Supporting Information for "Response of atmospheric pCO_2 to a strong AMOC weakening under climate change"

A. A. Boot[1], A. S. Von der Heydt[1,2], and H. A. Dijkstra[1,2]

[1]Institute for Marine and Atmospheric research Utrecht, Department of Physics,Utrecht University, Utrecht, the Netherlands

[2]Center for Complex Systems Studies, Utrecht University, Utrecht, the Netherlands

Contents of this file

1. Figure S1 to S21

Introduction This supplementary material includes additional figures of the results.

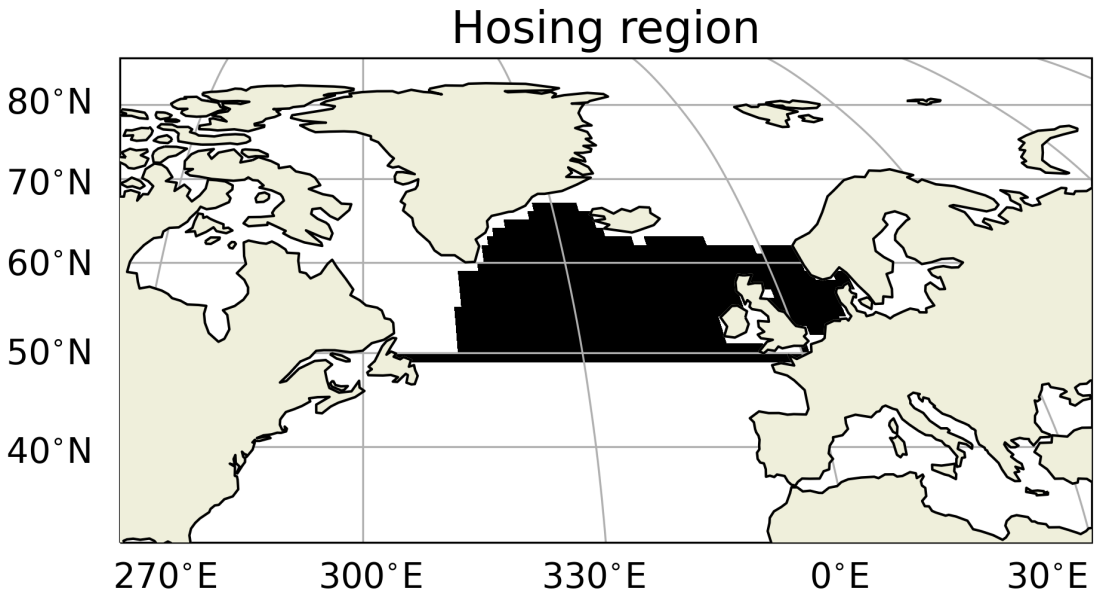

Figure S1. Region in black corresponds to the region where the freshwater forcing is applied. The freshwater forcing integrated over this region is 0.5 Sv throughout the entire simulation period.

