

We sincerely thank the editor for the valuable suggestions, which have been carefully considered and incorporated into the revised manuscript. Below, we provide our responses to each of the editor's comments. The editor's comments are presented in black, our responses in red, and the revised manuscript content is highlighted in italicized orange font.

Dear Authors,

Thanks for attention to the final reviewer comments. I suspect the reference to a new Figure S2 in the responses was meant to be called Figure S4?

Reply: We apologize for the incorrect figure citation. This error occurred because the field codes from Word were inadvertently copied when transferring the figure captions from the Supplement to the response document, leading to the incorrect display of Figure S2. The figures have now been updated to Figure S19 and Figure S20 and are correctly cited in Text S1 (Supplement, Lines: 72-77):

Additionally, we analyzed data from another campaign conducted over the South China Sea in June 2022. During this campaign, a typhoon (Chaba) altered local circulation patterns, leading to the transport of substantial pollutants from the Indochinese Peninsula to the ocean after June 28th (Fig. S19). Under these conditions, the mass concentrations measured by the SMPS were again consistently higher than those measured by the ACSM (Fig. S20), suggesting that the small size black carbon particle could be the primary factor underlying the mass discrepancy.

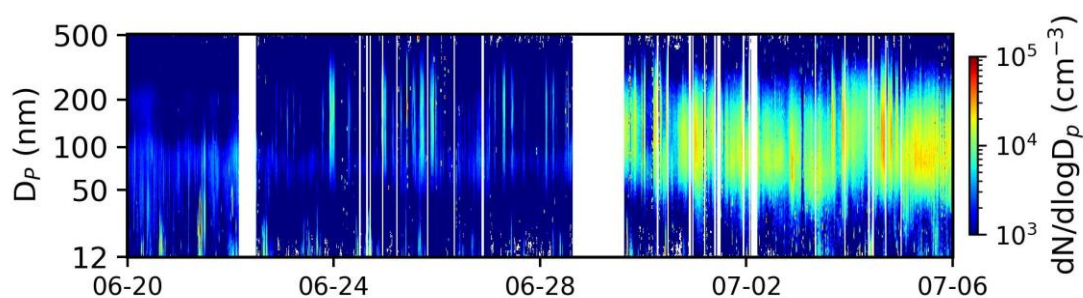


Figure S19. Timeseries of particle number size distribution in June 2022 in South China Sea.

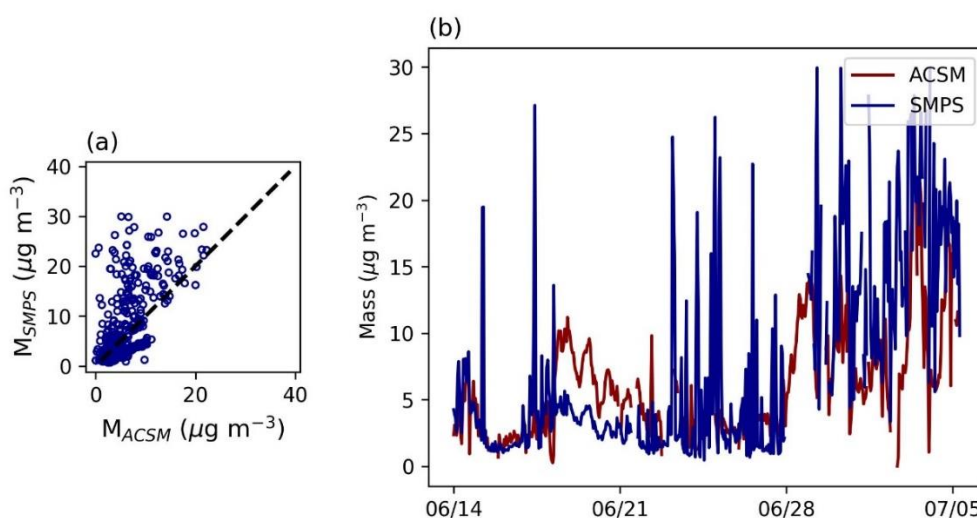


Figure S20. Comparison of mass concentration from ACSM and SMPS (a), the timeseries of mass concentration of ACSM and SMPS (b).

