Contents of this file

Figures S1 to S8.

Table S1 to S2.

Additional Supporting Information (Files uploaded separately)

Captions for Tables S3 (larger than 1 page, upload as a separate file), as well as available on Zenodo (https://zenodo.org/record/7187505)

Introduction

This file contains 8 figures (Fig. S1 to Fig. S8), 2 tables (Table S1 and S2) and a separately uploaded table (Table S3).

Figure S1 shows the calibration and validation of hydrological models (Fig. S1).

Figure S2 shows the feature selection for machine learning and deep learning models.

Figure S3 shows the comparison of data normalization methods.

Figure S4 shows the PCC and RB of three satellite precipitation estimations for 522 sub-basins.

Figure S5 shows the boxplot of twCRPS for different post-processing experiments.

Figure S6 shows the autocorrelation skill for two randomly selected sub-basins (No.10 and No.250) of different satellite precipitation driven simulation.

Figure S7 shows the hydrographs and prediction intervals for two randomly selected sub-basins (No.10 and No.250).

Figure S8 shows the hydrographs before and after post-processing for two randomly selected sub-basins (No.10 and No.250).

Table S1 summarizes the sharpness metrics of two randomly selected sub-basins (No.10 and No.250).

Table S2 summarizes the deterministic performance of two post-processing models for different FAA intervals.

The separately uploaded table (Table S3) describes the basin attributes of all 522 sub-basins, including longitude and latitude, elevation, area, flow accumulation area and flow direction.

