Climate
of the Past

Supplement of

Using a multi-layer snow model for transient paleo-studies: surface mass balance evolution during the Last Interglacial

Thi-Khanh-Dieu Hoang et al.

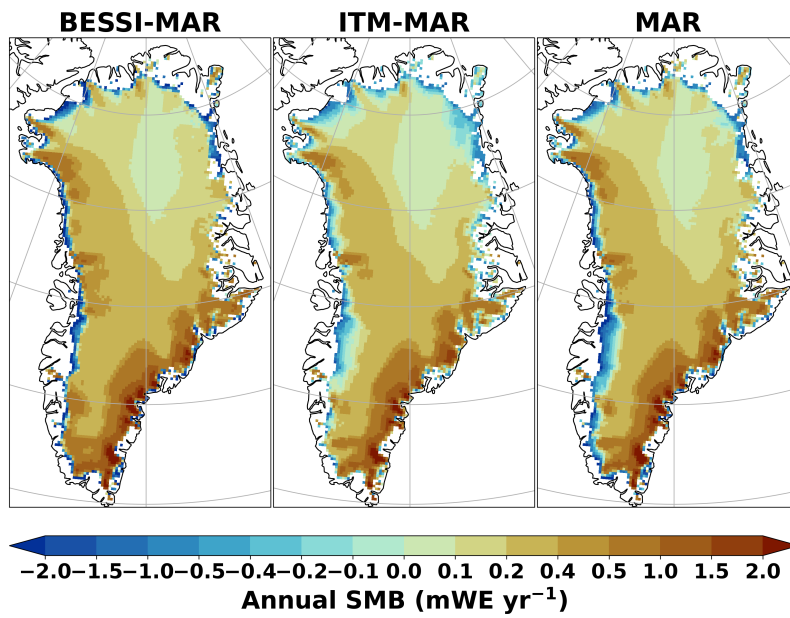*Correspondence to:* Thi-Khanh-Dieu Hoang (dieu.hoang@lsce.ipsl.fr)

Figure S1. Annual mean SMB values (in mWE yr⁻¹) of BESSI-MAR and ITM-MAR compared to MAR for Greenland Ice Sheet.
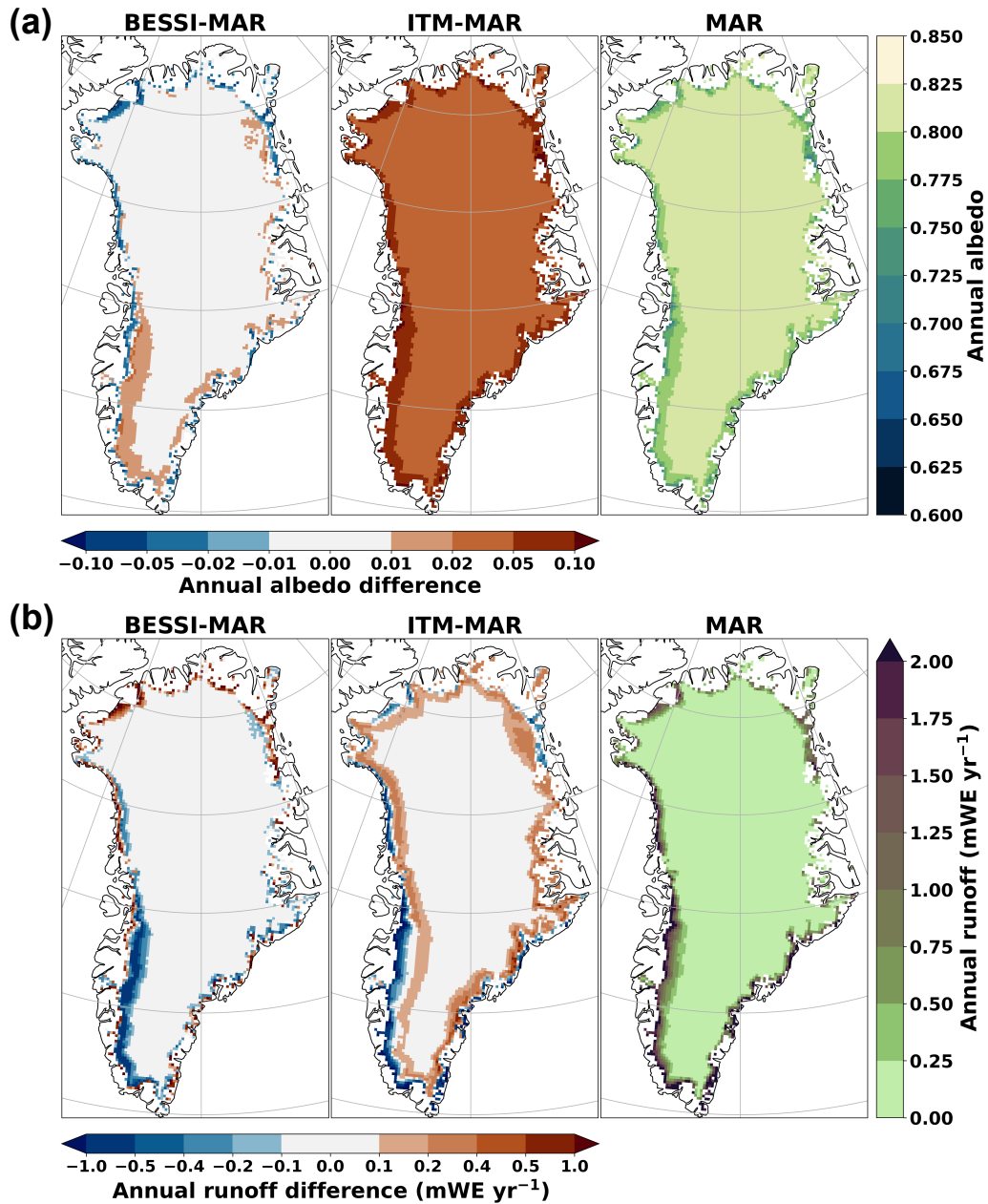
Figure S2. Annual anomalies (in mWE yr^{-1}) of BESSI-MAR and ITM-MAR with respect to MAR in term of (**a**) albedo and (**b**) runoff for Greenland Ice Sheet. The reference, MAR, is shown in absolute annual values.
