

LINKING STATISTICALLY- AND PHYSICALLY-BASED MODELS FOR IMPROVED STREAMFLOW SIMULATION IN GAGED AND UNGAGED WATERSHEDS

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The U.S. Geological Survey (USGS) has developed a National Hydrologic Model (NHM) to support coordinated, comprehensive and consistent hydrologic model development, and facilitate the application of hydrologic simulations within the continental US. The portion of the NHM located within the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative (GCPO LCC) is being used to test the feasibility of improving streamflow simulations in gaged and ungaged watersheds by linking statistically- and physically-based hydrologic models. The GCPO LCC covers part or all of 12 states and 5 sub-geographies, totaling approximately 726,000 km², and is centered on the lower Mississippi Alluvial Valley. A total of 346 USGS streamgages in the GCPO LCC region were selected to evaluate the performance of this new calibration methodology for the period 1980 to 2013. Initially, the physically-based models are calibrated to measured streamflow data to provide a baseline for comparison. An enhanced calibration procedure then is used to calibrate the physically-based models in the gaged and ungaged areas of the GCPO LCC using statistically-based estimates of streamflow. For this application, the calibration procedure is adjusted to address the limitations of the statistically generated time series to reproduce measured streamflow in gaged basins, primarily by incorporating error and bias estimates. As part of this effort, estimates of uncertainty in the model simulations are also computed for the gaged and ungaged watersheds.

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