

Hydrol. Earth Syst. Sci. Discuss., referee comment RC4
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Comment on hess-2022-379

Anonymous Referee #4

Referee comment on "Improving regional climate simulations based on a hybrid data assimilation and machine learning method" by Xinlei He et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-379-RC4>, 2023

This is a very well-written manuscript, and this reviewer enjoy reading it through. Some major comments as below:

- The wetting/cooling effect of the oasis is interpreted in this manuscript as WRF(DA-ML) - WRF(OL). Based on figure 9, this manuscript emphasizes that this oasis effect is related to irrigation and crop growth in the midstream. However, the wetting/cooling effect of oasis is by itself there, no matter if the DA-ML framework is applied or not. As such, this reviewer found that this manuscript is lacking of certain indices to demonstrate physically the wetting/cooling effect of the oasis (for example, one can use the difference in air temperature, and relative humidity between (above) the oasis and the surrounding areas). And then you can check how this indicator will be impacted by DA-ML (e.g. Oasis_Indictor (DA-ML) - Oasis_Indictor (OL))

- The authors state that the wetting/cooling effects of the downstream oasis are due to the shallow groundwater and riparian forest growth. This reviewer can understand that the 'riparian forest growth' can be reflected via the LAI assimilation. However, it is not explicitly clear how the shallow groundwater kicks in here. Are the authors suggesting the assimilation of root zone SM could be used to reflect the effect of shallow groundwater? If that is the case, the author should demonstrate it is indeed the case using the root zone SM, groundwater table measurements, and Noah-MP GW table simulations.

- Although the SM surrogate model development has been published in another paper. This reviewer strongly suggested the author illustrate how these surrogate SM models were constructed with workflow/flowchart etc.

Please see attached some other minor comments.

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2022-379/hess-2022-379-RC4-supplement.pdf>