

Interactive
Comment

***Interactive comment on* “Response of halocarbons to ocean acidification in the Arctic” by F. E. Hopkins et al.**

Anonymous Referee #1

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Anonymous Referee

Review of “Response of halocarbons to ocean acidification in the Arctic” by F. E. Hopkins et al.,

General comments:

This study examined the effect of acidification on the response of halocarbons in the Arctic using the mesocosm experiments. The area of study is of particular interest, because rapid environmental change is likely to be observed in this region. The general experimental set-up selected for this study seems sufficient for the objective to assess the effect of increased pCO₂ treatment on the production or decomposition of

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halocarbons.

My main concern is related with the low concentrations (about 1 p mol/L) of CH₂I₂ observed in the most samples with the exception of some anomalous spikes. The results suggested that the production of CH₂I₂ was observed, but not significant, in the mesocosmos experiments.

This study shows that pCO₂ concentration showed no or some correlations to halocarbon concentrations or dynamics but these data are important and valuable for the development of the knowledge about the oceanic halocarbon dynamics. I consider the paper “Response of halocarbons to ocean acidification in the Arctic” by Hopkins et al., acceptable after minor revision.

Specific comments and technical corrections

P8200, line 14-17 “Diiodomethane (CH₂I₂) displayed a number of strong relationships with biological parameters. Furthermore, the concentrations, the rate of net production and the sea-to-air flux of CH₂I₂ showed a significant positive response to pCO₂”: P8212, line 20 “3.3 Halocarbons and pCO₂”: P8215, line 19 “4.1.2 Diiodomethane (CH₂I₂)”: The values of CH₂I₂ observed in the samples were small as compared to the ranges of CH₂I₂ in the water column, for example, 1.7 – 8.2 pmol/L in the Southern Ocean (Carpenter et al., Mar. Chem., 103, 227-236, 2007) and <0.1–22.2 pmol/L in the western North Pacific Ocean (Kurihara et al., Mar. Chem., 118, 156-170, 2010). Low concentration (about 1 p mol/L) of CH₂I₂ could imply that the production of CH₂I₂ was observed, but not significant, in these mesocosm experiments. It would be useful for readers to present this more clearly.

P8210, line 6-8 “Peaks occurred following nutrient addition and in parallel with the chl a peak on t19 in PII, and during the rapid rise in chl a observed during PIII.”: Fig. 1A Could the author show the possible source of the rapid rise in chl a observed during PIII? I’d like to see the authors elucidate the possible source of this rise in chl a during PIII a bit more.

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9, C3720–C3722, 2012

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P8210, line 20-23 “M1 displayed significantly higher concentrations over almost the entire duration of the experiment, with a maximum and seemingly anomalous value of 2.5 pmol l^{-1} on t19 (ANOVA $F = 2.52$, $df=8$, $\sigma = 0.014$, $p < 0.05$).”: P8211, line 13-18 “Concentrations of CH_2BrCl (Fig. 2i) were low ($<0.1 \text{ pmol l}^{-1}$) and stable, with the exception of a small 15 number of anomalous data points in PI and PII. CH_2BrI showed little variability as the experiment progressed (overall mean= 0.35 pmol l^{-1}), with the exception of some anomalous spikes in concentration during PI and II, and little response to nutrient addition or phytoplankton growth (Fig. 2j).”: Were these anomalous spikes in concentration of halocarbons also observed in the procedure blanks? Because many of the halocarbons are used in laboratories, it would be useful to the readers to know how the potential problem (contamination of halocarbon) has been solved by the authors.

P8211, line 25-P8212, line 2 “To simplify these analyses and to give an overview of general trends, the halocarbons were assigned to three groups based on their common biological production pathways: (1) I-monohalocarbons (CH_3I , $\text{C}_2\text{H}_5\text{I}$, 2-C $3\text{H}_7\text{I}$, 1-C $3\text{H}_7\text{I}$), potentially formed via methyl transferase activity;”: It would be useful for readers unfamiliar with methyl transferase that $\text{C}_2\text{H}_5\text{I}$, 2-C $3\text{H}_7\text{I}$, 1-C $3\text{H}_7\text{I}$ potentially formed via methyl transferase activity is presented more clearly. Please cite a reference or experimental data.

P8216, line 16 “Fig. 5b, c” would be “Fig. 5b”.

Fig. 4 and Fig. 5 Note that the amounts of CH_2I_2 produced were small in comparison with the maximum concentration of CH_2I_2 observed in the open ocean. So I don’t think that changes in concentrations of CH_2I_2 would be significant, or is worth mentioning. Overall I am unclear as to the relevance of these Figures.

Fig. 6A The Y-axis title “net loss rate – flux t21 - t27” would be “net loss rate t21 - t27”.

Interactive comment on Biogeosciences Discuss., 9, 8199, 2012.