Supplementary Material

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Tables

Figures

Table S1. Selected hydrological monitoring stations.

No.	Name	Lat	Lon	Discharge		Water level	
				Start	End	Start	End
1	Chiang Saen	20.2741	100.0885	1/1/1960	9/19/2022	4/30/1960	9/19/2022
2	Luang Prabang	19.8928	102.1342	1/1/1939	12/31/2018	1/1/1960	9/19/2022
3	Chiang Khan	17.9003	101.6699	1/1/1967	9/19/2022	1/1/1965	9/19/2022
4	Nong Khai	17.8814	102.7322	1/1/1969	9/19/2022	1/1/1965	9/19/2022
5	Nakhon Phanom	17.4254	104.7739	1/1/1924	9/19/2022	4/1/1972	9/19/2022
6	Mukdahan	16.5828	104.7332	1/1/1923	9/19/2022	1/1/1960	9/19/2022
7	Pakse	15.0998	105.8132	1/1/1923	9/19/2022	1/1/1960	9/19/2022
8	Stung Treng	13.5325	105.9502	1/1/1910	9/19/2022	1/1/1910	9/19/2022
9	Kratie	12.4814	106.0176	1/1/1924	9/19/2022	1/8/1933	9/19/2022
10	Chroy Chang Var	11.5874	104.9384	1/1/1960	12/31/2002	1/1/1960	12/31/2012
11	Kompong Cham	11.9110	105.3841	1/1/1960	12/31/2002	1/1/1930	9/19/2022
12	Chau Doc	10.7053	105.1335	1/1/2001	12/31/2007		
13	Can Tho	10.0529	105.7871	1/1/2001	12/31/2007	4/1/1979	9/19/2022

Table S2. Selected dams for CaMa-Flood-Dam simulations and their attributes.

No.	Project name	Lat	Lon	Purpose	COD	Height (m)	Total storage (FSL, Mm3)
1	A Luoi	16.20	107.16	HPD	2012	49.5	
2	Battambang 1	12.80	102.91	MPD	2018	56.8	193.43
3	Bien Ho	14.06	108.00	ID	1983	21	42
4	Buôn Kuốp	12.53	107.93	HPD	2010		14
5	Buon Tua Srah	12.28	108.04	HPD	2009	80	522
6	Chulabhorn	16.54	101.65	HPD	1972	70	165
7	Cibihu	26.13	99.96	ID	1956		93.22
8	Dachaoshan	24.02	100.37	HPD	2003	111	940
9	Dahuaqiao	26.31	99.14	HPD	2019	106	293
10	Dak Doa	14.18	108.11	HPD	2010	20	29.13
11	Dak N'Teng	12.20	107.93	HPD	2011	31	25.49
12	Dak Psi 5	14.66	107.94	HPD	2012		3.53
13	Dak Wi	14.54	107.97	ID	1977		26.2
14	Dak Yen	14.29	107.98	ID	2008	22.5	6.45
15	Don Sahong	13.94	105.96	HPD	2020	22.5	25
16	Dong'erhe	23.08	101.06	ID	1959	26.43	1070
