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Supplement of

Interannual variability of summer surface mass balance and surface melting in the Amundsen sector, West Antarctica

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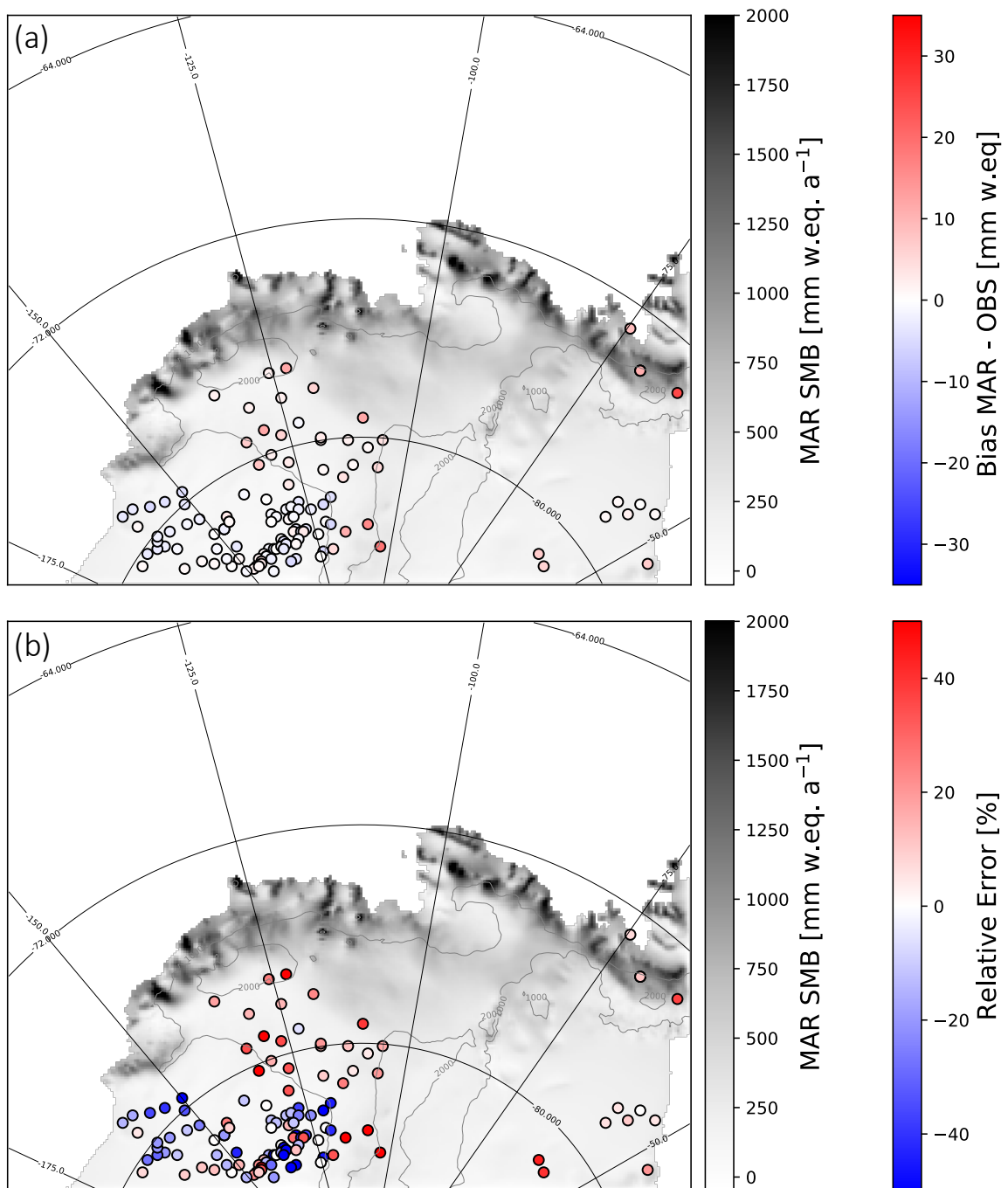
Figure S1: Annual mean (1979-2017) simulated SMB (grey scale) and (a) bias between simulated SMB and SMB from GLACIOCLIM SAMBA dataset from Favier et al., (2013) updated by Wang et al., (2016) (blue-red color bar) ; (b) relative error of the simulated SMB compared to GLACIOCLIM SAMBA dataset (blue-red color bar). Grey contours indicate the surface height.

