

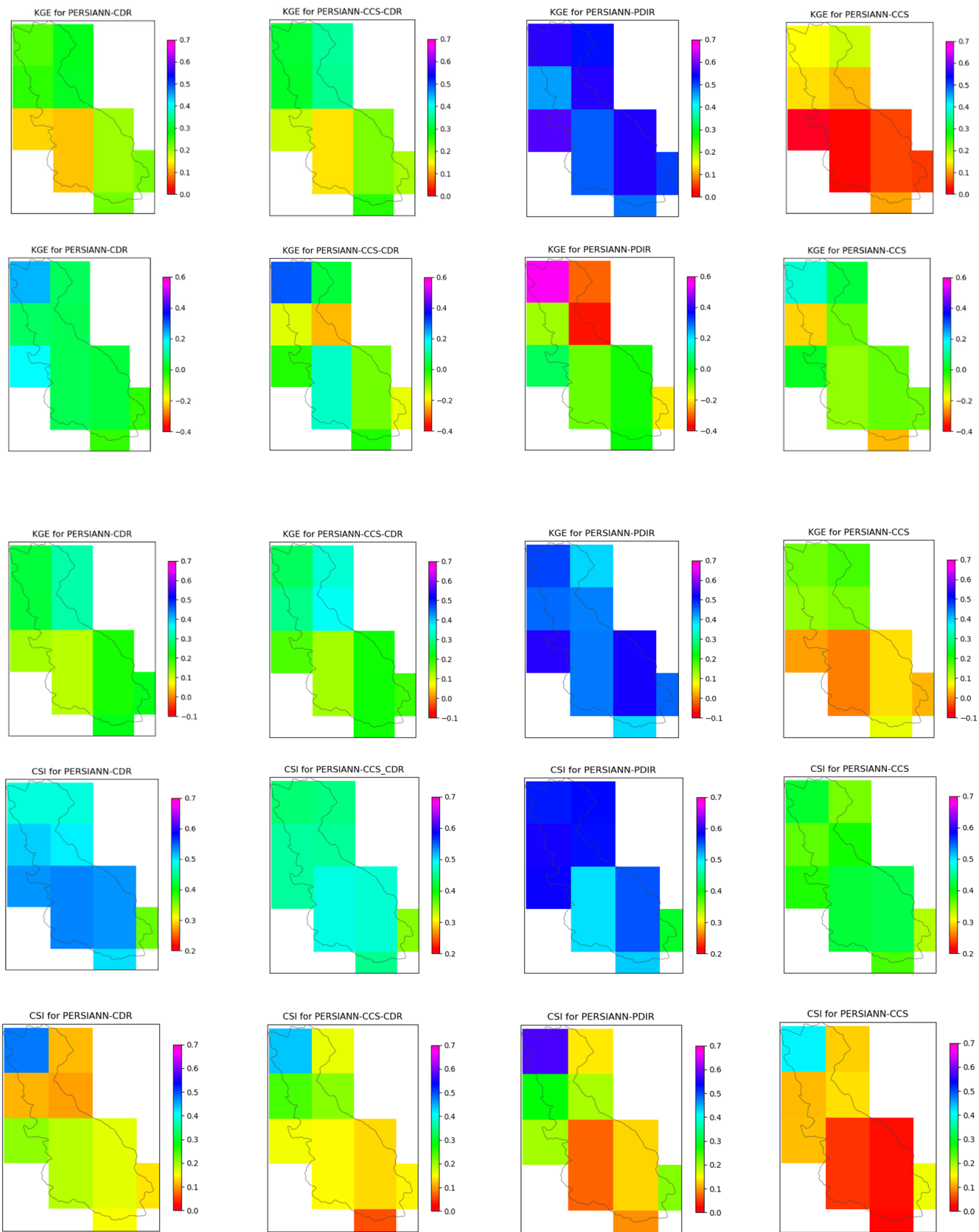
Supplementary

Table S1. Statistical metrics used for evaluating multiple precipitation products.

