Supplement of:
Dome C migration in Antarctica during the last 800,000 years

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1 Climate forcing anomalies

For the transient simulations, the near-surface air temperature, used in the model as a surface boundary condition, is assumed to follow the following equation:

$$T(t,i,j) = \left(T_{\text{lgm}}(i,j) - T_{\text{pi}}(i,j)\right) I_{\text{atm}}(t) + T_{\text{ref}}(i,j) + \lambda \Delta Z(i,j)$$

with Tlgm(i,j) and Tpi(i,j) respectively the temperature at the LGM and PI period, Tref(i,j) the reference temperature and I(t)atm the atmospheric index varying between 0 and 1 over time, λ a uniform lapse rate correction (7 °C/km) and ΔZ the surface difference. The ocean temperatures are then calculated in the same way, but, to avoid cases where the seawater freezing point is exceeded, a minimum basal melt rate of −0.01 m/an has been imposed.

Precipitation rate during the transient simulation are calculated thanks to the following equation:

$$pr(t,i,j) = pr_{\text{ref}}(i,j)\left[1 - I_{\text{atm}}(t) + \left(I_{\text{atm}}(t)\right)\frac{pr_{\text{lgm}}(i,j)}{pr_{\text{pi}}(i,j)}\right] exp\left(w \cdot \Delta Z(i,j)\right)$$

with prref the reference precipitation, prlgm and prpi the precipitation at the LGM and PI, and w is the precipitation to temperature ratio, fixed at 0.11 °C-1. The salinity is calculated in the same manner than the precipitation.

2 Figures

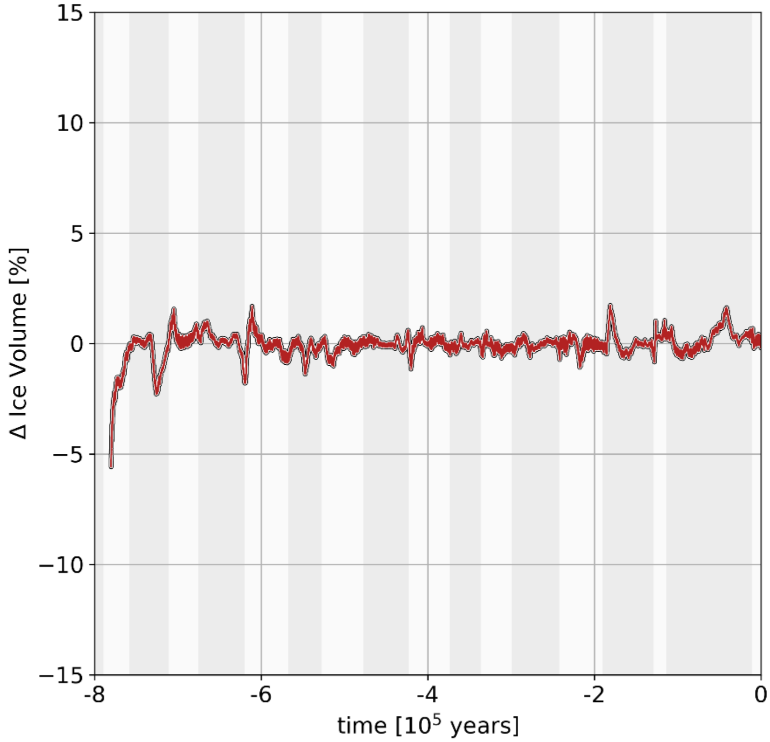

Figure S1: *Difference in ice volume over time, based on the same simulations (IPSLCM5A2_006) but starting at 800,000 years ago and 780,000 years ago, illustrating the dependence of the results on the simulation start time*

