Supplementary Material

Area, volume and ELA changes of West Greenland local glaciers and ice caps over the last 35 years

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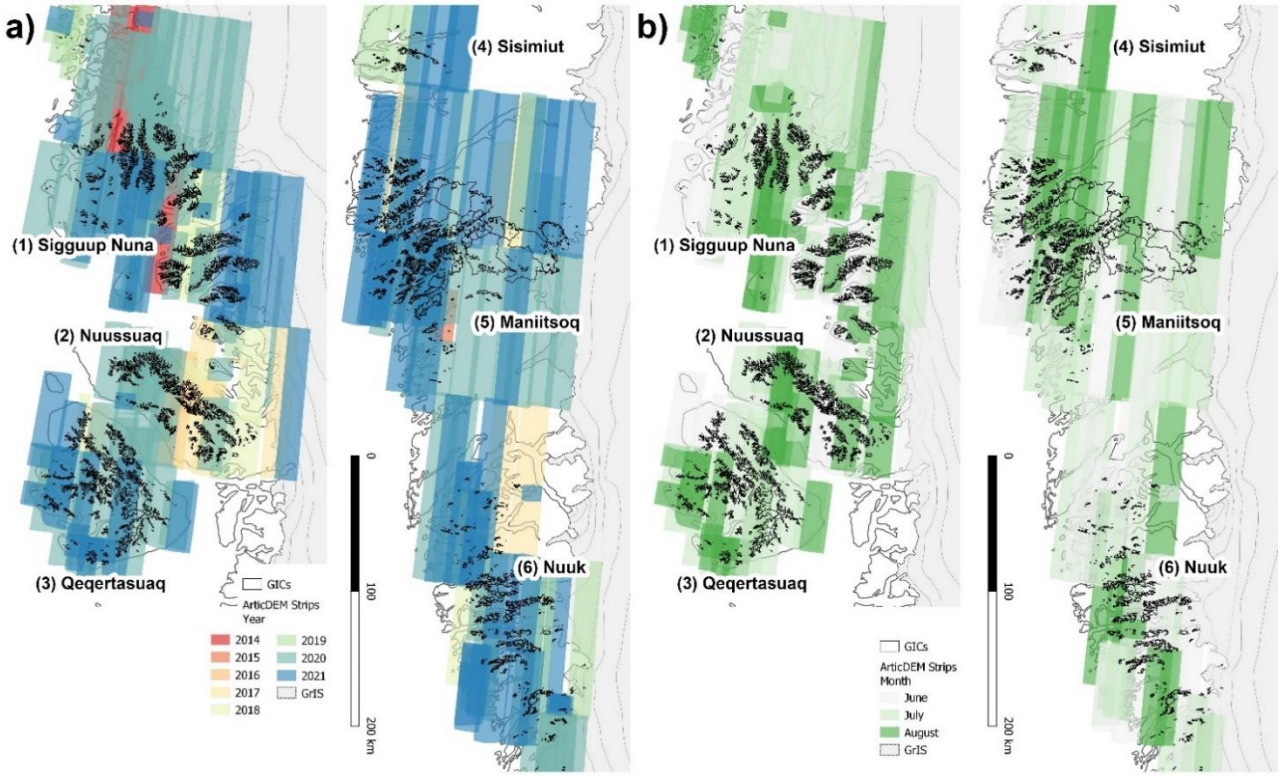

Fig. S1. *Arctic DEM Strip temporal and spatial coverage of local glaciers and ice caps used in this study. All Strips are between 15th of July and 15th of September with most of the area from the end of August and first days of September 2020-2021.*