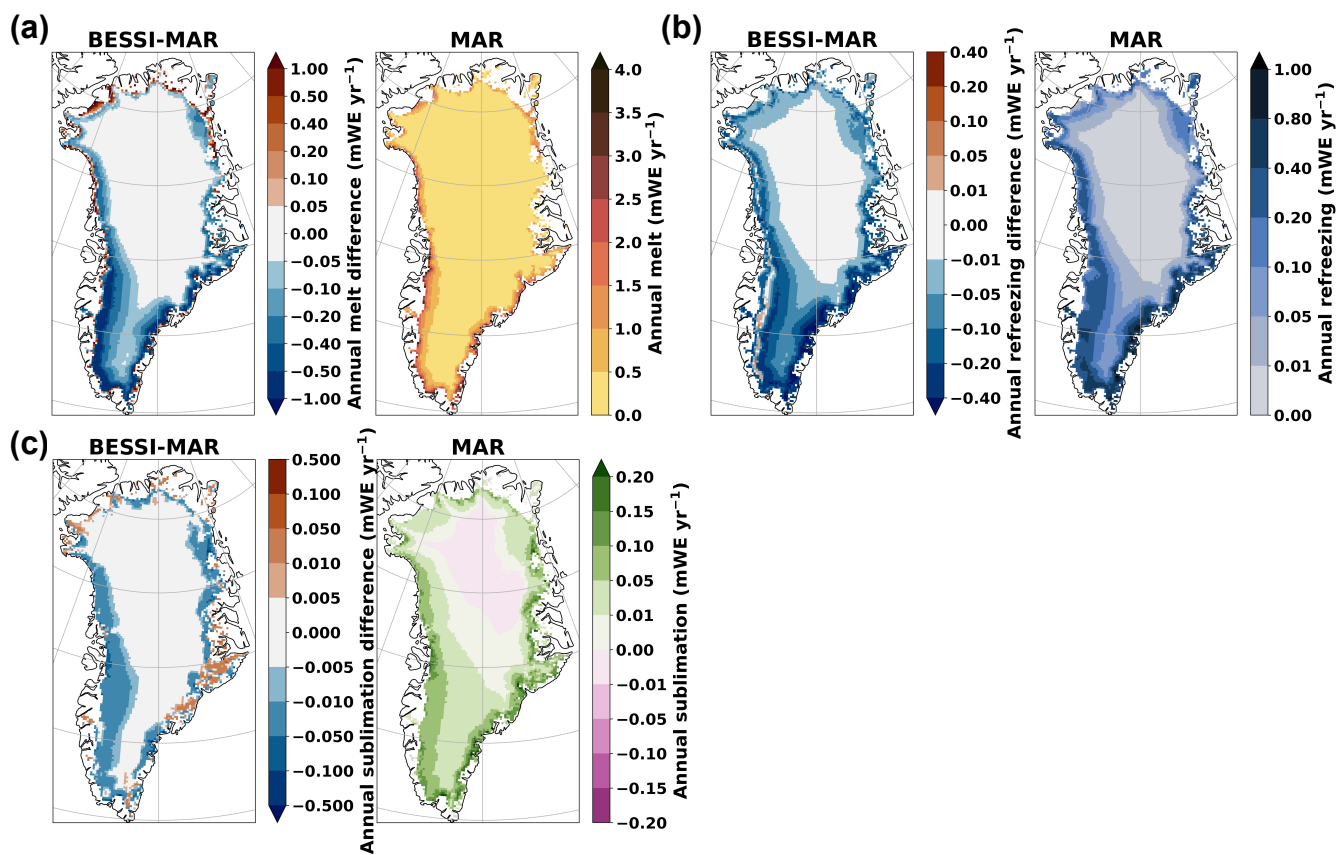
Figure S3. Comparison of BESSI-MAR to MAR in term of annual (**a**) melt, (**b**) refreezing and (**c**) sublimation (in mWE yr^{-1}) for Greenland Ice Sheet. The reference, MAR, is shown in absolute annual values.
