



Supplement of

**Simulated density reorganization on the Weddell Sea continental shelf
sensitive to atmospheric forcing**

Vanessa Teske et al.

Correspondence to: Vanessa Teske (vteske@geomar.de)

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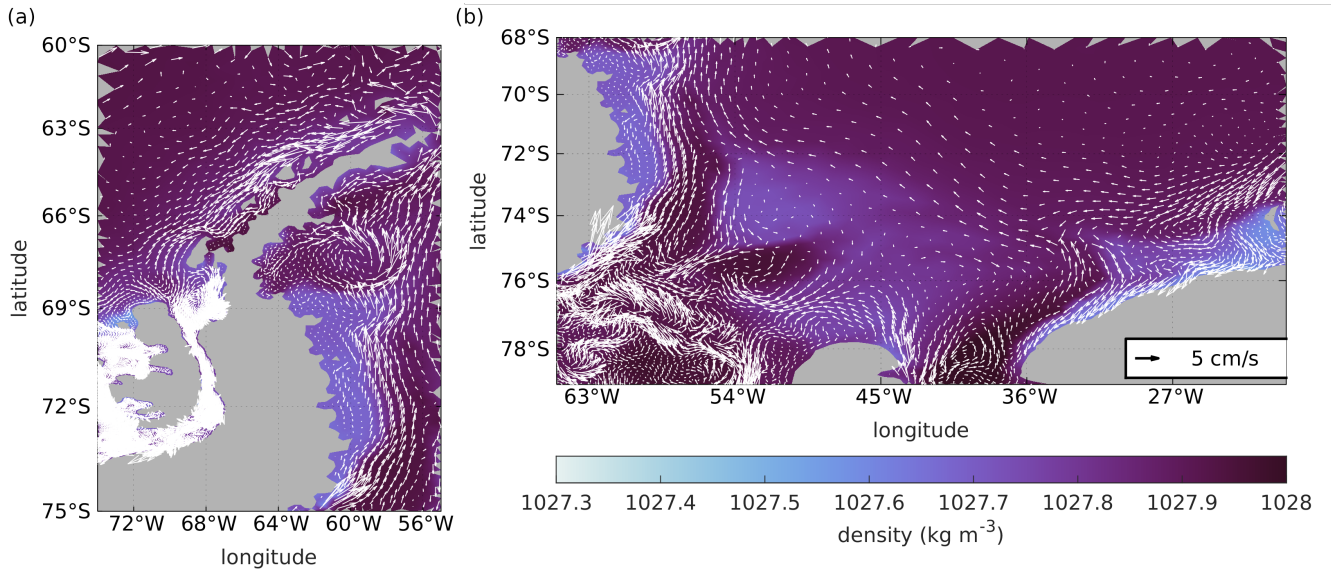


Figure S1. Bottom density and mean ocean velocity (whole water column) in REF (2010-2014) at the Antarctic Peninsula (a) and on the southern Weddell Sea continental shelf (b).