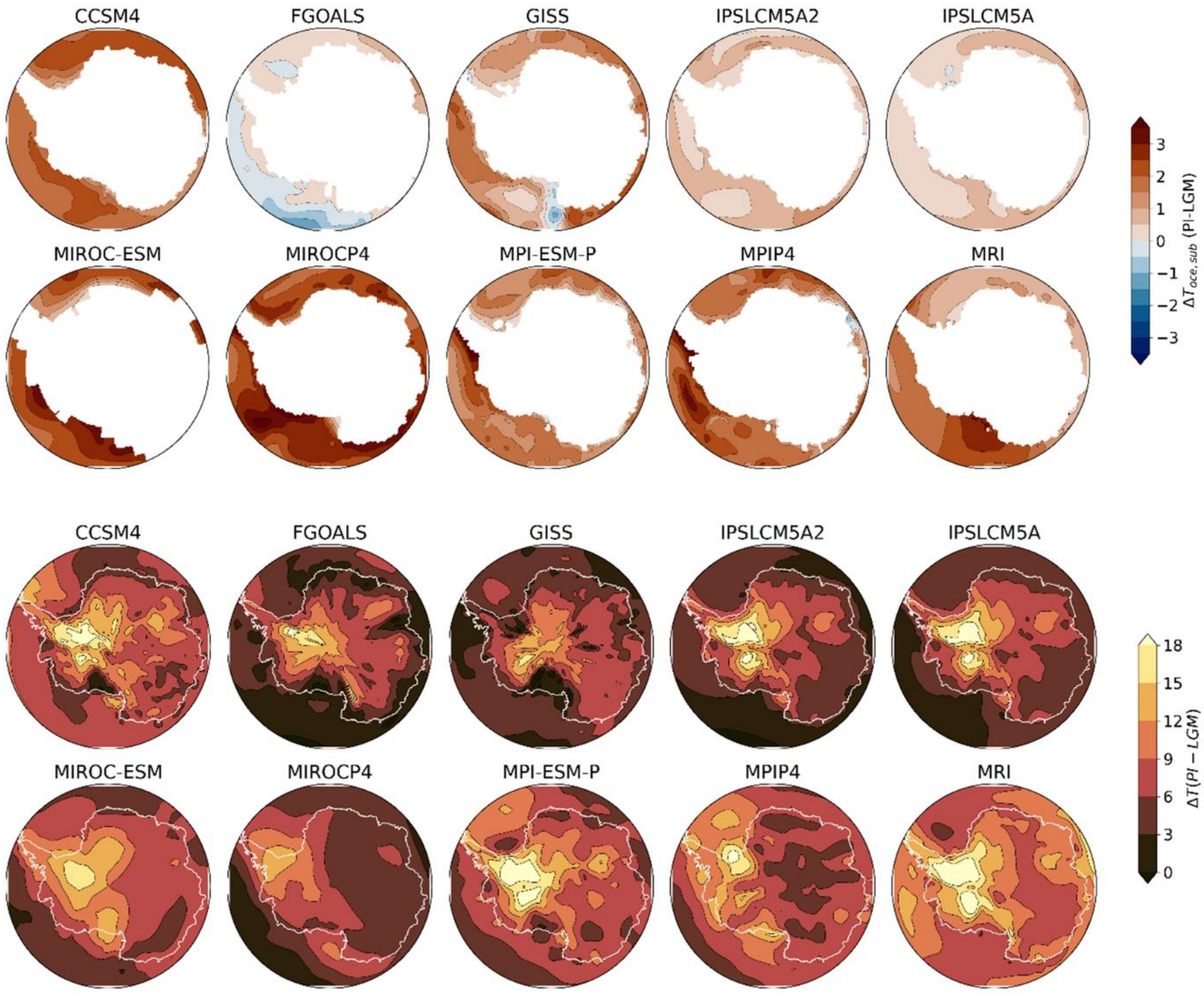

Figure S2: *Top: Subsurface ocean temperature anomaly (LGM minus PI) for the 10 PMIP models used to force GRISLI. Bottom: Same as top but for the surface air temperature anomaly.*

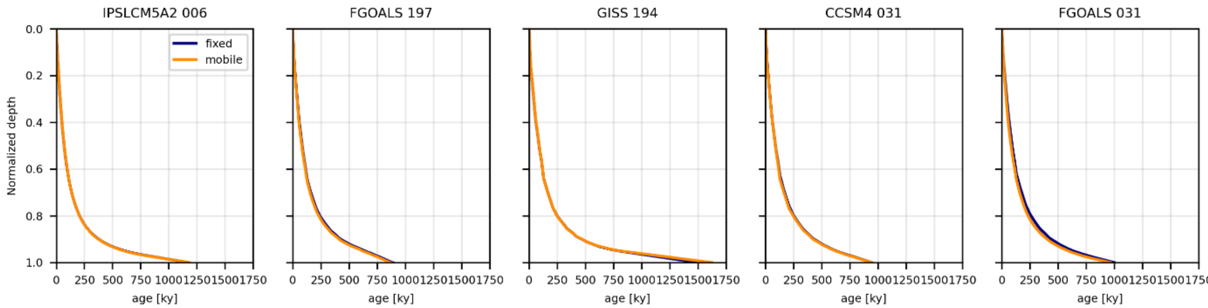

Figure S3: *Age-depth relationship computed with the 1D ice flow model for the 5 nested simulations. The orange curve corresponds to the mobile dome configuration and the blue curve to the fixed dome configuration.*