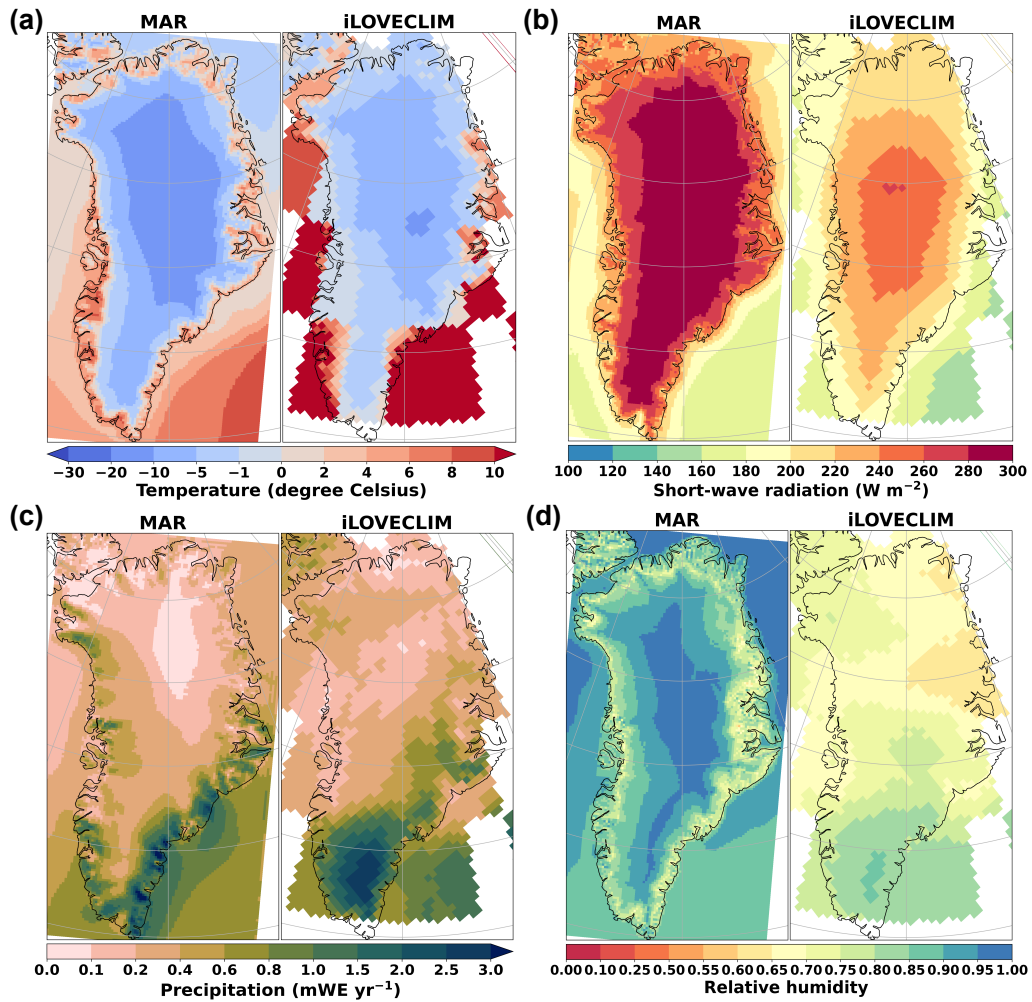
Figure S4. Mean value of climate variables including (**a**) summer temperature (in degree Celsius), (**b**) summer shortwave radiation (in W m^{-2}), (**c**) annual precipitation (in mWE yr^{-1}) and (**d**) annual relative humidity of MAR and *i*LOVECLIM for Greenland Ice Sheet. The summer months here are June-July-August (JJA).
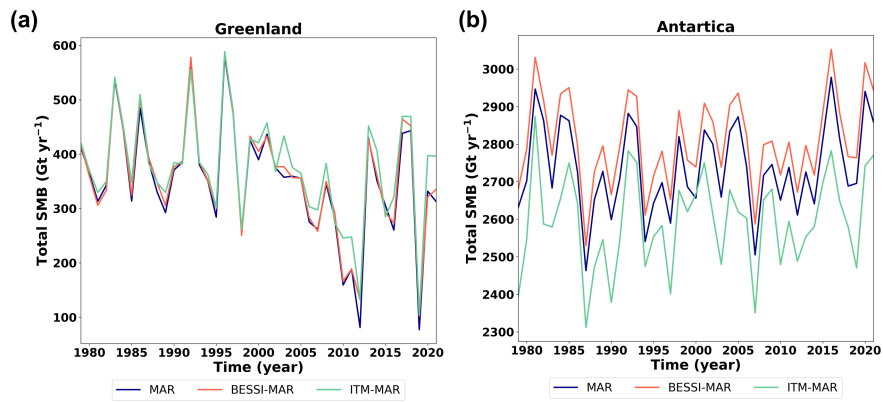
Figure S5. Temporal variation of the yearly mean total SMB integrated on present-day ice sheet extent (in Gt yr^{-1}) during 1979-2021 of MAR, BESSI-MAR and ITM-MAR for (**a**) Greenland and (**b**) Antarctica.
