Supplementary Information for Antarctic sub-shelf melt rates via PICO

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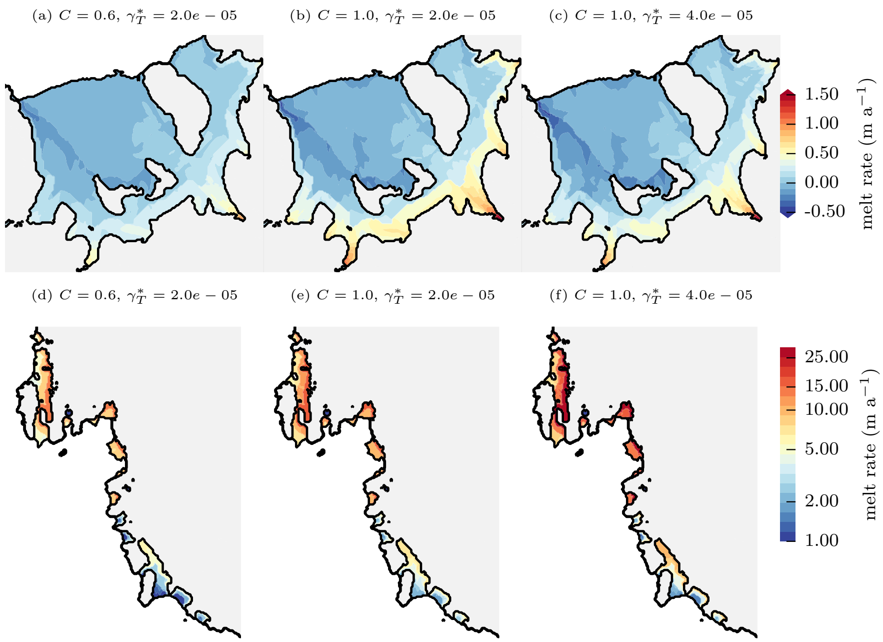

Figure S.1. Basal melt rates in the Pine Island and Filchner-Ronne regions for different parameter combinations of the overturning strength C and the effective turbulent heat transfer coefficient γ_T^*. Grounded ice regions are shown in grey.

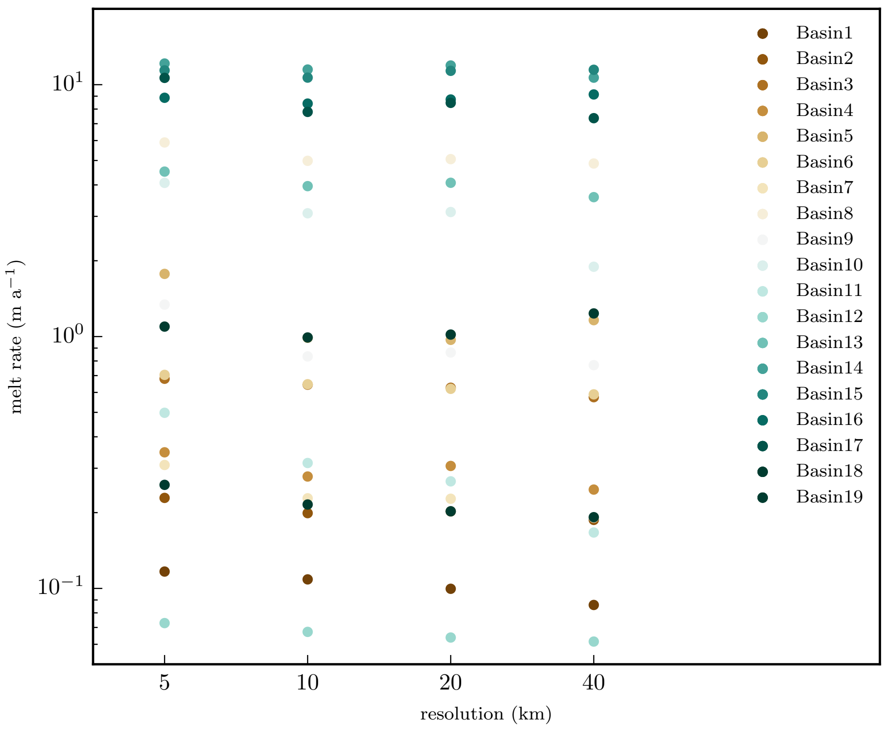

Figure S.2. Sensitivity of mean sub-shelf melt rates to the ice-sheet model resolution.

