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Supplement of

Reconstructions of the 1900–2015 Greenland ice sheet surface mass balance using the regional climate MAR model

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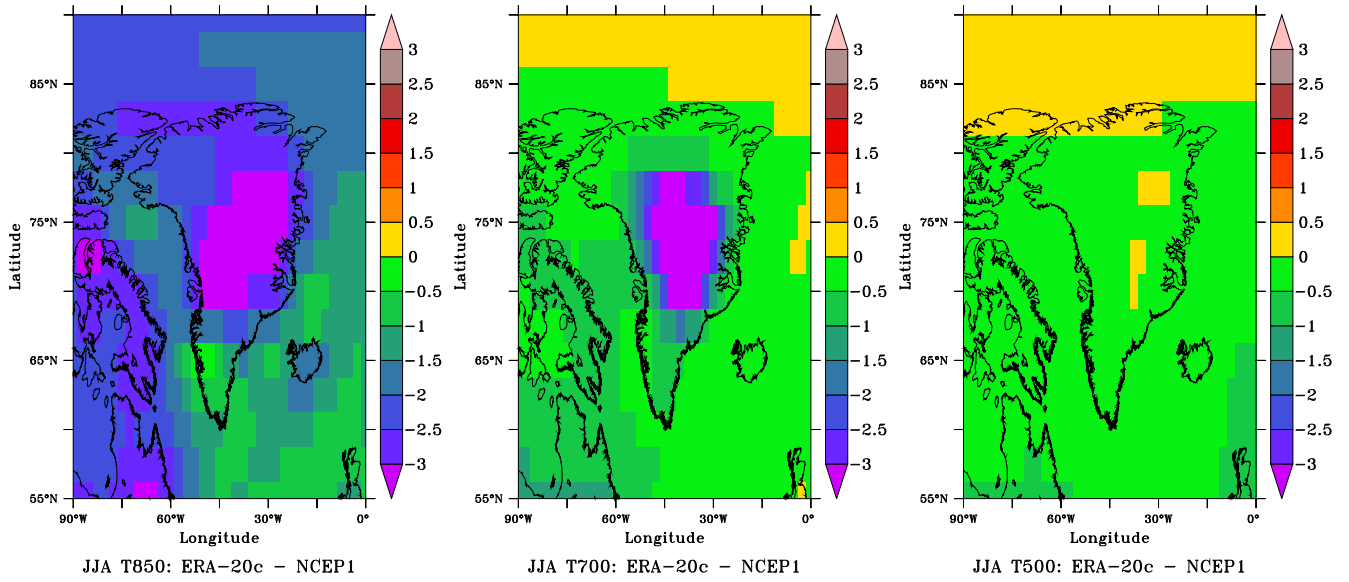


Figure S1. Differences of the JJA 850, 700 and 500 hPa temperature over **1948-2010** between ERA-20c and NCEPv1. Units are Celsius degrees.

