

Abstract

Extreme weather and climate events such as floods and droughts are common in East Africa, causing huge socio-economic losses. This study links the east African October-December (OND) rainfall, Indian Ocean Dipole (IOD) and Mascarene High (MH). Correlation analysis is applied to quantify the relationship between the index of IOD (Dipole Mode Index (DMI)) and OND rainfall. Results show that there exists a significant correlation between OND rainfall and DMI, with a correlation coefficient of 0.6. During dry years, MH is observed to intensify and align itself in the southeast-northwest orientation, stretching up to the continent, which in turn inhibits the influx of moisture from Indian Ocean into East Africa. During wet years, MH weakens, shifts to the east and aligns itself in the zonal orientation. Moisture from Indian Ocean is freely transported into east Africa during wet years. Analysis of the drought and flood years with respect to the different variables including wind, velocity potential and divergence/ convergence revealed that the drought (flood) years were characterized by divergence (convergence) in the lower troposphere and convergence (divergence) at the upper level, implying sinking (rising) motion, especially over the western Indian Ocean and the study area. Convergence at low level gives rise to vertical stretching, whereas divergence results in vertical shrinking, which suppresses convection due to subsidence. Positive IOD (Negative IOD) event results into flood (drought) in the region. The evolution of these phenomena can thus be keenly observed for utilization in the update of seasonal forecasts.