17	Dray H'Linh 1	12.67	107.91	HPD	1990		1
18	Ea Kao	12.61	108.04	ID	1983	17	17.74
19	Ea Sup	13.07	107.89	ID	1980	10	5.55
20	Ea Sup Thuong	13.03	107.93	ID	2004	26	146.94

No.	Project name	Lat	Lon	Purpose	COD	Height (m)	Total storage (FSL, Mm3)
21	ErChahe	24.44	99.86	HPD	2008	46	10.92
22	Gongguoqiao	25.59	99.34	HPD	2012	105	316
23	Guodazhai	24.30	99.78	ID	2017	83.5	50.93
24	GuoDuo	31.53	97.19	HPD	2015	93	82.72
25	Haixihai	26.28	99.97	ID	1995	21	62
26	Hoàng Ân	13.82	107.95	ID	1976	20	6.9
27	Houay Ho	15.06	106.76	HPD	1999	79	3530
28	Houay Lamphan	15.36	106.50	HPD	2015	75.6	141
29	Hua Na	15.13	104.70	HPD	1995	17	
30	Huai Kum	16.41	101.79	HPD	1980	35.5	22
31	Huai Luang	17.37	102.60	ID	1984	12.5	113
32	Huangdeng	26.56	99.12	HPD	2019	203	1613
33	Jinfeng	21.59	101.23	HPD	1998	45	19.48
34	Jinghong	22.05	100.77	HPD	2008	108	
35	Jinhe	30.81	97.33	HPD	2004	34	4.27
36	Kamping Puoy	13.08	102.97	ID	1977		110
37	Krông Buk Hạ	12.78	108.37	ID	2013	35.45	109.34
38	Lam Chamuak	15.08	102.49	ID	1992	18	26
39	Lam Nang Rong	14.30	102.76	ID	1982	23	150
40	Lam Pao	16.60	103.45	ID	1968	33	1340
41	Lam Phra Phloeng	14.59	101.84	ID	1967	50	110
42	Lam Plai Mat	14.30	102.44	ID	1988	44.6	98
43	Lam Sae	14.42	102.27	ID	1988	29.5	275
44	Lam Ta Khong P.S.	14.87	101.56	HPD	1974	40.3	310
45	Laoyinyan	24.47	99.82	HPD	1997	4.23	1092
46	Lidi	27.85	99.03	HPD	2019	75	75
47	Lower Sesan 2	13.55	106.26	HPD	2018	75	2715
48	Luozhahe 1	24.51	100.45	HPD	2016	59	14.33
49	Luozhahe 2	24.49	100.40	HPD	2017	71	3391
50	Manfeilong	21.91	100.78	ID	1958		10.64
51	Manman	21.88	100.21	ID	1970		14.5
52	Manwan	24.62	100.45	HPD	1995	132	1006
53	Mengbang Reservoir	21.92	100.28	ID	1958		17.86
54	Menglun	21.93	101.18	ID	2011		6.8
55	Miaowei	25.85	99.16	HPD	2017	139.8	660
56	Mun Bon	14.48	102.15	ID	1980	32.7	141
57	Nam Beng	19.95	101.24	HPD	2017	25.5	3611
58	Nam Chian 1	19.15	103.56	HPD	2018	93	23.12
