Atmospheric Chemistry and Physics Discussions

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Comment on acp-2021-74

Anonymous Referee #2

Referee comment on "Fluorescent biological aerosol particles over the central Pacific Ocean: covariation with ocean surface biological activity indicators" by Kaori Kawana et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-74-RC2, 2021

In this manuscript, K. Kawana et al. investigate fluorescent biological aerosol particles over the central Pacific Ocean and propose equations to derive atmospheric bioaerosol number density in the marine atmosphere from a combination of biogenic proxy quantities and wind speed. These equations could help in the parameterization of models, and as such, this manuscript will make a nice addition to the literature. My only relatively major concern is the absence of discussion on analytical or sampling uncertainties, especially for the following parameters: nutrients, Chl-a, bacteria, TEP, and CSP. The rest of my comments (see below) are mostly minor.

Page 4, lines 7-9: "To avoid contamination from ship exhaust, the data points from the online measurements were screened using the same criteria that were applied to the operation of the pump of the high-volume air sampler". Have you checked whether this criteria of ±75° from the bow is stringent enough? A simple test is to check whether you have instances with sudden ozone titration (due to NOx emissions from the ship exhaust).

Page 4, lines 10-13: surface seawater sampling was carried out with a bucket but you only analyzed 200 mL of water (if I understood correctly). Is this volume of water (200 mL) representative of what was in the bucket (homogeneous sample)? Did you collect replicate filters? If so, please indicate the results as error bars in the figures. If no replicate samples were collected, could you please at least discuss analytical uncertainties and report them as error bars in the figures? I'm simply wondering if the temporal variation you describe later in Figures 6-7 is significant or if it's just noise.

Page 5, lines 5-6: There should be a section on back-trajectories in the Methods. In addition: 1) which meteorological data did you use to generate the trajectories? 2) why did you use a starting altitude of 500 meters? 3) please also include the fact that you only generated trajectories twice a day (0600 and 1800 UTC according to Fig. 1 caption).

Page 5, lines 10-13: Are these results in line with literature? See Bourgeois (2020) for example.

Page 6, lines 1-5: How about the increase in type B particles at the end of the campaign?

Page 6, lines 18-19: It's hard to tell with the log scale. Can you please add in the text the mean ± standard deviation before and after March 12 for each size range?

Page 6, lines 30-31: Please make it clear in the caption that the y-axis is different for the two instruments; it took me a while to realize that.

Page 7, line 8: "high again in the south of the KR on March 22". This is not obvious…I'd appreciate error bars on this Figure. Same comment for the rest of this section.

Figure 1: Color on trajectories show air parcel altitude pressure (not altitude).

Figure 2: Very few data points for both ozone and CO before 3/12. Is that due to instrument issues or to pollution from the ship exhaust (wind out of the clean air sector)? If the latter, how did this pollution impact the representativeness of bioaerosol results presented in the manuscript? I'd appreciate a table showing the daily hours of operation of each instrument during the campaign to better appreciate the temporal representativeness of the samples.

Figure 4c: please make it clear in the caption that the y-axis is different for type C. I initially got confused.

Figure 6: please add the different regions on the map (Figure 1).

Figures 6-7: please add error bars!

Table S1: please clarify what "Zone" refers to. This should be added in the caption.

References

Bourgeois, I., Peischl, J., Thompson, C. R., Aikin, K. C., Campos, T., Clark, H., Commane, R., Daube, B., Diskin, G. W., Elkins, J. W., Gao, R.-S., Gaudel, A., Hintsa, E. J., Johnson, B. J., Kivi, R., McKain, K., Moore, F. L., Parrish, D. D., Querel, R., Ray, E., Sánchez, R., Sweeney, C., Tarasick, D. W., Thompson, A. M., Thouret, V., Witte, J. C., Wofsy, S. C., and Ryerson, T. B.: Global-scale distribution of ozone in the remote troposphere from the ATom and HIPPO airborne field missions, Atmospheric Chem. Phys., 20, 10611–10635, https://doi.org/10.5194/acp-20-10611-2020, 2020.