

## ***Interactive comment on “Modeling of the anthropogenic heat flux and its effect on air quality over the Yangtze River Delta region, China” by M. Xie et al.***

### **Anonymous Referee #4**

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In this manuscript, the spatial distribution of anthropogenic heat (AH) emission with seasonal and the diurnal variations is constructed over Yangtze River Delta. AH impact on meteorology and air quality were studied, especially focusing on horizontal and vertical circulations. The effect of Urban Heat Island (UHI) by urban land-use on ozone and air quality have been reported in the world. However, limited data and simulations of UHI by AH on ozone and air quality are currently conducted. Such kinds of study, especially the seasonal differences of AH effects as presented in this manuscript, should be valuable and encouraged. The manuscript is well written and organized. The scientific issue raised in the manuscript that AH effects on meteo and O<sub>3</sub>, NO<sub>x</sub> and PM are interesting to the ACP audiences. I suggest publication the manuscript after ad-

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ressing the comments and suggestions below: 1) Since the AH effects (dynamic and chemistry) are generally quite weaker than that of UHI by land-use, and the mechanisms of AH effect should be different from land-use effect especially under distinct meteorological and diffusion conditions. I suggest the authors give a quick review of the UHI effect by land-use on meteorology and air chemistry, which have recently published on JGR-atmos and Boundary Layer Meteorology. I find some of the conclusions are different from that in this manuscript, for example the impact on PBLH and ozone vertical variations. I suggest the author compare the AH and UHI by land-use effects and give a more general conclusion. 2) Interpret the Q<sub>F,B</sub>, Q<sub>F,T</sub>, Q<sub>F,M</sub> in equation 1. 3) I did not find the references “Ryu et al., 2013; Yu et al., 2014”the manuscript raised on page 8 in line 18. 4) on page 16, “On account that AH and its diurnal variation are only added to the sensible heat item, there are no significant differences between the simulation for latent heat flux (LH).”. I suggest the authors should indicate latent heat release could be a non-neglectable parts of AH due to many AH processes related to water vapor releasing. 5) On page 17, 2m-temperature changes typical value of 1.6 °C in January and 1.4 °C in July in Shanghai, and AH fluxes make the PBLH rise up to over 140m in January and more than 160m in July in Shanghai. Please explain the reasons why surface temperature and PBLH changes are opposite in the two seasons. 6) On page 22 line 22-25, I suggest you compare ozone variations in vertical with that on the references which ozone variations induce by urban land-use.

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