I request a final set of minor corrections, including telling readers how you derived a mass concentration explicitly in Figure S4 from the SMPS since the SMPS measures volume concentration.

Reply: Thank you for the editor's suggestion. We had previously provided a brief explanation in Text S1 on how to convert $dN/d\log D_p$ to mass concentration. To improve clarity, we have now added Equation 7 and Equation 8 in Text S1 along with a detailed explanation of the calculation process (Supplement, Lines: 45-52):

In addition, the SMPS data was used to compared with ACSM data in order to verify the CE value. An average particle density (ρ) of 1.5 g cm^{-3} was assumed to convert the PNSD data obtained from the SMPS into mass concentrations (Geller et al., 2006) according to Eq. (7) and Eq. (8):

$$\frac{dV}{d\log D_p} = \frac{\pi}{6} D_p^3 \frac{dN}{d\log D_p} \quad (7)$$

$$M_{SMPS} = \int_{D_{p,min}}^{D_{p,max}} \rho \frac{dV}{d\log D_p} d\log D_p \quad (8)$$

where M_{SMPS} is the mass concentration from SMPS, $D_{p,min}$ and $D_{p,max}$ refer to the minimum and maximum particle sizes scanned by the SMPS. $dN/d\log D_p$ and $dV/d\log D_p$ are particle number size distribution and particle volume size distribution which could be measured by SMPS.

Lastly, please check that you add units to all figure axes when missing such as for $dN/d\log D_p$ in Figure S15 and $dV/d\log D_p$ in Figure S16. There are additional typos that need to be cleaned up like in caption in Figure S16 (e.g., "volumn"). A final cleaning of both the article and SI file for such details would be helpful prior to advancing to publication.

Reply: Thank you for the valuable suggestion. We have carefully reviewed the figures (ie. Figure 2, Figure S13, Figure S15, and Figure S16) and their captions (ie. Figure S16) in the appendix to ensure that both axes are labeled with appropriate units and that the captions clearly and accurately describe the content of the figures.