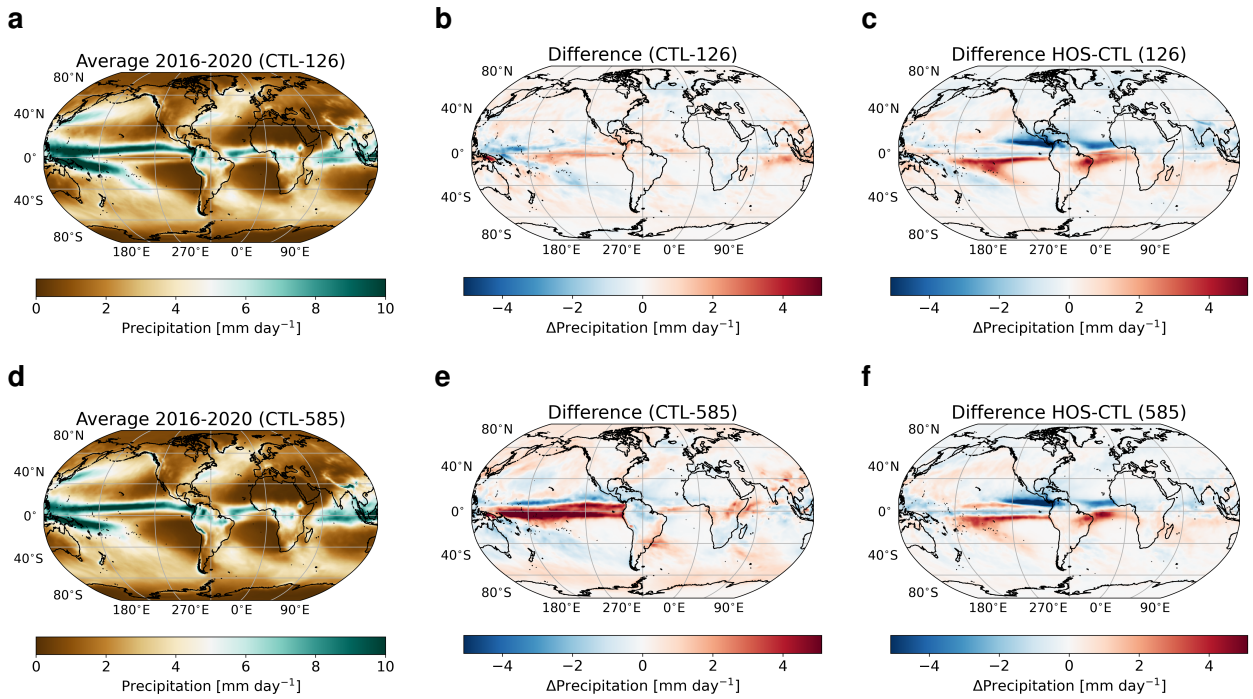

Figure S2. Results for precipitation in mm day^{-1}. he top row (a-c) is for SSP1-2.6, and the bottom row (d-f) for SSP5-8.5. The left column (a, d) represents the average over 2016-2020 in the control simulations. The middle row (b, e) represents the difference between the average of 2096-2100 and 2016-2020 for the control simulations. The right row (c, f) represents the difference between the hosing and control simulations averaged over 2096-2100. Note the different scaling between b and e.

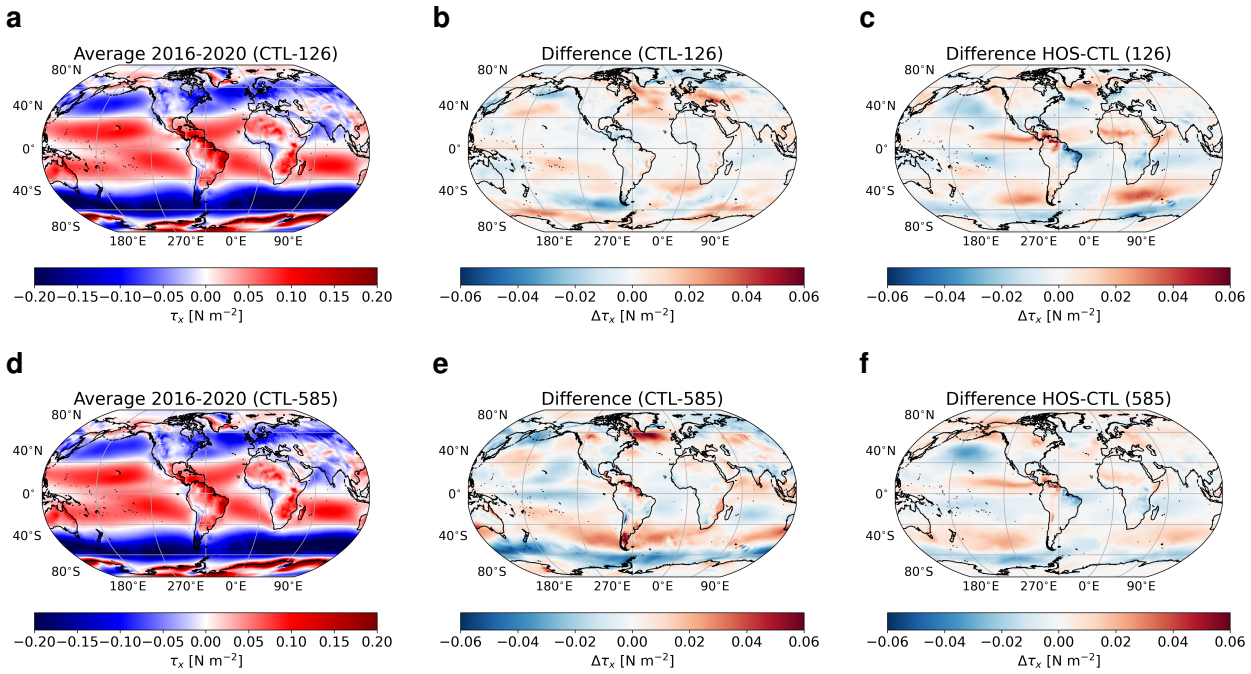

Figure S3. Results for the zonal wind stress in N m^{-2}. Panels represent the same as in Fig. S2.