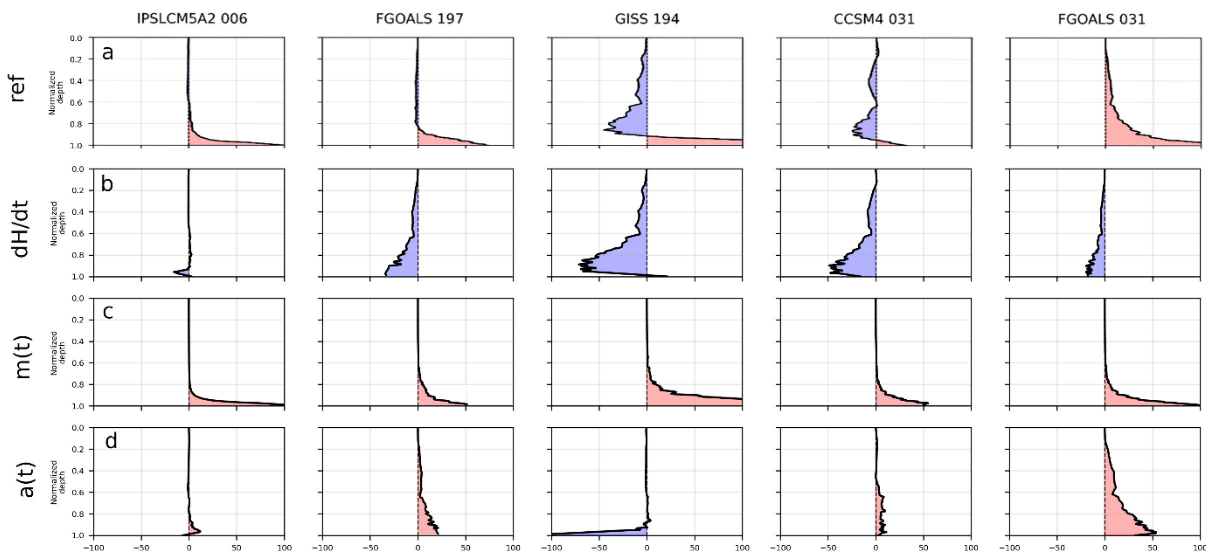

Figure S4: A: *Age difference as a function of normalized depth between the fixed and mobile dome. A positive value indicates that assuming a fixed dome leads to an overestimation of the ice age, while a negative value indicates an underestimation. B: same as a but for experience exp_dh. C: same as a but for experience exp_bmelt. D: same as a but for experience exp_acc*

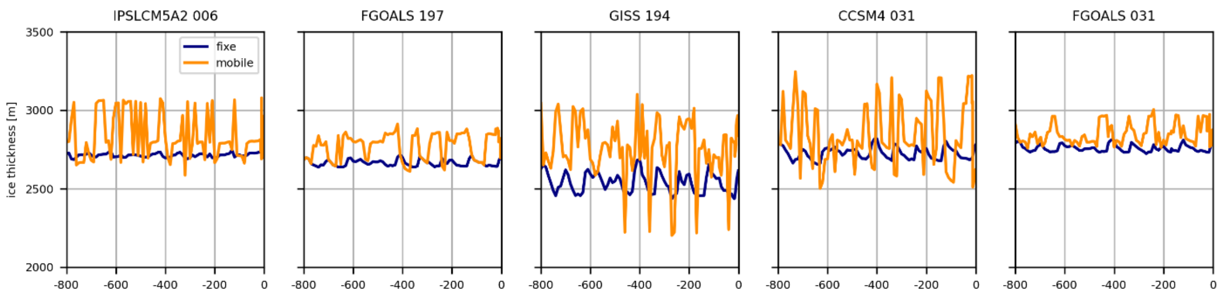

Figure S5: *Ice thickness variations at the Dome C position over time. The orange curve corresponds to the mobile dome configuration and the blue curve to the fixed dome configuration.*

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