Figure S1. Bottom density and mean ocean velocity (whole water column) in REF (2010-2014) at the Antarctic Peninsula (a) and on the southern Weddell Sea continental shelf (b).
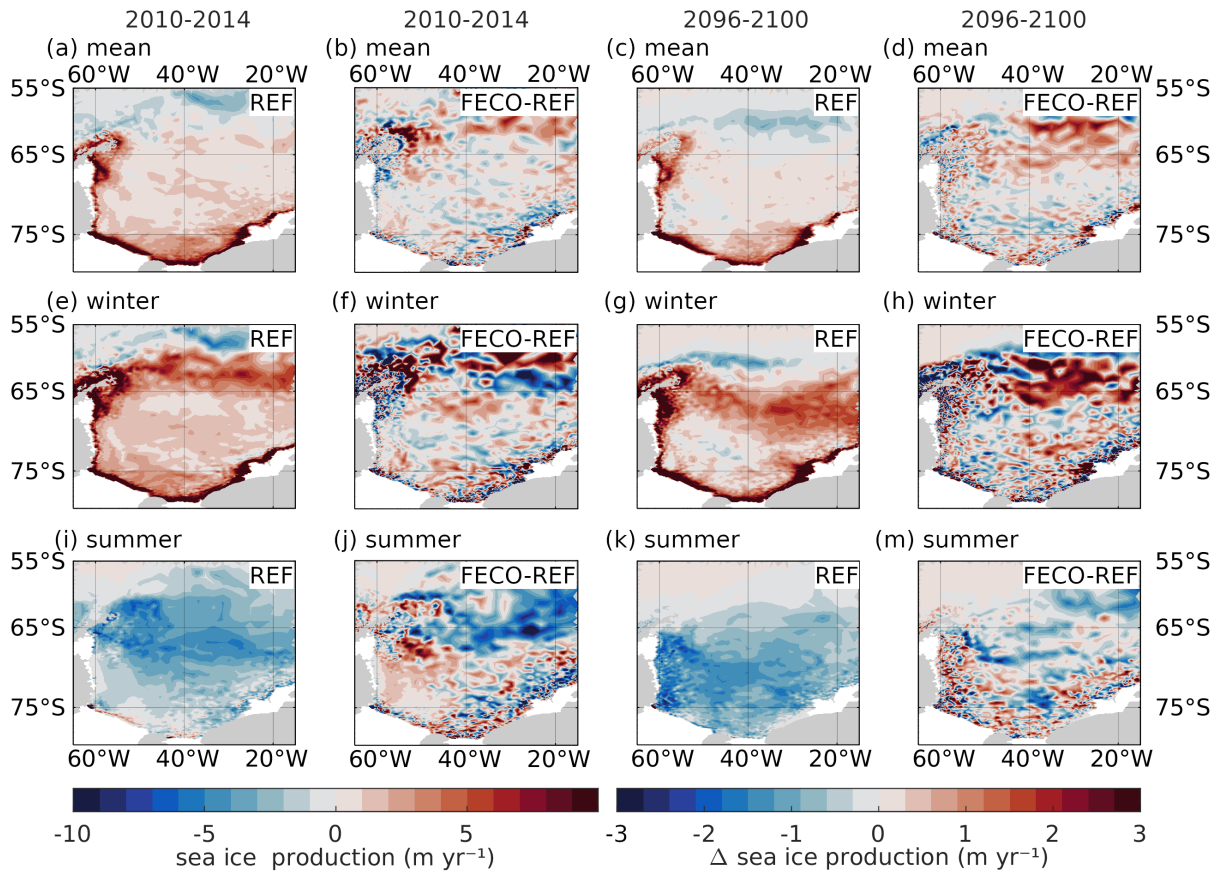
Figure S2. Mean sea-ice formation by thermodynamic processes in REF for (a) 2010-2014, and (c) 2096-2100. Mean sea-ice formation difference between FECO and REF in (b) 2010-2014 and (d) 2096-2100. (e)-(h) same as (a)-(d) but only for summer means (December-February), and (i)-(m) for winter means (June-August).
