

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-940

Anonymous Referee #1

Referee comment on "Observations and modelling of glyoxal in the tropical Atlantic marine boundary layer" by Hannah Walker et al., Atmos. Chem. Phys. Discuss.,
<https://doi.org/10.5194/acp-2021-940-RC1>, 2021

This paper presents a sensitive technique for the detection of glyoxal and describes in-situ experiments with ancillary measurements of key precursor species involved in the glyoxal photochemical cycle. It is a complete paper that adds a great deal to the literature and our understanding of this species which has attracted a good deal of attention in the last decade based primarily on satellite observations and long-path DOAS measurements that have shown hard to explain high levels of this short-lived species in remote environments. It is well written and well researched. The paper presents data, courtesy of the technique that is capable of detecting glyoxal in the low pptv range, that appear to be in reasonable accord with our understanding of remote atmospheric chemical distributions and processes, although questions remain on sources of glyoxal in the absence of sunlight.

The paper explores in detail sources and sinks of marine glyoxal. Sources not considered in as much detail in previous studies but considered here include terpenes and acetaldehyde. Results indicate that monoterpenes are unlikely to be responsible for a significant part of glyoxal formation but acetaldehyde may well be an important contributor.

It will be interesting to see the response from the satellite and DOAS communities and a side-by-side comparison of glyoxal measurements may be warranted at some point.

P 7 line 12: what is trace heating tape?

P 7 line 28 and Figure 1. It would help the casual reader to put the pulse delay generator in the figure and to better explain the trigger and the pulse.

Table 1: Data all look reasonable except n-hexane is surprisingly high. My guess is that

there may be an issue with the measurement although it this will not impact any conclusions in the paper so it is minor.

I'm not sure that using the MCM names for chemical species throughout the document is the best approach but leave it to authors' discretion.

P 12 line 2: Put dates here for the two respective campaigns

P 12 line 11. I would change sentence for clarification to "The maximum glyoxal mixing ratio of 36.3 pptv was observed during the first campaign on 22 June 2014; however, the 24 hour...."

Page 13 line 18 – update to: <https://www2.acom.ucar.edu/modeling/tropospheric-ultraviolet-and-visible-tuv-radiation-model>

P 15 paragraph beginning with line 17: Maybe I missed it but do you discuss/speculate why the mixing ratios are higher during the second campaign? If not, this would be a good addition or if you don't know of any reasons why then perhaps state that.

P16 line 13: ATOm not AToM

P20 line 14. "moderately elevated" is a better description here then significantly elevated

More explanation needed for Figure 8. The Figure 9 caption implies that these are diurnal means – is that correct? I find it intractable to compare the diurnal means described in Figure 9 with those from a scatter plot in Figure 8.

Figure 10 – Cumulative production and loss rates would be preferable in my view. The yellow legend doesn't show up well and see note on MCM names.

Figure S9 – label as a and b