Table S1: Evaluation of daily near-surface wind speed for the selected AWS, including Root Mean Square Error (RMSE), correlation (R) and standard deviations (σ).

Station name	Bias (MAR-OBS)	Centered RMSE	R	σMAR/σAWS
1 Brianna	-0.17	1.84	0.87	0.97
2 Byrd	0.09	1.77	0.86	0.89
3 Cape_Adams	-0.09	1.70	0.62	0.94
4 Doug	0.22	2.40	0.76	0.91
5 Elizabeth	0.06	1.72	0.77	0.85
6 Evans_Knoll	-0.56	2.28	0.82	0.87
7 Harry	0.18	2.14	0.78	0.93
8 Janet	-0.33	1.69	0.89	0.89
9 Kominko_Slade	0.55	2.30	0.81	0.85
10 Martha_2	2.02	1.72	0.77	0.99
11 Martha_I	1.22	1.92	0.65	0.92
12 Mount_McKibben	-2.59	2.91	0.76	0.59
13 Noel	-1.82	3.87	0.79	0.53
14 Patriot_Hills	0.00	2.29	0.75	0.89
15 Siple	0.11	1.81	0.82	0.82
16 Ski_Hills	-1.11	2.46	0.86	0.70
17 Swithinbank	-0.91	1.73	0.88	0.93
18 Theresa	1.69	2.07	0.86	1
19 Backer_Island	-2.23	2.41	0.77	0.77
20 Bean_Peaks	-0.07	2.71	0.71	0.61
21 Bear_Peninsula	-0.52	3.68	0.63	0.88
22 Clarke_Mountain	-0.69	3.62	0.45	0.77
23 Gomez_Nunatak	-3.18	2.62	0.82	0.58
24 Haag_Nunatak	-3.00	2.66	0.80	0.58
25 Howard_Nunatak	0.85	2.55	0.77	1.2
26 Inman_Nunatak	-1.40	2.98	0.80	0.68
27 Kohler_Glacier	-0.95	1.92	0.65	0.94
28 Lepley_Nunatak	-1.69	2.48	0.78	0.88
29 Lower_Thwaites	-0.48	2.03	0.71	1.1
30 Lyon_Nunatak	-1.34	2.14	0.74	0.76
31 Mount_Paterson	-1.12	2.40	0.69	0.74
32 Mount_Sidley	2.99	3.96	0.61	1
33 Mount_Suggs	-2.18	3.44	0.55	0.54
34 Pirrot_Hills	-2.30	3.56	0.70	0.55
35 Steward_Hills	-5.98	2.76	0.87	0.52
36 Thurston_Island	-1.32	2.56	0.74	0.68
37 Toney_Mountain	-4.71	5.76	0.53	0.44
38 Up_Thwaites_Gla	-0.39	2.02	0.73	0.83
39 Whitmore_Mounta	-3.08	3.69	0.72	0.45
40 Wilson_Nunatak	-2.42	2.42	0.78	0.83
41 Russkaya	-4.32	7.68	0.54	0.54

Table S2: Evaluation of daily near-surface temperature for the selected AWS, including Root Mean Square Error (RMSE), correlation (R) and standard deviations (σ).

