

Response to anonymous referee #2's comment on the manuscript point by point below.

The authors present a reorganized manuscript of a study of TSP aerosol observations at a location in the northern South China Sea. The focus of the reorganization of the paper has been on presenting a clearer description of the results and a more thorough description of the methodology used in the study. In particular, they have added additional methodological detail in two supplemental sections that provide additional information on sample collection and analysis, and the use of back-trajectory analyses. They have also removed redundant information and presented the results in more clearly defined sections.

The authors adequately addressed most of the earlier concerns raised about the manuscript, though several minor issues remain. Overall, the presentation of the key phenomena in TSP aerosol variability that were observed are now presented effectively. There is not substantial treatment of the limitations TSP aerosol observations have in regards to interpreting the relative importance of various sources in the region. However, this facet of the analysis may not be necessary in order to present information on TSP and its variability in the region, or to comparisons of the results to other regions. I therefore recommend the manuscript to be published subject to minor corrections.

Specific comments:

1. Supplement S1. The additional description in the supplemental information adequately explains the sample collection process. I am used to seeing more of this in the main manuscript methods, but the authors may leave this here as long as they explain this in section 2.2.

Response: Thank you for your suggestion. We have moved the information of the sample collection process to the main manuscript in section 2.2.

2. Supplement S2. I believe TrajStat is an analysis package that is built on top of the NOAA HYSPLIT model. The details of how this was run are still needed. In particular, HYSPLIT version number, the meteorological dataset used (e.g. Gdas1 is often used), and the receptor height. If any sensitivity testing (e.g. time of day) was conducted to validate representativeness of the data, that could be included as well, though for this island receptor it may not be necessary. At minimum, a short mention and reference to HYSPLIT should be included in section 2.4.

Response: Thank you. We have added more information in Supplement S2 and section 2.4.

Supplement S2: For each day, 10-day (240 hours) back trajectories of air masses (Pavuluri et al., 2015) arriving at Yongxing Island were computed by the program of TrajStat (version 1.2.26) (Wang et al., 2009) with Global Data Assimilation System (GDAS) data (<http://www.arl.noaa.gov/HYSPLIT.php>) of GDAS one-degree archive (Xiao et al., 2015). The top of model was set to 1000m above sea level.

Section 2.4: For each day, 10-day (240 hours) back trajectories of air masses (Pavuluri et al., 2015) arriving at Yongxing Island were computed, with top of model set to 1000m above sea level (Xiao et al., 2015). In CWT model, each grid cell receives a weighted concentration obtained by averaging sample concentrations that have associated trajectories crossing the grid cell (Xiao et al., 2015).

3. Use of the NAAPS model for figure S1 should be mentioned in the methods somewhere.

Response: We have added the information in section 2.1.

In order to identify the effect of sulfate, dust and smoke on Yongxing Island, we obtain NAAPS Global Aerosol Model data (gif format, <https://www.nrlmry.navy.mil/aerosol/#aerosolobservations>) between March 2014 and February 2015 to synthesize one year of picture (gif, Fig. S1).

Typos and minor correction suggestions:

L28: “Air mass source region” rather than “air masses”

Response: OK.

L32: Should be “77.4% of Na⁺ and 99.3% of Cl⁻“

Response: Yes.

L43: “... anthropogenic sources, such as terrestrial...” could be “... anthropogenic sources, include terrestrial...”

Response: Thank you.

L59: Should refer to boreal winter, northern hemisphere winter, or similar term, rather than just winter.

Response: Yes. It refers to “boreal winter”, and we have revised them.

L61: Again, clarify the “cool season” refers to the boreal winter cool season, or the cool northeastern monsoon phase, etc.

Response: OK. We used “boreal winter cool season” in the manuscript.

L180: Is “local” intended here? Source regions were from remote ocean regions, rather than local regions?

Response: Thank you. We have revised it.

L187: Should be “important”

Response: Yes.

L334: Secondary inorganic aerosol for the SIA acronym is not defined earlier.

Response: Thank you. We have added “Secondary inorganic aerosol” before “SIA”.

L429: Consider phrasing as “Chemical composition of one year of aerosol samples...” or similar. Also, the beginning of the conclusion should make clear that results are for TSP aerosol samples (as opposed to PM10, PM1, etc...).

Response: Thank you. We have revised it as “Chemical compositions of one year of aerosol samples (TSP) at Yongxing Island”.

L438: The final conclusion should refer to only the SCS or northern SCS, rather than the wider northern Pacific ocean.

Response: Agree.

Figure 7. The labels on the chemical species are a bit small and hard to read.

Response: Thank you. We have revised them.