59	Nam Houm	18.18	102.47	ID	1981	22	42
60	Nam Khan 2	19.69	102.37	HPD	2016	160	528

No.	Project name	Lat	Lon	Purpose	COD	Height (m)	Total storage (FSL, Mm3)
61	Nam Khan 3	19.75	102.22	HPD	2016	90	860.5
62	Nam Kong 1	14.54	106.74	HPD	2021	80	505
63	Nam Kong 2	14.49	106.86	HPD	2018	50	71.4
64	Nam Kong 3	14.57	106.91	HPD	2021	65	471
65	Nam Leuk	18.44	102.95	HPD	2000	51.5	185
66	Nam Lik 1	18.62	102.39	HPD	2019	36.5	6.8
67	Nam Lik 1-2	18.79	102.12	HPD	2010	103	11.13
68	Nam Mang 1	18.53	103.20	HPD	2017	70	16.52
69	Nam Mang 3	18.35	102.77	HPD	2005	28	49.43
70	Nam Nga 2	20.18	101.92	HPD	2017	47	157.7
71	Nam Ngiep 1	18.65	103.55	HPD	2019	167	1192
72	Nam Ngiep 2	19.30	103.35	HPD	2015	70.5	163
73	Nam Ngiep 3A	19.24	103.28	HPD	2014	30	
74	Nam Ngum 1	18.53	102.55	HPD	1971	75	4700
75	Nam Ngum 2	18.76	102.78	HPD	2013	181	3590
76	Nam Ngum 5	19.36	102.62	HPD	2012	99	314
77	Nam Ou 1	20.09	102.27	HPD	2020	65	89.1
78	Nam Ou 2	20.41	102.47	HPD	2016	49	121.7
79	Nam Ou 3	20.70	102.67	HPD	2020	72	181
80	Nam Ou 4	21.12	102.49	HPD	2020	47	141.6
81	Nam Ou 5	21.41	102.34	HPD	2016	74	335
82	Nam Ou 6	21.78	102.20	HPD	2016	88	409
83	Nam Ou 7	22.08	102.26	HPD	2020	143	1770
84	Nam Pha Gnai	19.01	102.87	HPD	2020	70	
85	Nam Pung	16.97	103.98	MPD	1965	41	165
86	Nam San 3A	19.13	103.66	HPD	2016	75	123
87	Nam San 3B	19.09	103.62	HPD	2015		11.7
88	Nam Tha 1	20.27	100.87	HPD	2019	93.65	1755
89	Nam Theun 1	18.36	104.15	HPD	2022	177	3009
90	Nam Theun 2	18.00	104.95	HPD	2010	48	3500
91	Nam Un	17.30	103.76	ID	1973	29.5	520
92	Nandeng	23.70	99.89	MPD	2010	89	51.49
93	Nanhe 1	24.34	100.01	HPD	2009	56.8	11.36
94	Nuozadu	22.64	100.44	HPD	2014	261.5	23703
95	Pak Mun	15.28	105.47	HPD	1994	17	0.13
96	Plei Krong	14.41	107.86	HPD	2008	65	1048.7
97	Pleipai	13.49	107.90	ID	2011	16.5	13.28
98	Sesan 3	14.22	107.72	HPD	2006	79	3.8
99	Sesan 3A	14.11	107.66	HPD	2007	35	239
100	Sesan 4	13.97	107.50	HPD	2009	74	893

