

1 Supplementary material

In this Supplementary material, we report the additional information we do not show in the manuscript for the sake of brevity. Specifically, we report the results of the commission/omission error analysis for all the available stations. For graphical reasons we assign an ID to the stations as follows:

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Station	ID
Swiss Camp	01
Crowford Pt. 1	02
NASA-U	03
GITS	04
Humboldt	05
Summit	06
TUNU-N	07
DYE-2	08
JAR-1	09
Saddle	10
Southdome	11
NASA-E	12
Crowford Pt. 2	13
NASA-SE	14
KAR	15
JAR-2	16
KULU	17

Table S1 Automatic weather station ID

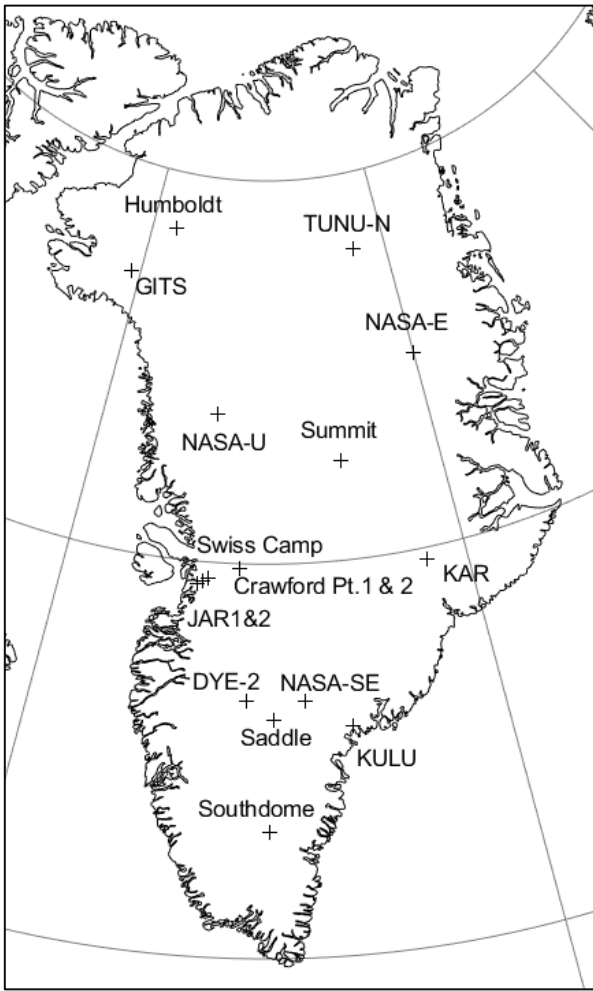


Figure S1 Map of the automatic weather stations (AWS) of the Greenland Climate Network (GCNet) adopted for this study.

C		17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01
M+30	T=0°	0.39	7.03	1.15	2.5	1.36	1.17	2.79	5.57	3.93	8.97	3.81	1.21	5.63	2.94	5.33	6.12	3.2
M+30	T=-1°	0	6.66	0.76	2.06	0.19	1.14	2.46	4.8	2.8	6.67	3.54	1.21	4.96	2.57	4.91	4.57	2.42
M+30	T=-2°	0	5.11	0.38	1.42	0.19	1.09	2.11	3.91	2	5.04	3.15	1.19	4.43	2.1	4.4	3.27	1.71
M+30	LWC _{im}	2.33	34.22	1.53	3.16	4.08	1.3	2.93	6.25	17.8	9.8	4.22	1.21	6.06	3.27	5.7	6.46	10.4
M+30	LWC _{sem}	2.33	30.84	1.53	2.72	3.69	1.29	2.62	5.68	13.2	9.18	4.2	1.21	6.01	3.14	5.44	6.36	7.58
M+35	T=0°	0	3.56	0.76	1.88	0.78	0.4	1.82	4.03	2.96	7.74	1.37	0.19	2.71	1.5	2.87	4.48	2.71
M+35	T=-1°	0	3.28	0.38	1.58	0	0.38	1.64	3.41	2.01	5.54	1.3	0.19	2.32	1.3	2.59	3.2	2
M+35	T=-2°	0	2.28	0.19	1.06	0	0.35	1.37	2.59	1.32	4.03	1.07	0.19	1.99	1.02	2.3	2.14	1.34
M+35	LWC _{im}	1.55	28.28	1.15	2.32	3.5	0.5	1.98	4.54	16.3	8.72	1.76	0.19	3.04	1.8	3.06	5.02	9.76
M+35	LWC _{sem}	1.55	25.18	1.15	2.06	3.3	0.48	1.8	4.17	11.9	8.1	1.76	0.19	2.99	1.72	2.93	4.98	6.99
M+40	T=0°	0	1.82	0.38	1.58	0.78	0.3	1.38	3.11	2.16	6.85	0.64	0.11	1.44	0.75	1.74	3.9	2.51
M+40	T=-1°	0	1.73	0.19	1.34	0	0.28	1.24	2.61	1.34	4.78	0.57	0.11	1.18	0.63	1.58	2.75	1.82
M+40	T=-2°	0	0.91	0.19	0.93	0	0.27	0.98	1.92	0.84	3.38	0.43	0.11	0.98	0.52	1.37	1.77	1.21
M+40	LWC _{im}	0.78	23.18	0.57	1.88	3.3	0.4	1.51	3.59	13.9	7.86	0.98	0.11	1.75	1	1.96	4.4	9.15
M+40	LWC _{sem}	0.78	20.71	0.57	1.71	3.11	0.38	1.43	3.32	10.1	7.24	0.98	0.11	1.73	0.92	1.88	4.41	6.59
MEMLS	T=0°	0.78	10.77	0.95	3.48	1.17	0.25	3.12	3.65	4.48	6.65	0.46	0.11	0.7	0.83	1.42	4.14	3
MEMLS	T=-1°	0.39	10.13	0.57	2.98	0	0.23	2.83	3.06	3.3	4.71	0.41	0.11	0.53	0.68	1.26	2.87	2.21
MEMLS	T=-2°	0.39	8.3	0.38	2.09	0	0.22	2.51	2.35	2.48	3.33	0.3	0.11	0.39	0.52	1.06	1.84	1.47
MEMLS	LWC _{im}	3.1	40.6	1.34	4.2	3.88	0.35	3.29	4.2	19.3	7.65	0.77	0.11	0.93	1.1	1.64	4.7	10.4
MEMLS	LWC _{sem}	3.1	36.59	1.34	3.74	3.69	0.33	3.03	3.9	14.5	7.01	0.77	0.11	0.91	1.02	1.56	4.62	7.54
245K	T=0°	0	0.36	0	1.11	0.39	0	0.6	1.08	1.59	2.28	0.09	0.03	0.26	0.15	0.31	1.22	1.29
245K	T=-1°	0	0.36	0	0.87	0	0	0.53	0.93	1.06	1.58	0.09	0.03	0.19	0.13	0.26	0.85	0.87
245K	T=-2°	0	0.18	0	0.61	0	0	0.39	0.63	0.69	1.14	0.07	0.03	0.15	0.1	0.19	0.55	0.61
245K	LWC _{im}	0.78	16.79	0	1.38	1.75	0	0.71	1.09	11.8	2.98	0.12	0.03	0.36	0.18	0.39	1.67	6.22
245K	LWC _{sem}	0.78	14.51	0	1.24	1.75	0	0.66	1.08	8.39	2.66	0.12	0.03	0.36	0.15	0.35	1.72	4.15

10 **Table S2 Commission errors computed as percentage of the number of melting days detected by the specific algorithm (first column) with respect to 365 days for the 17 AWS (only days in which data are available from all the datasets have been considered).**