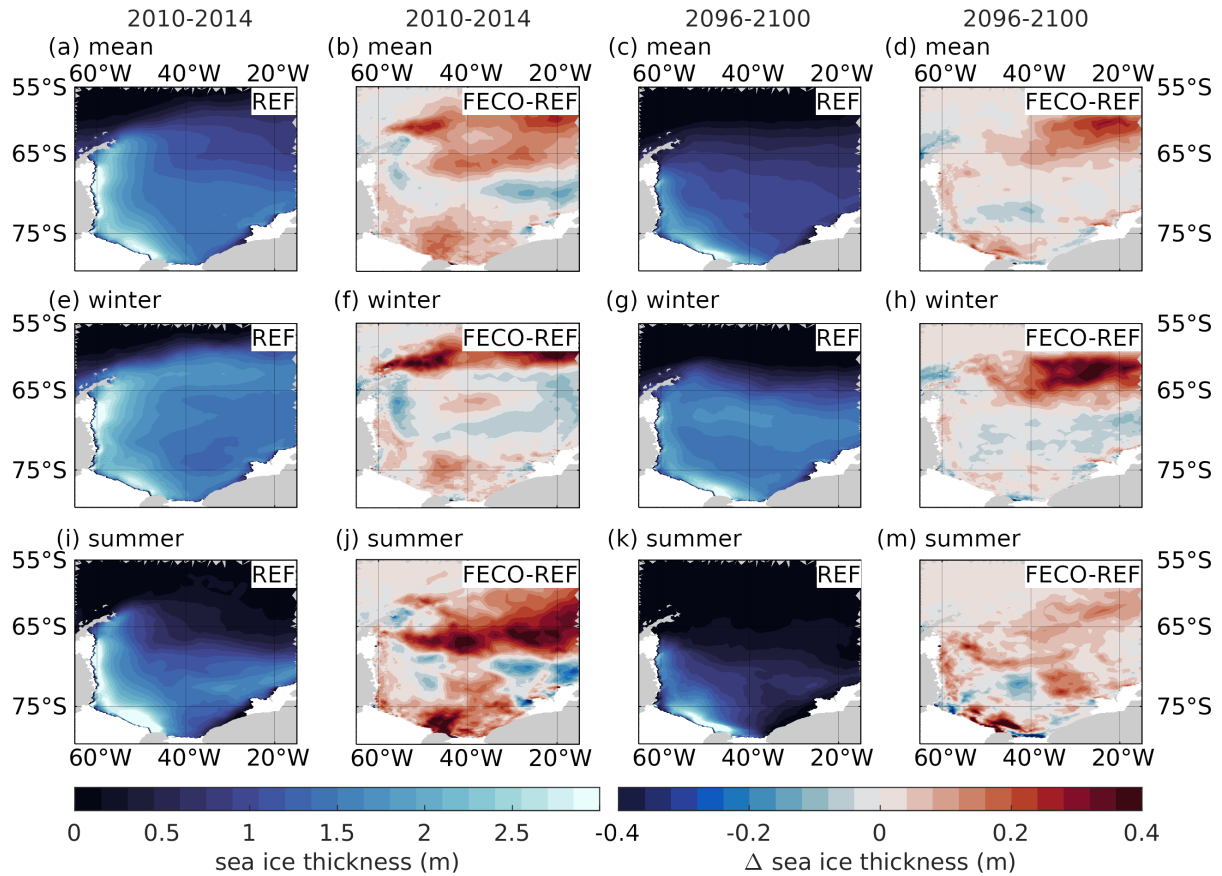
Figure S3. Mean sea-ice thickness in REF for (a) 2010-2014, and (c) 2096-2100. (b) Mean sea-ice thickness difference between FECO and REF in (b) 2010-2014 and (d) 2096-2100. (e)-(h) same as (a)-(d) but only for summer means (December-February), and (i)-(m) for winter means (June-August).
