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Comment on hess-2022-96

Anonymous Referee #11

Referee comment on "FarmCan: A Physical, Statistical, and Machine Learning Model to Forecast Crop Water Deficit at Farm Scales" by Sara Sadri et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-96-RC11>, 2022

The manuscript authored by Sara Sadri et al demonstrates an interesting study of using machine learning modelling technique to predict one of the challenging research topics - crop water deficit. The authors showed that by utilising several freely available remote sensing and modelling results datasets, they were able to reach their forecast goal with a 2-week lead time and reasonable performance. The presentation of the manuscript is well organised, and I found it was easy to follow although certain parts do need to be improved further.

It is also clear that the manuscript has received a great deal of interest from reviewers (I am the 11th reviewers by the time I was submitting my review). I don't think I need to repeat the points other reviewers already mentioned but would like to highlight the one that concerns me most, i.e., the fact that the model in question was built without using any physically observation for model validation and calibration and this, in my opinion, must be properly justified. I therefore think the followings should be provided in any future revision (or revisions):

- How reliable are the datasets used in this study in terms of representing the physical quantity they are supposed to? For example, ET, PET, P, SM etc. This should be referred to the study area instead of the overall performance as they can be very sensitive to spatial locations.
- The precipitation P has been found to be a very critical variable (which is not surprising). However, there is nowhere to see from the current version that how accurate it is, as compared with real gauge measurements from the locations of the study.
- The model calibration/validation is not clearly presented. We need to see both the training and testing of the models. This could well be accompanied by a flow chart.
- Finally, I don't see how the forecast target, NI, can be checked against the field measurement. If again, the NI value obtained from other models/remote sensing, the

authors should make this very clear.

Another general observation, from modelling perspective, is that the study although seems very interesting and probably of great practical value, it remains as a 'fitting process' of several datasets from other modelling processes, which produces very limited insights into the underlying physical processes. The 'forecast' capacity is highly dependent on the climate, and I doubt whether the whole methodology can be applied elsewhere, for example, with much larger temporal variation of precipitation.