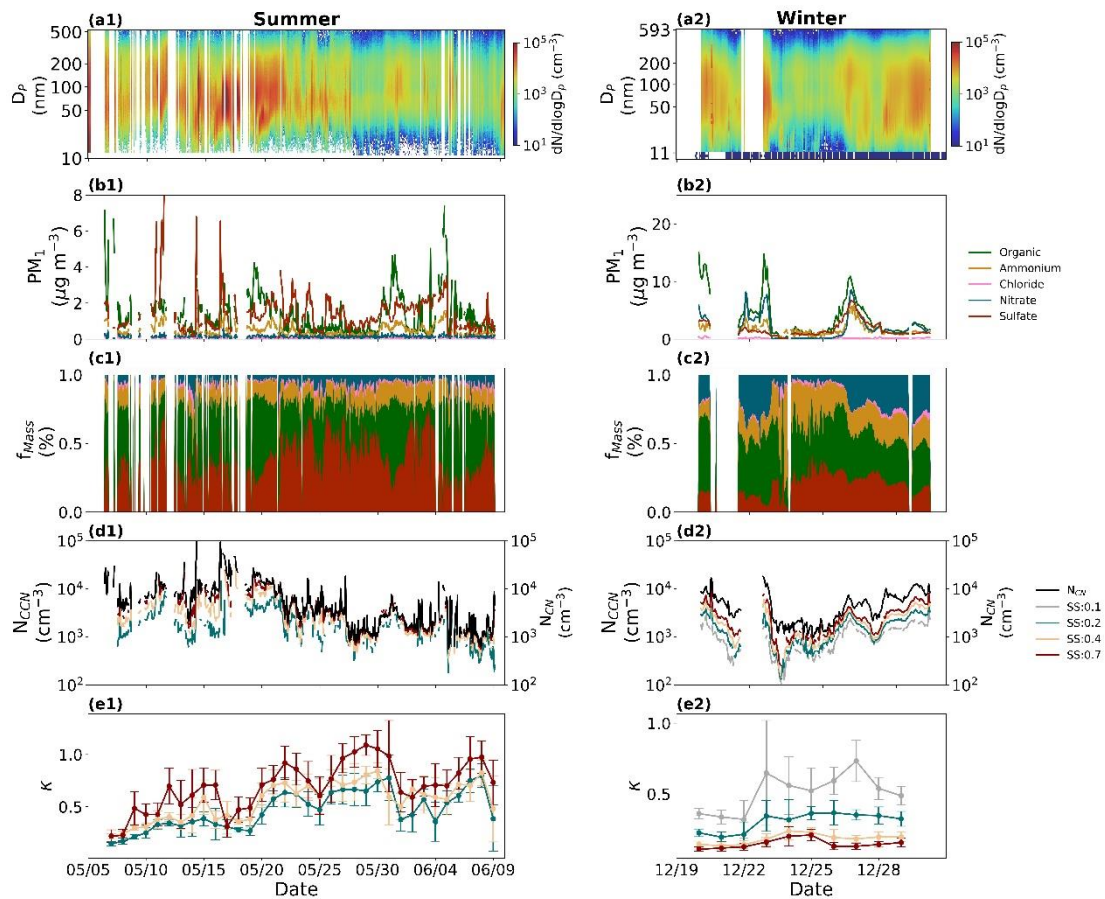


Figure 2. Timeseries of (a) particle number size distribution, (b) mass concentration of NR-PM1, and (c) its fraction, (d) number concentration of total particle and cloud condensation nuclei under the supersaturation of 0.1%, 0.2%, 0.4%, and 0.7%, and (e) aerosol hygroscopicity. The number 1 in figure number means timeseries in summer and number 2 means it in winter.