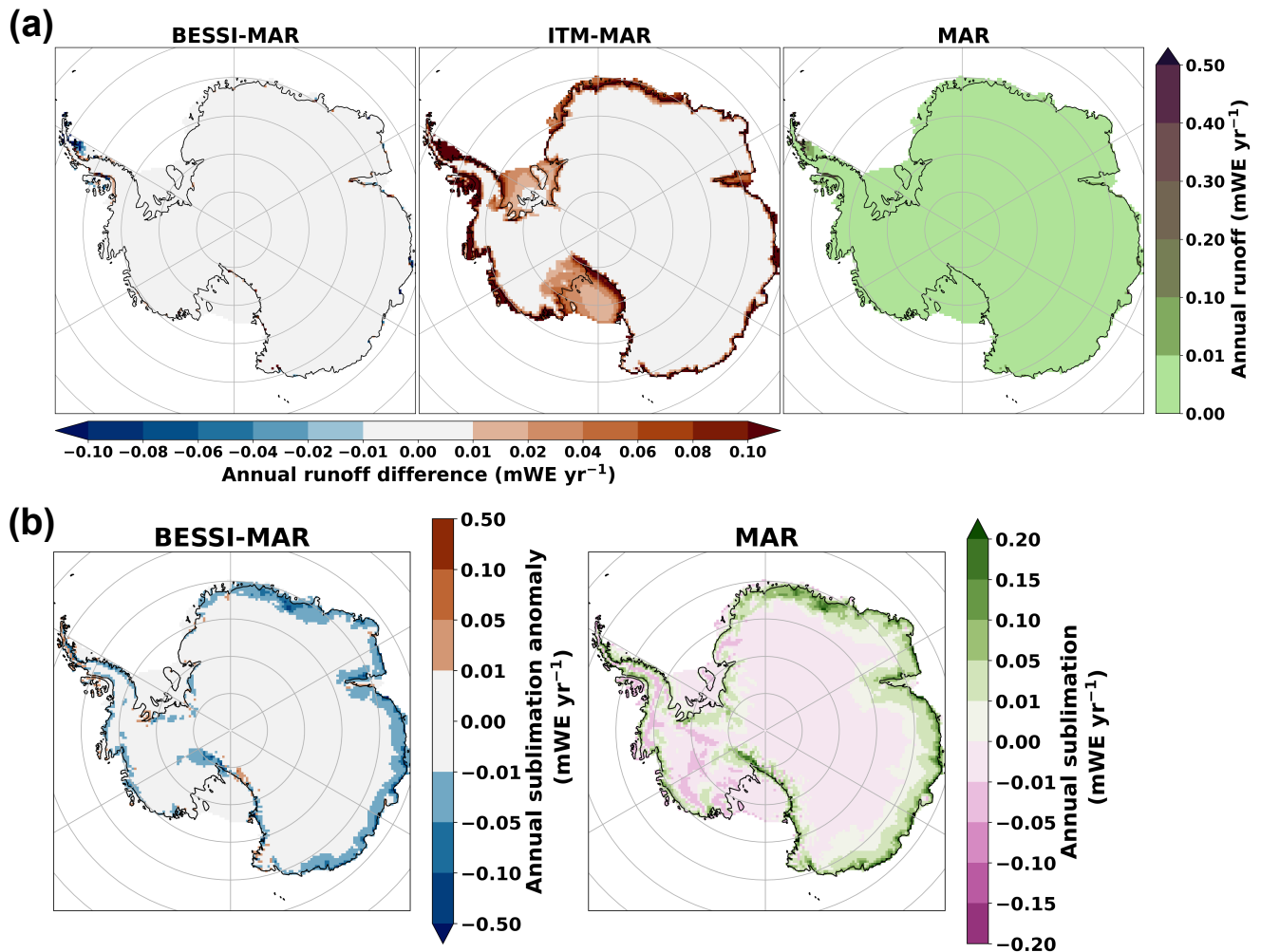
Figure S6. Annual anomalies (in mWE yr⁻¹) of BESSI-MAR and ITM-MAR with respect to MAR in term of (**a**) runoff and (**b**) sublimation for Antarctic Ice Sheet. The reference, MAR, is shown in absolute annual values.
