



Figure S.1 Daily precipitation spatially aggregated annual correlation with reference to the AHCCD observed data set in each gauge (1981-2010). White represents years excluded for missing data. If a single month was rejected, that year was also excluded.

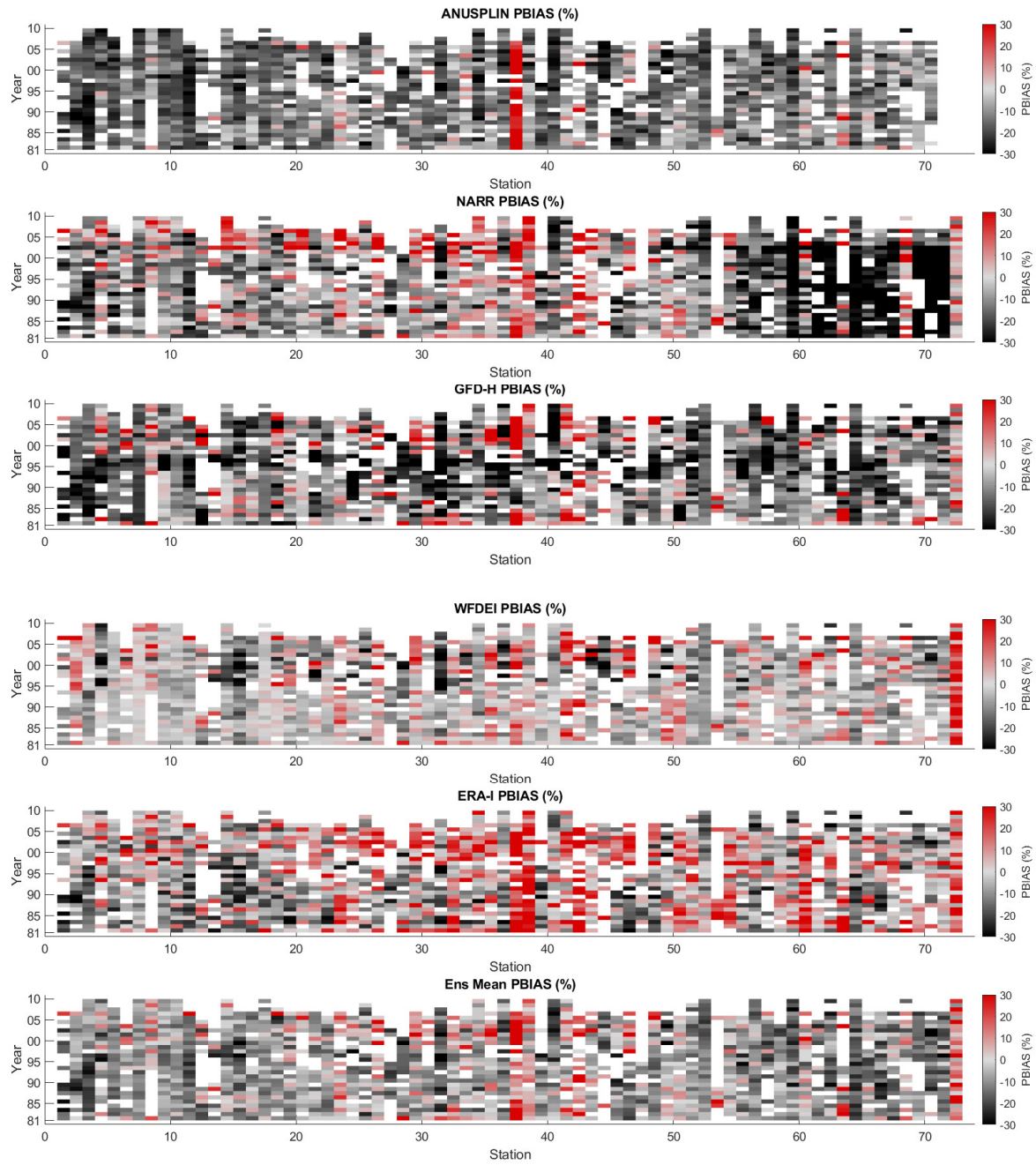


Figure S.2 Daily precipitation spatially aggregated annual PBIAS with reference to the AHCCD observed data set in each gauge (1981-2010). White represents years excluded for missing data. If a single month was rejected, that year was also excluded.