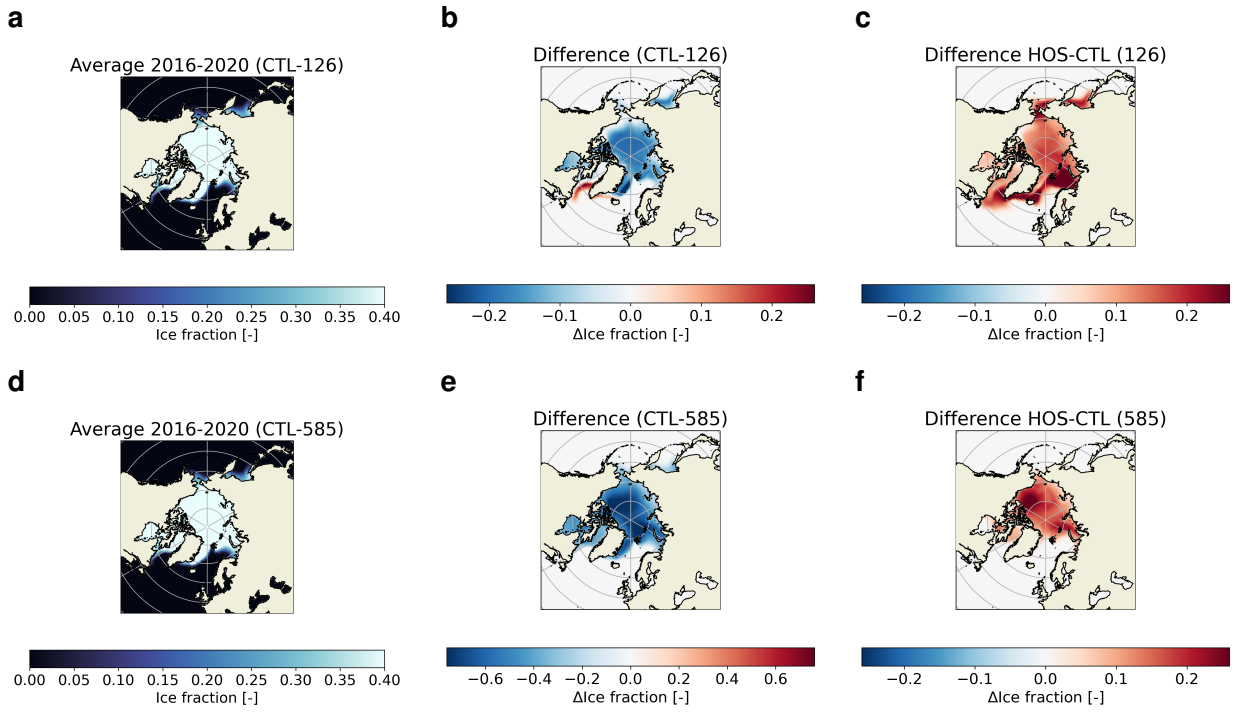

Figure S4. Results for the ice fraction in the Arctic. Panels represent the same as in Fig. S2. Note the different scaling for e.