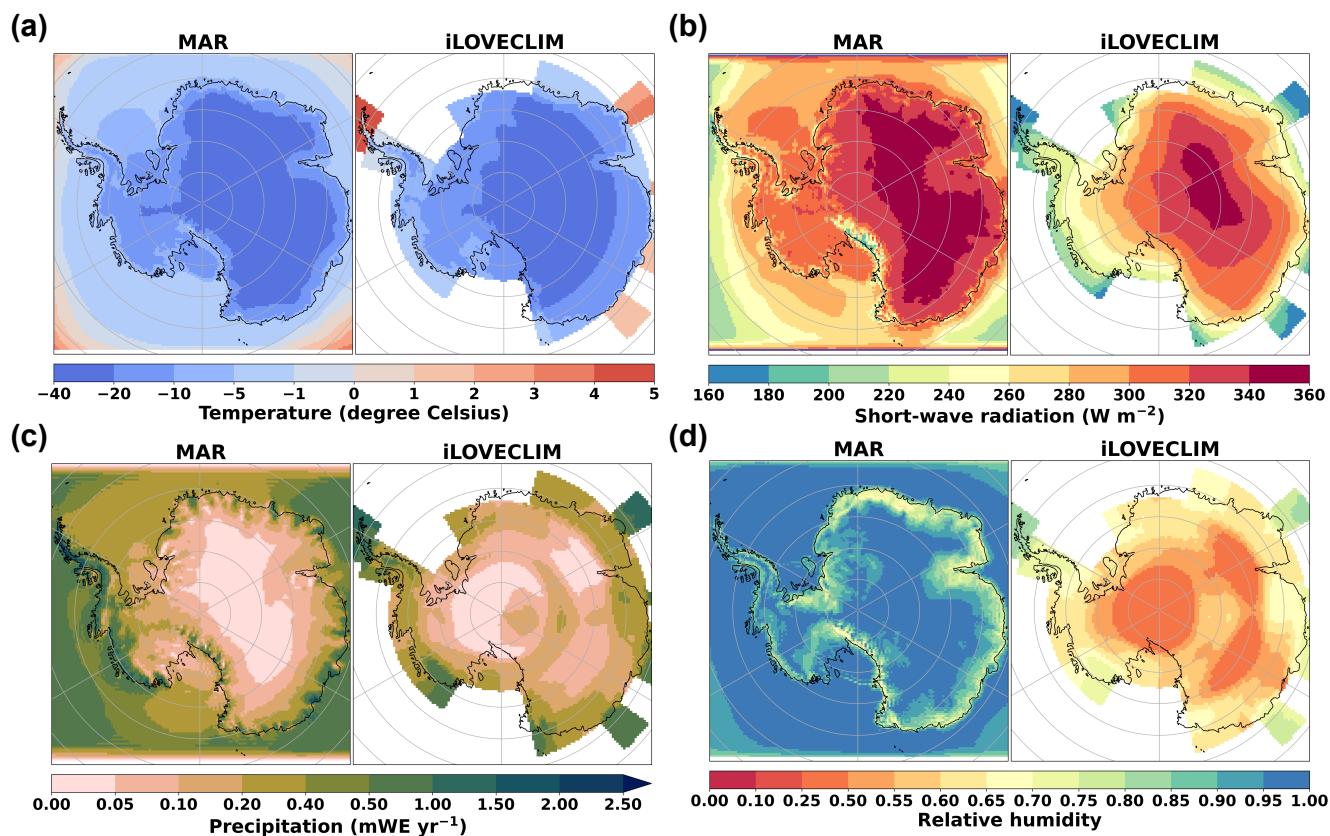
Figure S7. Mean value of climate variables including (**a**) summer temperature (in degree Celsius), (**b**) summer shortwave radiation (in W m^{-2}), (**c**) annual precipitation (in mWE yr^{-1}) and (**d**) annual relative humidity of MAR and *i*LOVECLIM for Antarctic Ice Sheet. The summer months here are December-January-February (DJF).
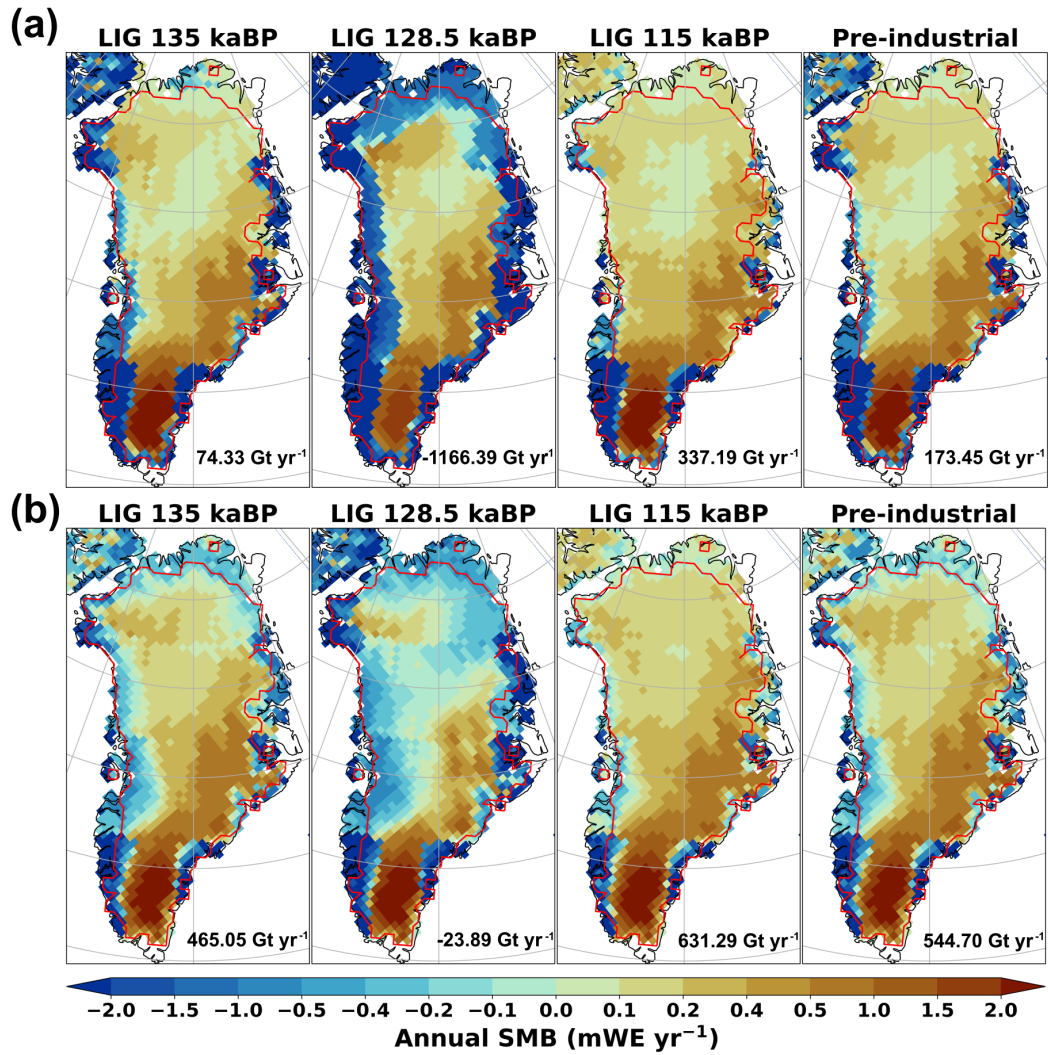
Figure S8. Annual mean SMB (in mWE yr^{-1}) of several LIG time slices (135, 128.5 and 115 kaBP) and the pre-industrial simulation of (**a**) BESSI-*i*LOVECLIM and (**b**) ITM-*i*LOVECLIM for Greenland Ice Sheet. The total SMB (Gt yr^{-1}) integrated for the present-day ice sheet extent (red line) is also included.