No.	Project name	Lat	Lon	Purpose	COD	Height (m)	Total storage (FSL, Mm3)
101	Sesan 4a	13.93	107.47	HPD	2011	17.3	13.13
102	Siridhorn	15.21	105.43	HPD	1971	42	1967
103	Srepok 3	12.75	107.88	HPD	2009	52.5	219
104	Srepok 4	12.81	107.86	HPD	2011	155	
105	Theun-Hinboun	18.26	104.56	HPD	1998	27	
106	Theun-Hinboun exp.	18.30	104.64	HPD	2013	65	2450
107	Ubol Ratana	16.78	102.62	HPD	1966	35.1	2559
108	Upper Kontum	14.69	108.23	HPD	2021		145.52
109	Weiyuanjiang	23.28	100.56	HPD	2014		274
110	Wunonglong	27.93	98.93	HPD	2019	137	284
111	Xayaburi	19.25	101.81	HPD	2019	32.6	1300
112	Xe Lanong 1	16.36	106.24	HPD	2021		373
113	Xekaman 1	14.96	107.16	HPD	2016	120	3340
114	Xekaman 3	15.43	107.36	HPD	2013	101.5	141.5
115	Xekaman-Sanxay	14.89	107.12	HPD	2018	28	
116	Xepian-Xenamnoy	14.95	106.63	HPD	2019	75.5	1092
117	Xeset 1	15.49	106.28	HPD	1990	18	
118	Xeset 2	15.40	106.28	HPD	2009	26	9
119	Xiangshui	23.77	100.63	ID	1989	54	56.7
120	Xiaowan	24.70	100.09	HPD	2010	292	15043
121	Xi'er He 2	25.56	100.13	HPD	1987	37.25	0.2
122	Xi'er He 4	25.58	100.07	HPD	1971		14
123	Ximahe	22.78	100.98	ID	1956		420
124	Xinfang Reservoir	22.72	100.96	ID	1958		7.1
125	XunCun	25.42	99.99	HPD	1999	67	73.74
126	Yali	14.23	107.83	HPD	2001	65	1037.09
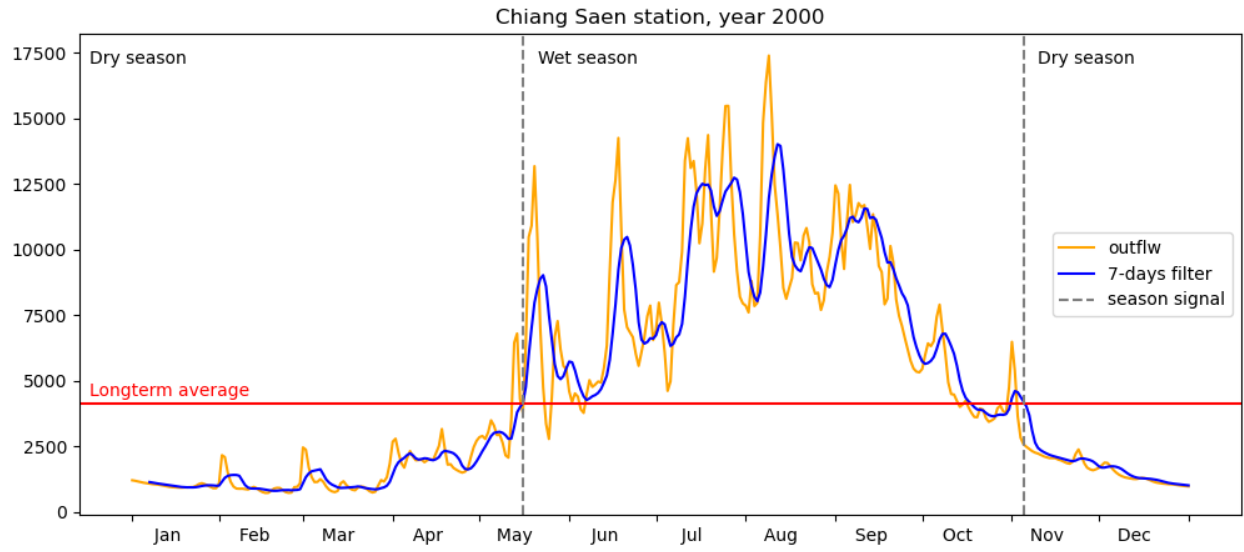
Figure S1. Sample of season separation after applying a 7-days moving window filter to the simulated outflow at Chiang Saen station in year 2000.
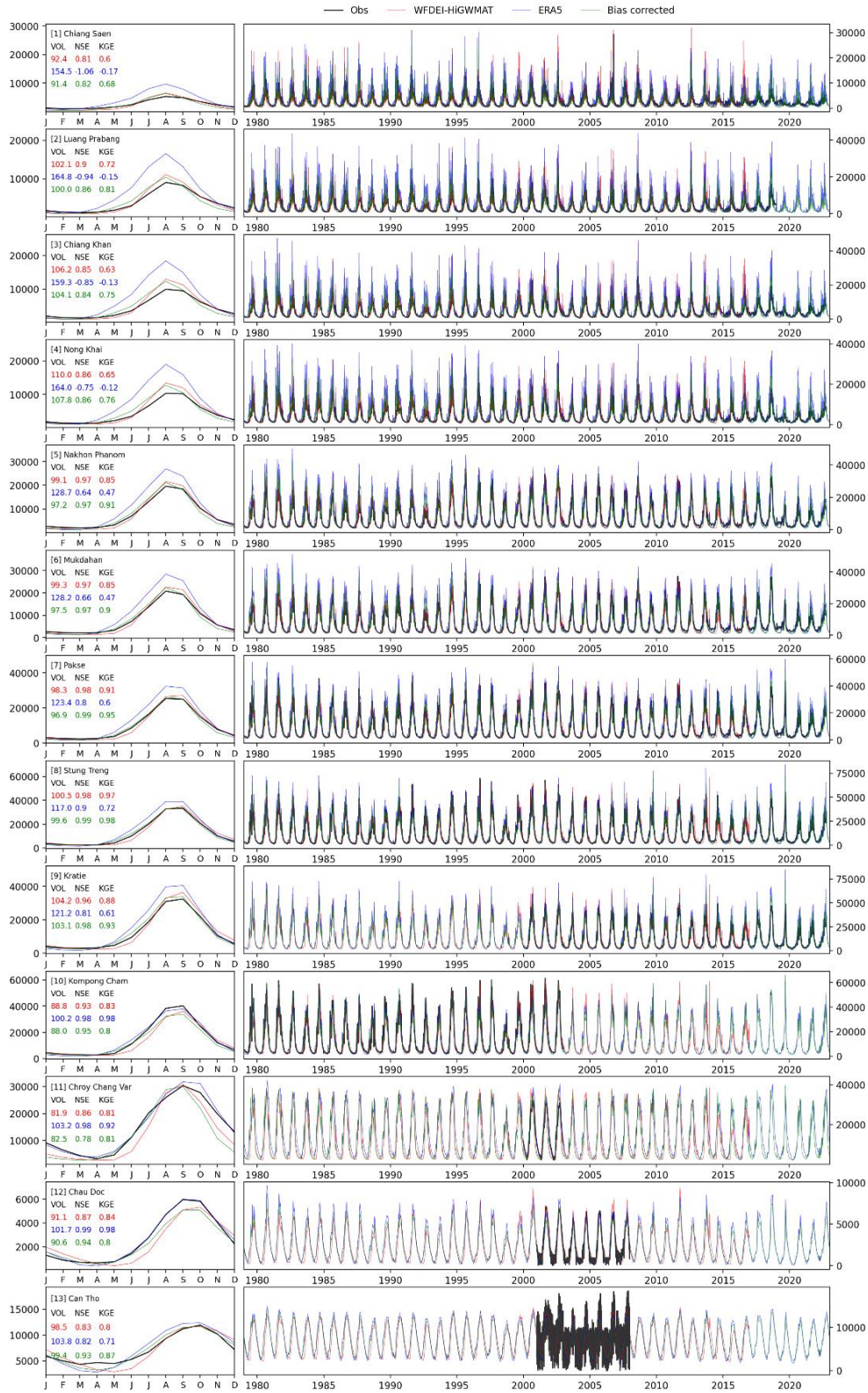
Figure S2. Complete time series validation of daily simulated discharge at selected stations between 1979-2022 from multiple runoff datasets. It should be noted that the simulated results of year 1953 has been removed from further analysis due to problems caused by the ERA5 runoff dataset.
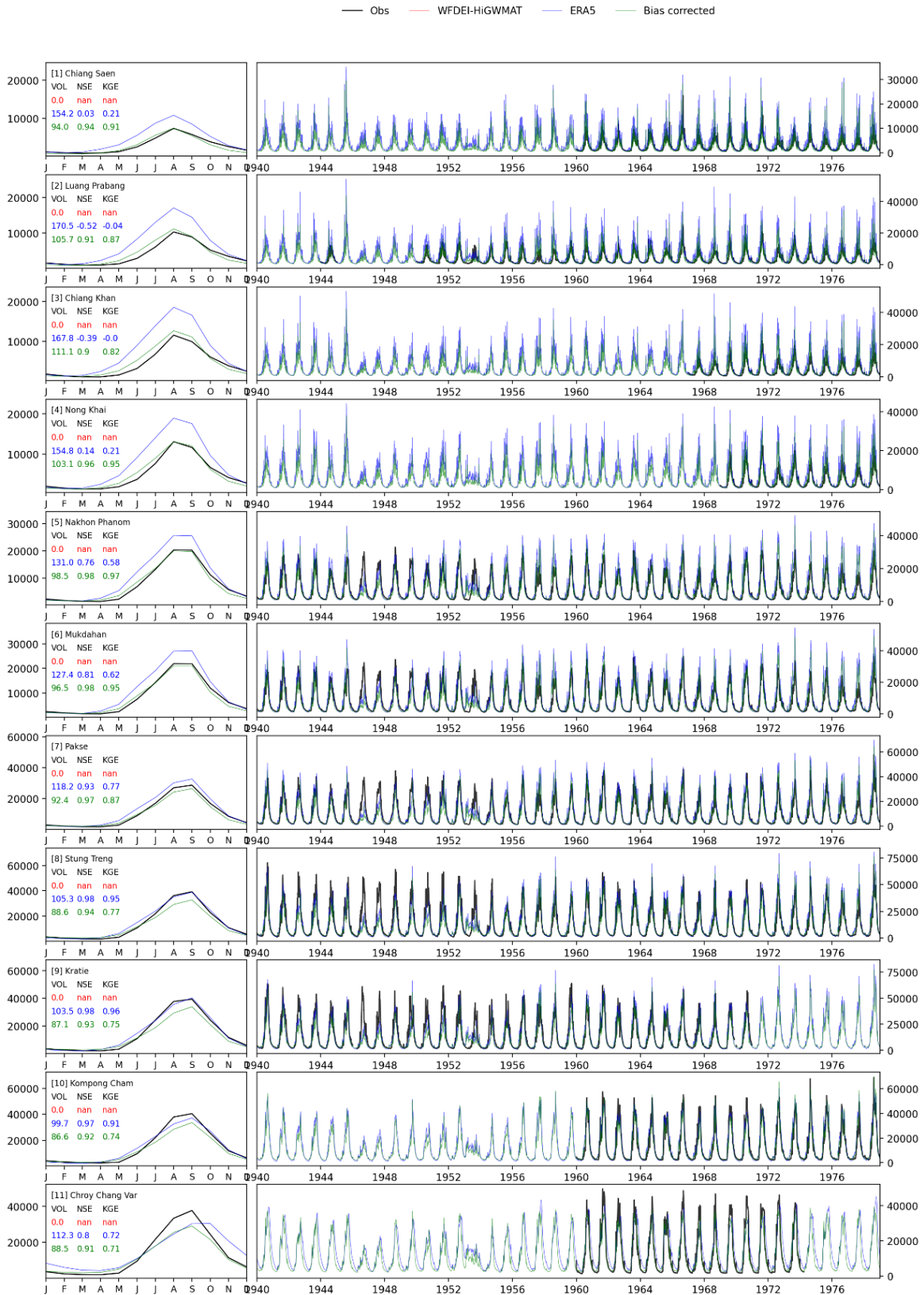
Figure S3. Same a Figure S2 but for 1940-1978; note that HiGW-MAT simulations are not available for this period.
