Refree 1:

The article by Zhang et al. provides an accurate description of oceanographic data acquired by using moorings and buoys deployed in the Northern South China Sea. The article is interesting and presents a valuable dataset to understand the impact of high-intensity sea-weather events such as monsoons and cyclones that affect this sea area.

The article is well written with a clear introduction and detailed data description. However, Section 3, although comprehensive, primarily presents a straightforward description of the results without offering critical analysis.

In Section 3.3, the authors state:

Sea surface waves observed at B1 and B4 also merit further explanation. The variations of sea surface waves from the two wave gauges at B1 and B4 are similar (Fig. 8), indicating that the characteristic of the sea surface waves at the observation array were comparable

This statement is not entirely accurate. A detailed observation reveals that Buoy 4 exhibits different behaviour compared to Buoy 1. This is particularly evident in the peak period plot. Buoy 4 shows a drastic variation in the period from June 14 to June 20 and on July 26. In contrast, Buoy 1 displays a smooth peak period plot during the same time frame. Additionally, there is a discrepancy in the mean wave direction during these periods. Why?

Please explain these observations and include this discussion in the main text.

A significant remark is the lack of discussion regarding the results. I would expect a conclusive interpretation of the seawater dynamics in the area. I suggest including a final general model derived from your oceanographic data. Anyway, a discussion emphasizing the potential applications of your data is required.

The abstract should be rewritten to include the major results and potential applications.

Minor remarks:

- In many cases, the description of data references specific figures, but these references are not explicitly stated (e.g., lines 201-203).
- Figures need to be improved: remove titles, add units to the color bars, and ensure a consistent figure style (e.g., units are reported along the Y-axis in Figures 5 and 6, but not in Figure 7).
- See the annotated PDF for minor changes.

Response: We thank the refree for the review of this manuscript and provides the comments and annotations that good for the improvement of this manuscript. We have revised the whole manuscript according to the comments and annotations, and the special responses are as follows:

1) We thank the refree points out the discrepancy of sea surface waves observed by Buoy 1 and Buoy 4 in the period from June 14 to June 20 and on July 26, which we ignored before. After carefully checked air-sea processes during the two periods, we find it may due to

tropical cyclones Hagibis which generated near the moored array near June 14 and tropical cyclone Matmo may influenced the moored array near July 22 and then influenced local sea surface wave fields afterwards, we have added a sentence “However, B4 showed more drastic variation of peak period than B1 with different mean wave direction and wave spread during 14 to 20 July and near 26 July, which may due to the influence of tropical cyclones Habibis and Matmo.” to explain it in Section 3.3 in the revised manuscript. We have also added the information of Hagibis and Matmo in Figure 1.

2) We thank the refree for the suggestions including the abstract, main text and discussion, which is valuable for the improvement of this manuscript. The revisions are as follows:

(1) For the abstract, it has been rewritten and include these sentences for major results and potential applications: “The data reveals air-sea interactions and oceanic processes in the upper and bottom ocean, it reveals the transition of air-sea interface and ocean conditions from summer to winter monsoon along with the effects of six tropical cyclones on the moored array, the multiscale processes such as air-sea fluxes, tides, internal waves and low-frequency flows were also recorded. The data is valuable and has multiple potential applications, including the analysis of the phenomena and mechanisms of air-sea interactions and ocean dynamics, as well as validation and improvement of local numerical model simulations, data reanalysis and assimilations.”.

(2) For the main text, the texts are revised according to the annotated PDF. Figure 5 and 6 were redrawn to add unit on colorbar, Figure 7 is redrawn to leave letter (a, b, c..) of the sub panels and move the title of graph to Y label. For the link between text and figures, it is improved by adding the words such as ‘(Fig. 1a)’ to ‘(Fig. 10j)’ to indicate which figure or subfigure the sentences refer to. The time when the tropical cyclones were closet to the moored stations were added in Figs. 4 to 10 which dashed lines and name of the TCs, for the reader to better view the influence of TCs and following the text.

