Supporting Information for "Accelerated Greenland ice sheet mass loss under high greenhouse gas forcing as simulated by the coupled CESM2.1-CISM2.1"

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Table S1. Location of maximum for climatological (350-year and 20-year means) NAMOC for selected periods.

Simulation Years	Mean Latitude	Mean Depth (m)
Preindustrial (1-350)	57.26° N	757
131-150	56.13° N	657
331-350	53.56° N	503

Table S2. Trends in mass balance components (Gt yr^{-2}), from linear regression, for three simulation periods chosen in a way that the change between them is optimized. Mass Balance (MB) = Surface Mass Balance (SMB) - Ice Discharge (ID) - Basal Mass Balance (BMB). We do not discuss the BMB because it is very small.

Component	Period 1		Period 2		Period 3	
	Years	Trend	Years	Trend	Years	Trend
MB	1-119	-2.4	120-225	-11.3	226-350	-4.6
SMB	1-119	-3.5	120-225	-13.9	226-350	-5.4
ID	1-93	-0.9	94-218	-2.6	219-350	-0.9

Table S3. Retreat of terminus of major outlet glaciers. The terminus position is referenced to pre-industrial. N/A indicates that the glacier maintains a marine front throughout the simulation

Basin	Glacier	Terminus position. at year 350 (km)	Start retreat (year)	Transition to land margin (year)
NE	Nioghalvfjerdsfjord	-46	159	N/A
NE	Zachariae	-50	180	N/A
NO	Petermann	-36	246	N/A
NO	Humboldt	-60	184	311
SE	Kangerlussuaq	0	-	N/A
SE	Hellheim	0	-	N/A
CW	Jakobshavn	-20	271	N/A

