Supplementary Information

Changes in Greenland's peripheral glaciers linked to the North Atlantic Oscillation

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Supplementary table 1. Inventory of PGICs mapped in East Greenland within this study. All glaciers have an ID that is unique to this study (STUDY_ID), and the ID associated with the glacier polygon available in the Randolph Glacier Inventory (RGI_ID) and in the Global Land Ice Measurements from Space (GLIMS_ID) inventory. Note that two or more glaciers may share the same RGI/GLIMS ID as one glacier polygon in these databases may contain several glacier lobes. Lengths (L_"year") are in meters and given relative to the 1932 position.

STUDY_ID	RGI_ID	GLIMS_ID	LAT	LON	L_1910	L_1932	L_1966	L_1973	L_1987	L_2000	L_2013
ENEGL011	RGI40-05.09267	G338738E76036N	76,0021	-21,2121	109	0	-240	-145	-193	-180	-245
ENEGL010	RGI40-05.09271	G338553E76027N	75,9961	-21,4423	570	0	-141	-59	-50	-2	-84
ENEGL121	RGI40-05.09122	G338574E75927N	75,9341	-21,395	218	0	-124	108	-208	-253	-575
ENEGL122	RGI40-05.09121	G338677E75906N	75,932	-21,3265	107	0	-467	-461	-704	-968	-1196
ENEGL118	RGI40-05.08718	G338221E75515N	75,501	-21,7346	132	0	-125	114	-203	-245	-277
ENEGLN248	RGI40-05.20209	G337877E74767N	74,7458	-22,1791	422	0	-192	-298	-250	-270	-317
ENEGLN253	RGI40-05.20040	G337647E74625N	74,6282	-22,2952	91	0	84	72	32	-75	-345
ENEGL108	RGI40-05.20151	G338219E74613N	74,5973	-21,8686	145	0	-437	-441	-471	-518	-582
ENEGL109	RGI40-05.20104	G338026E74628N	74,5836	-21,8998	172	0	-25	-18	52	5	-306
ENEGLN111	RGI40-05.20051	G337726E74500N	74,4632	-21,9971	729	0	332	485	647	848	896
ENEGLN129	RGI40-05.20029	G338890E74418N	74,4315	-21,0958	0	0	-230	-494	-368	-588	-682
ENEGLN130	RGI40-05.20003	G338841E74420N	74,424	-21,1388		0	334		148		
ENEGLN013	RGI40-05.19972	G338786E74405N	74,4037	-21,2453	143	0	-154	-93	-156	-176	-267
ENEGLN120	RGI40-05.20030	G339171E74378N	74,4007	-20,876	783	0	-641	-381	-826	-616	-701
ENEGLN132	RGI40-05.20022	G339241E74360N	74,3831	-20,6846	353	0	-389	-569	-679	-663	-740
ENEGLN288	RGI40-05.20023	G339301E74366N	74,3712	-20,682	483	0	122	152	-13	14	-166
ENEGLN128	RGI40-05.20002	G338999E74270N	74,3699	-20,9515	54	0	1	-144	-95	-197	-656
ENEGLN011	RGI40-05.19981	G338770E74363N	74,3698	-21,293	-24	0	-481	-407	-566	-675	-1073
ENEGLN114	RGI40-05.19973	G338940E74365N	74,369	-21,0195	-63	0	-142	-248	-191	-232	-248
ENEGLN239	RGI40-05.19974	G338876E74351N	74,35	-21,0939		0	-1		-31	-271	-480
ENEGLN010	RGI40-05.19985	G338784E74336N	74,3451	-21,3419	344	0	-649	-741	-917	-948	-1125
ENEGLN241	RGI40-05.19983	G338931E74340N	74,3429	-21,0511	-31	0	-915	-875	-1026	-1031	-1359
ENEGLN009	RGI40-05.19988	G338732E74323N	74,332	-21,3298	56	0	-155	-170	-191	-212	-271
ENEGLN084	RGI40-05.20021	G338850E74229N	74,2169	-21,1764	264	0	-120	-151	-121	-160	-127
ENEGLN083	RGI40-05.19936	G338832E74181N	74,205	-21,1801	264	0	-4	-143	-165	-163	-360
ENEGLN082	RGI40-05.19936	G338832E74181N	74,2047	-21,1677	102	0	-121	-144	-164	-200	-276
ENEGLN112	RGI40-05.19936	G338832E74181N	74,17	-21,2293		0	-54	-40	-55	-19	-123
ENEGLN105	RGI40-05.19928	G337670E74121N	74,1165	-22,318	351	0	-52	-11	-42		-349
ENEGL139	RGI40-05.19875	G337497E74033N	74,0522	-22,489	384	0	68		103		

STUDY_ID	RGI_ID	GLIMS_ID	LAT	LON	L_1910	L_1932	L_1966	L_1973	L_1987	L_2000	L_2013
ENEGLN103	RGI40-05.19869	G337558E74027N	74,0365	-22,3985	221	0	-159	-360	-260		
ENEGL095	RGI40-05.19877	G337447E74002N	74,0359	-22,6993	-278	0	-1697	-1495	-2102		-3191
ENEGL114	RGI40-05.19775	G334736E74017N	73,9992	-25,3162	97	0	-113	-5	-139	-110	-366
ENEGLN157	RGI40-05.17453	G336887E73992N	73,9952	-23,1107	368	0			-372	-458	-445
ENEGL113	RGI40-05.19736	G334626E73966N	73,9788	-25,3195	141	0	-33	0	-70	-100	-194
ENEGL257	RGI40-05.19776	G334899E73985N	73,9549	-25,1559	64	0	-118	-90	-174	-192	-268
ENEGLN156	RGI40-05.19833	G336960E73923N	73,9426	-23,0164	108	0	-247	-170	-242	-447	-1343
ENEGL021	RGI40-05.19876	G337508E73949N	73,9425	-22,4302	470	0	-743	-1185	-1505	-1583	
ENEGLN138	RGI40-05.19886	G338432E73939N	73,9416	-21,5659		0	56		0	-70	-102
ENEGL026	RGI40-05.19745	G334504E73971N	73,9336	-25,5453	89	0	-108	-58	-267	-318	-496
ENEGLN134	RGI40-05.19883	G338581E73922N	73,9308	-21,4135	145	0	-269	-31	-459	-535	-708
ENEGLN153	RGI40-05.19832	G337130E73902N	73,92	-22,876		0		-133	-258	-282	-417
ENEGLN152	RGI40-05.19835	G337047E73896N	73,9121	-22,9337	1177	0	-1001		-2334	-2296	-2586
ENEGLN000	RGI40-05.19887	G338485E73915N	73,909	-21,6036	1681	0	-338	-730	-960	-1244	-1665
ENEGLN258	RGI40-05.19781	G335048E73943N	73,9018	-25,0496	170	0		-47	-140	-163	-245
ENEGLN151	RGI40-05.19831	G337216E73884N	73,9006	-22,7562		0	-171		-507	-1313	-1485
ENEGLN150	RGI40-05.19831	G337216E73884N	73,8995	-22,7052	992	0	-106		-313	-660	-836
ENEGL147	RGI40-05.19878	G337506E73900N	73,895	-22,4351	365	0	92	-393	90	-627	-697
ENEGLN062	RGI40-05.19844	G336811E73923N	73,8852	-23,199	-70	0	-186	-190	-358	-403	-591
ENEGL001	RGI40-05.19893	G338541E73873N	73,8848	-21,5914	2555	0	129	27	17	-484	-561
ENEGL029	RGI40-05.19588	G333641E73885N	73,8802	-26,2226	342	0	-241	-306	-425	-521	-2040
ENEGLN063	RGI40-05.19847	G336906E73902N	73,8684	-23,1996	-64	0	-126	-64	-295	-612	-824
ENEGLN060	RGI40-05.19846	G337093E73871N	73,8549	-22,9835	945	0	-306	-242	-326	-578	-647
ENEGLN142	RGI40-05.19816	G337973E73839N	73,8501	-22,0628	772	0	-916	-997	-1087	-1028	-1051
ENEGL030	RGI40-05.19619	G333689E73841N	73,8421	-26,1882	51	0	-175	-162	-183	-151	-180
ENEGLN059	RGI40-05.19850	G337203E73845N	73,8385	-22,9335	790	0	-476	-593	-694	-712	-830
ENEGLN143	RGI40-05.19817	G337923E73825N	73,8384	-22,0946	633	0	-822		-1369	-1100	-932
ENEGLN145	RGI40-05.19821	G337866E73812N	73,8282	-22,1672	501	0	-904	-1019	-1086	-1208	-1309
ENEGLN058	RGI40-05.19698	G337332E73828N	73,8263	-22,6791	190	0	-274		-415	-403	-477
ENEGLN057	RGI40-05.19797	G337355E73814N	73,8155	-22,7011	278	0	-490	-545	-598	-545	-593
ENEGLN017	RGI40-05.19705	G335468E73802N	73,8114	-24,5009	-222	0		-494	-626	-669	-806
ENEGL031	RGI40-05.19622	G333597E73798N	73,7978	-26,265	236	0	-160	-63	-135	-144	-179
ENEGLN098	RGI40-05.19822	G337922E73797N	73,7911	-22,0106		0	86	-622	-61		-779
ENEGLN048	RGI40-05.18499	G336569E73796N	73,785	-23,4227		0	34		-18	12	-85
ENEGLN163	RGI40-05.18495	G336725E73758N	73,7523	-23,2761		0			-57	0	-681
ENEGLN044	RGI40-05.19717	G336815E73733N	73,7508	-23,1857	280	0	-34	-49	-121	-211	-204
ENEGLN162	RGI40-05.19716	G336876E73733N	73,7382	-23,1142		0	-44	-132	-193	-240	-325
ENEGLN043	RGI40-05.19718	G336909E73723N	73,737	-23,0477	262	0	233	-29	120	-174	-333
ENEGLN041	RGI40-05.19727	G337233E73738N	73,7314	-22,7916		0			244	-17	-65