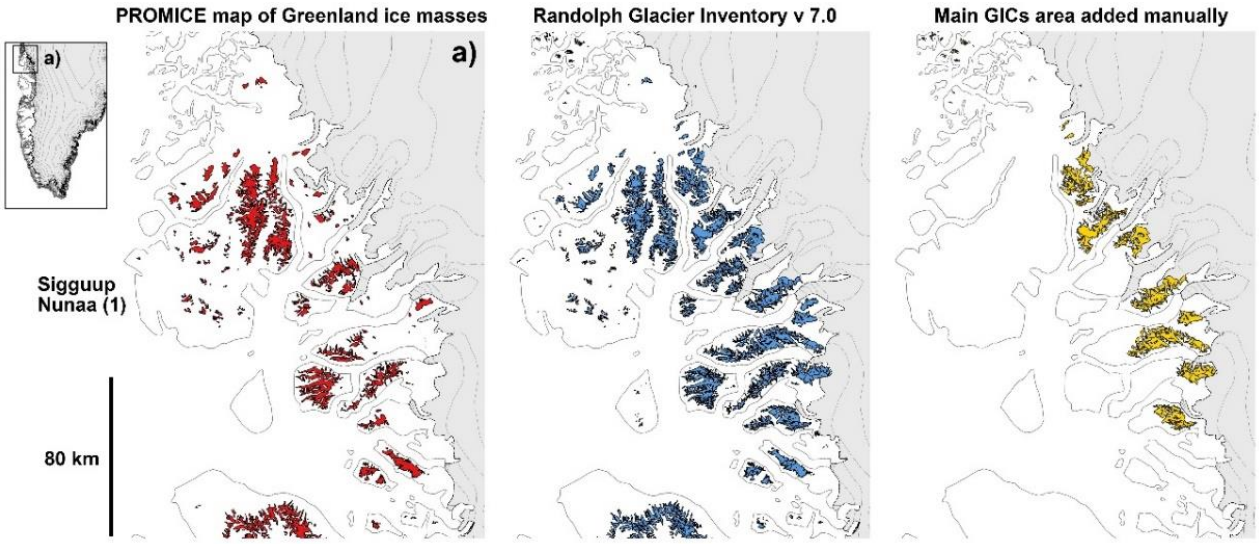

Fig. S2. *Sector 1 (Sigguup Nunaa) of the study area with local glaciers and ice caps areas present in PROMICE map of Greenland ice masses (Citterio and Ahlstrøm, 2013), Randolph Glacier Inventory (RGI Consortium, 2023) and main areas added manually.*

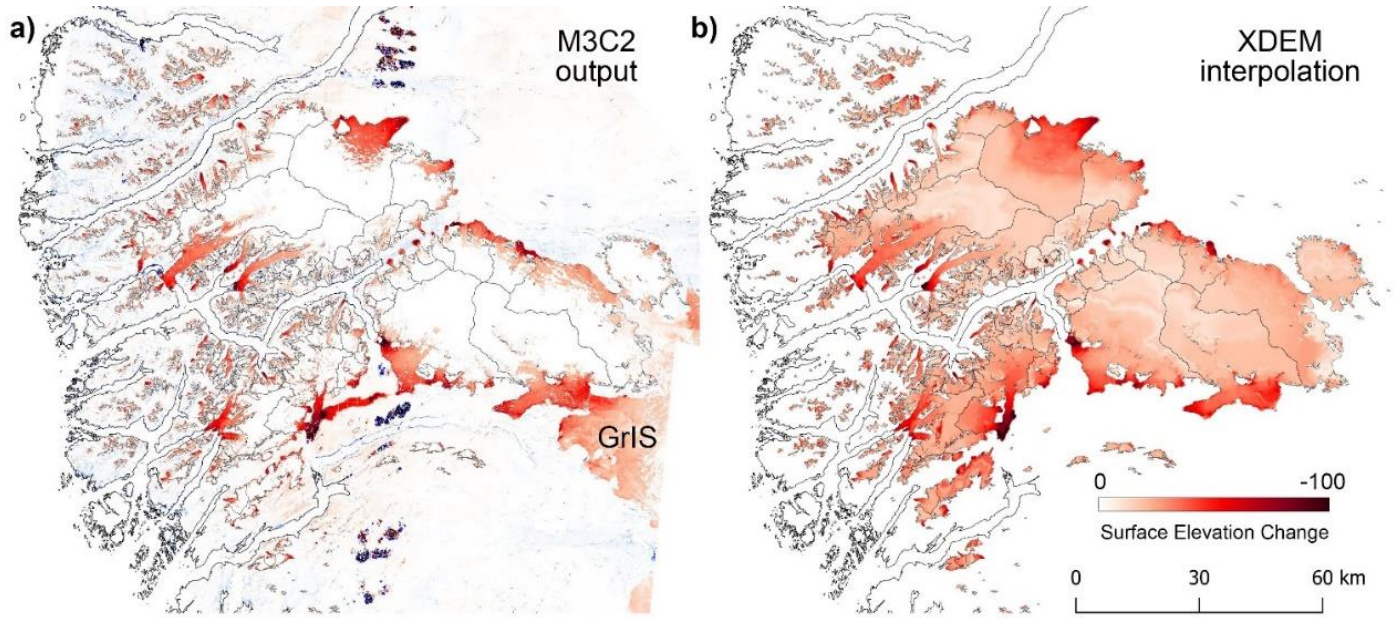

Fig. S3. *Example of local and regional interpolation used in xDEM for recovering the surface elevation change from voids due to 1985 dataset. XDEM interpolation is based on RGI polygons. Maniitsoq area (5) and its ice caps are the area with more voids in 1985 DEM data, because of snow cover.*