Station name	Bias (MAR-OBS)	Centered RMSE	R	σMAR/σAWS
1 Brianna	0.18	2.83	0.96	0.94
2 Byrd	1.31	3.95	0.93	0.87
3 Cape_Adams	2.51	3.78	0.94	0.90
4 Doug	0.94	3.04	0.94	0.89
5 Elizabeth	-0.70	3.53	0.95	0.94
6 Evans_Knoll	-0.29	3.54	0.92	1
7 Harry	1.08	2.87	0.96	0.91
8 Janet	1.06	3.62	0.92	0.97
9 Kominko_Slade	1.15	4.08	0.92	0.86
10 Martha_2	-0.22	4.18	0.96	0.94
11 Martha_I	-1.61	4.26	0.95	0.96
12 Mount_McKibben	0.34	2.66	0.95	1.1
13 Noel	0.94	4.49	0.86	0.82
14 Patriot_Hills	-2.78	1.76	0.97	0.96
15 Siple	2.12	3.45	0.93	0.88
16 Ski_Hills	0.83	3.15	0.94	0.92
17 Swithinbank	-0.92	3.04	0.95	0.92
18 Theresa	-1.47	2.73	0.94	0.87
19 Backer_Island	-1.53	3.37	0.94	1.1
20 Bean_Peaks	-0.12	2.88	0.95	0.93
21 Bear_Peninsula	-0.06	2.6	0.94	1
22 Clarke_Mountain	-2.81	3.39	0.94	1.2
23 Gomez_Nunatak	-0.34	2.29	0.93	0.97
24 Haag_Nunatak	0.04	2.74	0.95	0.95
25 Howard_Nunatak	-0.09	2.86	0.92	0.93
26 Inman_Nunatak	0.38	2.86	0.93	1
27 Kohler_Glacier	0.89	3.56	0.91	0.93
28 Lepley_Nunatak	0.52	3.06	0.91	0.97
29 Lower_Thwaites	1.32	4.10	0.90	0.87
30 Lyon_Nunatak	0.88	3.46	0.90	1
31 Mount_Paterson	-2.82	2.84	0.95	1.1
32 Mount_Sidley	-2.27	2.85	0.91	1
33 Mount_Suggs	-1.03	3.99	0.90	1
34 Pirrot_Hills	-1.97	2.79	0.94	0.95
35 Steward_Hills	-0.42	2.13	0.97	0.95
36 Thurston_Island	-0.28	3.35	0.89	0.98
37 Toney_Mountain	0.72	3.16	0.91	0.96
38 Up_Thwaites_Glacier	1.31	4.75	0.88	0.88
39 Whitmore_Mounta	-0.69	3.01	0.92	1.1
40 Wilson_Nunatak	1.10	1.90	0.98	0.90
41 Russkaya	0.47	4.15	0.87	0.87

Table S3: Correlation R between -SOI, SAM, and ASL indices and the SMB over individual drainage basins in austral fall (MAM), winter (JJA), and Spring (SON). The statistical significance (t-test) is written within brackets.