Functions	Unit	Description
$CC = \frac{\sum_{t=1}^n (P_{o,t} - \overline{P_o})(P_{s,t} - \overline{P_s})}{\sqrt{\sum_{t=1}^n (P_{o,t} - \overline{P_o})^2} \sqrt{\sum_{t=1}^n (P_{s,t} - \overline{P_s})^2}} \quad (7)$	/	$P_{s,t}$ is the satellite precipitation in time step t $P_{o,t}$ is the observation precipitation in time step t
$RMSE = \sqrt{\frac{1}{n} \sum_{t=1}^n (P_{o,t} - P_{s,t})^2} \quad (8)$	mm	n is the total number of days in the evaluation period
$Bias = \frac{\sum_{t=1}^n (P_{s,t} - P_{o,t})}{\sum_{t=1}^n P_{o,t}} \quad (9)$	/	$\overline{P_s} = \frac{1}{n} \sum_{t=1}^n P_{s,t}$, $\overline{P_o} = \frac{1}{n} \sum_{t=1}^n P_{o,t}$
$POD = H / (H + M) \quad (10)$	/	H is the observed precipitation correctly detected
$FAR = F / (F + H) \quad (11)$	/	M is the observed precipitation not detected
$CSI = H / (F + H + M) \quad (12)$	/.	F is the precipitation detected but not observed

Table S2. Calibration parameter and their intervals (N: nontransformed mode and T: transformed mode).

	Binf(N/A)		Ds(fraction)		Dsmax(mm/day)		Ws(fraction)		D1(m)		D2(m)		D3(m)	
	(0-0.4)		(0-1)		(0-30)		(0-1)		(0.05-0.25)		(0.25-2.5)		(0.25-2.5)	
	N	T	N	T	N	T	N	T	N	T	N	T	N	T
CPC	0.38	0.12	0.25	0.31	4.9	6.22	0.001	0.53	0.16	0.11	2.17	1.05	0.8	1.04
CDR	0.33	0.007	0.71	0.017	17.99	8.06	0.007	0.44	0.05	0.10	0.72	0.61	0.71	0.35
CCS- CDR	0.27	0.016	0.62	0.33	15.69	14.76	0.002	0.29	0.05	0.14	0.51	1.18	0.74	1.71
CCS	0.37	0.32	0.67	0.46	22.58	16.65	0.3	0.26	0.07	0.11	0.26	1.42	0.9	1.14
PDIR	0.11	0.16	0.86	0.29	18.32	2.48	0.56	0.36	0.15	0.12	1.98	2.25	0.98	0.44



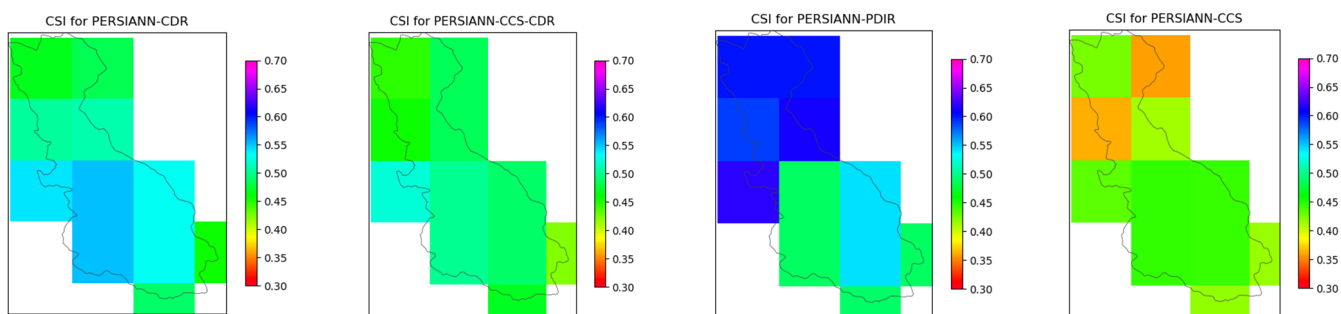


Figure S1. Distribution of PERIANN family precipitation datasets' performance against CPC according to E_{KGE} (rows 1 to 3 = daily, summer, and winter, respectively) and CSI (row 4 to 6 = daily, summer and winter, respectively). CDR, CCS-CDR, PDIR, and CCS: columns 1 to 5.