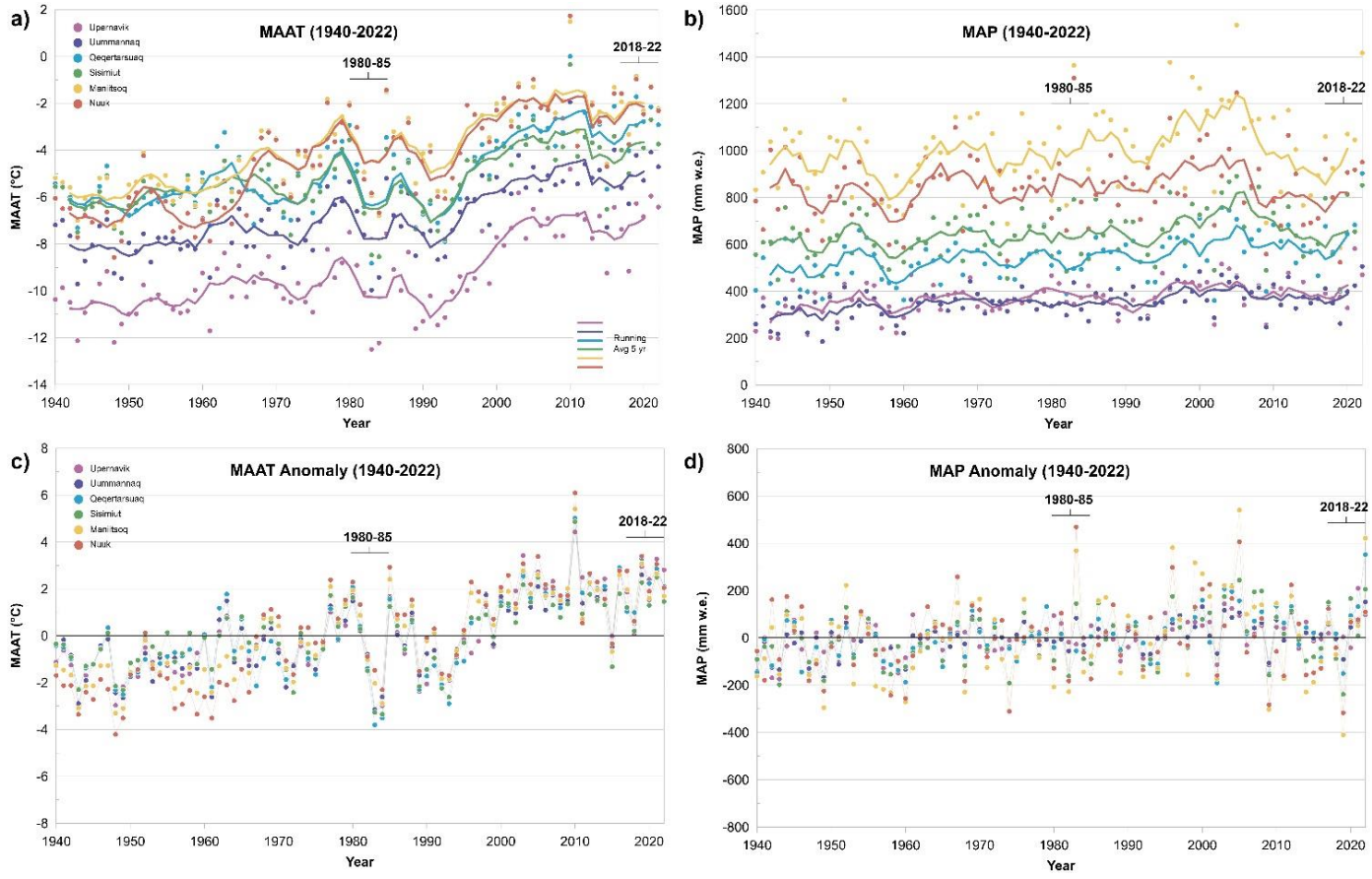

Fig. S4. *ERA5 Mean Annual Air Temperature (MAAT) in °C (a) and Mean Annual Precipitation (MAP) in mm w.e. (b) from 1940 to 2022 in six locations representative for the sectors (1-6). MAAT (c) and MAP (d) anomalies compared to the 1940-2022 average. Location positions are available in Figure 1 of the main text.*

