A Study on the Extreme Temperature Events Based on Gridded Data

Ashu Mamgain and S. K. Dash

Center for Atmospheric Sciences, IIT Delhi, HauzKhas, New Delhi 110016

Studies suggest that the frequency of occurrence of extreme temperature days is increasing over India. Such studies have been conducted based on observed data at several stations covering different time durations. Today, the values of daily maximum and minimum temperatures for the period 1969-2005 are prepared by the India Meteorological Department (IMD) at a resolution of $1^{o}x1^{o}$ over the land points of India. Using this daily dataset we have examined the temperature characteristics in seven different Indian regions as well as over the whole of the country. The maximum temperatures are analysed for heat wave events while minimum temperatures are used for cold wave events. It may be noted that to study the maximum and minimum temperature events in a particular homogeneous region two steps are followed. The number of days with temperature above or equal to the 75^{th} percentile of daily maximum temperatures are screened to obtain the number of days with maximum temperature equal to or above 99^{th}, 95^{th} and 90^{th} percentiles. The first step is adopted to identify the period for which a particular frequency distribution could best fit to the temperature data. Otherwise it is difficult to fit any distribution pattern in case of whole year dataset of widely varied intensities. Similar strategy is adopted in case of minimum temperature. The number of days with temperature below or equal to the 25^{th} percentile of daily minimum temperatures are screened to obtain the number of days with minimum temperature equal to or below 1^{st}, 5^{th} and 10^{th} percentiles. Generalized extreme value distribution is significantly fitted to these data in all the regions except Western Himalaya. Using 37 years of data we have identified significant increasing trends in heat events in East Coast and West Coast and significant decreasing trends in cold events in East Coast, Interior Peninsula, North Central, North West and West Coast of India.