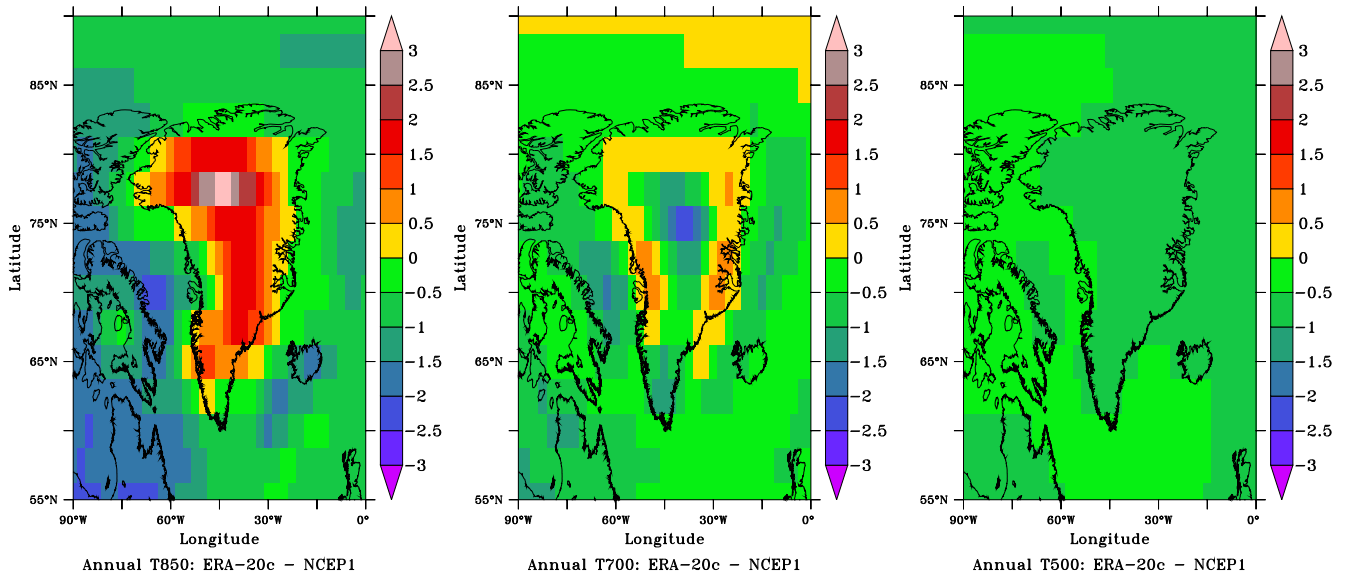


Figure S2. Differences of the Annual 850, 700 and 500 hPa temperature over **1948-2010** between ERA-20c and NCEPv1. Units are Celsius degrees.

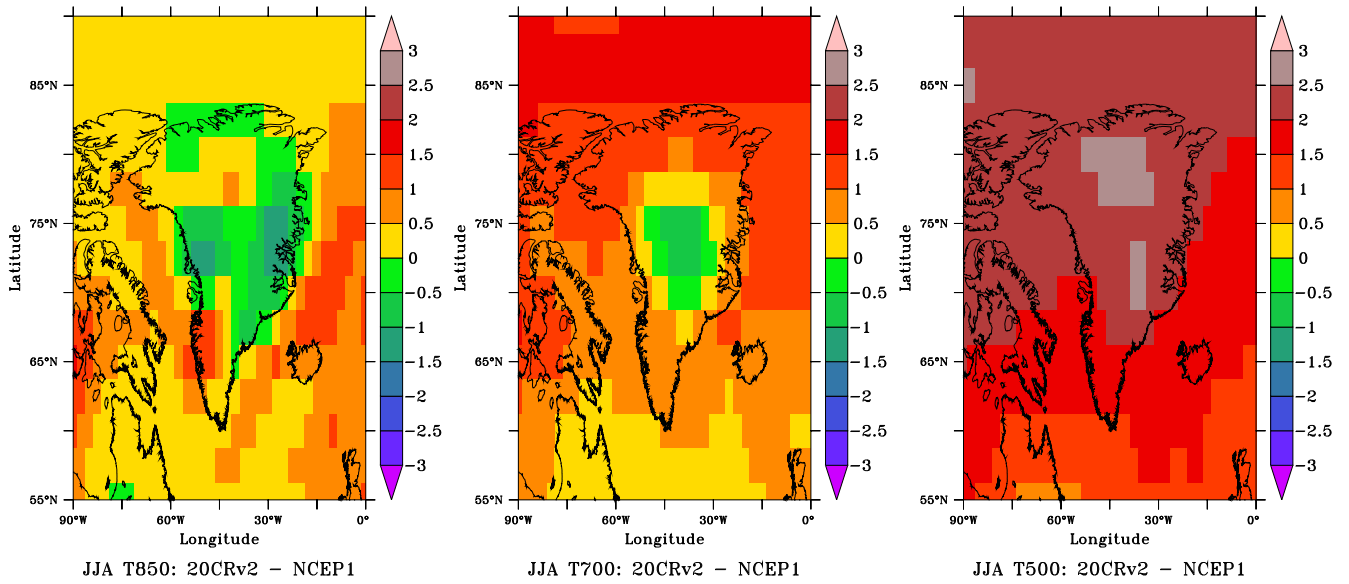


Figure S3. Differences of the JJA 850, 700 and 500 hPa temperature over **1948-2010** between 20CRv2 and NCEPv1. Units are Celsius degrees.

