This is concise analysis of the potential impact of stratospheric variability on CO_2 mixing ratios at the surface, using similar methods to those used in Ruiz et al. (2021) to analyze N_2O. The expected variability for CO_2 at the surface from the stratosphere is found here to be small compared to the actual observed interannual variability (IAV), suggesting that this effect is not as important as in the case of those other gases. Two methods to quantify the effect were used: modeling the stratospheric effect using a full 3D transport model, and the stratospheric effect as inferred from actual N_2O variability with a scaling factor used to convert to CO_2. These methods give a peak-to-peak amplitude of about 0.05 ppm in the Southern Hemisphere, which is small compared to a value of about 0.5 ppm, ten times that, that they compute from actual monthly time series at South Pole (SPO) and Cape Grim (CGO), as well as Samoa (SMO).

This is a nice paper and would be good to publish, to put to rest speculation that this effect may be large enough to matter much, compared to the other drivers of CO_2 variability. However, I have a concern that the analysis of the CO_2 data at CGO and SPO (and SMO, too, I suppose, though I did not check it) has not been done correctly: in particular, the calculation of the black 'IAV' curve in Figures 1c and 1d. When I attempted to do the same calculation in MATLAB, I was able to replicate the red curve in Fig 1c, but I get a very different curve than the black one when I filter out Fourier components with periods longer than 5 years and shorter than two years. Please see my figure below that shows what I get for that black curve (I used 5.5 and 1.5 years as the cutoff). The amplitude of the variability is larger, on the order of 0.8 ppm, and the location of the peaks is completely different that what Prather obtains. I found the MATLAB *lowpass* function difficult to work with (in that the cutoff frequency did not seem to correspond to the results obtained), but the *highpass* function seems to work. I used it to quantify the portion of the signal corresponding to *highpass(signal,0.182,12)* and *highpass(signal,0.67,12)*, or those frequencies higher than cutoffs corresponding to periods of 5.5 and 1.5 years, respectively, and subtracted the second from the first. Prather says in the caption to Figure 1c that he ran the detrended timeseries through a *highpass(series,0.32,12)* filter followed by a *lowpass(series,0.3,12)* filter. According to my understanding of these functions, that corresponds to keeping all periods shorter than 1/0.32 = 3.125 years, then those longer than 1/0.3 = 3.333 years, in which case no frequencies should be left. While I was not able to understand how the given frequency cutoff functioned in the case of *lowpass*, I did figure it out in the case of *highpass*, and the description in the caption does not seen to agree with inclusion of periods from 5 to 2 years. The black curve given in Figs 1cd appears of show beat phenomena (with an expanding and contracting envelope inside of which the variability occurs) that I don't see in my results. I would ask Dr. Prather to check what he has done here and get back to me before proceeding towards publication (i.e. I'd like another look at that point). Perhaps the curve I get might correspond more closely with the timing of the QBO phases given at the bottom of Figure 1d -- I thought I might have detected some coincidence for some of the larger fluctuations. If the black curve in Figs 1cd changes, this could impact the discussion in the text.

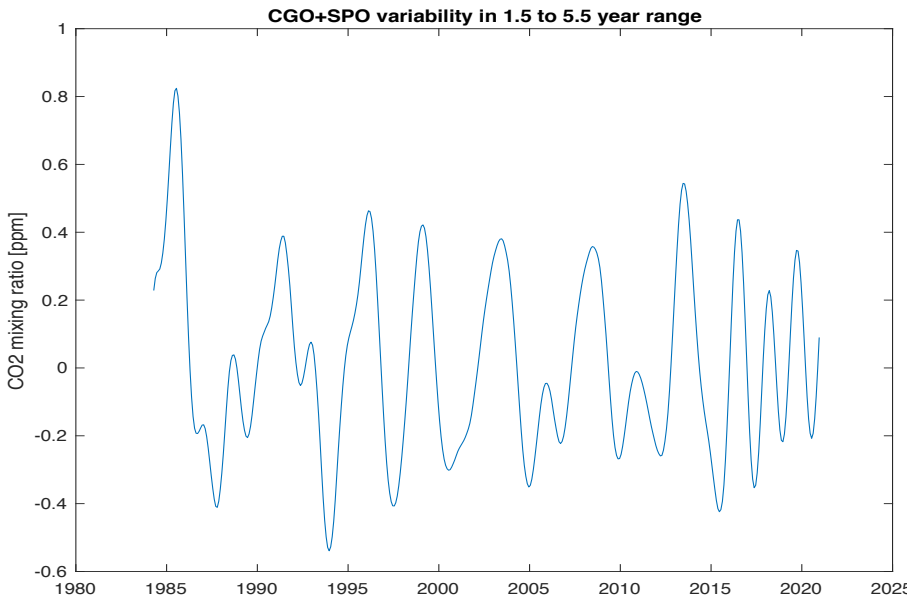

Figure: Filtered CO_2 variability for periods between 1.5 and 5.5 years, based on gap-filled monthly NOAA data at CGO and SPO (averaged).

The paper is well-written; I only had a few editorial comments, below:

61: add "there" at end of sentence, for clarity.

335: add "a" before "2 ppm"

Fig 1: Does the NOAA analysis remove any frequencies in the gap-filling calculation that they do? Do they attempt to make the 'months' equally-spaced? (i.e. to remove the impact of the differing month lenghts, February in particular -- I believe they do do this for some of their products)

66: if the emissions are spatially uniform, how can you generate a N/S gradient? Are you referring to the creation of a N/S gradient from the flat emissions field due to transport effects?

85: remove "are"

99: instead of "does have", say "does drive" or "does cause"?

138: add "of CO_2 at the surface" after "annual cycle".

139: what sort of signals -- IAV? If so, please say that... for clarity.