

Comments:

1. Graphical abstract: make the y-axis on the right same limits for the size distributions and whats the unit? Is the right y-axis same as left y-axis?
2. The second panel of graphical abstract: are those correlations for pelagic or offshore? Not clear from the figure
3. Introduction: line 45: " Hoppel (1979, 1985) studied the aerosol NC and the particle size distribution on the east coast of the United States, and the significant changes in the particle size distribution can be associated with the changes in meteorological parameters and oceanic air mass." . When you say significant changes in PSD, my question is change from what? To what? Did he compare spatial distribution of aerosols? Or what you mean? Please clarify
4. Line 50: "In the Arctic, Leck (1996) reported that the submicrometer aerosol ($D_p \leq 1000$ nm) mass concentrations during the International Arctic Ocean Expedition (IAOE-91) cruise; for instance, the average mass concentration was $0.76 \mu\text{g m}^{-3}$ over the ocean.:" rewrite the sentence. "reported that" doesn't make sense if you don't follow it with result.
5. Rewrite this too for clarity: ". In terms of the Antarctic, Savoie (1993) reported the submicrometer aerosol ($D_p \leq 1000$ nm) concentrations, and the mean concentrations were $3.15 \mu\text{g m}^{-3}$ at Marsh."
6. All your references measure in $\mu\text{g/m}^3$, and Sakerin (2015) 's value is in ng/m^3 . I suggest use same units so its easy for the reader to compare
7. ". For the China waters, Kim (2009) found that the average submicrometer aerosol particle ($10 \text{ nm} \leq D_p \leq 300 \text{ nm}$) concentrations were $4335 \pm 2736 \text{ cm}^{-3}$ over the East China Sea and $5972 \pm 2736 \text{ cm}^{-3}$ over the Yellow Sea." This reference feels out of place specially when the previous and following references mention units in $\mu\text{g/m}^3$.
8. "All in all, there were some discrepancies in the marine aerosol concentrations and size distributions between the different ocean areas;" what discrepancy? That they aren't able to come to a common consensus for mass concentration? Or what you mean here?
9. "the major measurement data are relatively outdated and need to be updated." What you mean by outdated? Like previous measured values have changed or science behind them changed? What exactly and why outdated?
10. Line 77: are generation functions and source functions same? In that case use source function. May be cite Gong et al for source function involving wind speed?
11. Is SCS analogous to any other place on earth in terms of meteorology? I ask this because studying marine aerosols at a single location which isn't representative of similar areas would make little less sense but if it were to explain (or represent) marine aerosols for larger areas, it would make more sense. What I mean to ask is why is this location important to study?
12. Line 94. It is mentioned that diurnal variations are lacking. My question is why is it important? Add a hypothesis or reasoning why we want to learn about diurnal variations of marine aerosols and what impacts do diurnal variations have?
13. Line 119: ". Fig. 1 showed that the particle losses were small in the size range from $0.5 \mu\text{m}$ and $10 \mu\text{m}$. Thereby, aerosol data within the size range of 0.5 to $10 \mu\text{m}$ were selected for future analysis in this study." You only measured this size range and calculated loss for this range, which is understandable. But saying that this range was selected for future analysis due to a small loss raises a question of whether you know the losses of other size ranges?
14. I don't think equation 1 is readable. Its all symbols and I think format needs to be changed
15. Line 204; avoid using words like drastically. If you use, give a quantitative measure of it'

