TRENDS AND VARIABILITY OF AGRICULTURAL DROUGHT UNDER CLIMATE CHANGE IN ETHIOPIA

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Most of farmlands in Ethiopia are located in the highlands. The total amount of rainfall is 1600 mm per year, but they are still affected by short-term droughts, especially during the dry season. The erratic nature of the seasonal rainfall distribution affects the rainfed agricultural system in the country. Moreover, the frequency of agricultural drought is reported to further increase due to climate change. Therefore, assessing the historical and future agricultural drought projections under climate change is critical. The objective of this study was to investigate the trends and variability of agricultural droughts in Ethiopia under five Global Circulation Models (GCMs; GFDL_ESM4, MPI_ESM1_2_HR, MRI_ESM2_0, and UKESM1_0_LL), two Shared Socioeconomic Pathways (SSPs; SSP245 and SSP585) and three climatological periods (Baseline; 1991-2020, 2035s; 2021-2050, and 2065s; 2051-2080). Downscaling of GCMs was conducted using the Bias Correction/Constructed Analogues with Quantile Mapping Reordering (BCCAQ) method. Trends and variability of short-term agricultural drought were investigated using a 3-months standard precipitation index (SPI) and consecutive dry days (CDD) in Ethiopia. The Mann Kendall test was used to evaluate temporal trends of agricultural drought. Most of the GCMs showed consistent projections of an increasing agricultural drought in Ethiopia for the two periods (2035s and 2065s). Results also showed a significant increase trend in SPI and CDD in most parts the country. Up to 65% of the total area of country is projected to be affected by an increasing agricultural drought (mild (0 - -0.99 of SPI) to severe (-1.5 - -1.99 of SPI)) under the two SSPs in 2035s. However, the proportion of drought affected areas is projected to decrease almost by half in 2065s compared to in 2035s. Trends in CDD are also projected to increase under the two SSPs in 2065s. This result indicates that future agriculture will likely suffer from a more frequent and intensive agricultural droughts (Mild to severe). Therefore, management decision should aim to tackle short term agricultural droughts through different interventions.

PRESENTER BIO: Mr. Fikadu Getachew is currently a Ph.D. Student at the University of Florida in the Agricultural and biological engineering department. He has eight years of working experience in crop and climate modeling. He has also been awarded an International Climate Change Protection fellowship from the Alexander Von Humboldt in Germany, Young Scientist support program 2012, and recently won the Intergovernmental panel on climate change (IPCC) scholarship program 2021. His research interest is detecting a proxy of drought indices from surface and satellite observations using crop simulation modeling approaches. His current research looks into the effects of supplemental irrigation and shifting planting dates to mitigate climate change impacts on sorghum production.