Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC7
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Comment on hess-2022-96

Anonymous Referee #7

Referee comment on "FarmCan: a physical, statistical, and machine learning model to forecast crop water deficit for farms" by Sara Sadri et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2022-96-RC7, 2022

This manuscript is well-prepared and concise. The authors provide a thorough description of a random-forest model for irrigation need prediction. They demonstrate the relevance in the literature, assess correlations that make an RF feasible, provide a brief case study, and provide some validation. I see no reason to prevent publication once the comments of other reviewers have been addressed. I see, as I will describe in my comments, places where the work could be extended to greater impact if desired.

My main concern is that most of the paper is devoted to description of the model and a grounding in its anticipated utility; comparatively little space is given to through validation or exploration of the nuances of performance. Further investigation could lead to great impact.

The model, for example, produces a KGE for fourteen-day predications of something like 0.4. The authors provide limited discussion of the implications of this performance. What level of uncertainty does that imply? What could be the social and economic costs (crop loss, reduced yield, water costs, etc.)? How does this prediction accuracy vary over the season? How does accuracy vary over the prediction horizon? These questions could be discussed qualitatively (in leaving work for later) or quantitatively (in trying to add more work here). The provide, either way, a more robust understanding of the utility of this model.

I’d also be interested in, if space allows, a qualitative discussion of the accuracy of the forecast data. That is, what hypotheses can we make about the decay in performance as a function of forecast uncertainty? Obviously, a lot of work would be required to answer this question quantitatively, and I’m not asking for that necessarily. I still think it important to understand what question can now be posed because of the development of FarmCan.

All in all, a great piece of work, and I’m looking forward to reading more. Thank you.