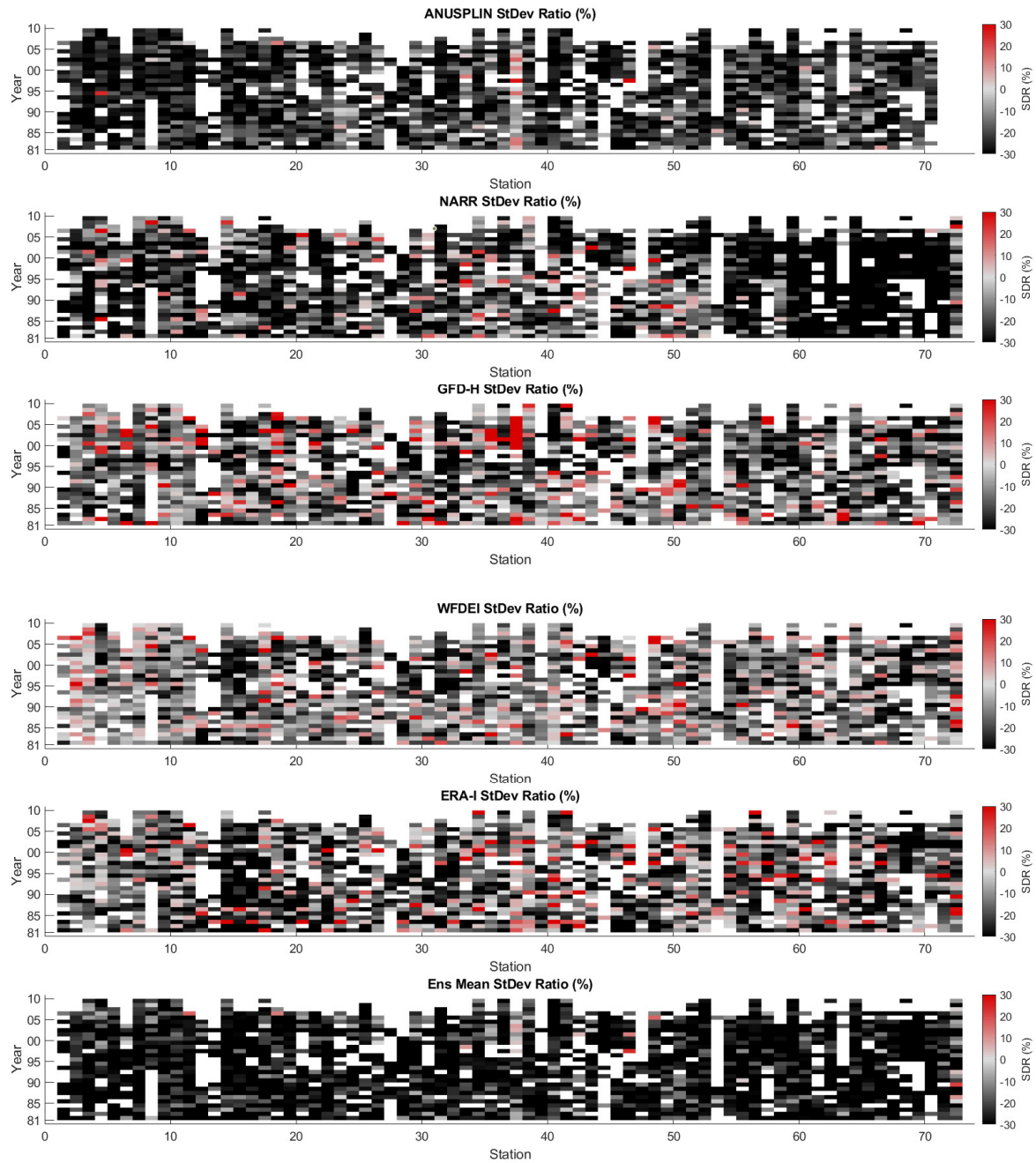


Figure S.3 Daily precipitation spatially aggregated annual SEDI score with reference to the AHCCD observed data set in each gauge (1981-2010). White represents years excluded for missing data. If a single month was rejected, that year was also excluded.

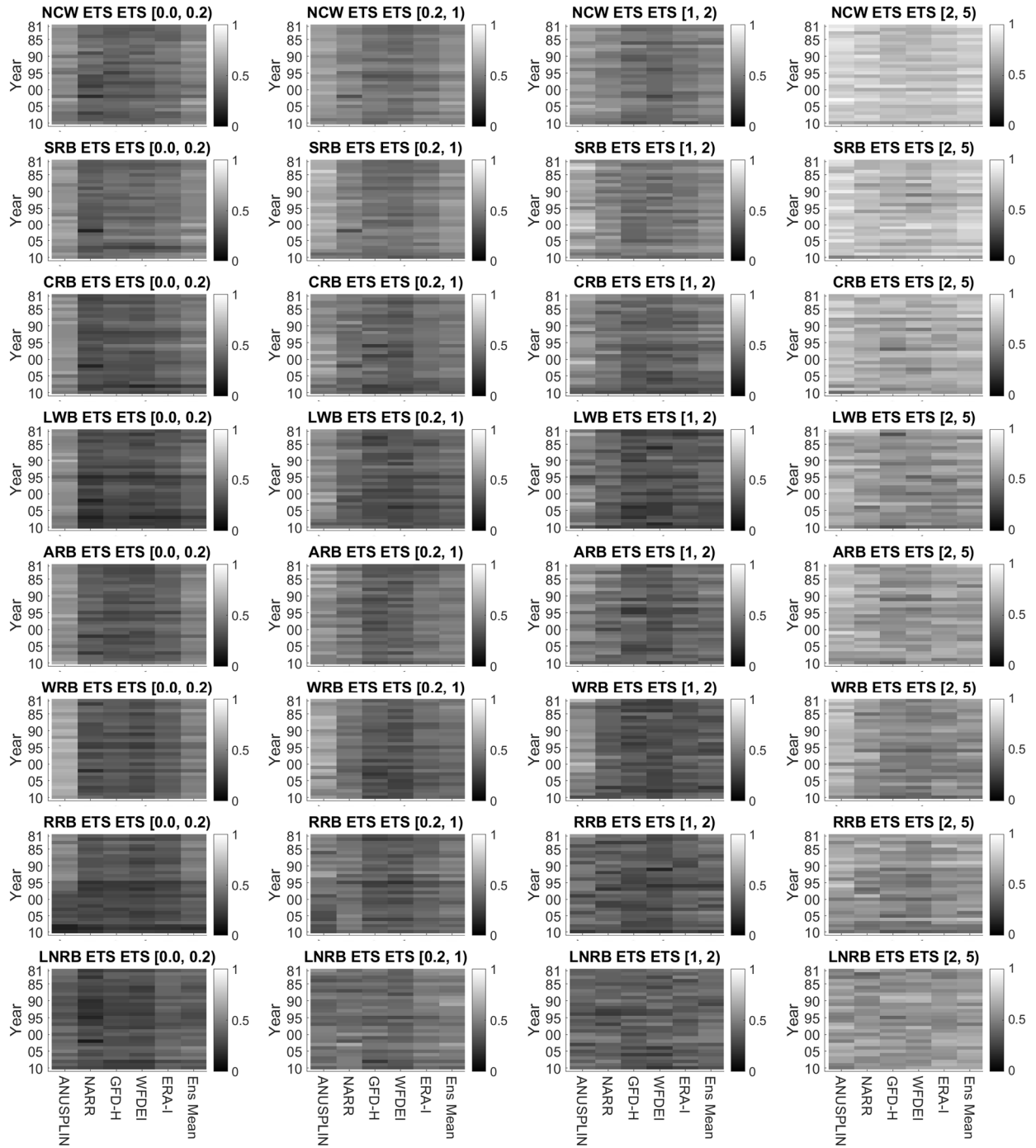


Figure S.4 Daily precipitation spatially aggregated annual ETS score with reference to the AHCCD observed data set in each sub-basin (1981-2010). Scores for 0-5 mm bins are presented.