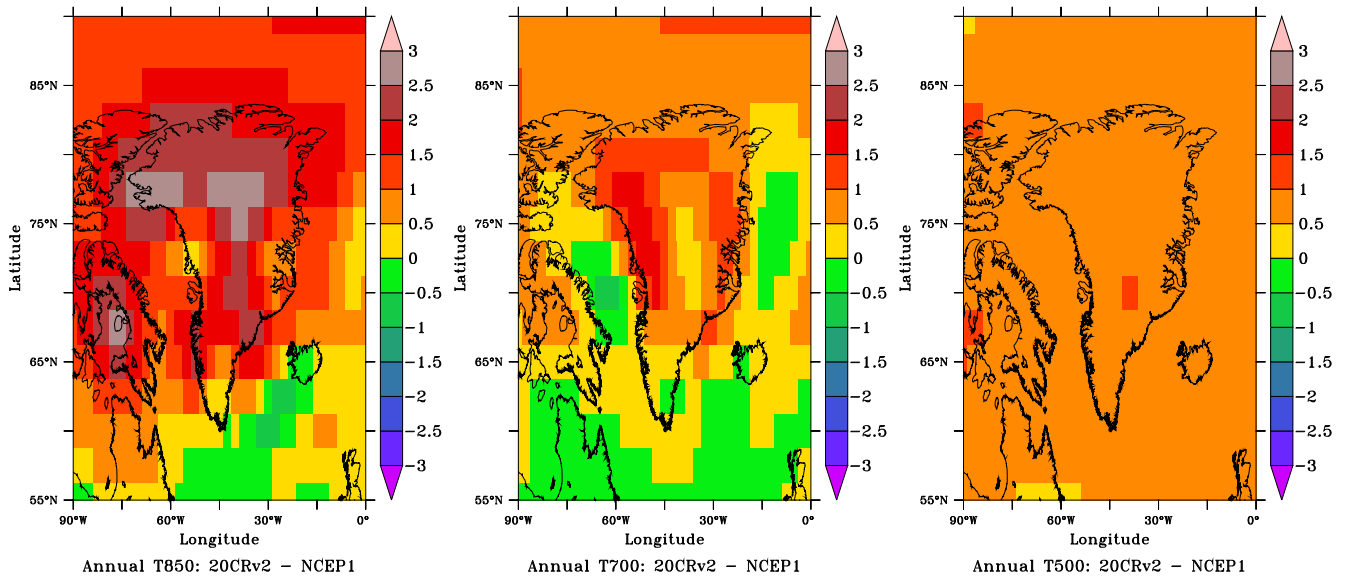


Figure S4. Differences of the Annual 850, 700 and 500 hPa temperature over **1948-2010** between 20CRv2 and NCEPv1. Units are Celsius degrees.

