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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Improving early warning of drought-driven food insecurity in Southern Africa using operational hydrological monitoring and forecasting products" *by* Shraddhanand Shukla et al.

Anonymous Referee #1

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To my understanding, this paper connects dynamical forecasts of soil moisture with regional crop yields over southern Africa statistically, and the results are encouraging since the soil moisture forecast correlates with crop yield quite well with a lead time of a few months. This study is novel and has a solid basis on climate-hydrology forecasting, where NASA Hydrological Forecasting and Analysis System that incorporates seasonal climate prediction and land surface hydrological simulation is implemented over southern Africa, and is evaluated for a number of extreme drought cases including the 2015/16 drought during the super El Nino. Utilizing dynamical hydrological forecasts in

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agricultural and water resources management sectors is not trivial, and this study push it a step further by smartly combining dynamical and statistical approaches, which provides implications for applications over other regions around the world. The paper is well written and the results are convincing, so I could not comment more while listing only a few minor suggestions below.

1. The abstract could be condensed and reconstructed by placing this southern Africa study in a wider context, where I believe the system has potential to be implemented globally.

2. Two references regarding the African ensemble drought forecasting (Yuan et al., 2013) and southern Africa 2015/16 severe drought attribution (Yuan et al., 2018) might be relevant. The latter focus on rapid evolving soil moisture drought (i.e., flash drought) over southern Africa, where the anthropogenic climate change intensified southern Africa flash drought, especially during 2016/16 El Nino in the midst of heat waves. So, an effective early warning system is essential for drought mitigation over the region.

3. L208-209. The authors mentioned that existing systems like FEWS NET and SADC failed to forecast rainfall during 2015/16. I am wondering whether they can compare the latest GEOS5 rainfall prediction, which is a central component in the forecast system proposed in this study, with those predictions from existing systems. This might highlight the advantage of the new system/method.

4. Although Figure 4 shows a good relationship between crop yield and predicted soil moisture, it might be useful to use some statistical techniques to convert soil moisture prediction into crop yield prediction. Perhaps the authors could comment on that in the discussion section, if they believe it would be useful for their future development of the forecast system.

References:

Yuan, X., L. Wang, and E. F. Wood, 2018: Anthropogenic intensification of southern

African flash droughts as exemplified by the 2015/16 season. Bulletin of the American Meteorological Society, 99, S86-S90, doi:10.1175/BAMS-D-17-007.1

Yuan, X., E. F. Wood, N. W. Chaney, J. Sheffield, J. Kam, M. Liang, and K. Guan, 2013: Probabilistic Seasonal Forecasting of African Drought by Dynamical Models. Journal of Hydrometeorology, 14, 1706-1720, doi:10.1175/JHM-D-13-054.1

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