(3) For the discussion, the conclusion section (Section 5) is now totally revised to give a discussion and conclusive interpretation of the air-sea surface and seawater dynamics in the area as well as their applications: “For example, tropical cyclones Hagibis in June, Rammasun and Matmo in July, Kalmaegi and Fung-wong in September, and Hagupit in December 2014 traveled over the South China Sea and influenced the time series of the observations. The tropical cyclones increased sea surface wind speed, enhanced sea surface wave height and near-surface ocean currents, cooled sea surface water and air temperature, induced near-inertial waves as well as near-bottom currents. The moored array also experienced a transition from the summer to winter monsoons, with prevailing nearly south wind (approximately 200°) and wave (approximately 180°) with sea surface significant wave height <2 m and peak period <10 s from late July to mid-August, then shifted to nearly northeast wind (approximately 20°–80°) and east wave (approximately 90°) with sea surface significant wave height >3 m and peak period <10 s after October. In addition, ocean data may have recorded multiscale air-sea interactions and ocean processes, such as air-sea heat and momentum fluxes, ocean tides, internal waves, seasonal variations in temperature, salinity, and flows, as well as background processes, such as mesoscale eddies and local circulations.” and “The data has already been used for the analysis of the air-sea

and ocean variations on the moored array (Quan et al., 2022; He et al., 2024), validation of ocean (Zhang et al., 2016; Liu et al., 2020; Lu et al., 2023) and air-sea coupled (Wu et al., 2020; Lim Kam Sian et al., 2020; Liu et al., 2024) model simulation, check the parameterization of air-sea surface flux (Zhang et al., 2020; Liu et al., 2024), investigate the mechanisms and theory of ocean response to tropical cyclones (Hong et al., 2022; Zhang 2023). The dataset has the potential for further studies in these fields, while may also be used for other fields such as data reanalysis and assimilations.

References:

Liu, F., Zhang, H., Ming, J., Zheng, J., Tian, D., and Chen, D.: Importance of Precipitation on the Upper Ocean Salinity Response to Typhoon Kalmaegi (2014), Water, 12, 614, doi:10.3390/w12020614, 2020.

Liu F, Toumi R, Zhang H, Chen D. Impact of Precipitation on Ocean Responses during Tropical Cyclone. Journal of Physical Oceanography, 2024, 54(3): 895–909. doi:10.1175/jpo-d-23-0138.1, 2024.

Lu, X., Dong, C., Xu, Z., Yang, J., Zhang, H., Wang, D., and Chen, D.: Effects of numerical model's horizontal resolution on the vertical transport of near-inertial energy, Deep-Sea Res. II, 207, 105223, doi:10.1016/j.dsr2.2022.105223, 2023.

Quan, Q., Liu, Z., Yang, Y., Cai, Z., Zhang, H., and Liu, X.: Characterization of intraseasonal fluctuations in the abyssal South China Sea: An insight into the energy pathway, Prog. Oceanogr., 206, 102829, doi:10.1016/j.pocean.2022.102829, 2022.

He, Y., Lin, X., Han, G., Liu, Y., and Zhang, H.: The different dynamic influences of Typhoon Kalmaegi on two pre-existing anticyclonic ocean eddies, Ocean Sci., 20, 621–637, doi:10.5194/os-20-621-2024, 2024.

Hong, W., Zhou, L., Xie, X., Zhang, H., and Liang, C.: Modified parameterization for near-inertial waves, Acta Oceanol. Sin., 41, 41-53, doi:10.1007/s13131-022-2012-6, 2022.

Zhang, H.: Modulation of Upper Ocean Vertical Temperature Structure and Heat Content by a Fast-Moving Tropical Cyclone, J. Phys. Oceanogr., 53, 493–508, doi:10.1175/JPO-D-22-0132.1, 2023.

Zhang, H., Chen, D., Zhou, L., Liu, X., Ding, T., and Zhou, B.: Upper ocean response to typhoon Kalmaegi (2014), J. Geophys. Res. Oceans, 121, 6520–6535, doi:10.1002/2016jc012064, 2016.

Zhang, H., Liu, X., Wu, R., Chen, D., Zhang, D., Shang, X., Wang, Y., Song, X., Jin, W., Yu, L., Qi, Y., Tian, D., and Zhang, W.: Sea surface current response patterns to tropical cyclones, Journal of Marine Systems, 208, 103345, doi:10.1016/j.jmarsys.2020.103345, 2020.

