

Abstract

Extreme weather events; floods and droughts are common in southern Africa (SA) consisting of 8 countries (Botswana, Namibia, South Africa, Lesotho, Swaziland, Mozambique, Zimbabwe, parts of Angola and Zambia). This study examines the linkage between the SA October-December (OND) rainfall, the Indian Ocean Dipole (IOD) and the South Atlantic Oscillation Dipole (SAOD). Empirical Orthogonal Functions (EOF) technique is used to establish the dominant mode of variability of OND rainfall, as correlation analysis is applied to quantify the relationship between the indices; IOD [Dipole Mode Index (DMI)], SAOD Index (SAODI) and OND rainfall variability. Results show that the dominant mode of variability of OND rainfall exhibits a dipole pattern over SA and there exists a significant correlation at 95% confidence level between the area average OND rainfall (rainfall index (RFI)) and DMI, with a correlation coefficient of -0.3. The relationship between the mean SA OND rainfall and the positive phase of IOD varies greatly in space, ranging from one country to another. Further analysis of the dry and wet of SAOND rainfall years reveal that wet years are associated with convergence at surface level (850 hPa) and divergence at upper level (200 hPa), depicting rising motion in the region, whereas dry years are associated with divergence at low level and convergence at upper level, implying descending motion. The study recommends further research on a reduced spatial scale, for instance at a country level to ascertain the effect of IOD on individual country's weather. This will help in accurate monitoring of the evolution of IOD events to improve quality of seasonal weather forecasts in the region.