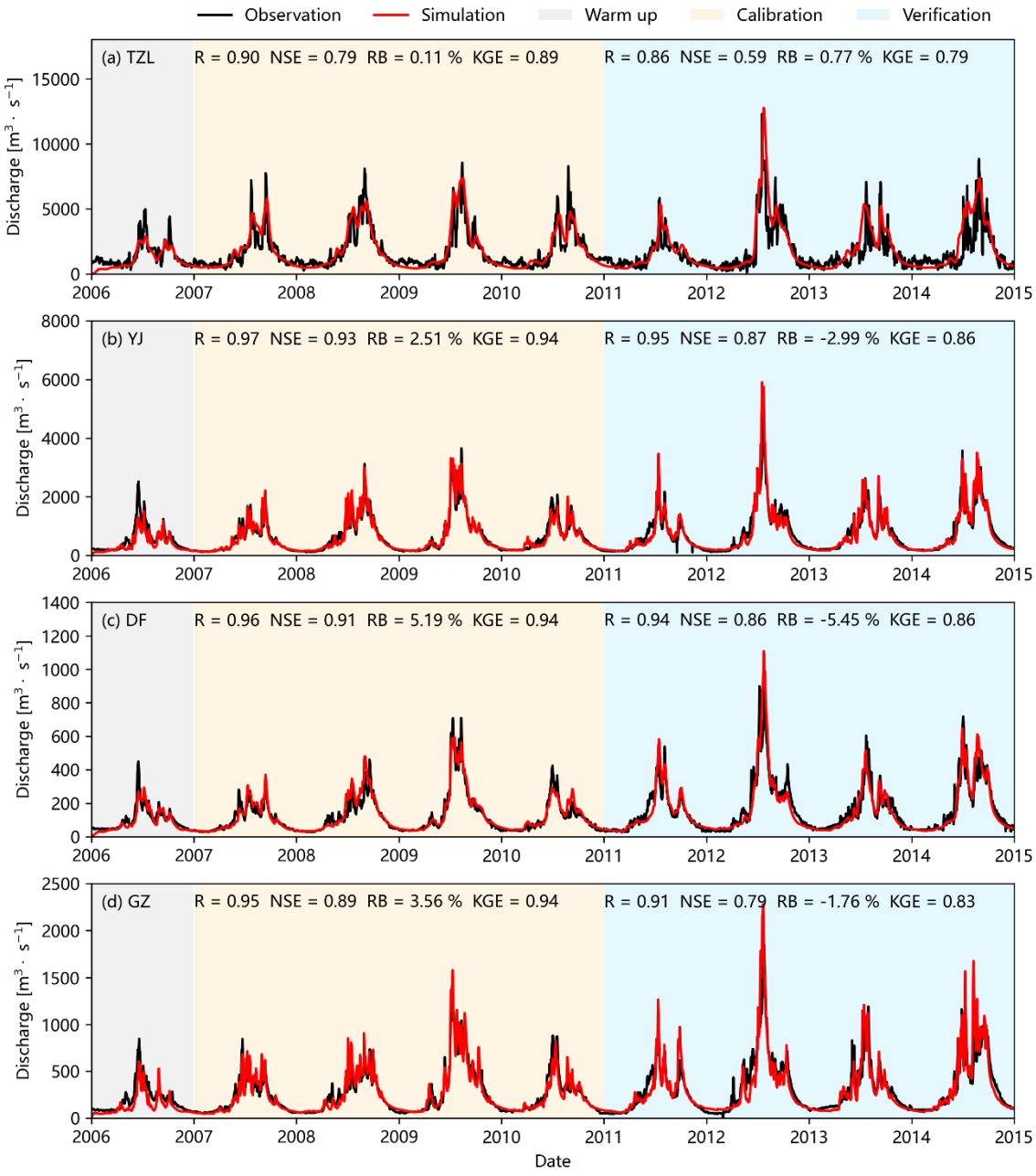

Figure S1. DTVGM calibration and validation at four gauged hydrological stations. (a) TZL, (b) YJ, (c) DF and (d) GZ.

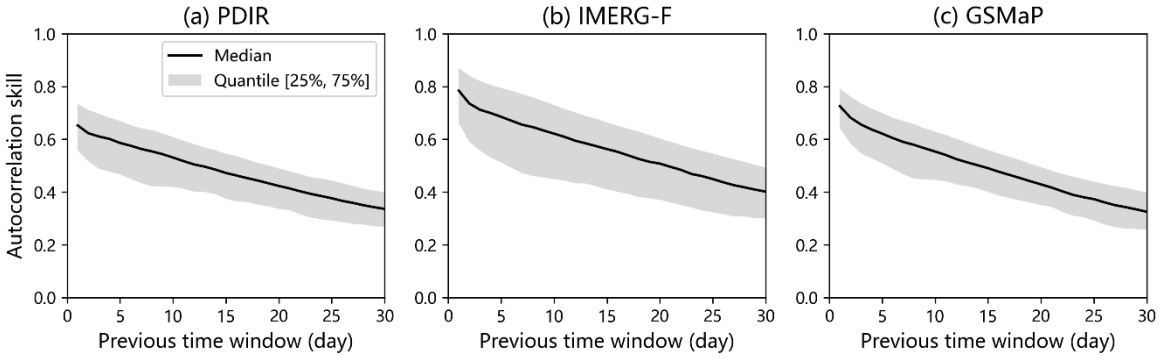

Figure S2. Streamflow autocorrelation skill with different lag-timewindow.