Refree 2：

Review of “A Moored Array Observation Dataset for Air-Sea·Surface, Upperand Bottom Ocean in the Northern South China Sea during 2014–2015 (MASCS 1.0)” by Zhang et al

The dataset presented in this paper consists of an array of 5 surface buoys and 4 ocean moorings in the northern South China Sea, a region that is frequently impacted by tropical cyclones. The dataset is based on a considerable logistical effort and results in an interesting set of meteorological and ocean observations. The presentation and description of the experiment and data is fine but would significantly benefit from including more details and a more thorough link between text and figures. I am missing a more thorough introduction into the circulation and geographical setting of the study region for the general reader. A better map with circulation features and names would help there. More details on the sensors (manufacturer, model, uncertainties etc.) should be provided in the dataset description chapter. Some of the data displayed in the figures is very spiky and obviously erroneous, so I would recommend to apply some kind of quality control and not only show the raw data. It is ok to publish raw data in the data files, but some sort of quality considerations should be provided.

I further recommend to the authors to improve the text and to better guide the reader through the paper. In the current version, several observations are pointed out but are not directly linked to figures, or require enhanced efforts from the reader to find the information in the figures, which distracts the flow of the paper. Some visual aids in the figures, such as for instance text and arrows pointing to cyclone periods would help. The conclusion chapter does not really offer actual conclusions and should be improved.

Overall, I think it is an interesting dataset, but I would strongly recommend some of the above-mentioned improvements before the paper should be published.

Response: We thank the refree for the careful review and comments of this manuscript, which are beneficial for the improvement of this manuscript. The manuscript is totally revised according to the comments. The details of the sensors are added in chapter 2.2, the data for the figures are preliminarily quality controlled with the data before deployment and after recovery removed, as well as the missing data removed. The abstract, text of main body, conclusion chapter are revised or rewritten according to the comments. The time when tropical cyclones were closest to the moored array were added by dashed lines in the figures to help the readers better see the influence of the tropical cyclones. Other specific comments are as follows:

Below are some more specific comments.

Title: “Upper and bottom ocean” sounds not ideal

Response: Thank you for the comment, “Upper” and “bottom” is now deleted and the title has been revised to “A Moored Array Observation Dataset for Air-Sea·Surface and Ocean in the Northern South China Sea during 2014–2015 (MASCS 1.0)”.

21: you mean above the seafloor?

Response: Thank you for the comment, it was a typo, “surface” has been revised to “seafloor”.

30: transport heat and salt: from where? More information needed

Response: Thank you for the comment, “from Kuroshio loop near the Luzon Strait” has been added.

31: background circulation: here it would be very helpful to include a map with circulation arrows and geographic features, otherwise the unfamiliar reader has no reference for orientation.

Response: Thank you for the comment, please see figure R1 for the map with circulation arrows and geographic features. Figure R1 (left) is the figure 1 from Cai et al., (2020), while figure R1 (right) is the figure we plot that according Cai et al., (2020) while add the observation stations. However, as study of background circulations is not the goal of this work, we do not put figure R1 (right) into the main body of this manuscript.

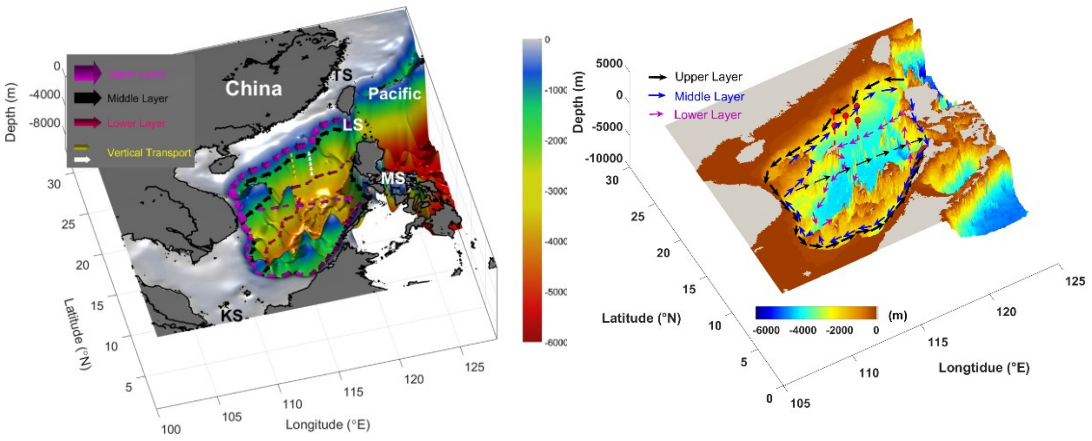

Figure R1. The sketch for the background circulation in the South China Sea, the left figure is Fig. 1 in Cai et al., (2020), the right figure is the sketch we plot that according to Cai et al., (2020), the red dots and red dashed lines indicate the positions of observation stations (B1-B5, M1, M2, M4, M5).

