

Interactive comment on “Changes of regional meteorology induced by anthropogenic heat and their impacts on air quality in South China” by Min Xie et al.

Anonymous Referee #2

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The article analyses the impacts of anthropogenic heat (AH) emissions on the atmospheric conditions and air quality in South China considering January and July from 2014. The article is based in a spatial and temporal analysis of AH emissions from top-down energy inventory method and WRF/CHEM model simulations.

This paper is very well written, organized, with very clear graphics/figures and with interesting analysis results. Despite of the positive view of the article, there are some deficiencies, but this referee recommends the manuscript to be accepted for publication in the Atmospheric Chemistry and Physics after suggested revisions are made. The suggestions are described below:

Page 3, lines 84-86. The article showed that the main impacts of AH emissions were

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observed in Pearl River Delta (PRD) region. However, it is not presented an explanation of that region, such as which cities are located in that area. Please, for readers who do not know that area, provide more detailed information of the area, such as a map illustrating the location. In the same way, the article has a deficiency in the description of the South China region. This referee thinks that is important to describe some information about land use, land cover, topography, as well as the typical climatological and atmospheric conditions such as circulations breezes, among others.

Page 5, Figure 1 - The resolution of Figure 1 is not good. If possible, the authors could improve the figure.

Page 5, lines 176 - 178. In the description of chosen period, that is, January and July from 2014, the paper mentioned that “January and July are used to represent the hot and the cold weather condition, respectively”, but the months of January and July represent the cold and hot months for the region analyzed, respectively. Also in this context, why did you choose those periods? Moreover, the use of monthly average could produce erroneous or masked results, since it includes days with different synoptic conditions.

Page 6, lines 182-183. The authors present a vertical cross section analysis through the line AB reaching the Haikou and Guangzhou areas. However, it is not presented the motivation of choosing that line. If line AB was a latitudinal section, approximately 22.5°N or 23°N reaching the Nanning and Guangzhou areas, do you think it would be possible to find a different pattern from the impact of AH emissions? Why?

Page 6, lines 186-193. In the description of the physical parameterizations schemes, it was mentioned about which urban canopy parameters were adopted. Then, it would be interesting to add a descriptive table that contains main urban parameters such as height of buildings and constructions, street and avenues information, albedo of urban areas, among others.

Page 8, line 266. The mentioned figure seems to be wrong (Fig.4f). It would not be

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Fig.2f?

Page 12, line 358-360. The article demonstrates the impact of AH emissions on the atmospheric condition through the analysis of some variables such as wind speed at 10m (WS10) and vertical wind velocity (w). Do you think that AH emissions can disturb the horizontal wind regime? How AH emissions can affect the land and the sea breezes circulation? The spatial and temporal patterns of these variables and their correlations would be investigated more properly.

Page 13, line 381-382. The other deficiency is the description that AH emissions can modify the Urban Heat Islands (UHI). It appears to be questionable whether the increase in AH emissions can quantitatively enhance the UHI. The authors could provide concrete evidence of the UHI intensification. One way that authors can analyze could be the temperature difference between the most urbanized region (e.g. Guangzhou) and rural or less urbanized region (e.g. Nanning or Haikou) for simulations with (Grd_AH) and without adding AH (Non_AH). Therefore, perform an analysis of the Urban Heat Island Intensity (or UHI) and examine whether results are in agreement with paper, so, if there is an intensification of the UHI when adding AH.

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