PROJECTED CHANGES IN MEAN RAINFALL AND TEMPERATURE OVER EAST AFRICA BASED ON CMIP5 MULTIMODEL ENSEMBLE

Victor Ongoma[1,2,*], Haishan Chen[1], Chujie Gao[1]
[1]Nanjing University of Information Science & Technology, Nanjing 210044, China, [2]South Eastern Kenya University, P.O. Box 170-90200, Kitui - Kenya
*Email: victor.ongoma@gmail.com

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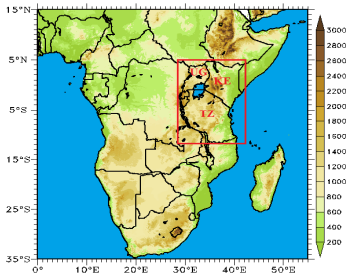
1. Introduction

•Rainfall over East Africa (EA; Kenya, Uganda, & Tanzania) exhibits high spatiotemporal variability.
•EA is highly vulnerable to the effects of climate variability &change
•Rainfall is the most valuable weather parameter in EA.
•Temperature has a strong influence on malaria cases.
•Rainfall is declining (March-May 'MAM' season), while temp. is on increase.
•Projected upward rainfall trend; CMIP5
•In this study, CMIP5 model datasets are used to elaborate on the projected changes in mean annual & seasonal rainfall & temp. over EA



Area of Study

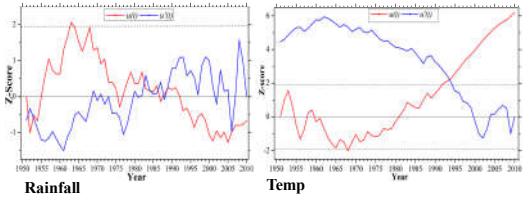
UG–Uganda
KE–Kenya
TZ–Tanzania

2. Data and Methodology

Data
•Monthly reanalyzed rainfall; CRU
•22-CMIP5 Models
•MME mean of 5 models: CanESM2, CESM1-CAM5, CNRM-CM5, CSIRO-Mk3-6-0, & MICROC5
•RCPs4.5&8.5

Methodology
•Model Evaluation; Bias, RMSE, Hovmoller Diagram, Taylor Diagram
•Projection period; 2071 to 2100
•Baseline period; 1961 to 1990
•Trend analysis: MK & Sen's slope estimator
•Decadal anomalies
•Probability density functions (PDFs)
•*F*-Test statistic

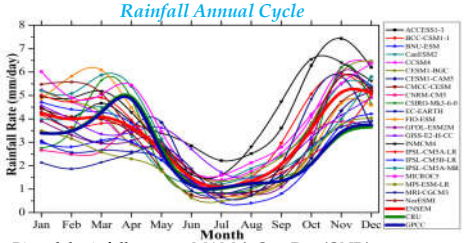
3. Results and Discussion



Rainfall **Temp**

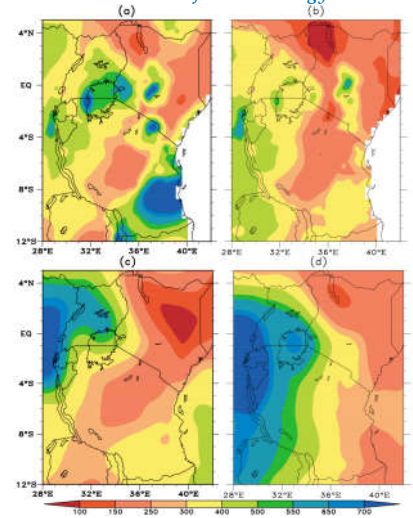
Sequential MK test at 5% significance level, based CRU data, 1951-2010

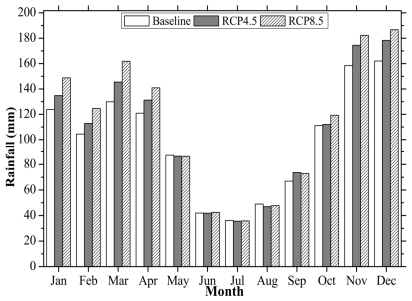
Rainfall Annual Cycle



Bimodal rainfall pattern: MAM & Oct.-Dec (OND) seasons
Models overestimate (underestimate) OND(MAM) rainfall
The models poorly reproduce interannual rainfall variability

Seasonal rainfall climatology



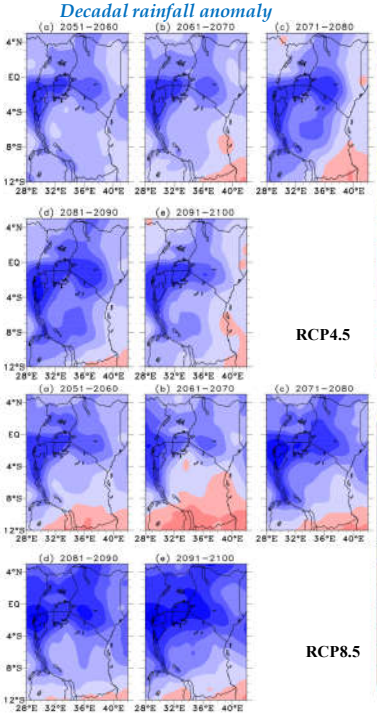


Monthly modelled rainfall climatology (mm) for the baseline & for the projected period EA under the RCP4.5 & 8.5 scenarios.
**Projected rainfall decrease in May

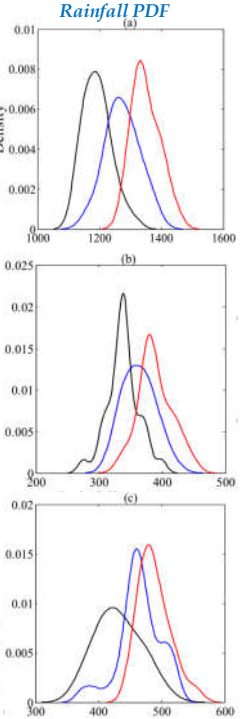
4. Discussion & Conclusion

•The results support the observed EA climate paradox.
•Warming is likely to exceed UNFCCC's target of limiting temp. within 1.5 & 2 °C above pre-industrial levels.
•The PDFs of seasonal rainfall show an increase in rainfall frequency; possibility of extreme wet seasons & years.
•Decrease in May rainfall is likely to hinder agriculture in the region.
•The results are based on models with high uncertainty, and thus should treated with low confidence.
•There is need for improving performance of CMIP models over EA.

Decadal rainfall anomaly

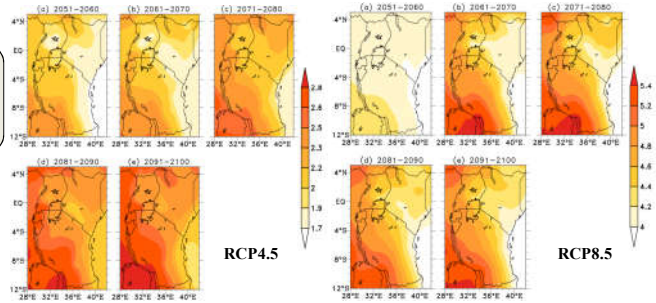


Rainfall PDF



(a) Annual, (b) MAM, &d (c) OND, RCP4.5(Blue) & RCP8.5 (Red) scenarios, & baseline (Black).

Temp. Anom.



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