Reference: Cai, Z., Gan, J., Liu, Z., Hui, C. R., and Li, J.: Progress on the formation dynamics of the layered circulation in the South China Sea, Prog. Oceanogr, 181, 102246, doi:10.1016/j.pocean.2019.102246, 2020.

57: the deployment times are unusual. Perhaps provide more detail on deployment and recoveries, also the ship used. Was it not possible to recover all moorings/buoys at the same time?

Response: Thank you for the comments, we have revised the time range in Table 1 to give a better show of the deployment and recovery of the moored stations. The annotation is also added to explain the meaning of time range in Table 1: “B1 were lost and not recovered, the

end time of B1 represents the latest time when observation data received. Otherwise, time range represents the deployment and recovery time for the stations". What is more, the paragraph of chapter 2.1 is revised to explain the deployment, maintenance and recovery of the moored stations. You may also see Table R1 and Figures R2 to R3 for the cruises of deployments and recoveries of the observation.

Table R1. Information of the cruises

Cruises	Time Range (BJT)	Deployment/Maintenance/Recovery
1	2014.06.03–2014.06.12	Deployment (M1, M2, M4, M5)
2	2014.06.14–2014.06.22	Deployment (B1, B4)
3	2014.07.21–2014.07.31	Deployment (B2), Maintenance (B4)
4	2014.08.19–2014.08.29	Deployment (B5)
5	2014.09.03–2014.09.07	Maintenance (B1)
6	2014.09.10–2014.09.14	Deployment (B3)
7	2014.10.12–2014.10.21	Recovery the drifter part of B3
8	2015.03.23–2015.04.01	Recovery (M1, B4, M4), recovered the moored part of B3 (named as M3), did not found B1
9	2014.03.30–2015.04.04	Recovery (B2, M2, M5), recovered the moored part of B5, did not found B1

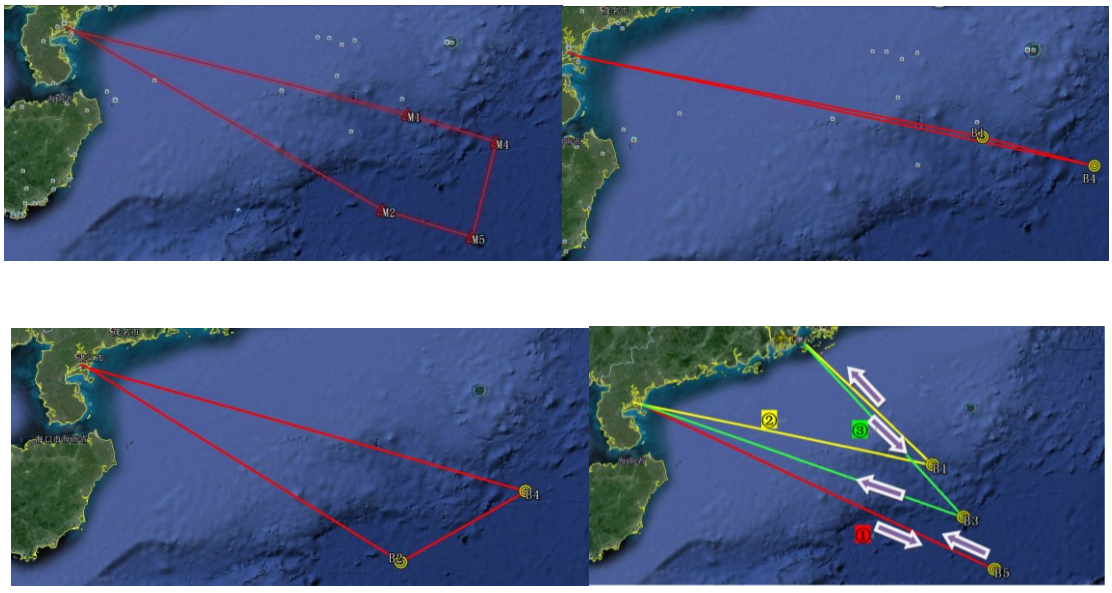

Figure R2. The tracks for the deployment and maintenance cruises. Red, yellow and green lines in the bottom-right figure represent first, second and third cruises during 18 August to 14 September in 2014. Buoy 1 (B1) was maintained by cruise in 21 July to 31 July in 2014, while buoy 4 (B4) was maintained by cruise in 3 September to 7 September in 2014.

