Supplementary material

Text S1. Freshening due to increase in surface runoff

An increase in surface runoff also contributes to the reduction in salinity of waters close to the coast (Fig. S4c, d). While both the average rate of precipitation and surface evaporation are higher over the continent at the LIG compared to PI, changes in precipitation are larger than changes in evaporation, leading to an 8% increase in surface runoff at the LIG compared to PI (Fig. S4k, l). As there is no ice-sheet interaction in the model, all surplus in water budget contributes to runoff. Surface runoff increases along most of the Antarctic coast, except along the Western Antarctic Peninsula due to a decrease in precipitation in that region. Runoff increase is largest over East Antarctica, particularly over the Amery ice shelf region.

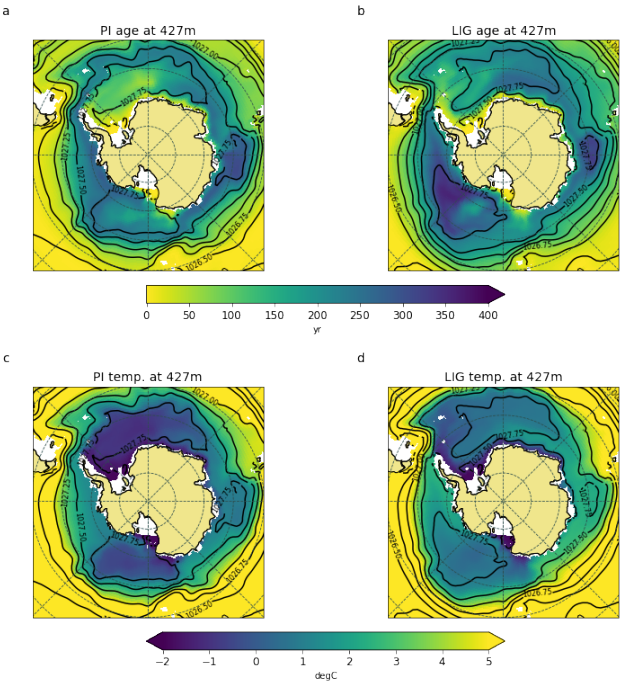

Fig. S1 (top) Age (yrs) of water-masses at (a) PI and (b) LIG. (bottom) Ocean temperatures (°C) at 427 m depth with density contours overlaid for (c) PI and (d) LIG.

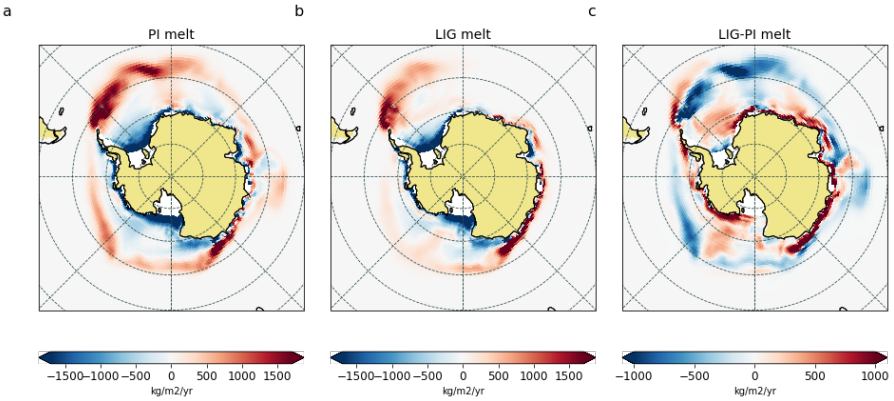

Fig. S2 Freshwater flux due to sea ice formation/melting (>0 enters ocean) for (a) PI, (b) LIG and (c) LIG-PI.