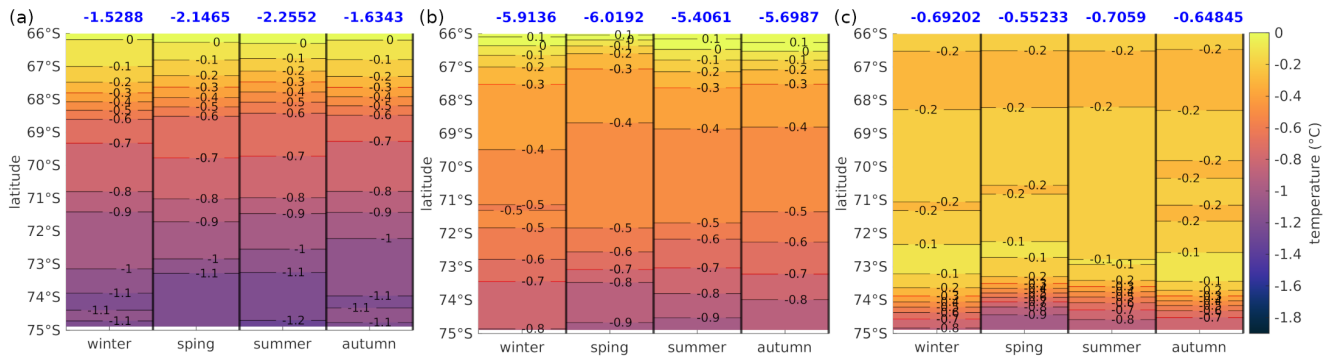
Figure S4. Temperature at 300 m depth zonally averaged along the Filchner Trough section between 75°S and 66°S (see Fig. 1) in REF (2010-2014) with the distance between the -0.3°C and -0.7°C isotherms (marked in red) in degree in blue for (a) REF (2010-2014), (b) REF (2096-2100), and FECO (2096-2100).
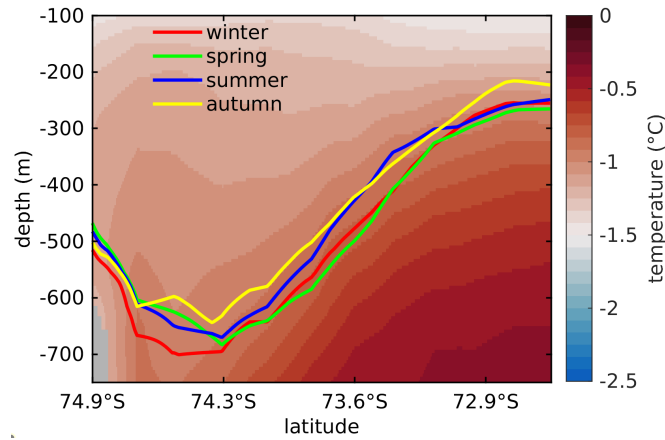
Figure S5. Potential mean temperature in 2010-2014 in REF. Colored lines show the position of the 27.7 kg m^{-3} isopycnal during the four seasons.
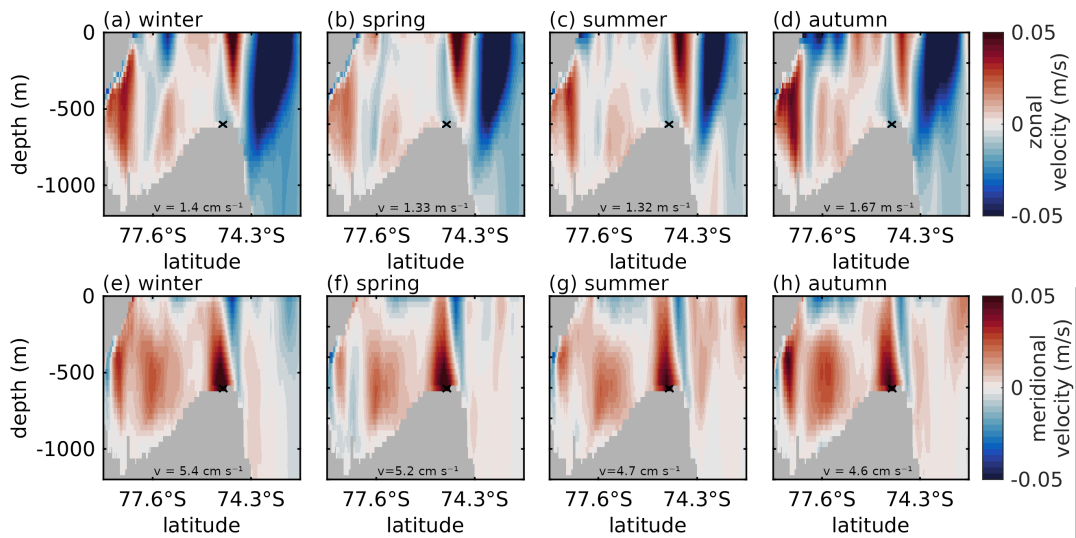
Figure S6. Zonal velocity in ms^{-1} along the Filchner Trough section (see Fig. 1) for (a) winter, (b) spring, (c) summer, and (d) autumn in REF (2010-2014). Positive values describe eastward velocity. The black x marks the spot where the velocity was determined and the location of the DSW exporting current. (e)-(h) same as (a)-(d) but for meridional velocity. Positive values describe northward velocity.