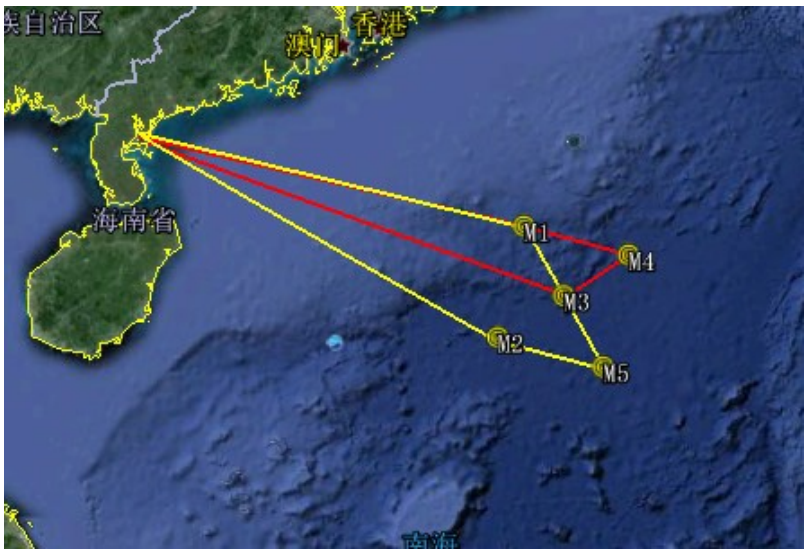

Figure R3. The tracks for the recovery cruises. Red line is the first cruise and yellow line is the second cruise.

66: it would be better to provide the radius of buoy movement in km, not in °longitude. As they were tethered, the movement must have been very limited.

Response: Thank you for the comment, the horizontal movement of the buoys in the manuscript and figure 3 has been revised to the unit in 'km'. You are right, the horizontal movments seem within a radius shorter than 3km.

70: rather than stating when a ship was dispatched, I would state when the buoy was picked up. Fig 2 shows the buoy locations but does not show when the buoy was not free drifting anymore. Also, more information on the mooring design would be of interest (anchor weight, tether length etc.). I assume with tropical storms putting a lot of force on the moorings.

Response: Thank you for the comment. "B3 was recovered by a ship on 17 October 2014" was edded in the second paragraph of chapter 2.1. Fig. 2b is added to show the movement of buoy 3 before the tether snapped. The anchor weight and tether length of all the stations are added in Fig. 1b and 3. The horizontal movements of the buoys intensified during the influence of tropical cyclones. We also add the sentences to assume the influence of typhoon Kalmaegi on B1: "Typhoon Kalmaegi also increased the horizontal circular movement of B1 to approximately 4 km on the northwest side on 15 September, which was attributed to the northwestward winds on the right side of the typhoon and may indicate that the anchor of B1 was northwestward moved by the typhoon as its tether length was approximately 2 km (nearly half of 4 km), see Figs. 2c and 3a."

Table 2, "Current 1": you mention layer 1, 2 and 3. Please provide more details in the text or a reference in the figure on where or what these layers are, otherwise it is difficult to follow.

Response: Thank you for the comment. Layer 1-3 has been revised to ADCP 1-3, and add annotation of Table 2 to explain it: "ADCP 1 was the downward looking ADCP deployed at buoy, ADCP 2 and 3 were the upward and downward looking ADCPs on the mooring."

103: rain gauge (throughout text).

Response: Thank you for the comment, all the “rainguage” in the manuscript has been revised to “rain guage”.

107: what is wave temperature? Do you mean air temperature?

Response: Thank you for the comment. Yes, it is the air temperature observed by the radiometer, “wave temperature” is revised to “air temperature”.

116: “were lost during observations”. What do you mean? They were lost during the deployment period?

Response: Thank you for the comment. Yes, it is, “were lost during observation” has been revised to “were lost during deployment period”.