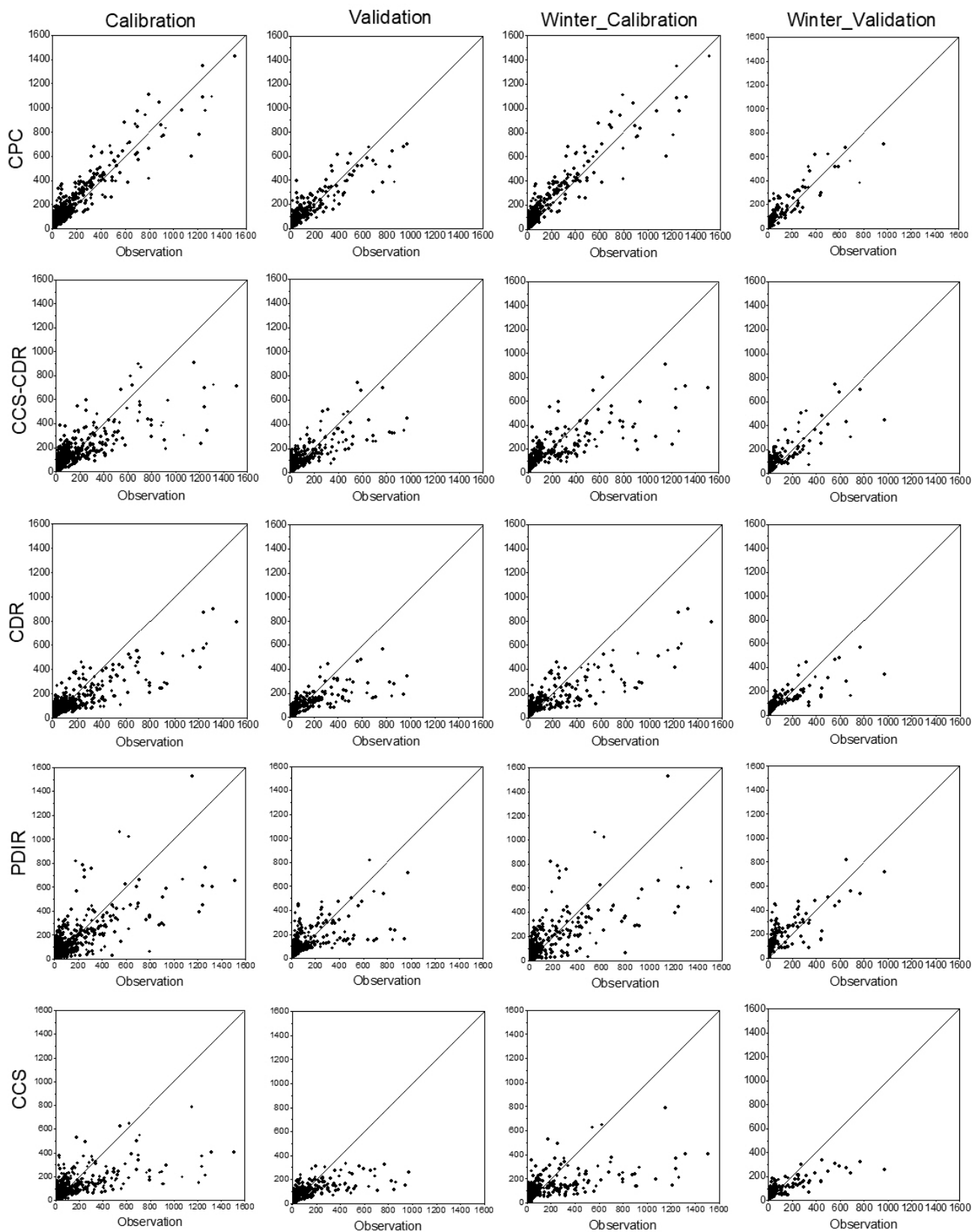


Figure S2. Scatter plots of daily streamflow generated from CPC and the PERSIANN family. The horizontal axis is observation discharge (m^3/s), and the vertical axis is simulated discharge (m^3/s).