Drainage Basins	Season	-SOI vs SMB	SAM vs SMB	ASL longitudinal location vs SMB	ASL relative central pressure vs SMB
Abbot	MAM	0.26 (89%)	0.20 (78%)	0.09 (43%)	0.17 (70%)
	JJA	-0.32 (95%)	0.37 (98%)	0.03 (16%)	0.06 (30%)
	SON	-0.19 (99%)	0.40 (99%)	0.10 (47%)	-0.02 (7%)
Cosgrove	MAM	0.46 (100%)	-0.02 (8%)	0.09 (40%)	0.26 (89%)
	JJA	-0.16 (66%)	0.16 (68%)	0.11 (51%)	0.02 (13%)
	SON	-0.03 (13%)	0.28 (91%)	0.12 (52%)	0.04 (21%)
Pine Island	MAM	0.44 (100%)	-0.02 (9%)	0.12 (53%)	0.24 (85%)
	JJA	-0.24 (85%)	0.26 (89%)	0.03 (15%)	0.07 (33%)
	SON	-0.03 (15%)	0.27 (90%)	0.08 (35%)	-0.01 (5%)
Thwaites	MAM	0.27 (90%)	-0.18 (72%)	0.24 (85%)	0.16 (68%)
	JJA	-0.22 (83%)	0.09 (42%)	0.02 (9%)	0.13 (55%)
	SON	-0.09 (40%)	0.18 (73%)	0.12 (53%)	-0.02 (9%)
Dotson	MAM	0.15 (64%)	-0.22 (83%)	0.22 (82%)	0.12 (52%)
	JJA	0.00 (2%)	-0.01 (3%)	-0.01 (6%)	0.09 (40%)
	SON	-0.10 (46%)	-0.01 (4%)	0.15 (64%)	-0.04 (17%)
Crosson	MAM	0.21 (81%)	-0.16 (68%)	0.22 (82%)	0.15 (63%)
	JJA	-0.13 (55%)	0.06 (27%)	-0.02 (11%)	0.13 (56%)
	SON	-0.09 (41%)	0.04 (17%)	0.15 (65%)	-0.04 (19%)
Getz	MAM	0.24 (85%)	-0.48 (99%)	0.20 (79%)	0.08 (37%)
	JJA	0.21 (80%)	-0.29 (93%)	0.08 (36%)	0.01 (7%)
	SON	0.27 (90%)	-0.29 (93%)	0.08 (37%)	0.15 (62%)

Table S4: Composite dates for surface melt and surface mass balance define as dates where value, averaged over Thwaites and Pine Island basins, is lower than the percentile 15th (composite -) or higher than percentile 85th (composite +).