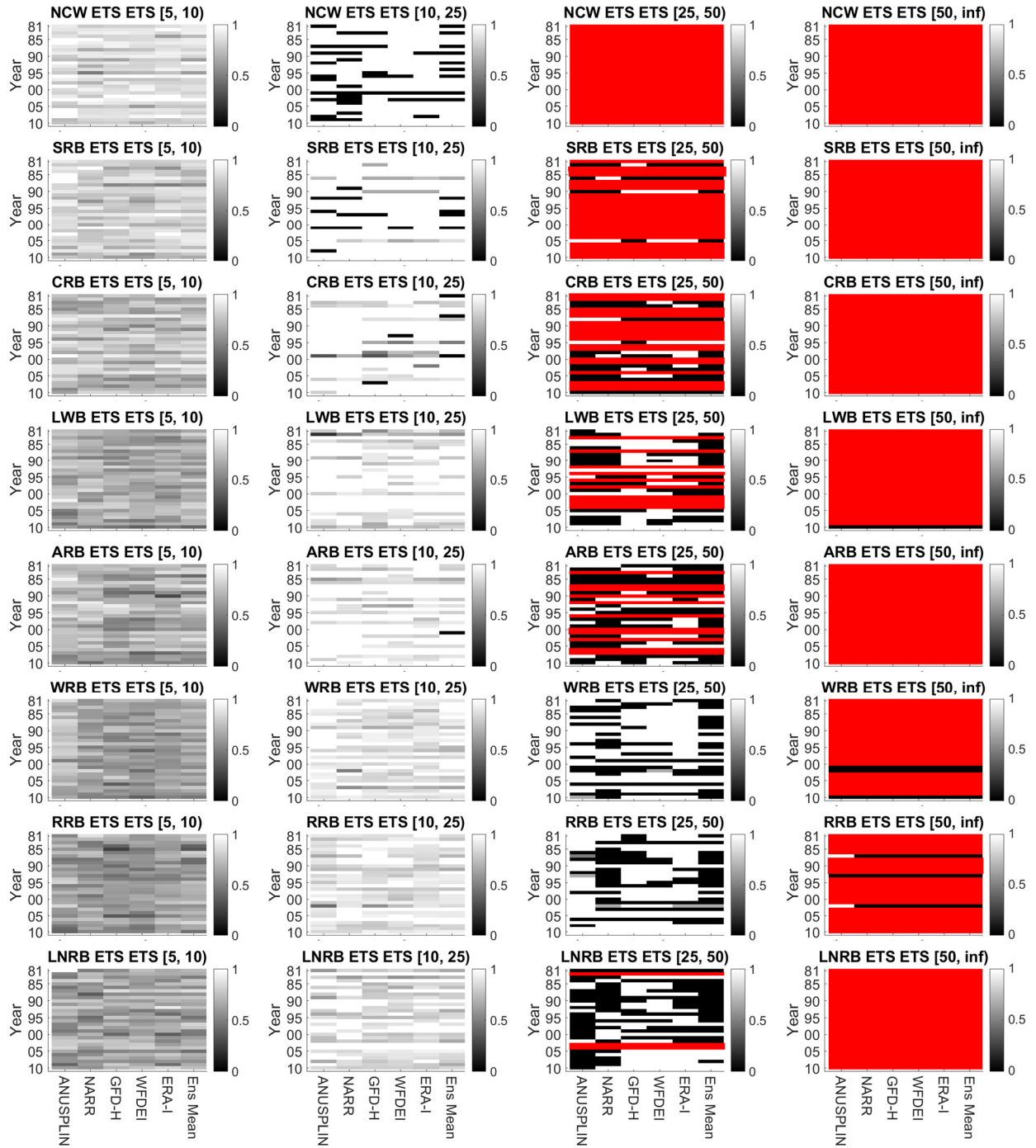


Figure S.5 Daily precipitation spatially aggregated annual ETS score with reference to the AHCCD observed data set in each sub-basin (1981-2010). Scores for 5-inf mm bins are presented. Red represented no data.

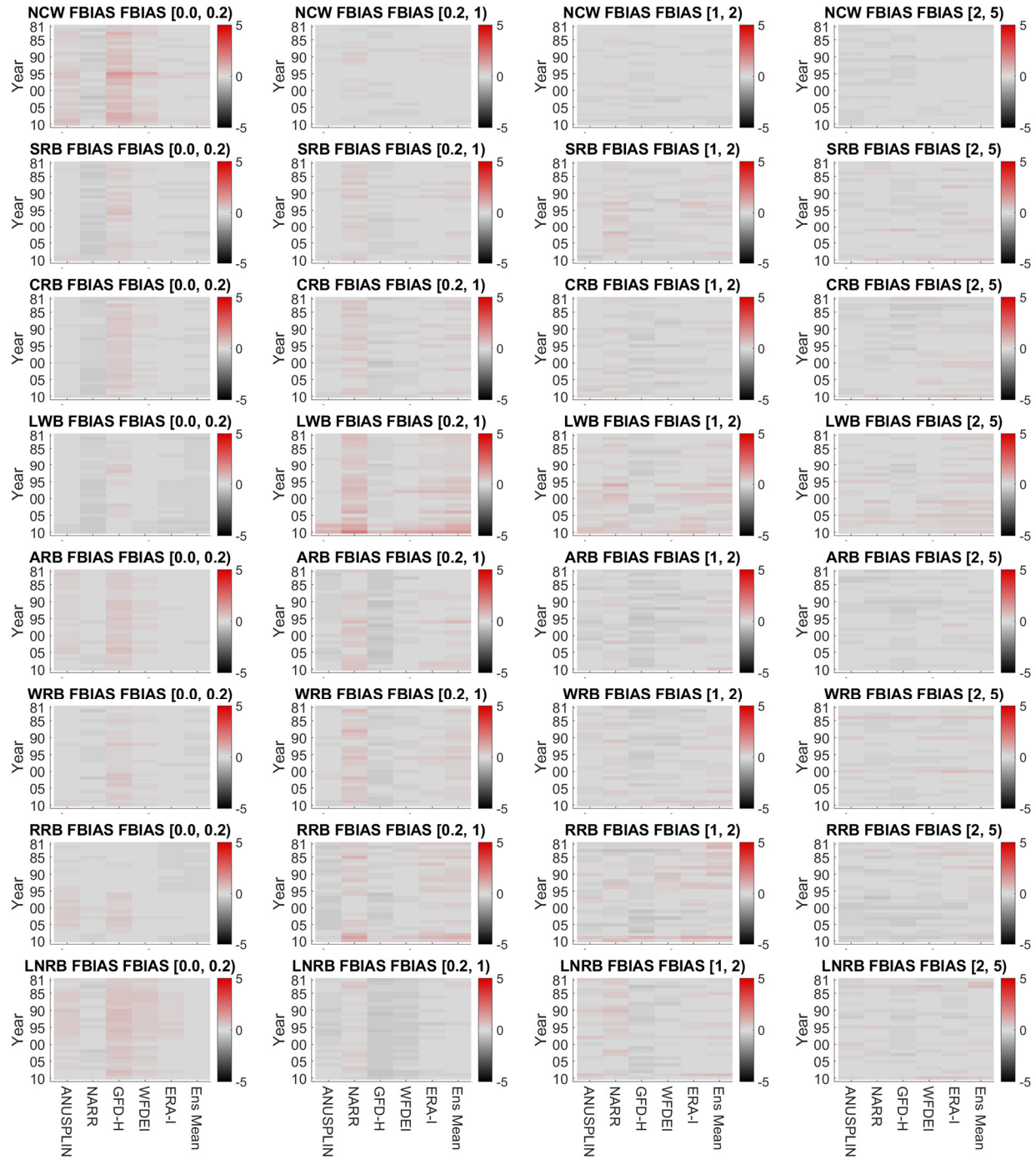


Figure S.6 Daily precipitation spatially aggregated annual FBIAS score with reference to the AHCCD observed data set in each sub-basin (1981-2010). Scores for 0-5 mm bins are presented.