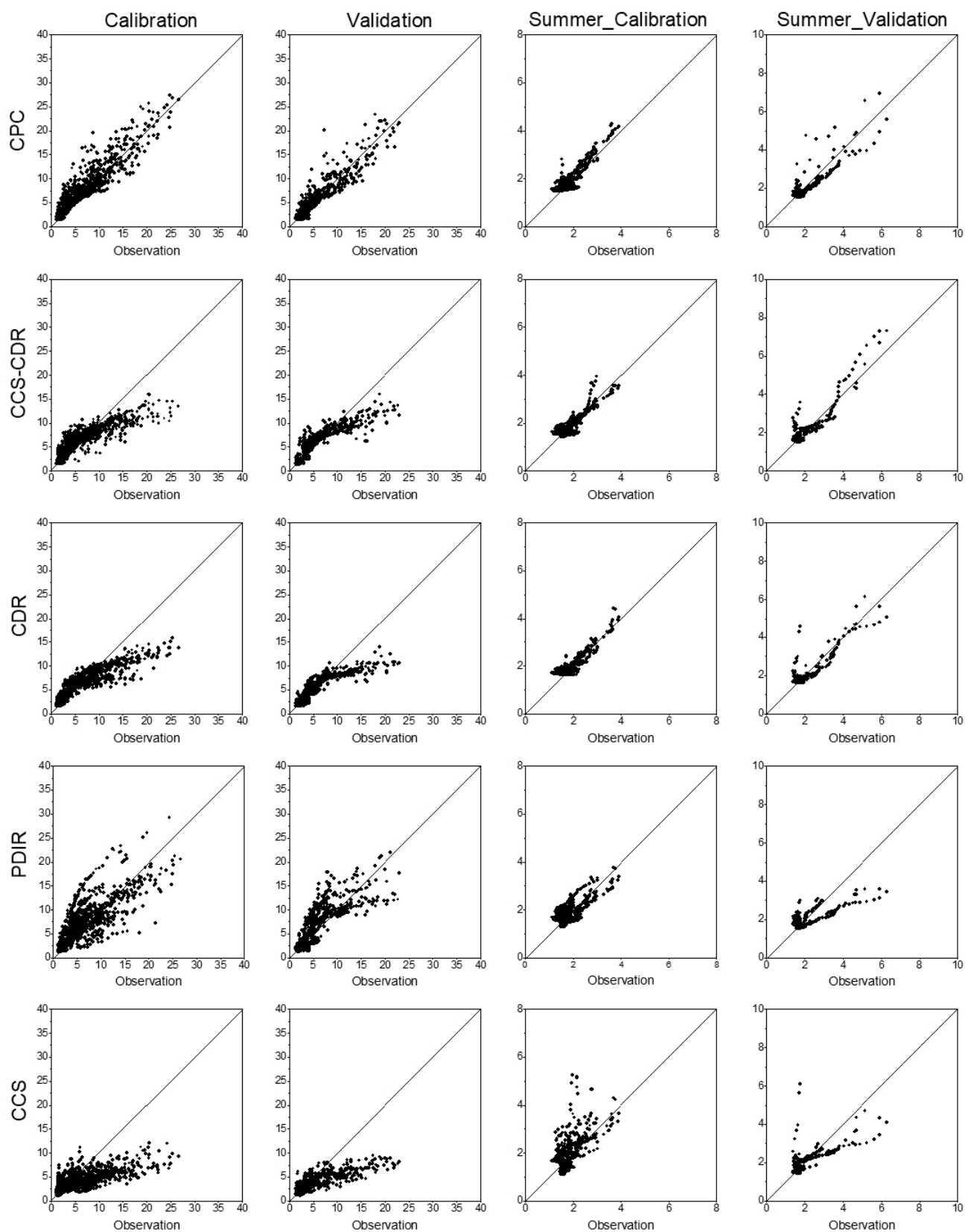


Figure S3. Scatter plots of transformed daily streamflow generated from CPC and the PERSIANN family. The horizontal axis is observation discharge (m^3/s), and the vertical axis is simulated discharge (m^3/s).