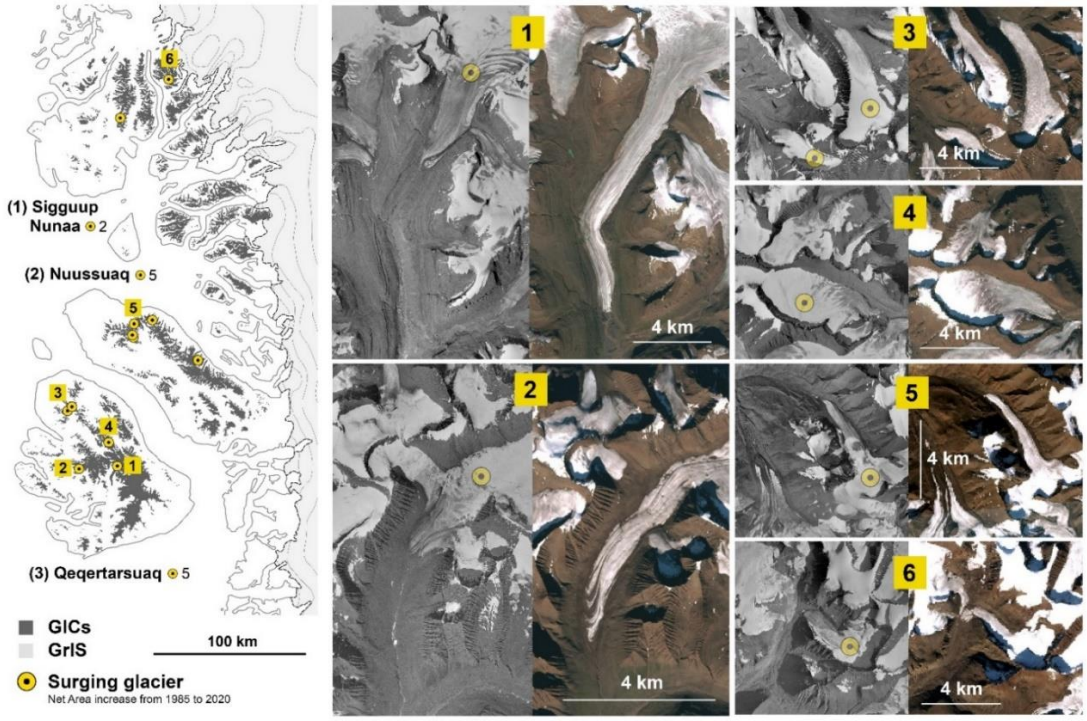

Fig. S5. *Map of surging glaciers with a net area increase between 1985-2020 in the study area and comparison between 1985 and 2020 of some significant sites. All 12 surging glaciers detected in this study because of their net area gain were already mentioned in Lovell et al. (2023) inventory.*