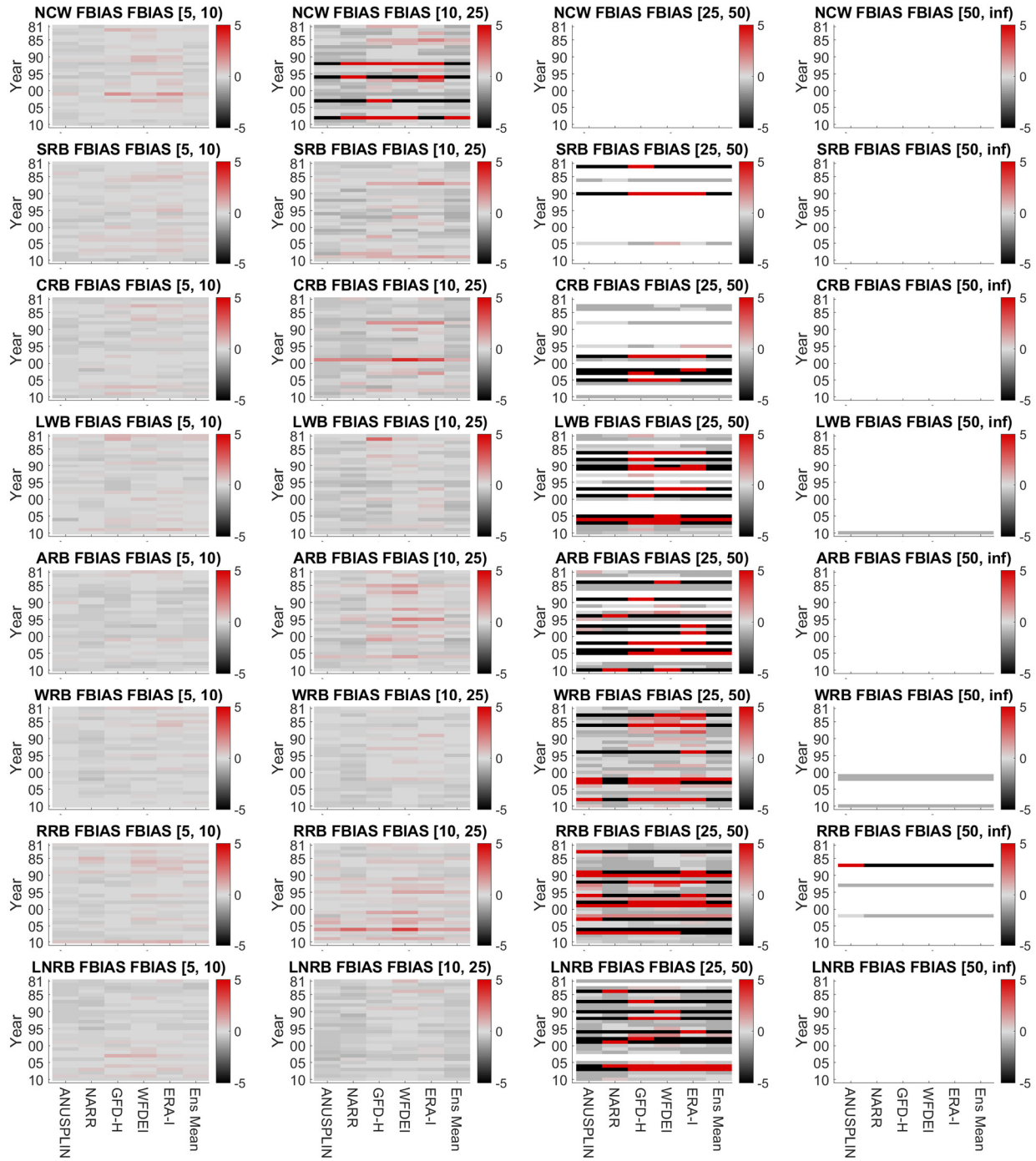


Figure S.7 Daily precipitation spatially aggregated annual ETS score with reference to the AHCCD observed data set in each sub-basin (1981-2010). Scores for 5-inf mm bins are presented. White represented no data.