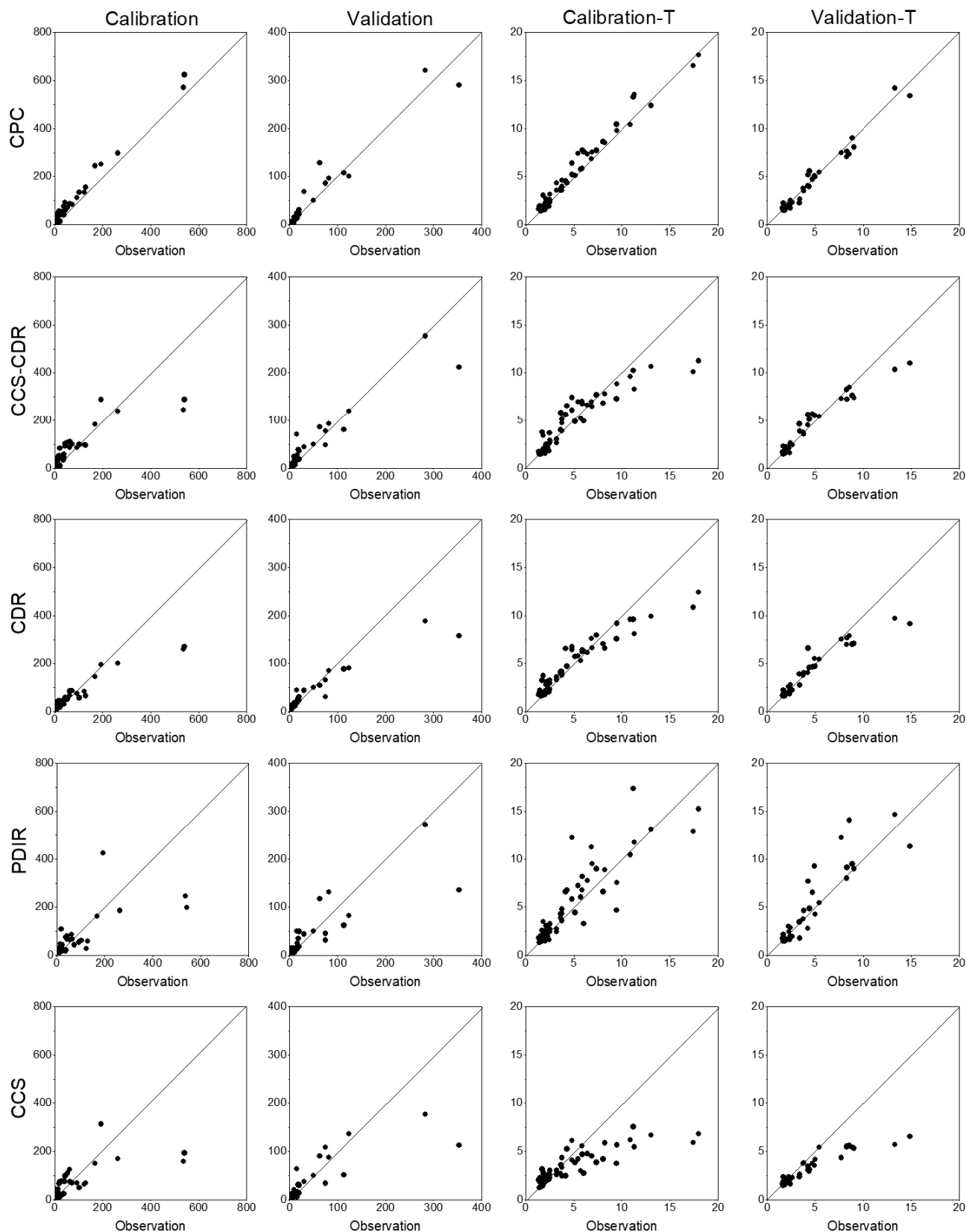


Figure S4. Scatter plots of monthly streamflow for the general (column 1 and 2) and transformed (column 3 and 4) datasets generated from CPC and the PERSIANN family. The horizontal axis is observation discharge, and the vertical axis is simulated discharge.