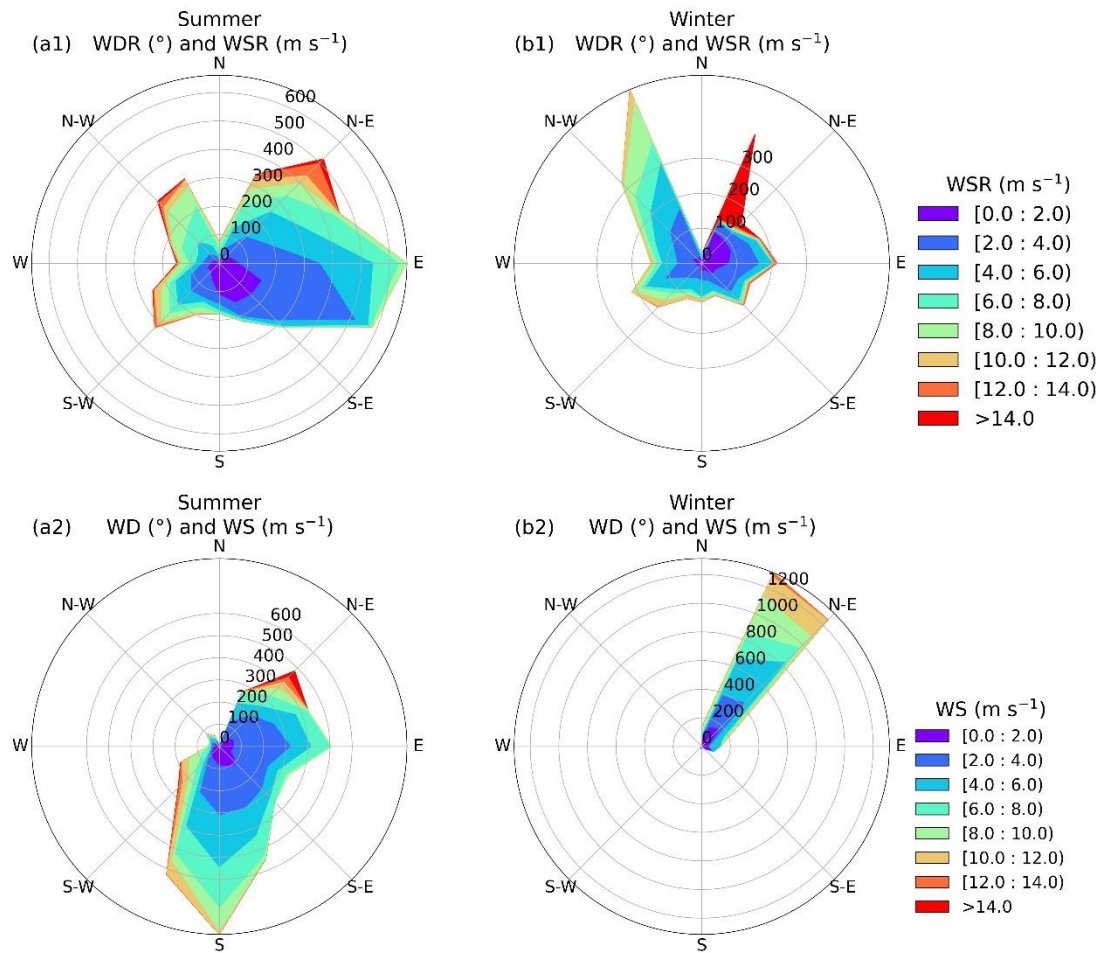
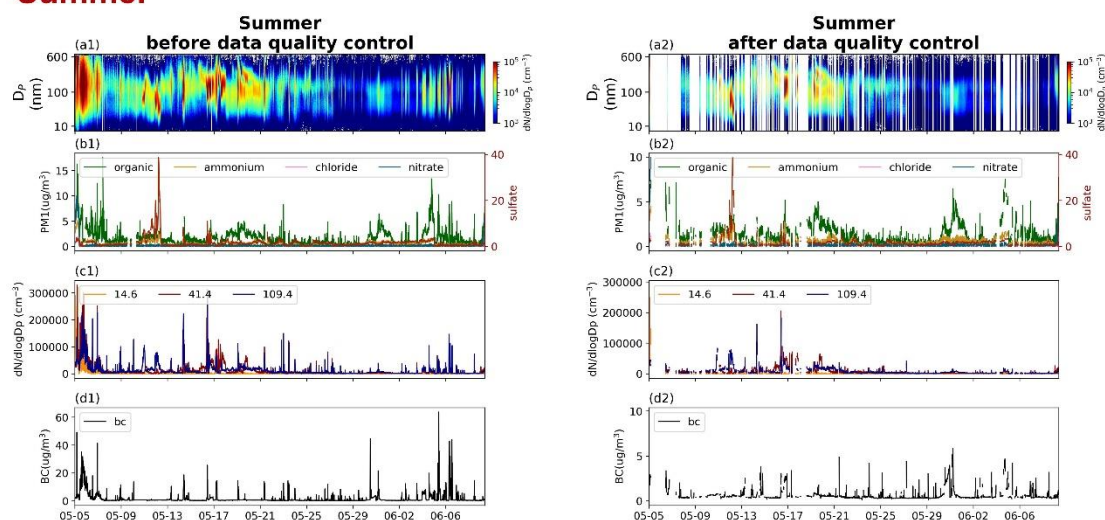


Figure S13. Wind rose of the relative wind direction (with respect to the bow) and relative wind speed (with respect to the ship speed) in summer and winter cruises; The radius represents the frequency of wind direction occurrences, and the shaded areas indicate wind speed (a1) and (b1); Wind rose of the wind direction and wind speed in summer and winter (a2) and (b2).

