Changes in the Characteristics of Precipitation and Temperature Over India

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Because of the vastness of geographical extent, heterogeneity of climate and complexity of topography, the study of climate change in India needs emphasis on the regional aspects to arrive at meaningful scientific results. In this study emphasis has been given on the notable spatial (across different regions) as well as temporal (across different seasons) changes in precipitation and temperature in the last half century based on the gridded data of India Met Department. During the summer monsoon season the number of short spell rain events and dry spells have increased in the last half century, but long spell rain events show decreasing trend. The short spell rainfall events usually occur because of local convection, thunderstorms, western disturbances and other meso-scale phenomena which are not necessarily due to monsoon circulation and organized convection. On the other hand long spell rain events during summer monsoon months are normally associated with synoptic scale or planetary scale phenomena. The decrease in the number of long spell rain events associated with similar tendencies in the number of monsoon depressions, the mean monsoon wind and its shears over India point towards the proposition that the Indian summer monsoon circulation has been weakening. These regional phenomena can be well studied by the use of a regional climate model. Analysis shows that extreme temperature events have increased in the east coast of India in the recent past. There has been increase in severe cases of visibility less than 200m in the north. Rainfall patterns during different seasons indicate small increase except in summer monsoon. Also during summer monsoon months, there is a decreasing trend in the frequency of depressions and systems with higher

intensities together in contrast to increase in the number of low pressure areas.

Results of this comprehensive study based on observed data and reanalysis indicate that in the last century, the atmospheric surface temperature in India has enhanced by about 1^{o}C during winter and post-monsoon months. Also decrease in the minimum temperature during summer monsoon and its increase during post monsoon months has created a large seasonal temperature gradient of about 0.6^{o}C which may affect the circulation pattern and associated rainfall. The sea surface temperatures of Arabian Sea and Bay of Bengal also show increasing trend. Since RegCM3 simulates the Indian summer monsoon circulation and associated rainfall reasonably well and also it is sensitive to the land surface feature such as Tibetan snow, this model is currently used to generate the regional climate scenarios in the warming atmosphere. In this talk it will be highlighted that from the point of climate change the role of the Himalayas in the northern India is as important as the role of the oceans in the southern India.