



Reviewer #2:

We thank the reviewer for the helpful comments and suggestions, which are in plain text below. Our response is in bold text.

1. 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 (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?

Response: As suggested, more information about the irrigation scheme was described (P5, L33-P6, L19). Currently the model does not consider any reservoir in the basin for irrigation purpose, and the pumping wells are placed on the location where the groundwater is consumed. The reservoirs and places of pumping wells may be considered in the future. The discussion above was added in the manuscript (P12, L33-P13, L2).

2. 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.

Response: As suggested, a figure on comparison between modeled and observed stream flows was included. Please refer to Figure 5 and P8, L19-28 in the manuscript.

3. 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.

Response: As suggested, a discussion for the mechanism was added in the manuscript (P12, L13-22).

4. 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.

Response: As suggested, the point of water depletion was addressed in the manuscript (P12, L23-29).

