General.

We would like to appreciate the referee for providing the valuable comments to improve the manuscript. We have revised our manuscript by fully taking the editor's comments into account. Responses to specific comments are described below. All the changes made and appeared in the revised text are shown in red. All detailed answers to comments are displayed in blue.

Comments of Referee #2 and our responses to them

This manuscript presented the quantification of OSs and measurements of nitrogen-containing organic compounds (NOCs) in PM2.5 collected in the Sansha region over a one-year period. The proportion of aliphatic and aromatic OSs in the total OSs was significantly higher in Sansha than in other Chinese cities investigated. They concluded that the emissions of marine organisms can contribute to the formation of both typical BSOA and aliphatic- and aromatic-derived SOA in this sea area with few anthropogenic sources of pollution. This study can provide a scientific bases for studying on the potential origins and formation of tropical marine aerosol OSs and NOCs.

The manuscript is mostly well written and easy to read. The results and discussion are detailed and convincing through the comparative analysis of results. The manuscript deserves publication after the authors take care of the following minor revision described below.

Response: We deeply appreciate your valuable suggestions and time spent reviewing our manuscript.

Specific comments:

1. Page 5: Why was Sansha chosen as the research area? How does the intensity of marine biological activities there compare with those in other tropical seas?

Response: We chose Sansha because it is the only tropical sea area that allows us to conduct one-year field observations.

2. Page 7: the authors mention that all OSs were undetectable in the blank samples. However, the specific handling procedures for the blank samples were not specified. It is recommended to provide more details on the quality control of the blank samples.

Response: We greatly appreciate your comments. We have updated the relevant content.

Lines 124–125: A blank filter sample was collected on a monthly basis using the same air sampler (without operation) as referenced above.

Lines 147–148: All OSs were undetectable in the blank samples with the same measurement methodology as mentioned above.

3. Page 9: Why did you choose the forward mode with the thermodynamically metastable state when using ISORROPIA-II to predict the pH value?

Response: The model was run in the forward mode for metastable aerosols, which was shown to yield more accurate aerosol pH predictions than reverse-mode calculations using only aerosol data input (Wang et al., 2021; Guo et al., 2015; Hennigan et al., 2015).

More descriptions have been added to the SI.

S4. Prediction of pH: …The model was run in forward mode for metastable aerosols, yielding more accurate aerosol pH predictions than reverse-mode calculations using only aerosol data input (Wang et al., 2021; Guo et al., 2015; Hennigan et al., 2015) ...

4. Page 10: Were the OSs and NOCs detected in the study reported in other marine aerosols? Are their abundances geographically specific?

Response: The occurrence of OSs in marine aerosols has been reported (**Table S4** in the SI). The abundance of oceanic OS exhibits spatial variation, although there is limited research on marine aerosol OSs. However, there were not as many types of marine aerosol OSs reported previously as in this study, especially the lack of reports on the OS_a group. This also indicates that our work is sufficiently novel and unique.

The determination of NOC molecular abundance is tightly associated with different instruments, methodologies, and operators. Thus, in this study, the NOC data reported for comparison were derived from our research group, and all NOC data showing in Figure 1 were obtained with the same instruments, methodology, and operators.

Lines 164–166: …an intercomparison of the relative abundance of compounds identified with the same analytical approach and instrument by the same person was performed in the present study (Ma et al., 2025)…

Lines 239–240: …The NOC data were identified using the identical analysis methodology (Ma et al., 2025)…

5. Page 11: Figure 1 compares the OSs and NOCs data of different cities, but does not specify whether the sampling times and analysis methods of these data are consistent. It is suggested that a description of the comparability of the methods be added.

Response: Table S4 (the data in Figure 1 is presented in bold) in the SI shows the specific sampling times reported in different studies. Due to the fact that OSs are quantitatively analyzed and the analytical methods (LC-MS method) are generally similar, comparisons between different studies are feasible. The determination of NOC molecular abundance is tightly associated with different instruments, methodologies, and operators. Thus, in this study, the NOC data reported for comparison were derived from our research group, and all NOC data showing in Figure 1 were obtained with the same instruments, methodology, and operators (Lines 164–166 and 239–240).

6. Page 14: Is it possible that the formation of NOCs in low NH_4^+ environments occurs through other pathways (such as reactions involving organic amines)?

Response: The abundance of organic amines is usually about 100–1000 times lower than that of ammonia. In this study site, the abundance of atmospheric ammonia (/ammonium) is quite low (up to ten times lower relative to other cities), therefore, ammonia and organic amines are expected to be constraining factors in the formation of NOCs.

Some updated descriptions have been added to the revised manuscript.

Lines 287–292: …Presumably, the significantly lower levels (up to ten times lower) of aerosol NH_4^+ (**Table S1**) and gaseous NH_3 in the Sansha area relative to other cities (Ma et

al., 2025; Pan et al., 2018; Dong et al., 2023) may be one of the important factors constraining Re-NOC formation. The insignificant correlation between CHON+ abundance and NH_4^+ concentration ($P > 0.05$) also partially supports the above inference…

7. Page 20: the authors mention that the above results suggest that ship emissions were not the primary factor in controlling the abundance of aerosol OSs and NOCs in the Sansha area. It is suggested to provide specific percentages to illustrate this point, and to elaborate on the results shown in Figure 4.

Response: We cannot provide a specific percentage to quantify the impact of ship emissions. Because this conclusion is a reasonable speculation we made based on the results of data analysis. Briefly, if the impact of ship emissions on the formation of OSs and NOCs is significant, then the changes in OS and NOC abundances are at least consistent with ship VOC emissions. However, we did not observe this phenomenon.

8. Page 21: the authors mention that a Mantel test correlation analysis was conducted to further investigate the impact of different factors on the formation of OSs and NOCs in the Sansha area. However, the criteria for variable selection (such as why Na^+ was chosen instead of other ions) were not explained. It is suggested to provide the basis for variable selection.

Response: Sodium ions and Chl a have been identified as important indicators of marine sources (Wang et al., 2023; Xiao et al., 2017). Thus, in this study, we prioritized sodium

ions and Chl a as indicators of marine sources.

We have updated the relevant content in the revised manuscript.

Lines 453–455: …Sodium ions and Chl a have been identified as important indicators of marine sources (Wang et al., 2023; Xiao et al., 2017)…

Once again, we deeply appreciate the time and effort you've spent in reviewing our manuscript.

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