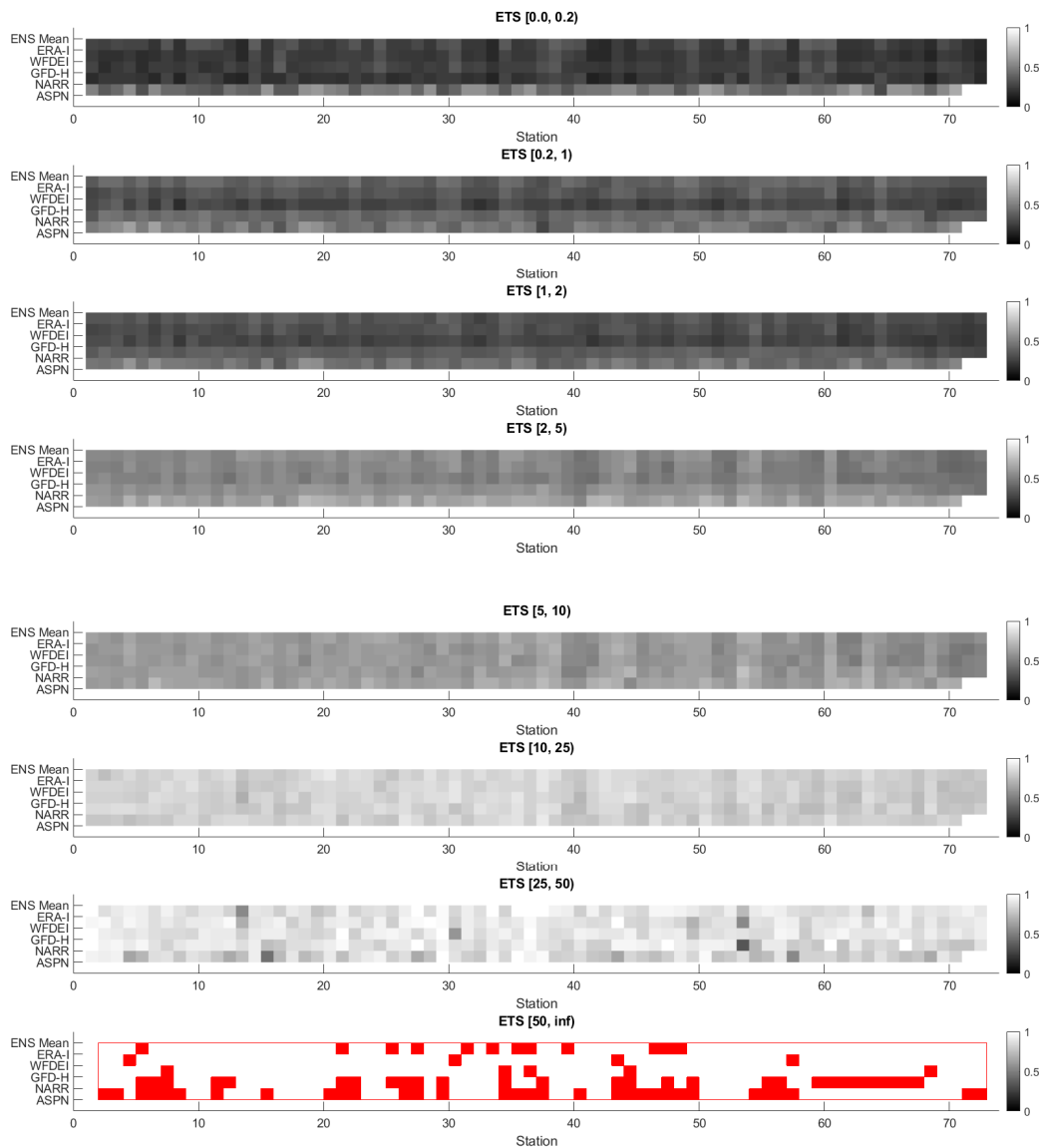


Figure S.8 Daily precipitation spatially aggregated annual ETS score with reference to the AHCCD observed data set in each gauge (period mean for 1981-2010). Red represented no data.

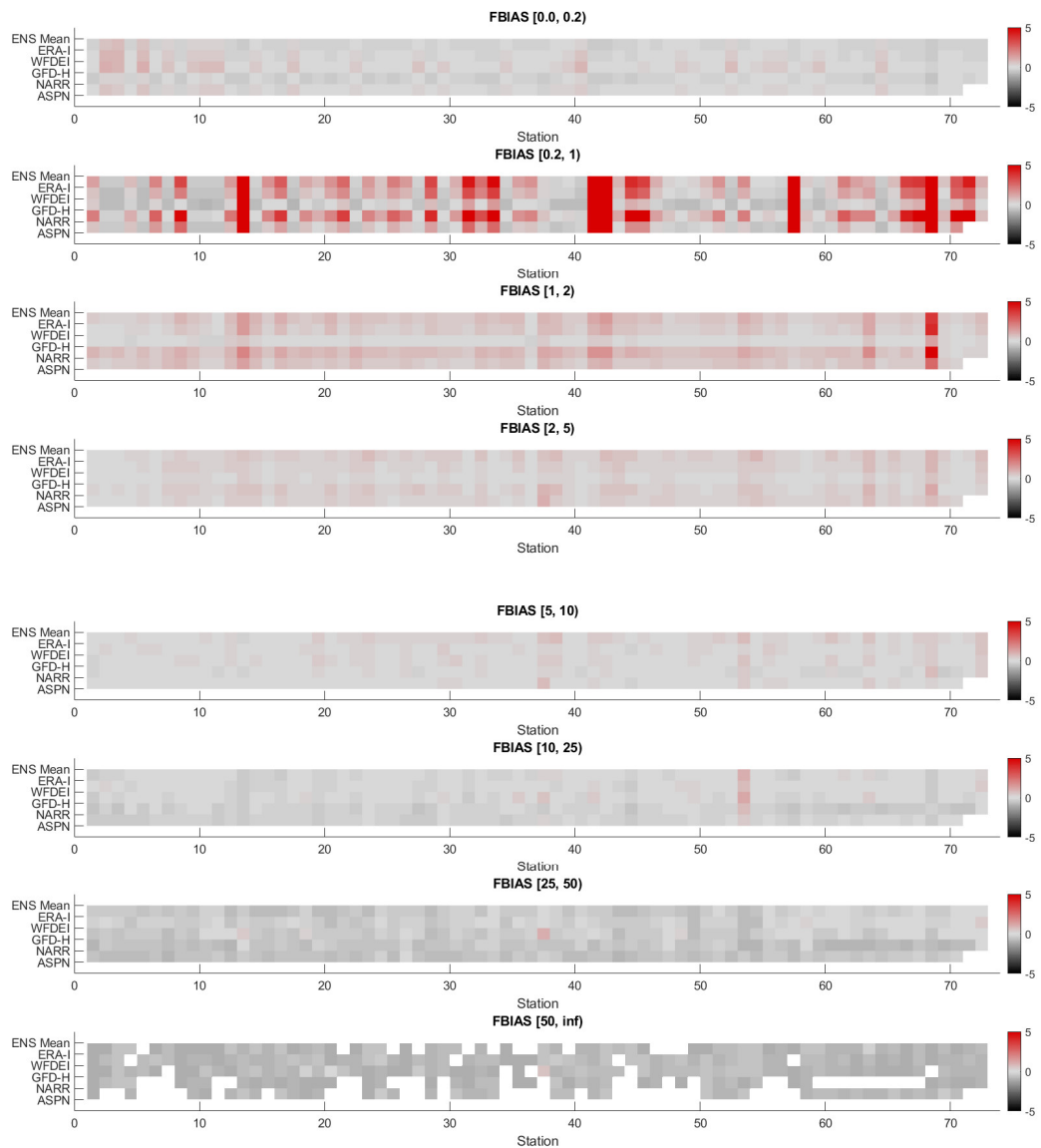


Figure S.9 Daily precipitation spatially aggregated annual FBIS score with reference to the AHCCD observed data set in each gauge (period mean for 1981-2010). White represented no data.