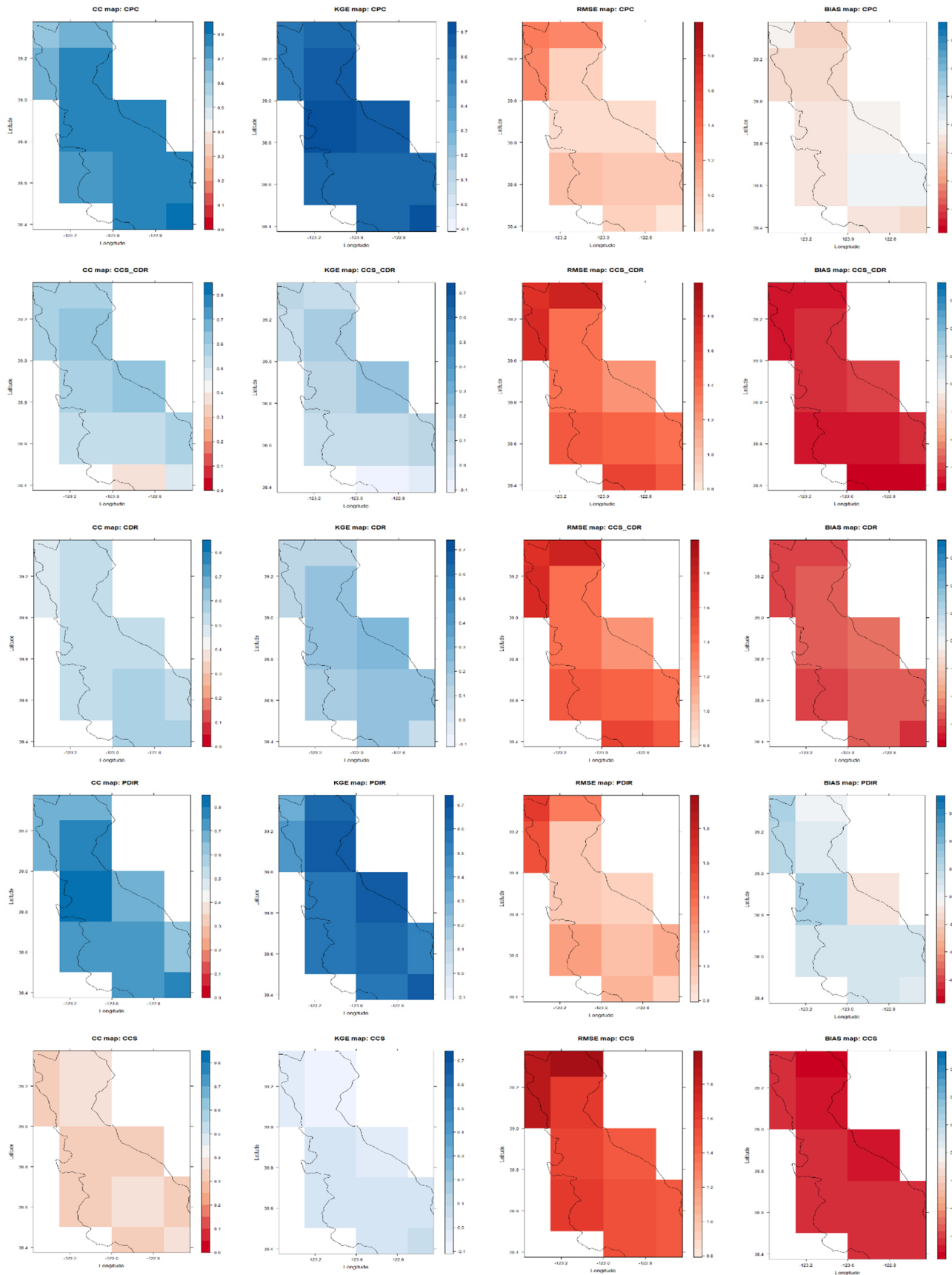


Figure S5. CC, E_{KGE} , RMSE, and Bias (columns 1 to 4) for CPC, CCS-CDR, CDR, PDIR, and CCS (rows 1 to 5), over the Russian River catchment for ET simulation.