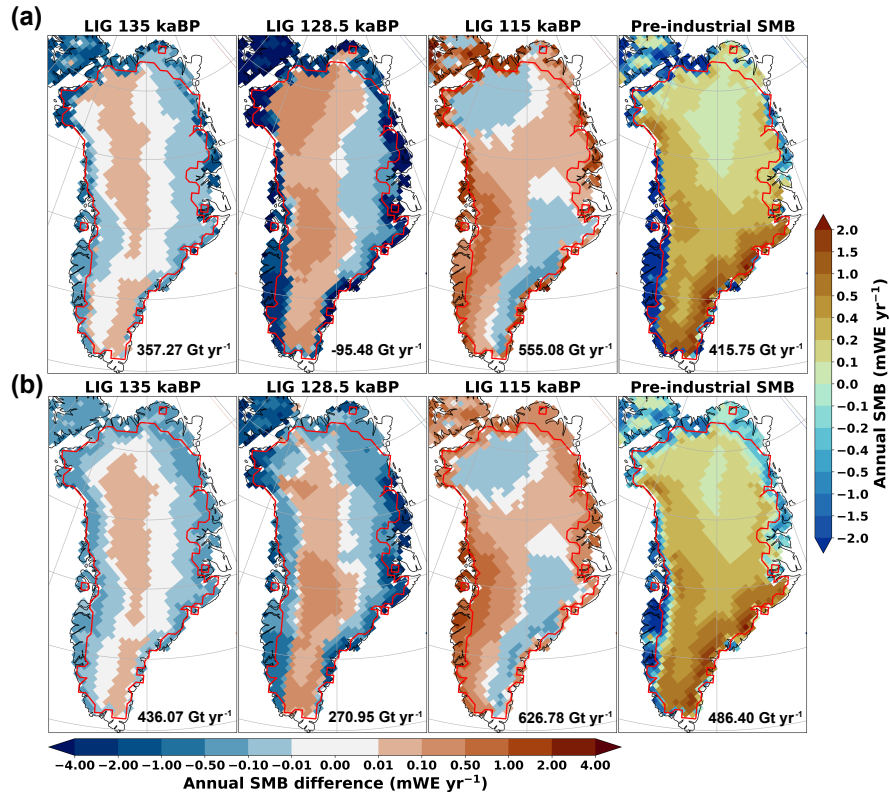
Figure S9. Annual mean SMB anomalies (in mWE yr^{-1}) between several LIG time slices (135, 128.5 and 115 kaBP) and the pre-industrial simulation of (**a**) BESSI-*i*LOVECLIM and (**b**) ITM-*i*LOVECLIM after bias correction for Greenland Ice Sheet. The total SMB (Gt yr^{-1}) integrated for the present-day ice sheet extent (red line) of each simulation is also included.