STUDY_ID	RGI_ID	GLIMS_ID	LAT	LON	L_1910	L_1932	L_1966	L_1973	L_1987	L_2000	L_2013
ENEGLN055	RGI40-05.19759	G337363E73744N	73,7305	-22,5941		0	-3	-69	-103	-245	-358
ENEGLN040	RGI40-05.19722	G337247E73711N	73,7168	-22,7657	170	0	-121		-210	-220	-173
ENEGL034	RGI40-05.19514	G332935E73725N	73,7143	-27,0845	1147	0	-23	-55	-137	-155	-204
ENEGLN042	RGI40-05.19719	G336956E73707N	73,7068	-23,0108		0	-257	-227	-325	-308	-289
ENEGLN261	RGI40-05.19556	G334259E73703N	73,7049	-25,4732	258	0		-854	-1426	-1540	-1652
ENEGLN039	RGI40-05.18493	G337299E73683N	73,6929	-22,7762	869	0		-524	23	-793	-793
ENEGLN260	RGI40-05.19554	G334479E73647N	73,6722	-25,3156	915	0		-370	-510	-625	-804
ENEGLN019	RGI40-05.19683	G336257E73648N	73,6574	-23,7564		0		-683	-304	-654	-654
ENEGLN018	RGI40-05.19685	G336213E73643N	73,6563	-23,7799	310	0	-234	-390	-371	-647	-1085
ENEGLN022	RGI40-05.19682	G336300E73645N	73,6556	-23,6944	119	0	-138	-137	-254	-343	-454
ENEGLN262	RGI40-05.19559	G334654E73618N	73,6456	-25,2946	42	0		30	-40	-91	-147
ENEGLN263	RGI40-05.19559	G334654E73618N	73,6287	-25,2416	12	0		-221	-102	-165	-407
ENEGLN177	RGI40-05.19677	G336501E73616N	73,6261	-23,5109		0	-249	-280	-326	-387	-447
ENEGLN027	RGI40-05.19662	G336541E73614N	73,6134	-23,4486		0	-196	-210	-299	-322	-371
ENEGLN176	RGI40-05.19690	G336719E73607N	73,6073	-23,2777		0	-362	-113	-343	-438	-498
ENEGL041	RGI40-05.19632	G334011E73670N	73,6068	-25,8883	403	0		81	-17	-19	-129
ENEGLN028	RGI40-05.19679	G336516E73600N	73,6012	-23,4496	245	0	-244	-366	-455	-552	-575
ENEGLN030	RGI40-05.19670	G336669E73591N	73,6007	-23,3551		0			-216	-331	
ENEGLN029	RGI40-05.19671	G336691E73594N	73,5997	-23,3077		0		-382	-273	-370	-411
ENEGLN174	RGI40-05.19691	G336733E73598N	73,5983	-23,2615		0	-22	23	0		
ENEGLN031	RGI40-05.18456	G336623E73595N	73,598	-23,369	167	0			-102	-329	
ENEGLN264	RGI40-05.19559	G334654E73618N	73,5939	-25,3	89	0		-36	-152	-167	-302
ENEGLN172	RGI40-05.18466	G336853E73583N	73,593	-23,1656	167	0	-112		-157	-128	-262
ENEGLN265	RGI40-05.19576	G334551E73595N	73,5851	-25,3959		0		-185	-310	-379	-586
ENEGL035	RGI40-05.19077	G332170E73570N	73,5347	-27,756	296	0	-119		-293	-333	-686
ENEGLN266	RGI40-05.19453	G334408E73475N	73,5293	-25,5128	547	0		-524	-638	-850	-994
ENEGLN165	RGI40-05.19668	G337269E73517N	73,5221	-22,732	367	0	-156		-228		-597
ENEGLN166	RGI40-05.18436	G337078E73499N	73,5062	-22,9176	494	0	-440	-353	-450	-562	-723
ENEGLN109	RGI40-05.18439	G337020E73493N	73,5041	-22,9727	1676	0			132		294
ENEGLN238	RGI40-05.18365	G334664E73486N	73,4938	-25,311	22	0	-86		-137	-165	-197
ENEGL039	RGI40-05.19434	G333354E73507N	73,4933	-26,6446		0		-417	-511	-563	-669
ENEGLN167	RGI40-05.18437	G337098E73488N	73,4893	-22,9241		0			-155		-477
ENEGLN235	RGI40-05.19449	G334503E73472N	73,4721	-25,4844		0	-162		-192	-183	-208
ENEGLN271	RGI40-05.19490	G334180E73459N	73,465	-25,7965		0		-92	-151	-170	-164
ENEGLN270	RGI40-05.19451	G334100E73475N	73,463	-25,6869	122	0	-102		-156	-214	-310
ENEGLN234	RGI40-05.19457	G334466E73459N	73,4567	-25,5032		0	-68	-131	-222	-245	-546
ENEGLN272	RGI40-05.19370	G334208E73449N	73,4484	-25,7771	328	0			-160	-221	-176
ENEGLN274	RGI40-05.19471	G334169E73439N	73,4294	-25,8423	292	0	-78	66	-187	-375	-571
ENEGLN216	RGI40-05.19384	G335244E73401N	73,4064	-24,7612	19	0			-222	-353	

STUDY_ID	RGI_ID	GLIMS_ID	LAT	LON	L_1910	L_1932	L_1966	L_1973	L_1987	L_2000	L_2013
ENEGLN231	RGI40-05.19396	G335028E73389N	73,3864	-25,0305	625	0	-186	-378	-508	-792	-1007
ENEGLN015	RGI40-05.19519	G337113E73379N	73,375	-22,8797	466	0	-53		-116	-164	-928
ENEGL033	RGI40-05.19397	G335106E73370N	73,3572	-24,8564	83	0	-249	-256	-325	-348	
ENEGL042	RGI40-05.19489	G333810E73373N	73,3364	-26,1422	112	0	-185	-257	-224	-325	-368
ENEGL043	RGI40-05.19286	G334666E73266N	73,2714	-25,3226		0	5		-81	-205	-407
ENEGL288	RGI40-05.19027	G331714E73268N	73,2685	-28,2568	96	0	-92	-108	-203	-223	-292
ENEGLN277	RGI40-05.19203	G333347E73253N	73,25	-26,6413		0	136	-20	-96	-99	-86
ENEGL289	RGI40-05.19022	G331681E73254N	73,2468	-28,2887		0	-14	0	-36	-65	-131
ENEGLN226	RGI40-05.18289	G335311E73241N	73,2462	-24,682	2362	0	-464		-550	-615	-725
ENEGLN225	RGI40-05.18297	G335340E73235N	73,2428	-24,6508	507	0	-354	-421	-443	-466	-525
ENEGLN278	RGI40-05.19208	G333261E73244N	73,2418	-26,736	625	0	210	229	166	27	31
ENEGLN229	RGI40-05.19320	G335223E73237N	73,2417	-24,7744	270	0	-272	-304	-303	-340	-399
ENEGLN227	RGI40-05.18291	G335275E73241N	73,2392	-24,7261	433	0	-80	84	-162	-223	
ENEGLN228	RGI40-05.19322	G335230E73231N	73,2382	-24,755	182	0	24		-107	-190	-249
ENEGL290	RGI40-05.19023	G331664E73242N	73,2353	-28,2889	207	0		-91	-111	-129	-221
ENEGLN280	RGI40-05.19230	G333184E73220N	73,2271	-26,7796	57	0	-512	-602	-786	-814	-930
ENEGL295	RGI40-05.19253	G332000E73248N	73,227	-27,9923	536	0			-283	-239	-245
ENEGL291	RGI40-05.18996	G331636E73229N	73,226	-28,3161	188	0		-55	-79	-98	-164
ENEGL292	RGI40-05.20117	G331649E73194N	73,2256	-28,2574	111	0		-67	-132	-168	-250
ENEGLN281	RGI40-05.19161	G333286E73204N	73,2122	-26,7084	240	0	-163	-74	-115	-144	-190
ENEGL293	RGI40-05.19001	G331832E73201N	73,2116	-28,1666	29	0			-23	-23	-75
ENEGL294	RGI40-05.19000	G331942E73192N	73,2077	-28,0628		0			-72	-56	-123
ENEGL296	RGI40-05.19017	G332108E73178N	73,1963	-27,8163	251	0			-40	-52	-137
ENEGLN220	RGI40-05.19276	G335548E73191N	73,1956	-24,4501	428	0	-352	-492	-468	-526	-704
ENEGLN284	RGI40-05.19238	G333185E73195N	73,1885	-26,7373	2029	0	29	242	-1	-26	-37
ENEGLN221	RGI40-05.19090	G335566E73186N	73,1865	-24,4358	160	0	-242	-253	-352	-408	-482
ENEGLN208	RGI40-05.19124	G333773E73158N	73,1742	-26,2026		0	-211	-212	-248	-249	-408
ENEGLN209	RGI40-05.19125	G333835E73165N	73,17	-26,1669	845	0	-5		-10	-41	-394
ENEGLN283	RGI40-05.19241	G333227E73167N	73,1637	-26,7546		0	24	-30	-29	-41	-42
ENEGLN286	RGI40-05.19245	G333188E73168N	73,1596	-26,8066		0	-192	-258	-245	-302	-497
ENEGLN203	RGI40-05.19115	G334054E73144N	73,1525	-25,9511	1131	0	-152	-144	-218	-286	-383
ENEGLN204	RGI40-05.19132	G333831E73107N	73,143	-26,0352	4051	0	-85	-84	-137	-178	-358
ENEGLN026	RGI40-05.19176	G333856E73146N	73,1385	-26,1101		0	-313	-399	-439	-465	-583
ENEGLN205	RGI40-05.19132	G333831E73107N	73,1289	-26,0661	941	0		-3502	-3764	-4301	-4805
ENEGL198	RGI40-05.19130	G334013E73079N	73,093	-25,9192	922	0	-251	-404	-576	-624	-722
ENEGL197	RGI40-05.19131	G334071E73062N	73,0766	-25,8695	156	0	-446	-566	-708	-749	-1138
ENEGLN191	RGI40-05.19039	G334504E73041N	73,0581	-25,4455		0	-948	-980	-1290	-1505	-2421
ENEGLN187	RGI40-05.19045	G334590E73026N	73,0481	-25,3688		0	-280	-336	-455	-547	-747
ENEGL184	RGI40-05.19037	G334732E73009N	73,0442	-25,2763	405	0	8	-22	3	-7	-111

STUDY_ID	RGI_ID	GLIMS_ID	LAT	LON	L_1910	L_1932	L_1966	L_1973	L_1987	L_2000	L_2013
ENEGL049	RGI40-05.19139	G334048E73020N	73,0351	-25,8833	37	0	-528	-536	-618	-680	-748
ENEGLN185	RGI40-05.19107	G334676E73024N	73,033	-25,305		0	-104	-87	-180	-239	-438
ENEGLN182	RGI40-05.19038	G334790E73016N	73,0295	-25,22		0	-32	-138	-266	-292	-431
ENEGL045	RGI40-05.19053	G334475E72993N	72,9864	-25,4735		0	-662	-640	-729	-744	-818
ENEGL046	RGI40-05.19055	G334394E72980N	72,9763	-25,6678	207	0	-217	-241	-382	-436	-584
ENEGL052	RGI40-05.19181	G333622E73023N	72,9714	-26,1734	2451	0	-821	-1487	-1948	-2127	-2410
ENEGL051	RGI40-05.19187	G333780E72953N	72,9567	-26,2027	328	0	17		-98	-98	-67
ENEGL055	RGI40-05.18950	G331989E72965N	72,9488	-27,8639	572	0		153	-120	-156	-478
ENEGL004	RGI40-05.18917	G333869E72887N	72,9401	-26,1493	626	0	100	-126	-172	-234	-397
ENEGL050	RGI40-05.18911	G333810E72910N	72,9178	-26,1962		0		-245	-210	-235	-341
ENEGL053	RGI40-05.19162	G332905E72930N	72,8773	-26,924	709	0		-334	-451	-505	-656
ENEGL054	RGI40-05.19167	G332816E72885N	72,8641	-27,1242	474	0		-158	-203	-184	-348
ENEGL059	RGI40-05.18699	G333235E72675N	72,6872	-26,7717	90	0	-75		-135	-150	-193
ENEGL060	RGI40-05.18824	G333861E72640N	72,6519	-26,1957	243	0			-1248	-1601	-2864
ENEGL062	RGI40-05.18759	G334407E72577N	72,5717	-25,5004	1673	0		-366	-545	-646	-765
ENEGL061	RGI40-05.18774	G333737E72517N	72,5586	-26,4756	25	0		-137	-61	-81	-167
ENEGL064	RGI40-05.18781	G334030E72510N	72,5394	-25,718	514	0		-319	-1928	-3260	-3271
ENEGL065	RGI40-05.18768	G334486E72512N	72,5193	-25,485	0	0			-1112	-1213	-1363
ENEGL066	RGI40-05.18757	G334342E72492N	72,4957	-25,5624	549	0		-2095	-2098	-2162	-2278
ENEGL067	RGI40-05.18816	G334389E72464N	72,476	-25,5071	829	0	-588	-194	-796	-1034	
ENEGL068	RGI40-05.18813	G334098E72468N	72,4525	-25,8198		0			-150	-136	-133
ENEGL071	RGI40-05.18792	G333764E72451N	72,4225	-26,2204	602	0		50	57	90	-55
ENEGL069	RGI40-05.18794	G333627E72451N	72,4202	-26,3922	200	0		-134	-218	-288	-500
ENEGL070	RGI40-05.18792	G333764E72451N	72,4105	-26,1961	528	0		-207	-173	-108	-218
ENEGL072	RGI40-05.17850	G333845E72336N	72,3367	-26,1235	316	0			-321	-329	
ENEGL073	RGI40-05.17851	G333960E72347N	72,3245	-26,1149	563	0		-96	-200	-370	
ENEGL300	RGI40-05.17052	G333735E72257N	72,3049	-26,0301	1194	0		382	238	86	-79
ENEGL083	RGI40-05.17118	G334533E72097N	72,0971	-25,444	191	0		-997	-1186	-1262	-1501
ENEGL079	RGI40-05.17019	G334126E72089N	72,0425	-25,7491	1666	0		586	-498	-805	-826
ENEGL077	RGI40-05.17035	G334006E72088N	72,0356	-25,9673	647	0		-156	-271	-454	-742
ENEGL081	RGI40-05.17070	G334634E71988N	72,0213	-25,4468	805	0		-484	-304		-335
ENEGL080	RGI40-05.17192	G334487E71915N	72,0092	-25,6613	138	0		-172	-148	-207	-497
ENEGL078	RGI40-05.17084	G334134E71899N	71,982	-25,867	1960	0		319	510	570	470
ENEGL085	RGI40-05.16817	G332272E71960N	71,953	-27,818	173	0	-422	-538	-499	-714	-1161
ENEGL084	RGI40-05.17067	G335975E71859N	71,8456	-24,1058	970	0		-192	-409		-578
ENEGL087	RGI40-05.16828	G332861E71856N	71,8323	-27,1455		0	-13	127	137	-45	-710
ENEGL086	RGI40-05.16826	G332654E71872N	71,8241	-27,2448	102	0	-246	-330	-428	-541	-635
ENEGL091	RGI40-05.17102	G333762E71638N	71,6317	-26,1817	271	0	44	217	42	86	
ENEGL088	RGI40-05.16289	G333058E71612N	71,6078	-27,0018	182	0	36	-10	-61	-275	-677

