

Interactive comment on “Contribution of dissolved organic matter to submicron water-soluble organic aerosols in the marine boundary layer over the eastern equatorial Pacific” by Y. Miyazaki et al.

Anonymous Referee #2

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This work discusses ship-board measurements of sub-micron aerosol during a cruise around the eastern Equatorial Pacific Ocean region. A rich dataset was collected with the data analysis focused on water-soluble organic carbon characteristics. Results include the following: (i) WSOC in aerosols were enhanced due to dissolved organic carbon in surface seawater and subsequent emissions in the marine atmosphere; (ii) enhanced WSOC, monosaccharides and WSOC/TC were observed in upwelling areas suggestive of the influence of ocean emissions; (iii) a lack of correlation between MSA and WSOC suggests that DMS in the surface water is not linked to formation of sub-micron WSOC; (iv) monosaccharides are a suitable tracer for ocean-derived WSOC associated with sea salt. The paper is written well. The figures and tables are clear.

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The title and abstract are reflective of the contents in the paper. The topic is of interest to this journal, and the authors have done a nice job to present the valuable pieces of information from their dataset. I am supportive of publication after the authors address the following items:

Specific Comments: Page 2, Line 22: Provide a reference for WSOC altering hygroscopicity.

Page 4, Line 34; Page 8, Line 13: Report sample number when reporting correlations.

Figure 1 caption: what are the red traces in the right panel representative of? Clarify in caption, and thicken the red lines to allow for readers to see them more easily.

Page 5, Line 32: For the sake of comparison, it would be useful to provide info here about other archived datasets such as (for example) data collected in the North-east Pacific Ocean showing both unimodal and bimodal characteristics for water soluble organic species: Maudlin, L. C., et al. (2015). Impact of wildfires on size-resolved aerosol composition at a coastal California site, *Atmos. Environ.*, 119, 59-68, doi:10.1016/j.atmosenv.2015.08.039. Also, some discussion about the sources of the two modes in this study would be helpful for readers.

Page 6, Line 11: Have other studies also shown a link between organics and high Chl A? if so, I suggest a discussion of those other studies too and what their chief results were to enrich the discussion in this section of the paper. Some suggested studies to look up are: Facchini, M.C., et al. (2008). Important source of marine secondary organic aerosol from biogenic amines, *Environ. Sci. Technol.*, 42, 9116e9121. <http://dx.doi.org/10.1021/es8018385>.

Sorooshian, A., et al. (2009). On the link between ocean biota emissions, aerosol, and maritime clouds: airborne, ground, and satellite measurements off the coast of California, *Global Biogeochem. Cycles*, 23, GB4007, doi:10.1029/2009GB003464.

Section 3.4: For the discussion about MSA and its lack of correlation with WSOC and

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Chl A, it may be useful here to bring up the point that other studies have observed that MSA may be enhanced in the presence of metals (mainly vanadium). Such catalytic effects that are speculated in past works may be at least one contributing factor as to why correlation is not observed between MSA and these other parameters:

Gaston, C. J., et al (2010), Real-time detection and mixing state of methanesulfonate in single particles at an inland urban location during a phytoplankton bloom, *Environ. Sci. Technol.*, 44(5), 1566–1572. Sorooshian, A., et al. (2015). Surface and airborne measurements of organosulfur and methanesulfonate over the western United States and coastal areas, *J. Geophys. Res.*, 120, doi:10.1002/2015JD023822.

Do the authors have any indication about how important cloud processing was during the research cruise in explaining any of the features in their WSOC data?

Figure 2: Was precipitation important in explaining any of the reductions in concentrations observed during the time period shown after the local maxima values observed?

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