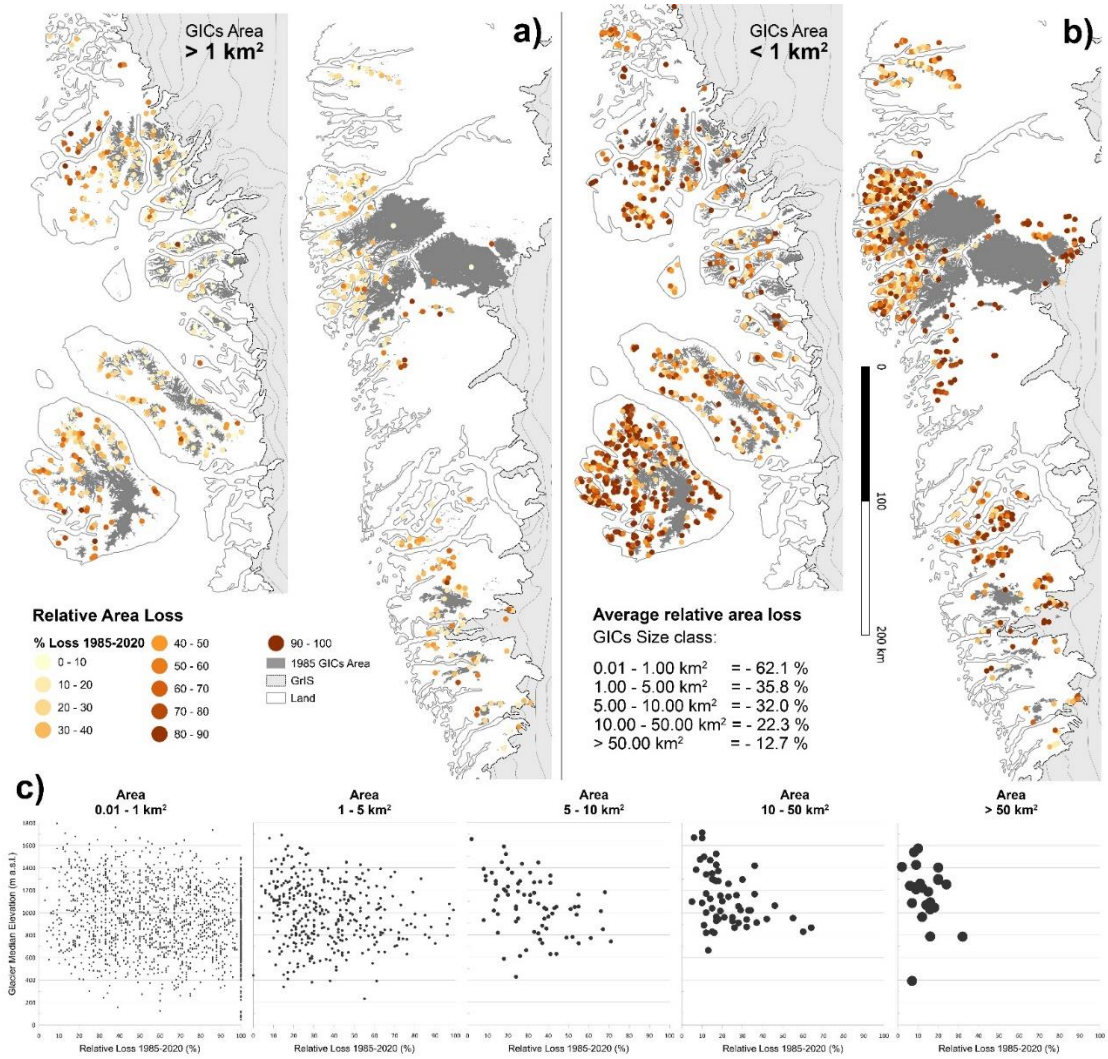

Fig. S6. *Relative area loss from 1985 to Present for glaciers and ice caps > 1 km^2 (a) and glaciers between 0.1-1 km^2 (b). Scatter plot of the relative loss (%) and the glaciers and ice caps median elevation for different size classes of glaciers and ice caps (c).*

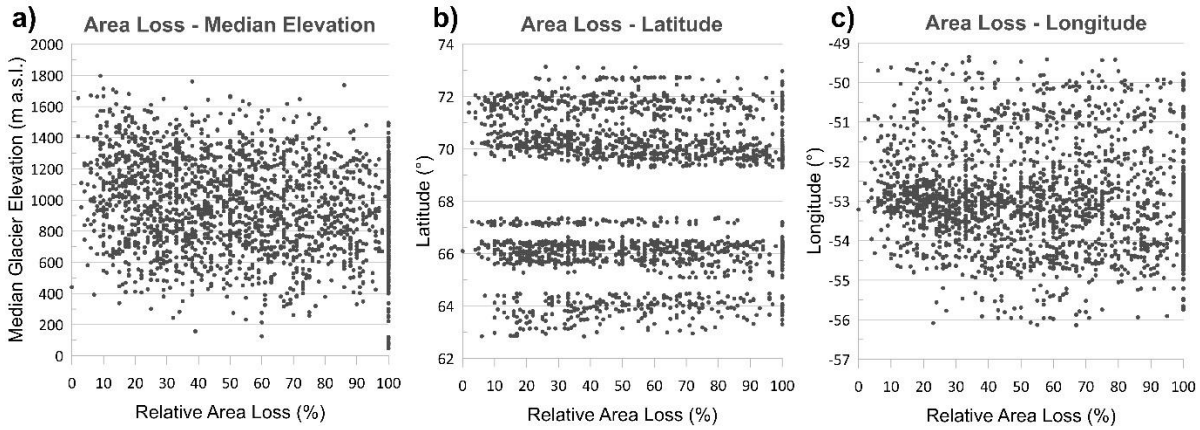

Fig. S7. Relative area loss of West Greenland local glaciers and ice caps and median elevation (a), latitude (b) and longitude (c) scatter plot.

