Teleconnection between Ocean-Atmospheric Oscillations and Extreme Rainfall: A Case Study for Jaffna Peninsula during 2015 and 2020

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Indian Ocean Dipole (IOD) and El-Nino Southern Oscillation (ENSO) are identified as two ocean-atmospheric oscillations that impact over rainfall of Sri Lanka and cause extreme rainfall events. However, recent studies on teleconnection between ocean-atmospheric oscillations and rainfall over Sri Lanka are lacking. Despite that, this study aimed to identify the IOD and ENSO impacts of the extreme rainfall that caused flooding at the end of 2015 and 2020 in Jaffna Peninsula, Sri Lanka. The daily rainfall (from 2000 to 2020) for the Jaffna Peninsula and monthly sea surface temperature (SST) data (1960 to 2020) over IOD and Nino regions were used for the study. The climatological mean was calculated for monthly rainfall and SSTs, and anomalies were derived. The warm and cold ENSO months were identified based on the SST anomalies at the threshold of ± 0.5 and for the Dipole Mode Index which derives IOD, the threshold levels were as ± 0.4. According to the results, the maximum above-average monthly rainfall was received during November 2015 and December 2020. Nevertheless, IOD was at the neutral phase for both the identified months. Interestingly, except for the Nino 3.4 region, all other regions were in the warm ENSO phase in November 2015. A cold ENSO phase was observed for all the Nino regions in December 2020. Furthermore, the presence of cyclone Burevi in the Bay of Bengal could alter the effect of ENSO during December 2020. Hence, further studies are suggested to understand the relationship between above-average rainfall in Jaffna with the cold ENSO phases, because previous studies identified warm ENSO phases facilitate the above-average rainfall over India.

Keywords: Extreme rainfall, Jaffna, Ocean-atmospheric oscillations