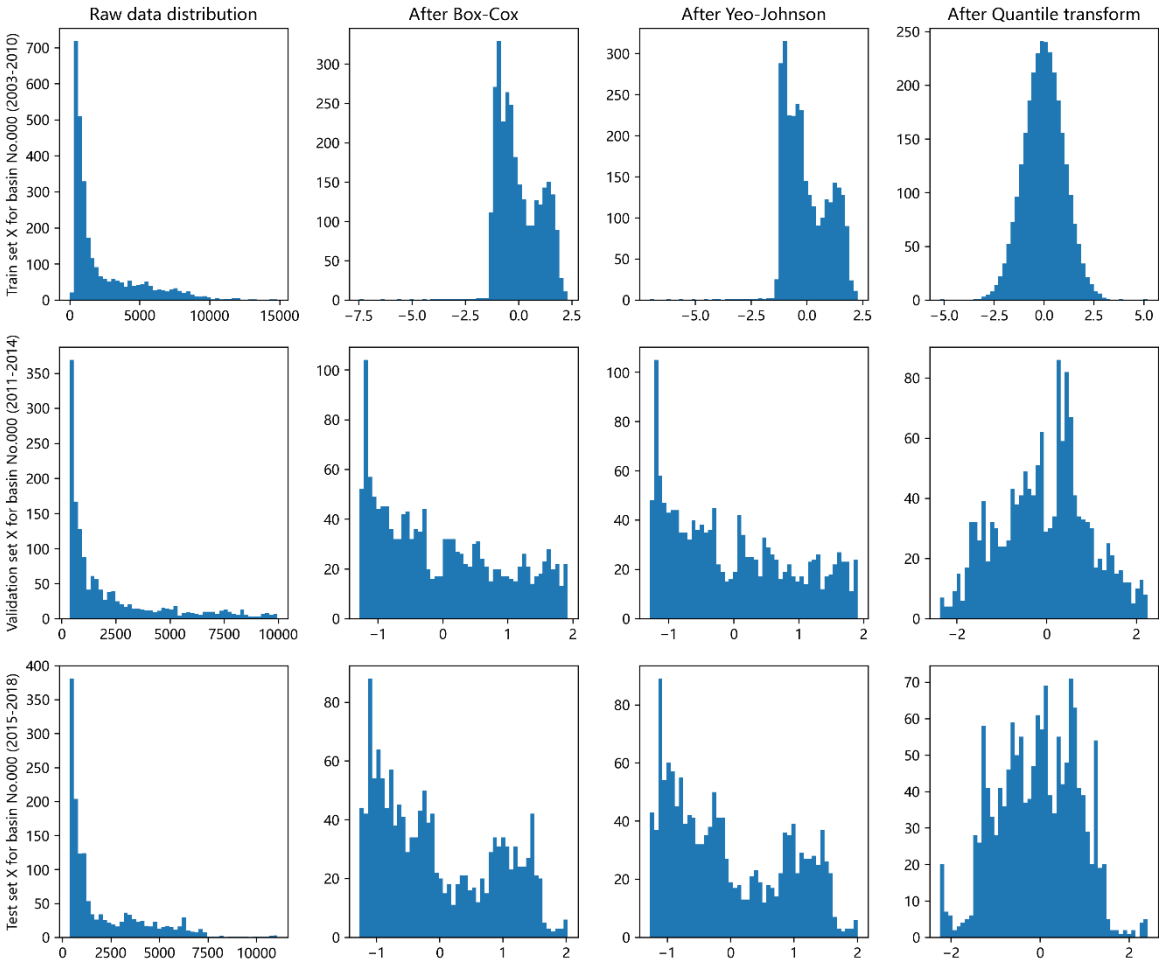

Figure S3. Data normalization with different methods.

