Brief communication: Impact of the recent atmospheric circulation change in summer on the future surface mass balance of the Greenland ice sheet

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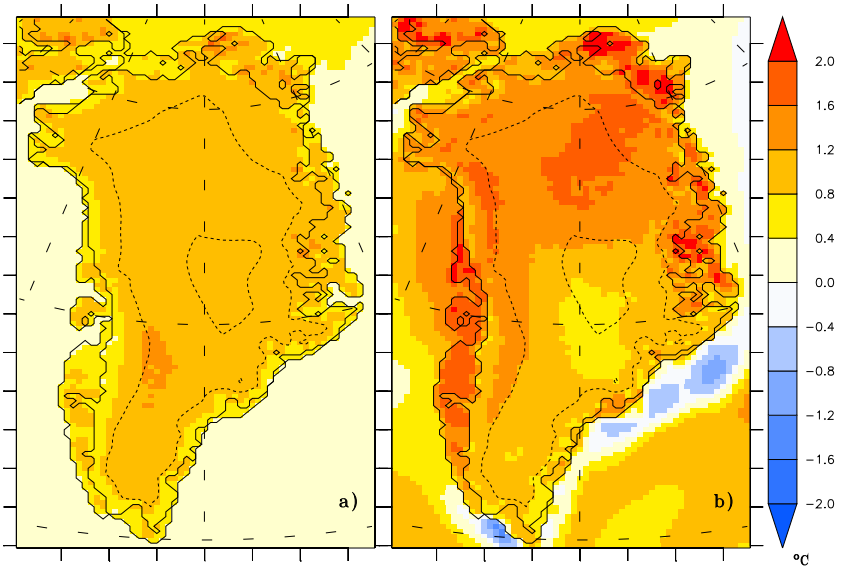

Figure S1. Mean anomalies of JJA near-surface temperature (°C) of MAR forced with ERA-Interim warmer of +1 °C over a) 1980 – 1999 and b) 2000 – 2016 compared to MAR forced with unaltered ERA-Interim over 1980 – 1999. Dashed lines are equal altitude lines of 2000 m and 3000 m.

