

## ***Interactive comment on “Seasonal effects of irrigation on land–atmosphere latent heat, sensible heat and carbon fluxes in semi-arid basin” by Yujin Zeng et al.***

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This study investigate irrigation effects on carbon, water and energy fluxes in an agricultural region in China using CLM4.5. The value of this study lies in applying the high-resolution modeling framework for investigating irrigation effects on carbon flux, in addition to the well documented irrigation effects on water and energy balance components. The paper is well-written and concise. In principal, I am in favor of publication. However, I have several comments that should be addressed before publication. Please find my detailed comments below.

1. Irrigation is prescribed at fixed rates or depend on crop water stress? Please clarify and add discussions on the advantage and disadvantage of the two approach. In addi-

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tion, brief introduction on the parameterization of groundwater withdrawals are required in the methodology section, although it was well documented in published papers.

2. Could you please show the spatial pattern of crops considered in this study? Is irrigation treated the same way for the three crops? That is, how irrigation water is determined, abstracted and applied for each of the three crops?

3. Is irrigation efficiency accounted in the experiment? When water is supplied to ground, I would expect substantial losses to runoff and/or groundwater, which is considered in the model. If so, could you elaborate on this and show the range of estimated irrigation efficiency in the model?

4. Authors stated that one advantage of the irrigation scheme is consideration of groundwater withdrawals. In fact, recent works by Leng et al. has done similar studies with CLM for this topic. I suggest to review Leng et al. explicitly in the introduction and method sections. Leng et al. 2014, 2015 are found in the list but not cited in the text.

5. Authors found a threshold of 5mm/day irrigation rate, above which irrigation effects on LH and SH does not change considerably. This is very interesting. Could you please elaborate on this and add discussions on the underlying mechanisms?

6. Figure 5 and 6 shows the ET and NPP from observations and the simulations, respectively. I would suggest adding subplots on the difference between simulations and observations.

Overall, the results are interesting and also informative. I very much enjoyed reading your paper.

Sincerely, Guoyong Leng

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