16. Line 203: During the shipboard observation period, the average total marine aerosol NC was $54.01 \pm 35.37 \text{ cm}^{-3}$, the NC of aerosol accumulation mode was $52.35 \pm 34.96 \text{ cm}^{-3}$, and the NC of aerosol coarse mode was $1.66 \pm 0.83 \text{ cm}^{-3}$; do the mean values include/exclude measurements during data events?
17. Line 205: unnecessary use of 'meanwhile'
18. Rephrase this sentence for clarity: Line 207 ". The shipboard observation data recorded and showed the overall average values and standard deviations of marine aerosol NCs under different temporal and geographical conditions, which were used to compare with the marine aerosol NCs observed."
19. Line 212: "This suggested that the NC of aerosol accumulation mode in the East China Sea might affected by the higher frequency of the new marine aerosol particle" can you cite some studies? Do newly formed particle have high growth rate that they can impact accumulation mode aerosols so much? Cite some studies which have shown the growth of small aerosols in the mentioned region. And studies which show npf is sparse in SCS.
20. Line 214: please rephrase this for clarity "Meanwhile, the total marine aerosol NC observed in this study contained the aerosol coarse mode ($2 \mu\text{m} \leq D_p \leq 10 \mu\text{m}$) and the part of aerosol accumulation mode ($500 \text{ nm} \leq D_p \leq 2000 \text{ nm}$), and the NC was slightly lower than the marine aerosol NC in the Atlantic by Flores et al. (2020)". Why sudden comparison with Atlantic? Are SCS and Atlantic supposed to have similar concentrations? Or why just compare with Atlantic?
21. What seasons did Cai et al. (2020) and Kong et al. (2016) carry their study in? easier to mention, it leaves the reader well informed. Did you compare the rain events between their study and your? is it possible they had less rain which kept the concentrations higher?
22. Line 218: "Although the differences in the observation seasons, the study region, and the particle size might influenced the average NC observations, it can still show that the marine aerosol was significantly affected by the continental transport and the anthropogenic activity in the offshore areas according to the latitude and longitude." Why did you mention differences in study region? The line before this says Cai and Kong did their study in the same region as yours. Next line says differences in study region. Its confusing.
23. Line 222: "However, some studies found that the aerosols might be generated on the porous surface when impinged by liquid droplets" porous surface of what? I know the next lines make it clear but it would be better if you introduce the concept when you first mention it.
24. Line 229: you mention only one size 4068nm. It's hard to say if ambient aerosols are just of one particular size. Please give a range.
25. Line 243: ". High NCs ($\geq 150 \text{ cm}^{-3}$) were observed almost entirely in which the WD were between NW and N that were caused by the high RH accompanied by the rainfall events, and the distributions of NCs were uniform when the wind was blowing in the other directions." So this high NC is the artificial aerosols created by porous surface of the ship and not natural aerosols? Because rainfall is supposed to cause wet removal or deposition of aerosols and thus decreased concentrations
26. Table 2: when you write accumulation mode, please mention the size, I don't think there's any use of comparing with n10-400 because your measurement starts from 500nm.
27. Line 274:284: include this is methods instead of results
28. Figure 7b shows same shape of size distribution, ofcourse, the concentrations are different. But doesn't same shape of distribution say same sources for the two regions? If one were affected by continental sources, wouldn't the distributions be slightly different?

29. Line 298: Can you elaborate this more? “. The marine aerosols decreased slowly with the increasing particle diameters below 1.114 μm due to the transport effect.” You didn’t discuss the ‘transport effect’ before, so its difficult for the reader to associate this.
30. In figure 7c, where is the correlation ($r=-0.87$) shown between Acc NC and distance? All is see is boxplot and distance points in red. Where’s the correlation? The distance on 5/31 was higher than 5/27 but still number concentrations were higher on 5/31. How do you explain this?
31. Your accumulation mode starts from 500nm, how can you show that transport brings in particles which are atleast 500nm for contributing to increase in NC os accumulation mode? Can you cite someone who has shown the size of transport particles in this range? You also mentioned higher wind speed in offshore compared to pelagic areas. How can you say the higher NC at offshore was due to transport and not high WS?
32. In Figure 8, please add the arrows showing direction of air
33. Line 324: again words like significant doesn’t make much sense. Talk in numbers. Out of all components dust shows the maximum change between pelagic and offshore, the difference in the rest of the components do not look ‘significant’
34. Rephrase line 367: Fig 9a showed a clear diurnal variation emerged
35. During the daytime, WS increases and SST and difference in temperature between surface and 2m also decreases; so shouldn’t the daytime NC be increasing because all the factors you mentioned for the transition period aligns for daytime, yet there’s no clear trend in daytime. Why is that?
36. Line 433, add references of studies that showed entrained air decreased with increasing SST. Entrained where? sea surface or boundary layer? clarify
37. Instead of holding wither WS or SST constant for SST-T2m correlations, I suggest you perform multi linear regression or lasso regression or any suitable regression analysis to study the impact of these factors on NC variability. When you hold WS const for Fig 13, SST is still varying and when you hold SST const for Fig 14, WS is still varying.
38. Does the size distribution remain the same with increasing SST? What would you comment on the increase of diameter with warming SST as observed by Saliba (2019)?