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).

Here we analyse the forecast quality of seasonal forecasts of total rainfall and of the meteorological water balance as a proxy for plant available water. 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.

Rainfall forecasts outperform forecasts assuming a stationary climate mainly in north-eastern Ethiopia – an area that is particularly vulnerable to droughts. Forecasts of the water balance index seem to be even more skilful and thus more useful than pure rainfall forecasts. The results vary though for different lead times and skill measures employed. We further explore the potential added value of dynamically downscaling the forecasts through several dynamical regional climate models made available through the EU FP7 project 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.