STUDY_ID	RGI_ID	GLIMS_ID	LAT	LON	L_1910	L_1932	L_1966	L_1973	L_1987	L_2000	L_2013
ENEGL009	RGI40-05.17157	G335033E71610N	71,5995	-24,9364	806	0	-271	-146	-331	-361	-553
ENEGL007	RGI40-05.17133	G333993E71611N	71,5885	-26,0671	244	0	51	-12	-33	-22	-61
ENEGL008	RGI40-05.17109	G334017E71596N	71,5859	-26,0009	934	0	349	436	245	166	68
ENEGL097	RGI40-05.15874	G333021E71468N	71,4621	-26,9827	305	0	-233	-164	-305	-337	-356
ENEGL096	RGI40-05.15880	G332925E71458N	71,4554	-27,0696	218	0	-318	-210	-296	-316	-249
ENEGL101	RGI40-05.16175	G334487E71328N	71,3424	-25,4752		0		61	-122	-80	-334
ENEGL102	RGI40-05.16189	G334396E71316N	71,2903	-25,4758		0			-150	-165	-214
ENEGL005	RGI40-05.16231	G337833E70882N	70,9023	-22,2512	600	0	-111	-102	-310	-464	-666
ENEGL111	RGI40-05.15836	G337933E70679N	70,6703	-22,1982	611	0	-44	-107	-299	-459	-588
ENEGL287	RGI40-05.15821	G337976E70640N	70,638	-22,1397	554	0	-162	-237	-424	-539	-744

Supplementary table 2. Inventory of PGICs mapped in West Greenland within this study. All glaciers have an ID that is unique to this study (STUDY_ID), and the ID associated with the glacier polygon available in the Randolph Glacier Inventory (RGI_ID) and in the Global Land Ice Measurements from Space (GLIMS_ID) inventory. Note that two or more glaciers may share the same RGI/GLIMS ID as one glacier polygon in these databases may contain several glacier lobes. Lengths (L_"year") are in meters and calculated from a point placed on the glacier parallel to retreat axis. Coordinates are in WGS84/UTM24.

STUDY_ID	RGI_ID	GLIMS_ID	POINT_X	POINT_Y	L_LIA(1890)	L_1953	L_1969	L_1985	L_2002	L_2015
NWGL12	RGI50-05.03257	G306061E72228N	-5162,13	8078064		0	-70	-70	-270	-426
NWGL118	RGI50-05.03226	G306428E72240N	7820,873	8076723		0	-31	-121	-245	-283
NWGL8	RGI50-05.03204	G305744E72154N	-18285,5	8076688	812	0	-362	-604	-635	-690
NWGL117	RGI50-05.03227	G306374E72239N	5958,203	8076554	3	0	-57	-413	-457	-559
NWGL119	RGI50-05.03226	G306428E72240N	9006,209	8076003	168	0	-317	-361	-399	-495
NWGL120	RGI50-05.03231	G306496E72229N	9895,211	8075093	111	0	-104	-197	-284	-362
NWGL10	RGI50-05.03222	G305843E72185N	-11554,5	8074127	466	0	-75	-231	-191	-283
NWGL13	RGI50-05.03262	G306058E72184N	-6982,46	8073978	779	0	-65	-264	-394	-584
NWGL121	RGI50-05.03231	G306496E72229N	10868,88	8073929	252	0	-137	-200	-235	-353
NWGL136	RGI50-05.03260	G306116E72191N	-2440,96	8073739		0	-128	-135	-73	-230
NWGL122	RGI50-05.03228	G306574E72210N	13218,38	8073717	282	0	-478	-598	-928	-1344
NWGL115	RGI50-05.03237	G306436E72210N	6085,203	8071961	902	0	-346	-498	-626	-824
NWGL11	RGI50-05.03198	G305856E72158N	-12104,8	8071460	808	0	135	-32	19	-51
NWGL126	RGI50-05.03235	G306703E72184N	15864,22	8071347	210	0	-65	-217	-455	-707
NWGL14	RGI50-05.03265	G306044E72163N	-8125,46	8070952	541	0	-44	-232	-366	-473
NWGL114	RGI50-05.03243	G306435E72195N	5806,067	8070864	504	0	-154	-47	-131	-286
NWGL113	RGI50-05.03245	G306471E72170N	5210,754	8069706	520	0	-423	-886	-1428	-1905
NWGL138	RGI50-05.03193	G306137E72158N	-3581,97	8069341		0	-90	-90	-176	-129
NWGL112	RGI50-05.03247	G306377E72169N	3854,761	8069111		0	-144	-206	-305	-325
NWGL17	RGI50-05.03205	G305856E72133N	-12358,8	8068433	238	0	-634	-979	-1176	-1331
NWGL20	RGI50-05.03206	G305777E72114N	-21714,5	8068009	1679	0	-66	-778	-1066	-1385
NWGL128	RGI50-05.03241	G306777E72181N	17578,73	8067812		0	56	56	-130	-862
NWGL21	RGI50-05.03268	G306060E72133N	-8367,56	8067250	0	0	-71	-406	-474	-536
NWGL18	RGI50-05.03203	G305869E72118N	-13099,6	8067036	694	0	-53	-107	-130	-242
NWGL23	RGI50-05.03167	G306051E72105N	-9062,09	8064836	248	0	-546	-875	-1071	-1258
NWGL19	RGI50-05.03207	G305856E72092N	-13226,6	8064813	291	0	-112	-325	-348	-485

STUDY_ID	RGI_ID	GLIMS_ID	POINT_X	POINT_Y	L_LIA(1890)	L_1953	L_1969	L_1985	L_2002	L_2015
NWGL280	RGI50-05.03240	G306659E72137N	10372,15	8064654		0	-518	-794	-977	-772
NWGL24	RGI50-05.03213	G305770E72078N	-20273,8	8063347		0	-103	-151	-260	-470
NWGL25	RGI50-05.03120	G305760E72045N	-20935,3	8061330	1928	0	-55	-342	-696	-965
NWGL29	RGI50-05.03174	G306154E72089N	-6614,69	8060073	211	0	-293	-417	-1343	-1682
NWGL26	RGI50-05.03122	G305729E72035N	-21861,3	8059875	0	0	-396	-966	-1085	-1307
NWGL134	RGI50-05.03159	G306809E72112N	19791,36	8059830		0	-431	-459	-516	-611
NWGL133	RGI50-05.03160	G306735E72113N	13391,74	8058887		0	-406	-448	-492	-656
NWGL140	RGI50-05.03179	G306281E72066N	-605,406	8058840		0	12	-47	-47	-103
NWGL31	RGI50-05.03070	G306214E72038N	-6217,81	8057494		0	-129	-750	-1311	-1695
NWGL141	RGI50-05.03068	G306310E72026N	204,8821	8056922	2241	0	-283	-634	-969	-2178
NWGL142	RGI50-05.03052	G306383E72047N	1478,192	8055500	448	0	-82	-82	-128	-300
NWGL33	RGI50-05.03123	G306011E72018N	-10186,6	8055245	738	0	-581	-567	-567	-697
NWGL32	RGI50-05.03069	G306170E72029N	-6383,18	8055178	498	0	-103	-156	-204	-362
NWGL34	RGI50-05.03028	G305555E71968N	-28343,6	8053624	507	0	-130	-337	-307	-380
NWGL41	RGI50-05.03125	G306019E71993N	-9591,26	8053326	164	0	-850	-1141	-1242	-1492
NWGL152	RGI50-05.03105	G307074E72067N	23737,01	8053130		0	124	-152	-981	-1385
NWGL36	RGI50-05.03127	G305799E71978N	-24970,2	8052433	4158	0	-110	-325	-650	-862
NWGL46	RGI50-05.03073	G306239E72004N	-5920,16	8051739	1401	0	41	74	-45	-227
NWGL47	RGI50-05.03074	G306287E71982N	-5258,7	8049391	2909	0	-122	304	341	-309
NWGL143	RGI50-05.03075	G306373E71986N	552,1485	8049298		0	-156	-272	-300	-404
NWGL42	RGI50-05.03134	G306030E71965N	-10848	8048498	933	0	-249	-344	-409	-690
NWGL48	RGI50-05.02991	G306290E71958N	-5622,5	8048498	1999	0	-340	-472	-579	-623
NWGL144	RGI50-05.03075	G306373E71986N	1329,364	8048306	253	0	-528	-688	-729	-907
NWGL37	RGI50-05.02986	G305750E71935N	-23548,1	8047935		0	-240	-250	-545	-727
NWGL243	RGI50-05.02953	G305324E71889N	-38298,6	8047136	343	0	-107	-215	-652	-652
NWGL244	RGI50-05.02955	G305364E71885N	-37049,7	8046691	63	0	-215	-243	-227	-324
NWGL38	RGI50-05.02984	G305784E71925N	-22423,6	8046546	0	0	-1375	-1310	-1426	-2003
NWGL245	RGI50-05.02948	G305394E71882N	-35737,4	8045908	721	0	-16	-118	-294	-1291
NWGL145	RGI50-05.02990	G306373E71963N	22,98073	8045743		0	-198	-237	-262	-299
NWGL247	RGI50-05.02930	G305407E71858N	-36626,4	8043305		0	-152	-508	-743	-909
NWGL51	RGI50-05.02999	G306168E71905N	-9111,7	8042991		0	-170	-308	-483	-588
NWGL79	RGI50-05.02924	G305067E71824N	-48953,2	8042868	0	0	-228	-342	-418	-843
NWGL77	RGI50-05.02925	G305052E71823N	-49461,2	8042836	35	0	-113	-169	-479	-554
NWGL52	RGI50-05.02999	G306168E71905N	-9690,48	8042578	581	0	-63	-157	-291	-378
NWGL249	RGI50-05.02919	G305365E71837N	-38510,2	8041781	3	0	-585	-1282	-1254	-1460
NWGL81	RGI50-05.02918	G305288E71832N	-41765,1	8041601		0	-357	-724	-1310	-1578
NWGL284	RGI50-05.02910	G305232E71828N	-43379,9	8041585		0	141	-22	-130	-202
NWGL63	RGI50-05.02908	G305595E71842N	-30931,4	8040534	399	0	-314	-314	-640	-896