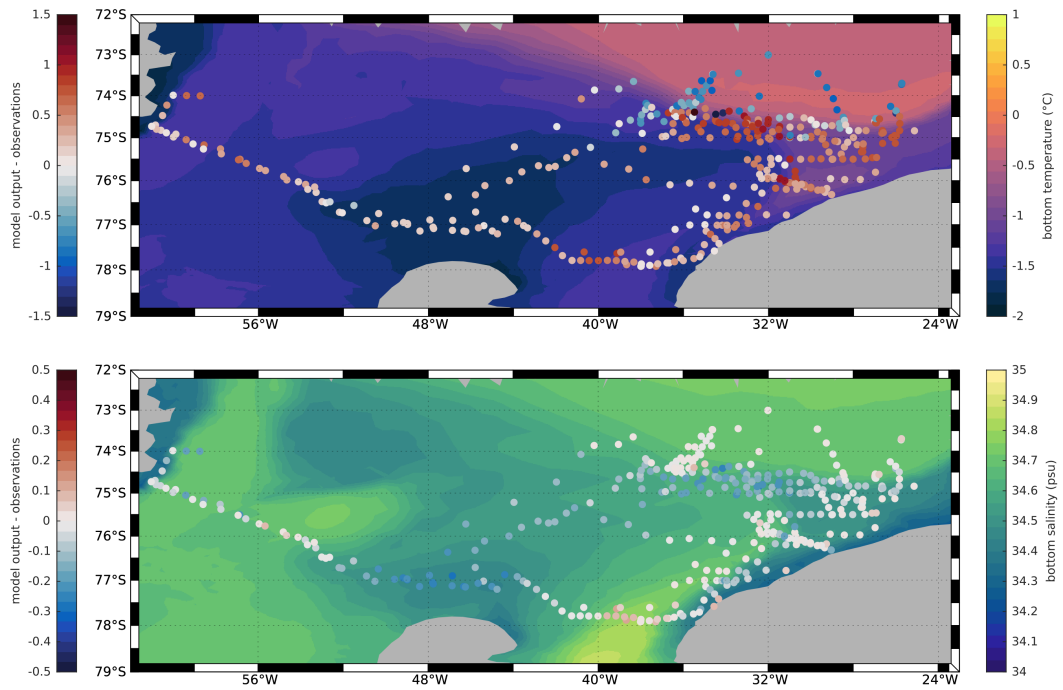


Figure S2. a) Mean bottom temperature averaged over 2000-2014 in REF. Dots show the temperature difference to observations of bottom temperature. b) Same as a) but for salinity.

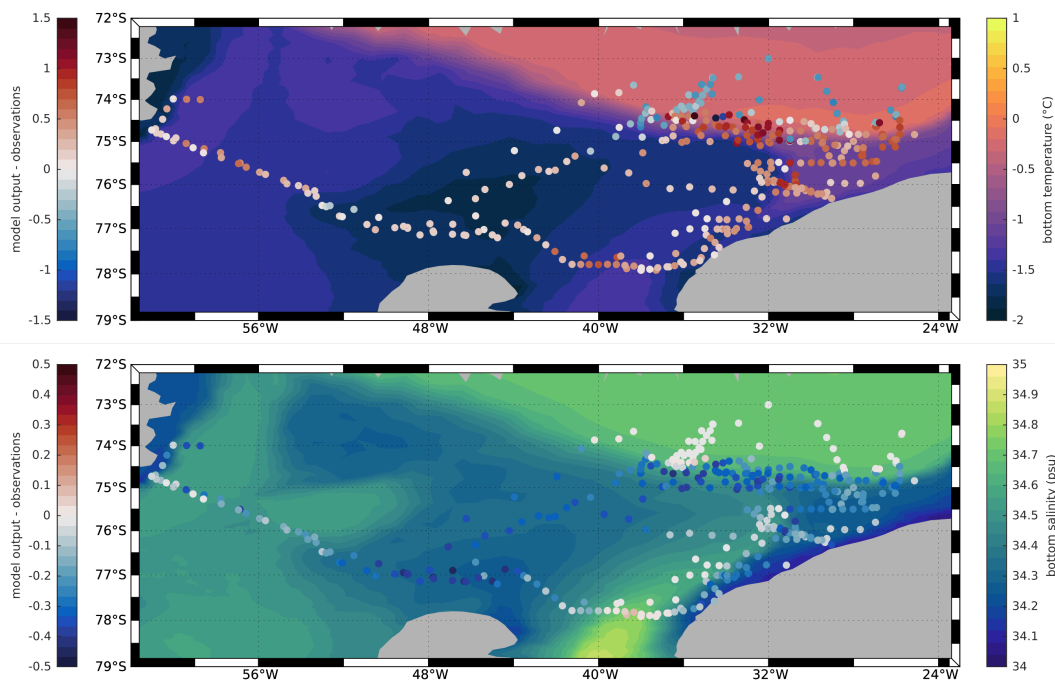


Figure S3. Same as previous figure but for FECO.