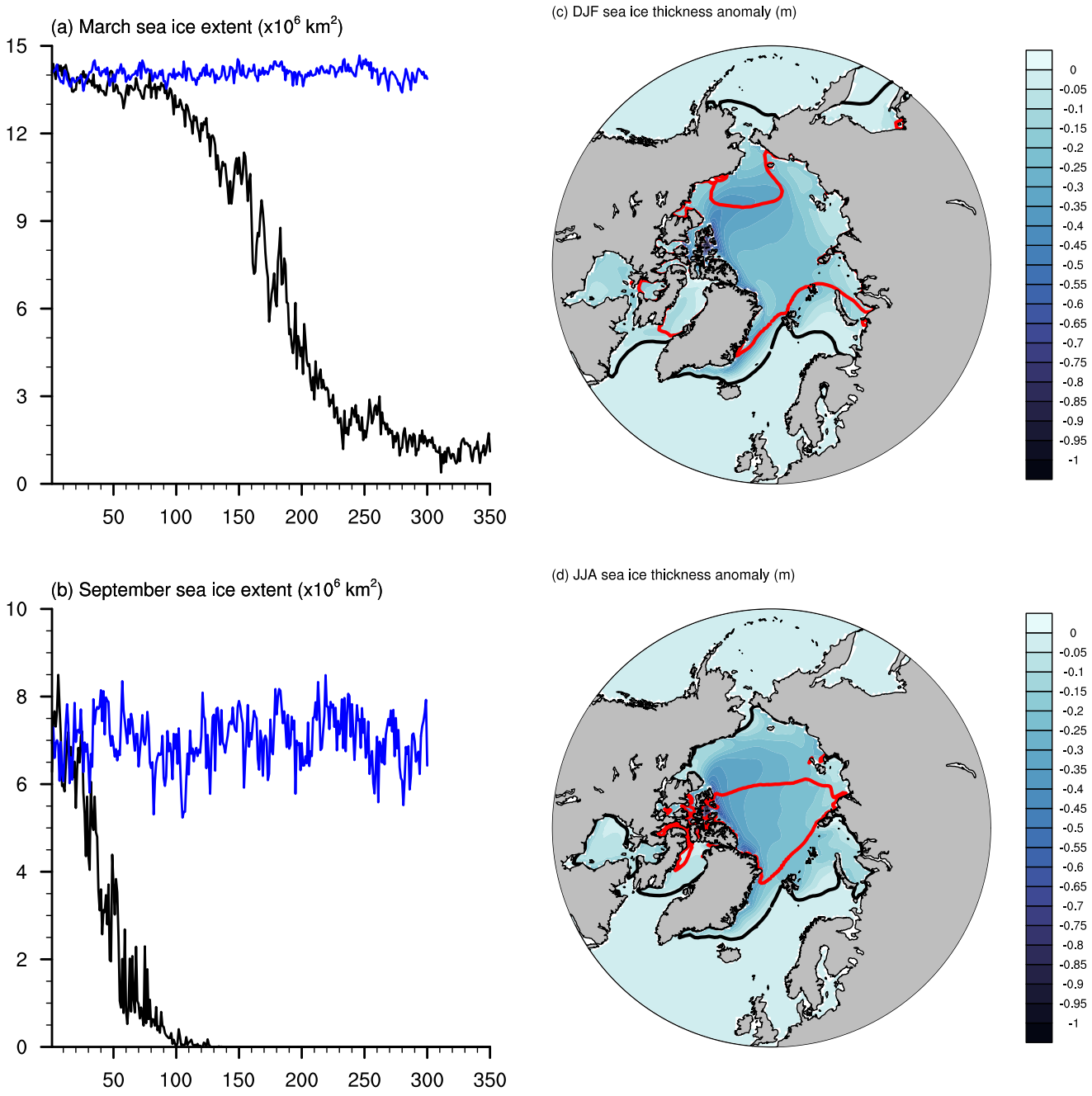

Figure S1. Time series of (a) March and (b) September sea ice extent (10e6 km^2) with pre-industrial (blue line) and 1% to 4xCO_2 (black line); and maps of (c) DJF and (d) JJA sea ice thickness anomalies (m) of the period 131-150 with respect to pre-industrial. Black and red lines represent the pre-industrial and 131-150 sea ice extent.

