Review of 'Coupling the high complexity land surface model ACASA to the mesoscale model WRF" By Xu et al.

Authors evaluate performance of Advanced-Canopy-Atmosphere-Soil Algorithm (ACASA) model coupled with Weather Research and Forecast Model (WRF) using surface observations from 700 meteorological stations in California. Authors also compare WRF- ACASA results with WRF-NOAH LSM results, where NOAH LSM is a low complexity land surface scheme typically used in standard WRF simulations. Authors find that WRF- ACASA results are comparable to the WRF-NOAH LSM results and in some cases, e.g. dew point temperature WRF-ACASA results are slightly better. The manuscript is well written and authors have done tremendous amount of work in synthesizing observations from 700 stations and performing model simulations. The presentation style needs some improvement to bring out advantages gained due to increased complexity land surface scheme, as well as the overall readability of the manuscript (see major comment). Hence, I recommend publication of the manuscript after revision.

Major Comment:

(1) I think, the overall advantages gained due to increased model complexity have been lost in presenting the results for all 700 sites together. Authors discuss some of the advantages particularly related to land cover type in the text e.g. Line 5 to 14, page 2843; however these advantages are not clearly visible to me in Figure 2 and other figures. Focusing the results for contrasting land cover regions, e.g. central valley regions would be helpful.
(2) Several figures e.g. Figures 6 and 7 are not legible, i.e. figure legends, x and y axis titles are not readable, mostly because authors present 16 plots in a single figure. Also, hourly data has been plotted (I think) in Figure 6, and 10 which may not be required because hourly composite (diurnal cycle) have been presented in the subsequent figures. Authors may want to synthesize the data and present in the figure only when it is necessary. For example, authors may want to present the figure only for JJA because land-atmosphere interaction is strong during JJA. Also, plotting the difference plot from observation in Figures 6, and 10 may be helpful.

Minor Comments

(1) Page 2834, Line 5: 2.5 degree (equivalent to 250 km2) -> 2.5 degree (equivalent to 250 km at the equator)
(2) Page 2845, Line 10 to 19: This description seems to be based on Figure 7, MD JJA. Please check why there is sharp drop at the beginning of the diurnal pattern. Does this affect the simulation?
(3) Basins and stations are confused some times. For example, page 2848 Line 28-29, says Figure 10 show results for four stations; whereas Figure 10 caption says results are for four basins. Since, a basin has several stations (Table 2), please check carefully.
(4) First paragraph in section 4 describes differences between ACASA and NOAH LSM, which is rather long and may not be needed here. Such description can be a part of model description (Section 2.2)
(5) Page 2854, Line 6: "… ecosystem responses to the atmospheric impacts…" -> "… ecosystem responses to the human and natural disturbances.." or something similar to this.
(6) Page 2870: Figure 9: Legends and axis titles are not legible.