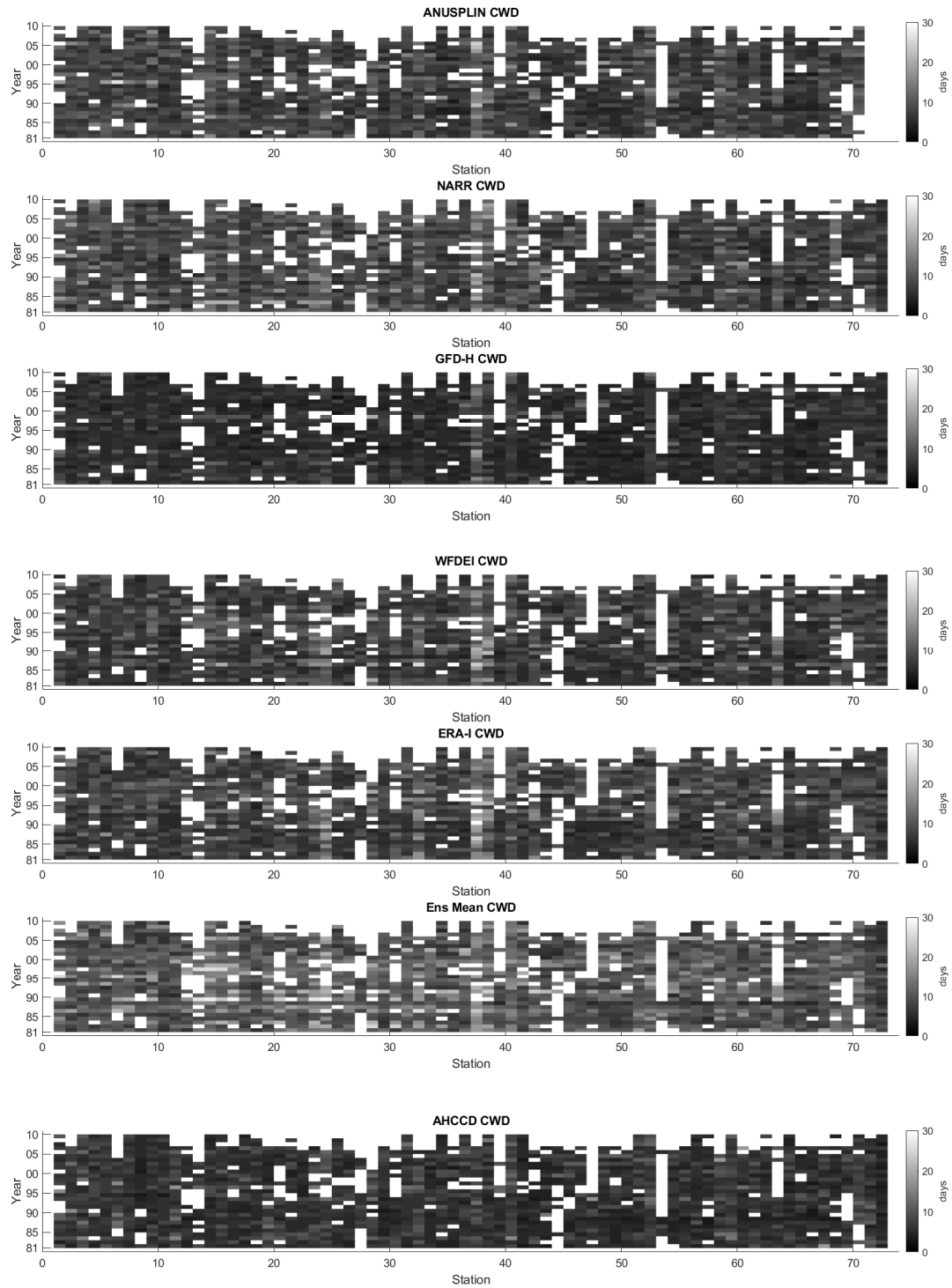


Figure S.10 Daily precipitation spatially aggregated annual CDD score with reference to the AHCCD observed data set in each gauge (1981-2010). White represents years excluded for missing data. If a single month was rejected, that year was also excluded.

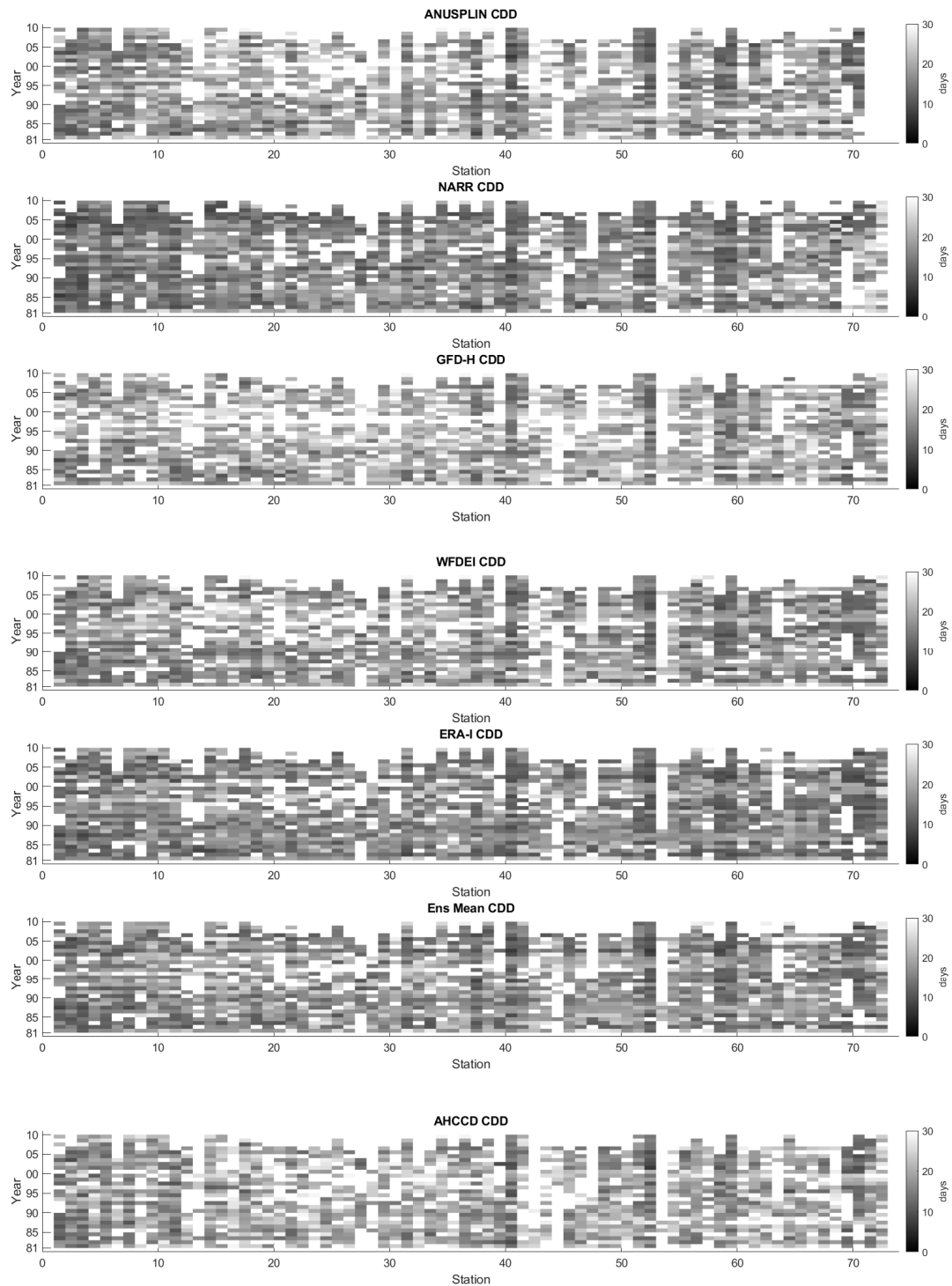


Figure S.11 Daily precipitation spatially aggregated annual CWD, with AHCCD observed data set presented for reference, in each gauge (1981-2010). White represents years excluded for missing data. If a single month was rejected, that year was also excluded.

