



## Comment on acp-2021-623

Anonymous Referee #1

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Referee comment on "Long-range transport of anthropogenic air pollutants into the marine air: Insight into fine particle transport and chloride depletion on sea salts" by Liang Xu et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-623-RC1>, 2021

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This manuscript presented the characteristics of aerosol particles collected from eastern China sea (ECS) and northwestern Pacific Ocean (NWPO) based on particle analysis by TEM. The results showed during the cruise the samples collected in ESC contained more anthropogenic particles than those in NWPO. The chloride depletion in the sea salt particles was also discussed. The manuscript find that the particles may have been impacted by the long range transported anthropogenic pollutants. This study provides a case study in these areas for the better understanding in the impact of anthropogenic emission on the marine environments. The scope of this manuscript is suitable for this journal. A set of issues and comments need to be considered before publication.

Comments:

1, The manuscript presented a new set of data for this area, but the general implications in the current version are somewhat limited or not clearly discussed. It is suggested to re-categorize the manuscript as a measurement report. The manuscript stated that the acidic gas precursors transported for a longer distance and thus posed a significant impact on particles in NWPO which can't directly concluded from the evident or data of particle characteristics presented. The conclusion in Line 31-35 is overstated. In addition, in those 11 samples from NWPO, there are only two samples that contain S-rich particles over 15% in number. Also, most of these from 11 samples from NWPO are originated from Sea of Japan and were transported to NWPO within two days, that means those sea salt particles may have been aged when passing Japan.

2, Line 27-28, I didn't find the definition for the primary and secondary anthropogenic aerosols in the text based on these TEM analysis or particle classification.

3, Line 35-38, The statement doesn't provide useful information or conclusion for this manuscript.

4, Line 49-51, Chloride depletion doesn't release I-containing compounds.

5, Line 55-58, The references are not related to ice nuclei and so the statement need more related references for aged SSA serving as IN.

6, Line 72, Please rewrite this sentence, it is not very clear what that means.

7, Line 152-155, Line 176-180, the classification scheme is not clear and somehow mixed. Please use the same definition for the particle types. Line 157-159, how does two types of OM particles were distinguished based on the TEM analysis?

8, Line 198-199, Is the 5% significantly higher than 2% based on the number of particles analysis using TEM? Have you considered the uncertainties in the classification since the total number of particles analyzed are low?

9, Line 231, there is no evidence showing that S-rich particles are formed from the precursors.

10, Line 310, This statement doesn't need a figure here. There is no further description for this Figure 9.

11, Line 323-326, It is not clear what does the authors try to explain.