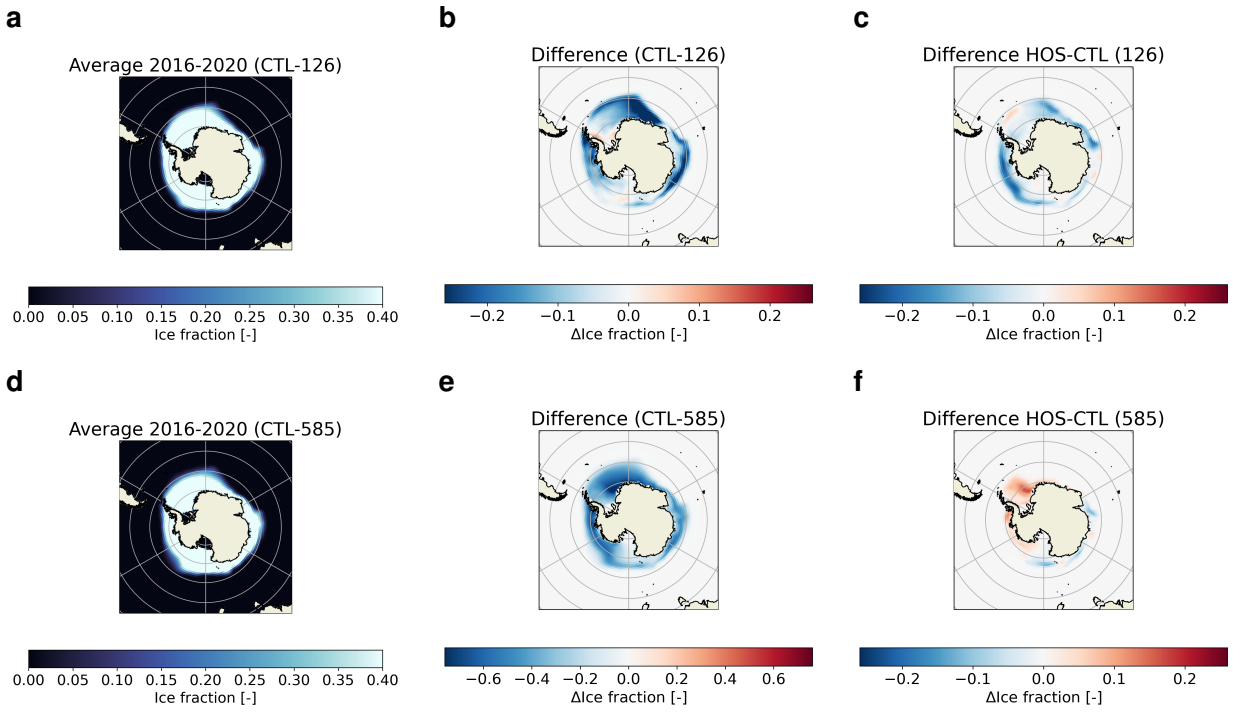

Figure S5. Results for the ice fraction in the Antarctic. Panels represent the same as in Fig. S2. Note the different scaling for e.

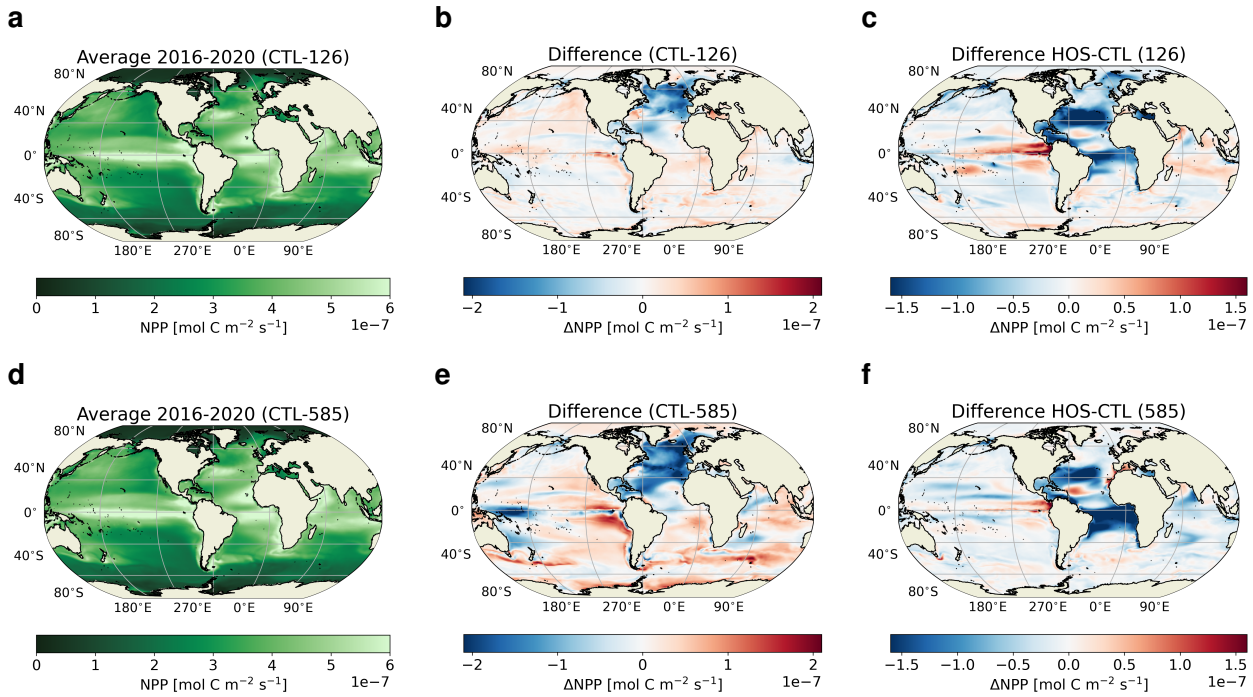

Figure S6. Results for Net Primary Production (NPP) integrated over the surface layer (0-150 m) in mol m^{-2} s^{-1}. Panels represent the same as in Fig. S2

.