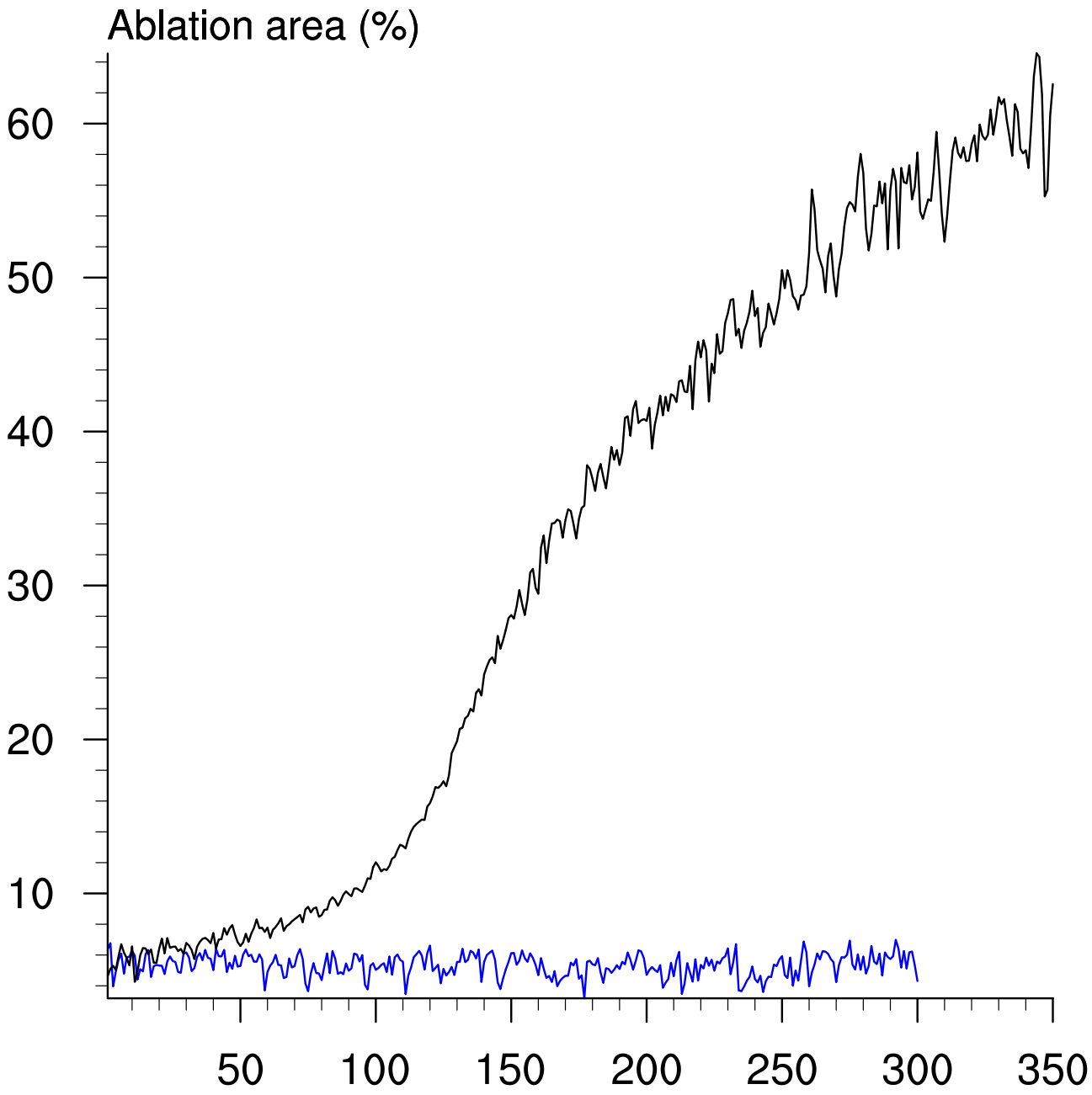

Figure S2. Time evolution of ablation area (% of total GrIS area).

