

Trends in Seasonal Extremes of Rainfall and Temperature of Sri Lanka

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Due to several reasons, including regional climatic fluctuations, Sri Lanka is likely to have a feedback effect on the local climate, especially the changes in the trends of seasonal extremes of rainfall and temperature. In this study, a comprehensive set of climate indices were used to investigate the trends in seasonal extremes of rainfall and temperature of Sri Lanka. The data consists of 55 years (1961–2015) of unadjusted daily rainfall and temperature records from 20 synoptic meteorological stations scattered throughout Sri Lanka. The iterative prewhitening method was first used to separate autocorrelation from the time series by checking the significance of the lag 1 autocorrelation coefficient and the modified seasonal Mann–Kendall test then applied to the seasonal values. The trend homogeneity between the seasons tested before the application of seasonal versions of the Mann-Kendall and Sen-Theil tests. Although variable rainfall pattern is typical in Sri Lanka, during the southwest monsoon, 15% of the stations showed a statistically significant ($p < 0.05$) decrease in wet days. The increasing tendency in 2, 3 and 7-day mean rainfall events indicate the consistent trends in short duration rainfall events. Warming of nighttime and daytime temperature is apparent due to the increase in daily minimum temperature and the daily maximum temperature as observed in 70 and 55% of the stations, respectively. In the wet and dry zones, the decreasing trends in the daily temperature range (DTR) were most evident in the southwestern part of Sri Lanka while increasing DTR became more common in the dry zone. The fitted generalised extreme value distribution resulted in the positive shape parameter for all the seasons. The nonparametric statistical technique used in this investigation, which addresses seasonality and extremes, provides a good understanding of trends in seasonal extremes of rainfall and temperature in Sri Lanka.

Keywords: Block Maxima, Climate Change, GEV Distribution, Prewhitening, Trend Analysis