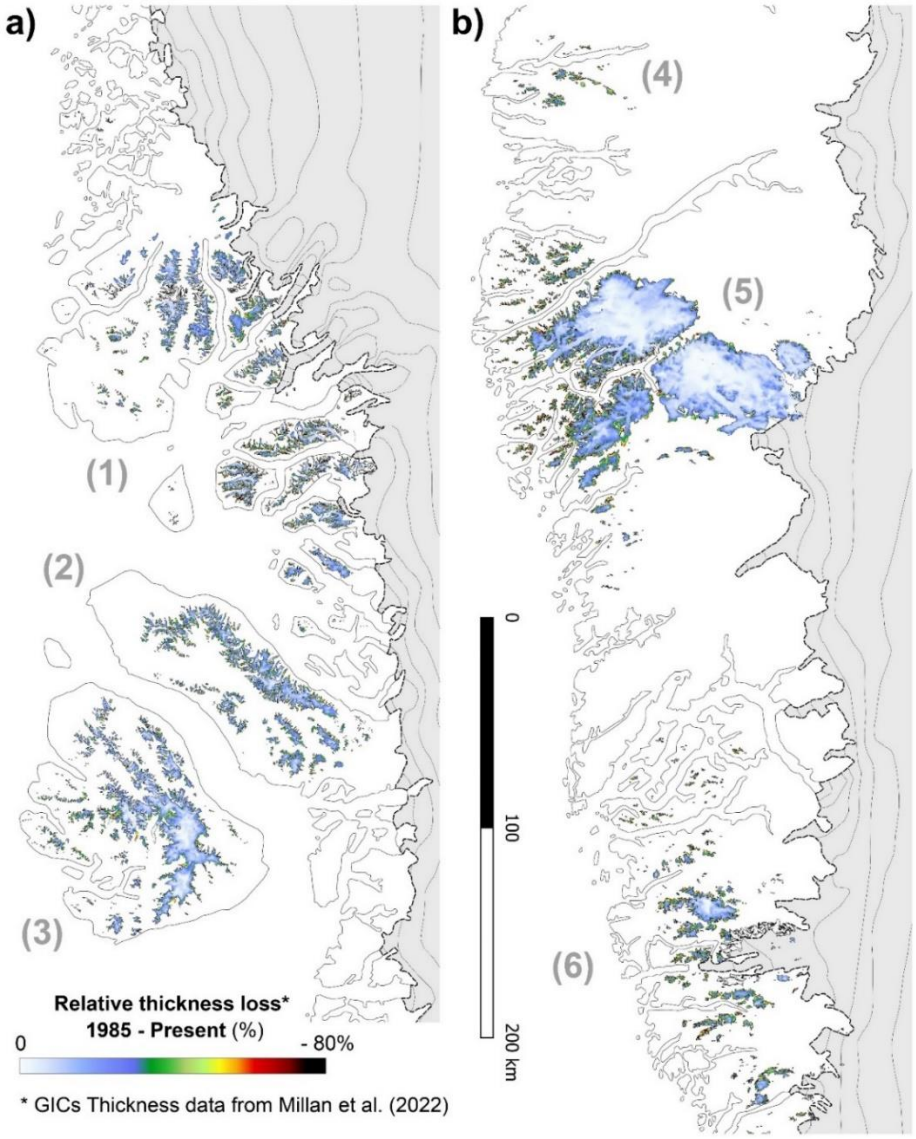

Fig. S8. *Relative thickness loss from 1985 to present calculated from Korsgard et al. (2016) DEM and ArcticDEM for zones 1-3 (a), 4-5 (b) and 6 (c). Ice thickness values are retrieved from Millan et al. (2022).*