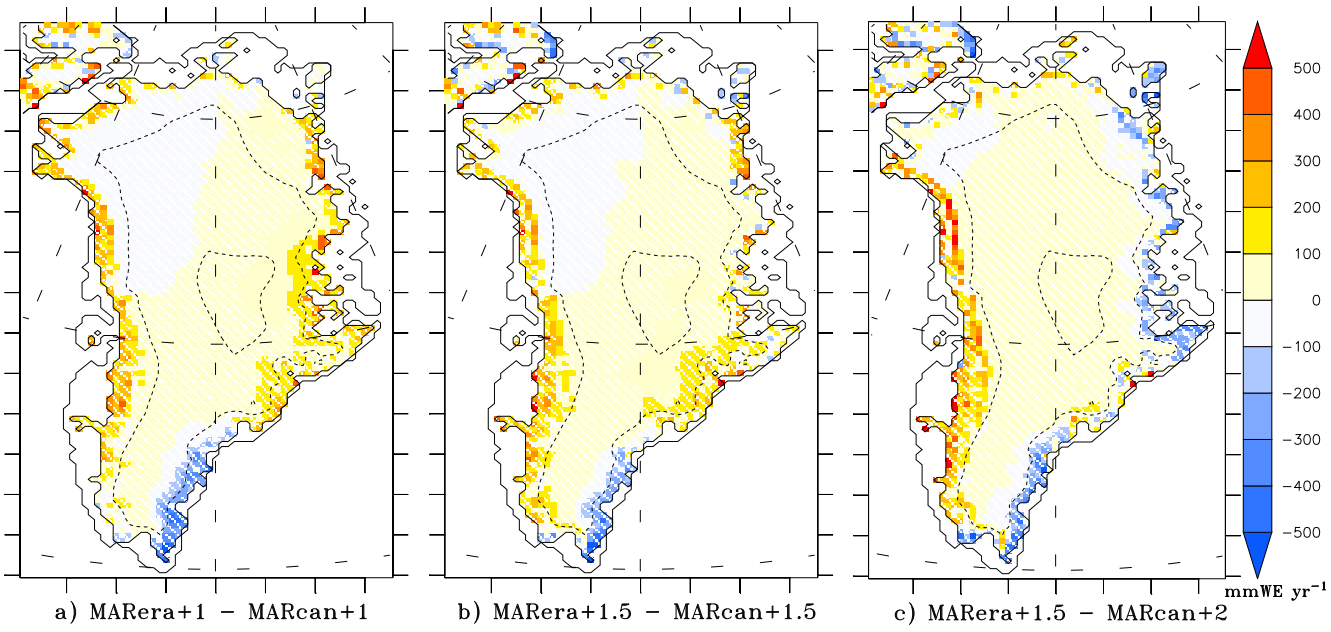

Figure S2. Differences of mean anomalies of annual SMB (in mmWE y^{-1}) between a) MARera+1 and MARcan+1, b) MARera+1.5 and MARcan+1.5 and c) MARera+2 and MARcan+2. Areas where anomaly differences are smaller than the inter-annual variability (i.e. the standard deviation) of the simulation of MAR forced by unaltered ERA-Interim over 1980 – 1999 are hatched. Dashed lines are equal altitude lines of 2000 m and 3000 m. See Table S1 and Table S2 for abbreviations.

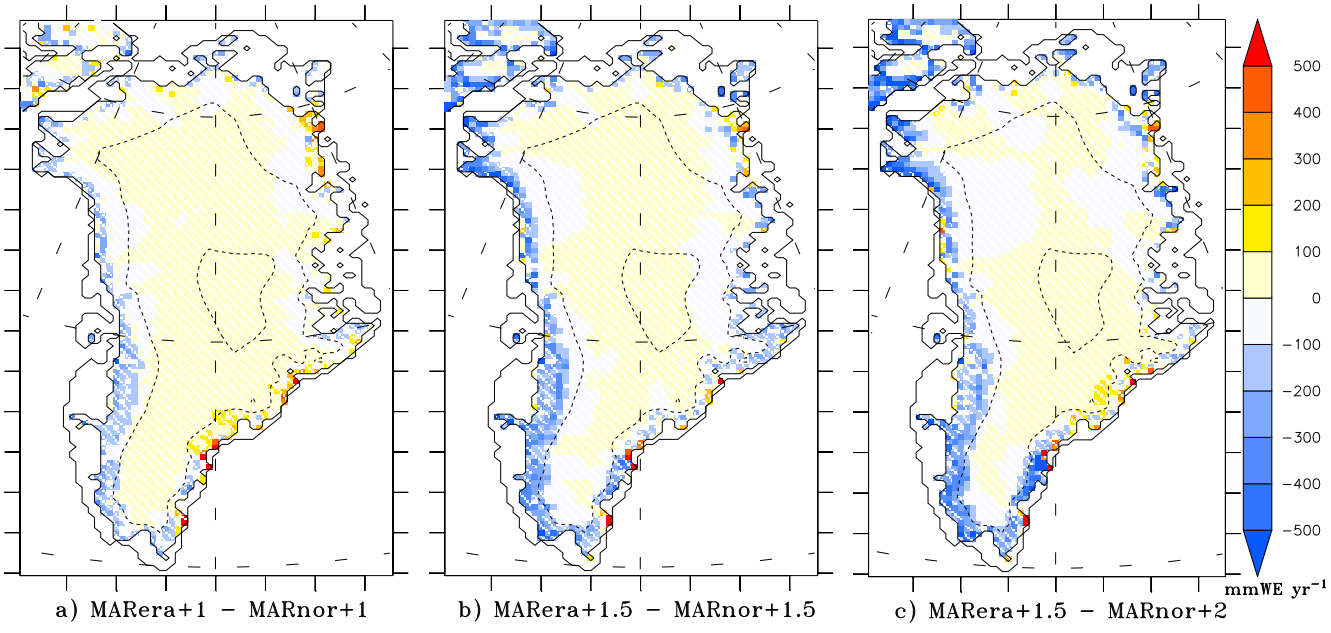

Figure S3. Same as Fig. S2 but for MARnor+x where x equals 1,1.5 or 2.

