

Interactive comment on “HCl and ClO profiles inside the Antarctic vortex as observed by SMILES in November 2009: comparisons with MLS and ACE-FTS instruments” by T. Sugita et al.

Anonymous Referee #3

Received and published: 9 September 2013

This paper presents two retrieval versions of late spring Antarctic vortex profiles of HCl and ClO from SMILES, comparing with observations from other satellite instruments. The data are placed in the context of what has already been published about reformation of chlorine reservoir gases as ozone levels fall. I have suggestions for minor revisions. Some grammatical issues are included at the end.

p. 6739 L 25 The equivalent latitudes are -71 for SMILES and -76 and -75 for MLS and ACE-FTS. I would have thought that might be enough difference for SMILES to be nearer the Antarctic 'collar'. MLS should have enough data to discern if this much difference in equivalent latitude might affect some of the comparisons.

C2463

I have trouble figuring out which of the possible causes for difference in retrieval are important. For example:

First discuss differences in approach - although I have no sense of the magnitude of the differences, the physical argument (that the larger spectral interval gives more information) at least make sense intuitively.

The paragraph on 6736 lines 13-23 about differences in the spectroscopic data is difficult to read, and there is no sense of how such differences might contribute to differences in the final product. Also, a table might be more readable.

In the discussion of the differences in the retrievals - raise the possibility of the a priori (p. 6735, l 24) and then say later that it isn't important (p. 6741 L 26)

On P. 6740 call out the uncertainty in the meteorological input (up to 1K) but again no sense as to how large an error might come from this.

I looked at Livesey et al. and could not find anything to suggest the high HCl bias for values greater than ~ 3 ppbv. So this must come from somewhere other than the summary table 3.9.1 which mentions bias only at low latitudes 147 hPa.

Grammar p 6731 L 6 it is suggested that HCl IS (rather than was)

P. 6732 L 19 measurements from the Atmospheric Trace MOleculT Spectroscopy on the Space Shuttle WERE conducted (rather than was)

p. 6736 While SMILES-NICT ff - this is not a sentence. Delete 'While'.

p. 6744 l 29 Since this high HCl happens every spring in the Antarctic vortex (now observed as a regular feature for about a decade), I would delete 'anomalous'.

p. 6745 L 9 Since the conversion is quite rapid for a least a week or two (derivatives of plots in Santee et al.) and far more rapid than Cl + CH₄ would suggest for Cl in any other part of the lower atmosphere, I would delete 'gradually'.

C2464

p. 6747 I don't know what is meant by "This strongly suggests that even in the late November period HCl dominates Cly inside the Antarctic vortex in the lower stratosphere, when the vortex situation was somewhat distinct compared to other years."

p. 6748 L 25 'dedicated' is the wrong verb. Do you mean it is strictly speaking appropriate only for the Arctic? It seems like that is where you are heading with the later discussion of older air in the Antarctic than in the Arctic.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 6729, 2013.

C2465