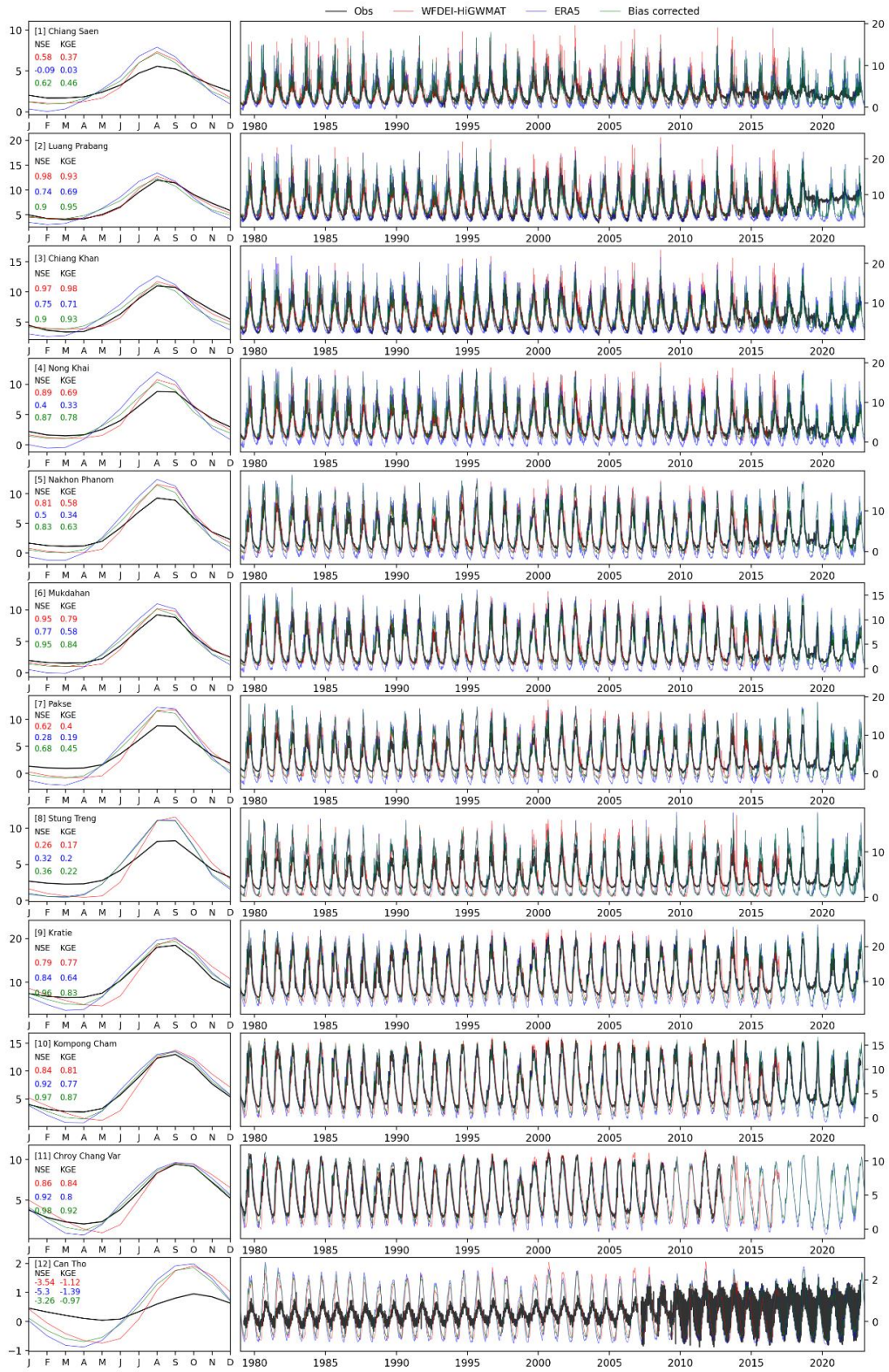
Figure S4. Complete time series validation of daily simulated water level at selected stations between 1979-2022 from multiple runoff datasets.
