

## ***Interactive comment on “Quantifying the contribution of land use change to surface temperature in the lower reaches of Yangtze River” by Xueqian Wang et al.***

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Response: We would like to thank the referee for providing the insightful suggestions, which indeed help us reconsider and further explore the underlying problems in quantifying the relative contributions to local surface temperature change in the lower reaches of Yangtze River. In the revised manuscript, we have added more clear descriptions on the physical characteristics, in-depth discussion of different factors' effects on surface temperature change, and compared the results with previous studies. The revisions corresponding to each specific comment are tracked in the marked-up manuscript respectively.

Specific comments: (1)It would be helpful if more quantitative information can be pro-

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vided in the “Abstract”. Response: Accepted. We have added more quantitative information in the section of Abstract.

(2)It would be meaningful to show the site locations and the spatial distribution of land covers over the lower reaches of Yangtze River. Response: Yes. The locations and spatial distribution of the sites and land covers have been shown on the other paper ( Guo et al., 2016) which can be find in our manuscript. We restated it in P4L20. Reference Guo, W., Wang, X., Sun, J., Ding, A., and Zou, J.: Comparison of land-atmosphere interaction at different surface types in the mid- to lower Yangzi River Valley, Atmospheric Chemistry & Physics, 16, 9875-9890, 10.5194/acp-2016-49, 2016, 2016.

(3)Page 2, Line 24: should be “weakening related precipitation”. Response: Accepted.

(4)Figure 1: what do the lines of error bar indicate? How to calculate the uncertainty of temperature change? Response: The Error bars in Fig.1 represent 1 s.d. of the daily surface temperature change for each month. We have made an explanation in P8L3.

(5)As shown in Figure 2, the albedo in grassland is different from that in cropland, especially in June. This could lead to different energy distributions in these two sites, eventually the changes in surface temperature. However, Figure 3 shows that the contribution of surface albedo to the temperature changes over cropland is the least. Why? Response: It is true that there is a large difference in albedo between cropland and grassland, especially in June. However, net radiation, the source of the energy distribution, is not just related to the shortwave radiation, but also the longwave radiation. And other surface characteristics also effect energy distribution. The surface temperature changes are more sensitive to the evaporation and surface roughness than albedo in the lower reaches of Yangtze River. Even the difference in albedo is large, its contribution is small. This is also the case for the differences in albedo between urban area and grassland.

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(6) This study suggested that the effect of evaporation cooling dominates the change in surface temperature. However, some studies based on Lee's method reported different findings in other regions. It is worth comparing the results of this study with previous ones. Response: Yes. We have added more descriptions about previous studies in other regions and compared them with ours in the section of Conclusions and Discussions.

(7) Eq (2): S used in the calculation is the difference of net shortwave radiation between managed site and grass site. Is this mismatched? Response: We have corrected it.

(8) Page 5, Line 16: the authors only show the differences in surface temperature. No more information on other atmospheric variables (e.g., humidity, precipitation) is given. It could not indicate that "extremely warm and dry condition in April and July was more evident in urban area than at the grassland site". Response: The difference of humidity between grass and urban area has been shown in our previous study (Guo et al., 2016). We have added the reference for this sentence: Reference Guo, W., Wang, X., Sun, J., Ding, A., and Zou, J.: Comparison of land-atmosphere interaction at different surface types in the mid- to lower Yangzi River Valley, Atmospheric Chemistry & Physics, 16, 9875-9890, 10.5194/acp-2016-49, 2016, 2016.

(9) Page 5, Line 4: It isn't reasonable to state that "Bowen ratio decrease when there is sufficient soil water content", since other factors also can change Bowen ratio. Response: We have rephrased this sentence as "Sufficient soil water content can benefit the energy exchange in the way of higher LE and lower Bowen ratio".

(10) Page 6, Line 15: The sentence "The largest differences in aerodynamic resistance between grassland and urban area and that between grassland and cropland..." seems to be contradictory to Figure 2. Response: It has been rewritten as "...between urban area and grassland, and that between cropland and grassland..." .

(11) Page 6, Line 28: "observed Ts" and "calculated Ts" should be "observed  $\Delta T_s$ " and "calculated  $\Delta T_s$ ". Figure 3 shows the differences in  $\Delta T_s$ , not the original values.

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Response: We have replaced the "observed Ts" and "calculated Ts" as "observed  $\Delta T_s$ " and "calculated  $\Delta T_s$ "

(12) It would be helpful to change Ts and Ta to  $\Delta T_s$  and  $\Delta T_a$ . Response: It has been changed in our revised manuscript.

(13) Please change Lee or Lee (2011) to Lee et al. (2011). Response: Accepted. We have replaced it.

(14) Figure 3: It would be better if the scale ranges of y-axis were the same. Response: Thanks. We have used the same scale ranges in Fig. 3.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/acp-2016-1013/acp-2016-1013-AC1-supplement.pdf>

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Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-1013, 2016.

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