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Complex network analysis of high rainfall events during the northeast monsoon over south peninsular India and Sri Lanka

P. Martin (1), N. Malik (2), N. Marwan (1), J. Kurths (1,3)

(1) Potsdam Institute for Climate Impact Research, P.O. Box 60 12 03, 14412, Potsdam, Germany, (2) Department of Mathematics, University of North Carolina, Chapel Hill, NC 27599-3250, USA , (3) Department of Physics, Humboldt University, Newtonstr. 15, 12489 Berlin, Germany

The Indian Summer monsoon (ISM) accounts for a large part of the annual rainfall budget across most of the Indian peninsula; however, the coastal regions along the southeast Indian peninsula, as well as Sri Lanka, receive 50% or more of their annual rainfall budget during the northeast monsoon (NEM), or winter monsoon, during the months from October through December. In this study, we investigate the behavior of the NEM over the last 60 years using complex network theory. The network is constructed according to a method previously developed for the ISM, using event synchronization of extreme rainfall events as a correlation measure to create directed and undirected links between geographical locations, which represent potential pathways of moisture transport. Network measures, such as degree centrality and closeness centrality, are then used to illuminate the dynamics of the NEM rainfall over the relevant regions, and to examine the spatial distribution and temporal evolution of the rainfall. Understanding the circulation of the monsoon cycle as a whole, i.e. the NEM together with the ISM, is vital for the agricultural industry and thus the population of the affected areas.