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Influence of La Nina on extreme rainfall over southern Africa associated with tropical temperate troughs
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La Nina appears to have the greatest influence on rainfall in southern Africa and wet episodes tend to occur throughout the subcontinent. Extreme heavy rainfall events occurred over southern Africa due to synoptic disturbances during the austral summer and contributed to above normal seasonal rainfall in the case of La Nina events. Tropical temperate trough (TTT) is one such disturbance often associated with some of the severe floods of that region. The TTTs connect synoptic disturbances of the tropics and mid-latitudes, and bring heavy rainfall over southern Africa extended along the northwest-southeast direction. Based on a new objective method, 55 TTT events are identified using daily anomalies of outgoing longwave radiation and wind during the study period of 1980-2009. From the composite analyses of those 55 events, it is found that the TTTs evolve with suppressed convection over the southwest Indian Ocean adjacent to Madagascar region and enhanced convection over southern Africa. The suppressed convection found to be associated with the enhanced convection around Sumatra in southeast tropical Indian Ocean and this in turn associated with La Nina conditions in the Pacific. It is also found that, 11 TTT events evolved in 10 El Nino or El Nino Modoki years (average 1.1) but 18 TTT events evolved during 7 La Nina or La Nina Modoki years (average 2.6). Since the annual frequency of the TTT events is 1.8, it appears that more number of TTT events is associated with La Nina/ La Nina Modoki rather than El Nino/ El Nino Modoki. The La Nina and La Nina Modoki conditions seem to modify the Walker circulation, with upper level convergence over the equatorial Indian Ocean near the African continent and Madagascar region. This higher level convergence draws flow from the southern Africa landmass and this could induce anomalous low level convergence associated with the TTT over the landmass.

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