



Complex network analysis of extreme precipitation over the Indian subcontinent.

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The Indian monsoon is a large scale pattern in the climate system of the Earth. The motivation of our work was to reveal spatial structures in strong precipitation over the Indian subcontinent, and their evolution during the year, because it is crucial as for understanding of monsoon regularities as well for India's agriculture and economy. We present an analysis of extreme rainfall over the Indian peninsula and Sri Lanka. Using the method of event synchronization we constructed networks of extreme rainfall events (heavier than the 90-th percentile) for three time periods: during the Indian summer monsoon (ISM, June–September), the Northeast monsoon (NEM, October – December, so called winter monsoon) and period before the summer monsoon (January - May). Obtained networks show how extreme rainfall for specific areas in India is synchronized with extreme rainfall for other areas in India. Analysis of degree centrality of the networks reveals clusters of extreme rainfall events in India which are strongly connected to maximal number of other areas with extreme rainfall events, e.g., North Pakistan and the Eastern Ghats. Additionally, betweenness centrality shows areas that are important in the sense of water transport in the networks (e.g. the Himalayas, Western Ghats, Eastern Ghats etc.). By comparison of networks before the summer monsoon, during summer and winter monsoon season we determined how spatial patterns of rainfalls synchronization change during the year. These changes play a crucial role in the organization of the rainfall all over the Indian subcontinent.