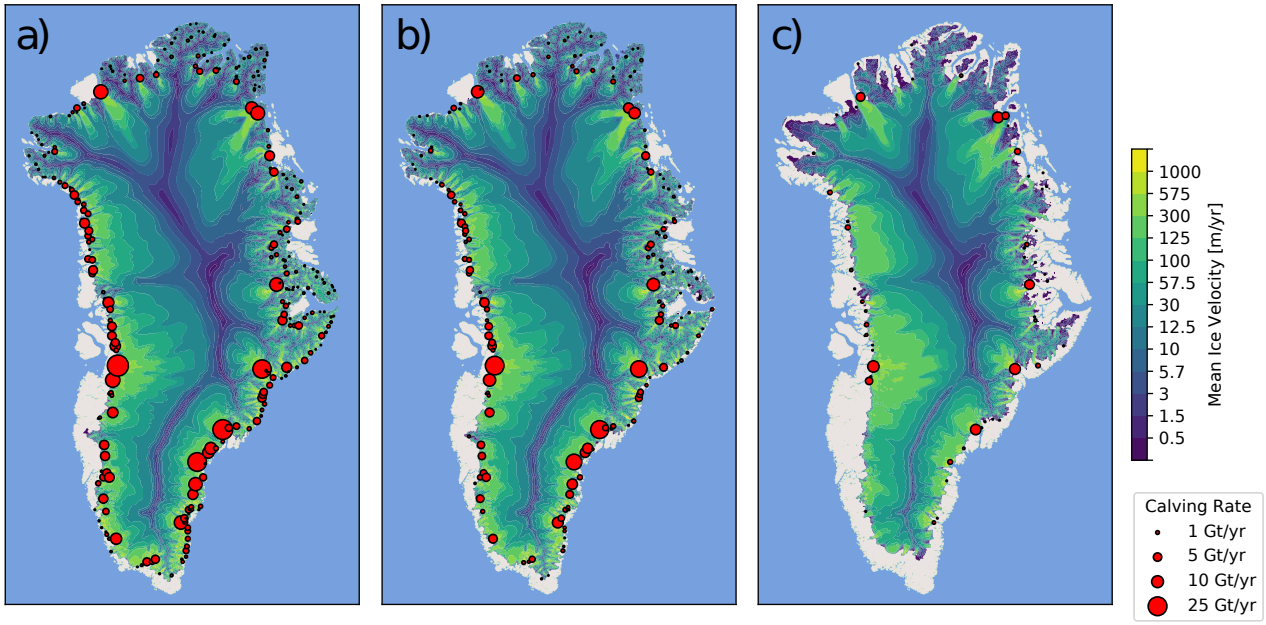

Figure S3. Ice discharge (Gt yr^{-1}), and surface velocity (m yr^{-1}) for: a) pre-industrial (1-300), b) years 131-150, and c) 331-350.

