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Calibration of Deterministic Streamflow Models in Ungaged Basins Using Statistically-Derived At-Site Streamflow Simulations utilizing the USGS National Hydrologic Model

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Abstract: The United States Geological Survey (USGS) developed the National Hydrologic Model (NHM) to support coordinated, comprehensive, and consistent hydrologic model development and application within the conterminous United States (CONUS). The NHM application of the Precipitation-Runoff Modeling System (NHM-PRMS) was used to model 1,380 gaged watersheds across the CONUS to test the feasibility of improving streamflow simulations by linking statistically- and physically-based hydrologic models. Daily streamflow was simulated at each of the 1,380 gaged watersheds using a cross-validated implementation of pooled ordinary kriging. In this manner, the streamflow at each gage was simulated as if no at-site streamflow information were available. The objectives of this study were to 1) test the ability of the NHM-PRMS and ordinary kriging to simulate streamflow across the CONUS for select watersheds, 2) compare simulations of the NHM-PRMS calibrated using measured streamflow and the NHM-PRMS calibrated using ordinary kriging with measured streamflow, and 3) to determine the feasibility of using ordinary kriging in place of measured streamflow to calibrate the NHM-PRMS to provide streamflow simulations in ungaged basins.

***Keywords**:* Calibration; hydrologic modelling; PRMS; streamflow