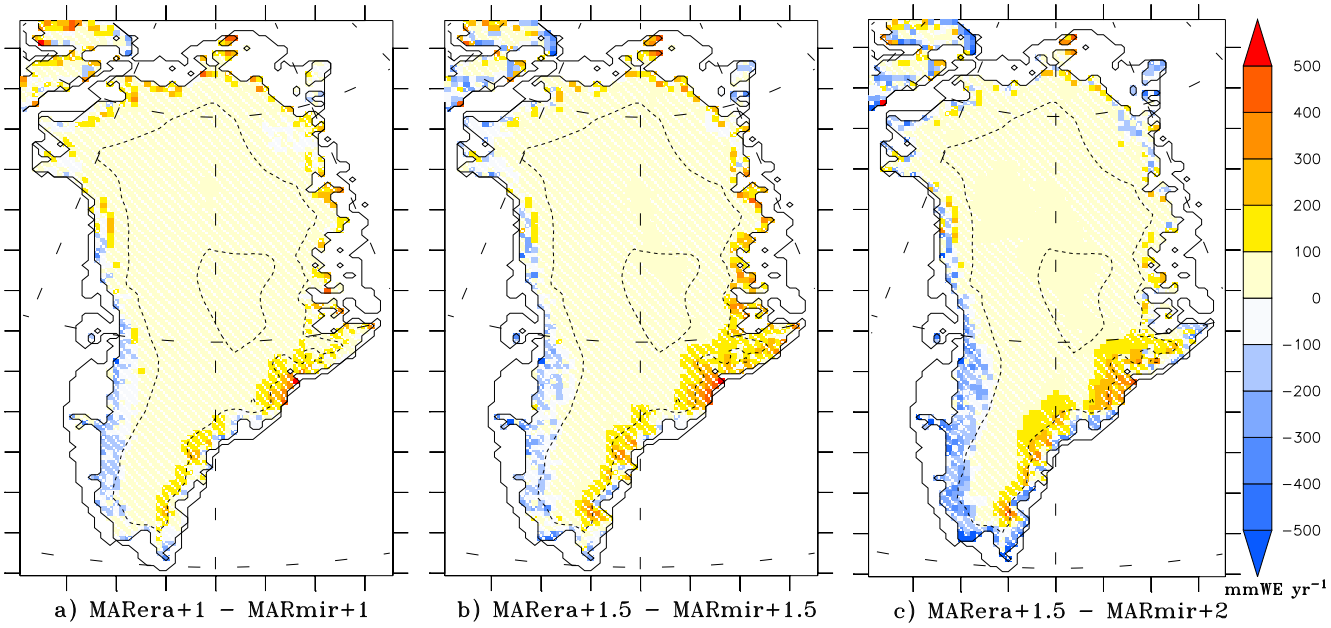

Figure S4. Same as Fig. S2 but for MARmir+x where x equals 1,1.5 or 2.