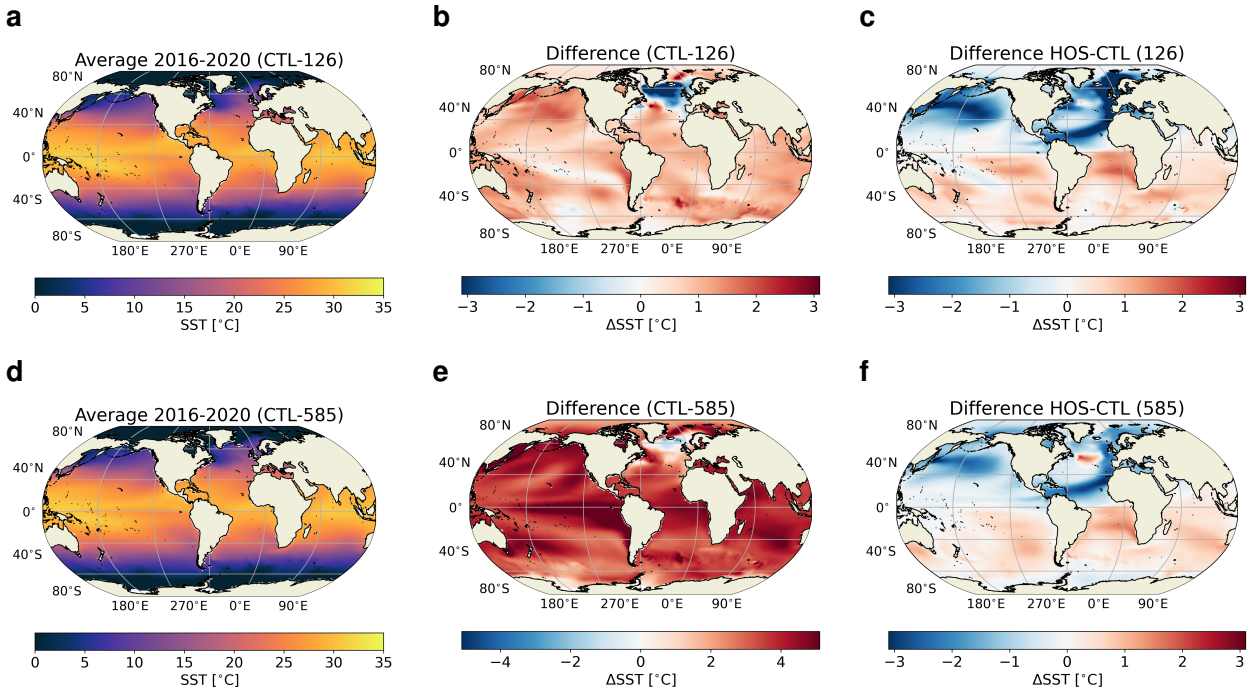

Figure S7. Results for Sea Surface Temperature (SST) in $°C$. Panels represent the same as in Fig. S2. Note the different scaling in e.