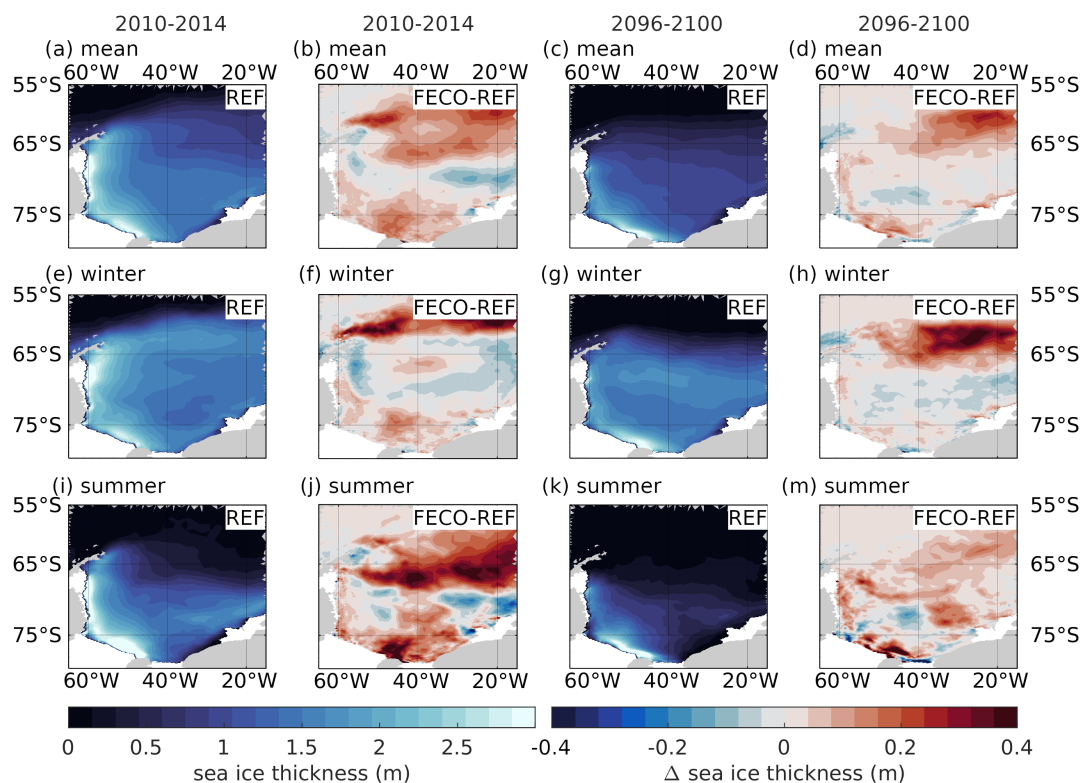


Figure S4. Mean sea-ice thickness in REF for (a) 2010-2014, and (c) 2096-2100. (b) Mean sea-ice thickness difference between FECO and REF in (b) 2010-2014 and (d) 2096-2100. (e)-(h) same as (a)-(d) but only for summer means (December-February), and (i)-(m) for winter means (June-August).