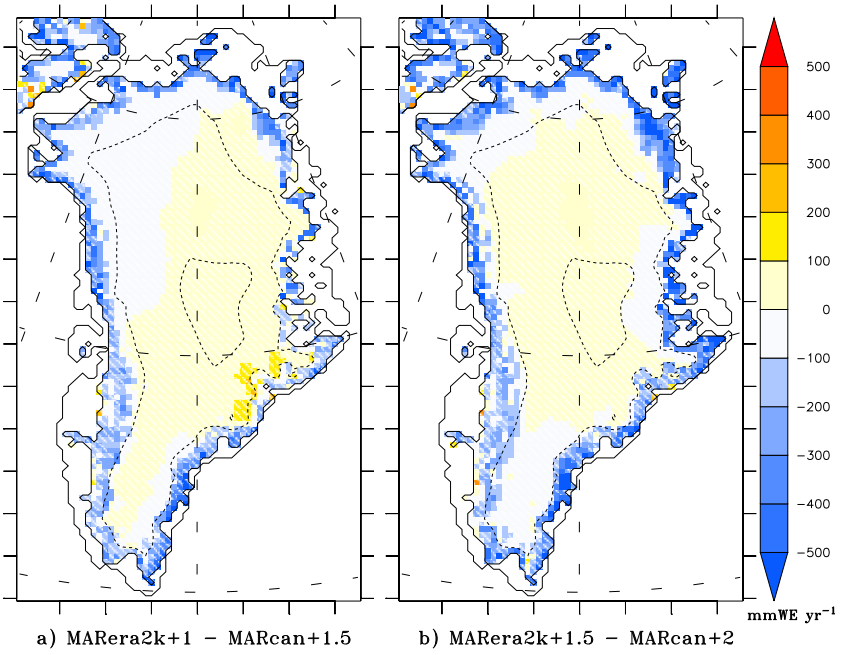

Figure S5. Differences of mean anomalies of annual SMB (in mmWE y^{-1}) between a) MARera2K+1 and MARcan+1.5 and b) MARera2K+1.5 and MARcan+2. Areas where anomaly differences are smaller than the inter-annual variability (i.e. the standard deviation) of the simulation of MAR forced by unaltered ERA-Interim over 1980 – 1999 are hatched. Dashed lines are equal altitude lines of 2000 m and 3000 m. See Table S1 and Table S2 for abbreviations.

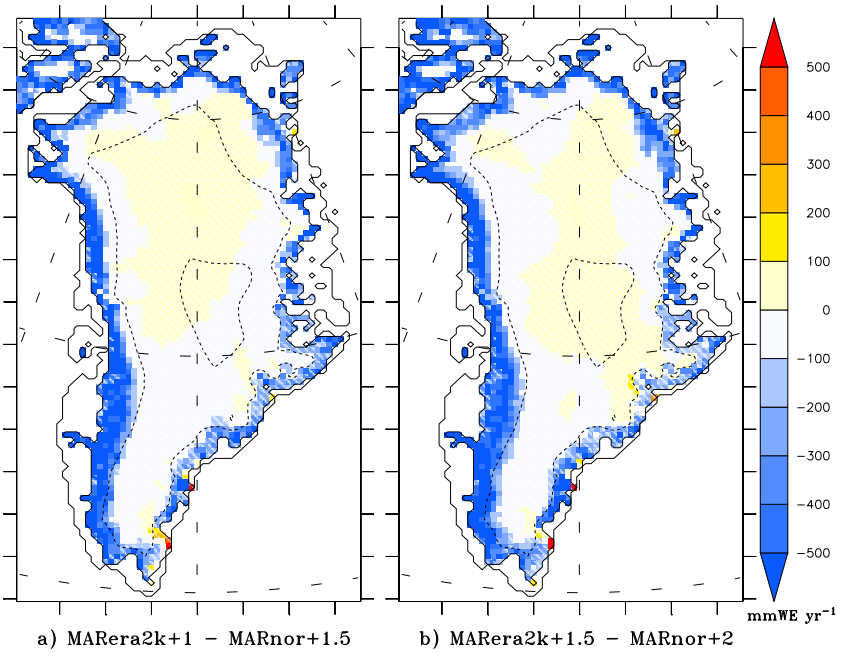

Figure S6. Same as Fig. S5 but for MARnor+x where x equals 1.5 or 2.

