Hydrology and
Earth System
Sciences
Discussions

Interactive comment on "A coupled human-natural system to assess the operational value of weather and climate services for irrigated agriculture" *by* Yu Li et al.

Anonymous Referee #2

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The presented manuscript describes and applies a methodological framework to assess the operational value of weather and climate forecast products on irrigated agriculture. It combines a set of forecast products with an agronomic model that simulates the crop yield based on meteorological inputs and an agent-based model that establishes the optimal cropping pattern depending on the forecasts available and the risk profile of the farmers. The novelty of the paper consists in the joint assessment of the forecast quality and its impact on management decisions and farmers risk profile. The methodology is well described and the structure and organization of the paper is coherent and adequate. The results point at the fact that the forecast quality is not necessary correlated with its impact on management decisions.

The paper fits the scope of the journal and has a clear potential for publication, given the increasing momentum of weather and climate services and how its "real" impact can be measured. I have no major concerns about the manuscript, although some improvements would further increase its quality. Therefore, I would consider it ready for publication after fixing the minor concerns I point at below.

TECHNICAL COMMENTS

1. Page 2, lines 28-31: In my opinion, the first sentence of this paragraph is just a summary of the previous one. I would delete it and reflect in the previous paragraph that an alternative promising metric would be the quality obtained on predicting decision-relevant variables.

2. Page 3, line 23: Although it becomes clear when moving forward that "post-processing" means "downscaling and bias-correction", I would add a remark here just to clarify it.

3. Page 4, line 6: what do you mean when you state "pilot"? I think it is a synonym of "case study", but sometimes the term "pilot" implies you run field experiments to apply the method developed. Please clarify the term.

4. Page 5, lines 33-34: can you provide information to support the assumption of using crop yield as main driver of the cropping pattern decisions? Sometimes other variables like management complexity or profit predictability is more important than crop yield. In my opinion, you should clarify, if it is the case, that you make this assumption in the absence of more detailed information about the farmers' decision-making process.

5. Page 6, line 21: as far as I know, the quantile-based mapping is a bias correction procedure. It is true that it has some downscaling component due to matching CDFs obtained at different spatial scales but, on a broader view, it is considered as a bias correction technique. In fact, you previously named it as a bias correction technique. Please fix this.

6. Page 8, lines 15-16: the way in which the aggregation is performed it is not clear. I assume you aggregate the daily data of the same month, but it may also mean you aggregate the ensemble members. Please clarify it.

If you aggregate the ensemble members to obtain a unique factor, I would rather suggest keeping the factor obtained by each ensemble member and generate synthetic daily time series with all of them. In this way, you will have a better representation of the extremes, which are flattened when taking the average.

7. Page 12, table 1: please include the ensemble members of each WCS used unless all the products provide just one ensemble. In this last case, you should indicate in the text that all of them provide a unique ensemble member.

8. Page 15, figure 6: from my point of view, the understandability of this figure would be increased by including the legend inside each individual plot as well as the name of the WCS product. Otherwise the reader needs to constantly go up and down the figure to find out what each bar refers to.

9. Page 16, figure 7: same comment as for figure 6.

10. Page 18, figure 8: I would include the name of the WCS product in each individual plot. Furthermore, I would also provide the value of an average score for the time series inside each plot (for example the MAE). In this way, the reader has a numerical way to easily compare the accuracy of each WCS product type for each plot.

11. Page 19, lines 1-5: Did you generate 100 time series for each year between 2001 and 2005? Did you choose one year between 2001 and 2005 and then generate 100 series for it? Or did you spare the 100 time series between 2001 and 2005? Please add a clarification about it.

12. Page 20, lines 1-14: In my opinion, the fact that the neutral or optimistic risk profiles did not obtain the best performance for the best forecast deserves more explanation. How can you justify this issue? In the absence of more information, I would doubt about

the suitability of the score used (median and variance of MAE). Maybe the IFS/HOPE product does not predict extremes as ECHAM5/MPIOM does, and due to this reason the latter offers the best performance on both the neutral and the optimistic risk profiles. Please add some explanation or theory about this unexpected finding.