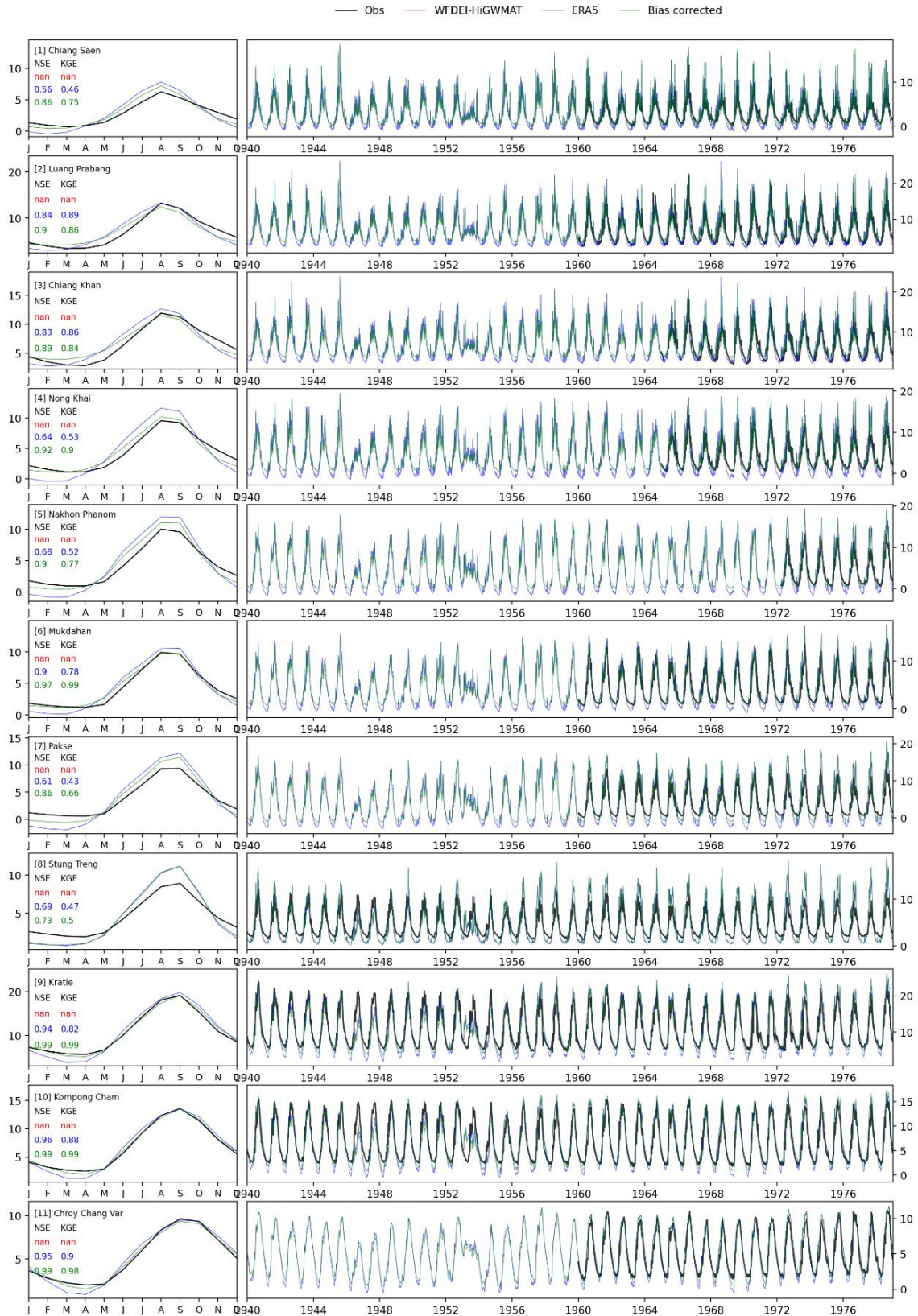
Figure S5. Same a Figure S4 but for 1940-1978; note that HiGW-MAT simulations are not available for this period.
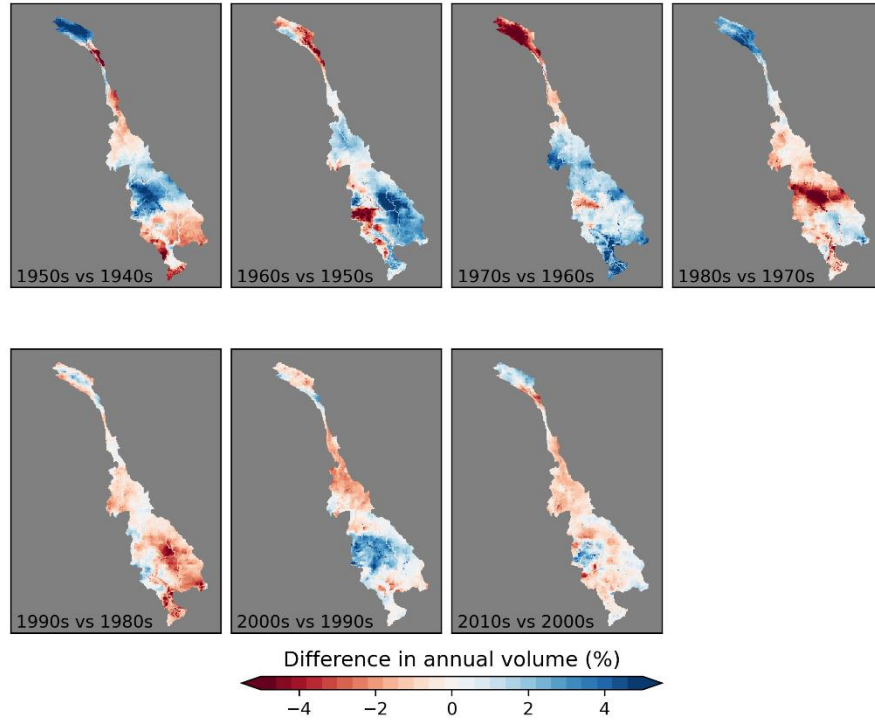
Figure S6. Decadal differences in CMFD simulated annual volume.
