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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Delivery of halogenated very short-lived substances from the West Indian Ocean to the stratosphere during Asian summer monsoon" *by* Alina Fiehn et al.

Anonymous Referee #2

Received and published: 21 March 2017

This paper presents observations of atmospheric and oceanic CHBr3, CH2Br2 and CH3I from a cruise in the tropical West Indian Ocean. A trajectory model is used to estimate how much of the derived oceanic emissions of these short-lived compounds reach the stratosphere. Comparisons are made with observations from other cruises and the impact of interannual variations in meteorology is also assessed.

Overall I think this is a good paper and should be published in ACP. There is considerable interest in short-lived halocarbon emissions and the cruise presented here provides important additional information. The stratospheric input is quantified and presented with a range of model-based metrics which allow comparison with other studies. The uncertainties/limitations of the modelling is described.

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I have only minor comments:

Line 130. The word ‘project’ is not correct here. (Also line 466).

Line 136. ‘..during the Asian summer monsoon season’? (Missing words?)

Line 193. Do you mean 154 samples every 3 hours, or 154 overall which are spaced about every 3 hours?

Line 257. ‘July 2000-2015’. Should be rewritten to clarify it is for July during those years.

Line 283. Can you show these differences with respect to the ECWMF winds somehow? Can you add the time varying ECMWF winds in Figure 2, if there is a discrepancy to discuss?

Line 291. Give the lifetime of butane so the reader can judge what this is testing.

Line 301. Change ‘lower’ to ‘smaller’. (There are many other places where I would suggest changing higher to larger, when higher can be confused with meaning higher altitude).

Section 3.3. This section compares the emission values between the cruises, but I think it is missing an overall synthesis or discussion about what these differences tell us about the different regimes or techniques. I would suggest adding a paragraph after line 389.

Line 398. It would be interesting to see some plot of the vertical distribution of tracers in the different transport regimes.

Line 413. I don’t understand the definition of transit half-life. It might be the use of ‘has reached 17km.’ All entrained tracer reaches 17km? It seems like Figure 5 would help but that comes later. For Figure 5 can you add a symbol on the blue line at the half-life value? (If I have understood correctly).

Line 416. Table 4. Please check all the values in Table 4. I tried to check my understanding of Transport Efficiency by dividing entrainment by emission. E.g. for CHBr3 cruise mean: 5.5/430 = 1.28%. Not 1.38. I tried other values and there seemed to be differences (23.6/430 = 5.49% and not 6.38%). What is wrong? Also, it would help if the text used the same precision as the table (e.g. line 419 say 1.38% and not 1.3%, or is it 1.28%?).

Figure 5. What are the units of the left-hand y axis?

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