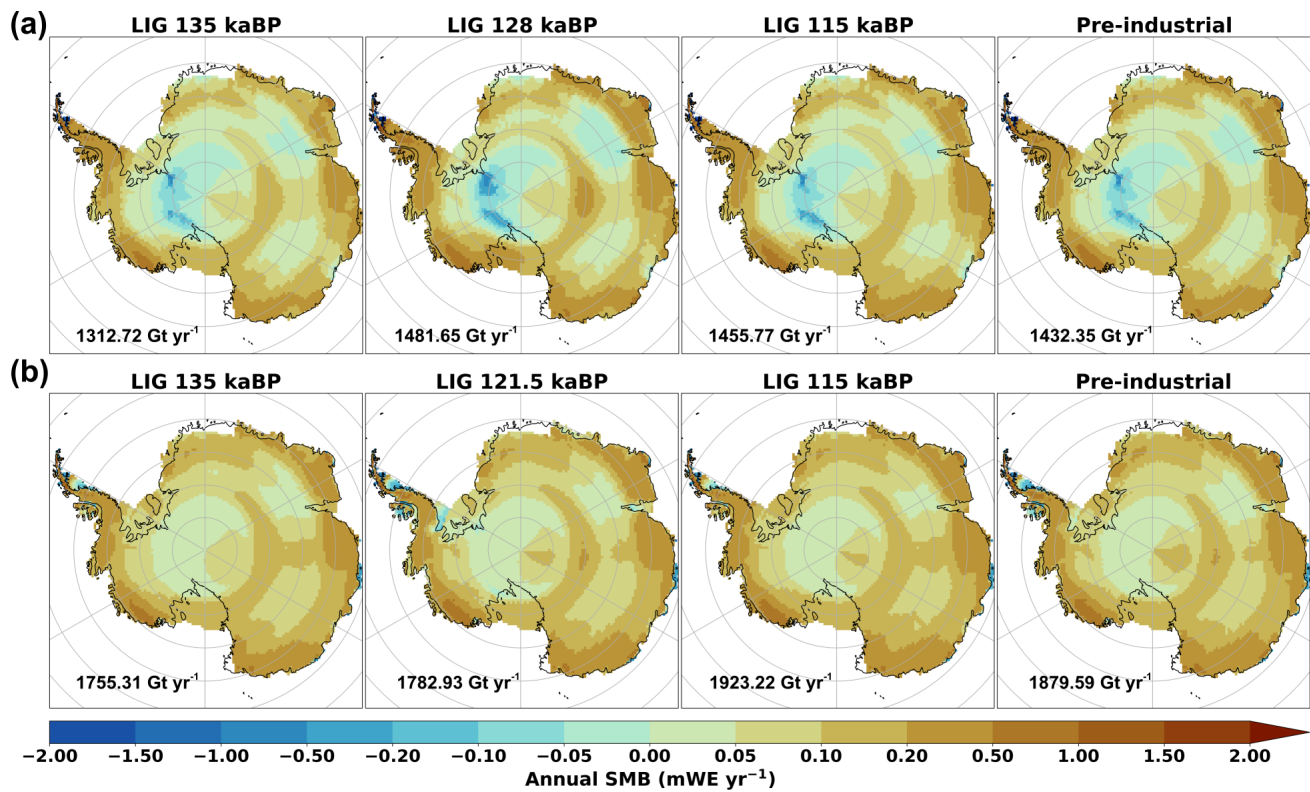
Figure S10. Annual mean SMB (in mWE yr⁻¹) of several LIG time slices and the pre-industrial simulation of (**a**) BESSI-*i*LOVECLIM and (**b**) ITM-*i*LOVECLIM for Antarctic Ice Sheet. The total SMB (Gt yr⁻¹) integrated for the present-day ice sheet extent is also included.
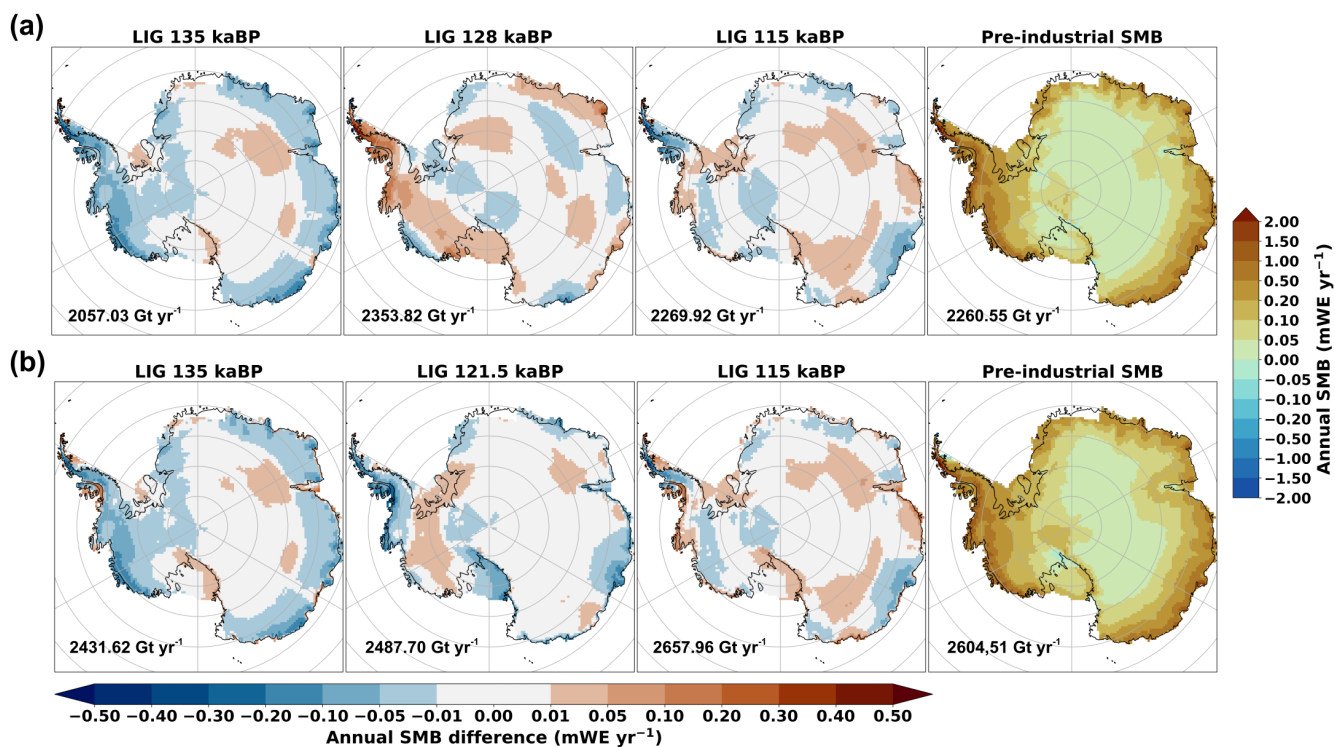
Figure S11. Annual mean SMB anomalies (in mWE yr⁻¹) between several LIG time slices and the pre-industrial simulation of (**a**) BESSI-*i*LOVECLIM and (**b**) ITM-*i*LOVECLIM after bias correction for Antarctic Ice Sheet. The absolute annual SMB value of PI and the total SMB (Gt yr⁻¹) integrated for the present-day ice sheet extent of each simulation are also included.

