Biogeosciences Discuss., 8, C1752–C1755, 2011
www.biogeosciences-discuss.net/8/C1752/2011/

Biogeosciences Discussions

Interactive comment on "Transport and fate of hexachlorocyclohexanes in the oceanic air and surface seawater" *by* Z. Xie et al.

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Received and published: 1 July 2011

General comments: The authors have submitted a manuscript for review that details the concentrations of various HCH isomers in atmosphere and surface water of the Atlantic Ocean. Samples were taken on a transect from Germany to the Antarctic from October – December 2008. That analytical work is sound, and the data seems free of artifacts linked to sampling on a ship, such as contamination etc. Results suggest that HCHs are declining in the water faster than in the atmosphere, which is an unexpected result. Gradients in both hemispheres indicated increasing concentrations with increasing latitude. In the NH, this could be explained by historical usage, while in the SH, this could be due to ocean currents supplying dissolved HCHs into the Southern Ocean. Overall, this is a key manuscript based on sound analytical data, with some

novel insights into the presence of these legacy pesticides in air and water. There are several areas where I would suggest the manuscript can be further strengthened, as noted below.

Specific comments:

- Line 20, p5538: I disagree that b-HCH displays a multi-hopper transport behaviour just because it displays air-water exchange gradients that are either favoring deposition or volatilization.

- Line 100ff, p 5543 G-HCH in the gas-phase showed declining concentrations compared to other studies – this is not apparent from the range of concentrations reported here. Refer to a figure or table with exact data, or better argue by focusing on specific regions where data can be compared!

- Line 13, p 5543 – Not sure how the wide range of data can be used to support a 'homogenous distribution' of atmospheric HCHs.

- Line 19ff, p.5544 – the concept of cold condensation is used here again to explain increasing concentrations of a and g-HCH with increasing latitude N and S. yet later in the manuscript (p.5546), the authors argue, probably correctly, that increasing concentrations of HCHs in the SH are linked to Ocean currents from the Indian Ocean, hence not global distillation! Also note that the r2 value for a-HCH is strong, but rather weak for g-HCH, suggesting that latitude is not a sufficient proxy to explain trends!

- Line 6, p 5545- There is no temporal trend for b-HCH available?

- Line 27, p5545 – Is there really sufficient biomass present in the tropical Atlantic to significantly deplete HCHs in the water column via particle settling? I suggest you retrieve average TOC values, and using a BCF approach estimate what fraction of HCHs can be removed. I assume this fraction is rather small.

- Section 3.4 – a/g and a/b ratios: This discussion needs to include the ratios of the technical mixtures, so that the average reader can better understand the significance

of the approach and conclusions drawn here!

- Section 3.5 – maybe better reference either a textbook or early papers as part of the two-film model calculations here.

- Line 4, page 5548 – an uncertainty of 0.2 is used here for H, while in the section above, Bruhn et al is cited,and used, who suggest that overall uncertainty of air-water exchange is closer to a factor of 3, mostly driven by uncertainty of H values.

- Figure 1 – I would suggest including a summary of atmospheric and ocean currents influencing samples in the Figure.

- Figure 3 – what about b-HCH? Also, including lines between sampling stations seems to imply linear behaviour between sites.

- Figure 4 – please include the ratios of the industrial formulations here to ease the understanding of the data reported here.

Technical corrections:

- please use only 2 significant figures – e.g. 3800 pg/m2/day (line 18, p 5538)

- Line 21, p5538 – delete 'process', and change from releasing to 'release'

- line 15, p.5539 – legacy not legend

- line 25, p.5539 – are these a-HCH concentrations in water or atmosphere? I don't agree that increasing concentrations with latitude indicate net deposition, while they might support the theory of cold condensation

- Were water samples stored at -4 or + 4 C?

- Line 23, p 5542 – 'determined FOR'

- Line 23, p 5544 – r2 of 0.0.329?

- Line 22, p 5545 – change to 'trade winds bring'

- Line 27, p 5548 – water, not waer

- Line 1, p 5550 – sorption. Not 'adsorption'

Interactive comment on Biogeosciences Discuss., 8, 5537, 2011.