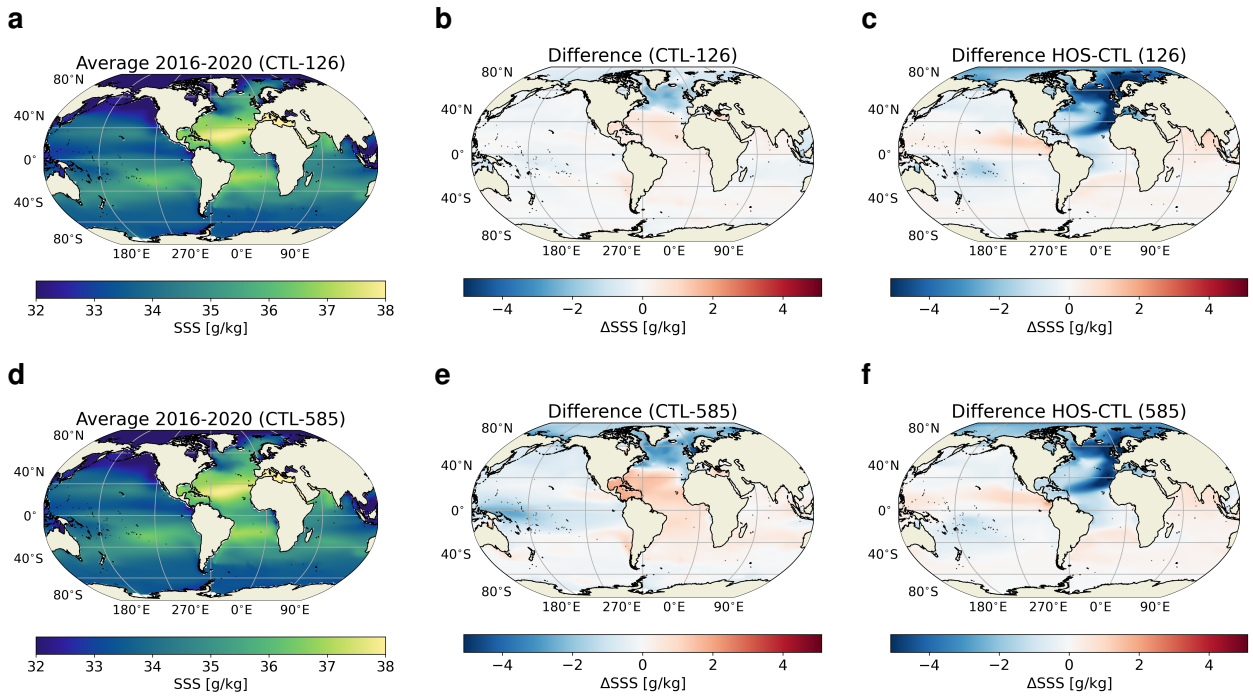

Figure S8. Results for Sea Surface Salinity (SSS) in g/kg. Panels represent the same as in Fig. S2.

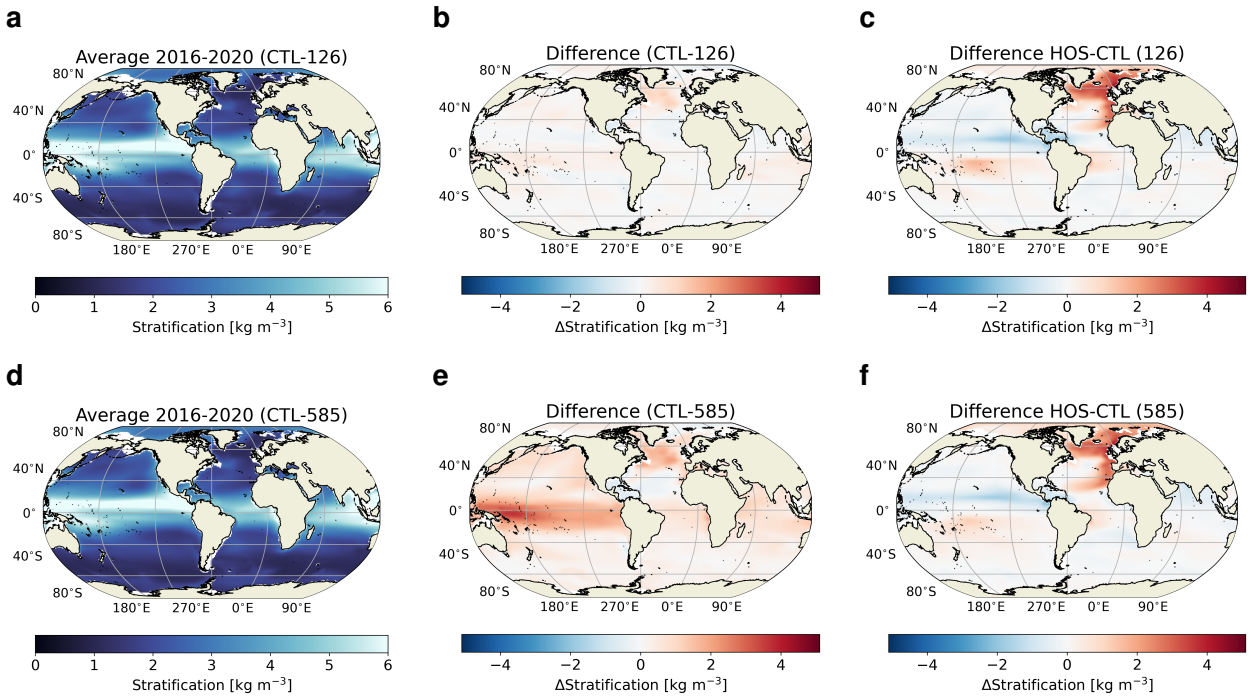

Figure S9. Results for stratification in kg m^{-3}, where stratification is defined as the densitiy difference between 200 m depth and the surface (ref). Panels represent the same as in Fig. S2.