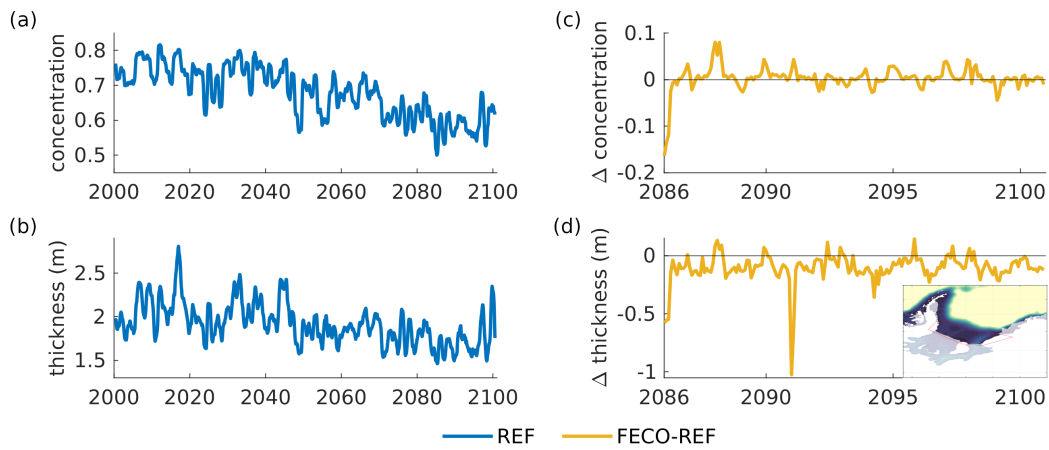
Figure S7. a) Mean sea ice concentration in Filchner trough (running mean of 12 months) in REF on the southern Weddell Sea continental shelf (see inset). b) Same but for mean sea ice thickness. c) Difference in monthly mean sea ice concentration FECO-REF. d) Same as c) but for sea ice thickness.