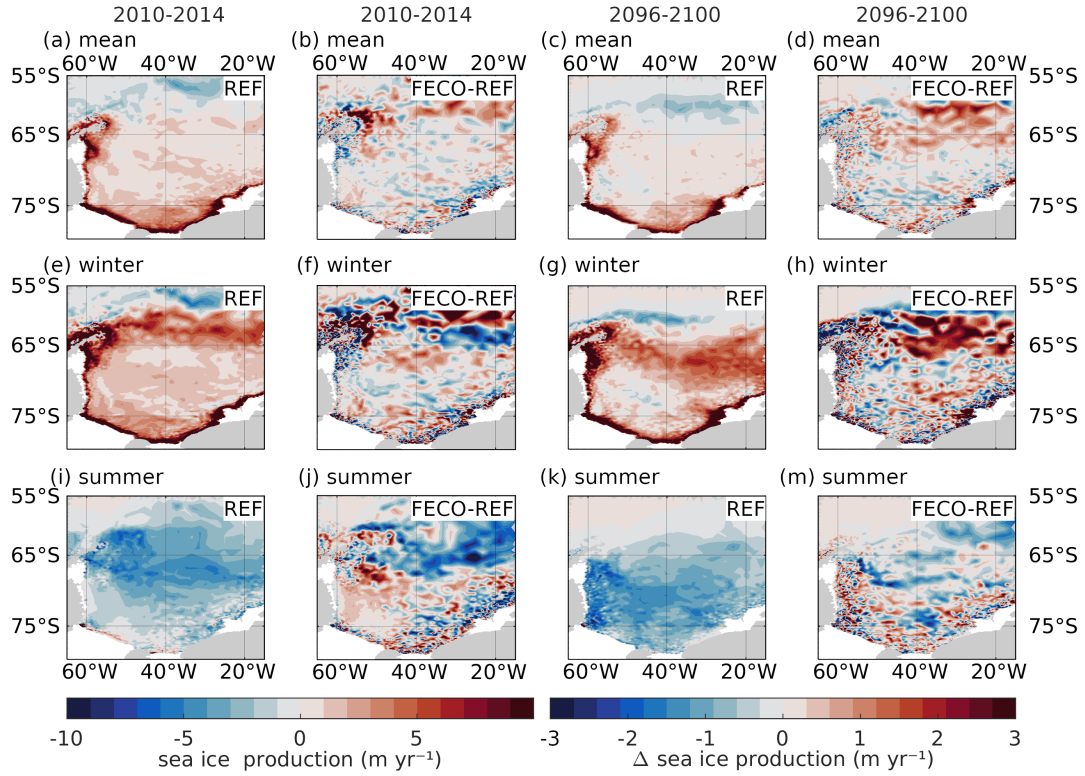


Figure S5. Mean sea-ice formation by thermodynamic processes in REF for (a) 2010-2014, and (c) 2096-2100. Mean sea-ice formation difference between FECO and REF in (b) 2010-2014 and (d) 2096-2100. (e)-(h) same as (a)-(d) but only for summer means (December-February), and (i)-(m) for winter means (June-August).

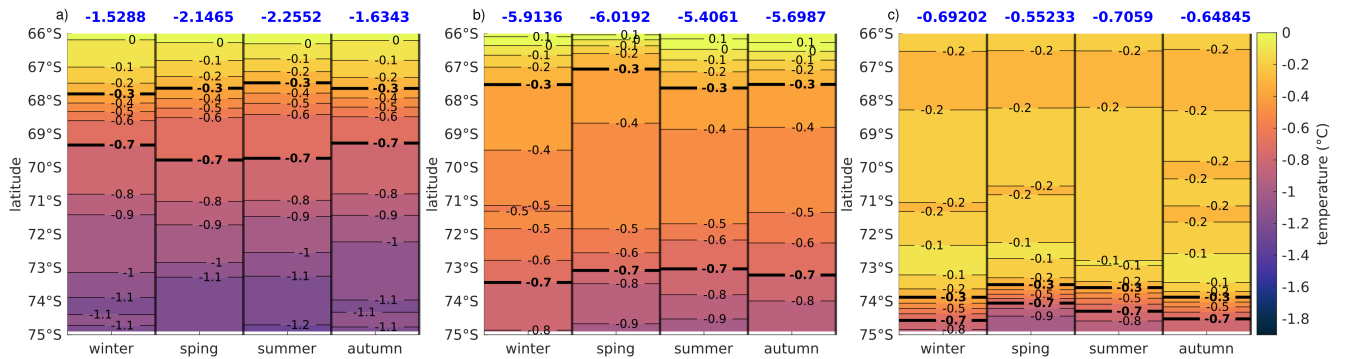


Figure S6. Temperature at 291 m depth zonally averaged over the Filchner Trough Sill between 75°S and 66°S (see Fig. 1) with the distance between the -0.3°C and -0.7°C isotherms (marked in bold) in degree in blue for (a) REF (2010-2014), (b) REF (2096-2100), and (c) FECO (2096-2100).

