Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-497-RC2, 2017

Atmospheric Chemistry and Physics Discussions

Interactive comment on "A growing threat to the ozone layer from short-lived anthropogenic chlorocarbons" *by* David E. Oram et al.

Anonymous Referee #2

Received and published: 22 July 2017

The manuscript titled "A growing threat to the ozone layer from short-lived anthropogenic chlorocarbons" present a very interesting and useful study of very short-lived substances (VSLS), particularly Chlorine (Cl). These substances are not regulated under the Montreal Protocol, although they would contribute to the ozone depletion. The authors have used measurement from IAGOS-CARIBIC and surface stations in East and South East Asia. The observations show higher values than expected or reported in the most recent Scientific Assessment of Stratospheric Ozone Depletion (Carpenter and Reimann et al., 2015). This study shows further evidence of rapid transport of Cl-VSLS toward the tropics and subsequently uplifted to the lower Tropical Tropopause Layer (lower TTL, 10-12km) using a lagrangian particle dispersion (NAME) and high quality in situ data (IAGOS-CARIBIC).

Printer-friendly version

Discussion paper

The manuscript is well written and the quality of the text is very much appreciated. I suggest minor revisions. You can find below general comments followed by more specific comments.

General comments:
Methods/Sample collection section:
In general, all the information on the samples: time, locations for all the data, number of flights for CARIBIC data, number of sampling at the ground-based stations should be added in this section. For instance, the 7 IAGOS-CARIBIC flights time should be mentioned. Days and months of samples should be specified in this section as well. It will help the reader to get the general feature of the sampling.
The altitude of CARIBIC needs to be shown. Have you filtered IAGOS-CARIBIC data to analyze data between 10 and 12 km only? The statistics of the sampling in this layer is needed.
In the text it is mentioned that 10-12km over East Asia is the lower boundary of the TTL. It would be very helpful to show a map of TTL or a figure of TTL and aircraft altitudes together with respect of the flight tracks (latitude). It would be also useful to directly refer to Box 1-3, Figure 1 of Carpenter and Reimann et al. (2015) that shows the altitude range of the TTL.

Results section:
About the results shown in Figure 3, a sentence explaining that three days have been chosen out of the seven days of the cold surge event would be helpful. The term “cold surge” should be mentioned.
In general, “see in supplement” is largely used in the manuscript but I would suggest to refer to figure number and section names of the supplement materials to help the reader. Results from Carpenter and Reimann et al., 2015 are cited as reference for

Cl-VSLS last information. For results at the lower TTL, it would be useful to recall the type of observations used in the assessment report: aircraft campaigns and balloons.

Specific comments:
Table: Units need to be added in Table 1 and its caption

Figures:
In general, the way to write Cl-VSLS should be consistent along the captions and the text (sometimes chlorinated VSLS or VSLS-Cl).
Figure 1: "(red crosses)" for surface sites on the map need to be added in the caption to guide the reader.
Figure 2: We don't see the blue circle on the map.
Figures 2,3,5: Helpful to have a recall of ground-based stations location.
Figure 2 and 3: I would rather use letter to name the panels in the caption and I would rather use numbers to link plots in upper panel with maps of the bottom panels.
Figure 3: Use arrows as for Figure 2 to help the reader to find the days that are chosen for air masses origin (map below). In the caption it is mentioned "true background levels", how these levels are estimated? Figure 3 a) is not specified, "a)" should be added on the figure.
Figure 4 and S2: What does CO anomaly mean? What is the reference value?

Text:
Line 126: "Both in the western Pacific region and globally". It is not clear what globally means.
Line 147: "Various time" needs to be specified (see general comments).
Line 150: Change "CARIBIC aircraft" to "IAGOS-CARIBIC aircraft" as CARIBIC is part of the IAGOS program.
Line 230: Change "shows the 2014 data. . ." to "shows data from CAPE Fuguei in the

end of March, beginning of April 2014".
Line 237: Change "March/April 2013" to "mid of March/beginning of April 2013".
Line 246: "January/February": the entire months are not shown so "end of January/beginning of February" would be more appropriate. "During this phase of the monsoon": A recall about the Asian Monsoon phases and references would be useful, maybe recall that it is the East Asian winter monsoon circulation as mentioned in the introduction.
Line 252: change "often" to "most of the case studies we are analyzing here" or "for N days out of Ntotal days of observations" or give the information in Line 277: Change "(see supplement for further details)" to "(Fig. S2 in the supplement material)".
Line 287: Change "in all CARIBIC flights" to "in the seven CARIBIC flights" and remove "(7)".
Line 334: Need a reference.
Line 362: Need a reference.
Line 383: Examples of other chemical pollutants would be useful.
Line 384: Remove "etc".

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-497, 2017.

Printer-friendly version

Discussion paper