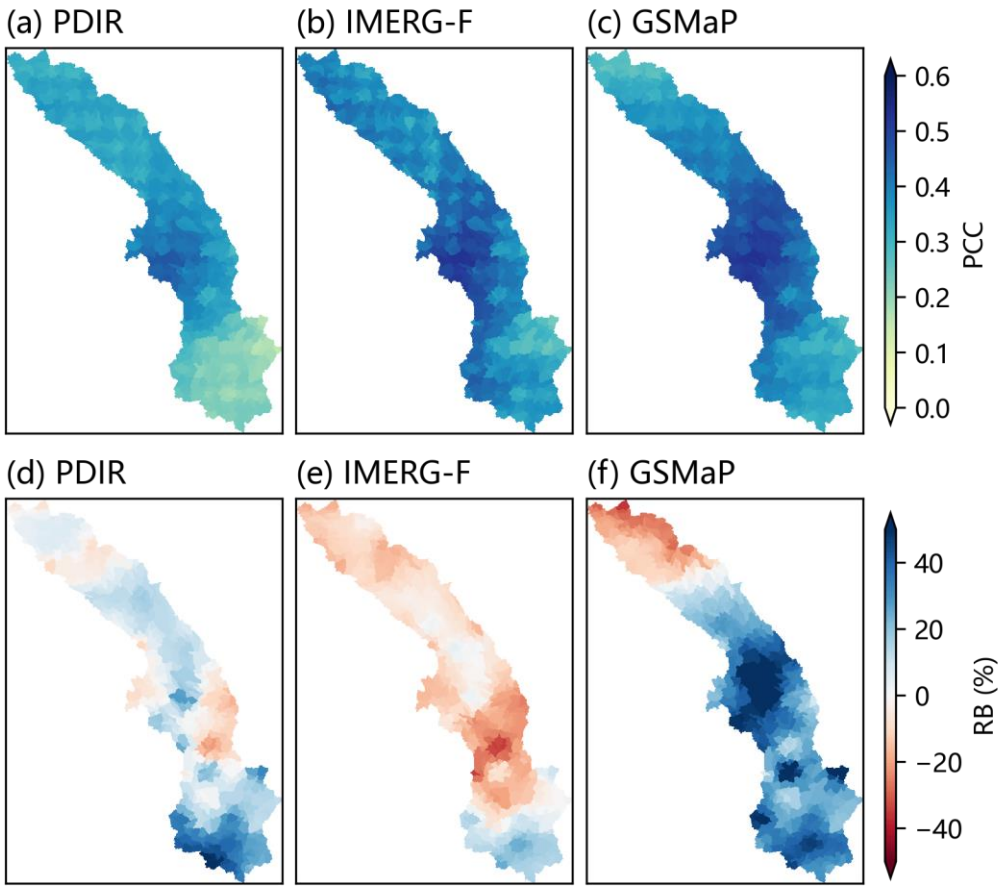

Figure S4. The PCC and RB of three satellite precipitation estimations for 522 sub-basins.

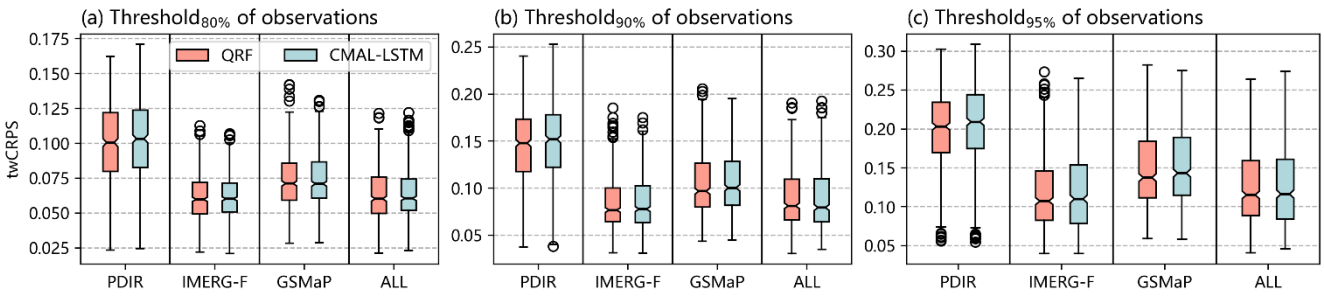

Figure S5. The boxplot of twCRPS for different post-processing experiments.