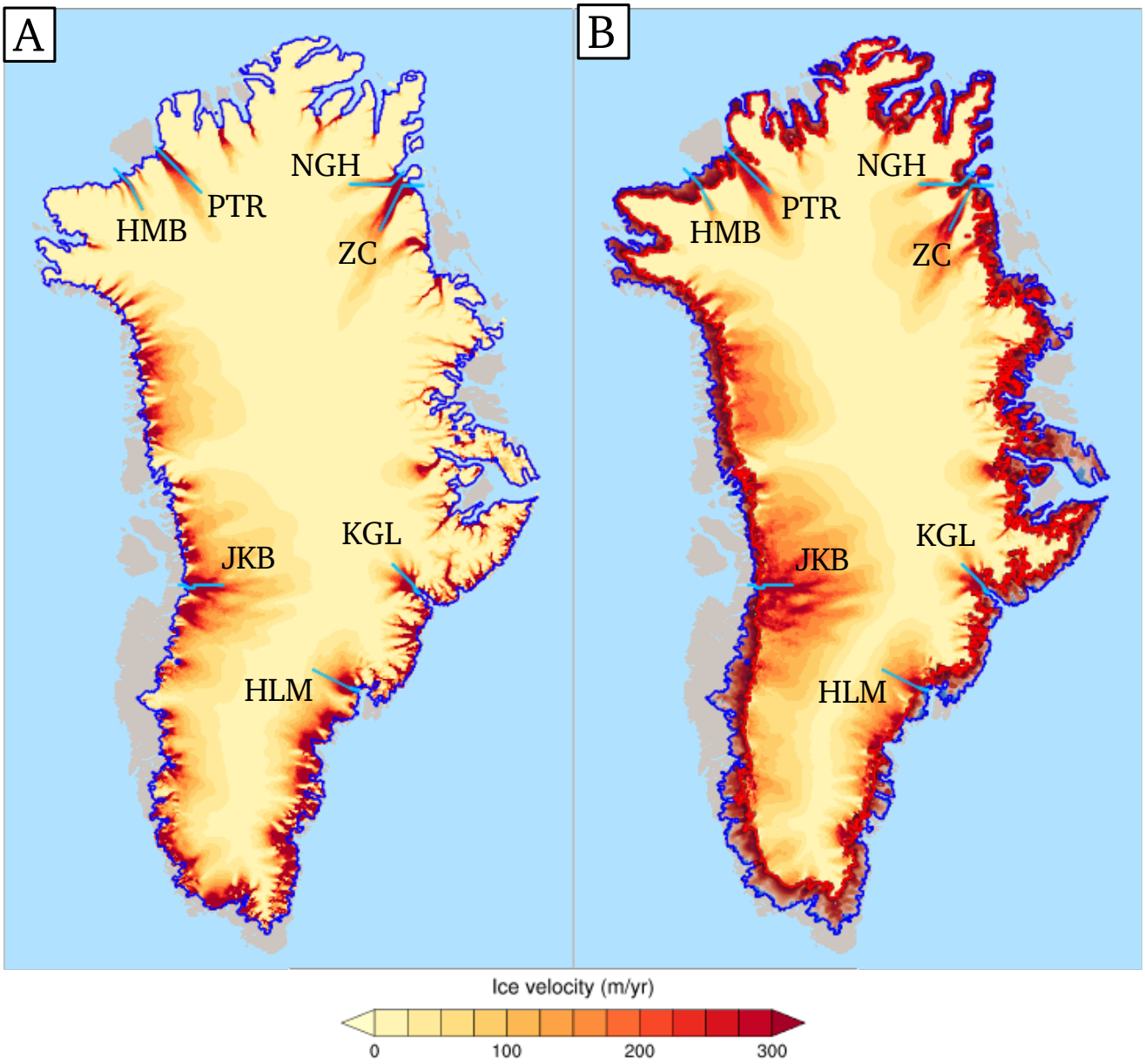

Figure S4. a) Map of initial ice velocity (m yr^{-1}); blue line indicates the initial ice margin position, whereas light blue lines indicate the transect considered for the outlet glaciers analysis in Figure 7. B) Map of ice velocity in year 350 (m yr^{-1}); blue and light blue lines as in the left panel, light to dark red shading between the initial and final margin indicate the ice margin position throughout the simulation (see time label bar in Figure 7).

