## Supplement

## **Teleconnections:**

All teleconnection indices used in the discussion are the definitions from the NOAA Climate Prediction Centre. Only a brief description is given here. Refer

to <u>https://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily\_ao\_index/history/history.shtml</u> for data and description of the methods used. The North Atlantic Oscillation is a normalised mean sea-level pressure (MSLP) index between two observation stations located in the Azores and in Iceland (Jones et al 1997, Hanna et al 2014b). NAO indices are related to the Arctic Oscillation (AO), which is defined as the first EOF of atmospheric pressure variability north of 20°N (Thompson and Wallace, 1998, Hanna et al 2014b). The NAO is also negatively correlated to the Greenland Blocking Index (GBI): the area-averaged 500hPa geopotential height over the majority of Greenland (60-80°N, 60-20°W). Finally, the East Atlantic (EA) index, in connection with the NAO, is a further teleconnection identified as being important for the climate in the northeast of Greenland by Lim et al (2016). The EA is the second prominent mode of variability for the North Atlantic, which has a similar, but southward shifted, structure as the NAO. Monthly GBI data were taken from https://psl.noaa.gov/gcos\_wgsp/Timeseries/GBI\_UL/.

## WRF setup

Table S1: Select physics options used in the PWRF simulations by Turton et al. (2020).

Physics option	Selected scheme
Land surface model	Noah LSM
Microphyises	Morrison two moment scheme
Surface layer physics	Eta similarity scheme
Boundary layer scheme	Yonsei University Scheme (YSU)
Convection	Kain-Fritsch scheme in D01
Radiation scheme	Rapid Radiative Transfer Model (RRTM) longwave and Goddard
	shortwave.
Fractional sea ice	On



Figure S1: A zoomed in section of Figure 1b highlighting the surface rivers and linear SGLs on the tongue of 79°N Glacier. Image from Sentinel 2b on July 31<sup>st</sup> 2019.



Figure S2: The SMB the week preceding July 21<sup>st</sup> 2017 (a) and August 17<sup>th</sup> 2017 (b) and the difference in SMB between them (c).