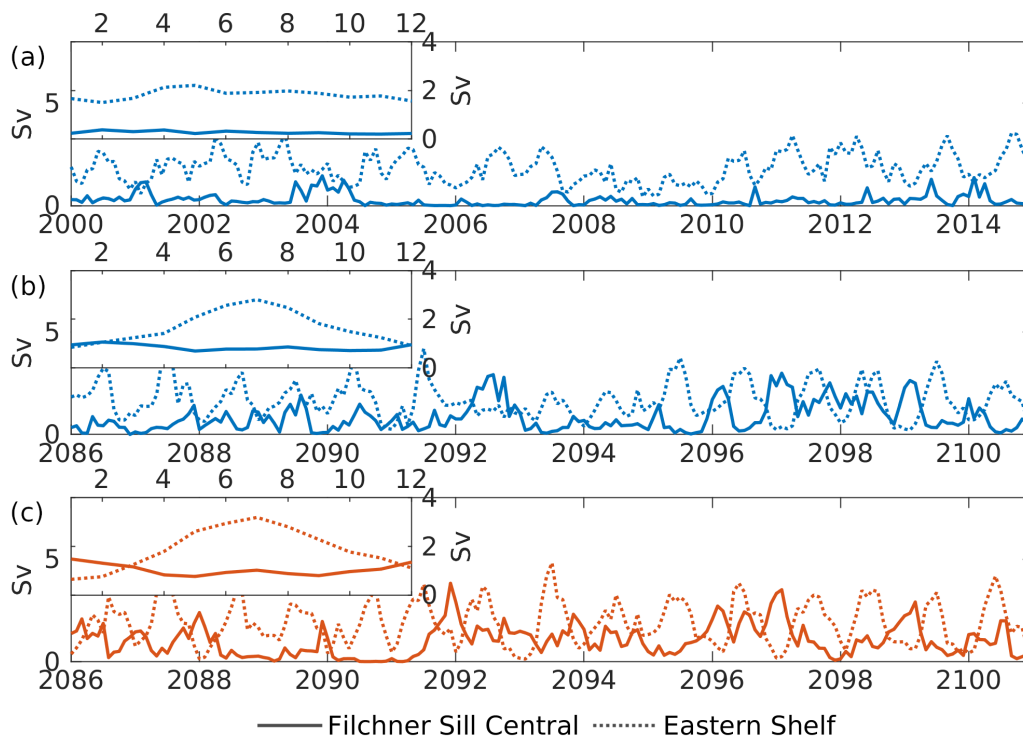
Figure S8. Southward volume transport of water masses with $\Theta > -1.5°C$ across the Filchner Sill and the Eastern Shelf in (a) REF (2000-2014), (b) REF (2086-2100), and (c) FECO (2086-2100). Insets show monthly averages.
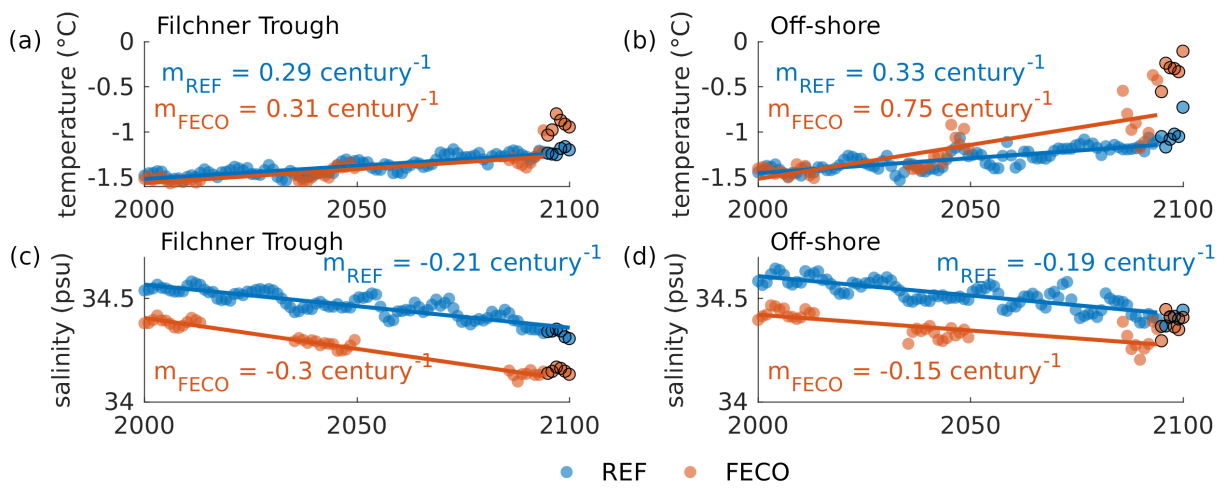
Figure S9. Lineare regression of mean temperature in Filchner Trough (a) and north of the Filchner Trough sill at 636 m depth (b). c)-d) same as a)-b) but for salinity. Data points outlined in black were excluded from the linear regression due to the regime shift in 2093.