STUDY_ID	RGI_ID	GLIMS_ID	POINT_X	POINT_Y	L_LIA(1890)	L_1953	L_1969	L_1985	L_2002	L_2015
NWGL157	RGI50-05.03095	G306766E71924N	8787,901	8040509	1730	0	-54	-251	-513	-775
NWGL53	RGI50-05.02999	G306168E71905N	-10467,7	8040494	448	0	0	-146	-336	-555
NWGL78	RGI50-05.02911	G305167E71806N	-48624,2	8040422	1090	0	-2027	-2257	-2836	-2879
NWGL158	RGI50-05.03095	G306766E71924N	10732,59	8039398		0	-134	-152	-271	-346
NWGL64	RGI50-05.02885	G305558E71826N	-32694,6	8038621	59	0	-339	-425	-687	-890
NWGL76	RGI50-05.02830	G304938E71761N	-55442,9	8037093	318	0	-79	-234	-259	-759
NWGL251	RGI50-05.02972	G307595E71977N	36806,75	8036713		0	-302	-433	-718	-1094
NWGL65	RGI50-05.02867	G305570E71801N	-32921	8035599	-127	0	-78	-493	-741	-796
NWGL74	RGI50-05.02802	G305220E71751N	-46184,7	8033208	294	0	-304	-486	-784	-954
NWGL75	RGI50-05.02504	G305188E71750N	-46967,9	8033145	417	0	-520	-416	-718	-877
NWGL73	RGI50-05.02809	G305242E71752N	-45295,7	8033145	857	0	-339	-241	-317	-458
NWGL71	RGI50-05.02812	G305350E71758N	-41252,9	8032869	190	0	-298	-361	-427	-654
NWGL72	RGI50-05.02808	G305297E71752N	-43517,7	8032785	375	0	-598	-710	-984	-1197
NWGL69	RGI50-05.02789	G305653E71746N	-31492,2	8029011		0	-145	-411	-494	-708
NWGL61	RGI50-05.02805	G306416E71803N	-4645,35	8028196	656	0	-32	-251	-467	-661
NWGL254	RGI50-05.02851	G307237E71804N	25300,61	8019216	908	0	-121	-212	-346	-416
NWGL163	RGI50-05.02862	G307102E71772N	15719,9	8018797		0	0	-178	-441	-1031
NWGL160	RGI50-05.02752	G306946E71731N	10917,71	8018122		0	20	309	-305	-348
NWGL161	RGI50-05.02749	G306994E71740N	13537,09	8017884	426	0	-92	-89	-139	-192
NWGL162	RGI50-05.02864	G307010E71749N	14568,96	8017884		0	-81	-100	-133	-169
NWGL253	RGI50-05.02852	G307157E71782N	22548,94	8017761	964	0	-442	-478	-461	-516
NWGL88	RGI50-05.02730	G305089E71589N	-55108,1	8017064		0	44	-160	-76	-103
NWGL89	RGI50-05.02721	G305146E71579N	-53234,8	8016566	574	0	-238	-393	-739	-1274
NWGL90	RGI50-05.02723	G305107E71567N	-55838,3	8014217		0	-434	-690	-878	-1109
NWGL96	RGI50-05.02674	G305433E71555N	-43914,2	8010662	375	0	-104	-217	-557	-1478
NWGL180	RGI50-05.02717	G308211E71783N	57394,7	8009767	316	0	-111	-294	-403	-530
NWGL94	RGI50-05.02670	G305389E71534N	-46549,5	8009741		0	-223	-344	-585	-654
NWGL103	RGI50-05.02728	G306781E71646N	3553,136	8007799	947	0	-319	-319	-486	-507
NWGL175	RGI50-05.02774	G307662E71668N	35225,55	8006827		0	-923	-1024	-1043	-1262
NWGL109	RGI50-05.02676	G306838E71629N	6855,142	8006106	246	0	87	-96	-131	-190
NWGL104	RGI50-05.02678	G306767E71618N	2494,8	8005704		0	-281	-726	-922	-893
NWGL99	RGI50-05.02651	G305597E71519N	-40386,3	8005356	866	0	-148	-256	-838	-1240
NWGL100	RGI50-05.02650	G305548E71514N	-41828,3	8004826		0	-272	-421	-600	-1271
NWGL108	RGI50-05.02679	G306882E71621N	7511,31	8004793	150	0	-47	-176	-218	-235
NWGL179	RGI50-05.02770	G308065E71704N	51023,86	8004076	794	0	-26	6	-26	-113
NWGL107	RGI50-05.02682	G306846E71598N	6135,474	8003079	1111	0	-30	-185	-253	-392
NWGL256	RGI50-05.02773	G308016E71690N	48242,94	8002514	587	0	-89	-195	-200	-233
NWGL106	RGI50-05.02684	G306786E71595N	1669,299	8001809	2871	0	253	43	0	-144
NWGL177	RGI50-05.02775	G307952E71673N	46557,68	8001007	404	0	-47	-104	-158	-268

STUDY_ID	RGI_ID	GLIMS_ID	POINT_X	POINT_Y	L_LIA(1890)	L_1953	L_1969	L_1985	L_2002	L_2015
NWGL176	RGI50-05.02777	G307835E71663N	42133,84	7999589	603	0	-131	-143	-154	-445
NWGL189	RGI50-05.02606	G307665E71505N	31420,72	7985438	224	0	27	-14	0	-35
NWGL188	RGI50-05.02645	G307789E71494N	34756,77	7984885	285	0	-22	-78	-226	-368
NWGL260	RGI50-05.02512	G308360E71553N	57722,19	7984451		0	-303	-399	-454	-537
NWGL195	RGI50-05.02582	G307400E71443N	19330,72	7984344	381	0	-100	-184	-293	-414
NWGL266	RGI50-05.02512	G308360E71553N	59897,06	7983958		0	-131	-166	-184	-215
NWGL261	RGI50-05.02508	G308514E71535N	60996,41	7982599		0	-200	-322	-306	-469
NWGL190	RGI50-05.02633	G307749E71465N	32577,44	7982018		0	-7542	-7561	-7862	-8027
NWGL198	RGI50-05.02572	G307102E71428N	9631,843	7981565		0	-134	-340	-387	-436
NWGL265	RGI50-05.02630	G307866E71464N	37161,98	7978897		0	-299	-106	-276	-543
NWGL196	RGI50-05.02587	G307461E71409N	18378,32	7978330	28	0	-131	-894	-1049	-1291
NWGL262	RGI50-05.02563	G308614E71521N	65990,43	7978101		0	12	-74	87	-149
NWGL264	RGI50-05.02565	G308745E71514N	68390,63	7977165	247	0	81	-151	-284	-475
NWGL267	RGI50-05.02546	G308466E71426N	57509,88	7971854	213	0	-36	-39	-59	-167
NWGL200	RGI50-05.02486	G307016E71310N	-1712,86	7970579		0	-197	-73	-284	-576
NWGL216	RGI50-05.02524	G307943E71378N	37114,82	7970331	482	0	-100	-77	-129	-204
NWGL209	RGI50-05.02521	G308216E71389N	50529,22	7968187		0	-173	-218	-356	-669
NWGL211	RGI50-05.02452	G307917E71273N	36241,69	7957525		0	63	-53	-60	-331
NWGL203	RGI50-05.02496	G307150E71202N	4637,15	7956010	462	0	-36	-167	-213	-440
NWGL212	RGI50-05.02431	G307653E71200N	22007,08	7951797	938	0	-268	-327	-418	-582
NWGL219	RGI50-05.02418	G308187E71209N	41008,06	7948972	2720	0	-301	-722	-1266	-1784
NWGL222	RGI50-05.02392	G308062E71158N	36033,89	7946305	819	0	-58	-35	-109	-242
NWGL220	RGI50-05.02391	G308109E71165N	39695,73	7946030	0	0	-304	-384	-630	-924
NWGL224	RGI50-05.02398	G307975E71138N	32858,88	7945056		0	172	-8	-4	-197
NWGL221	RGI50-05.02421	G308383E71186N	45008,57	7943955		0	-853	-854	-1005	-1152
NWGL227	RGI50-05.02424	G308463E71152N	48777,3	7939961	1536	0	-214	-261	-368	-520
NWGL228	RGI50-05.02426	G308500E71140N	51888,81	7938204	394	0	23	93	150	-239
NWGL240	RGI50-05.02359	G308485E70961N	44995,32	7919762	1472	0	-236	-222	-301	-552
NWGL232	RGI50-05.02341	G308027E70922N	27590,99	7917950	177	0	-462	-100	-59	-167
NWGL238	RGI50-05.02354	G308626E70954N	50716,95	7917910	2238	0	-92	-202	-497	-804
NWGL235	RGI50-05.02341	G308027E70922N	31014,05	7917702	292	0	-221	-386	-511	-635
NWGL234	RGI50-05.02341	G308027E70922N	28665,87	7917537	601	0	-622	-896	-1518	-1739
NWGL237	RGI50-05.02331	G308197E70891N	35710,41	7917057	330	0	-49	-187	-430	-471
NWGL239	RGI50-05.02354	G308626E70954N	51543,77	7916835		0	-394	-536	-587	-599
NWGL236	RGI50-05.02331	G308197E70891N	35048,95	7916230	158	0	-51	-41	-275	-249
NWGL233	RGI50-05.02305	G308003E70888N	28517,04	7916214		0	-102	-94	-231	-273

Supplementary table 3. Image sources and uncertainties. Image source and uncertainties for West Greenland (top) and East Greenland (bottom). Image digitizing accuracies are adopted from Bjørk *et al.* 2012 using similar imagery[4]. The retreat rate uncertainties are the sum of digitizing accuracies including ±5 m for periods including the LIA. As uncertainties are given m/yr for rates, longer time between observations will result in a relatively smaller retreat rate uncertainty.

	Year	LIA(1890)	1953	1969	1985	2003	2015
Western region	Data source	Aerial photos (1985 ortho)	Aerial photos	Corona satellite	Aerial photos orthorectified	Landsat7 satellite	Landsat8 satellite
	Digitizing accuracy	10m	12,5	12,5m	4m	16,7m	16,7m
	Retreat rate uncertainty	1890-1953 0,3m		1969-1985 0,9m		2003-2015 2,0m	
			1953-1969 1,1m		1985-2003 1,0m		

