Geophysical Research Abstracts
Vol. 18, EGU2016-17111, 2016
EGU General Assembly 2016

Probabilistic maize yield simulation over East Africa using ensemble seasonal climate forecasts

Geoffrey Ogutu (1,2), Iwan Supit (1), and Ronald Hutjes (1)

(1) Wageningen University, Environmental Sciences Group, Wageningen, Netherlands (geoffrey.ogutu@wur.nl), (2) Kenya Meteorological Service, Nairobi, Kenya(ogutugeoff@hotmail.com)

Seasonal climate variability influences crop yields, especially in areas where rain fed agriculture is widely practiced such as in the East African region. Assuming that seasonal climate prediction skill would translate to similarly skillful prediction of impacts, an ensemble seasonal climate hindcast (ECMWF system4 EPS) for the period 1981 to 2010 at different initialization dates (lead months) before sowing is used to drive a crop simulation model: the World Food Studies (WOFOST) model, implemented for a single season Maize crop. The water-limited yield predictions were assessed against reference yields produced by the same crop model forced by the WATCH Forcing Data ERA-Interim (WFDEI) at grid point level. We focus on the main sowing dates of June/July (Northern region), March (Equatorial East Africa) and November (Southern region). Deviation of yields from the mean over the study period is used to indicate regions in which probabilistic yield forecasts would be useful while the Relative Operating Curve Skill Score (ROCSS) indicates prediction skill of above normal, near normal and below normal yield prediction.

Equatorial regions of East Africa and coastal Kenya with sowing date in March show a mean deviation of $\geq$ 500 Kg/ha. Here probabilistic yield forecasts can potentially be useful as opposed to the northern and southern regions with less deviation. The high deviation in this region may also be due to the existence of more than one cropping season corresponding to the bi-modal rainfall regime since the model only simulates a single season. A positive ROCSS over a large extent of the equatorial region show predictability skill of all the tercile forecasts simulated by forecasts initialized at the start of sowing date (March i.e. lead 0 forecasts) and no predictability at longer lead months. Over Ethiopia in the northern region of East Africa, November harvests with a sowing date of June show predictability of the upper, lower and middle terciles at lead-0 forecasts (initialized in June) while lead-1 forecasts (initialized in May) are only as good as the climatology. In the South, considering March harvest date and November planting dates, only lead-0 forecasts show predictability of below and above normal yields (ROCSS up to 0.6) over large spatial extents while the middle tercile forecasts are poor (negative). Other skill metrics have also been assessed.Considering the sample sowing dates and harvest dates assessed, it can be concluded that even though probabilistic yield prediction show skill largely at lead-0 forecasts before sowing, there is potential to improve predictions.