108-127: I think the paper needs more details on the instruments used here. It is only mentioned that you used SBE instruments, be more specific.

Response: Thank you for the comment, details of the instruments are added in chapter 2.2, including the information such as manufacturers and measurement accuracies. The information of the bins of ADCPs are also added in chapter 2.2.

Data shown in Fig 4, chapter 3.1: I think it is somewhat confusing to show the two datasets like that, as one of the two met-systems is clearly erroneous. Perhaps the authors could check against reanalysis data on wind direction and air pressure, and evaluate the performance of these two systems.

Response: Thank you for the comment, European Centre for Medium-Range Weather Forecasts (ECMWF) Reanalysis v5 data (ERA5, https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5) is now used, and some explanations are also added to evaluate the performance of the two met-systems, see revised and Fig. 4 and chapter 3.1.

Figure 3 and instrument depth information: how far below the surface did the moorings actually reach? It would be very helpful to state the nominal depths of the ADCPs in the table as well. Also bin sizes of ADCPs are missing.

Response: Thank you for the comment, the estimated depth of the mooring that reached below surface (i.e. the depth of the two ADCPs on the top of the mooring) is added in Figure 1b and 3. Add the estimated average nominal depths of the ADCPs based on the ADCP data. The information of bin sizes of ADCPs are added in the annotation of Table 2 and in the last paragraph of chapter 2.2.

184: how do you know it was near-inertial waves?

Response: Thank you for the comment. You are right, the tilt of the mooring rope not only influenced by near-inertial waves, so “near-inertial waves” revised to “intensified currents”.

Fig 5 and 6: indicate instrument depths perhaps with some tickmarks on the yaxis. Display the depths of the 300 and 75 kHz bins. What happened after 10 November, why did the record stop there?

Response: Thank you for the comment. The depth of the 300 and 75 kHz ADCPs are added in Fig. 5 (black line) as well as the depths of the bins of the ADCPs (brown lines). The time variations of the depth of SBEs are also added in Fig. 6 (gray lines). For the missing data after 10 November, the upward-looking 300 kHz ADCP broke down and stopped recording after nearly 15 November.

186-188: here it would be good to include a visual reference to the cyclones in Fig 5 so that it is easier to connect the text to the figures

Response: Thank you for the comment. The time when tropical cyclones closest to the moored stations is added in Fig. 5 as well as other figures in the revised manuscript.

189: downward propagation of near-inertial waves: where do we see that in the figure?

Response: Thank you for the comment. We do not analyze the near-inertial waves in this work, so this sentence has been deleted in the revised manuscript.

196: it looks more like a salinity increase from summer to winter, and the reference is Fig 6 not Fig 5

Response: Thank you for the comment. Yes, it was a typo, 'Fig. 5' is now modified to 'Fig. 6' in the revised manuscript.

Fig 7a: why not use the more common unit dbar to display pressure in the ocean?

Response: Thank you for the comment. It is revised to "dbar", the unit of water pressure in the whole manuscript is now all revised to "dbar".

215-216: the previously intended water depth is not important here. It is normal that the actual depth differs from the original plan

Response: Thank you for the comment. "(true depth) rather than approximately 1630 m (designed depth)" is now deleted.

Chapter 3.3: the paper in general needs a closer coupling between text and figures. This paragraph mentions summer monsoon and cyclones with respect to wave height. A short visual pointer in Fig 8 to where the reader should be looking would be very helpful. Also, while it is good to provide the raw data for the data publication, a little bit of quality control should be done in order to display cleaner figures (especially fig 4 and 8, 9, 10).

Response: Thank you for the comments. The link between text and figures are improved by adding the words such as '(Fig. 1a)' to '(Fig. 10j)' to indicate which figures or subfigures the sentences refer to in both chapter 3.3 and the whole manuscript. The time when the tropical

cyclones (TCs) were closet to the moored stations were added in Fig. 8 and other figures (Figs. 4 to 10) with dashed lines and name of the TCs, for the reader to better view the influence of TCs and following the text. For the quality control, the data before deployment and after recovery are not shown now, while the data are briefly quality controlled with the missing data or unreasonable data not shown in Figures 4-10.

260: air visibility is in km

Response: Thank you for the comment, it is revised to "km".