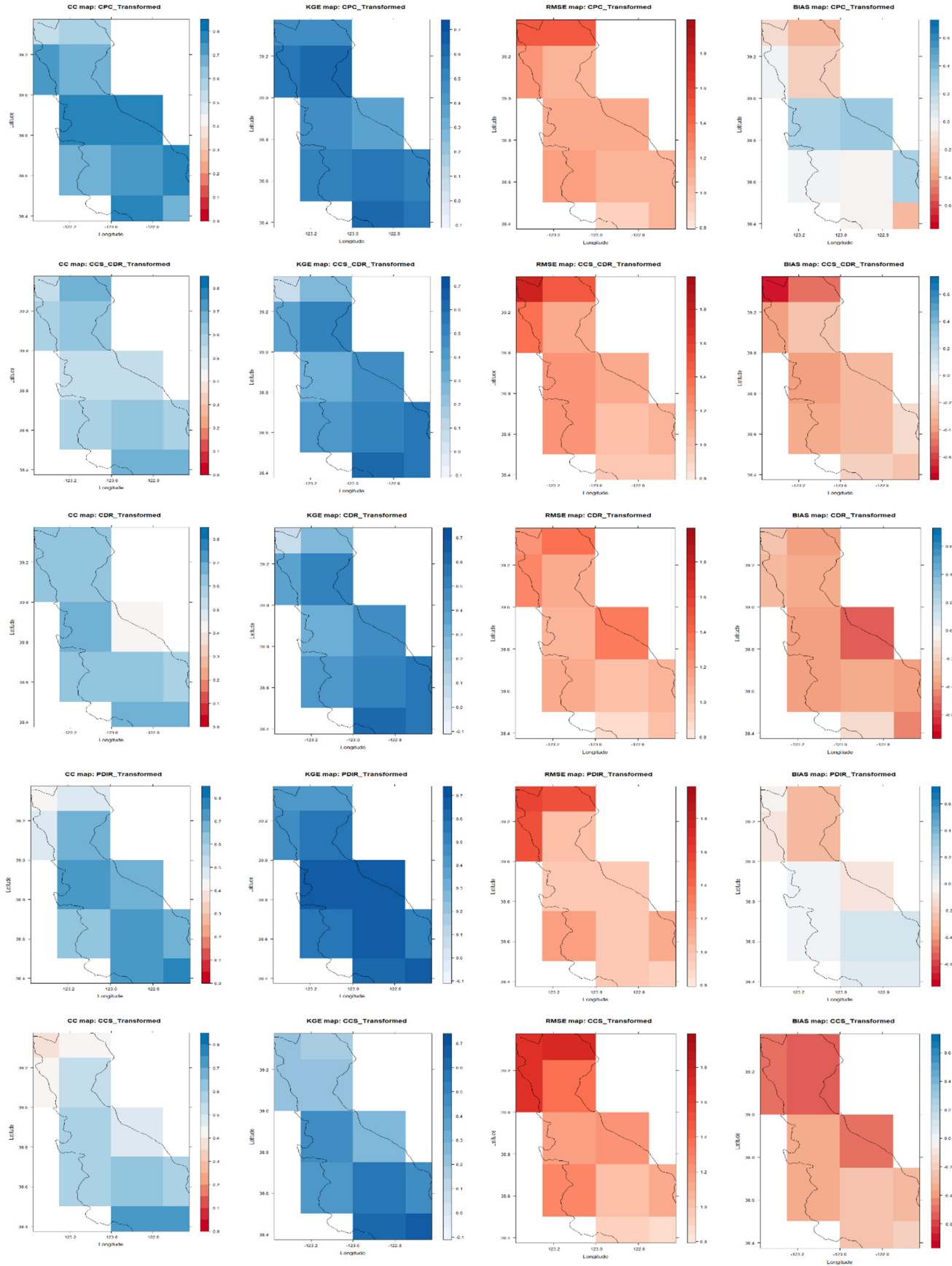


Figure S6. CC, E_{KGE} , RMSE, and Bias (column 1 to 4) for CPC-T, CCS-CDR-T, CDR-T, PDIR-T, and CCS-T (rows 1 to 5) over the Russian River catchment for ET simulation.

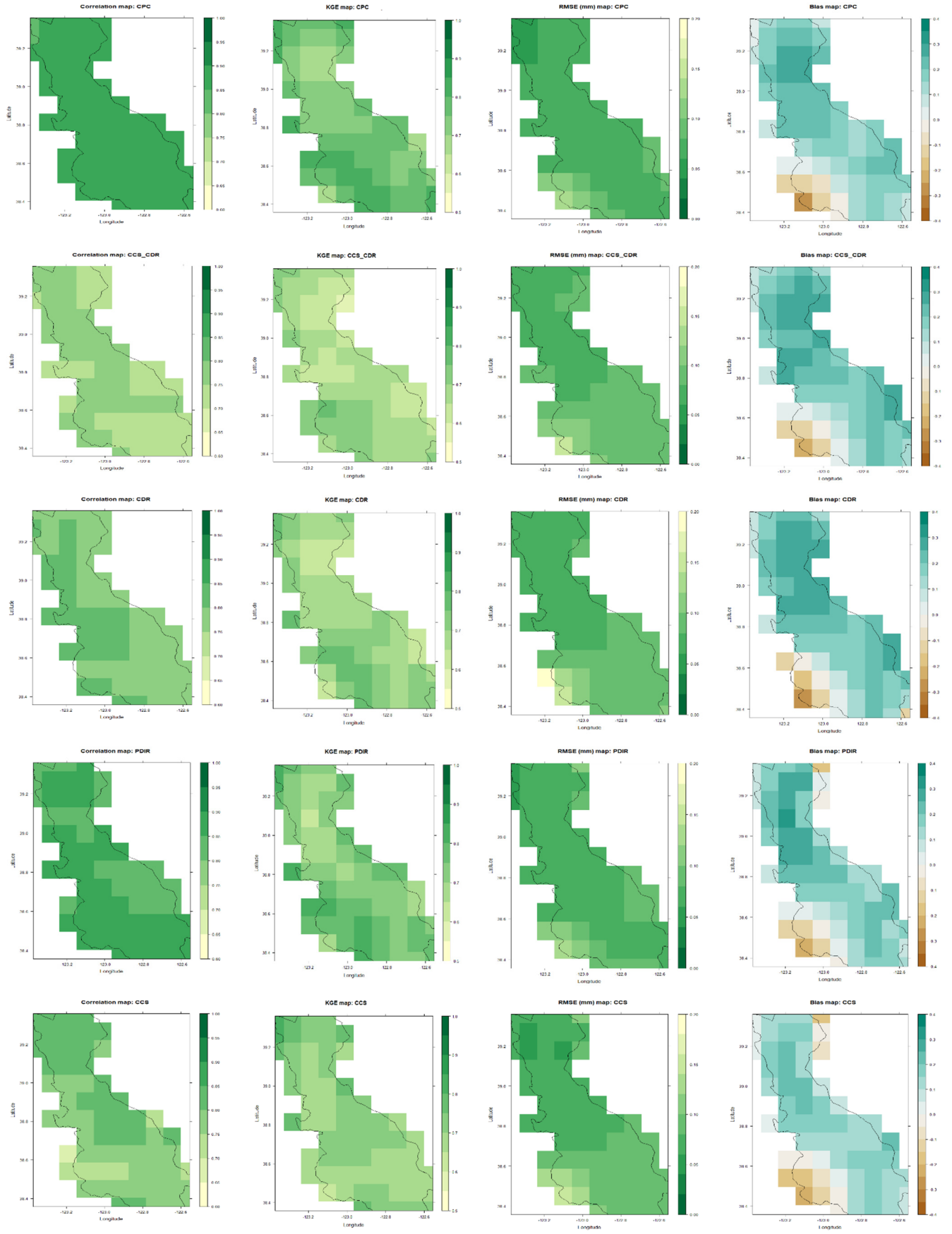


Figure S7. CC, E_{KGE} , RMSE, and Bias (columns 1 to 4) for CPC, CCS-CDR, CDR, PDIR, and CCS (rows 1 to 5) over the Russian River catchment for soil moisture simulation.

