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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Variations in N_{cn} and N_{ccn} over China marginal seas related to marine traffic emissions, new particle formation and aerosol aging" *by* Yang Gao et al.

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1. Line 45-46 (abstract): Moreover, the influences of the transported new particles from the continent on Ncn and Nccn in the marine atmosphere were also investigated. The sentence illustrated the transport of new particles. Are there any findings or conclusions from this analysis?

Response: The long-range transport of new particles from the upwind continental atmosphere has been discussed in Section 3.5. A few important findings and conclusions are highlighted below:

"Before 09:00 LT on DOY114 of 2018, a much weaker spike of nucleation mode particles was intermittently observed (Fig. 6a). The weak and intermittent NPF seems to occur in the marine atmospheres before 09:00 LT when no apparent growth of new particles was observed. Possibly due to the transport from the continent (Fig. S12) and an increase in the condensational sink around 10:00 am (Fig. 6a), the weak NPF signal gradually dropped to a negligible level half an hour later, concomitant with a large increase in the number concentrations of Aitken mode particles at 10:00-18:00 LT." This suggested the humid marine atmosphere did not favor regular banana-shape NPF events. However, the NPF event can occur in the upwind continental atmosphere and the grown new particles can be transported and detected in the marine atmosphere under the offshore wind.

2. Line 76-78: different marine atmospheres, e.g., over Mediterranean, Sea of Japan, Bay of Bengal, coast of California and the Northwest Pacific Ocean etc. (Bougiatioti et al., 2009; Ramana and Devi, 2016; Ruehl et al., 2009; Wang et al., 2019; Yamashita et al., 2011). Are the locations corresponding to the five references? It is better to list the reference following each location.

Response: Right, they are corresponding to each other, and the reference has been listed adjacent to the respective site.

3. Line 115-116: The correlation equations are valuable for a rough estimation of Ncn and Nccn from SO2 when their direct observations are not available. Please rephrase this sentence. For example, "their direct observation" mean the observation of Ncn and Nccn?

Response: It has been rephrased.

4. Line 153: ECMWF There is a couple of data sets from ECMWF. What did the authors use, ERA-40, ERA-Interim, or ERA5? Please be specific.

Response: The data used is NCEP GDAS, and this was corrected in the revised

manuscript.

5. Line 157-159: Meanwhile, the data of fire spots was available at the Fire Information for Resource Management System (FIRMS;http://firefly.geog.umd.edu/firemap). It does not seem the fire spots were used in this study. If not, the descriptions need to be removed.

Response: It has been removed. 6. Line 430-431: The Aitken mode particles evidently enhanced at 14:00-15:00 The enhancement here means the number concentration? Please clarify.

Response: Right, it has been revised.

Technical corrections: Line 102. continent al aerosols. An extra space before al, please remove it. Line 126-128: The FMPS were used; CPC were The word "were" changed to "was" Line 150-151: Ambient Ion Monitor-Ion chromatography (AIM-IC) AIM-IC has been defined at Line 125. Please avoid the duplication of definition. Line 164: one extra comma. Please delete it. Similar for Line 509. Line 189: "Fib" should be changed to "Fig" Line 198: "." needs to be changed to "," Line 273: "relative" should be revised to "relatively" Line 382: Hoppel W. A. (1986) proposed cloud-modified aerosols to be ... The citation is not appropriate. Hoppel et al. (1986) Line 384: Cloud-modified aerosols are quietly common Line 452. prior to the signal disappeared Grammar error exist here. Line 484. with diameters down 40 nm. Changed to "with diameters down to 40 nm" Nccn at SS of 0.2%-1.0% (3.2 -3.9 $\times$103 cm-3) The values inside the parenthesis should be moved next to Nccn.

Response: Sorry for the typos. Agree and revised.

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