Chapter 3.4: again, more visual aids are needed in the figure to follow. Anything the text mentions should be found in the figures, otherwise it is difficult to follow and the reader loses interest. Where do we see high pressure of 1100 hPa as mentioned in line 253?

Response: Thank you for the comments. Time when tropical cyclone Kalmaegi and Fung-wong were closet to buoy 3 was added in Figs. 9 and 10 with dashed lines and name to give visual aids. In this chapter, several words for Fig. 9a-j and Fig. 10a-j are added to indicate where the text mentions are link to subfigures if Figs. 9 and 10. "after 24 September" is add after 1100 hPa to indicate the time when pressure start to be high.

Conclusion-chapter: this chapter is not really a conclusion-chapter. Much of the information belongs in the data description. In fact, some details provided here are missing in the data chapter, such as details on the wave recorder and other instruments. This chapter should in my opinion better address some of the major achievements and shortcomings of the experiment and some pointers and links to scientific learnings and studies that can be done with this dataset.

Response: Thank you for the comment. The conclusion chapter is rewritten, the details of the observation and instruments have been moved and merged into dataset description chapter (chapter 2.2). The conclusion chapter is enriched to explain that the dataset captures the influence of 6 tropical cyclones and the transition of summer monsoon to winter monsoon during 2014-2015. A paragraph is also added to explain the potential applications of the dataset. We think that the dataset can be used for the study of multiscale air-sea interaction and oceanic processes, such as phenomenon and mechanism studies, numerical simulations and data reanalysis or assimilations.

Reference:

Cai, Z., Gan, J., Liu, Z., Hui, C. R., and Li, J.: Progress on the formation dynamics of the layered circulation in the South China Sea, Prog. Oceanogr, 181, 102246, doi:10.1016/j.pocean.2019.102246, 2020.

Editor：

Dear Authors,

All comments need to be addressed in the public discussion before a revised manuscript can be considered for final publication. In short, the reviewers' comments tend to be positive in terms of the interest of the dataset, but underline the need for improvement. In particular, you should explain how you intend to address the comments:

- The abstract should be rewritten to include the main results and potential applications.

- Discussion: develop the potential applications of the dataset.

- There is a need to improve the link between text and figures (see comments of reviewer #2).

Thank you for the comment. in the revised manuscript, the text of the whole manuscript is revised and the figures are redrawn, the response to particular comments are as follows:

1) The abstract is rewritten, especially the following sentences are revised to include the main results and potential applications: “The dataset captures … and ocean dynamics” are revised to “The data reveals air-sea interactions and oceanic processes in the upper and bottom ocean, especially the transition of air-sea interface and ocean conditions from summer to winter monsoon along with the effects of six tropical cyclones on the moored array. The multiscale processes such as air-sea fluxes, tides, internal waves and low-frequency flows were also recorded. The data is valuable and has multiple potential applications, including analysis of the phenomena and mechanisms of air-sea interactions and ocean dynamics, as well as validation and improvement of numerical model simulations, data reanalysis and assimilations.”

2) For the discussion, following sentences are added to explain the potential applications of the dataset: “In addition, ocean data may have recorded multiscale air-sea interactions and ocean processes, such as air-sea heat and momentum fluxes, ocean tides, internal waves, seasonal variations in temperature, salinity, and flows, as well as background processes, such as mesoscale eddies and local circulations. The data has already been used for the analysis of the air-sea and ocean variations on the moored array (Quan et al., 2022; He et al., 2024), validation of ocean (Zhang et al., 2016; Liu et al., 2020; Lu et al., 2023) and air-sea coupled (Wu et al., 2020; Lim Kam Sian et al., 2020; Liu et al., 2024) model simulation, check the parameterization of air-sea surface flux (Zhang et al., 2020; Liu et al., 2024), investigate the mechanisms and theory of ocean response to tropical cyclones (Hong et al., 2022; Zhang 2023). The dataset has the potential for further studies in these fields, while may also be used for other fields such as data reanalysis and assimilations.”

3) For the improvement of the link between text and figures the link between text and figures are improved in the whole manuscript by adding the words such as ‘(Fig. 1a)’ to ‘(Fig. 10j)’

to indicate which figure or subfigure the sentences refer to. The time when the tropical cyclones (TCs) were closet to the moored stations were added in Figure 4 to 10 which dashed lines and name of the TCs, for the reader to better view the influence of TCs and following the text.