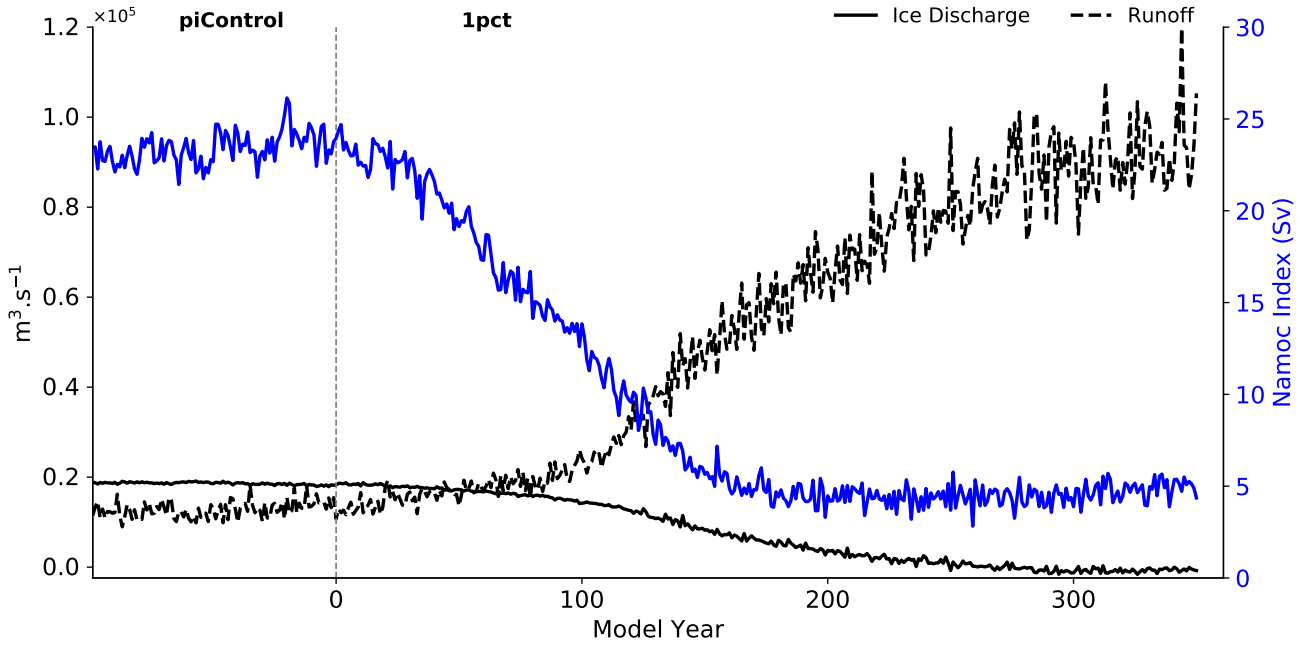

Figure S5. Comparison of evolution of solid (solid) and liquid (dashed) freshwater fluxes from the GrIS ($m^3\ s^{-1}$, black lines), and NAMOC index (Sv, blue line). Solid fluxes correspond to ice discharge; liquid fluxes are the sum of runoff and basal melt as computed by the land model and the ice sheet model, respectively.

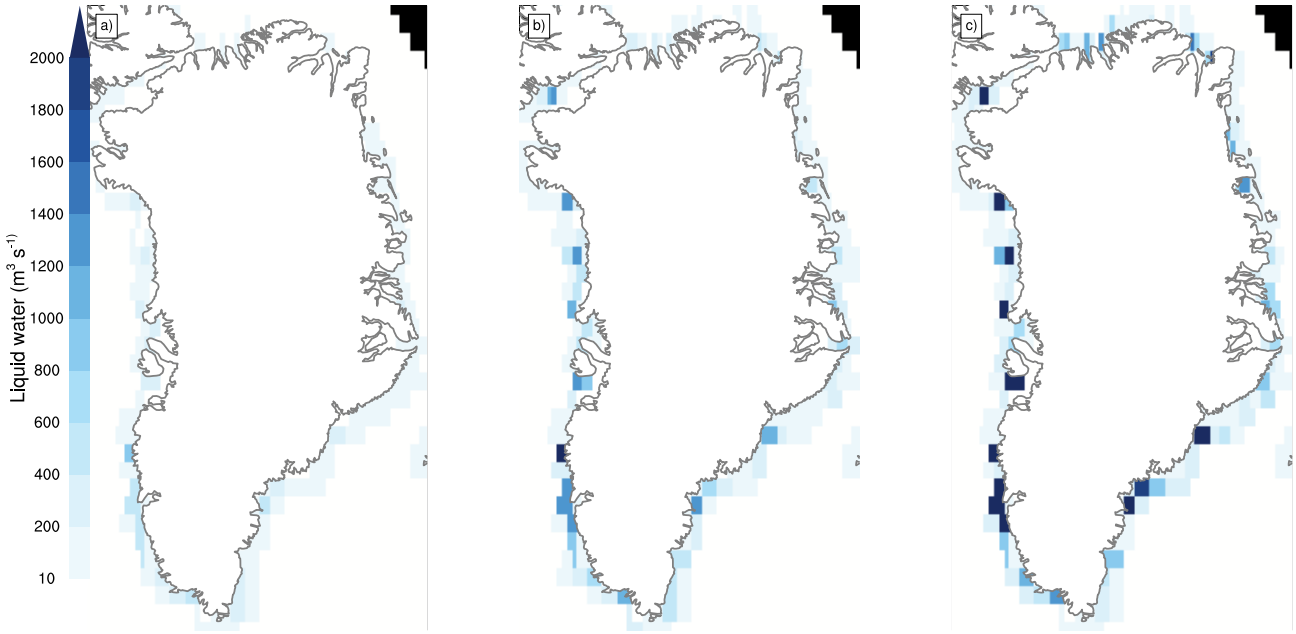

Figure S6. Annual mean liquid freshwater flux from Greenland Ice Sheet (m^3 s^{-1}) in a) pre-industrial (1-300), b) years 131-150, and c) 331-350. The flux is calculated as the sum of runoff from surface melt and a relatively small contribution from basal melt of grounded ice.