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Climate change effects on the sub-Saharan agriculture- a case study in Kenya on maize growth and adaptation options

Climate change is progressively advancing, and is affecting the entire globe, with some areas more vulnerable than others. Among them, the sub-Saharan Africa, with a very low adaptive capacity, mainly relies on one economic sector: agriculture. Due to its high climate-dependency, agriculture is at elevated risk.

Among the different staple crops produced in the sub-Saharan Africa, maize is the most cultivated, and partly guarantees food security. However, climate change is projected to lower maize yields, negatively affecting some parts of the region which already suffers high levels of famine.

In this study, two maize varieties based on their sowing date, early and late, are modelled in three diverse sites in Kenya under the RCP8.5 scenario using climate data retrieved from CORDEX for temperature, precipitation and evapotranspiration, from 1951 to 2100. Early and late maize yields and biomass was simulated using the crop model AquaCrop, developed by FAO. In parallel, important temperature-dependent maize development thresholds was specifically analyzed. The results indicated lower early maize biomass and yields in a future climate change scenario. This outcome suggested the late sowing maize variety as the most suitable adaptation option for the three sites in Kenya. Furthermore, the limitation of AquaCrop of only simulating year-by-year was discussed. It is therefore suggested to run model simulations on a longer time span in order to better project future climate change impacts. This study can contribute to the work of assessing climate change derived social implications in the sub-Saharan Africa, such as future food security and migrations.

Keywords: physical geography, sub-saharan africa, agriculture, maize, climate change

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