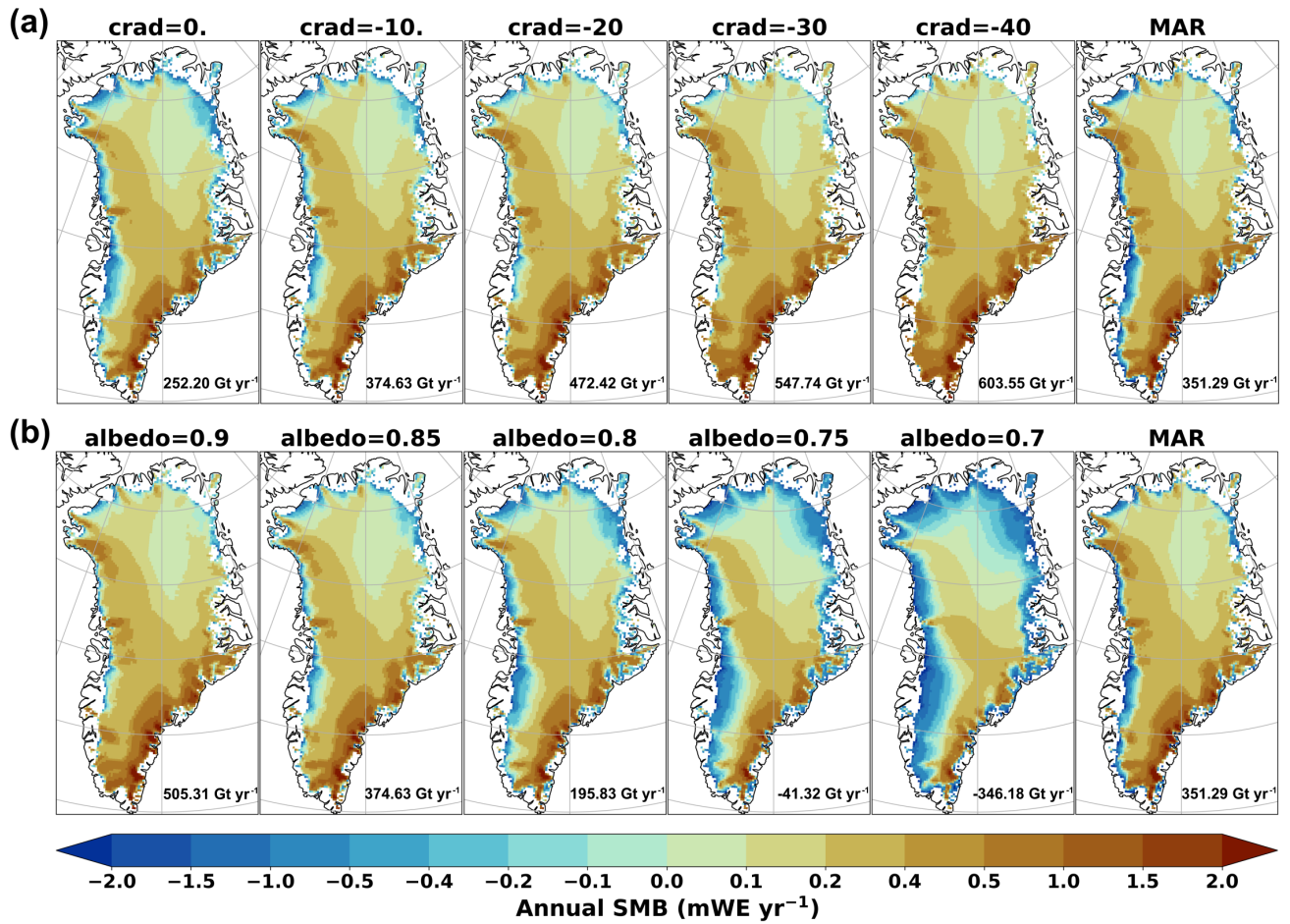**Figure S12.** Annual mean SMB values (in mWE yr^{-1}) of ITM-MAR compared to MAR for different cases: (**a**) crad changes and (**b**) albedo changes.