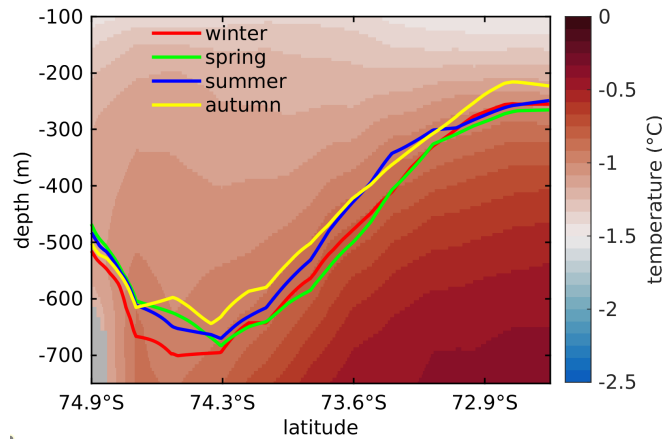


Figure S7. Potential mean temperature in 2010-2014 in REF. Colored lines show the position of the 27.7 kg m^{-3} isopycnal during the four seasons.

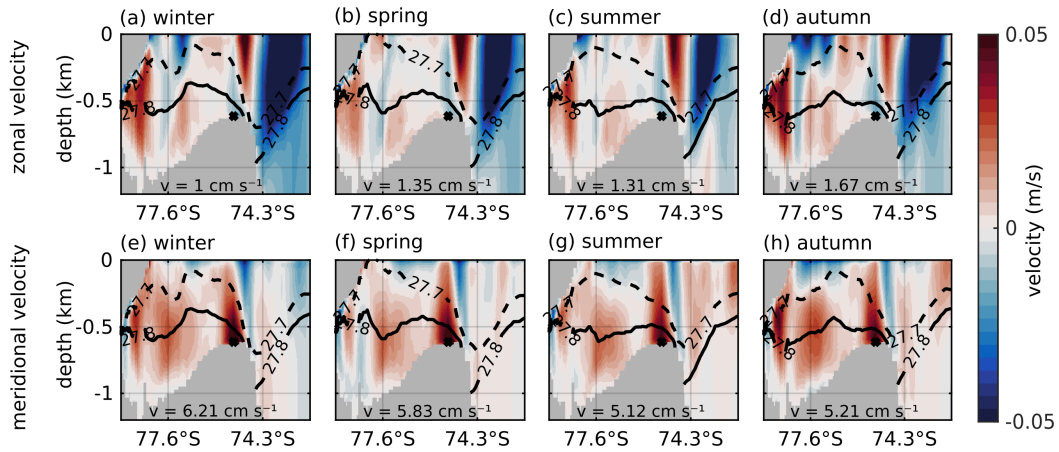


Figure S8. Zonal velocity in ms^{-1} along the Filchner Trough section (see Fig. 1) for (a) winter, (b) spring, (c) summer, and (d) autumn in REF (2010-2014). Positive values describe eastward velocity. The black x marks the spot where the velocity was determined and the location of the DSW exporting current. (e)-(h) same as (a)-(d) but for meridional velocity. Positive values describe northward velocity.

