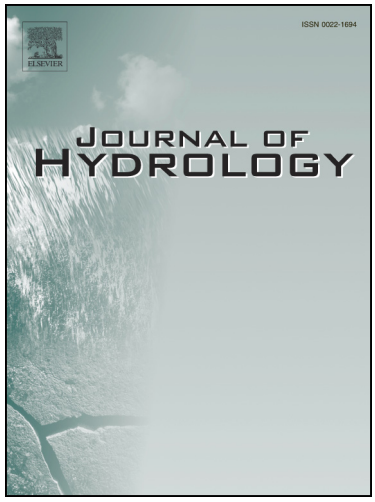

Research papers

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Temporal streamflow analysis: Coupling nonlinear dynamics with complex networks

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ABSTRACT

This study presents a new approach for complex networks-based analysis of temporal streamflow dynamics. The novelty comes in the form of using nonlinear dynamic concepts to construct the temporal streamflow network. The approach involves three steps. First, the single-variable streamflow time series is represented in a multi-dimensional phase space using delay embedding, i.e. phase space reconstruction. Next, this reconstructed phase space is treated as a *network*, with the reconstructed vectors (instead of the streamflow values themselves) serving as the *nodes* and the connections between them serving as the *links*. Finally, the strength of each node in the network is determined using a distance metric. The approach is employed independently to monthly streamflow time series observed over a period of 53 years (January 1950–December 2002) from each of 639 stations in the contiguous United States. For each time series, different delay time values for phase space