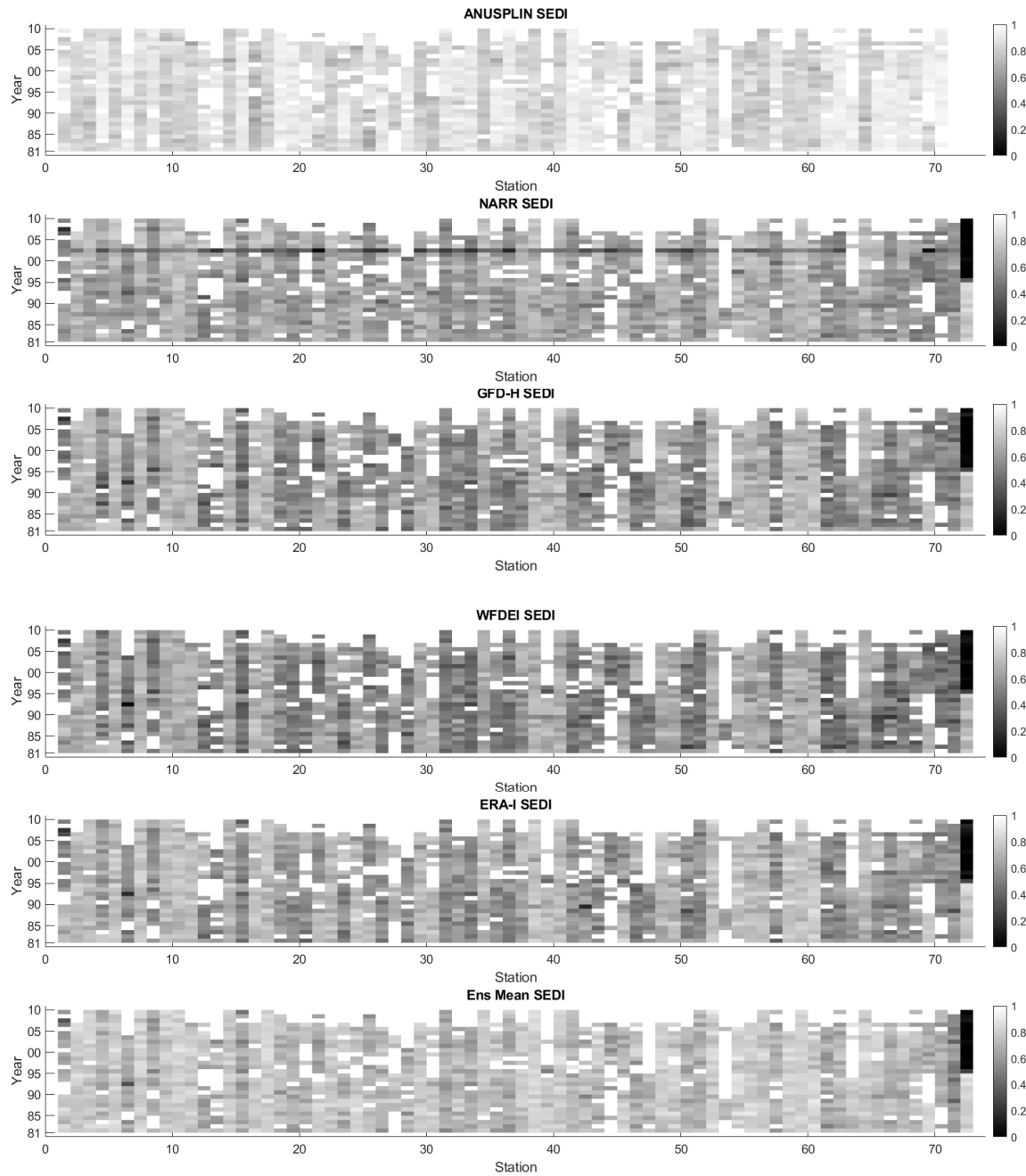


Figure S.12 Daily precipitation spatially aggregated annual SEDI score with reference to the AHCCD observed data set in each gauge (1981-2010). White represents years excluded for missing data. If a single month was rejected, that year was also excluded.

Table S.1: Final list of ground-based climate stations with mean yearly precipitation and the standard deviation of yearly precipitation. Stations are ordered from highest to lowest latitude. Station order is consistent for station performance metric plots.

Station Number	Name	Latitude Longitude			Mean yearly precipitation (mm)		Mean yearly precipitation standard deviation (mm)	
		(°N)	(°W)	Elev (m a.s.l.)	AHCCD	ECCC	AHCCD	ECCC
1	COLLINS_BAY	58.18	-103.7	490	601.1	488.5	141.2	109.7
2	LYNN_LAKE	56.87	-101.08	357	575.0	463.5	79.6	98.0
3	GILLAM_A	56.35	-94.72	145	610.0	473.0	106.5	90.1
4	BUFFALO_NARROWS	55.83	-108.43	440	489.6	448.8	86.5	89.8
5	THOMPSON_A	55.8	-97.87	222	603.4	510.1	112.6	110.7
6	ISLAND_FALLS	55.53	-102.35	297	507.8	476.2	71.4	73.7
7	LA_RONGE_A	55.15	-105.27	379	558.2	486.0	82.4	82.4
8	FLIN_FLON	54.77	-101.88	320	477.8	452.9	83.4	86.5
9	COLD_LAKE_A	54.42	-110.28	541	498.8	419.8	78.9	79.2
10	THE_PAS_A	53.97	-101.1	270	530.6	445.8	81.7	86.6
11	NORWAY_HOUSE	53.96	-97.85	224	611.2	514.8	83.5	86.2
12	WASKESIU_LAKE	53.92	-106.07	569	503.8	452.8	94.8	104.7
13	SION	53.88	-114.12	701	525.3	498.3	113.3	117.8
14	EDMONTON_INTL_A	53.57	-113.52	723	511.6	447.0	85.2	86.3
15	RANFURLY_2NW	53.42	-111.73	673	495.1	452.7	93.9	96.5
16	CALMAR	53.28	-113.85	720	547.5	515.9	76.0	79.5
17	PRINCE_ALBERT_A	53.22	-105.67	428	506.9	431.0	89.5	98.2
18	GRAND_RAPIDS_HYDRO	53.15	-99.28	223	533.7	499.0	84.8	102.8
19	WASECA	53.13	-109.4	638	457.7	420.2	94.3	98.6
20	CAMROSE	53.03	-112.82	739	469.4	431.2	60.0	64.3
21	HUDSON_BAY	52.82	-102.32	358	534.9	433.9	129.7	97.7
22	NORTH_BATTLEFORD	52.77	-108.25	548	454.0	368.0	57.4	69.4
23	LACOMBE	52.45	-113.75	860	481.4	411.9	107.5	85.3
24	ROCKY_MNT_HOUSE	52.43	-114.92	988	605.1	491.7	132.1	92.0
25	PILGER	52.42	-105.15	552	499.4	453.4	115.1	122.4
26	SCOTT_CDA	52.37	-108.83	660	383.8	353.9	68.7	69.9
27	BERENS_RIVER	52.35	-97.03	222	584.1	508.5	57.3	75.2
28	STETTLER	52.33	-112.72	821	519.1	477.4	85.1	91.0
29	SASKATOON_INTL_A	52.17	-106.72	504	418.4	350.3	84.6	90.2
30	CORONATION	52.08	-111.45	791	426.7	358.4	107.1	77.3
31	PELLY	52.08	-101.87	509	629.5	580.3	115.9	119.8
32	OLDS	51.78	-114.1	1046	513.7	492.1	91.7	94.7
33	COTE	51.52	-101.78	450	500.9	459.4	64.5	70.2
34	KINDERSLEY	51.52	-109.18	694	401.9	321.5	75.3	82.5
35	OUTLOOK_PFRA	51.48	-107.05	541	375.4	341.9	71.2	75.5
36	KELLIHER	51.26	-103.75	676	534.4	486.3	95.0	101.0
37	BANFF	51.2	-115.55	1397	497.7	443.3	122.8	105.3
38	CALGARY_INTL_A	51.11	-114.02	1084	482.2	415.7	64.5	65.2
39	DAUPHIN_A	51.1	-100.05	305	593.8	485.3	53.7	75.6

