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Seasonal Water Balance Forecasts for Drought Early Warning in Ethiopia

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Droughts severely impact Ethiopian agricultural production. Successful early warning for drought conditions in the upcoming harvest season therefore contributes to better managing food shortages arising from adverse climatic conditions. So far, however, meteorological seasonal forecasts have not been used in Ethiopia's national food security early warning system (i.e. the LEAP platform).
As part of the EU FP7 project EUPORIAS we aim at exploring the potential use of seasonal forecasts through predictions of relevant climate information indices (CII) for this region. Here we analyse the forecast quality of seasonal forecasts of total rainfall and of the meteorological water balance as simple drought stress indicator. We analyse forecast skill of June to September rainfall and water balance from dynamical seasonal forecast systems, the ECMWF System4 and EC-EARTH global forecasting systems. Furthermore we also look at the forecast performance for the recent drought at the Horn of Africa in 2015 and the outlook for 2016.
Rainfall forecasts outperform forecasts assuming a stationary climate mainly in Northeastern Ethiopia, including the highlands that are particularly vulnerable to droughts. Forecasts of the water balance index seem similarly or even more skilful and thus more useful than pure rainfall forecasts. The results vary though for different lead times and regions, as well as for skill measures employed. We further explore the potential for dynamical downscaling. To that end, we analyse forecasts of several regional climate models performed by other groups in EUPORIAS. Preliminary results suggest that dynamically downscaled seasonal forecasts are not significantly better compared with seasonal forecasts from the global models. We conclude that seasonal forecasts of a simple climate index such as the water balance have the potential to benefit drought early warning in Ethiopia, both due to its positive predictive skill and higher usefulness than seasonal mean quantities.