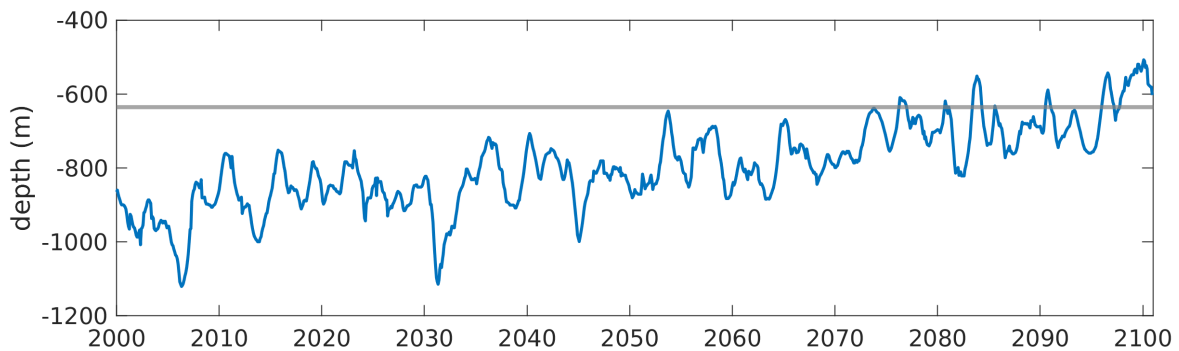


Figure S9. Depth of the intersection of the thermocline with the continental slope in REF. Horizontal gray line shows the depth of the Filchner Trough sill.

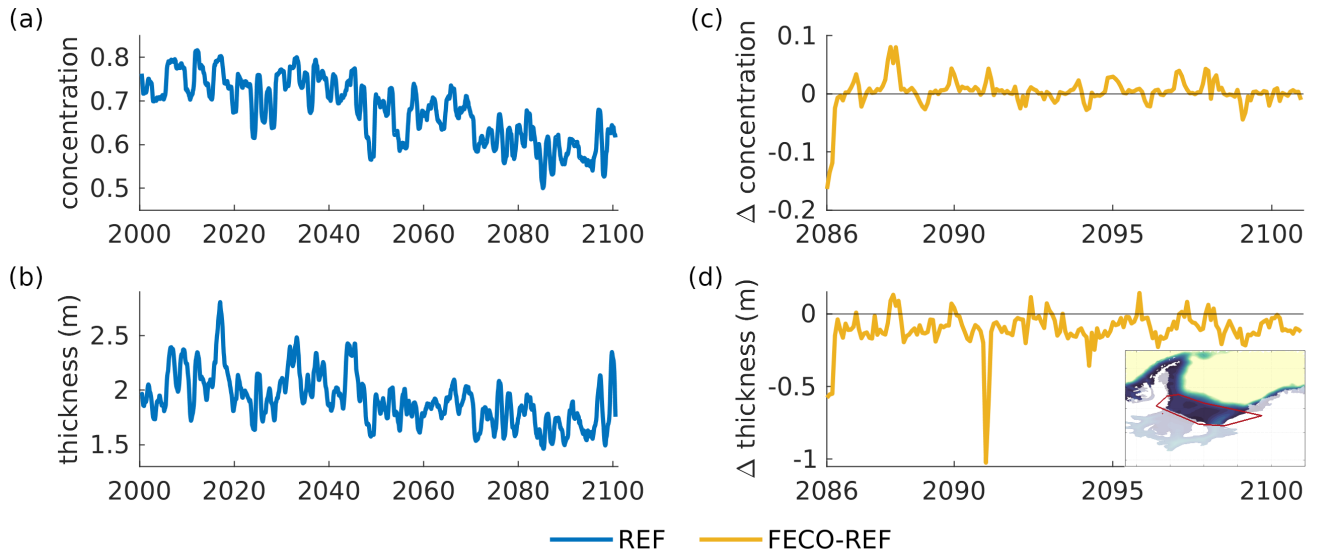


Figure S10. a) Mean sea ice concentration in Filchner trough (running mean of 12 months) in REF on the southern Weddell Sea continental shelf outlined in red in the map. b) Same but for mean sea ice thickness. c) Difference in monthly mean sea ice concentration FECO-REF. d) Same as c) but for sea ice thickness.

