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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Transport of short-lived halocarbons to the stratosphere over the Pacific Ocean" *by* Michal T. Filus et al.

Anonymous Referee #2

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This paper about "Transport of short-lived halocarbons to the stratosphere over the Pacific Ocean" by Michal T. Filus et al. reports about transport of VSLS above the West Pacific using the Lagrangian model NAME and new aircraft observations from the joint CAST, CONTRAST, ATREX campaign in Jan-Mar 2014. The authors use an improved NAME version which includes a convection scheme. This methodology has been applied to many VSLS transport studies before and is a common procedure in the community. However, as the authors investigate the VSLS transport from the boundary layer to the stratosphere comparing it with a new aircraft campaign and a further developed model version of NAME I believe it can fulfil the criteria to be published in ACP after carefully revising the paper including better specifying the new perspective of your study, the state of the art and background in this field and a thorough discussion of the

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Discussion paper

study uncertainties. See my specific comments below.

I) What is really new in your study? To use a Langrangian dispersal model including a convection scheme is nothing new in this field. Next there were several studies including the VSLS contribution to the stratosphere for CAST/CONTRAST/ATREX. Thus, I suggest to think carefully about what is different and thus really new compared to example i) the old NAME VSLS studies, ii) the FLEXPART model and VSLS studies (including a convection scheme) and iii) compared to other VSLS CAST/CONTRAST/ATREX studies, see Wales et al 2018 JGR. This new perspective should be clearer addressed in the introduction and could be added to the discussion of your results.

Line 85: “using a new Lagrangian methodology” I suggest deleting “new” as it is not a new method.

II) What is the state of the art in this research field? Here it seems to me that you are mainly referring to new recent studies and did not go back to the original literature. One example is the citation of the oceanic source of VSLS where you mainly cite VSLS modelling studies, which should be original biogeochemical oceanographic articles such as e.g. Carpenter et al., 1999; Moore and Zafiriou, 1994; Quack and Wallace, 2003 among others. Be aware of the different VSLS components which have different oceanic sources and thus will request different articles to cite. Overall, I suggest to carefully going through all references again citing also the specific original work instead of large selections of recent, maybe randomly chosen, papers.

III) Discuss the uncertainties of your VSLS transport calculations: What is the uncertainty due to the model and meteorology used, transport processes (e.g. BL vs convection scheme), using constant VSLS life times? (see Hossaini et al 2010, Fuhlbrügge et al 2016). - How good is the “Meteorological Office’s Unified Model” meteorology compared to the actual observed meteorology? Here, I refer to observed convection events and winds. How much does the use of this specific meteorology fields affect your results? -Btw, what kind of model is it (operational, assimilation or?) - If I under-

stand it correctly you use constant VSLS lifetimes. Is this appropriate (see Hossaini et al 2010, Liang et al 2010) and what would you expect the results to be using vertical varying lifetimes? I assume you cannot change and add new runs anymore, but you should add a clear and thorough discussion here at least! -How different are your NAME results compared to other transport model studies? (e.g. Fig. 3)?

Figures and text: Thoroughly revise your figures quality. Often the labelling is too small and unreadable on my print out. How about adding a line to your profiles? The main text and references still need revision and editorial help (typos).

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