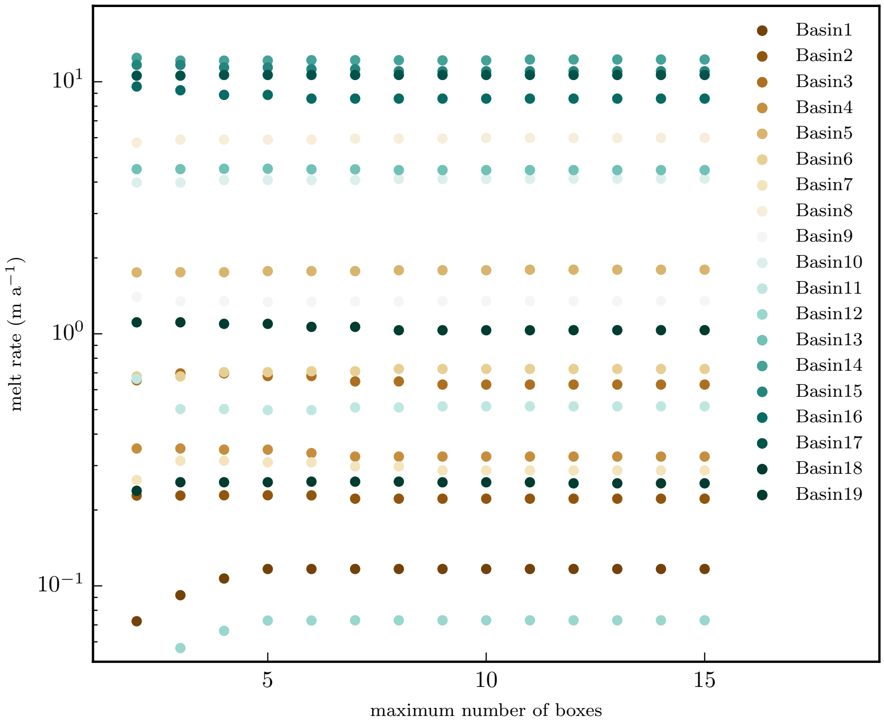

Figure S.3. Sensitivity of mean sub-shelf melt rates to the maximum number of boxes of PICO.

Table S.1. Results from the reference simulation as displayed in Fig. 5.

basin	$m_{\sum}$	$m_{\min}$	$m_{\max}$	q	q_1	$(q-q_1)/q_1$	$m_{\sum}/q$	Q_{in}	Q_{out}	Q_m	Q_{Δ}	b_1	b_{12}
	$\mathrm{Gt\,a^{-1}}$	$\mathrm{m\,a^{-1}}$	$\mathrm{m\,a^{-1}}$	Sv	Sv	%	%	$\mathrm{TJ\,s^{-1}}$	$\mathrm{TJ\,s^{-1}}$	$\mathrm{GJ\,s^{-1}}$	$\mathrm{GJ\,s^{-1}}$	m	m
1	42	-0.49	1.76	0.19	0.21	-12.58	0.69	206.88	206.56	441.79	-114.35	839	700
2	14	-0.15	1.61	0.09	0.10	-6.17	0.48	103.67	103.53	153.21	-9.00	261	219
3	19	-0.30	2.74	0.10	0.11	-2.00	0.57	115.19	114.99	203.96	-3.20	312	292
4	25	-0.19	2.07	0.12	0.13	-4.61	0.62	136.73	136.48	262.02	-6.50	318	275
5	11	0.22	4.26	0.08	0.07	5.32	0.44	85.39	85.27	115.71	7.74	209	262
6	33	-0.63	5.92	0.12	0.16	-23.24	0.83	134.69	134.49	346.20	-148.45	671	423
7	13	-0.24	3.40	0.09	0.09	-4.49	0.45	95.55	95.43	133.90	-14.94	301	267
8	70	3.20	11.39	0.20	0.20	-0.45	1.09	220.22	219.48	739.66	-0.84	449	429
9	14	-0.32	4.68	0.09	0.09	9.56	0.47	103.63	103.46	151.92	19.39	364	455
10	14	2.08	9.59	0.08	0.09	-11.03	0.55	86.98	86.86	148.15	-24.90	433	203
11	2	-0.17	3.63	0.03	0.02	15.82	0.18	29.55	29.53	16.31	2.82	191	263
12	29	-0.21	0.62	0.17	0.17	-4.35	0.55	183.25	182.89	311.79	48.54	411	373
13	175	0.84	7.83	0.31	0.31	-1.58	1.75	342.35	340.52	1847.88	-11.11	396	343
14	123	8.87	18.85	0.23	0.23	-0.72	1.64	258.24	256.95	1297.03	-3.79	396	353
15	292	6.28	17.32	0.35	0.35	-0.05	2.59	388.41	385.30	3089.48	25.16	248	245
16	363	3.54	18.91	0.35	0.36	-0.57	3.17	396.42	392.59	3844.48	-21.06	267	227
17	6	16.11	18.02	0.06	0.06	-0.15	0.31	63.56	63.50	61.49	-0.42	120	112
18	53	-0.15	3.44	0.17	0.17	-4.11	0.98	184.66	184.13	557.28	-23.54	267	207
19	2	-0.03	1.60	0.04	0.04	-8.45	0.20	39.82	39.80	24.52	-3.71	115	87
$\sum$	1299	-	-	2.85	2.95	-3.51	1.40	3175.20	3161.74	13746.78	-282.15	-	-

For each basin, $m_{\sum}$ is the aggregated melt rate over the entire basin, q the overturning flux computed as average along the boundary of box B_1, q_1 is the average overturning in the entire box B_1 of every basin, and $(q - q_1)/q_1$ is the relative deviation in mass flux introduced by computing averages along the boundary of B_1 to B_2 and not within the entire box. $m_{\sum}/q$ estimates the error in mass flux introduced by assuming constant overturning; $Q_{in} = T_0 \times q \times c_p \times \rho_w$ is the heat flux from box B_0 in box B_1, $Q_{out} = T_n \times q \times c_p \times \rho_w$ the flux from the last box B_n adjacent to the shelf front into the ocean, $Q_m = Lm_{\sum}$ the heat flux due to melting of ice, $Q_{\Delta} = Q_{in} - Q_{out} - Q_m$ the deviation in the heat balance. This results from differences in the average depth of the ice shelf: b_1 is the average depth within the entire box B_1 and b_{12} the average depth at the boundary to box B_2.