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Effect of solar activity on weather changes and occurrence of extreme event cyclones

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Variation of radiation emitted from the sun can affect the weather parameters. This paper describes an attempt made to understand the influence of solar activity on weather pattern in and around Sri Lanka surrounded by the vast Indian Ocean. Sunspot number was used as an indicator of solar

activity. Atmospheric temperature and the occurrence of extreme weather event cyclones were considered to understand weather changes within a limited scope.

Annual mean temperature was calculated using monthly atmospheric temperature data collected from thirteen Meteorological stations in Sri Lanka over a period of hundred and ten years from 1870 to 1980. Sunspots data were obtained from international solar observation projects NOAA and SOLAR.

Correlation coefficient between atmospheric temperature and sunspot number was calculated and found to be 0.1 in short term (monthly) as well as long term (annually) periods. The existence of no significant correlation between the solar activity (which is a global parameter on temperature) and atmospheric temperature in Sri Lanka can be attributed to the greater influence of local effect of the vast ocean around the island than the solar activity.

The second part of the study was focused to understand the influence of solar activity on cyclones affecting Sri Lanka. Out of the fourteen cyclones that crossed over Sri Lanka during the period 1900 to 1980, nine have crossed over the island during the period 1900 to 1932 and the rest during the period 1964 to 1980. In order to understand this, the temperature differences between annual mean temperature on the years having maximum sunspots and subsequent years having minimum sunspots was calculated. Results indicate that when the difference is negative (-0.3 ^{0}C for the period 1900 to 1932 & -0.1 ^{0}C for the period 1964 to 1980) cyclones are crossing over Sri Lanka, and when the difference is positive (difference vary from 0.5 ^{0}C to 0.1 ^{0}C during the period 1933 to 1954) cyclones originated in the Indian Ocean do not cross over the island. This criteria can be adopted after further verifications to identify potentially hazardous cyclone prone years to Sri Lanka and thereby in better disaster management.

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