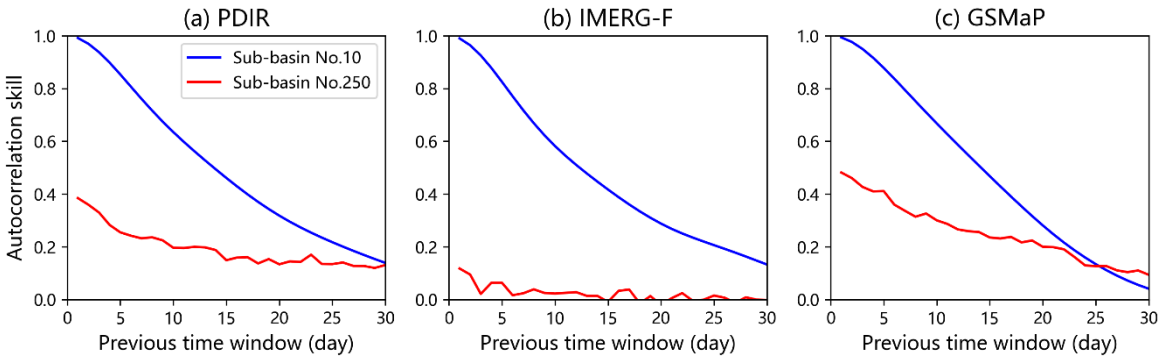

Figure S6. Autocorrelation skill for two randomly selected sub-basins (No.10 and No.250) of different satellite precipitation driven simulation. (a) PDIR, (b) IMERG-F, and (c) GSMaP.