40	RED_LAKE_A	51.07	-93.8	386	821.6	683.5	129.3	142.6
41	ARBORG	50.93	-97.08	224	548.3	509.3	86.6	91.0
42	GLEICHEN	50.88	-113.05	905	355.3	338.5	76.2	79.1
43	LEADER	50.88	-109.53	676	356.6	327.9	75.8	68.9
44	JENNER	50.72	-111.2	755	405.6	375.1	107.8	111.0
45	GIMLI	50.63	-97.05	230	611.5	545.8	96.7	100.9
46	INDIAN_HEAD_CDA	50.55	-103.65	579	474.0	429.2	97.1	107.3
47	BIRTLE	50.43	-101.05	522	514.6	466.0	87.3	94.6
48	REGINA_INTL_A	50.43	-104.67	577	460.6	388.5	87.1	91.5
49	MOOSE_JAW	50.33	-105.55	577	454.6	418.2	127.9	130.3
50	SWIFT_CURRENT_A	50.3	-107.68	817	403.0	403.3	106.9	90.2
51	PINAWA_WNRE	50.18	-96.07	267	652.3	591.9	96.5	116.4
52	SIoux_LOOKOUT_A	50.12	-91.9	383	865.5	769.1	152.3	157.9
53	VAUXHALL	50.05	-112.13	779	358.3	341.9	103.3	102.0
54	MEDICINE_HAT	50.02	-110.72	717	384.9	333.1	95.4	107.3
55	WINNIPEG_A	49.92	-97.23	239	592.4	516.4	100.7	105.1
56	BRANDON	49.91	-99.95	363	557.7	469.8	91.5	99.7
57	YELLOW_GRASS	49.82	-104.18	580	481.4	439.8	99.8	108.1
58	DRYDEN	49.78	-92.83	413	795.3	719.8	107.8	118.4
59	KENORA_A	49.78	-94.37	406	801.6	714.1	142.5	152.1
60	LETHBRIDGE_CDA	49.63	-112.8	929	407.4	235.1	152.8	109.2
61	INDIAN_BAY	49.62	-95.2	327	672.8	623.5	117.1	123.6
62	CYPRESS_RIVER	49.55	-99.08	374	581.2	526.8	77.4	86.2
63	PINCHER_CREEK	49.52	-113.98	1190	519.3	481.3	125.3	135.1
64	ESTEVAN_A	49.22	-102.97	581	511.0	426.8	90.6	98.3
65	MORDEN	49.18	-98.08	298	561.4	526.3	119.9	120.8
66	PIERSON	49.18	-101.27	469	517.3	457.8	95.0	104.9
67	SPRAGUE	49.02	-95.6	329	686.3	616.0	145.3	97.9
68	CARWAY	49	-113.37	1354	560.8	544.7	134.7	137.8
69	ATIKOKAN	48.8	-91.58	442	792.4	662.1	282.1	124.6
70	MINE_CENTRE	48.8	-92.6	361	823.8	784.8	143.9	150.4
71	FORT_FRANCES_A	48.65	-93.43	342	775.3	726.1	118.7	134.1
72	GRAND FORKS INTERNATIONAL AIRPORT, ND US	47.9428	-97.1839	256.6	523.7	523.7	92.1	92.1
73	FARGO HECTOR INTERNATIONAL AIRPORT, ND US	46.9253	-96.8111	274.3	577.2	577.2	129.2	129.2

Table S.2. Station coverage for each year in each basin as the percentage of stations with data available in a basin. Percentages below 100% represent the presence of one or more days with some stations missing data (AHCCD). Cells equal to 100% are left blank. The minimum (lowest data coverage day), the mean data coverage, and the maximum (best data coverage day) are presented. Mean values near 100% were rounded up to 100%.

	LNRB			RRB			WRB			ARB			LWB			CRB			SRB			
	min	mean	max	min	mean	max	min	mean	max	min	mean	max	min	mean	max	min	mean	max	min	mean	max	
1981							89	99				83	90		86			90	95	97		
1982									83	97		83	90		86			90	96			
1983							78	98				83	91		86	94		94	98			
1984				80			89	92		92	99		83	83	83	71	99		97	99		
1985	67						89	98		92		83	92		86	94		97	99			
1986				80			89	99		92		83			86			97	99			
1987							89			83		83						94	98			
1988				80			89	98		92					86			94	98			
1989							78	89	89	92	98		83	97		86		87	97			
1990							78	89	89	83					71	90		90	96	97		
1991				80			78	90		92	99		83	97		71	86	86	94	97		
1992							89	98		92	99		67	83	83	71	89		87	95	97	
1993							89	99					67	78	83	86	99		94	97	97	
1994				80			78	99					67	84		86	99		77	86	97	
1995							89	99		83	96		67	84		71	89		77	83	84	
1996										83	94		83	94		86	99		77	89	97	
1997	67	99					89			83	98		67	92				84	94	97		
1998				80	98		89			83	93		67	93		86	99		81	93	97	
1999				80	82					92	92		67	94				87	95	97		
2000										92	99		83	93		86	99		90	98		
2001										83	92	92		83	97				90	98		
2002										92	92	92							90	95	97	
2003										92	92	92		83	96		86		94	95	97	
2004							89			92	92	92		83	95		86	96	87	94	97	
2005				60	99		78	89		75	91	92		83	97		57	83	86	84	96	97
2006				80			78	89	89	75	85	92		67	81	83	71	86	86	87	90	97
2007	67	97		40	95		56	82	89	33	73	83		33	72	83	43	83	86	26	83	90
2008	33	66	67	40	40	40	56	71	78	25	40	42		33	54	67	43	55	57	32	38	45
2009	33	67	67	40	40	40	56	74	78	33	42	42		17	47	50	43	57	57	29	37	42
2010	33	66	67	40	40	40	56	75	78	33	41	42		17	34	50	43	56	57	32	37	39