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PRECIPITATION, SEA SURFACE TEMPERATURE (SST), AND THEIR RELATIONSHIP OVER THE TROPICAL INDIAN OCEAN FROM 1982 TO 2020

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Precipitation, sea surface temperature (SST) and their interactions contribute to the climate, ecology, economy, and social aspects of a given area. The precipitation over the tropical Indian Ocean fluctuates with SST. The evaporation, wind direction, wind speed, Indian Ocean dipole, El Niño, and La Niña are influenced by SST. This study aimed to identify the prevailing patterns and annual trends of precipitation and SST of the tropical Indian Ocean region (30°N, 20°S, 40°E, 110°E) from 1982 to 2020. Monthly precipitation and SST data were obtained from Asia-Pacific Data-Research Center. MATLAB R2020a version was used to analyse data. Monthly anomalies of the precipitation and SST were calculated by removing the seasonal cycle of the data set. Annual trends of precipitation and SST were analysed by annual means. The highest and lowest (driest) monthly precipitation was in July (4.30 mm) and March (2.69 mm), respectively. The precipitation range of June-July-August is 3.69 mm to 4.86 mm, and December-January-February data varied from 2.69 mm to 3.62 mm. May (28.5 °C) and January (26.4 °C) months represented the highest (warmest) and lowest (coldest) monthly SST, respectively. The annual trend of precipitation and SST showed a ± 0.004 mm/year and a positive 0.02 °C/year, respectively. The mean annual SST of the tropical Indian Ocean during recent years (2000-2020) was 0.4 °C higher compared to the past 17 years (1982-1999). A significant positive correlation was observed between the annual SST and precipitation (+ 0.34 at 0.05 level of significance). Therefore, increasing SST due to global warming may change normal precipitation pattern, and these changes can have substantial implications for ecosystems, weather patterns and climate dynamics.

Keywords: Annual trend, Monthly climatology, Precipitation, Sea Surface Temperature (SST), Tropical Indian Ocean