Long-term spatial-temporal trends and variability of rainfall over Eastern and Southern Africa.

Abstract

This study investigates the spatial-temporal trends and variability of rainfall within East and South Africa (ESA) region. The newly available Climate Hazards group Infrared Precipitation with Stations (CHIRPS-v2) gridded data spanning 37 years (1981 to 2017) was validated against gauge observations (N = 4243) and utilised to map zones experiencing significant monotonic rainfall trends. Standardised annual rainfall anomalies revealed the spatial-temporal distribution of below and above normal rains that are associated with droughts and floods respectively. Results showed that CHIRPS-v2 data had a satisfactory skill to estimate monthly rainfall with Kling-Gupta efficiency (KGE = 0.68 and a high temporal agreement (r = 0.73) while also preserving total amount (β = 0.99) and variability (γ = 0.8). Two contiguous zones with significant increase in annual rainfall (3–15 mm year^{-1}) occurred in Southwest Zambia and in Northern Lake Victoria Basin between Kenya and Uganda. The most significant decrease in annual rainfall (– 20 mm year^{-1}) was recorded at Mount Kilimanjaro in Tanzania. Other significant decreases in annual rainfall ranging between – 4 and – 10 mm year^{-1} were observed in Southwest Tanzania, Central-South Kenya, Central Uganda and Western Rwanda. CHIRPS-v2 rainfall product provides reliable high spatial resolution information on amount of rainfall that can complement sparse rain gauge network in rain-fed agricultural systems in ESA region. The observed spatial-temporal trends and variability in rainfall are important basis for guiding targeting of appropriate adaptive measures across multiple sectors.

Authors.

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