

## Author Response to Editor's Minor Comment (Dec 5, 2017)

There is one issue raised by Reviewer 2 that I think the authors need to clarify and possibly reconsider. This is the discussion about changes in the ratio of C<sub>2</sub>H<sub>4</sub> and CO at JPL over time which is in lines 212-216 and the interpretation of Fig 5a and part of Table 1.

Okay.

The main point is that it is not clear exactly what the authors are calculating: (a) is the correlation coefficient calculated on the raw measurements or after the sample means are taken out?;

The latter. The manuscript clearly states that we used the Pearson Correlation Coefficient (PCC). This is defined by the equation

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}}$$

which subtracts the means from the x- and y-values.

(b) is the gradient calculated on a line forced through zero or is a non-zero intercept allowed?

The latter. I have modified the text to make this clearer.

If a non-zero intercept is allowed, then the discussion about the background C<sub>2</sub>H<sub>4</sub> is moot, as an effective background of about 1.5E18 for CO is found from the data.

Agreed. My response to Reviewer 2's comment that: "L224: An emission ratio subtracts off the background. Was that done here for CO?" was: "Yes. This happens implicitly when you fit a straight line (gradient & intercept) to a plot of gas column vs CO column."

What is then interesting is if the slope of lines - or the intercepts - calculated for different time periods changing as that implies a change in the emission ratio.

Agreed. This is why I devote two paragraphs to discussing this.

So my recommendation is that the authors (a) clarify exactly what they have calculated in the text and in Table 1, e.g. by drawing a fitted line in Fig5a;

Oh dear, there seems to be a misunderstanding. The gradients and correlation coefficients in Table 1 refer to Figure SI.1, not Figure 5. Reviewer 2 was also confused about this. I am not adding straight lines, derived from JPL-only data in figure SI.1, to figure 5, which includes data from all sites.

I think that the underlying problem here is that the most-discussed figure in the whole paper is currently languishing in Supplementary Information, after being relegated from the main paper in June. But the discussion of it remains in the main paper.

So I have merged former figure SI.1 with Table 1. This was achieved by writing the gradients and correlation coefficients into each panel of Fig. SI.1. I have also added the fitted straight lines. The resulting Figure 6 is in the main paper, where Table 1 used to be. Figures 7 & 8 have been re-named to Figures 8 & 9.

Also, the old SI.2, which contained two tables (SI.2a and SI.2b), has been split. SI.1 now contains the list of sites and their properties, while SI.2 contains the number of observation days at each site in each year. SI.3 is unchanged.

Minor:

134: Figure 3 shows....

**Fixed.**