Referee comments in black. *My responses in green italics.*

Debra Wunch (Referee #2)

This paper describes the retrieval results from a newly developed propane spectroscopic pseudo-line-list. The paper convincingly argues that the retrievals of propane are realistic (albeit a bit too high), and that the variability is sensible. This new line list will be very interesting to apply to spectra already collected by the NDACC and TCCON networks. The paper is well-written and is appropriate for publication in ACP. I do not have major comments, but several Minor/Technical comments: *Thank you!*

Minor/Technical Comments

L12-13: This last sentence seems to be missing a few words for context. Maybe: "From high-altitude balloon borne MkIV solar occultation measurements, C3H8 was not detected at any altitude (5-30km*) in any of its 25 flights." (Please replace * with the correct numbers.) *Fixed.*

L26-27: I had to re-read this last sentence a few times, because the previous sentence begins with "In contrast," referring to the ethane lifetime. I think just switching the 2nd and 3rd sentences in this paragraph would help make your point clearer: that the 2-8- week lifetime is long enough to affect a large fraction of the hemisphere. *Moved second sentence (about C2H6) to 4 paragraphs later.*

L45: add "period" to: ". . . in the 2005-2010 *period* based on. . ." *Done.*

L85: remove "then". It would be helpful to briefly explain why the 1400 cm-1 band would be better on cold planets for thermal emission spectrometry. *Done both.*

Fig 1.: In my copy, this figure is blurry, and the text is too small for me to read clearly.

*Fig.1 looks crystal-clear in my MSWord file, but is indeed fuzzy in the PDF that I created using "Preview". I *think* that the final paper is submitted in the form of a MSWord file, not a PDF, in which case ACP will hopefully have a better PDF converter than I do.*

L97: I cannot download the report that's linked to this address; it gives the message that the requested URL was not found. L143-146: I think these sentences are missing a statement that although the absolute uncertainties are larger, the absolute values of the total columns themselves are much larger, so the relative uncertainties are smaller. (If that's indeed true.) *Fixed.*

L148: use -> us *Fixed.*

L150: Are the retrievals of C2H6 you're correlating with C3H8 done in the same window as the C3H8, or are they done in an independent window? (You answer this question later on L214, but it may be worth clarifying that the C2H6 retrievals are in independent windows here as well.) *Fixed.*

L153: It would be helpful to introduce the "X"C3H8 notation at this point, as it is used in the figure and the next paragraph. *Fixed.*

L166: measurement*s* (add an "s") *Fixed.*

L181: I suggest combining the sentence beginning with "And" to the previous sentence. Fixed.

Fig. 6: Why can't I see error bars on XC2H6? I can clearly see them for XC3H8 and XCO. (You state later on L210-211 that the ethane error bars are small – so small that they are the same size as the points on the figure? If so, I'm surprised they are so much smaller than XCO errors.)

You can see error bars in the upper right, where the XC3H8 values are high, but not for C3H8 values below 2 ppb. The diamond symbols have a height of nearly 0.1 ppb, so an error bar will only be discernable if it exceeds 0.05 ppb which is 5% at 1ppb. XCO errors are about 5% but are much more easily seen due to the much smaller dynamic range of the CO data. So if I were to zoom the y-scale to cover only 0.5 to 1.5 ppb, using the same panel size, then the error bars would grow by a factor 3.5 whereas the diamond symbols would stay the same size in absolute terms. So the error bars would all become visible.

L205: Could you use the global methane growth rate, or the Mauna Loa methane growth rate to detrend the XCH4? Or, instead, use an anomaly analysis (i.e., subtract the minimum or median total column of each gas on each day before plotting correlations of the various gases)? The anomaly analysis may help improve correlation coefficients and could help interpret the results.

For a gas that increased linearly with time (e.g., N2O) it would be easy to detrend the MkIV data. But CH4 has a growth that surges and then levels off. So I think that I would need information about the age of the air that was sampled in each observation at each site in order to do a proper detrending. Regarding correlating deviations from the daily mean, remember that the MkIV only observes for 1-2 hours each day, in general, so the measured columns don't have much opportunity to change.

Fig. 9b: I could not access the provided link to see the temporarily removed figure. Has permission been granted?

Link works for me. Can you see the link below. It is a different link to the same figure, but without the accompanying article: https://www.spglobal.com/platts/plattscontent/ assets/ images/latest-news/20191219-rig-count.jpg. Permission has not yet been granted after 4 months, so I've given up.

L362: produce -> product Done
L363: show ** increasing (no "a") Done
L379: I assume you mean Wunch et al., 2011. Yes. Fixed.