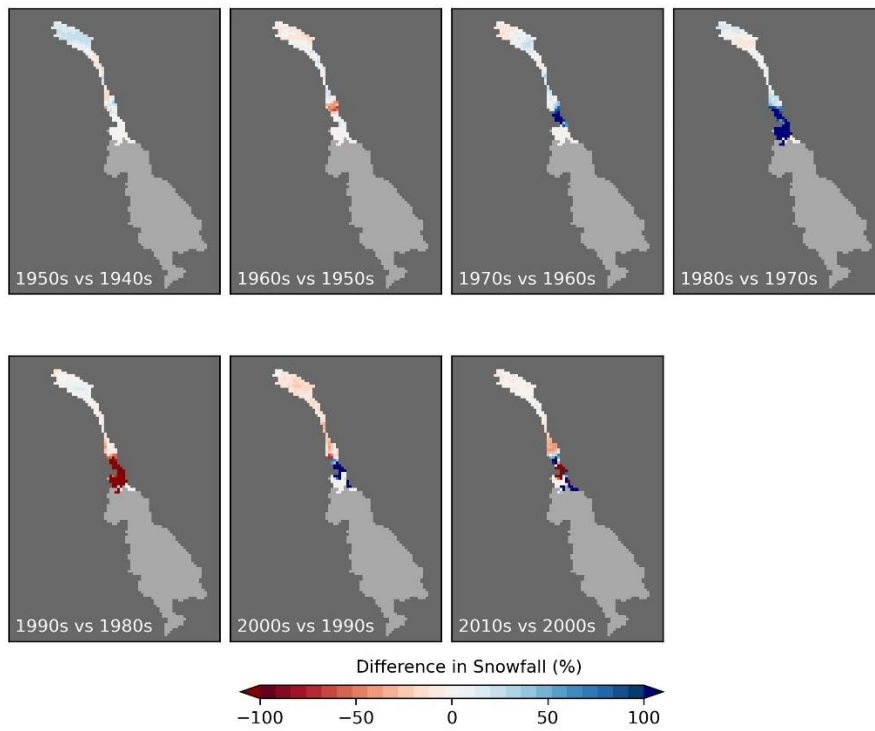
Figure S7. Decadal differences in snowfall from ERA5 dataset.
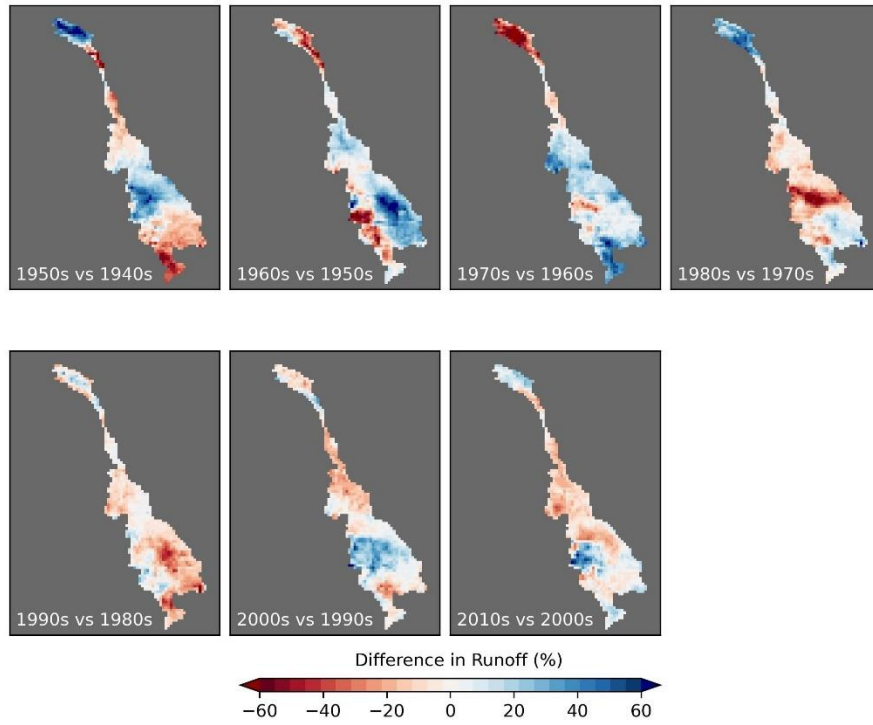
Figure S8. Decadal differences in runoff from ERA5 dataset.