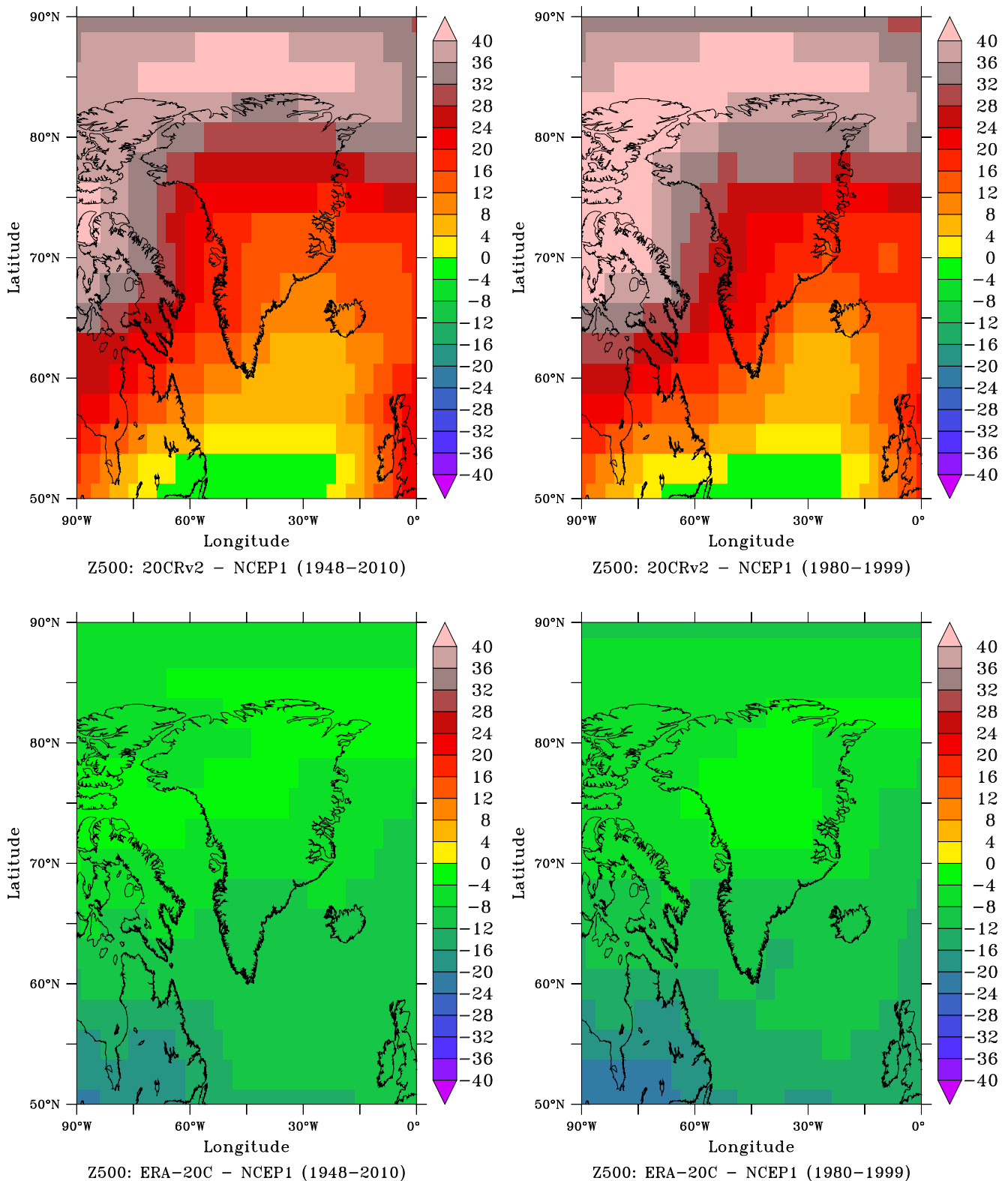


Figure S5. Differences of the annual Z500 over **1950-2010** and over **1980-1999** between 20CRv2 and NCEPv1. Units are meters. As 20CRv2 (resp. ERA-20c) is too warm (resp. too cold), 20CRv2 (resp. ERA-20c) overestimates (resp. underestimates) the annual geopotential height at 500 hPa. However, these biases are constant in time and not impacted by the reference period chosen.

Table S1. Localisation (Latitude, longitude and elevation) of the 12 AWS's from the PROMICE network used here to validate MAR. The location of the corresponding MAR grid cell is also listed.

AWS	PROMICE			MAR		
	Lat. ($^{\circ}$ N)	Lon. ($^{\circ}$ E)	Elev. (m)	Lat. ($^{\circ}$ N)	Lon. ($^{\circ}$ E)	Elev. (m)
KAN_L	67.10	-49.93	680	67.08	-49.92	649
KAN_M	67.07	-48.82	1270	67.08	-48.78	1298
KAN_U	67.00	-47.02	1850	66.98	-46.93	1896
KPC_U	79.83	-25.12	870	79.85	-25.07	766
NUK_L	64.48	-49.53	560	64.49	-49.54	877
NUK_N	64.95	-49.88	930	64.94	-49.90	888
NUK_U	64.50	-49.26	1140	64.50	-49.26	1117
QAS_A	61.24	-46.73	1009	61.30	-46.75	1075
QAS_L	61.03	-46.85	310	61.04	-46.83	525
TAS_L	65.64	-38.90	270	65.64	-38.91	440
TAS_U	65.70	-38.87	580	65.73	-38.90	655
UPE_U	72.89	-53.53	980	72.89	-53.54	1001

Table S2. Same as Table 3 in the manuscript but for each decade over 1910–2010. The numbers of observations (nbr) as well as the standard deviation (std) of observations are also listed.

Decade	nbr	std	MAR _{CORR-ERA-20c}			MAR _{20CRv2c}			BOX13		
			BIAS	RMSE	CORR	BIAS	RMSE	CORR	BIAS	RMSE	CORR
1910's	12	0.73	0.03	0.20	0.97	-0.02	0.18	0.97	0.16	0.35	0.95
1920's	19	1.13	0.03	0.41	0.94	-0.02	0.29	0.97	0.66	1.04	0.84
1930's	27	1.13	-0.04	0.23	0.98	-0.22	0.43	0.97	0.43	0.83	0.98
1940's	45	0.11	-0.01	0.04	0.92	-0.03	0.05	0.90	-0.03	0.05	0.93
1950's	274	0.68	0.10	0.45	0.77	-0.13	0.55	0.76	0.11	0.49	0.78
1960's	107	0.49	0.16	0.39	0.71	0.12	0.40	0.78	0.02	0.32	0.78
1970's	162	1.07	-0.11	0.35	0.96	-0.17	0.40	0.97	0.39	0.64	0.88
1980's	1072	1.03	0.02	0.42	0.91	-0.06	0.46	0.91	0.16	0.56	0.85
1990's	452	1.09	0.25	0.47	0.93	0.11	0.43	0.93	0.01	0.47	0.90
2000's	210	1.52	0.08	0.64	0.91	-0.12	0.62	0.92	0.28	1.16	0.68