

Supporting Information for

Dynamic Bayesian-Network-Based Approach to Enhance the Performance of Monthly Streamflow Prediction Considering Nonstationarity

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Table S1 Control parameters for support vector regression (SVR) for stationary and nonstationary cases

| Case | Period | Control parameters | |
|---------------|-----------|--------------------|--------------------|
| | | cost ^a | gamma ^b |
| Nonstationary | 1961-2000 | 100 | 0.01 |
| | 1963-2002 | 1000 | 0.001 |
| | 1965-2004 | 100 | 0.01 |
| | 1967-2006 | 100 | 0.01 |
| | 1969-2008 | 100 | 0.001 |
| | 1971-2010 | 100 | 0.001 |
| | 1973-2012 | 100 | 0.001 |
| | 1975-2014 | 1000 | 0.001 |
| | 1963-2002 | 1000 | 0.1 |
| Stationary | 1961-2000 | 1000 | 0.001 |

^acost: cost of constraints violation (default: 1)—it is the ‘C’-constant of the regularization term in the Lagrange formulation.

^bgamma: parameter needed for all kernels.

Table S2 Control parameters for adaptive-network-based fuzzy inference system (ANFIS) for stationary and nonstationary cases.

| Case | Period | Control parameters | | | |
|---------------|-----------|-------------------------|-----------------------|------------------------|----------------------|
| | | num.labels ^a | max.iter ^b | step.size ^a | type.mf ^b |
| Nonstationary | 1961-2000 | 5 | 20 | 0.01 | 3 |
| | 1963-2002 | 7 | 20 | 0.01 | 3 |
| | 1965-2004 | 5 | 10 | 0.01 | 3 |
| | 1967-2006 | 5 | 20 | 0.01 | 3 |
| | 1969-2008 | 5 | 10 | 0.01 | 3 |
| | 1971-2010 | 5 | 10 | 0.01 | 3 |
| | 1973-2012 | 5 | 10 | 0.01 | 3 |
| | 1975-2014 | 5 | 10 | 0.01 | 3 |
| Stationary | 1961-2000 | 10 | 10 | 0.01 | 3 |

^anum.labels: a positive integer to determine the number of labels (linguistic terms);

^bmax.iter: a positive integer to determine the maximal number of iterations;

^cstep.size: the step size of the gradient descent;

^ctype.mf: type of the membership function.

Table S3. Results of various performance metrics evaluated for different models during the model testing period from 2001 to 2015 at Huaihe River Basin.

| Performance metrics | Models | | | | | |
|---------------------|---------------|------------|---------------|------------|---------------|------------|
| | Nonstationary | Stationary | Nonstationary | Stationary | Nonstationary | Stationary |
| | GM-BN | GM-BN | SVR | SVR | ANFIS | ANFIS |
| R ² | 0.97 | 0.88 | 0.89 | 0.58 | 0.86 | 0.85 |
| NRMSE | 0.225 | 0.309 | 0.321 | 0.87 | 0.43 | 0.95 |
| NSE | 0.96 | 0.88 | 0.876 | 0.39 | 0.84 | 0.25 |
| d | 0.98 | 0.91 | 0.97 | 0.82 | 0.98 | 0.86 |
| KGE | 0.97 | 0.88 | 0.88 | 0.73 | 0.89 | 0.28 |

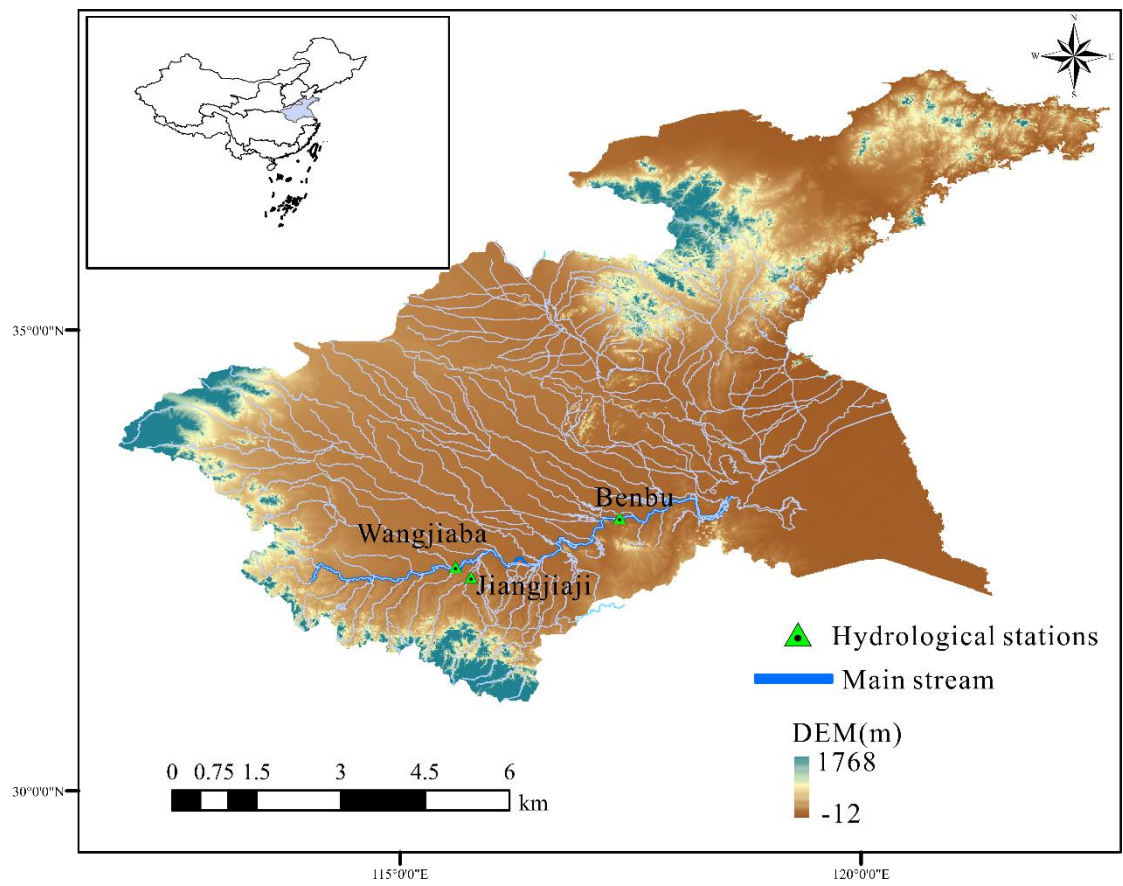


Figure S1 Plot of the Huaihe River Basin, China.