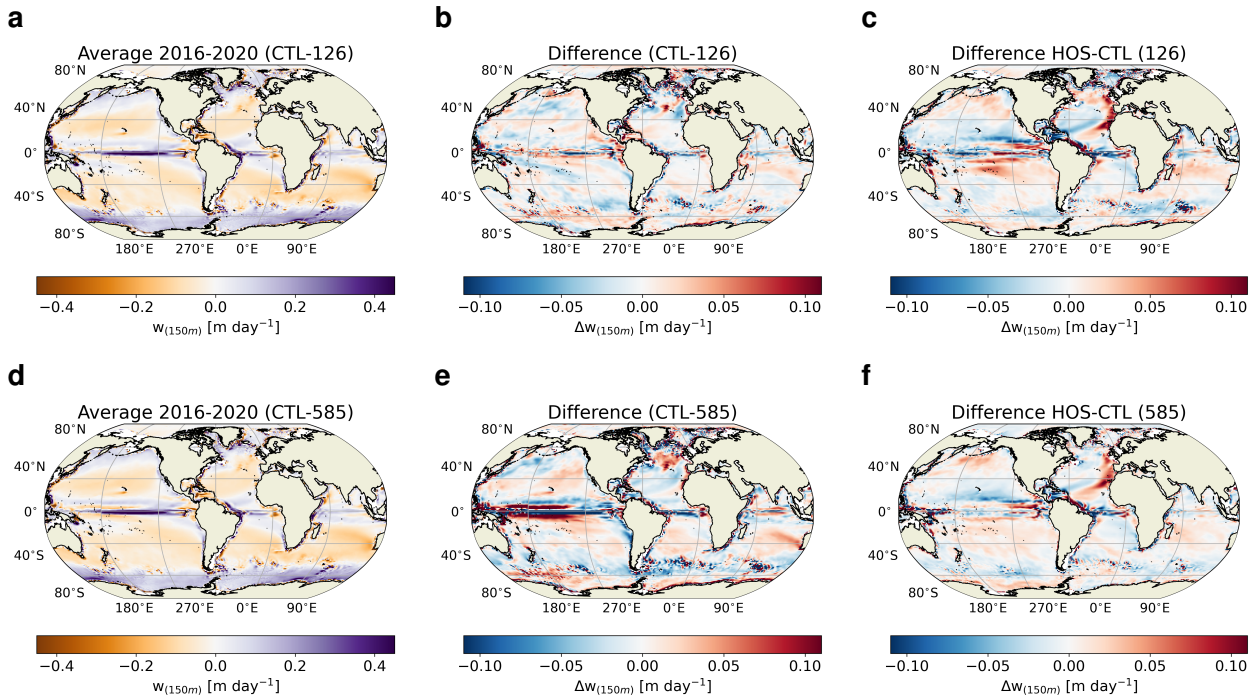

Figure S10. Results for vertical velocities at 150 m depth in m day^{-1}. Panels represent the same as in Fig. S2. Positive values (purple colors) in a and e represent upwelling and negative values (orange colors) downwelling.

