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Identification of Annual and Seasonal Trends of Extreme Temperature and Precipitation in the Intermediate Zone, Sri Lanka from 1981 to 2019

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Abstract

This study focuses on the Intermediate Zone (IMZ) in Sri Lanka, a region with diverse ecological and socio-economic characteristics. The main objective is to analyse annual and seasonal trends in extreme events of temperature and precipitation to better comprehend the potential impacts of climate change in this area. From 1981 to 2019, the daily maximum and minimum temperature and precipitation data were collected from the Department of Meteorology, Sri Lanka, as temperature data in four locations and precipitation data in six locations based on the maximum data availability. The analysis utilized sixteen extreme temperature indices and twelve extreme precipitation indices as defined by ETCCDI via RClimDex software. The Mann-Kendall trend test and regression analysis were employed for trend identification. The trend analysis of annual and seasonal as Yala and Maha revealed significant changes in daytime and night-time temperatures. Analysis of selected indices indicates that the daytime temperature has decreased significantly in Monaragala both seasonally and annually. Similarly, the number of days with cooler days has increased significantly in the Maha season. Badulla, the location that is adjacent to Monaragala, showed a similar pattern annually. However, by shifting the IM zone to the North-western part of the country, the temperature behaves differently. Kurunegala and Batalagoda experienced a significant decrease in the number of days with cooler daytime temperatures. Night-time temperatures behave differently than daytime temperatures in the IM zone. Badulla and Monaragala demonstrated a significant rise in night-time temperature patterns, while also experiencing decrease in the number of cooler days annually. The temperature difference between day and night decreased in Badulla and Monaragala while increasing in Batalagoda, both annually and seasonally, indicating both negative and positive impacts on agriculture. The annual mean daytime temperature (TMAXMEAN) showed a significant decreasing trend throughout the IM zone, while the mean night-time temperature (TMINMEAN) showed both increasing (Monaragala, Kurunegala) and decreasing (Batalagoda) trends annually as well as seasonally. Over the past 30 years, there have been no significant changes in precipitation, both annually and seasonally, in all the selected locations, and it is expected to continue this trend in the future. Over the study period, the Intermediate Zone in Sri Lanka experienced significant changes in extreme temperature indices. The daytime has become both warm and cool according to the location, and the night-time has become warm throughout the IM zone.

Keywords: Extreme, Intermediate zone, Precipitation, Sri Lanka, Temperature