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Network-based approach to explore basin network comparing observed and satellite dataset

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Complex network is a relatively young, multidisciplinary field with an objective to unravel the spatiotemporal interaction in natural processes. Though network theory has become a very important paradigm in many fields, the applications in the hydrology field are still at an emerging stage. In this study, we employed the Pearson correlation coefficient and Spearman correlation coefficient as a similarity measure with varying threshold ranges to construct the precipitation network of the Ganga River Basin (GRB). Ground-based observed dataset (IMD) and satellite precipitation product (TRMM) are used. Different network properties such as node degree, degree distribution, clustering coefficient, and architecture were computed on each resultant precipitation network of GRB. We also ranked influential grid points in the precipitation network by using weighted degree betweenness to identify the importance of each grid station in the network. Our results reveal that the choice of correlation method does not significantly affect the network measures and reconfirm that the thresholds significantly influence network construction and network properties in the case of both datasets. The spatial distribution of the clustering coefficient value is high to low from center to boundary and inverse in the case of degree. In addition, there is a positive correlation between the average neighbor degree and node degree. Again, we analyzed the architecture of precipitation networks and found that the network has a small world with random network behavior. Our results also indicated that both products have similar network measures and showed similar kinds of spatial patterns.