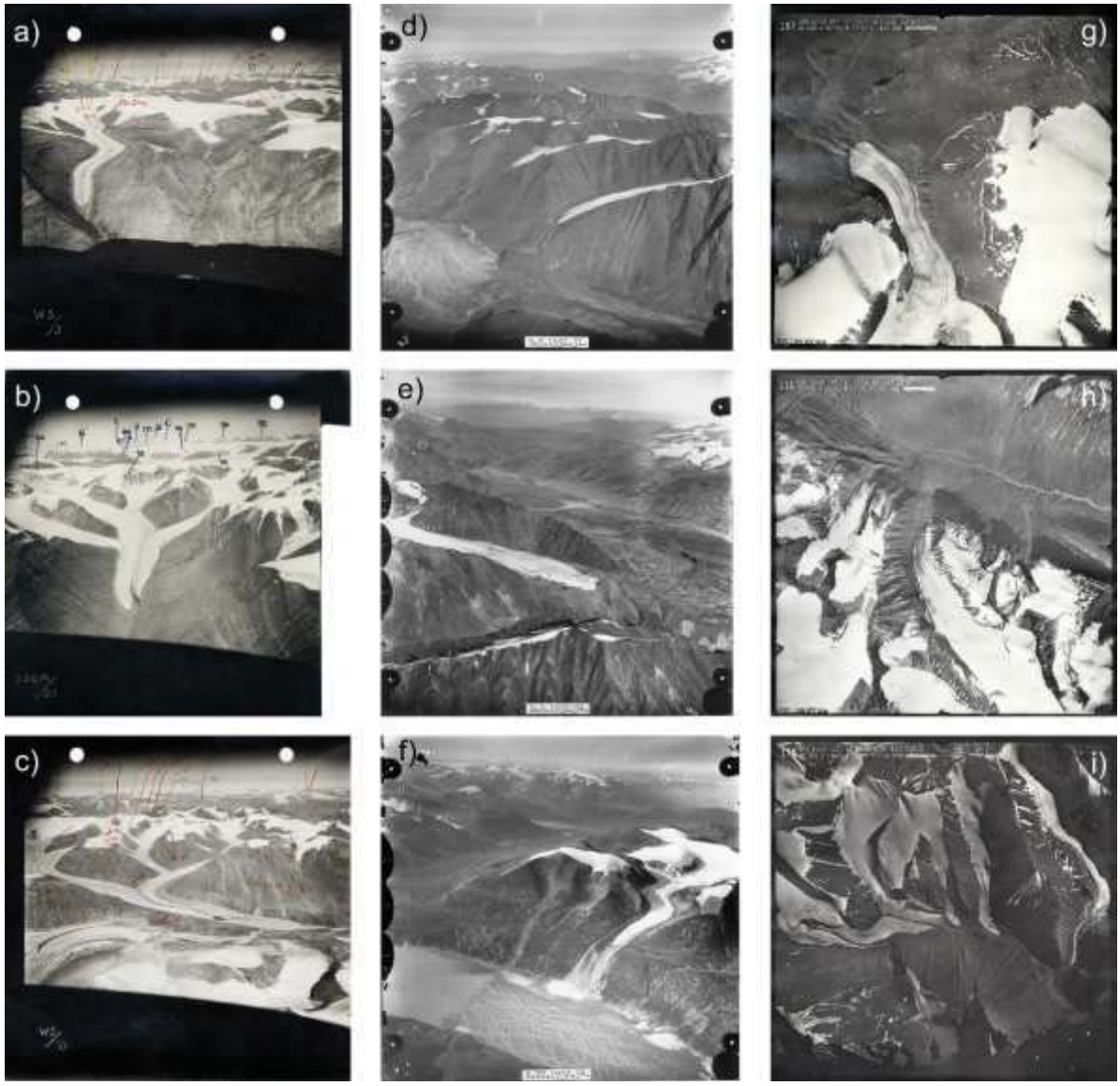
	Year	LIA(1910)	1932	1965	1973	1987	2000	2013
Eastern region	Data source	Aerial photos (1985 ortho)	Aerial photos, terr. photos	Corona satellite	Landsat1 satellite	Aerial photos orthorectified	Landsat7 satellite	Landsat7 satellite
	Digitizing accuracy	10m	60,5	12,5m	30,9m	4,0m	16,7m	16,7m
	Retreat rate uncertainty	1910-1932 6,4m		1965-1973 4,8m		1987-2000 1,3m		
			1932-1965 1,8m		1973-1987 2,2m		2000-2013 1,8m	

Supplementary table 4. Paired t-test of differences between frontal change rates. Here we test the statistical difference between two adjoining frontal change rates using a paired t-test. Statistically different departures are underscored and in bold.

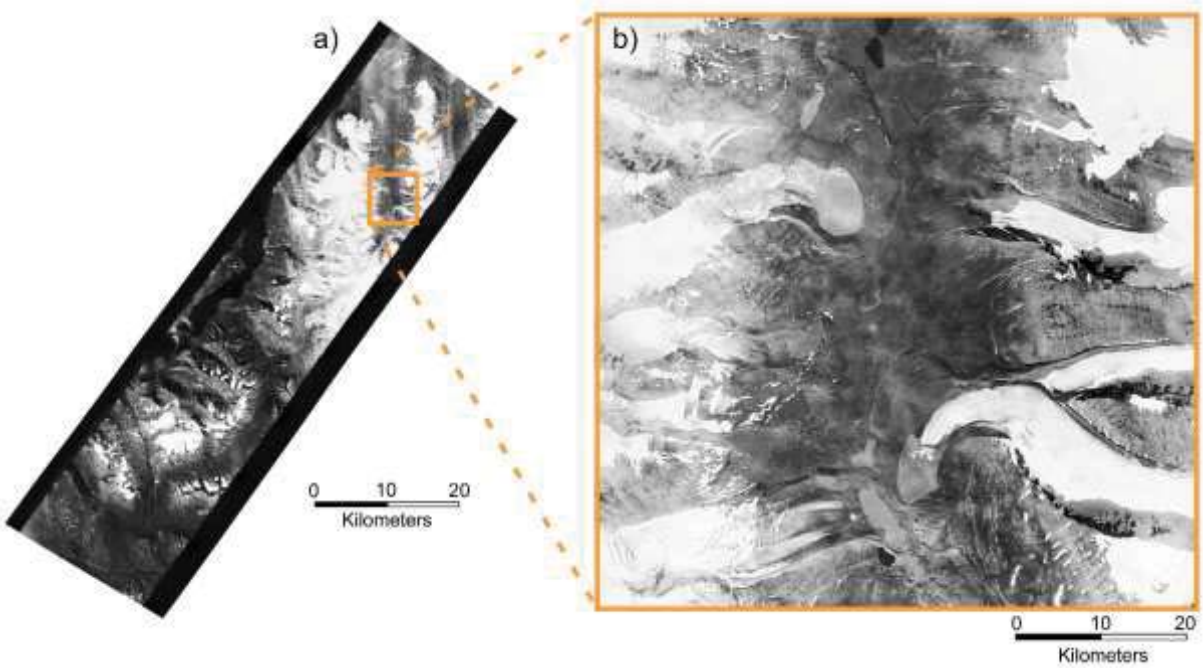
	Rate a	*Rate b*	*p-value*
West	LIA(1890)-1953	1953-1969	**0,0010**
	1953-1969	1969-1985	**0,0028**
	1969-1985	1985-2002	0,2626
	1985-2002	2002-2015	**0,0001**
East	LIA(1910)-1932	1932-1966	**0,0001**
	1932-1966	1966-1973	0,2772
	1966-1973	1973-1987	0,5449
	1973-1987	1987-2000	0,8956
	1987-2000	2000-2013	**0,0006**

Supplementary Table 5: GrIS accumulation anomalies for alternative baseline periods. Values are in Gt/yr for the entire ice sheet. We calculate the accumulation anomalies using the conventional baseline of 1961–1990, along with the 20th Century (1900–1999) reference period used in this study.

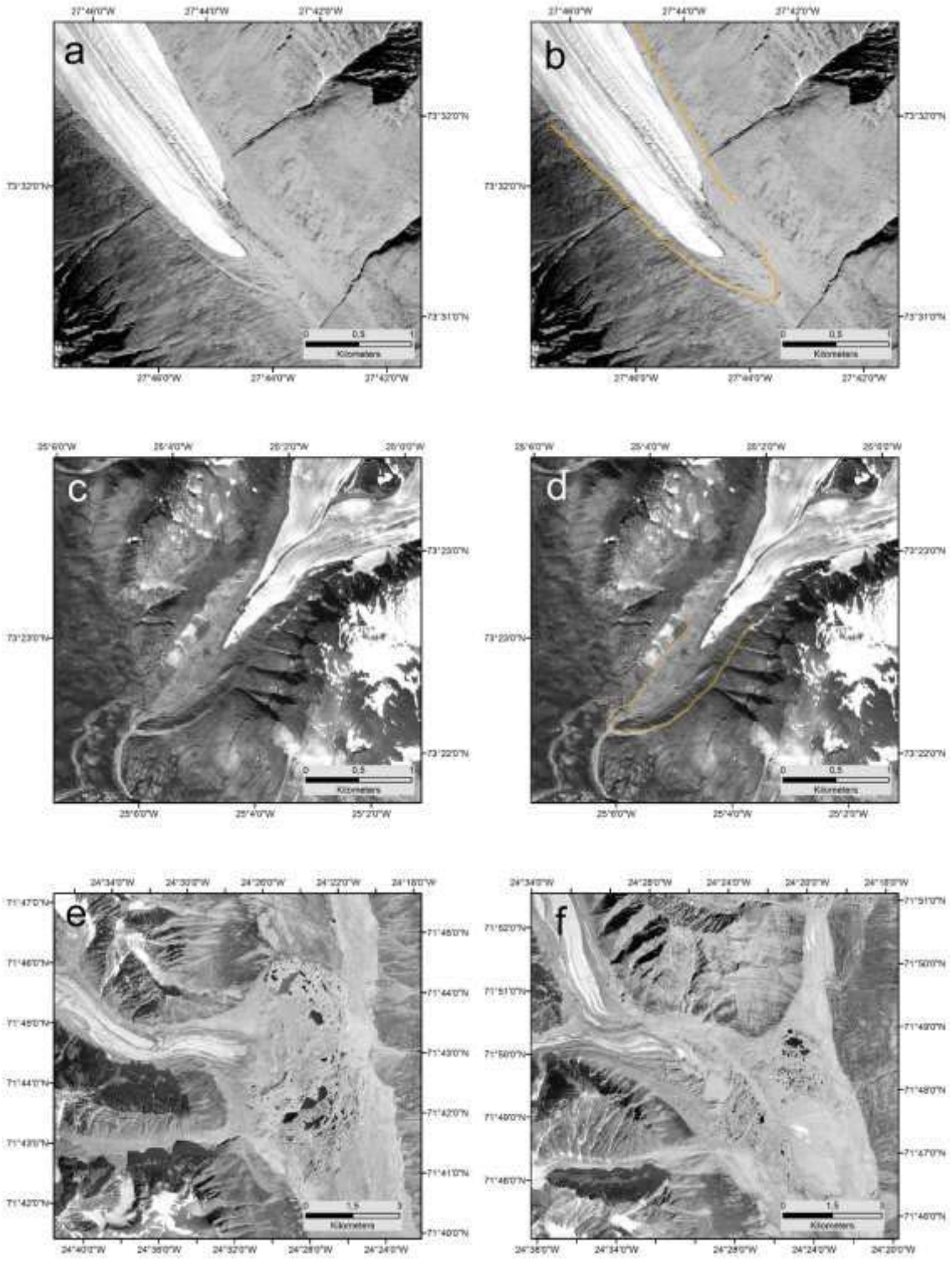
	NAO- (1962-1971)	**NAO+ (1988-1995)**
Reference period	**GrIS anomaly (Gt/yr)**	**GrIS anomaly (Gt/yr)**
1900-1999	-60.3±4.8	+10.5±0.8
1961-1990	-60.9±4.9	+9.9±0.8



Supplementary Figure 1. Historical aerial photographs. Examples of aerial images used in this study. **a), b), c)** are examples of images from the Danish flights in Northeast Greenland[33] from 1933. Images are scanned from contact copies at a resolution of 600 dpi. Images from the Danish Agency for Data Supply & Efficiency. **d), e), f)** are examples of Norwegian flights from Northeast Greenland[34], also 1932. Images are scanned from contact copies at a resolution of 1200 dpi. All 1930s images are oblique, and recorded off the side of the airplane or with the camera pointing aft (for some Danish flight lines). On the images, marks and hand drawing are visible, representing locations of ground control points used for the original map production. Images from the Norwegian Polar Institute. **g), h), i)** are examples of vertical aerial images recorded in West Greenland by the United States Navy in 1953. Images are scanned from contact copies at a resolution of 600 dpi. Trimlines and moraines are visible in both images and form the basis of the mapping of the LIA extent of non-surging glaciers prior to the onset of retreat in 1910 C.E. Images from the Danish Agency for Data Supply & Efficiency.