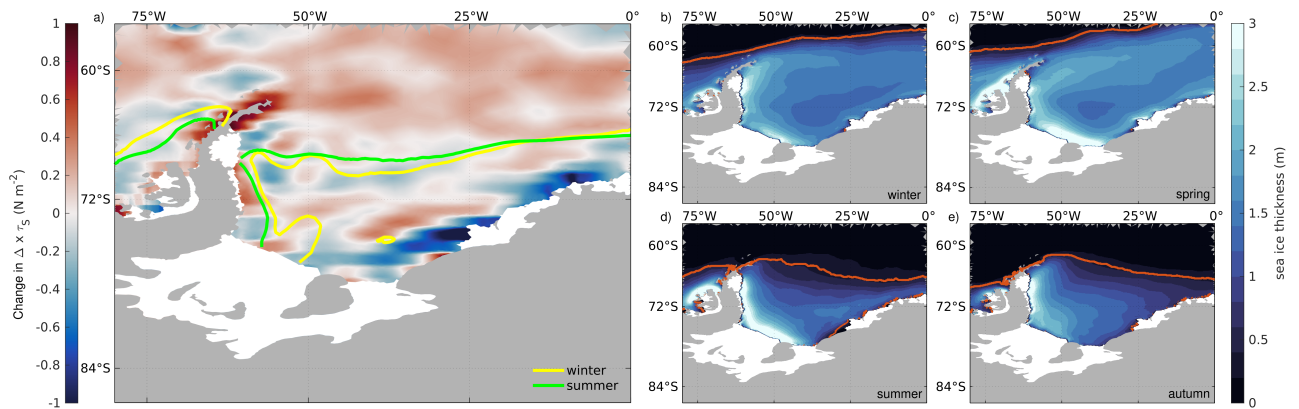


Figure S11. a) Surface stress curl difference in the 5 year mean 2010-2014 between summer and winter. Lines show the position of the boundary between Easterlies and Westerlies in winter (yellow) and summer (green). b)-e) Seasonal mean sea ice thickness. Red line depicts mean sea ice extent based on sea ice concentration (threshold: 15% sea ice concentration per area)

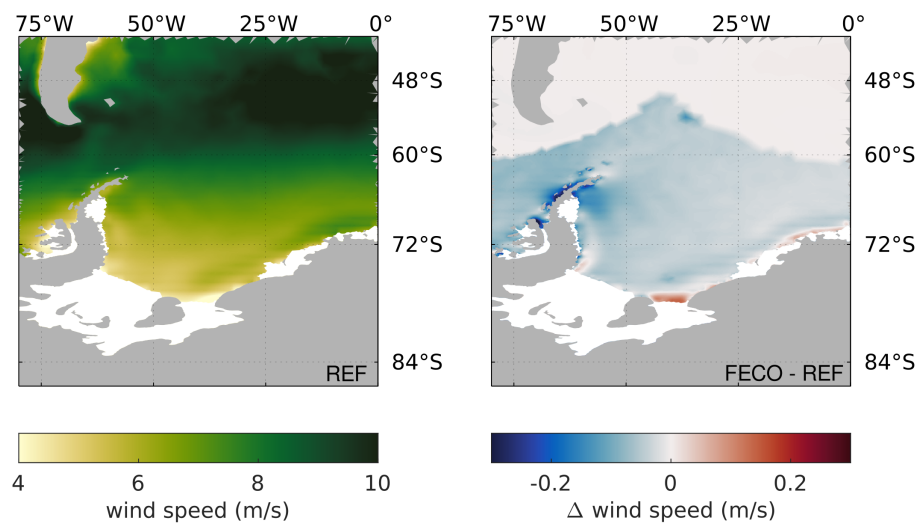


Figure S12. a) Wind speed in the 5 year mean 2010-2014 in REF. b) Difference between the wind speed in the 5 year means between FECO and REF.

