Dear Sir or Madam:

Thank you very much for your helpful review. We carefully studied the comments and suggestions and revised our paper accordingly. The following are our point-by-point responses to the general and specific comments. We hope that the revisions are acceptable and that our responses adequately address the comments. Thank you for your consideration.

Sincerely,

Zeng, Xin-Min and coauthors

Responses to comments from Referee #2

1. General comments

This paper evaluates the impact of changing soil moisture on short-range forecasts in a heat-wave event. The study uses 10 consecutive days and a large area to obtain robust conclusions. The study has a good systematic approach and presents the results well. The methodology looks sound. While many of the results are not surprising, there is value added in some aspects of the analysis, especially using budget studies for the surface temperature. The relative importance of surface heating, radiation, adiabatic motion, and advection were evaluated, bringing up interesting aspects related to the greenhouse effect of the changing water vapor, and the importance of the prevailing subsidence in the heat budget, with some clarity provided by separating daytime and nighttime periods. I think this paper is quite acceptable and only have minor technical points.

Response: Thank you for your general comments on our paper. We appreciate them from the point of view of the meteorological science.

2. Detailed comments

(1) p11672, line 23. I believe the National Center for Atmospheric Research is responsible for the ARW version. Please correct this.

Response: The correction has been done in the revised form of the paper.

(2) p11673, line 16. "hottest late July"? Hottest in what sense. Please clarify this phrase.

Response: Late July 2003 is regarded as the "hottest" according to 10-day moving averages of SAT over the summer (June, July, and August, 2003) for the study area, as also added in the revision.

(3) p11676. I am a little concerned about the use of the term "convection" for the mean subsidence term. This is not really convection, but a mean adiabatic ascent term on the

domain scale. Convection carries a very different meaning as a local eddy term often with diabatic effects. I would prefer this to be renamed carefully throughout the text.

Response: We agree with you. Although it comes from the "convection" term of Eq. (1), to be termed "subsidence" is more appropriate in the Results and Discussion section (and thereafter as well). We have made the revision accordingly.

(4) p11683, line 23 and Figure 9a and 9b. The zero values at hour 0 are just initialization values and should not be plotted. Also "pronounced differences after one hour" should be considered as an artifact of this too, if this phrase is referring to the initial false gradient.

Response: The revision has been made accordingly, both in the figure and in the text.

(5) p11687, line 1.Should enhancement be reduction?

Response: Yes. We have corrected it.

(6) p11693, line 22. adiabatic should be diabatic?

Response: Thank you. It has been revised accordingly.

(7) Conclusions. It appears that this period is characterized by mean subsidence. I don't know if this region is always characterized by this, or if it is a result of the synoptic situation. Some comment on this is needed because it the affects generality of the conclusions.

Response: The conclusion regarding the relative importance of the physic processes seems complex here. As listed in the text (Table 2), (a) in all of the five groups of simulations, the diabatic term dominates the subsidence term during daytime and nighttime separately, (b) only the DRY simulations show to be characterized by mean subsidence during the 24-hour periods, and (c) the CTL run shows to have a negative yet marginal value of the SAT change during the 24-hour periods. Therefore, regardless the sensitivity simulations (i.e., only CTL is taken into account), during the period of late July, the diabatic processes are slightly more important than mean subsidence over the region (i.e., the negative sign of the SAT change is opposite to that of the subsidence term during the 24 hours in CTL). This shows the feature of relative importance of physical processes for the hottest phase. For simulations of weather cases with lower temperatures, generally, values of both the diabatic and subsidence terms would be reduced. Given invariant signs for both in different cases, it is unlikely to get a definite conclusion of which term would dominate by theoretical analysis only. That is why follow-up numerical studies are needed. We have added some comments to the end of Sect. 3 ("Results and discussion).