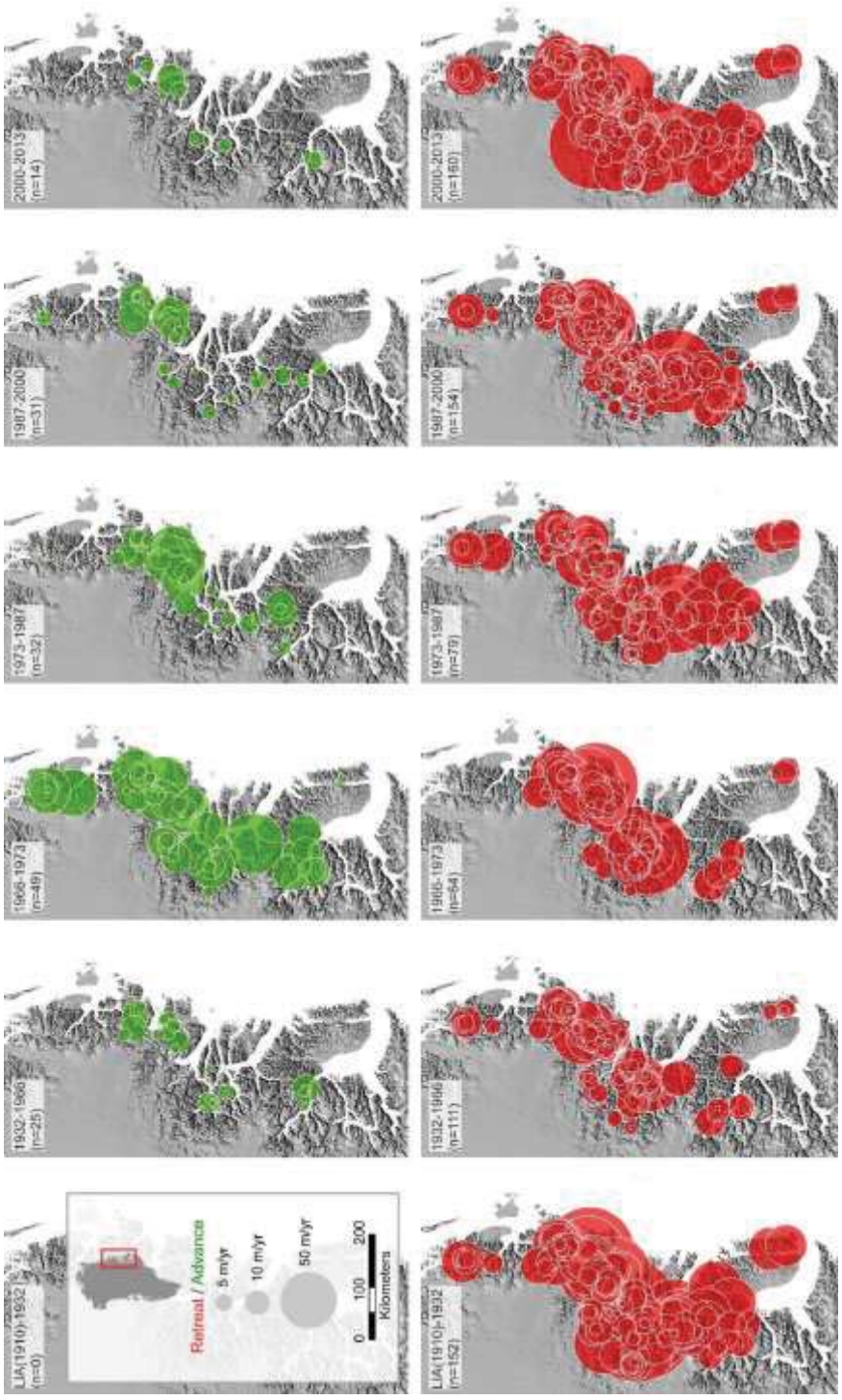


Supplementary figure 2. Historical satellite imagery. Example of a Corona image from the west coast of Greenland. Image a) represents one fourth of an original image, and b) is a close-up of glacier features in the image. For both regions in this study, the declassified Corona imagery forms an important temporal link between our historical aerial images and more modern and easily available satellite imagery. Image from U.S. Geological Survey, U.S. Department of the Interior.

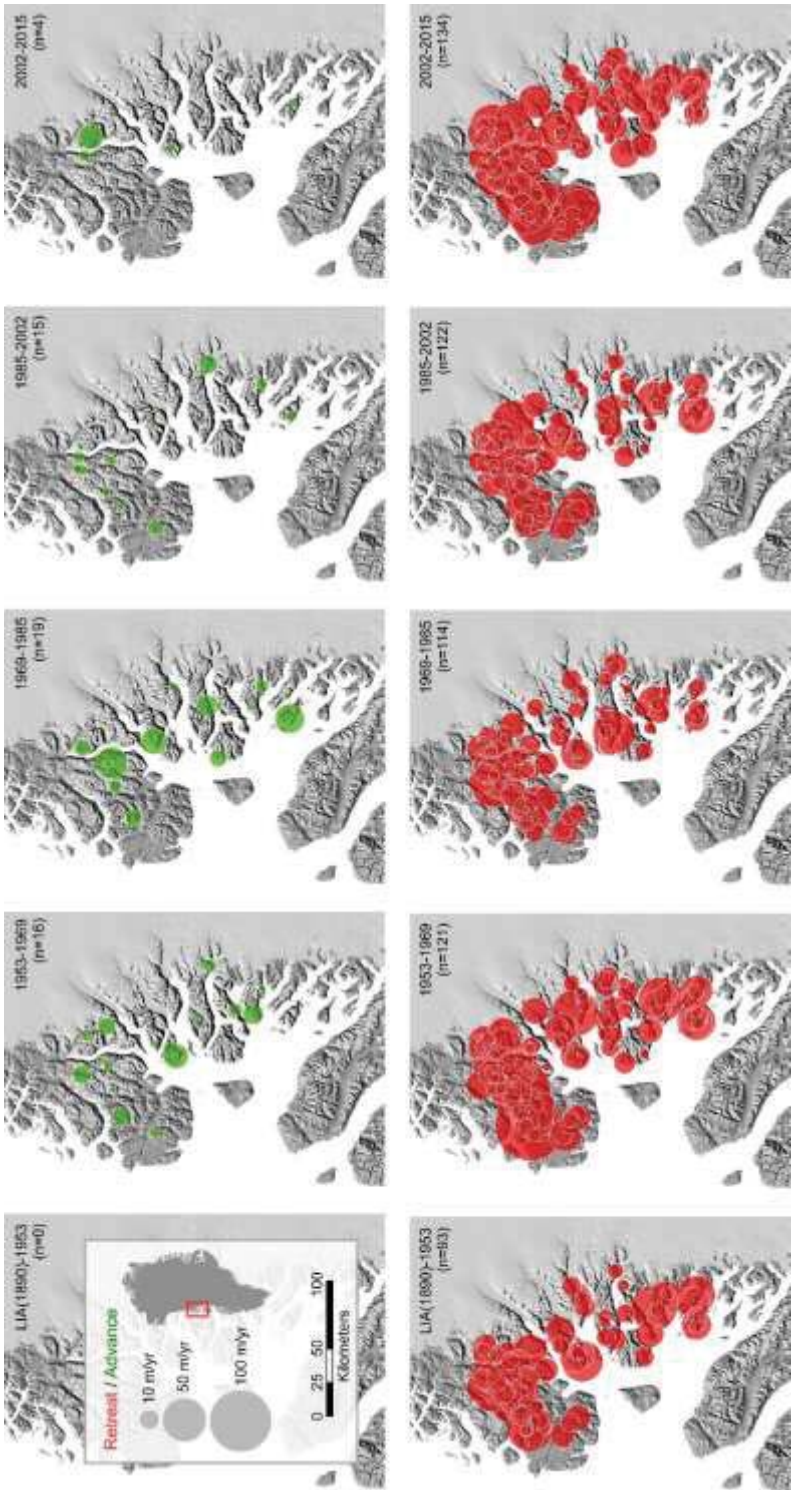


Supplementary figure 3. Mapping LIA features. **a)-d)** Two examples of the imagery used to map the LIA-maximum extent. The orthorectified photo is originates from an aerial survey covering all of Greenland in scale 1:150.000, resulting in an orthophoto with 2m resolution[31]. As both regions investigated in this study contains surging glaciers, these have been excluded from the study. **e)** and

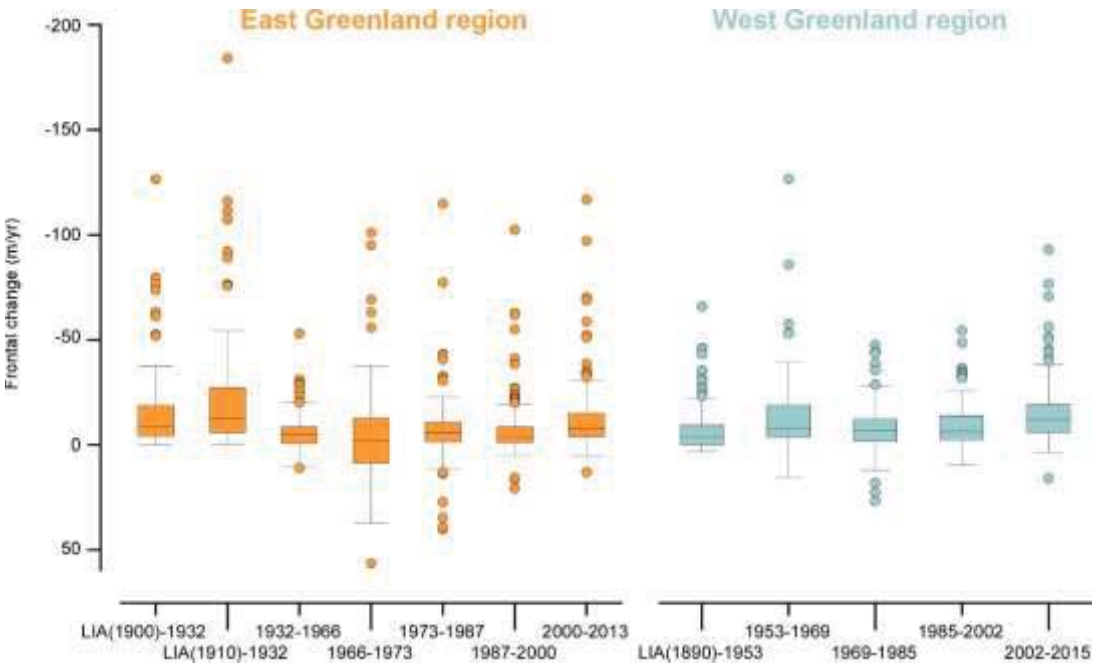
f) Two examples are given for geomorphological signatures left by surging activity in East Greenland. We assign 1910 C.E. to the onset of the regional LIA-deglaciation in East Greenland, and 1890 in West Greenland (see supplementary Information). lichens on end moraine boulders south of the study area have been dated to 1900 C.E.[35], and a marked decrease in sea-ice conditions near the study area has been dated to 1910 C.E.[36]. Farther north in East Greenland the onset of LIA glacial retreat has been observed at 1920 C.E.[37]. In West Greenland, the timing of the onset of LIA deglaciation is framed to c. 1890 C.E. by use of historical imagery sources and travel accounts[38]. Images from the National History Museum of Denmark.



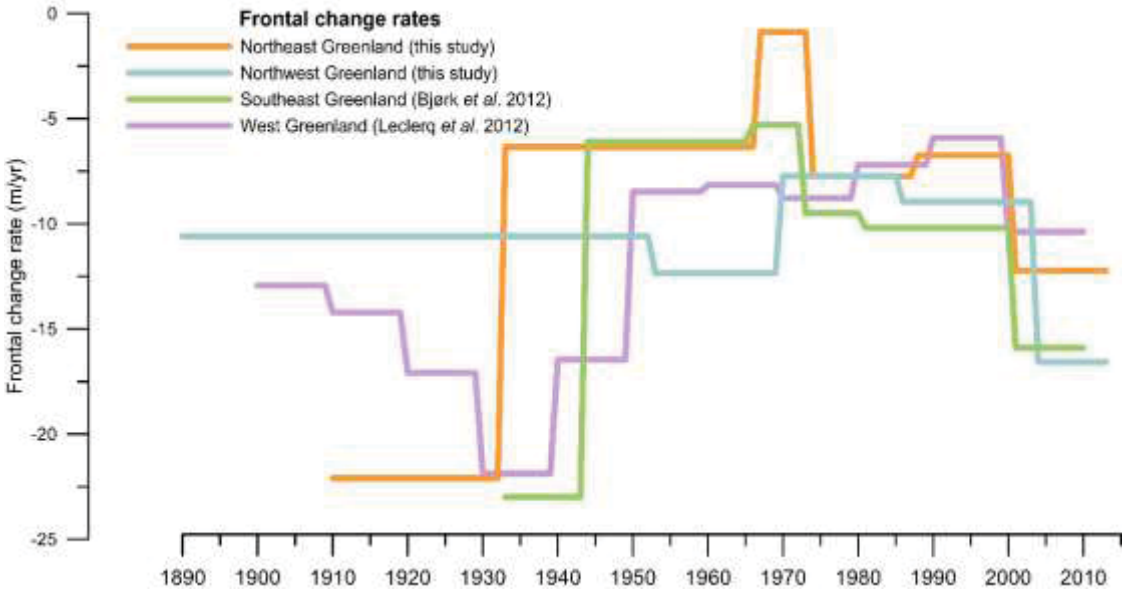
Supplementary figure 4: Spatial distribution of frontal change for East Greenland PGICs. The period 1910–2013 is divided into six sub-periods according to data availability. The top row shows green circles for advancing glaciers. The bottom row shows retreating glaciers. Circle area is proportional to the rate of retreat measured in m/yr. Note the difference scales between Supplementary Figure 1 and Supplementary Figure 2.



