

# Response to Referee #1

*With the development of social economy and population density increases, evidences have indicated that land use and environmental quality change a lot at a global scale, and the surface ecosystem becomes increasingly fragile. The surface vegetation cover has serious deteriorated by multi-sources (including NOAA-AVHRR and TIROS-TOVS satellite remote sensing data), which has been largely documented. While land cover changes, land variables such as albedo, roughness, and bulk transfer coefficients, also change, which lead to the variation of surface heat fluxes, and then result in surface temperature anomaly. Therefore, in many previous studies, using dramatic land condition change to evaluate the land surface process impact has been widely used for regional land surface impact studies in preliminary stage to excite more comprehensive studies. And most of them focused on the importance of land surface processes through climate modeling. This research investigated the impacts of different surface parameters for four different surface types over the mid-to-lower reaches of Yangtze River on the radiation budget and surface-atmosphere water, heat and mass exchanges. Firstly, the authors revealed the differences in several physical parameters among the four typical surface types. Secondly, they tried to explore the mechanism for the differences. The analyses in the paper are well organized and the results are reasonable. Few published papers discuss the differences of surface physical parameters among different surface types based on the field observations, especially over the mid-to-lower reaches of Yangtze River Valley. This paper provides useful information, especially for the land-atmospheric interaction research over East Asia monsoon region. The presentation of this article is generally clear. I suggest publication of this paper with some revisions.*

**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 comparing the land-atmosphere interaction at different surface types in the mid-to-lower Yangtze River valley. In the revised manuscript, we have added more descriptions on the research background and in-depth discussion of the differences in micro-climate elements and mechanism analysis.

*Major comments:*

- In the first part of the introduction, the authors review many studies about the impacts of land cover change on global and regional climate. Land-atmosphere interaction is strong in East Asian monsoon zone. Since the research focus on Yangtze River, some previous work on LULCC effects on China or East Asian climate should be mentioned importantly in the introduction. Actually, there were serious land degradations over East Asia during the past several decades and have identified Tibet*

Plateau, Northwest China and Inner Mongolian were among areas with severe land degradation. For example, Xue et al. (1996) and Qian and Xue (2010) have pointed out the East Asia summer monsoon circulation was weakened and the precipitation is reduced due to the land degradation over three areas.

**Response:** Accepted. The references of previous work on LULCC effects on East Asia has been added in the introduction in the revised manuscript (P4, lin14-17).

- In Table 1, the units of the measurement height for soil temperature and water content are not specified. It should be cm? Please complete them.

**Response:** We have added the units of the measurement height for soil temperature and water content, it's "cm" in Table 1.

- In page 10, line 10 and 11, "....., and it also lags in the summer that in the spring" please clarify the sentence. It's so hard for readers to understand. Also, in the same line, "Due to the influence of the surface,....." , it's a general statement and in the research article, it should be avoided. It's better to state what the influences are and how the surface or other anthropogenic factors make the surface temperature show larger diurnal range than air temperature.

**Response:** Thanks. We rephrased the sentence "and it also lags in the summer that in the spring" as "The peak time of both air and surface temperature in spring lags that in summer." in P10, line 11-13. Besides, the difference of radiation budget on land surface between daytime and nighttime results in larger diurnal range of surface temperature than air temperature. The words "Due to the influence of the surface" was unclear for readers to understand, so we rewrote it in P10, line 28-29.

- In the results and discussion part, the authors show the differences of many observed elements and several surface characteristics over four sites during spring and summer. Actually, tables that can show the detailed quantitative differences could be the compliment for the figures (e.g. figure 2, figure 3.....). For example, for the figure 3, a table can be presented that show the average of diurnal air temperature, surface temperature and relative humidity for the four sites. The table and figure can exhibit the differences more easily observable.

**Response:** Accepted. Figure 2 has already shown the average of micro-meteorological elements for the four sites in different season, and we added the diurnal range of these elements below figure 2 in the revised manuscript.