

Anonymous Referee #2

Received and published: 30 June 2009

General comments:

This paper reported a modeling exercise of source apportionment of a lighter PCB (28) and g-HCH. By implementing the FLEXPART model the authors simulated atmospheric transport of the two chemicals using well-documented emission inventories. By running in a time-reversed mode, the model was also used to identify the source regions responsible for the loading of two chemicals at the Birkenes. The study is of interest and useful for risk assessments for those remote and pristine sites and ecologically sensitive environments of toxic chemicals. There were, however, some items need to be addressed in the manuscript.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Specific comments:

In Abstract and Introduction the authors mentioned that FLEXPART was ran in a time-reversed (adjoint) mode to identify the source regions responsible for the chemicals loading at measurement site. It is interesting to know how this adjoint mode works. As a Lagrangian model the FLEXPART can run in backward trajectory for detecting source – receptor relationships. In adjoint mode comprehensive measurement data are needed to modify predicted concentrations. For toxic chemicals, I am afraid those measurement data are not always available. Or I may misunderstand the notation of "adjoint" in this paper. Is adjoint mode used in this study similar to what has been used in Eulerian models?

It will be helpful to mark Birkenes site on, for example, Fig. 1.

Pg. 12352, line 10. The authors estimate "dry gaseous deposition". It is interesting to know how the bulk surface resistance rc is defined in the paper, or at least a reference is perhaps necessary. For dry gaseous deposition, the surface resistance is likely the dominant resistance and is most difficult to be parameterized. Wesely's model appeared applicable in trace gases. How is it extended to POPs? How is rc parameterized for PCB28 and g-HCH?

Pg 12352, line 13 (right after eq. 1), is same diffusivity applied for PCB28 and g-HCH?

Figure 1. High g-HCH emission in Canadian Prairies in January is apparently unrealistic. There was neither application nor reemission for that period in that region.

Figure 2. Usually, January is the coldest month in the Northern Hemisphere. Fig. 2 shows higher g-HCH emission in January, even higher than April. Does this higher emission in January suggest an anomalous higher monthly air temperature? Pg. 12357, line 4, "positive temperature anomalies are correlated with transport..." It is not clear how the authors defined "positive temperature anomalies". Temperature anomalies usually indicate the departure of temperature from its means.

Figure 9. Authors should indicate different scales are used in x- and y-axis of Fig. 9.

Pg. 12361, line 6-8, "The decrease with distance is stronger for summer than for winter, due to both slower transport and . . ." Given that ES and EC maps shown in Figs. 10 and 11 are seasonal averaged, even "slower transport" could travel a long distance in air. During the summertime, atmospheric long waves in the wintertime break down to short waves and local atmosphere circulations dominate atmospheric transport. This renders long-range transport seldom occurring in summer.

Figure 12. Authors should put a color bar in Fig. 12 showing contribution percentage and label a- and y-axis (lat/lon) of upper panel of Fig. 12.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 12345, 2009.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper