Brief communication: Interest of a regional climate model against ERA5 to simulate the near-surface climate of the Greenland ice sheet

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Table S1. Dismissed AWS per studied variable (2-m temperature, 10-m wind speed, longwave and shortwave downward radiative flux) and justifications.

Variable	AWS	Justification
Surface Pressure	SCO_L	Difference between AWS and interpolated model elevations higher than 250 m in absolute value for all models
	TAS_A	exemple fev et mars 2014: obs » par rapport a MAR (voir resume station)
		Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
	QAS_A	Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
	TAS_L	Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
T2M	SCO_L	Difference between AWS and interpolated model elevations higher than 250 m in absolute value for all models
	TAS_A	Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
	NUK_L	Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
	TAS_L	Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
Wind Speed	SCO_L	Difference between AWS and interpolated model elevations higher than 250 m in absolute value for all models
	SCO_U	Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
	QAS_A	Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
	NUK_L	Defavourable statistic comparisons (correlation, RMSE and RMSEc) for the 5 simulations*
LWD	SCO_L	Difference between AWS and interpolated model elevations higher than 250 m in absolute value for all models
		Inconsistencies and period of malfunction have been evidenced from visual inspection of the time series :
	QAS_U	Feb-May and Jul-Aug 2012, Feb-Jul 2015
	NUK_U	Dec 2010, Jan-Aug 2011
	TAS_U	Jan-Jul 2011
SWD	SCO_L	Difference between AWS and interpolated model elevations higher than 250 m in absolute value for all models
		Inconsistencies and period of malfunction have been evidenced from visual inspection of the time series :
	QAS_U	Feb-May and Jul-Aug 2012, Nov-Dec 2013, Jan-Apr 2014 and Feb-Jul 2015
	NUK_U	Jan-Aug 2011
	NUK_L	Jan-Jun 2011
	TAS_U	Jan-Jul 2011

* Suggesting a likely influence of local surface conditions not represented at the model resolutions

				Difference in elevation (m) with :			
AWS	Lat	Lon	Elev. (m)	MAR	ASR	E5	EI
KPC_L	79.91	-24.09	370	176	140	172	229
KPC_U	79.83	-25.17	870	-15	-71	-83	-65
SCO_L	72.23	-26.82	460	881	895	743	723
SCO_U	72.39	-27.24	970	245	385	360	350
TAS_A	65.78	-38.90	890	-95	-251	-401	87
QAS_U	61.18	-46.82	900	-42	-292	-55	233
QAS_A	61.24	-46.73	1000	20	-167	-139	159
NUK_U	64.51	-49.27	1120	-51	-104	-16	22
NUK_N	64.95	-49.89	920	-67	-92	-84	30
KAN_L	67.10	-49.95	670	-112	-112	-70	164
KAN_M	67.07	-48.83	1270	12	-10	30	-12
KAN_U	67.00	-47.02	1840	3	1	-3	-30
UPE_U	72.89	-53.57	940	33	-3	-27	-8
THU_L	76.40	-68.27	570	-43	-106	-280	-187
THU_U	76.42	-68.14	760	-159	-281	-454	-379
NUK_L	64.48	-49.54	530	299	216	298	537
QAS_L	61.03	-46.85	280	119	6	151	770
QAS_M	61.10	-46.83	630	-31	-251	117	451
TAS_L	65.64	-38.90	250	14	-29	239	736
TAS_U	65.70	-38.87	570	-142	-275	-83	410
UPE_L	72.89	-54.30	220	2	319	350	449

Table S2. Differences in elevation (m) with AWS of the PROMICE network for the four models (MAR, ASR, E5 and E5).

Surface pressure (hPa)	Annually				Summer			
MAR_{E5}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-22.62	22.66	1.47	0.99	-21.63	21.66	1.01	0.99
KPC_U	0.59	1.27	1.12	0.99	0.21	0.9	0.88	0.99
SCO_L*	-102.07	102.12	3.1	0.96	-98.48	98.49	1.53	0.98
SCO_U	-28.08	28.11	1.28	0.99	-27.29	27.31	0.94	0.99
TAS_A*	11.37	11.97	3.76	0.96	11.02	11.05	0.83	0.99
QAS_U	3.73	4.15	1.83	0.99	3.65	3.77	0.92	0.99
QAS_A*	-1.84	4.23	3.81	0.95	-0.87	4.26	4.17	0.83
NUK_U	5.2	5.31	1.03	1	4.87	4.94	0.84	0.99
NUK_N	5.78	5.86	0.98	1	5.34	5.4	0.77	0.99
KAN_L	12.94	12.98	0.98	1	12.27	12.29	0.76	0.99
KAN_M	-2.58	2.73	0.88	1	-2.7	2.77	0.63	1
KAN_U	-0.84	1.2	0.85	1	-0.9	1.12	0.67	0.99
UPE_U	-2.38	2.98	1.78	0.99	-2.64	3.1	1.63	0.97
THU_L	1.84	2.21	1.22	0.99	1.6	1.82	0.87	0.99
THU_U	16.65	16.69	1.13	1	15.59	15.6	0.56	1
NUK_L	-34.72	34.78	2.03	0.98	-33.72	33.75	1.43	0.98
QAS_L	-13.67	13.79	1.87	0.99	-13.57	13.66	1.49	0.98
QAS_M	2.42	2.72	1.22	0.99	2.39	2.47	0.61	1
TAS_L*	-0.33	8.35	8.34	0.84	0.19	10.07	10.07	0.45
TAS_U	17.28	17.36	1.66	0.99	16.34	16.37	0.98	0.99
UPE_L	-1.69	2.1	1.25	0.99	-1.8	2.08	1.03	0.99
All AWS	-8.42	16.17	1.83	0.98	-8.54	15.75	1.41	0.96
17 selected AWS	-2.87	10.71	1.35	0.99	-3.18	10.35	0.97	0.99

* Dissmissed in the study. see Table S1

Table S3. Annual and summer surface pressure (hPa) mean bias (MB). RMSE. centered RMSE (RMSEc) and correlation (r) between daily observations at PROMICE AWS and MAR_{E5} over 2010 – 2016.

Surface pressure (hPa)	Annually				Summer			
MAR_{EI}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-21.86	21.9	1.37	0.99	-20.87	20.89	0.96	0.99
KPC_U	1.35	1.7	1.03	0.99	0.99	1.29	0.82	0.99
SCO_L*	-101.47	101.52	3.11	0.96	-97.79	97.81	1.56	0.97
SCO_U	-27.46	27.49	1.25	0.99	-26.59	26.61	0.92	0.99
TAS_A*	11.85	12.44	3.78	0.96	11.48	11.51	0.78	0.99
QAS_U	4.3	4.71	1.91	0.99	4.23	4.34	0.97	0.99
QAS_A*	-1.33	4.06	3.84	0.95	-0.32	4.12	4.11	0.84
NUK_U	5.93	6.03	1.08	1	5.59	5.66	0.87	0.99
NUK_N	6.45	6.52	1	1	6.04	6.09	0.79	0.99
KAN_L	13.76	13.79	0.98	1	13.08	13.1	0.77	0.99
KAN_M	-1.79	2	0.9	1	-1.88	1.98	0.63	1
KAN_U	-0.09	0.9	0.9	1	-0.1	0.68	0.68	0.99
UPE_U	-1.28	2.21	1.8	0.99	-1.56	2.26	1.64	0.97
THU_L	3.92	4.09	1.18	0.99	3.61	3.71	0.84	0.99
THU_U	18.73	18.76	1.13	1	17.58	17.59	0.65	1
NUK_L	-34	34.07	2.08	0.98	-33.01	33.04	1.48	0.97
QAS_L	-13.09	13.24	1.98	0.99	-13.01	13.1	1.54	0.98
QAS_M	2.99	3.29	1.37	0.99	3.08	3.13	0.58	1
TAS_L*	0.18	8.32	8.32	0.84	0.58	10.04	10.02	0.46
TAS_U	17.76	17.85	1.74	0.99	16.75	16.78	0.99	0.99
UPE_L	-0.46	1.33	1.25	0.99	-0.68	1.25	1.04	0.99
All AWS	-7.58	16.22	1.85	0.98	-7.69	15.77	1.42	0.96
17 selected AWS	-1.97	10.8	1.37	0.99	-2.28	10.41	0.99	0.99

* Dissmissed in the study. see Table S1

Table S4. Same as Table S3 but for MAR_{EI}.

Surface pressure (hPa)	Annually				Summer			
ASR	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-16.69	16.72	0.98	0.99	-16.06	16.08	0.71	0.99
KPC_U	8.72	8.77	0.97	1	7.92	7.94	0.64	1
SCO_L*	-102.45	102.5	3.24	0.95	-98.62	98.63	1.46	0.98
SCO_U	-42.31	42.33	1.42	0.99	-40.88	40.88	0.69	0.99
TAS_A*	29.88	30.09	3.59	0.97	29.49	29.5	0.59	1
QAS_U	33.12	33.16	1.69	0.99	32.72	32.73	0.72	0.99
QAS_A*	19.74	20.09	3.73	0.95	20.43	20.83	4.07	0.84
NUK_U	11.58	11.62	0.88	1	11.34	11.35	0.66	1
NUK_N	9.58	9.61	0.71	1	9.29	9.31	0.55	1
KAN_L	13.57	13.58	0.62	1	13.13	13.14	0.42	1
KAN_M	0.63	0.83	0.55	1	0.61	0.7	0.34	1
KAN_U	0.21	0.59	0.55	1	0.25	0.47	0.4	1
UPE_U	3.08	3.49	1.63	0.99	2.75	3.12	1.47	0.98
THU_L	11.92	11.98	1.16	0.99	11.33	11.36	0.79	0.99
THU_U	33.51	33.55	1.51	0.99	31.82	31.83	0.65	1
NUK_L	-24.21	24.27	1.69	0.99	-23.31	23.34	1.21	0.98
QAS_L	0.07	1.48	1.47	0.99	0.06	1.29	1.29	0.98
QAS_M	28.5	28.51	0.77	1	28.08	28.08	0.32	1
TAS_L*	5.39	9.82	8.21	0.85	5.98	11.56	9.9	0.47
TAS_U	33.47	33.49	1.12	1	32.38	32.39	0.6	1
UPE_L	-38.94	38.98	1.73	0.99	-37.38	37.4	1.07	0.99
All AWS	-3.34	23.05	1.69	0.98	-3.62	22.34	1.22	0.97
17 selected AWS	1.85	17.76	1.19	0.99	1.44	17.16	0.78	0.99

* Dissmissed in the study. see Table S1

Table S5. Same as Table S3 but for ASR.

Surface pressure (hPa)	Annually				Summer			
ERA5	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-20.65	20.67	0.86	1	-19.81	19.81	0.45	1
KPC_U	10.24	10.28	0.89	1	9.32	9.34	0.5	1
SCO_L*	-85.12	85.17	2.69	0.97	-82	82.01	1.26	0.98
SCO_U	-39.21	39.23	1.23	0.99	-38.03	38.04	0.67	0.99
TAS_A*	48.51	48.65	3.65	0.97	47.81	47.82	0.7	1
QAS_U	6.58	6.77	1.56	0.99	6.52	6.56	0.68	0.99
QAS_A*	17.47	17.85	3.67	0.95	17.99	18.45	4.06	0.84
NUK_U	2.47	2.57	0.7	1	2.21	2.28	0.58	1
NUK_N	9.28	9.29	0.6	1	8.73	8.73	0.38	1
KAN_L	9.16	9.19	0.68	1	8.6	8.61	0.42	1
KAN_M	-3.44	3.47	0.43	1	-3.54	3.55	0.23	1
KAN_U	0.77	0.86	0.39	1	0.68	0.77	0.35	1
UPE_U	6.43	6.64	1.65	0.99	5.81	5.99	1.46	0.98
THU_L	34.1	34.15	1.83	0.98	32.54	32.55	1	0.99
THU_U	55.66	55.7	2.34	0.98	53	53.01	0.91	0.99
NUK_L	-33.18	33.22	1.64	0.99	-32.26	32.28	1.18	0.98
QAS_L	-15.65	15.71	1.39	0.99	-15.41	15.47	1.27	0.98
QAS_M	-13.24	13.25	0.57	1	-12.82	12.82	0.26	1
TAS_L*	-25.68	26.97	8.24	0.85	-24.49	26.39	9.84	0.47
TAS_U	11.59	11.62	0.81	1	10.94	10.95	0.5	1
UPE_L	-42.54	42.57	1.71	0.99	-40.97	40.99	1.06	0.99
All aws	-6.13	23.76	1.65	0.98	-6.3	23.13	1.18	0.97
17 aws	-1.83	18.45	1.17	0.99	-1.96	18.03	0.74	0.99

* Dissmissed in the study. see Table S1

Table S6. Same as Table S3 but for ERA5.

Surface pressure (hPa)	Annually				Summer			
EI	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-28.17	28.2	1.13	0.99	-26.95	26.95	0.58	1
KPC_U	7.87	7.91	0.81	1	7.25	7.27	0.53	1
*SCO_L	-83.6	83.64	2.69	0.97	-80.39	80.4	1.22	0.99
SCO_U	-38.61	38.64	1.26	0.99	-37.32	37.33	0.62	1
*TAS_A	-7.48	8.3	3.59	0.97	-7.46	7.48	0.53	1
QAS_U	-25.55	25.61	1.7	0.99	-25.02	25.03	0.81	0.99
*QAS_A	-15.89	16.31	3.68	0.95	-14.7	15.26	4.1	0.84
NUK_U	-2.28	2.4	0.76	1	-2.38	2.46	0.62	1
NUK_N	-4.09	4.13	0.58	1	-4.14	4.17	0.46	1
KAN_L	-18.44	18.46	0.88	1	-17.76	17.77	0.5	1
KAN_M	1.27	1.35	0.47	1	1.09	1.13	0.29	1
KAN_U	3.47	3.51	0.46	1	3.38	3.4	0.36	1
UPE_U	4.47	4.76	1.62	0.99	3.93	4.19	1.43	0.98
THU_L	22.23	22.28	1.51	0.99	21.16	21.18	0.96	0.99
THU_U	45.93	45.97	2.02	0.98	43.67	43.68	0.84	0.99
NUK_L	-61.01	61.05	2.3	0.98	-59.27	59.28	1.32	0.98
QAS_L	-87.14	87.17	2.56	0.98	-85.47	85.49	1.7	0.97
QAS_M	-50.84	50.87	1.54	0.99	-49.38	49.39	0.58	1
*TAS_L	-82.93	83.35	8.4	0.84	-80.86	81.44	9.7	0.48
TAS_U	-45.31	45.32	1.24	1	-45	45.01	0.79	0.99
UPE_L	-53.8	53.84	2.08	0.98	-51.78	51.79	1.15	0.99
All AWS	-25.15	33.61	1.82	0.98	-24.33	32.71	1.24	0.97
17 selected AWS	-19.09	28.92	1.36	0.99	-18.26	27.96	0.83	0.99

* Dissmissed in the study. see Table S1

Table S7. Same as Table S3 but for ERA-Interim.

T2M (°C)	Annually				Summer			
MAR_{E5}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	2.94	2.84	0.97	11.07	1.79	1.5	0.91	2.67
KPC_U	2.56	2.53	0.98	11.66	1.27	1.18	0.94	3.11
SCO_L*	5.43	2.96	0.95	9.16	4.23	2.11	0.71	1.54
SCO_U	2.58	2.19	0.97	9.32	1.86	1.67	0.88	1.96
TAS_A*	2.15	2.13	0.95	6.9	1.36	1.35	0.68	1.68
QAS_U	2.55	2.52	0.94	7.3	1.14	1.06	0.76	1.53
QAS_A	3	2.94	0.93	7.92	1.56	1.21	0.77	1.88
NUK_U	1.86	1.86	0.98	8.62	1.81	1.26	0.85	1.85
NUK_N	2.14	2.08	0.98	8.39	3.03	2.03	0.81	1.71
KAN_L	2.12	2.1	0.98	9.57	1.87	0.88	0.89	1.88
KAN_M	2.26	2.23	0.98	10.33	1.02	1.02	0.92	2.38
KAN_U	2.58	2.43	0.97	10.66	1.39	1.39	0.91	3.33
UPE_U	2.01	2.01	0.98	10.14	0.9	0.79	0.96	2.42
THU_L	2.98	2.32	0.98	10.31	1.55	1.13	0.93	2.77
THU_U	2.41	2.16	0.98	10.41	1.16	0.98	0.94	2.91
NUK_L*	3.51	2.9	0.96	8.06	1.92	1.83	0.71	1.96
QAS_L	2.1	2.03	0.97	6.28	2.27	1.38	0.77	1.5
QAS_M	1.4	1.37	0.98	7.16	1.22	0.58	0.88	0.93
TAS_L*	2.53	2.49	0.93	5.35	3.41	2.11	0.59	1.34
TAS_U	2.31	2.01	0.95	6.07	2.89	1.37	0.79	1.44
UPE_L	2.75	2.68	0.97	9.89	2.45	1.49	0.82	2.43
All AWS	-0.39	2.65	2.36	0.97	0.3	1.93	1.37	0.83
17 selected AWS	-0.04	2.41	2.28	0.97	0.44	1.69	1.24	0.87

* Dissmissed in the study. see Table S1

Table S8. Annual and summer near-surface temperature (T2M, °C) mean bias (MB). RMSE. centered RMSE (RMSEc) and correlation (r) between daily observations at PROMICE AWS and MAR_{E5} over 2010 – 2016.

T2M (°C)	Annually				Summer			
MAR_{EI}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	2.7	2.65	0.97	11.07	1.55	1.46	0.92	2.67
KPC_U	2.43	2.33	0.98	11.66	1.1	1.1	0.94	3.11
SCO_L*	5.4	2.92	0.95	9.16	4	2.06	0.71	1.54
SCO_U	2.56	2.18	0.98	9.32	1.71	1.61	0.88	1.96
TAS_A*	2.21	2.19	0.95	6.9	1.33	1.3	0.69	1.68
QAS_U	2.56	2.52	0.94	7.3	1.16	1.03	0.77	1.53
QAS_A	3.07	3.03	0.93	7.92	1.51	1.23	0.75	1.88
NUK_U	1.9	1.9	0.98	8.62	1.93	1.23	0.85	1.85
NUK_N	2.21	2.11	0.98	8.39	3.23	1.96	0.81	1.71
KAN_L	2.12	2.08	0.98	9.57	1.95	0.89	0.89	1.88
KAN_M	2.16	2.13	0.98	10.33	0.98	0.97	0.93	2.38
KAN_U	2.55	2.4	0.97	10.66	1.42	1.42	0.91	3.33
UPE_U	2.01	2.01	0.98	10.14	0.89	0.82	0.95	2.42
THU_L	3.09	2.56	0.98	10.31	1.24	1.24	0.92	2.77
THU_U	2.52	2.33	0.98	10.41	1.05	1.03	0.94	2.91
NUK_L*	3.48	2.96	0.96	8.06	2	1.84	0.7	1.96
QAS_L	2.15	2.1	0.96	6.28	2.37	1.4	0.76	1.5
QAS_M	1.41	1.36	0.98	7.16	1.27	0.58	0.86	0.93
TAS_L*	2.65	2.59	0.93	5.35	3.65	1.96	0.64	1.34
TAS_U	2.44	2.09	0.95	6.07	3.24	1.34	0.79	1.44
UPE_L	2.81	2.8	0.97	9.89	2.5	1.52	0.82	2.43
All AWS	-0.34	2.66	2.38	0.97	0.58	1.93	1.36	0.84
17 selected AWS	0.01	2.42	2.29	0.97	0.72	1.68	1.24	0.87

* Dissmissed in the study. see Table S1

Table S9. Same as Table S8 but for MAR_{EI}.

T2M (°C)	Annually				Summer			
ASR	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-2.74	3.92	2.81	0.97	-2.06	2.66	1.69	0.87
KPC_U	-0.27	1.98	1.96	0.99	-0.78	1.35	1.1	0.94
SCO_L*	-5.36	6.04	2.77	0.96	-4.96	5.26	1.75	0.71
SCO_U	-3.66	4.12	1.88	0.98	-3.57	3.77	1.23	0.9
TAS_A*	1.23	2.22	1.85	0.97	0.14	1.32	1.31	0.71
QAS_U	2.06	3.31	2.59	0.94	1.66	2.11	1.3	0.71
QAS_A	0.82	3.2	3.09	0.92	-0.29	1.34	1.3	0.73
NUK_U	-0.37	1.86	1.82	0.98	0.54	1.27	1.15	0.88
NUK_N	0.9	2.07	1.86	0.99	2.84	3.12	1.29	0.92
KAN_L	0.49	1.95	1.89	0.99	2.09	2.22	0.75	0.95
KAN_M	-0.51	2.09	2.03	0.98	-0.7	1.49	1.32	0.89
KAN_U	-1.28	2.67	2.34	0.98	-1.64	2.28	1.59	0.9
UPE_U	-0.23	1.83	1.82	0.98	-0.16	0.95	0.94	0.95
THU_L	-1.73	3.01	2.46	0.98	-0.94	1.97	1.74	0.78
THU_U	-0.67	2.51	2.42	0.98	-0.14	1.77	1.77	0.79
NUK_L*	-1.63	3.66	3.28	0.96	1.38	2.2	1.71	0.74
QAS_L	0.13	1.68	1.67	0.98	2.09	2.28	0.91	0.88
QAS_M	1.47	1.85	1.13	0.99	1.79	1.93	0.73	0.92
TAS_*	0.13	1.48	1.47	0.97	0.85	1.5	1.23	0.72
TAS_U	1.51	2.03	1.36	0.97	1.39	1.67	0.94	0.83
UPE_L	-1.52	3.34	2.98	0.96	-0.74	1.58	1.39	0.88
All AWS	-0.75	2.76	2.2	0.97	-0.23	2.15	1.32	0.84
17 selected AWS	-0.47	2.54	2.14	0.98	-0.07	1.98	1.26	0.87

* Dissmissed in the study. see Table S1

Table S10. Same as Table S8 but for ASR.

T2M (°C)	Annually				Summer			
E5	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-2.15	2.72	1.66	0.99	-2.46	2.79	1.3	0.92
KPC_U	1.62	2.72	2.19	0.98	0.24	1.35	1.33	0.92
SCO_L*	-7.96	8.59	3.21	0.95	-5.64	6.1	2.31	0.65
SCO_U	-6.27	6.83	2.72	0.97	-4.96	5.31	1.87	0.81
TAS_A*	2.75	3.58	2.28	0.95	1	1.85	1.56	0.55
QAS_U	1.85	3.32	2.75	0.93	1.27	1.91	1.43	0.72
QAS_A	1.94	3.76	3.23	0.91	0.28	1.13	1.1	0.85
NUK_U	-0.05	2.17	2.17	0.97	-1.54	2.34	1.76	0.75
NUK_N	1.48	2.37	1.85	0.98	3.15	3.56	1.66	0.88
KAN_L	1.63	2.96	2.47	0.98	4.43	4.64	1.39	0.91
KAN_M	1.49	2.97	2.56	0.98	-1.22	1.88	1.43	0.86
KAN_U	1.37	3.12	2.8	0.98	-1.75	2.44	1.71	0.87
UPE_U	0.27	1.77	1.75	0.99	-0.54	1.33	1.21	0.91
THU_L	-2.33	5.36	4.82	0.96	2.29	2.97	1.9	0.85
THU_U	-1.42	5.03	4.83	0.97	3.06	3.54	1.77	0.87
NUK_L*	-2.33	3.27	2.29	0.96	-2.02	2.81	1.95	0.62
QAS_L	-0.07	1.73	1.73	0.98	1.76	2.07	1.09	0.88
QAS_M	0.37	2.02	1.99	0.96	0.03	1.16	1.16	0.87
TAS_L*	-0.68	1.63	1.49	0.97	0.11	1.33	1.33	0.67
TAS_U	1.23	1.85	1.38	0.97	1.16	1.62	1.14	0.74
UPE_L	-1.91	3.11	2.45	0.97	-1.42	2	1.42	0.87
All AWS	-0.66	3.45	2.51	0.97	-0.28	2.74	1.56	0.81
17 selected AWS	-0.11	3.18	2.55	0.97	0.19	2.6	1.49	0.85

* Dissmissed in the study. see Table S1

Table S11. Same as Table S8 but for ERA5.

T2M (°C)	Annually				Summer			
EI	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-3.44	4.48	2.87	0.98	-2.09	2.49	1.36	0.88
KPC_U	1.27	2.56	2.22	0.98	0.75	1.47	1.27	0.91
SCO_L*	-6.23	7	3.19	0.96	-3.38	4.05	2.24	0.77
SCO_U	-5.43	6.26	3.12	0.97	-2.96	3.58	2.01	0.83
TAS_A*	-1.85	3.15	2.55	0.95	-0.9	1.85	1.62	0.62
QAS_U	-1.24	4.1	3.9	0.93	0.75	1.63	1.44	0.7
QAS_A	-1.81	4.55	4.17	0.91	-0.41	1.11	1.03	0.88
NUK_U	-0.13	2.41	2.4	0.97	1.19	1.76	1.3	0.8
NUK_N	0.33	2.21	2.18	0.98	1.8	2.19	1.25	0.83
KAN_L	-0.6	2.56	2.48	0.98	1.17	1.63	1.14	0.88
KAN_M	1.72	2.65	2.01	0.98	1.3	1.76	1.19	0.88
KAN_U	2.06	2.95	2.12	0.98	0.58	1.63	1.52	0.89
UPE_U	-0.32	2.75	2.73	0.97	0.97	1.6	1.28	0.92
THU_L	-0.4	3.59	3.57	0.96	1.07	1.86	1.52	0.85
THU_U	0.73	3.67	3.6	0.96	2.11	2.62	1.55	0.87
NUK_L*	-3.56	4.65	3	0.96	-1.3	2.17	1.73	0.64
QAS_L	-4.81	5.92	3.44	0.96	-1.4	2.04	1.49	0.68
QAS_M	-4.23	5.38	3.31	0.97	-1.49	1.72	0.84	0.92
TAS_L*	-5.39	6.39	3.43	0.95	-1.79	2.43	1.65	0.63
TAS_U	-3.57	4.61	2.92	0.96	-0.6	1.64	1.53	0.66
UPE_L	-2.58	3.79	2.77	0.96	-1.23	1.86	1.39	0.87
All AWS	-1.77	4.03	2.9	0.96	-0.22	2.11	1.5	0.8
17 selected AWS	-1.08	3.65	2.85	0.97	0.22	1.95	1.41	0.83

* Dissmissed in the study. see Table S1

Table S12. Same as Table S8 but for ERA-Interim.

W10M (ms^{-1})	Annually				Summer			
MAR_{E5}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	0.4	1.94	1.9	0.73	-0.59	1.5	1.38	0.7
KPC_U	0.96	1.61	1.29	0.83	0.39	1.12	1.05	0.79
SCO_L*	1.7	2.32	1.57	0.54	1.15	1.67	1.21	0.53
SCO_U*	-0.34	1.64	1.61	0.45	-0.22	1.25	1.23	0.41
TAS_A	1.98	3.26	2.6	0.83	1.74	2.31	1.52	0.78
QAS_U	2.23	3	2.01	0.85	1.84	2.29	1.36	0.71
QAS_A*	1.31	2.64	2.29	0.76	0.71	1.42	1.22	0.73
NUK_U	1.49	2.34	1.81	0.84	1.24	1.75	1.23	0.73
NUK_N	1.29	1.92	1.42	0.88	0.87	1.28	0.94	0.83
KAN_L	1.88	2.29	1.31	0.85	2.2	2.45	1.07	0.79
KAN_M	0.79	1.58	1.37	0.9	1.04	1.52	1.11	0.78
KAN_U	0.31	1.36	1.32	0.93	-0.05	0.96	0.96	0.89
UPE_U	1.33	2.38	1.98	0.8	1.59	2.32	1.69	0.72
THU_L	1.89	2.99	2.32	0.79	1.48	2.52	2.04	0.85
THU_U	1.38	2.57	2.17	0.79	0.93	2.06	1.83	0.87
NUK_L*	2.69	3.4	2.08	0.77	1.71	2.18	1.35	0.64
QAS_L	1.84	2.73	2.02	0.83	0.72	1.53	1.35	0.68
QAS_M	1.18	1.9	1.49	0.92	0.34	0.77	0.69	0.75
TAS_L	1.94	3.53	2.95	0.79	0.5	1.74	1.67	0.56
TAS_U	1.94	3.31	2.68	0.81	1.2	1.99	1.58	0.68
UPE_L	1.62	2.58	2	0.74	1.48	2.08	1.46	0.77
All AWS	1.4	2.4	1.86	0.78	1.01	1.8	1.35	0.72
17 selected AWS	1.42	2.39	1.87	0.83	1.05	1.83	1.37	0.76

* Dissmissed in the study. see Table S1

Table S13. Annual and summer 10-m wind speed (W10M) mean bias (MB). RMSE. centered RMSE (RMSEc) and correlation (r) between daily observations at PROMICE AWS and MAR_{E5} over 2010 – 2016.

UV2 (ms^{-1})	Annually				Summer			
MAR_{E5}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-1.04	2.11	1.83	0.75	-1.73	2.24	1.42	0.69
KPC_U	-0.41	1.32	1.25	0.83	-0.67	1.24	1.04	0.78
SCO_L*	0.4	1.62	1.57	0.5	0.11	1.25	1.24	0.5
SCO_U*	-1.58	2.23	1.58	0.42	-1.3	1.78	1.22	0.41
TAS_A	0.25	2.64	2.63	0.82	0.38	1.6	1.55	0.76
QAS_U	0.41	2.01	1.96	0.83	0.38	1.38	1.32	0.7
QAS_A*	-0.47	2.25	2.2	0.75	-0.67	1.38	1.21	0.73
NUK_U	-0.02	1.74	1.74	0.84	-0.11	1.23	1.23	0.72
NUK_N	-0.18	1.41	1.4	0.87	-0.33	1.05	1	0.8
KAN_L	0.55	1.46	1.35	0.83	1.05	1.51	1.08	0.77
KAN_M	-0.53	1.51	1.42	0.89	0	1.11	1.11	0.77
KAN_U	-0.98	1.67	1.35	0.92	-1.02	1.43	1.01	0.88
UPE_U	-0.04	1.91	1.91	0.8	0.39	1.66	1.61	0.72
THU_L	0.38	2.38	2.35	0.78	0.13	2.17	2.16	0.83
THU_U	-0.08	2.21	2.21	0.78	-0.37	1.99	1.95	0.85
NUK_L*	1.2	2.3	1.96	0.76	0.34	1.36	1.31	0.64
QAS_L	0.04	1.98	1.98	0.81	-0.79	1.56	1.34	0.67
QAS_M	-0.61	1.67	1.55	0.89	-1.04	1.19	0.59	0.79
TAS_L	0.37	3.01	2.99	0.76	-0.69	1.8	1.66	0.52
TAS_U	0.31	2.74	2.72	0.78	-0.1	1.55	1.55	0.66
UPE_L	0.32	1.97	1.94	0.73	0.36	1.47	1.43	0.76
All AWS	-0.06	1.96	1.84	0.77	-0.2	1.53	1.36	0.71
17 selected AWS	-0.06	1.93	1.86	0.82	-0.17	1.55	1.38	0.75

* Dissmissed in the study. see Table S1

Table S14. Same as Table S13 but for AWS height wind speed (UV2).

W10M (ms^{-1})	Annually				Summer			
MAR_{EI}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	0.54	1.92	1.84	0.75	-0.44	1.46	1.39	0.7
KPC_U	1.09	1.69	1.28	0.84	0.56	1.19	1.05	0.79
SCO_L*	1.77	2.39	1.6	0.54	1.23	1.72	1.21	0.53
SCO_U*	-0.33	1.63	1.6	0.47	-0.2	1.21	1.19	0.45
TAS_A	2.02	3.24	2.53	0.84	1.92	2.45	1.52	0.79
QAS_U	2.32	3.12	2.09	0.84	2	2.44	1.4	0.7
QAS_A*	1.43	2.75	2.34	0.75	0.89	1.57	1.29	0.72
NUK_U	1.55	2.41	1.84	0.83	1.37	1.9	1.32	0.7
NUK_N	1.32	1.91	1.38	0.88	0.94	1.33	0.95	0.81
KAN_L	1.85	2.28	1.33	0.85	2.21	2.45	1.06	0.79
KAN_M	0.74	1.6	1.42	0.89	1.02	1.53	1.14	0.76
KAN_U	0.19	1.33	1.31	0.92	-0.14	0.93	0.92	0.9
UPE_U	1.23	2.26	1.89	0.81	1.56	2.19	1.54	0.76
THU_L	0.93	2.4	2.21	0.81	0.41	1.83	1.78	0.89
THU_U	0.36	2.07	2.04	0.81	-0.11	1.68	1.67	0.89
NUK_L*	2.75	3.46	2.11	0.76	1.81	2.25	1.33	0.66
QAS_L	1.88	2.8	2.08	0.82	0.78	1.57	1.37	0.67
QAS_M	1.28	1.99	1.53	0.92	0.49	0.9	0.75	0.71
TAS_L	1.9	3.44	2.87	0.8	0.54	1.77	1.68	0.56
TAS_U	1.95	3.24	2.59	0.82	1.26	2.02	1.58	0.68
UPE_L	1.5	2.47	1.96	0.74	1.42	1.98	1.38	0.78
All AWS	1.32	2.35	1.84	0.79	0.96	1.77	1.32	0.73
17 selected AWS	1.31	2.32	1.85	0.83	0.96	1.78	1.34	0.77

* Dissmissed in the study. see Table S1

Table S15. Same as Table S13 but for MAR_{EI}.

UV2 (ms^{-1})	Annually				Summer			
MAR_{EI}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-0.9	1.99	1.77	0.77	-1.57	2.12	1.42	0.69
KPC_U	-0.27	1.28	1.25	0.84	-0.5	1.15	1.04	0.79
SCO_L*	0.48	1.67	1.6	0.51	0.2	1.26	1.24	0.5
SCO_U*	-1.56	2.21	1.57	0.44	-1.25	1.71	1.17	0.45
TAS_A	0.28	2.59	2.58	0.83	0.54	1.65	1.56	0.76
QAS_U	0.52	2.09	2.02	0.83	0.53	1.45	1.34	0.69
QAS_A*	-0.36	2.3	2.27	0.73	-0.49	1.36	1.27	0.71
NUK_U	0.04	1.79	1.79	0.83	-0.01	1.31	1.31	0.69
NUK_N	-0.14	1.39	1.38	0.87	-0.28	1.08	1.04	0.78
KAN_L	0.52	1.46	1.37	0.83	1.05	1.5	1.07	0.77
KAN_M	-0.58	1.57	1.46	0.88	-0.03	1.16	1.16	0.75
KAN_U	-1.1	1.74	1.35	0.92	-1.11	1.49	0.99	0.88
UPE_U	-0.15	1.83	1.82	0.81	0.34	1.5	1.46	0.76
THU_L	-0.59	2.28	2.2	0.81	-0.94	2.09	1.87	0.88
THU_U	-1.1	2.33	2.05	0.81	-1.44	2.26	1.74	0.89
NUK_L*	1.26	2.36	1.99	0.76	0.43	1.36	1.29	0.66
QAS_L	0.11	2.03	2.03	0.8	-0.71	1.51	1.34	0.67
QAS_M	-0.51	1.67	1.59	0.89	-0.88	1.14	0.71	0.72
TAS_L	0.34	2.95	2.93	0.77	-0.7	1.84	1.7	0.51
TAS_U	0.3	2.66	2.65	0.8	-0.05	1.55	1.55	0.66
UPE_L	0.21	1.91	1.9	0.74	0.32	1.38	1.34	0.78
All AWS	-0.13	1.96	1.82	0.78	-0.26	1.53	1.32	0.72
17 selected AWS	-0.17	1.93	1.84	0.82	-0.26	1.55	1.34	0.75

* Dissmissed in the study. see Table S1

Table S16. Same as Table S14 but for MAR_{EI}.

W10M (ms^{-1})	Annually				Summer			
ASR	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	0.05	1.87	1.87	0.78	-1.34	2.04	1.54	0.7
KPC_U	1.86	2.39	1.51	0.84	0.96	1.53	1.19	0.81
SCO_L*	2.73	3.4	2.02	0.54	2.18	2.6	1.41	0.58
SCO_U*	1.45	2.37	1.87	0.56	1.45	2.04	1.43	0.53
TAS_A	2.1	3.23	2.44	0.86	3.09	3.48	1.61	0.74
QAS_U	2.22	3.04	2.07	0.8	2.35	2.72	1.38	0.68
QAS_A*	1.67	2.87	2.33	0.73	1.65	2.12	1.34	0.67
NUK_U	2.79	3.57	2.23	0.84	2.07	2.48	1.38	0.75
NUK_N	1.36	2.2	1.73	0.88	0.56	1.12	0.97	0.84
KAN_L	1.65	2.22	1.49	0.82	1.93	2.3	1.25	0.76
KAN_M	1.98	2.59	1.67	0.88	1.96	2.4	1.38	0.76
KAN_U	0.84	1.62	1.39	0.93	0.29	1.13	1.09	0.89
UPE_U	2.51	3.06	1.76	0.89	2.43	2.82	1.44	0.85
THU_L	-1.38	2.76	2.39	0.77	-2.02	2.83	1.98	0.86
THU_U	-1.45	2.79	2.39	0.74	-2.16	3.01	2.09	0.83
NUK_L*	2.79	3.69	2.41	0.78	1.31	2	1.51	0.57
QAS_L	1.25	2.22	1.83	0.82	0.63	1.39	1.24	0.73
QAS_M	0.5	1.9	1.83	0.82	1.48	1.65	0.73	0.68
TAS_L	1.82	3.01	2.4	0.86	1.46	1.97	1.32	0.76
TAS_U	1.99	3	2.24	0.87	2.48	2.86	1.43	0.74
UPE_L	3.36	4.18	2.49	0.72	2.61	3.06	1.59	0.76
All AWS	1.66	2.8	1.98	0.79	1.2	2.28	1.43	0.74
17 selected AWS	1.52	2.72	1.95	0.83	1.1	2.3	1.42	0.78

* Dissmissed in the study. see Table S1

Table S17. Same as Table S13 but for ASR.

W10M (ms^{-1})	Annually				Summer			
E5	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-2.26	2.71	1.49	0.85	-2.7	2.92	1.1	0.83
KPC_U	0.45	1.18	1.08	0.9	0.3	1.07	1.02	0.88
SCO_L*	-2.22	2.51	1.19	0.59	-2.02	2.32	1.14	0.65
SCO_U*	-3.43	3.66	1.3	0.65	-2.78	2.96	1.03	0.61
TAS_A	-2.31	3.36	2.44	0.88	-1.27	1.96	1.49	0.8
QAS_U	-0.82	1.72	1.51	0.87	-0.49	1.23	1.13	0.77
QAS_A*	-1.48	2.39	1.88	0.76	-1.24	1.9	1.44	0.55
NUK_U	-0.65	1.62	1.49	0.86	0.17	0.99	0.98	0.79
NUK_N	-1.88	2.17	1.1	0.92	-1.76	1.95	0.84	0.82
KAN_L	-0.97	1.41	1.03	0.9	-0.8	1.21	0.91	0.85
KAN_M	0.84	1.7	1.48	0.9	1.99	2.37	1.29	0.8
KAN_U	0.53	1.31	1.2	0.95	0.71	1.23	1	0.91
UPE_U	-0.5	1.35	1.26	0.91	-0.14	1.02	1.01	0.88
THU_L	-3.14	4.08	2.6	0.8	-3.71	4.32	2.21	0.92
THU_U	-3.33	4.1	2.39	0.79	-3.86	4.37	2.04	0.91
NUK_L*	-0.44	1.3	1.22	0.81	-0.34	1.09	1.03	0.68
QAS_L	-1.15	2.1	1.76	0.78	-1.38	1.97	1.4	0.54
QAS_M	-1.87	2.47	1.61	0.87	-1.55	1.75	0.81	0.64
TAS_L	-0.71	2.26	2.14	0.9	-0.81	1.2	0.88	0.79
TAS_U	-1.37	2.49	2.08	0.91	-0.81	1.25	0.96	0.81
UPE_L	0.21	1.82	1.81	0.75	-0.4	1.26	1.2	0.77
All AWS	-1.08	2.15	1.55	0.83	-0.95	1.89	1.19	0.78
17 selected AWS	-0.87	2.07	1.61	0.86	-0.78	1.84	1.21	0.82

* Dissmissed in the study. see Table S1

Table S18. Same as Table S13 but for ERA5.

W10M (ms^{-1})	Annually				Summer			
EI	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-2.7	3.35	1.99	0.72	-3.17	3.41	1.27	0.77
KPC_U	0.28	1.27	1.23	0.85	-0.18	0.98	0.97	0.86
SCO_L*	-1.56	1.88	1.04	0.65	-1.6	1.89	1.01	0.69
SCO_U*	-2.39	2.64	1.11	0.67	-2.09	2.28	0.91	0.63
TAS_A	-1.68	3.24	2.77	0.86	-0.33	1.56	1.52	0.77
QAS_U	-0.4	2.27	2.24	0.75	-0.08	1.41	1.41	0.7
QAS_A*	-1.03	2.82	2.63	0.59	-0.87	1.79	1.56	0.55
NUK_U	-1.2	2.1	1.72	0.81	-1.37	1.83	1.21	0.67
NUK_N	-1.6	2.13	1.4	0.85	-1.75	2.03	1.03	0.73
KAN_L	-0.56	1.41	1.29	0.84	-1.13	1.42	0.85	0.8
KAN_M	-0.38	1.41	1.36	0.9	0.11	1.21	1.21	0.78
KAN_U	0.24	1.48	1.47	0.92	0.32	1.17	1.13	0.88
UPE_U	-2.21	3	2.03	0.79	-1.67	2.29	1.57	0.61
THU_L	-2.71	3.6	2.37	0.82	-2.99	3.75	2.26	0.88
THU_U	-2.86	3.56	2.12	0.83	-3.11	3.7	2.02	0.89
NUK_L*	0.15	1.78	1.77	0.68	-0.88	1.74	1.5	0.41
QAS_L	-0.46	2.13	2.08	0.74	-0.67	1.65	1.51	0.61
QAS_M	-1.83	2.95	2.31	0.71	-0.88	1.54	1.27	0.6
TAS_L	-0.03	2.76	2.76	0.82	0.18	1.19	1.17	0.65
TAS_U	-0.73	2.75	2.65	0.84	0.13	1.16	1.15	0.72
UPE_L	-0.31	2.16	2.14	0.59	-0.53	1.69	1.61	0.52
All AWS	-1.03	2.28	1.82	0.78	-1.06	1.88	1.33	0.71
17 selected AWS	-0.97	2.31	1.91	0.8	-0.96	1.86	1.37	0.74

* Dissmissed in the study. see Table S1

Table S19. Same as Table S13 but for ERA-Interim.

LWD (Wm^{-2})	Annually				Summer			
MAR_{E5}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-12.82	26.84	23.58	0.87	-23.63	29.57	17.79	0.73
KPC_U	-8.98	25.41	23.77	0.85	-13.7	23.86	19.54	0.73
SCO_L*	-25.49	34.51	23.27	0.87	-40.6	44.79	18.9	0.75
SCO_U	-7.57	23.02	21.74	0.88	-19.66	27.37	19.04	0.76
TAS_A	-4.62	25.65	25.23	0.77	-9.91	19.66	16.98	0.81
QAS_U*	-10.41	30.48	28.65	0.81	-10.5	22.25	19.61	0.79
QAS_A	-10.78	26.26	23.94	0.87	-11.24	20	16.54	0.85
NUK_U*	-7.2	26.1	25.08	0.86	-13.51	27.45	23.9	0.73
NUK_N	-10.68	24.44	21.99	0.9	-15.39	22.96	17.03	0.84
KAN_L	-10.48	25.14	22.85	0.88	-13.98	21.76	16.67	0.8
KAN_M	-5.68	24.09	23.41	0.87	-10.31	22.35	19.83	0.8
KAN_U	-5.08	23.37	22.81	0.86	-10.08	23.49	21.21	0.81
UPE_U	-2.56	25.32	25.19	0.87	-9.05	23.92	22.15	0.77
THU_L	-18.33	30.68	24.6	0.88	-20.83	26.99	17.16	0.8
THU_U	-15.15	29.39	25.18	0.88	-11.89	20.05	16.14	0.85
NUK_L	-20.31	31.55	24.14	0.87	-24.24	30.11	17.85	0.81
QAS_L	-12.62	22.49	18.62	0.92	-15.86	22.93	16.56	0.82
QAS_M	-10.58	17.66	14.14	0.96	-13.15	17.44	11.46	0.93
TAS_L	-10.31	26.99	24.94	0.78	-14.02	22.33	17.38	0.77
TAS_U*	-9.49	28.31	26.67	0.77	-16.33	28.75	23.66	0.63
UPE_L	-15.62	31	26.78	0.85	-17.35	27.25	21.01	0.71
All AWS	-11.28	27.06	24.05	0.86	-16.43	25.84	19.17	0.77
17 selected AWS	-10.58	26.2	23.54	0.87	-15.12	24.33	18.61	0.79

* Dissmissed in the study. see Table S1

Table S20. Annual and summer long wave downward radiation fluxes (LWD) mean bias (MB). RMSE. centered RMSE (RMSEc) and correlation (r) between daily observations at PROMICE AWS and MAR_{E5} over 2010 – 2016.

LWD (Wm^{-2})	Annually				Summer			
MAR_{EI}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-12.12	25.84	22.83	0.88	-20.59	27	17.46	0.75
KPC_U	-7.93	24.55	23.23	0.86	-10.79	21.55	18.66	0.77
SCO_L*	-25.33	34.13	22.88	0.87	-38.2	42.76	19.23	0.76
SCO_U	-7.03	22.76	21.65	0.89	-17.02	25.36	18.8	0.78
TAS_A	-5.74	26.26	25.63	0.77	-10.26	20.59	17.85	0.79
QAS_U*	-11.36	30.93	28.77	0.81	-11	23	20.2	0.78
QAS_A	-12.32	27.6	24.7	0.86	-14.29	22.73	17.68	0.83
NUK_U*	-7.78	26.31	25.14	0.86	-13.93	27.64	23.87	0.73
NUK_N	-11.01	24.4	21.77	0.9	-15.43	22.86	16.87	0.84
KAN_L	-10.36	24.28	21.96	0.89	-14.09	21.86	16.72	0.8
KAN_M	-6.34	23.68	22.82	0.88	-10.85	21.83	18.94	0.82
KAN_U	-5.66	23.12	22.41	0.87	-10.73	22.79	20.1	0.83
UPE_U	-5.14	24.62	24.08	0.88	-10.78	23.02	20.34	0.8
THU_L	-20.74	31.59	23.82	0.89	-21.93	28.1	17.57	0.78
THU_U	-17.95	30.5	24.66	0.88	-13.77	21.36	16.33	0.84
NUK_L	-20.31	31.39	23.93	0.87	-24.06	29.79	17.56	0.82
QAS_L	-13.33	23.13	18.9	0.92	-16.18	23.49	17.02	0.81
QAS_M	-10.95	18.73	15.19	0.95	-11.61	22.74	19.55	0.76
TAS_L	-10.56	26.63	24.45	0.79	-12.92	21.5	17.19	0.78
TAS_U*	-9.88	28.21	26.42	0.78	-15.43	28.54	24.01	0.62
UPE_L	-18.15	31.53	25.78	0.86	-19.07	27.57	19.91	0.74
All AWS	-11.98	27	23.66	0.86	-16.28	25.45	18.93	0.78
17 selected AWS	-11.35	26.11	23.08	0.87	-15.11	23.93	18.22	0.8

* Dissmissed in the study. see Table S1

Table S21. Same as Table S20 but for MAR_{EI}.

LWD (Wm^{-2})	Annually				Summer			
ASR	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-22.63	27.96	16.42	0.94	-24.56	28.87	15.18	0.79
KPC_U	-16.81	24.6	17.96	0.92	-13.15	19.94	14.99	0.83
SCO_L*	-36.05	39.69	16.59	0.93	-45.81	47.86	13.87	0.83
SCO_U	-22.17	26.61	14.71	0.95	-29.24	32.56	14.33	0.84
TAS_A	-8.58	22.86	21.19	0.85	-13.42	19.55	14.21	0.86
QAS_U*	-9.64	28.07	26.36	0.85	-6.63	18.56	17.34	0.84
QAS_A	-11.63	23.82	20.79	0.91	-8.53	14.55	11.8	0.92
NUK_U*	-14.37	26.68	22.48	0.9	-14.9	26.54	21.96	0.76
NUK_N	-14.72	22.07	16.44	0.95	-8.9	16.34	13.71	0.9
KAN_L	-13.73	22.63	18	0.94	-5.68	14.19	13	0.88
KAN_M	-12.82	22.97	19.06	0.93	-5.34	16.8	15.92	0.88
KAN_U	-15.06	25.18	20.19	0.92	-5.67	18.27	17.37	0.87
UPE_U	-10.15	21.51	18.96	0.93	-10.29	19	15.97	0.87
THU_L	-18.74	27.55	20.19	0.93	-11.6	19.88	16.15	0.84
THU_U	-16.51	28.29	22.97	0.92	-4.02	16.05	15.54	0.86
NUK_L	-23.94	32.34	21.74	0.91	-18.46	24.15	15.56	0.86
QAS_L	-12.03	19.37	15.18	0.95	-9.92	16.93	13.71	0.89
QAS_M	-8.02	14.58	12.17	0.97	-4.05	12.26	11.58	0.92
TAS_L	-14.15	24.94	20.54	0.86	-13.64	20.6	15.44	0.82
TAS_U*	-12.41	25.57	22.36	0.85	-15	25.58	20.71	0.71
UPE_L	-26.15	34.24	22.11	0.9	-22.88	28.51	17.01	0.82
All AWS	-17.06	26.59	19.6	0.91	-14.81	22.78	15.83	0.84
17 selected AWS	-16.55	25.48	18.98	0.92	-12.91	20.69	15.22	0.86

* Dissmissed in the study. see Table S1

Table S22. Same as Table S20 but for ASR.

