

Response to Anonymous Referee #2

The referee is concerned that the altitude sensitivity of the measurements may be compromised and asks to see the averaging kernels for the measurements, and more detailed comparisons to the MLS time series. These issues are addressed in the Supplement.

Specific points:

p. 30573, l. 2-3: Ricaud et al (2000) shows that there is a substantial increase of ClO in daytime at 10, 4.6, and 2.1 hPa, and no clear diurnal variation at 1.0 and 0.46 hPa

p. 30573, l. 4: PSCs catalyze ClO production in the lower stratosphere, creating spectral signatures ~ 100 times broader than the upper stratospheric nighttime signal; we will revise the parenthetical comment to say '(except in the presence of polar stratospheric clouds)'

p. 30573, l. 16: the ClO profiles used for scientific analysis, and archived with NDACC, are the 'weekly' averages described in section 3.2; every time period which provided enough high quality spectra, between 1992 and 2012, is shown in Fig 5.

p. 30573, l. 26: the figure reference will be corrected in a revised manuscript

p. 30574, l. 2: This sentence seems clear; I don't know how to be any more precise.

p. 30574, l. 4: 'previous section' is correct

p. 30574, l. 6: 'all instrumental signals' does refer to the system baseline, but was used because it is more explicit; the subtraction of the 'interpolated night' spectrum produces an 'approximation' to the daytime spectrum, as stated on line 5. One error source preventing a more accurate estimate of the daytime spectrum is the interpolation function as described on line 8.

p. 30574, l. 27: The Mauna Kea and Scott Base ClO data sets are the only two long-term, ground-based time series of ClO in existence. I believe this sentence on their similarities and differences provides a useful context for the analysis method presented in this paper.

p. 30575, l. 7: The best references are Nedoluha et al, 2011 and Solomon et al, 2006; these will be cited when the retrieved profiles are first mentioned in a revised manuscript; the retrieval is an optimal estimation retrieval and uses the same a priori profile for the entire data set.

p. 30575, l. 19: addressed in the Supplement

p. 30576, l. 16: the error bars shown on the 'annual' averages are the rms variation of the weekly values included; they are smaller for day-night because there is less scatter in the weekly values

p. 30577, l. 4: only Aura is included in the upper panel of Fig 6, as stated on line 4. This was done for clarity of the Figure; UARS is included in the lower panel.