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Linking Atmospheric Moisture Transport to Extreme Precipitation Events Associated with Floods over India

Akash Singh Raghuvanshi¹ and Ankit Agarwal²

¹Indian Institute of Technology, Roorkee, Hydrology, India (akash_sr@hy.iitr.ac.in)

²Indian Institute of Technology, Roorkee, Hydrology, India (ankit.agarwal@hy.iitr.ac.in)

The primary component of the atmospheric branch of the water cycle is atmospheric moisture transport, and its amplitude has a strong influence on drought and precipitation extremes. Vertically integrated water vapor transport (IVT) is evaluated to assess atmospheric moisture transport (AMT) over the Indian Subcontinent. Linkages to flood-causing extreme precipitation events are understood using case studies that were in accordance with their intense rainfall conditions and flooding that resulted in huge losses over a specified region. Using a high-resolution daily gridded rainfall data set, an attempt has been made to analyze the spatiotemporal characteristics of atmospheric moisture transport (AMT) responsible for extreme events. The spatiotemporal characteristics of specific rainfall events associated with the occurrence of AMT show the existence of a strong relationship between the presence of high AMT and extreme precipitation events for the northwestern region where AMT penetrates inland and for the east coast region where AMT makes landfalls. Further analysis suggests that extreme precipitation events are predominantly influenced by the strong moisture convergence associated with the low-level pressure systems, wind speed, and wind direction developed in the vicinity of affected regions.