

General comments:

The authors developed a new irrigation scheme in the ISBA land surface model, in which several parameters could be assigned by input. This is of great importance, as in simulations, the spatial heterogeneity of the irrigation application could be taken into account with this new scheme. However, not all properties of this new scheme have been presented, like the irrigation methods, irrigation rate and irrigation time. It seems that the authors made a lot of efforts to prove that the new irrigation scheme is better than the old one, while this is always challenging, as there are always some other factors that may affect the results. I am not surprised that the results are not convincing enough. As we can see, in this study the seasonal patterns of LAI and GPP do not match the observations, and a possible reason may be that the crop growth module of the model is not suitable for the crops in this region, and there are few that the new irrigation scheme could do with this problem. Thus, it is very important to know what scientific question the authors are addressing here: a new irrigation scheme which considers spatial heterogeneity of irrigation, or a new irrigation scheme which is more suitable for the region of Nebraska? For me, the authors should show more this new irrigation scheme could do, and how it will affect the outputs of the model, rather than insisting on the superiority of the new scheme. Finally, the authors need to restructure some parts and rewrite some sentences. To be accepted, a major revision would be necessary for this study.

Minor comments:

L92: add the reasons why you chose to only consider offline simulations.

L95: this part is the description of study area, so I believe it can be moved to Section 2.

L105: It's a bit weird we have this part here, I would move it after the description of model and the new irrigation scheme.

L115: specify a bit more how this rule is applied here.

L131: give the reasons why you chose this period.

L195: be simulated or be assigned?

L238: what is the difference between drip and flood irrigation?

L321: since the USGS provide data every five year, then it is possible to compare the yearly irrigation water amount rather than the multi-year averaged value.

L327: It is always challenging to evaluate a model by comparing the model output to satellite-based fluxes data, as it is not easy to validate the quality of the data. My suggestion would be doing a single point run, and comparing the results with the station-observed data.

Figure1: Add the lat-lon grid on the frames.

Figure5: Specify that positive value for Correlation (b) means that the result of ISBA_pheno_irr is better, and for RMSD(c) negative value means that result of ISBA_pheno_irr is better. Otherwise it could be a bit confused.