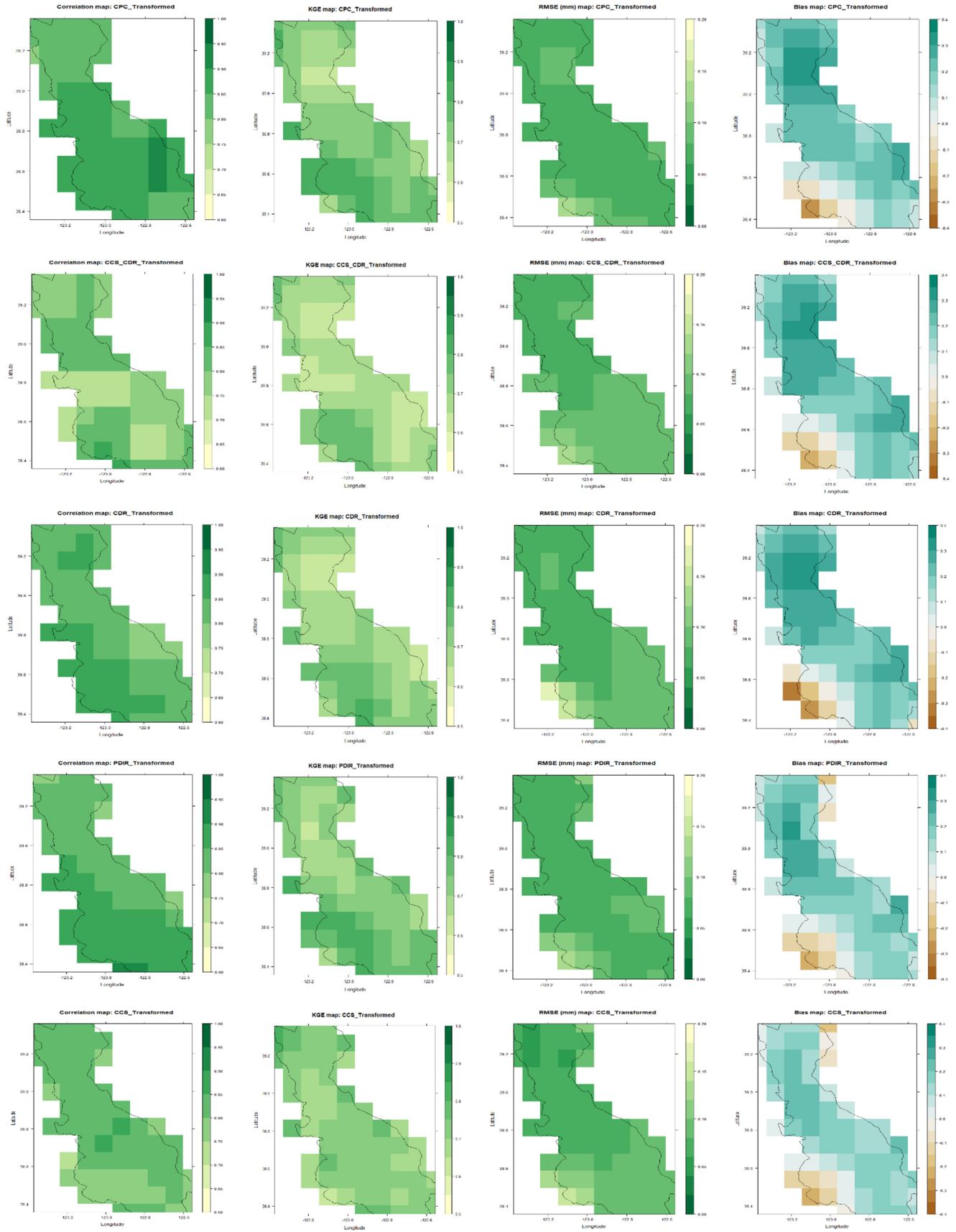


Figure S8. CC, E_{KGE} , RMSE, and Bias (columns 1 to 4) for CPC-T, CCS-CDR-T, CDR-T, PDIR-T, and CCS-T (rows 1 to 5) over the Russian River catchment for soil moisture simulation.