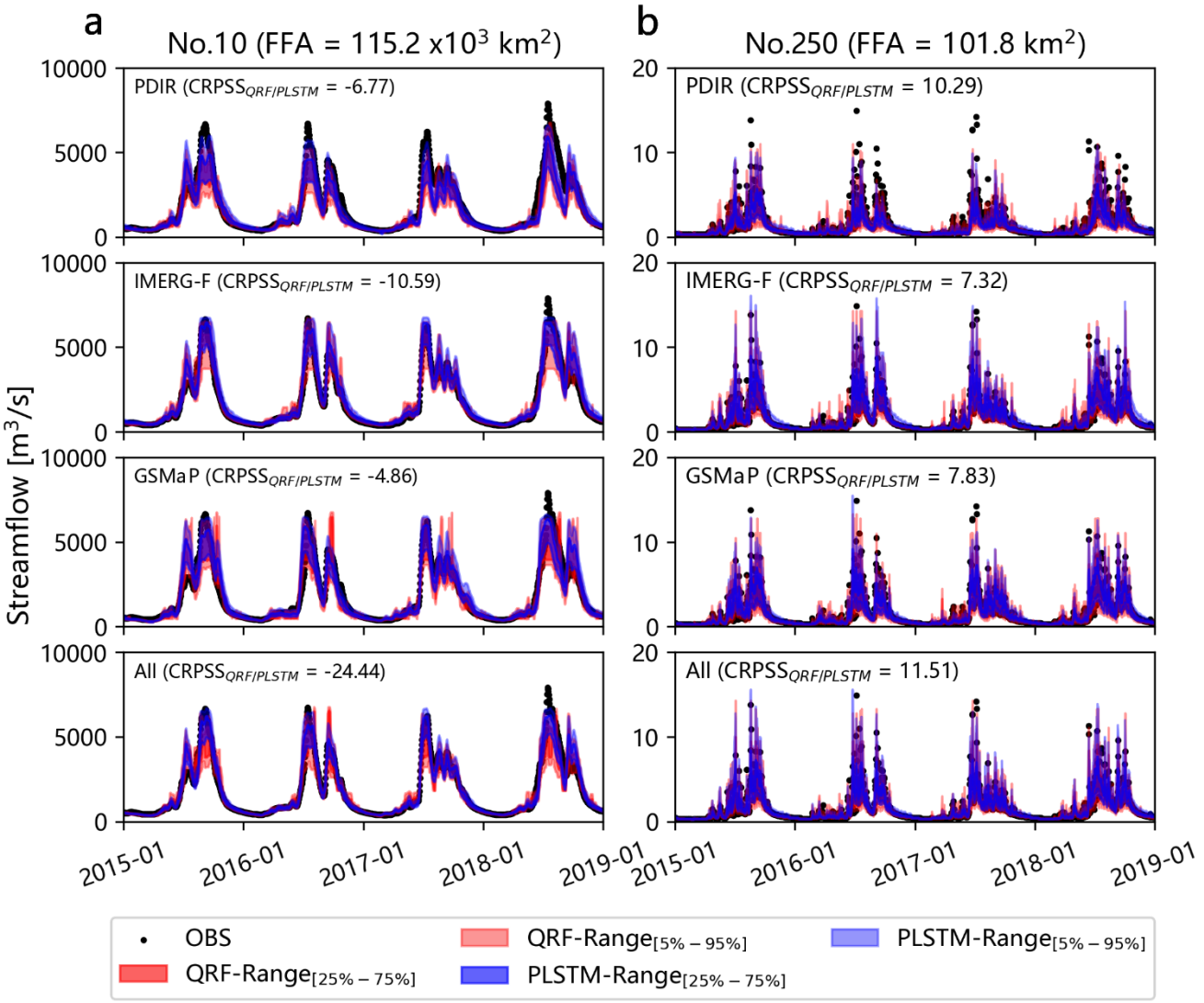

Figure S7. Hydrographs and prediction intervals for two randomly selected sub-basins (No.10 and No.250).

