Hydrology and Earth System Sciences

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Discussions

Interactive comment on "A seasonal agricultural drought forecast system for food-insecure regions of East Africa" *by* S. Shukla et al.

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General comment:

This is an interesting paper addressing the hot topic of providing high quality and timely agricultural drought forecasts information in a region hit by frequent droughts and famines. The methodology follows and compares with earlier work and similar approaches, although the exact objective and added value of this approach as compared to existing and similar ones should be given some more attention. However setion 2.3 is extremely difficult to follow and clearly needs more explanations (see detailed comments below). By reading the methodology again it is not completely clear whether the main envisaged result of the paper are the soils moisture forecasts or the derivation

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of daily rainfall amounts from cumulated seasonal forecasts and despite the complete introduction a clear statement of the objectives is missing. And whatever is the main objective, the benefit of the expected results on agricultural drought forecasting has to be better explained as well. Eg. are we talking about drought occurrence only or also drought impact? Finally it could be interesting to compare the results with some remote sensing derived Soil Moisture product.

Specific comments:

P3051 L10-14 I think it's not completely appropriate to put the need for early warning systems and early response following the 2011 famine on the same level. In general there is a high consensus that early warning systems worked relatively well while the lack of appropriate and timely response was one of the main reasons that lead to the famine.

Fig 1. CHIRPS appears here first, introduce the acronym.

P 3052 L5-15 I understand that you take SM (for crop areas only?) as a direct predictor of agricultural drought, as opposed to rainfall only which would be meteorological drought. Can this be stated more clearly? Also later on SM is compared directly with the WRSI, but could SM be used to improve the WRSI model? Also maybe worth to mention that, with the exception of limited areas in Southern Somalia, the study area is predominantly a pastoral area.

P 3052 L29 and following. What is the link between the statement "Reliable rainfall forecasts over .. " and the following one? What rainfall forecasts are meant? Long term climatological forecasts or seasonal forecasts? Is the debate concerning only the causes of the decline in rainfall or the decline itself? If seasonal forecasts are meant this would have a negative impact on the relevance of the paper since it is not clear how soil moisture forecasts based on debatable rainfall forecasts are expected to improve the final drought forecast. So please specify.

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P 3053 L13 It would be nice to briefly outline the main differences with the mentioned approaches and also explain what is exactly the expected benefit of introducing an additional similar approach

P 3054 L 10-11. Was a land cover classification used to assign some fixed values to each vegetation type? It is not mentioned in the following description.

Fig 3. Can you explain why the correlation figure is covering nearly the whole globe? It is not clear how the correlations outside the study area, Eg. in the ENSO area, are used for the following steps of the analysis

Section 2.3. It is really hard to a fully understand the method presented in this section. I suggest that this section is deeply revised. Some ideas: - Introduce the section by stating what is the general purpose of the production of seasonal climate scenarios (producing daily sequences of rainfall forecast from CFSv2 seasonal forecast - I assume it's a single map updated time to time, explain clearly what time of forecast you get from CFSv2 and how you treat the fact that they are dynamical forecasts). - Point 1. EA MAM rainfall is compared to CFSv2 precipitation forecasts at global scale? - Point 2 and 3. Always describe on which domain the computations are performed (EA or Global). - Point 2. Explain why you use the absolute value. Negative correlations are considered equally important as positive ones? - Pont 3. Explain which similarity metric you use. - Point 4. Explain clearly how the daily sequence is produced staring from all other years daily sequences. If you are doing a weighted average of all annual profiles, you might have small rain contributions from a large number of days. How is this deal with? More information is needed to really understand what is done here - Fig 4. Bottom panel refers to a uniform distribution? If this is the case it is not really adding information, I suggest to omit it. In addition, if uniform, why is the frequency not exactly the same? - Fig 4. Revise English of the caption.

Fig 5. This figure adds very little to the simple statement in the text. I strongly suggest to omit it. A more meaningful one should be constructed with actual model runs.

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Section 3. I suggest to emphasize that the initial comparison with WRSI is made with VIC-SM in retrospective mode (not using forecast). I suggest this because the title of the section is focused on forecast.

P 3059 L7-10. Here I am a bit confused by the terminology. Are the SMs forecasted by VIC?

Fig 7 Why are the results presented here as spatial aggregates and later on they are pixel based?

P 3059 L 15. Referring to SM estimates (using the VIC model when all info are available) as SM observations sounds confusing to me. The exercise of comparing the two is meaningful but the nomenclature is confusing. Would it make sense to refer to "SM forecast" and "SM a posteriori estimates"?

Section 4. There is no discussion in this section (move the text to conclusion and introduction). The discussion is mostly in section 3. When referencing Rojas et al. 2011 consider referencing Meroni et al. 2014 (Early detection of biomass production deficit hot-spots in semi-arid environment using FAPAR time series and a probabilistic approach. Remote Sensing of Environment, 142, 57-68) more focused on drought forecasting instead of drought monitoring.

P 3062 L23. Where are the station data described in section 2 used? Do you mean the station data used in CHIRPS?

P 3063 Point 1. Please explain what is the benefit of transferring the system to LDAS with regards to the problem stated above. What observation do you plan to assimilate?

P 3064 Point 3. The point is very relevant given the complexity of the paper and also the difficulty of representing forecasts in an easily understandable way. However the sentence "We recognize .." does not add much. It would be better to specify how exactly you plan to improve the presentation of the forecasts.

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