LWD (Wm^{-2})	Annually				Summer			
E5	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-18.25	23.45	14.74	0.95	-23.23	27.09	13.95	0.83
KPC_U	-13.18	20.87	16.18	0.93	-12.84	18.33	13.09	0.87
SCO_L*	-42.86	45.77	16.06	0.94	-56.54	58.23	13.94	0.82
SCO_U	-27.09	30.63	14.31	0.95	-37.94	40.37	13.81	0.85
TAS_A	-2.46	17.73	17.56	0.9	-1.43	13.45	13.38	0.88
QAS_U*	-15.36	29.15	24.78	0.87	-9.18	18.76	16.35	0.86
QAS_A	-12.79	23.02	19.14	0.92	-6.07	10.35	8.38	0.96
NUK_U*	-16.4	25.15	19.07	0.92	-16.64	26.89	21.12	0.8
NUK_N	-14.97	19.99	13.24	0.97	-5.55	14.08	12.94	0.92
KAN_L	-6.36	18.03	16.87	0.95	7.94	14.83	12.53	0.9
KAN_M	-11.71	18.04	13.72	0.95	-9.49	15.41	12.14	0.93
KAN_U	-14.18	20.45	14.73	0.94	-14.12	19.25	13.09	0.93
UPE_U	-11.18	19.28	15.7	0.95	-5.61	15.62	14.58	0.89
THU_L	-13.98	22.58	17.73	0.94	-7.12	15.38	13.64	0.89
THU_U	-11.65	23.16	20.02	0.93	-0.89	12.7	12.67	0.91
NUK_L	-27.32	32.72	18.01	0.93	-22.48	27.21	15.32	0.89
QAS_L	-13.99	19.42	13.46	0.96	-3.83	13.69	13.15	0.89
QAS_M	-15.66	18.35	9.57	0.98	-7.64	13.19	10.75	0.93
TAS_L	-15.8	23.85	17.87	0.9	-11.17	17.12	12.97	0.89
TAS_U*	-13.02	24.55	20.81	0.87	-10.7	23.21	20.6	0.73
UPE_L	-27.58	33.53	19.07	0.93	-17.48	23.56	15.8	0.84
All AWS	-17.2	24.99	17.04	0.93	-14.22	22.35	14.38	0.87
17 selected AWS	-15.58	23.02	16.18	0.94	-11.23	19.41	13.5	0.89

* Dissmissed in the study. see Table S1

Table S23. Same as Table S20 but for ERA5.

LWD (Wm^{-2})	Annually				Summer			
EI	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-13.89	21.08	15.86	0.94	-23.02	26.58	13.29	0.87
KPC_U	-7.3	18.46	16.96	0.92	-11.32	17.65	13.54	0.87
SCO_L*	-53.42	55.69	15.73	0.95	-50.93	53.8	17.34	0.85
SCO_U	-37.11	39.66	14	0.96	-35.79	39.02	15.55	0.86
TAS_A	-21.87	29.28	19.47	0.89	-21.79	24.57	11.36	0.92
QAS_U*	-26.96	40.13	29.73	0.84	-17.27	24.6	17.52	0.83
QAS_A	-25.16	36.4	26.3	0.88	-14.31	20.55	14.75	0.88
NUK_U*	-8.25	22.57	21.01	0.9	-16.31	27.17	21.74	0.75
NUK_N	-10.65	17.34	13.69	0.96	-12.24	18.56	13.95	0.88
KAN_L	-16.09	24.27	18.17	0.94	-10.39	17.98	14.68	0.88
KAN_M	-10.5	19.33	16.22	0.95	-7.84	16.4	14.4	0.9
KAN_U	-11.73	21.27	17.75	0.93	-8.9	18.93	16.71	0.89
UPE_U	-9.82	21.21	18.8	0.94	-1.23	15.36	15.31	0.89
THU_L	-23.87	38.1	29.69	0.89	-4.41	17.46	16.89	0.79
THU_U	-20.01	38.19	32.53	0.87	3.16	17.68	17.4	0.8
NUK_L	-23.72	30.73	19.54	0.91	-30.82	34.58	15.69	0.84
QAS_L	-31.03	35.14	16.48	0.95	-26.65	30.42	14.67	0.87
QAS_M	-28.92	32.83	15.54	0.96	-25.19	28.33	12.97	0.91
TAS_L	-34.91	40.22	19.97	0.88	-31.96	35.04	14.36	0.86
TAS_U*	-32.24	39.09	22.11	0.87	-30.55	36.11	19.25	0.77
UPE_L	-26.41	33.97	21.36	0.92	-17.22	23.76	16.38	0.84
All AWS	-22.16	30.9	19.88	0.92	-18.57	26.1	15.9	0.85
17 selected AWS	-19.6	28.28	19.26	0.92	-15.58	23.39	15.11	0.86

* Dissmissed in the study. see Table S1

Table S24. Same as Table S20 but for ERA-Interim.

SWD (Wm^{-2})	Annually				Summer			
MAR_{E5}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-3.27	30.54	30.36	0.97	2.26	48.18	48.13	0.89
KPC_U	-11.5	28.3	25.86	0.98	-14.83	38.59	35.63	0.93
SCO_L*	8.35	31.27	30.13	0.97	27.16	52.61	45.06	0.87
SCO_U	-2.28	28.57	28.48	0.98	10.29	43.41	42.18	0.89
TAS_A	-8.94	36.08	34.96	0.96	-12.56	40.15	38.14	0.89
QAS_U*	18.43	82.13	80.04	0.79	15.28	100.55	99.39	0.53
QAS_A	-1.85	37.63	37.58	0.95	-17.33	44.57	41.06	0.89
NUK_U*	3.73	69.2	69.1	0.83	22.81	102.58	100.02	0.57
NUK_N	-3.46	30.15	29.95	0.97	3.44	45.28	45.15	0.88
KAN_L	-14.09	35.87	32.99	0.96	-8.88	45.69	44.82	0.85
KAN_M	-10.74	30.84	28.91	0.97	-7.05	40.77	40.15	0.89
KAN_U	-20.36	36.79	30.64	0.98	-22.97	45.45	39.22	0.86
UPE_U	-11.66	33.23	31.12	0.97	-16.85	51.71	48.89	0.87
THU_L	-4.32	28.61	28.28	0.97	4.77	43.52	43.26	0.9
THU_U	-5.16	25.92	25.4	0.98	-4.62	38.47	38.19	0.92
NUK_L*	10.08	52.62	51.65	0.9	14	62.61	61.03	0.8
QAS_L	1.88	35.36	35.31	0.95	16.99	54.57	51.86	0.85
QAS_M	-2.21	24.14	24.04	0.95	23.56	46.29	39.84	0.79
TAS_L	-5.4	40.41	40.05	0.95	0.7	50.91	50.91	0.84
TAS_U*	4.73	72.2	72.04	0.81	25.76	113.4	110.44	0.39
UPE_L	-6.88	36.73	36.08	0.95	-2.3	54.83	54.78	0.83
All AWS	-3.17	40.47	39.12	0.94	2.43	56.35	54.26	0.81
16 selected AWS	-7.95	32.8	31.3	0.97	-4.42	46.07	44.41	0.88

* Dissmissed in the study. see Table S1

Table S25. Annual and summer short wave downward radiation fluxes (SWD) mean bias (MB). RMSE. centered RMSE (RMSEc) and correlation (r) between daily observations at PROMICE AWS and MAR_{E5} over 2010 – 2016.