Summer



Winter

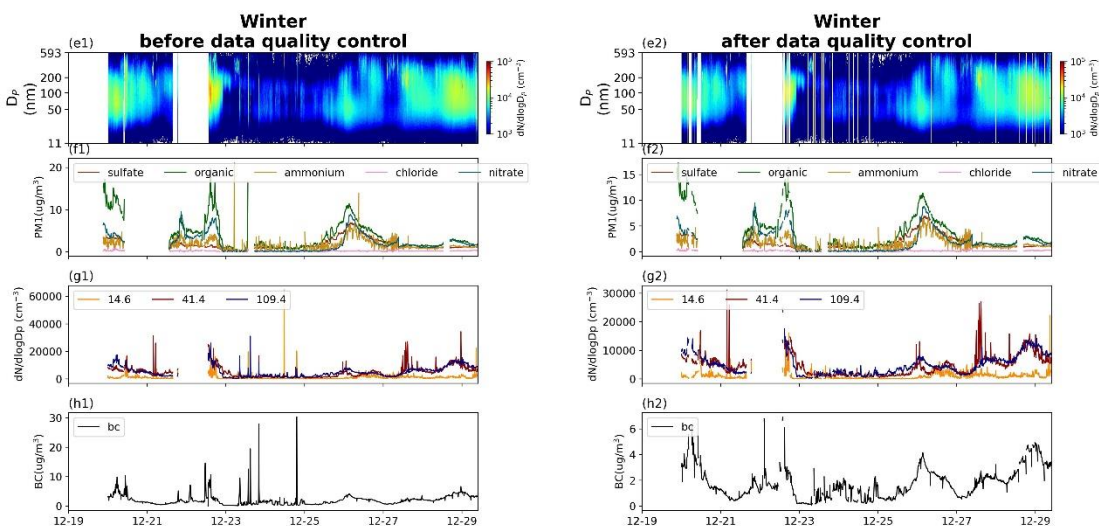


Figure S15. Timeseries of particle number size distribution (a) and (e), mass concentration of NR-PM₁ (b) and (f), particle number concentration in 14.6, 41.4, and 109.4 nm (c) and (g), mass concentration of black carbon (d) and (h); The figure letters from (a) to (d) mean the data in summer, and the figure letters from (e) to (h) mean the data in winter; The number 1 represented the data before data quality control and the number 2 represent the data after data quality control.

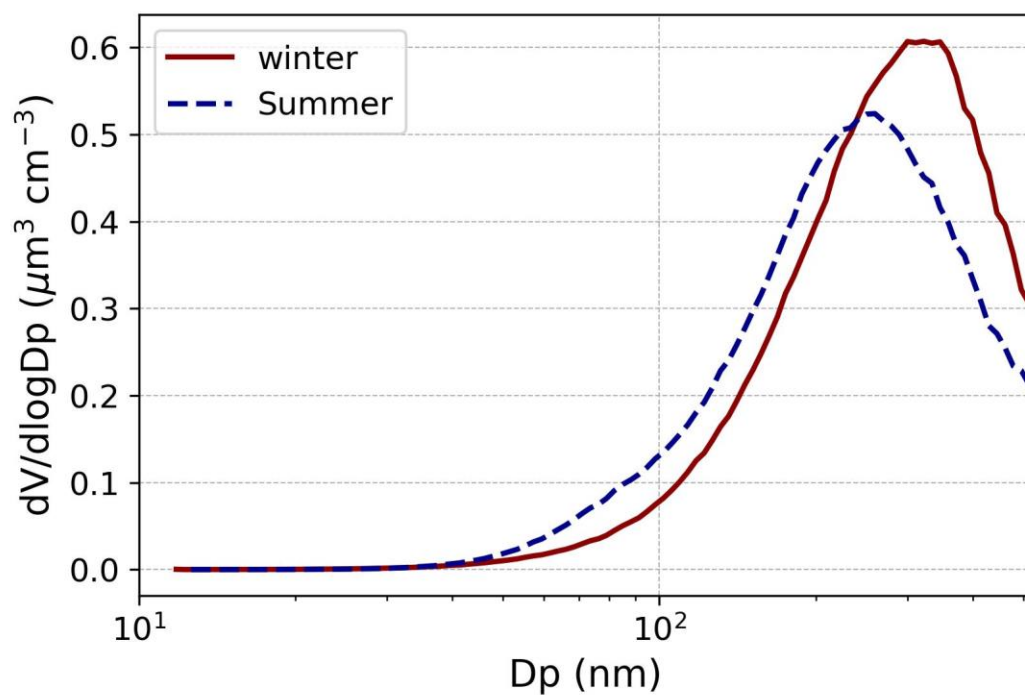


Figure S16. The average particle volume size distribution during summer and winter.