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Atmospheric Chemistry and Physics Discussions

Interactive comment on "How Marine Emissions of Bromoform Impact the Remote Atmosphere" *by* Yue Jia et al.

Anonymous Referee #1

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I have read the paper, entitled "How Marine Emissions of Bromoform Impact the Remote Atmosphere", by Yue Jia et al. and find it needs some revision before publication. The paper quantitatively underscores the interplay between emissions, loss or degradation, and transport in determining the concentrations of bromoform in the atmosphere. It is especially valuable because of its use of observations to test model results. It would be nice if the authors went further and used other oceanic and atmospheric observations that are available as well, but the paper as it stands is a good start on using this kind of approach to understand the behavior of CHBr3 in the atmosphere. My biggest concern is that the discussion bounces around too much, making it difficult to draw out the major points of the paper. If the authors can fix that and focus the paper on the major points, it should be good to go.

General Comments

The authors need to be sure they are clear when discussing models and observations. Certain parts of the paper have to be read a couple of times to be sure which is which, and we don't want the readers confusing simulations with reality. Also, be specific and consistent with terminology. "Boundary layer", for example, could replace "atmosphere" in several places in the paper. It's good to avoid using the word "concentration" to describe atmospheric amounts, which are better expressed as "mixing ratio" or "mole fraction". Overall, I think reorganizing the discussion around the major points they want to make would make the paper easier to understand and put less of a strain on the reader.

Specific comments

Title: Add "on" after "Impact"

Abstract: Delete first sentence Line 12: Insert "of CHBr3 and other VSLH's" after "emissions". Line 13: Insert "on" after "impact". Line 15: Insert "assumed" before "uniform"; delete "on the one hand". Line 16: Insert "consistent with those" before "observed". Emissions were not measured on those cruises, but calculated using a variety of assumptions. Delete "on the other hand". Line 17: Replace "due to" with "in the". Line 18: Insert "scenario" after emissions. Lines 19&20: Insert comma after "scales"; delete "the" before "atmospheric"; replace "the distributions of" with "distributing". Line 24: Insert "s" after "Ocean"; change "increases" to "increase". Lines 30&31: Delete sentence. It's too general, maybe not entirely true, and for others in the world to decide. Line 31: Delete "Significantly" and capitalize "Our". Line 32: Second "VSLH" should probably be "VSLHs" to denote plural.

Introduction:

Line 40: Replace "which" with "that". Line 49: Delete "quite". Line 60: Delete "very". Line 71: Insert "ocean" before "surface".

Data and Methods

Background

First paragraph, second sentence is redundant. This was already said in the introduction. I think the specificity belongs here in the methods, but the attribution (citations) for the two statements is different. The authors might consider using the attributions for the intro statement here and then deleting the sentence in the intro, thus keeping the intro general. Or they could omit it here if they prefer.

Line 133: Insert comma after “shelf”.

Modeling

Lines 160-164 and elsewhere in the methods section: Try to keep to one tense. Use of present tense for something that has already happened or already been done makes for awkward reading, especially when mixed with past tense to describe the same. Prefer present tense for describing things that are already understood or “true” in the broader sense.

Atmospheric CHBr3 (background). . .

Although it contains some good points, I find this section meandering and confusing. I believe it would benefit from some reorganization. I can derive what the authors are getting at, but only after several readings. Because this section is about what was learned from the transport model with constant emissions, it might be an easier read if the authors could state simply what the model demonstrates, then point out how data from each cruise supports those points in the model or where they differ. (But I think that is for the discussion on “hot spots”, or am I missing something?) For example, the statement on lines 239-240 summarizes a major point. It would be good to lead with that or another similar statement, then follow with a discussion about the features it demonstrates, and then go to the data if appropriate. Then go to another point in a similar fashion.

BTW, lines 260-262 are redundant for a second time (i.e., third mention), but if the authors want to reiterate that point, it should be at the beginning of the section, not in the middle.

Some specific points here that may or may not be helpful:

Line 191: I believe the authors mean “boundary layer mixing ratios” or “mixing ratios in the lower atmosphere” rather than “atmospheric” here? Lines 215 and 220: I think I know what the authors are trying to say, but it’s not possible to accumulate the amount of a gas through transport and mixing, and these statements come across as though that’s what they are saying. I think they want to state this more carefully, perhaps invoking how wind engages with the ocean surface while diluting what is emitted? Or is it simply about how the winds and mixing and loss redistribute CHBr3? Line 222: It’s really not a big leap to hypothesize that winds reduce the mixing ratios in the boundary layer. I think the valuable story is about how the wind shear and degradation can influence the distributions. Lines 224-225: “time period” is redundant; “respectively” is almost always unnecessary. Lines 228-229: Again, are these actually accumulations or higher concentrations as the result of dispersal? The former requires emissions of some sort and I don’t think that is what this section is about (i.e, constant emissions everywhere).

Atmospheric CHBr3 (hotspots)

Observed

Lines 289-90. Delete “on the other hand” Line 290: What is meant by “background” here? I would not use “background’ in this paper in any sense other than defined in lines 191-92. Lines 297-298: How does windspeed dominate the flux? Do the authors mean it is dominating the variability in the flux? Lines 306-308: What happened to transport? It’s not all just source and loss. And I’m curious, how is loss being handled? I presume it is variable in the atmosphere based on absorption bands etc.? Lines 339-342: Figure 7 is observations, not models. What is meant here? Lines 349-350:

Delete the “hand” phrases. Line 357: “Hand” again. Delete. Lines 381-384: This is an important statement. Don’t lose it during the revision.

Summary

Just a thought. The summary could be trimmed and used as the abstract of the paper, as it focuses on “what we did, what we found, and what it means”, which is all that is really needed in an abstract.

Line 392: Replace “revealing” with “demonstrating the role of”; delete “important”. Line 401: Insert comma after “location”. Line 416: Replace “produce” with “allow”.

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