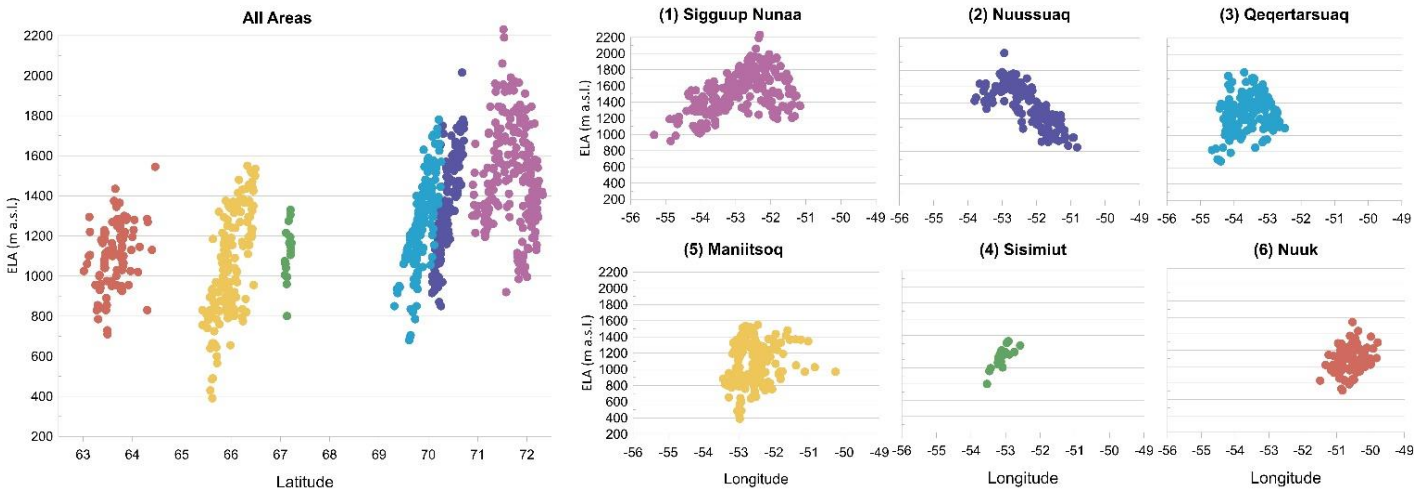

Fig. S9. *2018-2022 ELA_{AAR} of local glaciers and ice caps > 1 km^2 that have all 5 years of available data and Accumulation Area Ratio > 0, with their latitude and longitude information (centroids), divided by sector (1-6).*

	Surface Elevation Change uncertainty		**Mass Change uncertainty**
Zone	NMAD Mean (m)	NMAD St dev (m)	(m w.e.)
(1) Sigguup Nuna	5.2	2.2	4.6
(2) Nuussuaq	2.9	1.1	2.7
(3) Qeqertarsuaq	3.8	1.4	3.3
(4) Sisimiut	3.1	1.9	2.8
(5) Maniitsoq	4.3	2.1	3.8
(6) Nuuk	4.4	2.8	3.8
ALL	3.9	1.4	3.6

Table S1. Surface elevation change uncertainty: weighted mean and standard deviation of NMAD across slope bins (m) in the 6 sectors of the study area (Surface Elevation Change uncertainty); and mass change uncertainty that includes the 60 kg m^{-3} density conversion uncertainty.

	Satellite imagery dates for AAR and ELA calculation (2018-2022)					**Older data**
YYYY Month	2018 Aug.	2019 Aug.	2020 Aug.	2021 Aug.	2022 Aug.	1985
(1) Sigguup Nuna	16	18, 29	28, 30	05, 22	03	02 Jul. - 06 Aug.
(2) Nuussuaq	10, 21	13, 14	28, 30	22	05	10-23 Jul.
(3) Qeqertarsuaq	13	25, 29	28, 30	22	03	10-24 Jul.
(4) Sisimiut	10	18	22	22	21	10-26 Jul.
(5) Maniitsoq	05, 27	12	21, 22	21, 22	11	09 - 28 Jul.
(6) Nuuk	09	29	20, 22	23	Not used*	09 - 20 Jul.

Table S2. *Satellite imagery dates used for the calculation of Accumulation Area Ratio (AAR) and Equilibrium Line Altitude (ELA) from End of the Season Snowline accessed in Sentinel Hub (Project supported by ESA Network of Resources Initiative). *2022 imagery from Nuuk has not been used.*