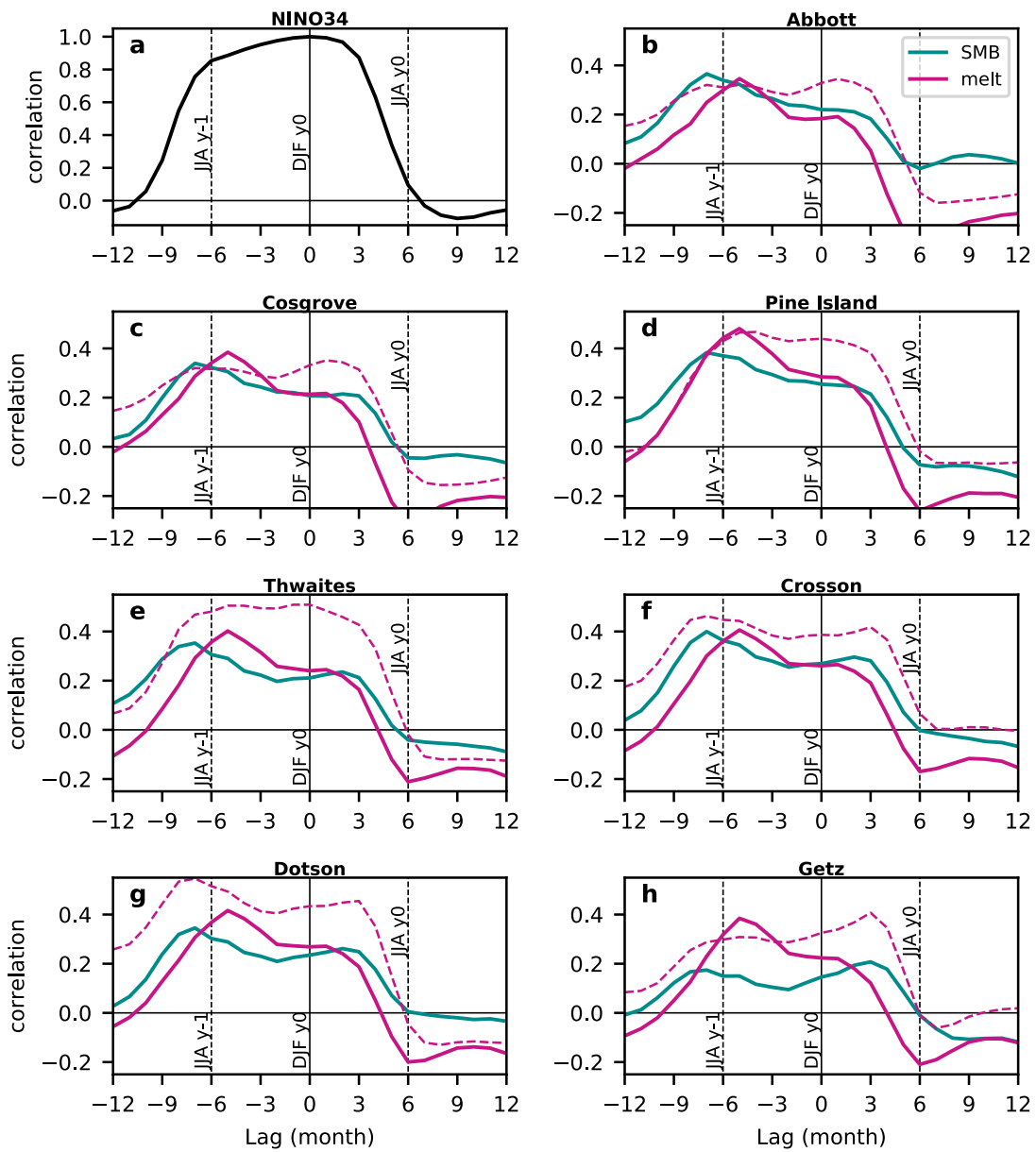| Melt +	Melt -	SMB +	SMB -
1982	1994	1993	1980
1985	2001	1998	1989
1988	2002	2013	2001
1993	2004	2015	2005
1998	2009	2016	2009
2013	2011	2017	2011
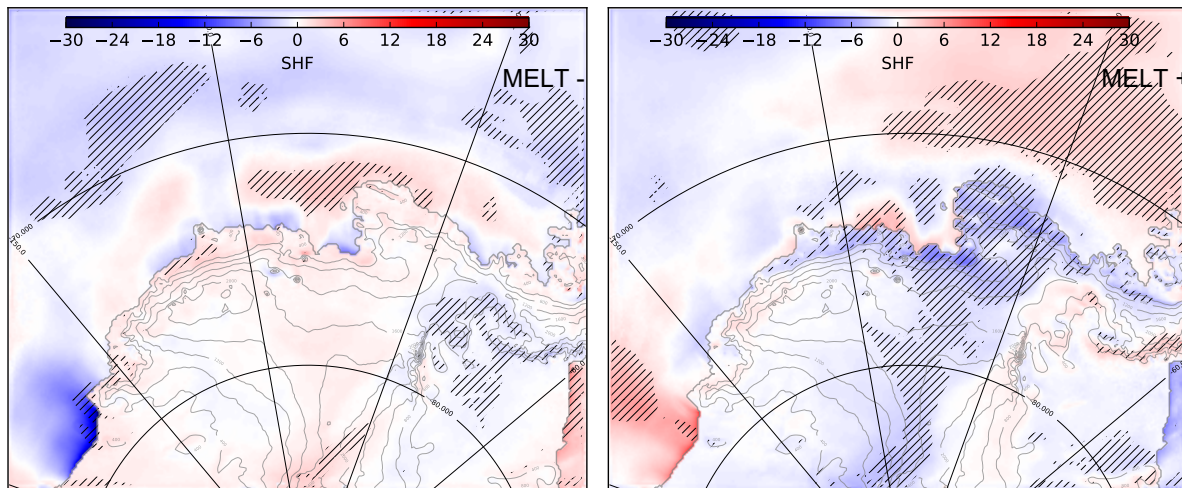
Figure S3: Correlation between lagged 3-month averaged NINO3.4 (i.e. DJF at zero lag, previous JJA at -6 lag) and (a) DJF NINO34, (b-h) simulated SMB and melt rates in individual drainage basins. The dashed curves correspond to the number of melt days derived from satellite data by Picard et al. (2007).