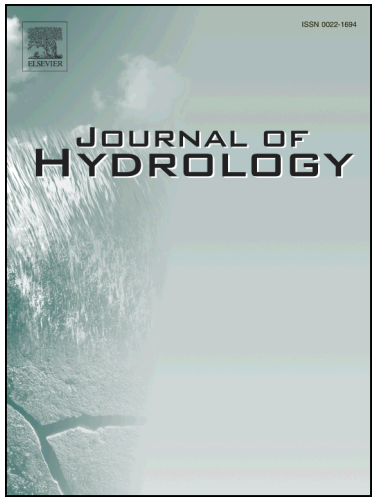

Research papers

High-spatial-resolution streamflow estimation at ungauged river sites or gauged sites with missing data using the National Hydrography Dataset (NHD) and U.S. Geological Survey (USGS) streamflow data

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High-spatial-resolution streamflow estimation at ungauged river sites or gauged sites with missing data using the National Hydrography Dataset (NHD) and U.S. Geological Survey (USGS) streamflow data

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Abstract

The need for a method of estimating streamflow with both high-quality and high spatial resolution, particularly for ungauged sites, is critical under current circumstances: intensifying competition over water resources and limited streamgages. A source of accurate and timely computations of streamflow, particularly at high spatial resolutions, has been the National Hydrograph Dataset (NHD), a comprehensive geographic information system (GIS) dataset of vector-based surface water features such as streams, lakes, and streamgages in fine detail. Utilizing the NHD with streamflow data from the U.S. Geological Survey and usage records of local water utilities, this paper proposes a simple streamflow estimation method that computes streamflow at any point on river reaches of the NHD with valid hydrograph data and tests the method in a local 613 square mile watershed. The method assumes that linearly connecting the timings of peak or bottom-base flows from upstream to downstream hydrographs leads to retracing upstream lateral inflows that have eventually arrived at a user-selected site between the upstream and downstream gauge stations of the hydrographs at any given time in a common period of record between the two hydrographs. Subsequently, the lateral inflows are added up to become the streamflow for a given site at a given time. NHD river networks and ArcGIS tools identify the locations of lateral inflows and the necessary parameters of the method. This paper assesses the results of the method by comparing them to measured streamflows through recommended evaluation statistics and visual inspection. The method has yielded promising results, including values of the Nash-Sutcliffe