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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Seasonal in situ observations of glyoxal and methylglyoxal over the temperate oceans of the Southern Hemisphere" *by* S. J. Lawson et al.

Anonymous Referee #2

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The manuscript by Lawson et al. documents new measurements of glyoxal and methylglyoxal in two locations sampling temperate southern ocean conditions. There is currently a lack of understanding as to the origin of glyoxal and methylglyoxal over the ocean in many parts of the world, as observed from a small set of in situ measurements and also remote sensing data. The present work is timely in that these additional in situ measurements provide a valuable resource for determining the nature of the source of these compounds. While the analysis presented here doesn't by itself determine the missing source, or reconcile experiments with models, it is an original piece of work that will surely be useful in the overall story. The article is thus highly suitable for ACP.

Overall, the manuscript was well written. I only have a few questions that constitute minor revisions.

Comments / Questions: 21664/21665: Seems relevant to also mention that elevated glyoxal columns over the ocean appear to be correlated with chlorophyll.

21665.4: However, SCIAMACHY ocean columns seemed, on average, highest in the southern tropics / southern hemisphere. In fact, how are these sites situated relative to areas where high glyoxal concentrations were observed over oceans from the remote sensing studies? Were they in some of the peak areas, or were they in regions where values were below the satellite detection limit?

21676: Is there any uncertainty introduced by using climatological OH and O3 values? If the source is episodic, such as correlating with phytoplankton blooms or some other temporary occurrence, would this climatological OH/O3 be representative?

Fig 4a: It's kind of hard to see the different line colors here since they are so thin and over a dark background.

Fig 4a/b / 21682.5: It seems to me that the obvious differences are the longitudes of the back trajectories. Also, it's not evident if there were any differences in the elevations, from one site to another or from day to day.

21678: Regarding contamination of the sampling by the ship's plume, the argument based on acetaldehyde makes sense. However, I don't quite see how they could be sampling CO2 from the ship exhaust (line 19), but not VOCs (13). Did these have separate inlets?

21681.6: "over the remote oceans" Or, over some remote oceans, as there is not much at Cape Grim. I'm not sure how much the results from just the two points measured here can be extrapolated to the rest of the world.

21683: The differences in precipitation seem very significant, and I was surprised this wasn't discussed earlier, given the importance of explaining differences between the

two sites. It makes me wonder if there were other major differences in meteorological conditions, such as temperature, RH, background aerosol loading, insolation, etc.

21685.15: It might be more correct to say here that the fraction of the production that has been accounted for is largely driven by isoprene and monoterpenes, but perhaps since this is still only a small fraction of the total, with the driver of the remainder not yet know.

21686.23: Could compare to / references estimates from Kwan et al. GRL 2006, regarding the organic aerosol source.

21687: Can the in situ data be shown on the same plot as the satellite data? It wasn't clear why they weren't shown together. More broadly, it seemed odd that the measurements were entirely described by a few values in Tables 1 and 2. Was there nothing that could be learned from time-series?

21687.27: Strictly speaking this isn't necessarily a "bias", since there isn't necessarily an error in the satellite VCD. It is possible there is just an inconsistency in determination of VCD from the surface vs the satellite.

21688.17: Would you expect the satellite to be higher or lower than the 24 hr average?

Corrections: 21660.20: Grim, suggesting âĂŤ> Grim suggest 21660:26: Gloxyal surface observations âĂŤ> Surface-level observations of glyoxal 21661.16: salt make âĂŤ> salt, make 21661.25: extra space before period 21662.7: classed as SOA. (Rinaldi. . .). âĂŤ> classified as, SOA (Rinaldi. . .). 21663.12: clouds is âĂŤ> clouds, is 21664.3: However significant âĂŤ> However, significant 21664.8: However there, âĂŤ> However, there

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