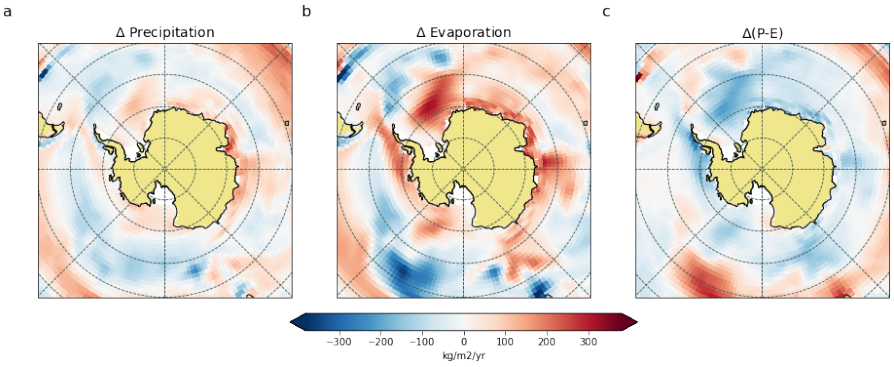

Fig. S3 (a) Precipitation, (b) evaporation and (c) precipitation minus evaporation anomalies over the ocean at the LIG compared to PI.

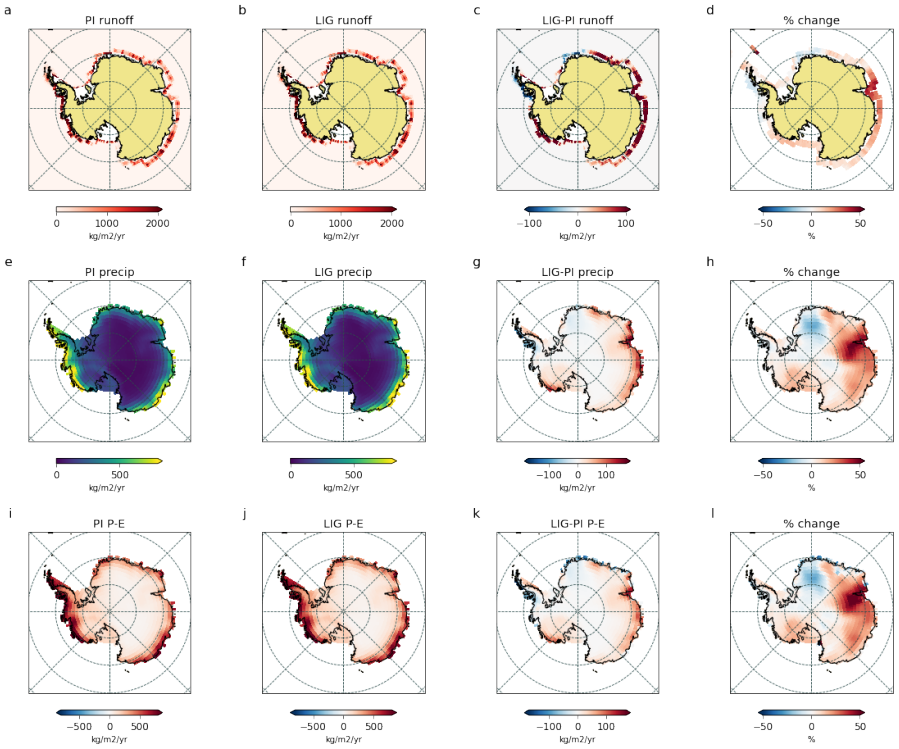

Fig. S4 (top) Surface runoff, (middle) precipitation over land, and (bottom) precipitation-minus-evaporation for (a, e, i) PI, (b, f, j) LIG, (c, g, k) LIG-PI and (d, h, l) percentage change.

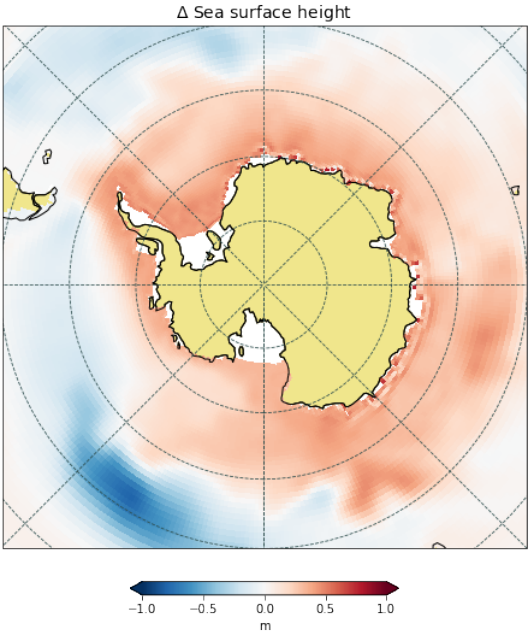

Fig. S5 Sea surface height anomaly at the LIG compared to PI.