O	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01
M+30	5.43	9.67	0.19	4.43	0.78	0.18	2.51	2.72	5.65	3.31	0.53	0.14	0.51	0.45	0.64	3.25	4.25
M+30	6.2	11.5	0.57	6.62	2.33	0.37	3.7	3.99	7.65	5.46	1.12	0.26	0.93	0.87	1.66	5.1	5.81
M+30	9.69	13.6	2.1	8.82	5.44	0.82	5.56	5.8	9.76	7.53	2.28	0.58	2.16	1.37	2.91	6.94	7.95
M+30	3.49	2.37	0.19	2.4	0.78	0.05	2.14	1.79	2.37	3.73	0.16	0	0.19	0.02	0.48	3.01	2.5
M+30	3.49	4.47	0.38	3.45	2.91	0.12	2.72	2.95	3.06	4.17	0.27	0.08	0.31	0.12	0.71	3.06	2.85
M+35	8.53	12.3	0.19	4.88	0.78	0.22	2.69	3.08	6.84	3.57	0.62	0.14	0.63	0.52	0.85	3.61	4.7
M+35	9.69	14.3	0.57	7.2	2.72	0.42	4.03	4.51	9.02	5.82	1.41	0.26	1.32	1.1	2.01	5.73	6.34
M+35	13.1	16.9	2.29	9.53	5.83	0.89	5.96	6.38	11.2	8.01	2.72	0.6	2.76	1.79	3.49	7.81	8.53
M+35	6.2	2.55	0.19	2.62	0.78	0.05	2.33	1.98	2.93	4.14	0.23	0	0.21	0.05	0.52	3.57	2.75
M+35	6.2	4.93	0.38	3.85	3.11	0.12	3.04	3.33	3.93	4.58	0.36	0.08	0.33	0.2	0.87	3.67	3.2
M+40	13.5	15.7	0.38	5.1	0.97	0.22	2.85	3.3	9.15	3.99	0.69	0.14	0.67	0.58	0.92	3.85	5.56
M+40	14.7	17.9	0.95	7.49	2.91	0.42	4.22	4.85	11.4	6.38	1.48	0.26	1.49	1.25	2.19	6.1	7.21
M+40	18.2	20.8	2.86	9.94	6.02	0.9	6.17	6.84	13.8	8.67	2.88	0.6	3.05	2.1	3.75	8.26	9.45
M+40	10.4	2.65	0.19	2.72	0.78	0.05	2.46	2.17	3.69	4.6	0.25	0	0.22	0.07	0.61	3.77	3.19
M+40	10.4	5.66	0.38	4.03	3.11	0.12	3.27	3.62	5.19	5.04	0.37	0.08	0.38	0.22	1.01	3.93	3.85
MEMLS	3.49	6.66	0.19	4.03	0.78	0.22	2.53	3.03	4.54	4.04	0.73	0.14	0.77	0.57	0.93	3.62	4.12
MEMLS	4.26	8.3	0.57	6.15	2.33	0.42	3.75	4.48	6.49	6.55	1.53	0.26	1.68	1.2	2.21	5.75	5.68
MEMLS	7.75	10.1	2.29	8.12	5.44	0.9	5.64	6.46	8.58	8.87	2.97	0.6	3.31	2	3.78	7.86	7.79
MEMLS	1.94	2.01	0.19	2.06	0.78	0.05	2.17	1.96	2.13	4.63	0.25	0	0.24	0.07	0.63	3.61	2.54
MEMLS	1.94	3.47	0.38	3.08	3.11	0.12	2.8	3.38	2.71	5.05	0.37	0.08	0.39	0.22	1.03	3.67	2.88
245K	13.5	21.7	0.57	5.28	2.14	0.32	3.04	4.4	12.2	7.57	1.01	0.14	0.98	0.85	1.08	5.72	10.7
245K	14.7	24	1.34	7.67	4.47	0.53	4.49	6.3	14.8	11.3	1.87	0.26	1.99	1.62	2.46	8.74	12.6
245K	18.2	27.4	3.24	10.2	7.57	1.04	6.55	8.68	17.4	14.5	3.4	0.6	3.72	2.55	4.17	11.5	15.2
245K	10.4	3.65	0.19	2.87	0.78	0.05	2.64	2.8	5.23	7.86	0.27	0	0.33	0.12	0.63	5.59	6.68
245K	10.4	6.84	0.38	4.2	3.3	0.13	3.48	4.51	7.15	8.59	0.39	0.08	0.5	0.32	1.08	5.78	7.84

Table S3 Omission errors computed as percentage of the number of melting days detected by the specific algorithm (first column) with respect to 365 days for the 17 AWS (only days in which data are available from all the datasets have been).