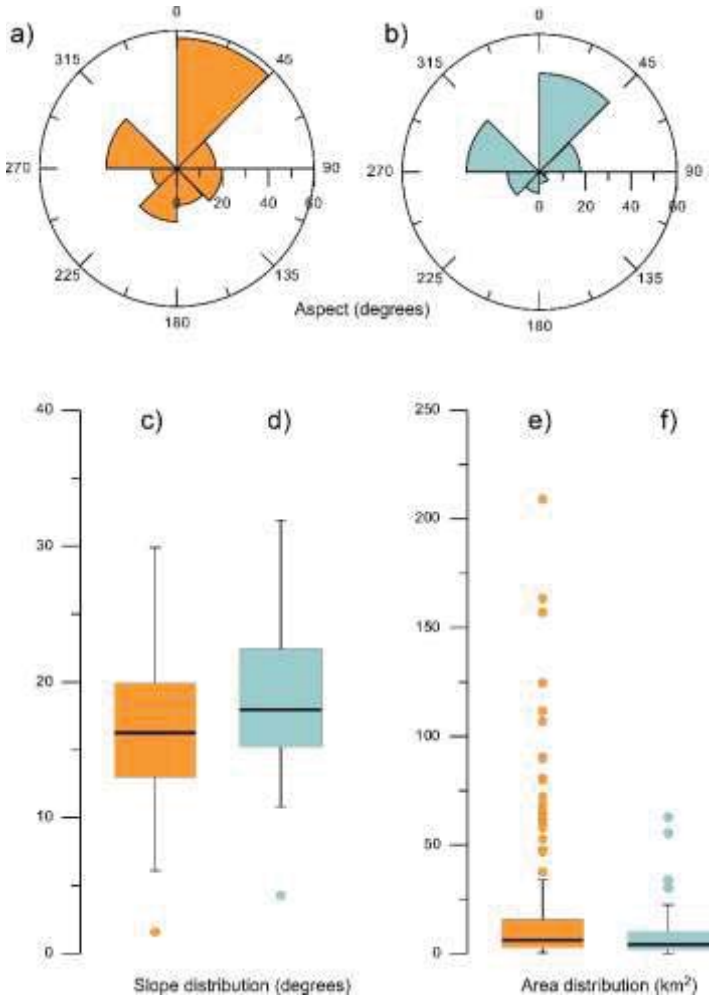
Supplementary figure 5: Spatial distribution of frontal change for West Greenland PGICs. The period 1890–2015 is divided into five sub-periods according to data availability. The top row shows green circles for advancing glaciers. The bottom row shows retreating glaciers. Circle area is proportional to the rate of retreat measured in m/yr. Note the difference scales between Supplementary Figure 1 and Supplementary Figure 2.



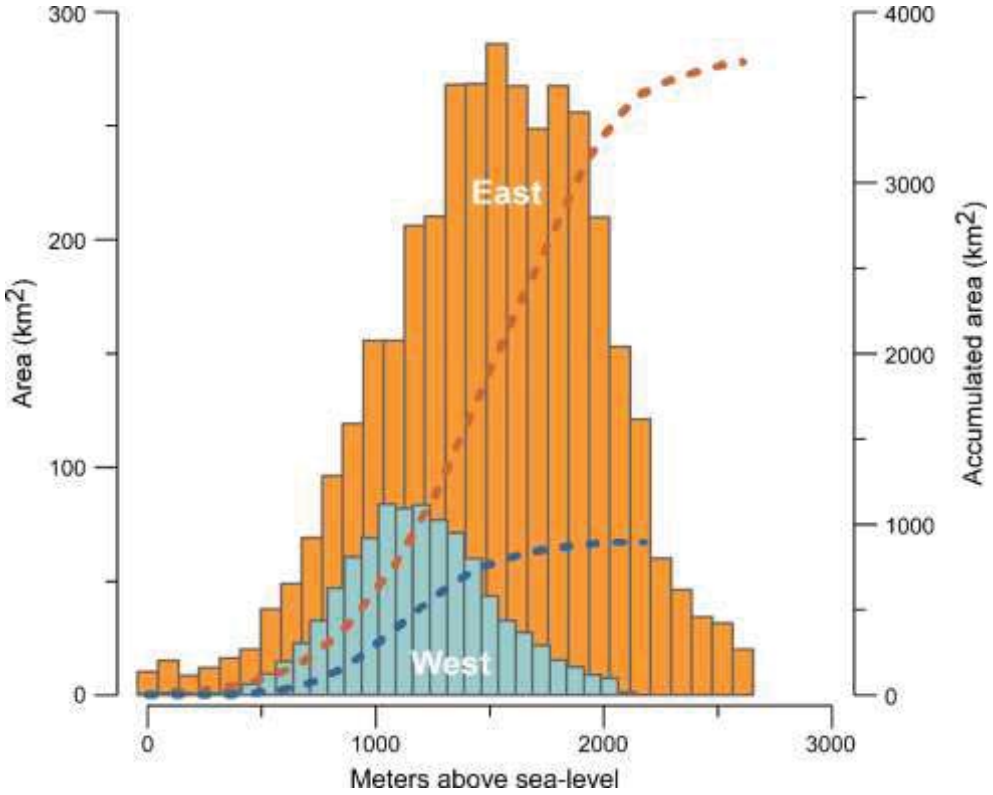
Supplementary figure 6. Distributions of measured frontal change rates. For both regions, the distribution of frontal change rates are shown. The frontal change rate distributions are large in all periods, with a skewness towards retreat (here shown as negative values on the y-axis). Outliers are shown with colored circles mostly represented in the retreating group of glaciers.



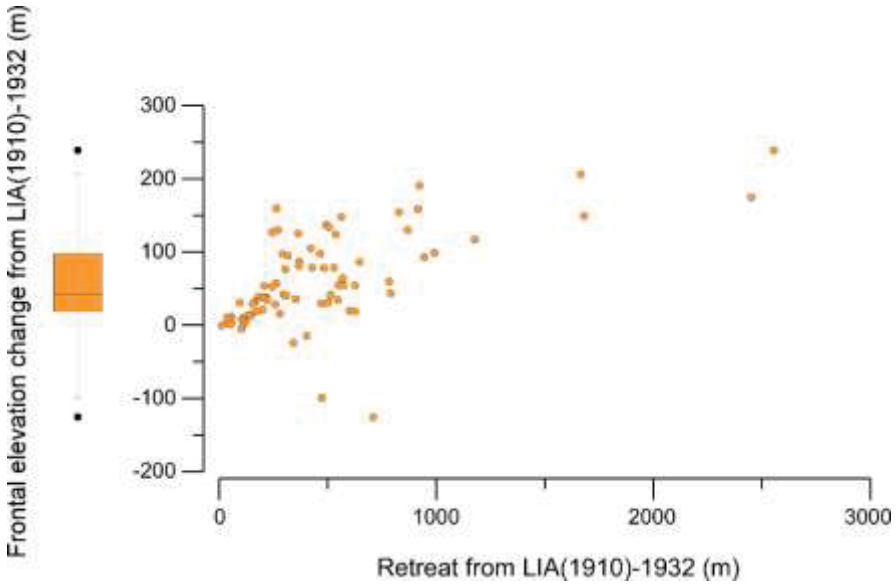
Supplementary figure 7. Regional comparison of PGIC retreat. Comparison of glacier lengths found in this study to other glacier populations in Southeast Greenland[4] and West Greenland[11]. While observational periods vary for the different regions, the overall trend is similar with rapid retreat in the early 20th and 21st Century. Because of the long initial observational period for Northwest Greenland (blue), it cannot be excluded that a similar period of rapid retreat occurred in the early 20th Century.



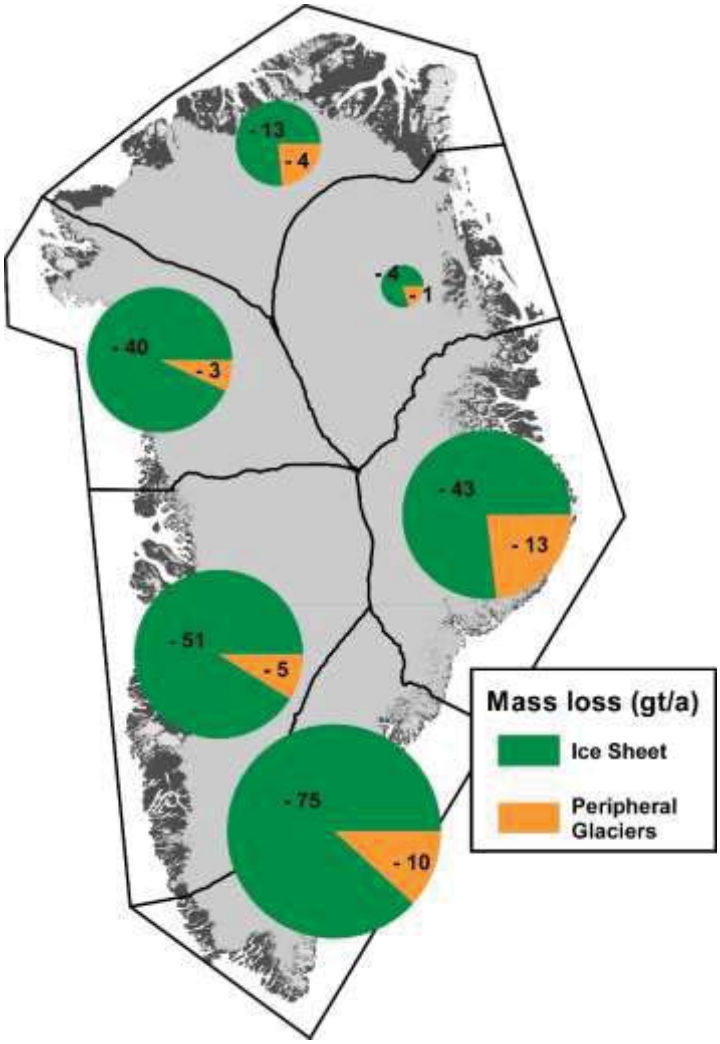
Supplementary figure 8. Characteristics of glaciers in studied regions. Aspect (**a** and **b**), slope (**c** and **d**), and area (**e** and **f**) for the two glacier distributions in East Greenland (orange) and West Greenland (blue). Parameters are derived from the Randolph Glacier Inventory[39]. The two regions share similar aspects; slopes are generally higher in West Greenland, while the glaciers are larger in East Greenland.



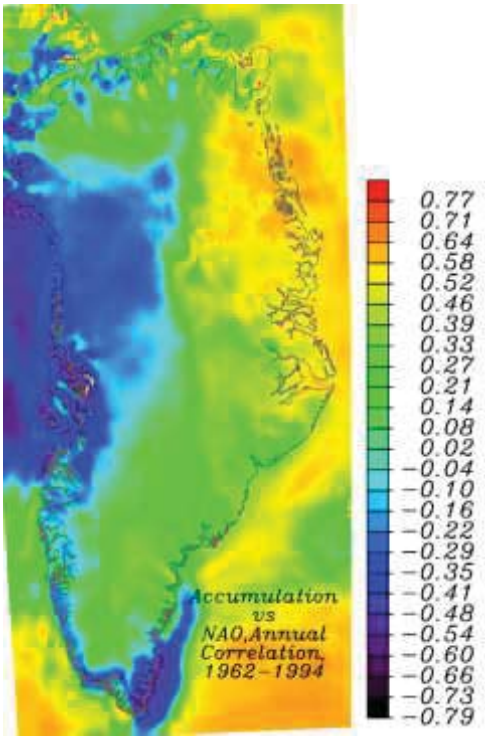
Supplementary Figure 9. Hypsometry of glaciers studied in east and west Greenland. The two studied glacier regions in East Greenland (orange) and West Greenland (blue) show a different hypsometry with the eastern region having bigger and higher located glaciers.