SWD (Wm^{-2})	Annually				Summer			
MAR_{EI}	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-3.85	29.26	29	0.98	-0.61	45.95	45.95	0.9
KPC_U	-12.48	28.52	25.64	0.99	-17.94	38.88	34.49	0.93
SCO_L*	7.67	30.42	29.44	0.97	24.58	50.27	43.85	0.88
SCO_U	-3.32	28.09	27.89	0.98	7.17	41.38	40.75	0.9
TAS_A	-8.17	36.5	35.57	0.96	-12.08	42.47	40.72	0.87
QAS_U*	18.79	82.88	80.72	0.78	15.41	101.77	100.6	0.52
QAS_A	-0.42	37.86	37.85	0.95	-12.51	44.75	42.96	0.87
NUK_U*	4.49	69.84	69.7	0.83	24.91	103.14	100.09	0.57
NUK_N	-2.94	30.61	30.47	0.97	3.86	46.56	46.4	0.87
KAN_L	-13.73	36.25	33.54	0.96	-7.33	46.8	46.22	0.84
KAN_M	-10.17	30.79	29.06	0.97	-6.05	41.05	40.6	0.88
KAN_U	-19.69	35.75	29.84	0.98	-22.08	43.75	37.77	0.88
UPE_U	-9.59	30.62	29.08	0.97	-11.84	46.17	44.63	0.89
THU_L	-1.85	30.31	30.25	0.97	10.01	48.11	47.05	0.88
THU_U	-2.23	25.75	25.65	0.98	2.5	39.2	39.12	0.91
NUK_L*	10.43	53.2	52.17	0.9	15.74	63.29	61.3	0.79
QAS_L	2.38	36.88	36.81	0.95	17.82	57.99	55.19	0.83
QAS_M	-2.89	23.43	23.26	0.95	20.51	48.35	43.79	0.75
TAS_L	-5.14	40.02	39.69	0.95	0.01	51.1	51.1	0.84
TAS_U*	5.6	72.09	71.87	0.82	26.45	113.52	110.4	0.4
UPE_L	-4.67	35.18	34.87	0.96	3.25	51.27	51.17	0.85
All AWS	-2.54	40.31	39.06	0.94	3.57	56.11	54.1	0.82
16 selected AWS	-7.18	32.52	31.15	0.97	-2.98	45.74	44.18	0.88

* Dissmissed in the study. see Table S1

Table S26. Same as Table S25 but for MAR_{EI}.

SWD (Wm^{-2})	Annually				Summer			
ASR	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	8.37	30.92	29.76	0.98	28.34	54.93	47.06	
KPC_U	0.41	19.33	19.33	0.99	8.21	32.14	31.07	
SCO_L*	24.16	43.28	35.91	0.97	56.49	73.35	46.78	
SCO_U	15.56	35.48	31.89	0.98	43.26	62.62	45.28	
TAS_A	9.96	33.74	32.24	0.97	23.58	46.25	39.78	
QAS_U*	36.63	89.5	81.66	0.79	50.99	109.18	96.54	
QAS_A	11.76	39.54	37.74	0.95	16.83	42.76	39.31	
NUK_U*	24.27	78.2	74.34	0.83	63.55	120.6	102.5	
NUK_N	6.5	27.55	26.77	0.98	15.43	43.24	40.4	
KAN_L	-1.5	30.34	30.3	0.97	10.13	44.03	42.85	
KAN_M	4.28	24.96	24.59	0.98	15.93	41.34	38.14	
KAN_U	-3.64	22.6	22.3	0.99	-0.93	31.9	31.88	
UPE_U	5.71	25.17	24.51	0.98	21.35	44.95	39.55	
THU_L	4.69	29.34	28.96	0.97	24.34	49.87	43.53	
THU_U	6.86	26.03	25.1	0.98	20.95	42.89	37.43	
NUK_L*	21.71	57.4	53.14	0.9	33.61	69.51	60.84	
QAS_L	15.18	39.1	36.03	0.96	41.65	64.87	49.73	
QAS_M	2.93	27.06	26.9	0.94	37.02	54.72	40.3	
TAS_L	17.35	48.29	45.06	0.94	41.8	72.35	59.05	
TAS_U*	25.96	77.9	73.45	0.83	65.27	124.15	105.61	
UPE_L	10.75	36.1	34.47	0.97	34.36	58.46	47.29	
All AWS	12.28	40.84	38.39	0.94	31.1	61.83	52.27	
16 selected AWS	6.8	30.31	29.09	0.97	22.87	48.69	41.88	

* Dissmissed in the study. see Table S1

Table S27. Same as Table S25 but for ASR.

SWD (Wm^{-2})	Annually				Summer			
E5	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	4.03	25.39	25.07	0.98	15.16	44.11	41.42	0.92
KPC_U	-4.15	17.9	17.41	0.99	-4.28	28.25	27.92	0.96
SCO_L*	22.78	39.57	32.36	0.98	53.75	67.8	41.33	0.89
SCO_U	13.47	30.98	27.9	0.98	38.52	55.3	39.67	0.9
TAS_A	-3.09	30.28	30.12	0.97	-9.24	34.19	32.92	0.92
QAS_U*	28.26	83.84	78.93	0.79	28.35	100.19	96.1	0.54
QAS_A	4.22	35.82	35.57	0.95	-13.05	34.85	32.31	0.93
NUK_U*	18.15	71.43	69.09	0.84	47.39	109.16	98.34	0.57
NUK_N	-9.54	26.48	24.7	0.98	-25.9	43.44	34.87	0.93
KAN_L	-21.61	38.5	31.86	0.97	-39.79	57.22	41.12	0.88
KAN_M	0.78	22.16	22.15	0.98	9.27	34.33	33.05	0.93
KAN_U	-9.86	22.72	20.47	0.99	-12.7	30.38	27.6	0.93
UPE_U	-0.88	22.27	22.25	0.99	-1.95	38.4	38.35	0.92
THU_L	-10.6	27.03	24.86	0.98	-18.6	41.6	37.21	0.93
THU_U	-9.48	27.1	25.39	0.98	-22.48	43.87	37.68	0.92
NUK_L*	18.84	51.92	48.39	0.91	26.26	59.94	53.88	0.83
QAS_L	1.13	27.4	27.38	0.97	-1.63	43.45	43.42	0.9
QAS_M	1.4	17.49	17.43	0.97	17.95	33.88	28.74	0.91
TAS_L	4.53	34.33	34.03	0.96	14.07	45.02	42.76	0.89
TAS_U*	13.96	70.44	69.04	0.83	37.04	109.9	103.47	0.46
UPE_L	2.04	27.48	27.4	0.97	4.65	43.02	42.76	0.89
All AWS	3.56	36.86	34.73	0.95	7.83	54.01	47.71	0.85
16 selected AWS	-2.98	26.98	25.59	0.98	-3.68	41.53	37.1	0.91

* Dissmissed in the study. see Table S1

Table S28. Same as Table S25 but for ERA5.

SWD (Wm^{-2})	Annually				Summer			
EI	MB	RMSE	RMSEc	r	MB	RMSE	RMSEc	r
KPC_L	-0.99	23.26	23.24	0.99	7.26	35.22	34.46	0.94
KPC_U	-8.39	23.2	21.63	0.99	-10.4	33.82	32.18	0.95
SCO_L*	17.19	34.37	29.76	0.98	45.01	58.52	37.4	0.91
SCO_U	7.8	27.91	26.79	0.98	30.74	47.71	36.48	0.92
TAS_A	-3.7	30.47	30.25	0.97	1.38	31.82	31.79	0.93
QAS_U*	19.14	81.29	79	0.79	20.33	98.24	96.11	0.55
QAS_A	-4.75	37.01	36.7	0.95	-16.85	41.48	37.91	0.91
NUK_U*	3.76	69.27	69.16	0.83	18.31	103.97	102.35	0.54
NUK_N	-4.75	25.79	25.35	0.98	-2.45	39.31	39.24	0.91
KAN_L	-12.55	30.8	28.12	0.97	-9.16	40.07	39.01	0.9
KAN_M	-6.16	27.39	26.69	0.98	2.19	38.14	38.08	0.9
KAN_U	-12.45	28.6	25.75	0.98	-9.23	37.08	35.91	0.91
UPE_U	-9.92	26.67	24.75	0.98	-14.68	38.95	36.08	0.93
THU_L	-16.33	33.07	28.75	0.97	-28.52	50.01	41.08	0.91
THU_U	-16.14	34.54	30.53	0.97	-35.56	55.51	42.63	0.9
NUK_L*	10.19	51.54	50.52	0.9	10.24	59.55	58.66	0.8
QAS_L	6.93	33.48	32.75	0.96	29.16	52.8	44.02	0.9
QAS_M	-4.24	21.82	21.4	0.96	24.1	40.03	31.96	0.9
TAS_L	5.72	36.83	36.38	0.96	26.23	51.41	44.22	0.88
TAS_U*	13.7	73.72	72.43	0.83	47.06	116.75	106.84	0.46
UPE_L	-4.44	28.05	27.69	0.97	-1.41	39.63	39.61	0.92
All AWS	-0.41	38.02	36.36	0.95	6.5	53.91	48.91	0.85
16 selected AWS	-5.55	29.21	27.67	0.98	-1.4	42.34	38.22	0.91

* Dissmissed in the study. see Table S1

Table S29. Same as Table S25 but for ERA-Interim.