

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.

Anonymous Referee #2

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The manuscript "Seasonal effects of irrigation on land-atmosphere latent heat, sensible heat and carbon fluxes in semi-arid basin" by Zeng et al. investigated the energy fluxes responses to irrigation using a land surface model (CLM 4.5). This study demonstrate a high resolution modeling case using CLM4.5, which combines lateral groundwater transfer and irrigation effects. It is of great interest to the large scale land surface modeling community. I think it's a well-written manuscript and I recommend it for publication after addressing the following comments.

Given that the irrigation is the key part of this manuscript. I think more information about the irrigation scheme should be described here rather than simply refer to another paper. For example, how does the model differentiate the source of the irrigation water

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(i.e. groundwater or river water)? Does the model consider any reservoir in the basin for irrigation purpose? When water was taken from groundwater, how the pumping wells be placed across the grid cells since they may create different drawdown behaviors?

The model validation should also include some comparisons between modeled and observed/naturalized stream flows at multiple gauges. I understand the interested variables are energy fluxes in this paper. However, valid stream flow indicates that the model takes right amount of water from the river for irrigations.

The authors found that 5mm/day of irrigation is a threshold beyond which the LH and SH will remain consistent. The authors may want to discuss the mechanism behind this.

Heihe basin is one of the largest inland river basins in China. Most of the irrigation water is from mountainous glacial or groundwater supply. The manuscript shows that the basin was losing about 2mm of water per year constantly during the past 15 years. This trend may change the future groundwater availabilities for irrigations. The author may want to address this point in their discussion.

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