

## ***Interactive comment on “Properties of aerosols and formation mechanisms over southern China during the monsoon season” by Weihua Chen et al.***

**Anonymous Referee #1**

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It is a pleasure to review the manuscript "Properties of aerosols and formation mechanisms over southern China during the monsoon season" by Chen et al. This manuscript addresses an important science question: what are the characteristics of size distribution and formation of atmospheric aerosols in southern China and how they are affected by local and long-range transport? Given the heavy PM concentrations in that region, answering this question has practical implications for public health. This study makes diligent use of a unique in-situ dataset, modeling, and remote-sensing products, investigates various physical and chemical mechanisms of aerosol (including secondary) formation and evolution, and provides some new insights into this scientific issue. The paper is comprehensive in its scope, well organized and well written, and the research

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quality is high. I suggest to accepting this manuscript after the authors clarify the following points, which are mostly minor concerns and editorial changes:

- Line 150, the model required the use of measured: did you have all those measurements from your site observations? - Line 180, use of GDAS: why did you use higher resolution WRF/Chem meteorological fields in place of GDAS? - Line 187: the sentence is confusing. It looks like you use WRF simulated fields as input to FLEXPART, which contradicts with the previous statement of using GDAS? - Line 200: Which two sites are referring to here? There are three sites listed in Table 1. - Line 203-208: very nice analysis! - Line 287: something is missing the sentence "far-upwind urbanization and biomass burning". Urbanization cannot be transported. - Line 304, "the sites": which sites? - The quality of some figures are acceptable but not very good. For instance: o Figs 3c&d: the figure labels need to be improved. It is hard to read. o Fig 4: again the x-axis label is hard to read. o Fig 6 labels need to be improved. - Line 417: a nice example of using backward trajectories to test your hypothesis! - Section 3.6: can authors elaborate on the MODIS Fire products? Are these daily products or twice a day or 8-day?

Editorial suggestions:

- Line 92: replace "The data is" by "those data were" - Line 94: insert "of size distribution" between "characteristics" and "in" - Lin 98-99: something is missing in "and the impacts mixing sea-salt and urban pollutants" - Line 103: it would be good to show photos of these sites to give an idea of site environments - Line 110: replace "The first site was set at (23.12°N, 113.36°E), on" by "The first site (23.12°N, 113.36°E), is located on" - Line 111: replace "an urban mega-city" by "a mega-city" - Line 149: delete "to" - Line 170: replace "All of the data is" by "All data are" - Line 194: delete "mass" - Line 212-213: replace "no matter what the particle size was" by "irrespective of particle size" - Line 217: should "formed" be "from" - Line 219: delete "with" - Line 226: delete "of" - Line 242: replace "showing" by "shows" - Line 281: replace "high levels" by "high-level" - Line 288: replace "as talked about later" by "as discussed later

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in this paper" - Line 303: replace "show" by "shown" - Line 312: replace "evidence" by "evidenced" - Line 323: replace "of the" by "shows that" - Line 489: delete the second "instead" - Line 527-529: replace "Based on specific case studies, some models of the air flow, and remote sensing, the impacts of chemistry and atmospheric transport were investigated" by "These site observations, together with model simulations and remote-sensing data, were used to investigate impacts of chemistry and atmospheric transport". - Line 547: delete "further" - Line 554: be specific on "they". What are they?

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