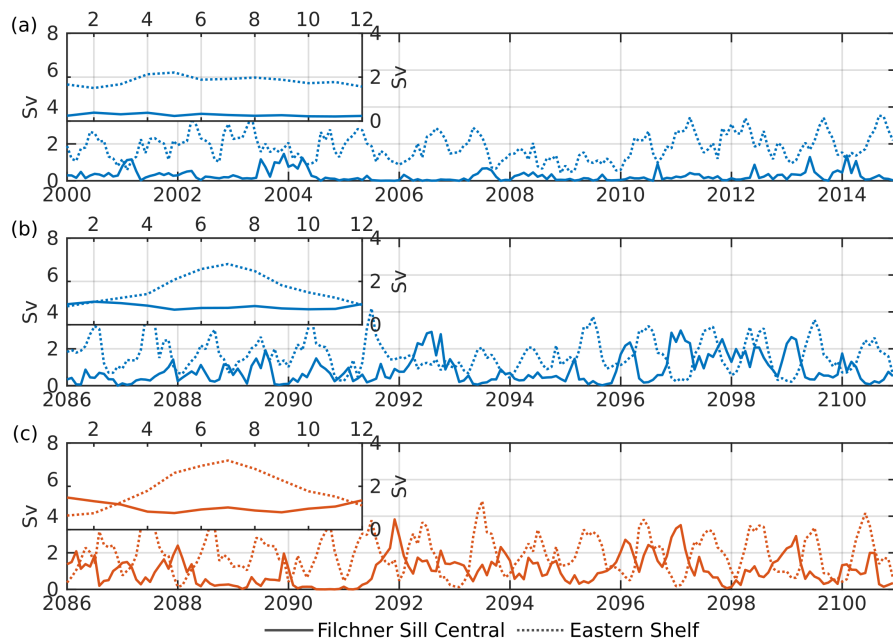


Figure S13. Southward volume transport of water masses with $\Theta > -1.5^{\circ}\text{C}$ across the Filchner Sill and the Eastern Shelf in (a) REF (2000-2014), (b) REF (2086-2100), and (c) FECO (2086-2100). Insets show monthly averages.

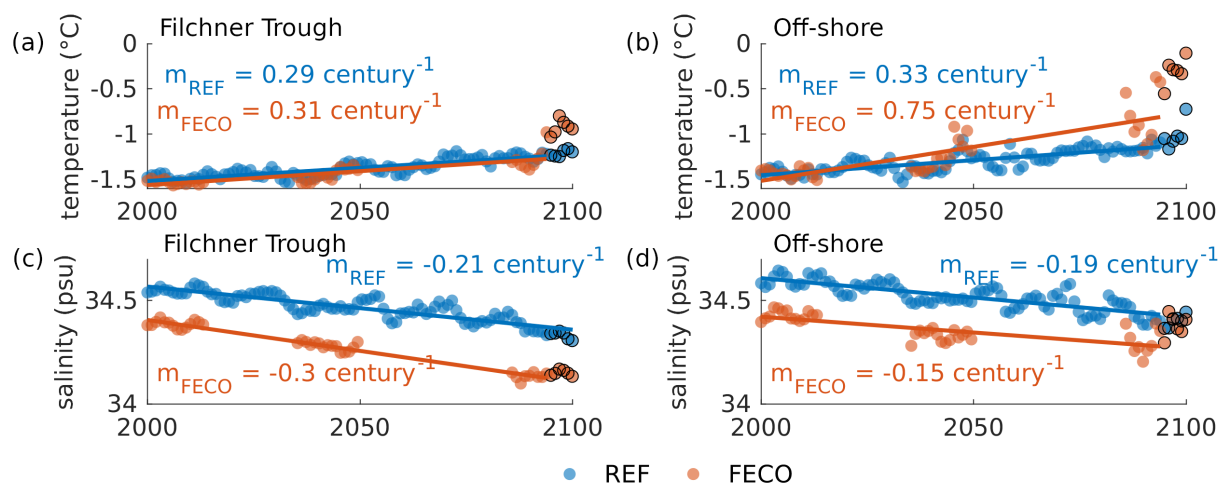


Figure S14. Linear regression of mean temperature in Filchner Trough (a) and north of the Filchner Trough sill at 636 m depth (b). c-d) same as a)-b) but for salinity. Data points outlined in black were excluded from the linear regression due to the regime shift in 2093.