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Hydrology and Earth System Sciences
Discussions

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

Anonymous Referee #2

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Seasonal drought forecasting in food-insecure regions such as East Africa is important for reducing drought risks in terms of decision making. This paper is targeted at augmenting the Famine Early Warning System Network (FEWS NET) through incorporating dynamical climate forecast models and a physically-based large-scale land surface hydrologic model. It is an interesting topic and it will benefit local agencies for drought vulnerable regions. I think the paper will finally fit HESS, but currently it suffers from insufficient validation and inappropriate presentation on its difference against previous studies. I would recommend for its publication after the comments below are addressed.

Major comments:

1. The title has to be changed, given that Sheffield et al. 2014 and Yuan et al. 2013 already introduced an African drought forecasting system based on CFSv2 and VIC which are also used in this paper. We know that climate forecast model and land surface hydrologic model (with non-trivial calibration) are the most important component for a dynamical-model-based seasonal hydrologic forecasting system, although an update of observation climatology with CHIRPS data is not trivial. Actually the novelty of the paper, in my opinion, is to assess CFSv2/VIC system for growing season in East Africa, and is more targeted at agricultural/crop management. I would suggest changing the title as "Seasonal forecasting of agricultural drought for food-insecure regions of East Africa" to avoid using "system development".

2. Validation. I was excited when I was looking at the title because I was supposed that the paper will address the application of seasonal hydrologic forecasting in crop management in a food-insecure region. But I finally realized that, as pointed out by the authors, the paper is a first step toward augmenting the FEWS NET. It's a reasonable argument because we have to validate the system before application. But I could not find any reference forecast to compare with the CFSv2/VIC forecast throughout the paper. While comparison with ESP/VIC (although straightforward) might be a huge task for revising the paper, at least the comparison with the FEWS NET seasonal climate outlooks (no matter precipitation or soil wetness) would be beneficial to show the rationale of implementing such CFSv2/VIC system.

3. The recent 2011 East of Horn Africa drought is a severe drought, which has been addressed in terms of seasonal forecasting by several papers (Dutra et al., HESS, 2013; Sheffield et al., 2014). Given that the hindcast period in this paper is 1993-2012 that also covers 2011, I would suggest adding a figure to show the system's performance on the prediction of 2011 drought for comparison with other studies.

Minor comments:

1. P3053. For the introduction of experimental/operational seasonal hydrologic fore-

casting system, the Princeton's CONUS seasonal drought forecast system that is based CFSv2 and VIC (http://hydrology.princeton.edu/forecast/current.php; Yuan et al., J Climate, 2013) would also be relevant.

2. P3056, generation of seasonal climate scenarios. The hindcast period is 1993-2012, while CFSv2 became operational in 2011 where different numbers of ensemble are generated: there are 24 ensemble members during CFSv2 hindcast period (1982-2010), while up to 124 members in the real-time forecast from 2011 to present. I am wondering how to handle them in post-processing CFSv2 forcings in this paper. Do you use all real-time members or just the 5-day gap members that are exactly the same as the hindcast? Is there any significant difference between them?

3. P3057. It is not clear how the bias correction is carried out. Some key equations should be introduced. Although the authors mentioned that the general method was introduced and validated in previous study, it will be useful for the readers to understand the paper if the authors could introduce that in this paper by showing a bias correction example with CFSv2 data. The bias correction might be another unique feature of the system and so it needs to be addressed clearly.

4. P3064. For the NMME/drought topic, Yuan and Wood, GRL, 2013 is also relevant.

5. Figure 3. How to explain the big negative correlations over west tropical Pacific? Are they reasonable?

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