

We sincerely appreciate the reviewer for taking the time to review our manuscript and for providing valuable feedback. Based on the reviewers' suggestions, we have revised the paper. Below, we provide our responses to each of the reviewers' comments. The reviewers' comments are presented in black, our responses in red, and the revised manuscript content is highlighted in italicized orange font.

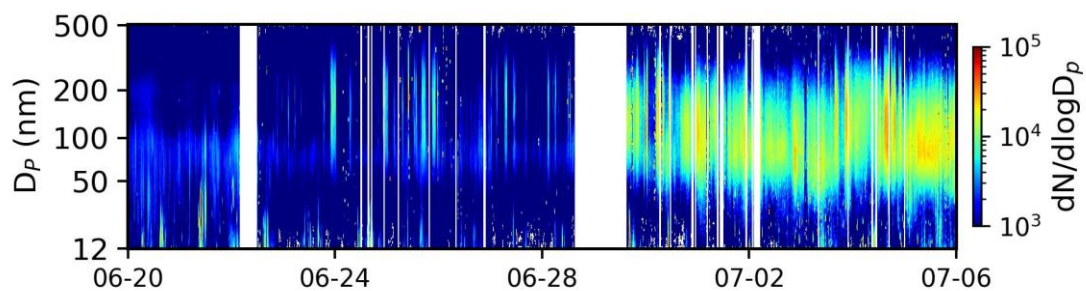
I would like to thank the authors for their efforts in carefully considering and addressing the reviewers' comments, which have substantially improved the clarity of the manuscript. This study makes a significant and informative contribution to aerosol and CCN research in the SCS. I have only a few minor suggestions before it might be published.

Reply: We appreciate the reviewers' recognition of our work and are grateful for the valuable feedback provided by the reviewers and editors. In this revised version, we have made changes based on the reviewers' suggestions, added relevant information, and acknowledged the support and assistance of the reviewers and editors in the Acknowledgment section.

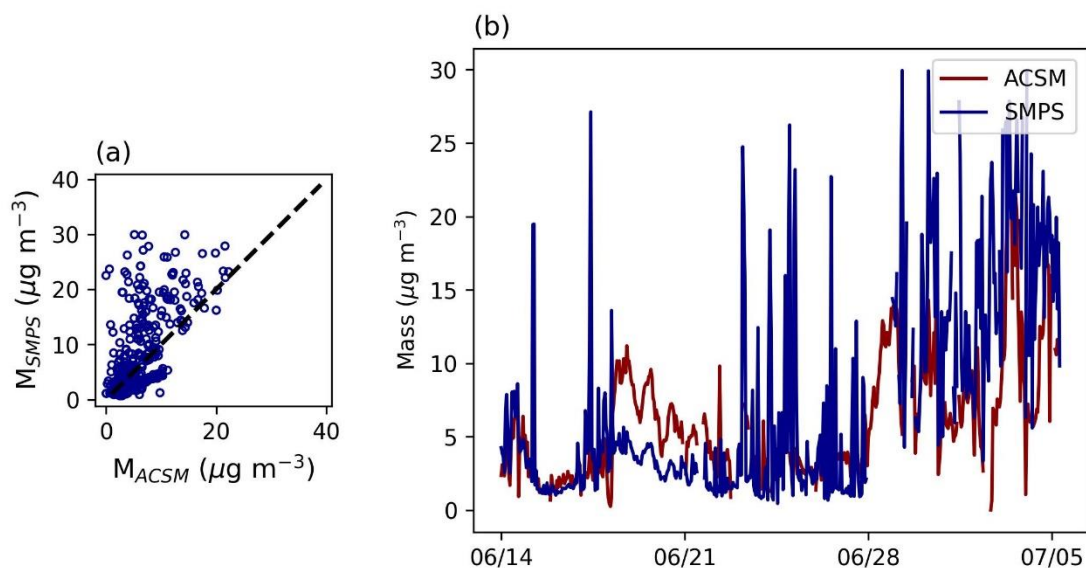
The discussion in the authors' responses regarding the analysis of another campaign's results on the ACSM/SMPS comparison— '...we analyzed data from another campaign conducted over the South China Sea in June 2022...'—provides valuable insights into the mass discrepancy. This part, along with the associated figures, should also be included in the supplementary material.

Reply: Thank you for the reviewer's suggestion. We have discussed the discrepancies between the ACSM and SMPS during the 2022 campaign in the Supplement (Supplement, Lines 67-72).

*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 concentration 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 S1. Timeseries of particle number size distribution in June 2022 in South China Sea.**



**Figure S2. Comparison of mass concentration from ACSM and SMPS (a), the timeseries of mass concentration of ACSM and SMPS (b).**

In the main text, a brief mention of the potential or speculated causes of the ACSM and SMPS mass discrepancies should be added after the statement on Line 193: ‘...the mass concentrations measured by the SMPS and ACSM exhibit a strong overall correlation, with correlation coefficients of 0.84 in summer and 0.93 in winter...’.

Reply: Thank you for the reviewer’s suggestion. We have added information about the discrepancies between the ACSM and SMPS during certain periods after the statement on Line 193 (Lines 195-197):

*During the pre-onset phase of the summer monsoon (prior to May 24), periodic discrepancies were observed between the ACSM and SMPS data, likely due to the influence of refractory aerosol (ie. Black carbon). This issue is discussed in detail in Text S1.*

Finally, I note that the manuscript has been significantly improved through multiple rounds of peer-reviews. The efforts of all the reviewers and the editor throughout this process should be acknowledged in the Acknowledgments section.

Reply: We thank the reviewer for the valuable comment. We deeply appreciate the constructive feedback provided by both the reviewers and the editors, which has greatly enhanced the quality of our manuscript. Acknowledgment of their contributions has been included in the Acknowledgment section:

*We sincerely thank the reviewers and editors for their valuable suggestions during the review process, which have been instrumental in enhancing the quality of this manuscript. Lastly, we wish to honor the memory of Professor Zhao Jun and express our heartfelt gratitude for his significant contributions to this work.*