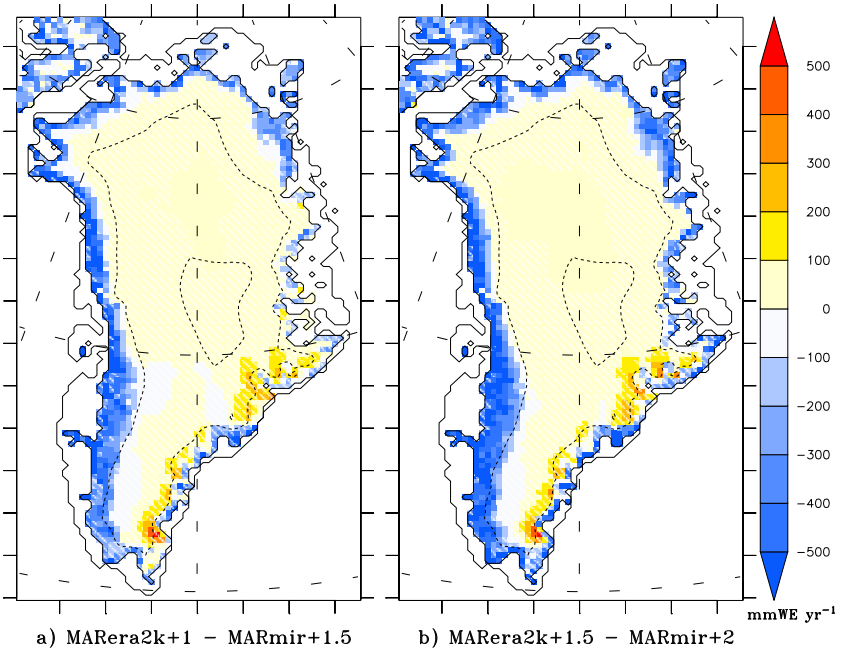

Figure S7. Same as Fig. S5 but for MARmir+x where x equals 1.5 or 2.

Table S1. Abbreviation description of reanalysis sensitivity experiments

MARera+1	Anomalies between MAR forced with the ERA-Interim reanalysis warmer of +1 °C over 1980 – 1999 and MAR forced with the unaltered ERA-Interim reanalysis over 1980 – 1999
MARera+1.5	Anomalies between MAR forced with the ERA-Interim reanalysis warmer of +1.5 °C over 1980 – 1999 and MAR forced with the unaltered ERA-Interim reanalysis over 1980 – 1999
MARera+2	Anomalies between MAR forced with the ERA-Interim reanalysis warmer of +2 °C over 1980 – 1999 and MAR forced with the unaltered ERA-Interim reanalysis over 1980 – 1999
MARera2k	Anomalies between MAR forced with the ERA-Interim over 2000 – 2016 and MAR forced with the unaltered ERA-Interim reanalysis over 1980 – 1999
MARera2k+1	Anomalies between MAR forced with the ERA-Interim reanalysis warmer of +1 °C over 2000 – 2016 and MAR forced with the unaltered ERA-Interim reanalysis over 1980 – 1999
MARera2k+1.5	Anomalies between MAR forced with the ERA-Interim reanalysis warmer of +1.5 °C over 2000 – 2016 and MAR forced with the unaltered ERA-Interim reanalysis over 1980 – 1999
MARera2k+2	Anomalies between MAR forced with the ERA-Interim reanalysis warmer of +2 °C over 2000 – 2016 and MAR forced with the unaltered ERA-Interim reanalysis over 1980 – 1999

Table S2. Abbreviation description of GCM sensitivity experiments

MARmir+1	Anomalies between MAR forced with MIROC5 over a warmer 20-yr period of +1 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period
MARmir+1.5	Anomalies between MAR forced with MIROC5 over a warmer 20-yr period of +1.5 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period
MARmir+2	Anomalies between MAR forced with MIROC5 over a warmer 20-yr period of +2 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period
MARnor+1	Anomalies between MAR forced with NorESM1 over a warmer 20-yr period of +1 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period
MARnor+1.5	Anomalies between MAR forced with NorESM1 over a warmer 20-yr period of +1.5 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period
MARnor+2	Anomalies between MAR forced with NorESM1 over a warmer 20-yr period of +2 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period
MARcan+1	Anomalies between MAR forced with CanESM2 over a warmer 20-yr period of +1 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period
MARcan+1.5	Anomalies between MAR forced with CanESM2 over a warmer 20-yr period of +1.5 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period
MARcan+2	Anomalies between MAR forced with CanESM2 over a warmer 20-yr period of +2 °C relatively to the reference period 1980 – 1999 and MAR forced with MIROC5 over the reference period