

Interactive comment on “Spectrometric measurements of atmospheric propane (C₃H₈)” by Geoffrey C. Toon et al.

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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:

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

C1

not detected at any altitude (5-30km^{*}) in any of its 25 flights.” (Please replace ^{*} with the correct numbers.)

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.

L45: add “period” to: “. . . in the 2005-2010 ^{*}period^{*} based on. . .”

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.

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

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.)

L148: use -> us

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.)

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.

L166: measurement^{*s*} (add an “s”)

L181: I suggest combining the sentence beginning with “And” to the previous sentence.

C2

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.)

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.

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

L362: produce -> product

L363: show ** increasing (no "a")

L379: I assume you mean Wunch et al., 2011.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-1135>, 2020.