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Trends and variability of East African rainfall and its relationship to the Mascarene High pressure system

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In the recent decades, East Africa suffered from strong fluctuations in seasonal rainfall including precipitation extremes. In context of climate change, such extremes can become more frequent in the future. However, regional climate projections are uncertain about the future development of seasonal precipitation in the region.
Rainfall regimes over East Africa are influenced by multiple factors, including two monsoon systems, several convergence zones and the Rift Valley lakes. In addition, local conditions, like topography, modulate the large-scale rainfall pattern. East African rainfall variability is also influenced by various teleconnections like the Indian Ocean Zonal Mode and El Niño Southern Oscillation.
The specific aim of the present study is the analysis of historical datasets to quantify climate variability in the recent past and to understand its causes.
The study of past climate variability in East Africa requires sufficient observational data coverage in the region. As East Africa does not have a dense observational network of meteorological stations, satellite rainfall observations gain on importance in studies on climate variability in the region. Hence, for this study we analyze historic data from weather stations in East Africa (Kenya, Tanzania, Ruanda and Uganda), gridded satellite products, and three-dimensional atmospheric reanalysis (e.g., ERA-Interim) to quantify climate variability in the recent past and to understand its causes.
Climate variability and trends, including changes in extreme events, are evaluated using ETCCDI climate change and standardized precipitation indices. These climate indices are determined in order to investigate the variability of rainfall and its trends with the focus on recent decades. For seasonal trend analysis, an independent and non-calendaric rainfall onset criterion is introduced.
In the follow-up, statistical and dynamical analyses are conducted to quantify the local impact of Mascarene High as a part of the Subtropical High Pressure Ridge on East African seasonal rainfall. Possible connections to pertinent large-scale modes of climate variability (Indian Ocean Zonal Mode and El Niño Southern Oscillation) are expected.