Inter-Annual to Decadal Variations in Extreme Precipitation over India: Observations

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There has been a growing consensus[1] that a discernable influence of human activity has become evident in the Earth's climate in the last 50 years or so. The global mean surface temperature rose by about 0.74˚C between 1906 and 2005. Most of this increase has been attributed to human-induced emissions of greenhouse gases. A comparable increase of 0.71˚C has been observed[2] in mean surface temperature over India between 1901 and 2003. While a robust signal associated with human activity has emerged on global and hemispheric scales, there are still large uncertainties in the magnitudes and regional changes projected for the coming years. While the temperature over has been increasing, no significant change in the monsoon season or annual mean precipitation has been observed over India. Previous studies[3,4,5] that have looked at changes in the incidence of extreme precipitation events (averaged over various geographic regions) find a consistent increase in the frequency of high intensity events accompanied by a decrease in low-to-moderate intensity events when recent decades are compared to earlier periods. An interesting question would be to see if changes in the frequency distribution of extreme precipitation events are statistically different than random variations and if so, are the changes consistent with climate change due to anthropogenic activities. As a first step towards this objective, this paper investigates the spatiotemporal variability of daily extreme precipitation events over India on Inter-annual to decadal time scales. We use the 1901-2004 gridded (1˚x1˚) rainfall data from IMD and perform our analysis at each grid-point to avoid averaging over climatically diverse regions and also to gain a comprehensive picture of variability over India.

Keywords: extremes; precipitation; variability; decadal; inter-annual; India.

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