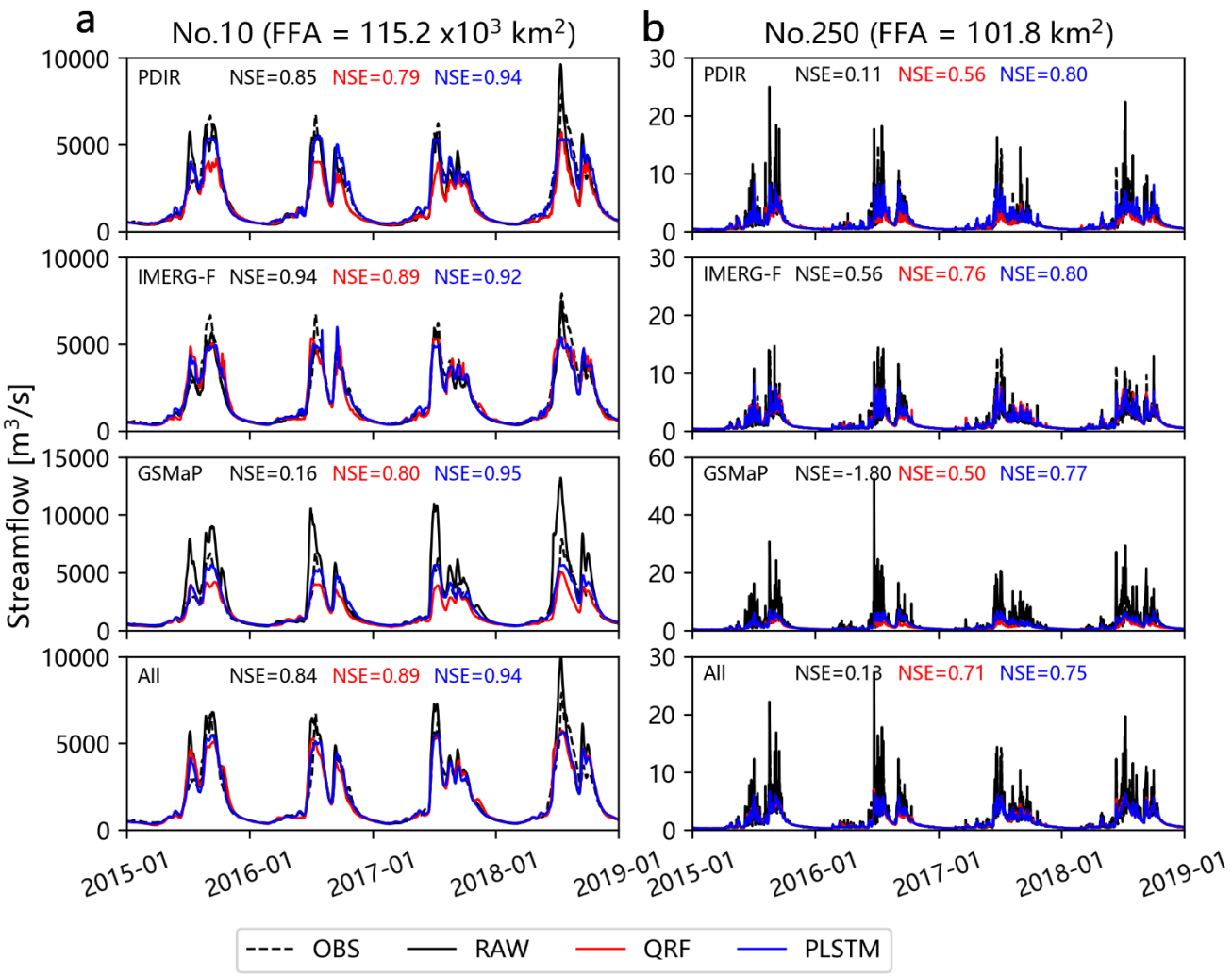

Figure S8. Hydrographs before and after post-processing for two randomly selected sub-basins (No.10 and No.250).

Table S1. Sharpness metrics for the randomly selected tow sub-basins.

ID	Input	Model	High flow seasons (May–Oct.)				Low flow seasons (Nov.–Apr.)			
			DIS_{25-75} (m^3/s)	DIS_{5-95} (m^3/s)	CO_{25-75} (%)	CO_{5-95} (%)	DIS_{25-75} (m^3/s)	DIS_{5-95} (m^3/s)	CO_{25-75} (%)	CO_{5-95} (%)
10	PDIR	QRF	**596.8**	**1491.5**	28.8	60.9	**113.4**	**232.6**	40.0	76.1
		CMAL-LSTM	676.4	1765.9	**33.0**	**68.6**	124.7	345.1	**56.4**	**97.0**
	IEMRG-F	QRF	**634.5**	**1576.2**	40.5	82.7	**72.6**	**186.1**	41.9	78.5
		CMAL-LSTM	670.7	1879.5	**53.8**	**92.5**	139.0	327.5	**57.8**	**94.5**
	GSMaP	QRF	**825.5**	**1755.8**	**39.3**	71.3	**125.1**	**275.8**	41.8	68.0
		CMAL-LSTM	762.5	1921.5	33.4	**81.9**	130.0	398.4	**46.3**	**82.8**
	All	QRF	**669.6**	**1542.7**	41.2	79.2	**73.4**	**191.2**	39.9	78.5
		CMAL-LSTM	558.7	1444.1	**46.1**	**83.3**	84.3	214.2	**59.4**	**84.0**
250	PDIR	QRF	0.88	2.53	**38.32**	**80.57**	**0.12**	**0.43**	82.21	**97.24**
		CMAL-LSTM	**0.73**	**2.34**	32.47	75.68	0.14	0.50	**86.76**	96.28
	IEMRG-F	QRF	**1.20**	**3.13**	**65.08**	**94.84**	0.10	**0.35**	**82.21**	93.93
		CMAL-LSTM	1.24	3.71	62.77	94.29	**0.09**	0.48	79.86	**94.07**
	GSMaP	QRF	**1.20**	**3.12**	57.07	**92.93**	**0.13**	**0.47**	79.86	**98.62**
		CMAL-LSTM	1.26	3.35	**58.29**	92.26	0.13	0.49	**85.38**	97.79
	All	QRF	1.11	**2.88**	**60.87**	**93.89**	0.09	**0.33**	80.14	97.38
		CMAL-LSTM	**1.00**	3.22	55.30	92.53	**0.08**	0.42	**81.52**	**97.93**

Table S2. The deterministic performance of two post-processing models for different FAA intervals. The bold numbers indicate better performance in each group.

FAA (10^4 km^2)	Number of sub-basins	PDIR		IEMRG		GSMAP		ALL	
		QRF	CMAL-LSTM	QRF	CMAL-LSTM	QRF	CMAL-LSTM	QRF	CMAL-LSTM
< 2	476	8	**468**	37	**439**	10	**466**	40	**436**
2–4	15	0	**15**	2	**13**	0	**15**	2	**13**
4–6	4	0	**4**	0	**4**	0	**4**	**4**	0
6–10	13	0	**13**	0	**13**	0	**13**	0	**13**
> 10	14	0	**14**	0	**14**	0	**14**	0	**14**