

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC3
<https://doi.org/10.5194/nhess-2022-260-RC3>, 2023
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Comment on nhess-2022-260

Anonymous Referee #3

Referee comment on "Multi-scale EO-based agricultural drought monitoring system for operative irrigation networks management" by Chiara Corbari et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-260-RC3>, 2023

I believe the topic is relevant, and I think the paper might merit the chance to be published eventually, but it definitely needs major revisions.

- Some general comments

I believe the purpose of the paper is lost in divagations due to the reporting style and contents. The ADMOS indicator results should be more explained, in particular regarding its capacity to reproduce impacts on yield or its covariation with irrigation. Since the indicator values and thresholds are arbitrary, it is essential to see if such thresholds are capable of marking when impacts on crop yields are to be expected- which seems not the case, or when irrigation inputs are necessary, and in what order of magnitude. It is not clear to me in the end it is possible to use ADMOS to recommend better water management for agriculture.

Since several indices have been calculated to compose the ADMOS, I was expecting a separate comparison between them and the irrigation and yields. Maybe them separately have better prediction capacity than the ADMOS itself, but it was not showed. The conclusions say that you prove that "droughts cannot be described by one single indicator but there is the need first to select the correct physical index for detecting a drought type and secondly to use different drought indices to identify specific conditions", but I don't see how you compare the ADMOS predictive capacity (for irrigation or crop yields) and the predictive capacity of all your anomalies series for P, SM, temperature or VI.

Also, it is very difficult to understand the spatial and temporal aggregation scales for the indices and the ADMOS indicator itself. It seems it is calculated daily, but then the yields are annual for the entire consortium, not sure though. What about the irrigation values? They don't even appear in the data list. How often are them recorded? How are them aggregated over time?

On the other hand, the paper devotes too much space (6 full pages, and 4 chapters, 3.1 to 3.4) to debate the differences between each product (RMSE, r) in each of the variables, when it is not the essential result and could be solved with a summary table and a paragraph of explanation.

I have doubts if- from a statistical point of view- it is recommendable to accumulate an indicator (ADMOS) whose values are categories and not quantifications. For example,

accumulating two time steps with ADMOS -1 is -2, but it is not necessarily equivalent to another time step with -2, and still they are added up. That might explain that in summer there are peaks in the accumulation. It should be better justified why it is computed like this.

In any case, does a value of cumulative ADMOS at certain point means that at that moment a certain irrigation volume should be applied? In the conclusions, the papers says "This ADMOS might help irrigation districts managers and farmers to activate the preventive protection actions to try to avoid water volume and crop yield losses.", but after reading the study I don't really see how, it would merit an explanation.

Also, the potential lags / delays are not taken into consideration for comparing the evolution of the different variables. Only SPI1 is calculated and confronted with the situation at the same time in other variables, presumably at the daily level, but not sure you can capture the propagation of the anomalies like this. For example, time-steps with very high negative anomalies in SM or Vegetation Index can be concealed by the fact that that day in particular it rained a lot, the ADMOS would show "surplus of water", but the system has not recovered yet. There is not a way to know if ADMOS then marks real issues in terms of irrigation needs or yield losses at the daily level. With more granular data on these two impacts, tests could be made.

More generally, I do not really see how the ADMOS is helping identify the main agricultural drought problems in the pilots used. More examples, maybe using a particular event, would help strengthening that point.

Last, on a different note, the used references do not seem always the most relevant to justify the points the authors make, sometimes it is just general drought literature, not even focused on reviewing similar efforts.

- Some specific comments

450- "All the curves have a common trend: from the begin of the year till March the curves have gentle slopes, then from March to October they are very steep due to drought conditions, and at the end of the year they return flat." I think this reveals that the drought indicator is more marking stress than drought, as it points to systematic intensification in summer

Figure 9 and 10. "Synchronicity among the different variables' anomalies in..." - I don't think the color code and the graphs are easy to read and interpret.

515- "Following the principles of CAP to improve irrigation management"- Spell CAP.

540- "This methodology improves the traditional analysis, which are generally analysed by considering only soil moisture anomalies". Many drought analyses rely on other variables.

The writing is confusing in many parts and there are several typos or incongruences, it needs a language revision.