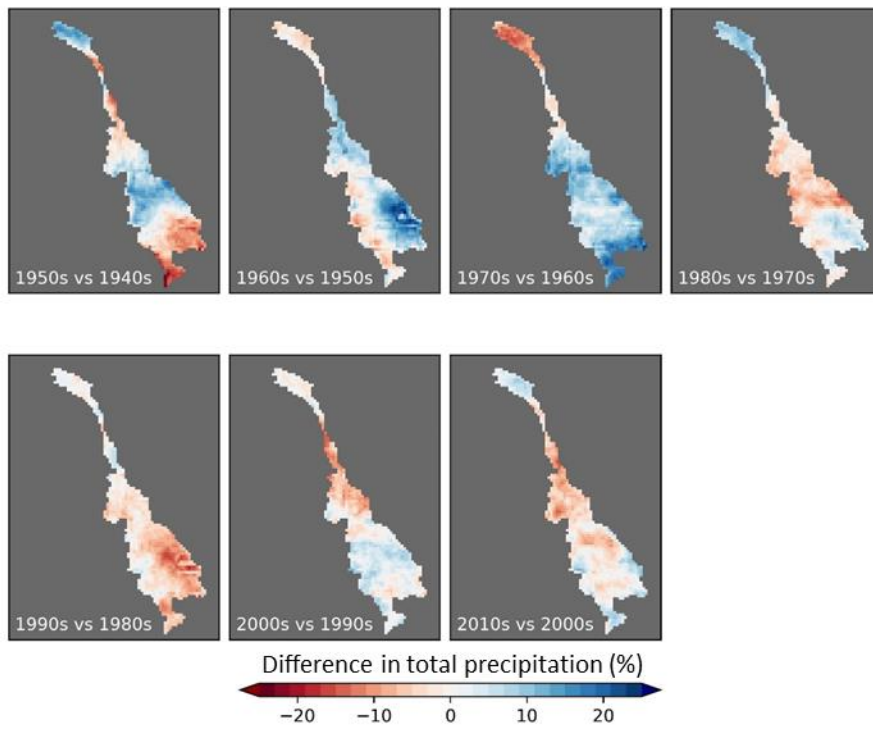
Figure S9. Decadal differences in total precipitation from ERA5 dataset.
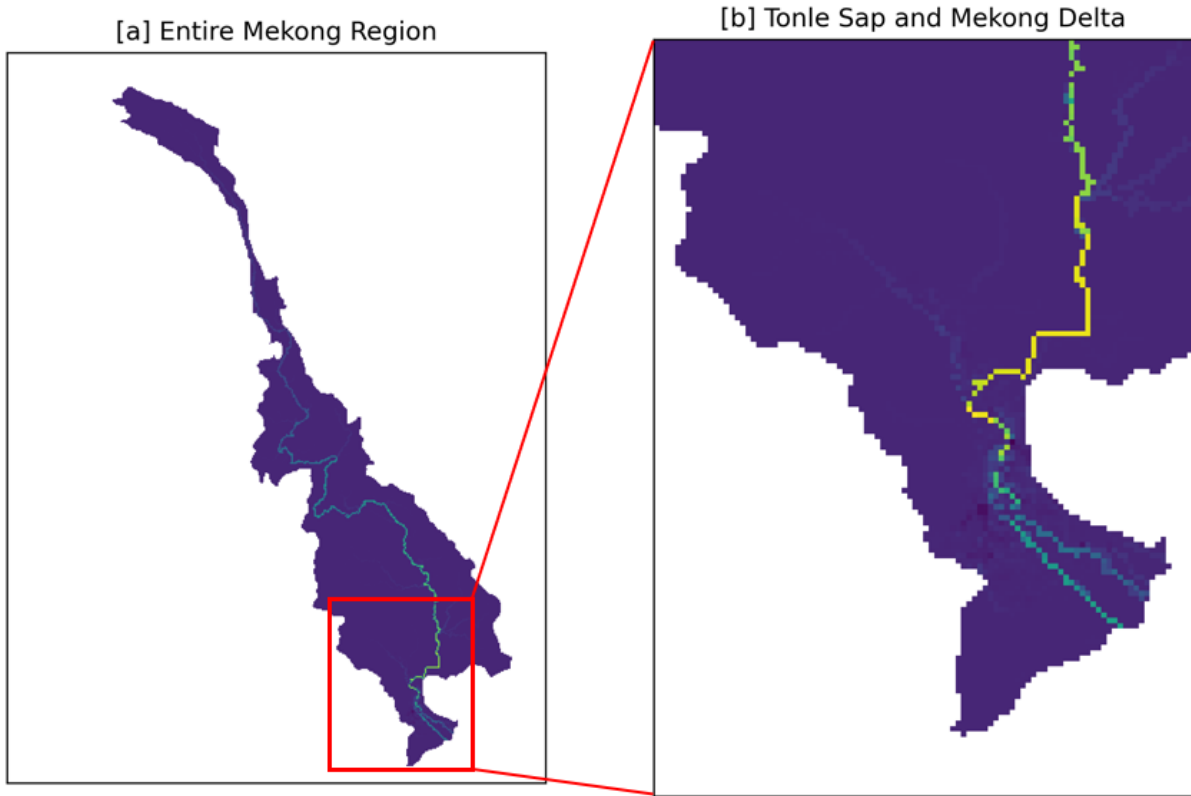
Figure S10. Long-term average simulated discharge across the entire Mekong Region and the Tonle Sap, Mekong Delta region.