

Reviewer comment:

The paper of Okuljar et al. has great potential for better understanding the potential NPF from Great Barrier Reef. However, the authors need to go deeper into the rich dataset that they were able to generate despite the troubles that occurred during campaign. I suggest using all this potential to investigate the different processes of oxidation of DMS and maybe other VOCs such as monoterpenes that were not considered in this study. The paper also needs more improvement in its structure. I suggest a major revision with further comments below.

General requests:

1. Could you consider studying the impact of the island on VOC emissions and then potential interaction with NPF?
2. VOC are oxidized in the atmosphere but they have not all the same lifetimes. Could you discuss this more in the text? Indeed, you performed 72h backtrajectories but if you consider the lifetime of DMS it is only ~1 day and monoterpenes are oxidized by OH in only few hours!
3. Section 3.1: the separation of air masses seems to be arbitrary at this stage. The reader understands that you separate from north air masses and south air masses and not necessarily regarding the air masses that are associated with the GBR. Please be more accurate in your text and Figures.
4. Quality of figures: please revise all your figures to improve their quality (font size, colors,...)
5. Discussion: you present VOCs concentrations but you do not discuss these concentrations with literature from both coastal and clean marine areas. Please add this discussion.
6. Section 3.2: This section is not clear and needs to be improved by separating your discussion into subsections. Indeed, you are switching from NPF to backtrajectories classification, link with meteorological parameters and finally implication of VOCs...
7. Concerning the DMS oxidation pathway, the authors assume only one through the formation of DMSO. But the DMS oxidation pathways are more complex. Some discussion needs to be improved here. I suggest reading the Mynard et al. (2026) paper.
8. Could you consider that other compounds than DMS can oxidize and form SOA such as monoterpenes which are very reactive in the atmosphere?

Other comments:

Line 62: Can you add more reference to illustrate that coral reef environment is well known to emit aerosols?

Line 234: you indicate that you flagged using BC by using a threshold of 0.45g/m³. Could you consider using other parameters such as NO_x/CO₂/O₃ for filtering your data?

Line 340: “pollution event”: I don’t understand why you hypothesize a pollution event as you removed all polluted data by filtering by BC.

Figure 1: please give more information on this Figure: give a global map with a zoom on the island and color the GBR.

Figure 2: the legend is not clear: please define better what you mean by “emission affected” or change the legend.

Figure 4: I am very surprised by the concentrations of benzene and toluene. The variability is higher for clean marine air as you have spikes of these compounds. Also, if you compare it with previous studies, not so high concentration has been reached (Lawson et al., 2015; Rocco et al., 2021; Wohl et al., 2023). Please check your data to see if you have any pollution somewhere (group generator running due to power cut?).

Figure 5: the apparition of greater particles is very abrupt. Can it be linked to a change of wind direction?

Figure 8: it is not so common to have the y-scale in log, please change the scale or precise in the figure.

Table S.2: Why is the detection limit very high for some compounds (eg cyclohexane)? How do you calculate the DL from this instrument? Did you remove data below the DL?

Some key references cited in my comment:

Lawson, S. J., Selleck, P. W., Galbally, I. E., Keywood, M. D., Harvey, M. J., Lerot, C., ... & Ristovski, Z. (2015). Seasonal in situ observations of glyoxal and methylglyoxal over the temperate oceans of the Southern Hemisphere. *Atmospheric Chemistry and Physics*, 15(1), 223-240.

Rocco, M., Dunne, E., Peltola, M., Barr, N., Williams, J., Colomb, A., ... & Sellegri, K. (2021). Oceanic phytoplankton are a potentially important source of benzenoids to the remote marine atmosphere. *Communications Earth & Environment*, 2(1), 175.

Wohl, C., Li, Q., Cuevas, C. A., Fernandez, R. P., Yang, M., Saiz-Lopez, A., & Simó, R. (2023). Marine biogenic emissions of benzene and toluene and their contribution to secondary organic aerosols over the polar oceans. *Science Advances*, 9(4), eadd9031.

Mynard, C., Franklin, E. B., Alroe, J., Westwood, K., McNabb, B. J., Strzepek, R., ... & Dunne, E. (2026). Drivers of Atmospheric Volatile Methylated Sulfur Variability Across the Southern Ocean and Antarctic Coast. *Atmospheric Chemistry and Physics*, 26(16), 11583-11604.