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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Short-lived brominated species – observations in the source regions and the tropical tropopause layer" *by* S. Brinckmann et al.

Anonymous Referee #2

Received and published: 27 September 2011

This paper presents observations of very short-lived bromocarbons from three campaigns: at the coast of the North Sea, in the Western Pacific onboard the research vessel Sonne and from balloon-borne measurements in the tropical tropopause layer above Brasil. The observations are used to derive correlations between the individual species that are then used to derive emission ratios. This is an important data set that adds significantly to the very few previously available data in these regions.

I recommend publication in ACP after consideration of the following comments.

General comments

List data set: While I assume that further analyses of the West Pacific observations

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Interactive Discussion

Discussion Paper

onboard Sonne will follow in forthcoming publications, the List data set will probably not discussed in more detail elsewhere? In this respect it may be appropriate to discuss the conditions during this campaign and the results of this campaign in somewhat greater detail. The current manuscript contains essentially only one paragraph on the results of this campaign. The most intriguing feature of the measurements is the increase of most of the bromocarbons by about a factor of 3 during one event on 25 June. This is explained by "a change in catchment area from the North Sea to the Baltic". To me this raises a number of questions: (a) how much are the measurements influenced by local emissions from the nearby tidal flats versus transport from more remote source regions? (b) why are bromocarbon mixing ratios so similar between the beginning and the end of the campaign although trajectories initially come from the North Sea and later from the Baltic? I would have expected this to be very different environments. (c) Why does the change on 25 June lead to enhanced bromocarbon mixing ratios? Is this related to increased wind speed? While you probably cannot answer all these issues, it would be useful to provide more information here.

Emission ratios: There are a number of assumptions and inherent uncertainties in the estimated emission ratios. It would therefore be helpful if you could give some quantitative uncertainty for the estimated emission ratios. One point that did not come out so clear for me was if you have clear indications that the emission ratios are universal in the sense that you expect to find the same ratios in different regions and under different conditions, or if they represent only something like an average ratio with individual emissions differing?

Specific comments

p. 22202, l. 13: "free grass area": free of what? More generally it would be useful to provide more information on the local environment: I assume this is close to tidal flats? Do you see a signature of the tides in the bromocarbon data? This could provide some indications to discriminate local from remote emissions.

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p. 22205, l. 10: "Possible temporal drifts...were not considered": What will this mean for the uncertainty?

p. 22207, l. 7: "our measurements": IAU only?

p. 22207, l. 25: is this really the "absence" of emissions?

p. 22209, l. 15: what is the meaning of the phrase "typical quantitative ratios"?

p. 22211, l. 20: I'm having some difficulties with the concept of an "initial concentration". To me this is a continuous process where in steady-state emission is balanced by in-mixing (and photochemical decay). Are these only two points of view leading to the same conclusions, or are there further assumptions involved that justify the concept of an initial concentration?

p. 22217, l. 20: I don't understand the reasoning for the relatively low potential temperature. Please elaborate or just remove.

p. 22218, l. 15: Wouldn't it be okay just to write "the mixing ratio of bromine atoms"?

p. 22218, l. 26: How reasonable is it to assume a linear drift versus an exponential decay? How would this change the results? Do you have any possibility to estimate this?

p. 22219, l. 25: Can you make at least a rough order of magnitude estimate by how much the 8 months storage time could have reduced bromocarbon measurements?

p. 22221, l. 11: Numbers are different from the abstract. Please use the same numbers throughout the paper.

Technical corrections

p. 22200, l. 1: either "of up to five" or "of the five"

p. 22201, l. 26: define Bry

p. 22202, l. 9, insert "the island of" before "Sylt"

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Interactive Comment

p. 22202, l. 17-19: IAU, GC-MSD, EI: spell out first and use acronyms in brackets

p. 22203, l. 19: "could be obtained" -> "was obtained"

p. 22204, l. 5: "performed experiments aiming at the investigation of possible" ->"tested possible"

p. 22205: l. 11: "Observations source regions" -> "Observations in source regions"

p. 22206, l. 5: why comes Fig.9 before Fig. 4?

p. 22216, l. 15: better replace the dashes by commas to avoid confusion with the minus signs

p. 22217, l. 3: "Observations TTL" -> "Observations in the TTL"

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 22199, 2011.