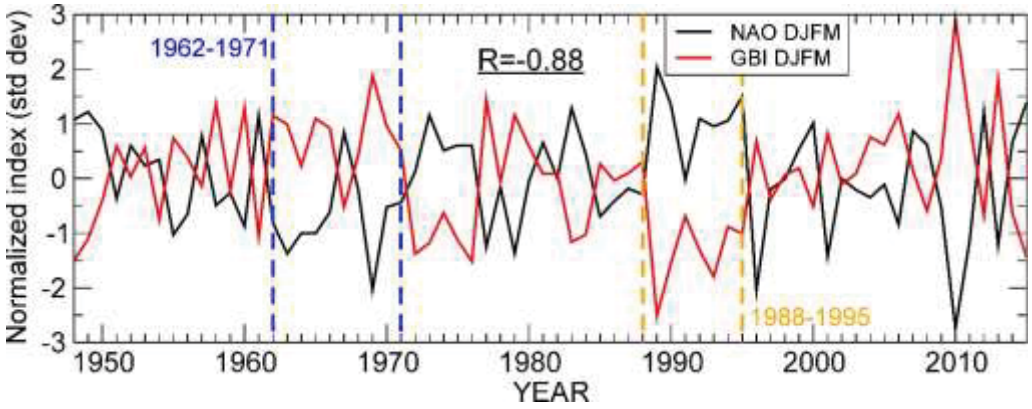
Supplementary figure 10. Frontal elevation change following the LIA in East Greenland. The plot is showing the frontal elevation change from the measured LIA-maximum position to the position in 1932 for 78 glaciers in East Greenland where elevations could be measured. The rapid retreat is partly explained by retreat on a relatively flat terrain as 60 glaciers (77%) have elevated less than 100m. For 6 glaciers (8%) glaciers, the frontal elevation has lowered as a result of retreat into their own over deepenings. Elevations are measured in the MEaSUREs Greenland Ice Mapping Project (GIMP) Digital Elevation Model from GeoEye and WorldView Imagery data[40].



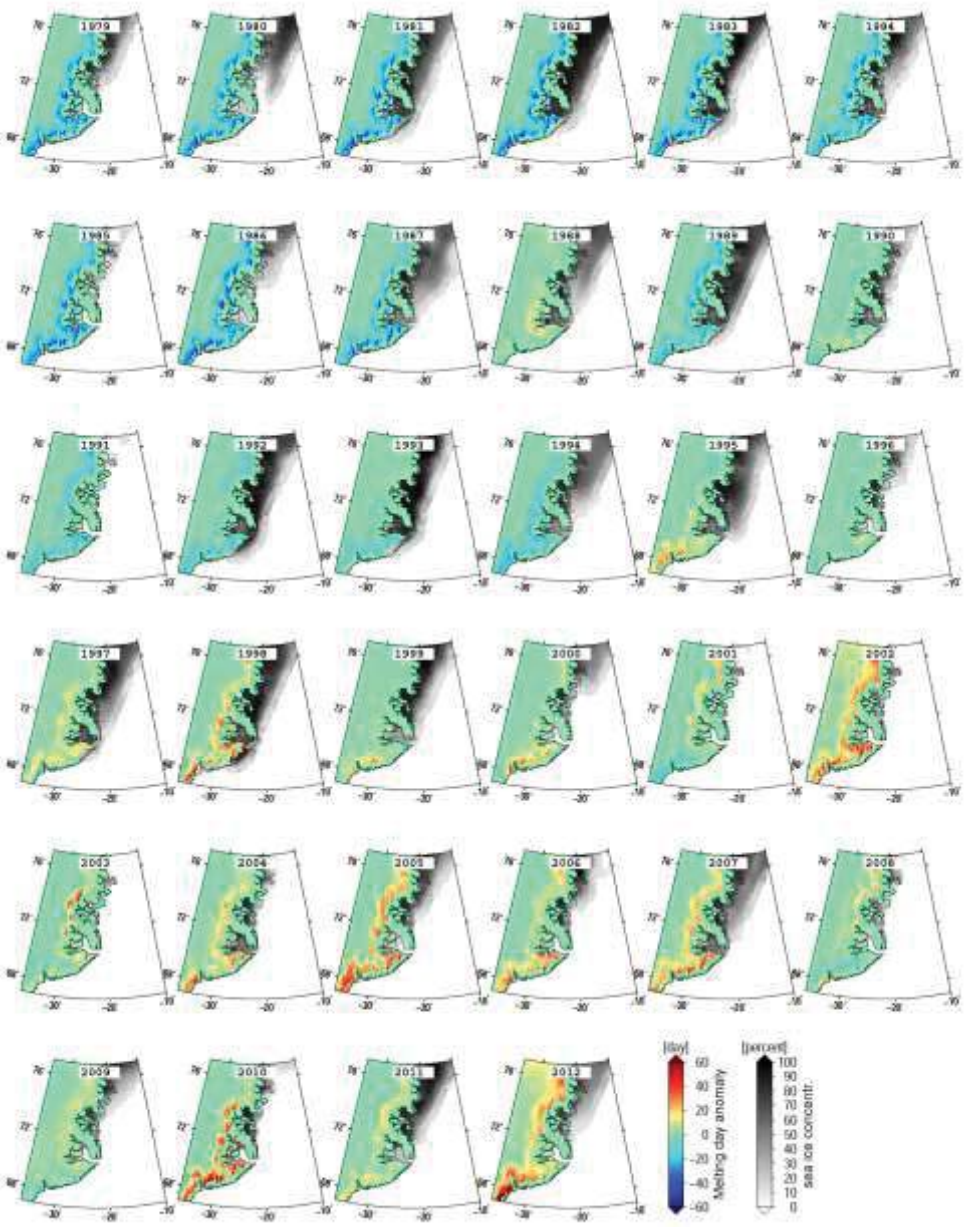
Supplementary figure 11: Recent regional mass loss contribution from the Greenland Ice Sheet and PGICs. Regional partitioning of mass loss for the recent mass loss from Greenland. Values are in Gt/yr and are average mass loss rates from 2003-2008/09[1–3]. Sub-regions are made according to the original studies, and where possible made to represent the major regions in Zwally *et al*. 2005[41].



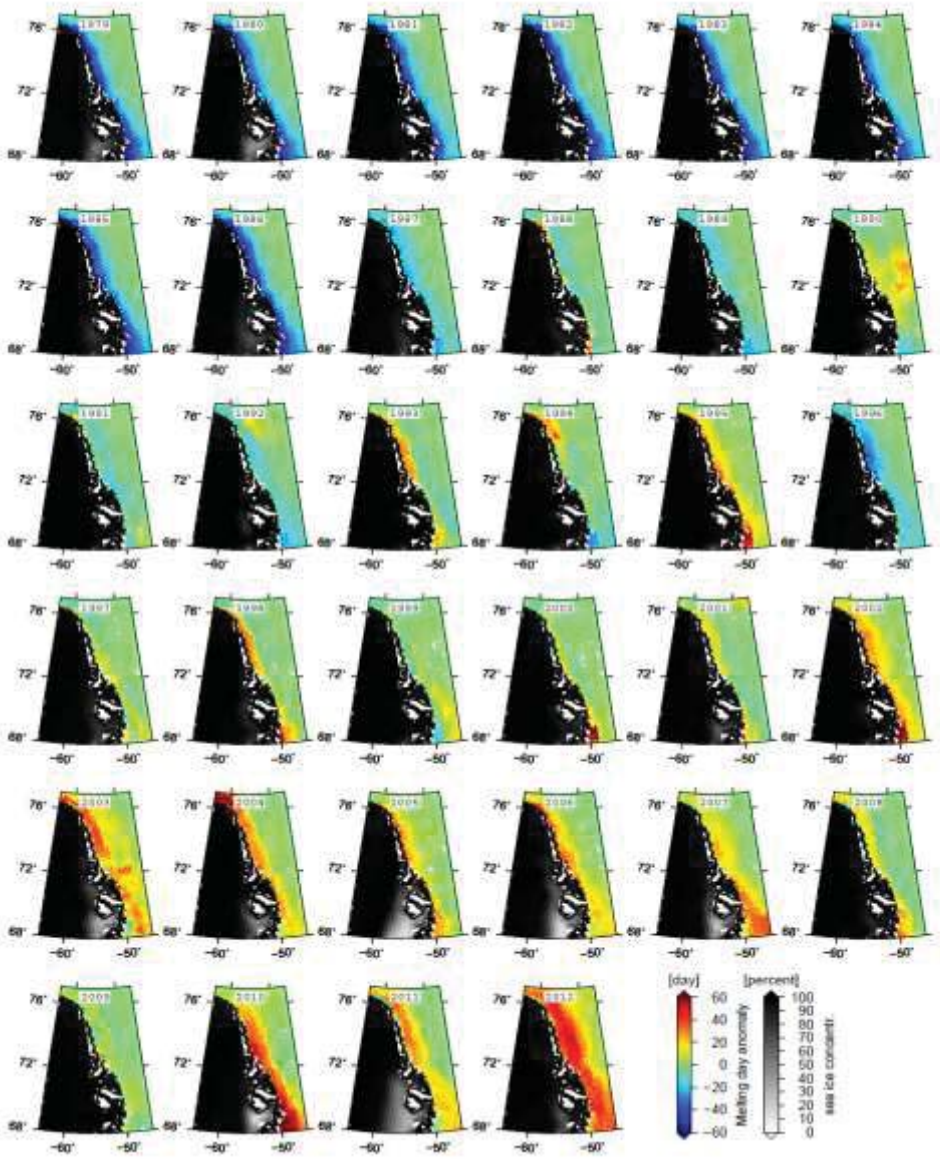
Supplementary figure 12. Correlation of NAO and Greenland accumulation. The annual (1962-1994) correlation of NAO and accumulation plotted for all of Greenland. Accumulation record from Box-SMB[15].



Supplementary Figure 13. Correlation between winter NAO and winter GBI. There is a strong negative correlation (-0.88) between the winter NAO and the winter GBI. Both specific periods investigated in this study (highlighted) show a significant departure from the mean for both indices.



Supplementary Figure 14: September sea-ice coverage and melt day anomalies 1979–2012 for East Greenland. Sea-ice coverage in percentages for September (annual minima) is shown for the East Greenland region. Accumulation rates are high during the second half of the 1980s and the 1990s when sea-ice concentrations are relatively high, with the exception of 1991[42]. Melt day anomalies over the GrIS and large PGICs presented in a 25 km grid of annual melting days relative to the 1979–2012 average. The presence of melting is determined from brightness temperature data acquired during a 34-year span by three satellite-borne microwave radiometers: the Scanning Multichannel Microwave Radiometer (SMMR), the Special Sensor Microwave/Imager (SSM/I), and the Special Sensor Microwave Imager/Sounder (SSMIS)[43].



Supplementary Figure 15: March sea-ice coverage and melt day anomalies 1979–2012 for West Greenland. Sea-ice coverage in percentages for March (annual maxima) is shown for the West Greenland region. Melt day anomalies over the GrIS and large PGICs presented in a 25 km grid of annual melting days relative to the 1979–2012 average. The presence of melting is determined from brightness temperature data acquired during a 34-year span by three satellite-borne microwave radiometers: the Scanning Multichannel Microwave Radiometer (SMMR), the Special Sensor Microwave/Imager (SSM/I), and the Special Sensor Microwave Imager/Sounder (SSMIS)[43].

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