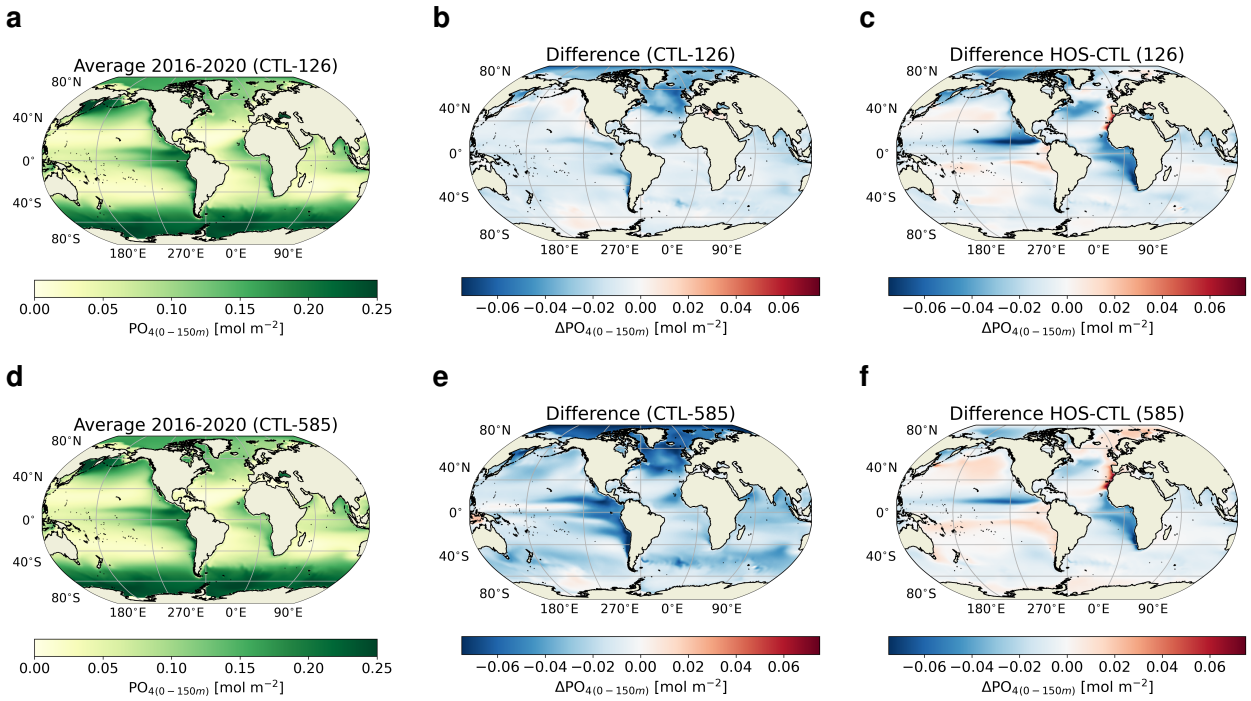

Figure S11. Results for PO_4 concentrations integrated over the surface layer (0-150 m) in mol m^{-2}. Panels represent the same as in Fig. S2.

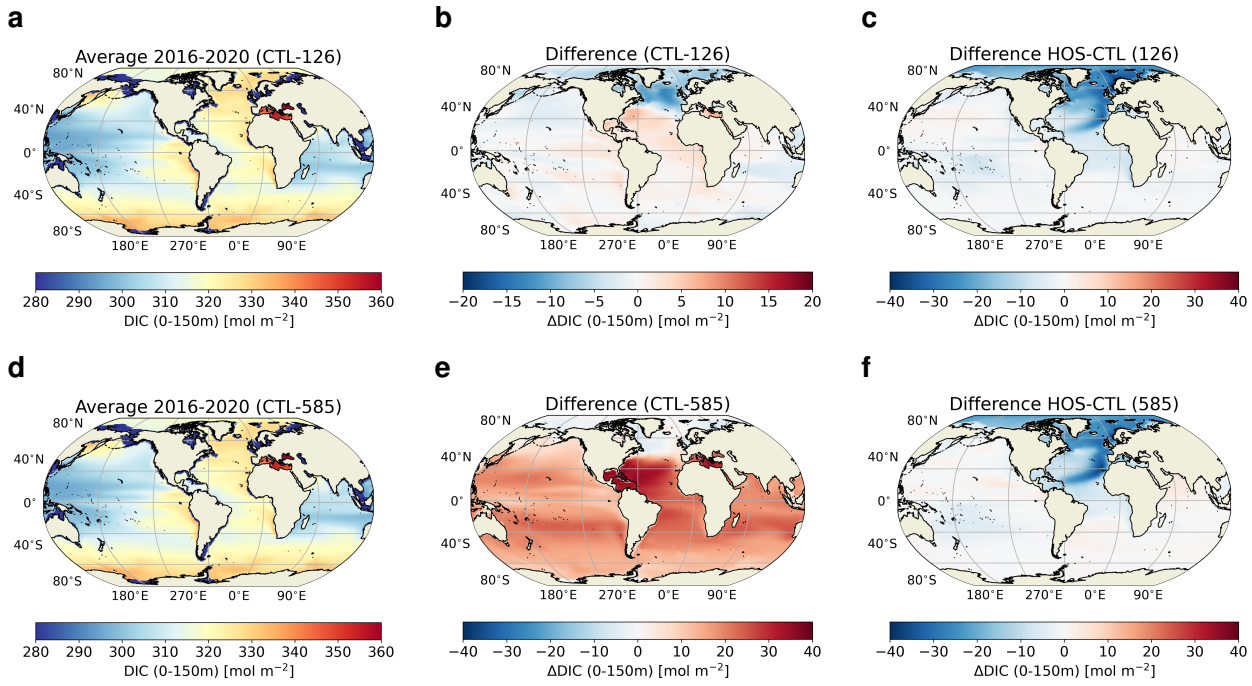

Figure S12. Results for DIC concentrations integrated over the surface layer (0-150 m) in mol m^{-2}. Panels represent the same as in Fig. S2. Note the different scaling in e.

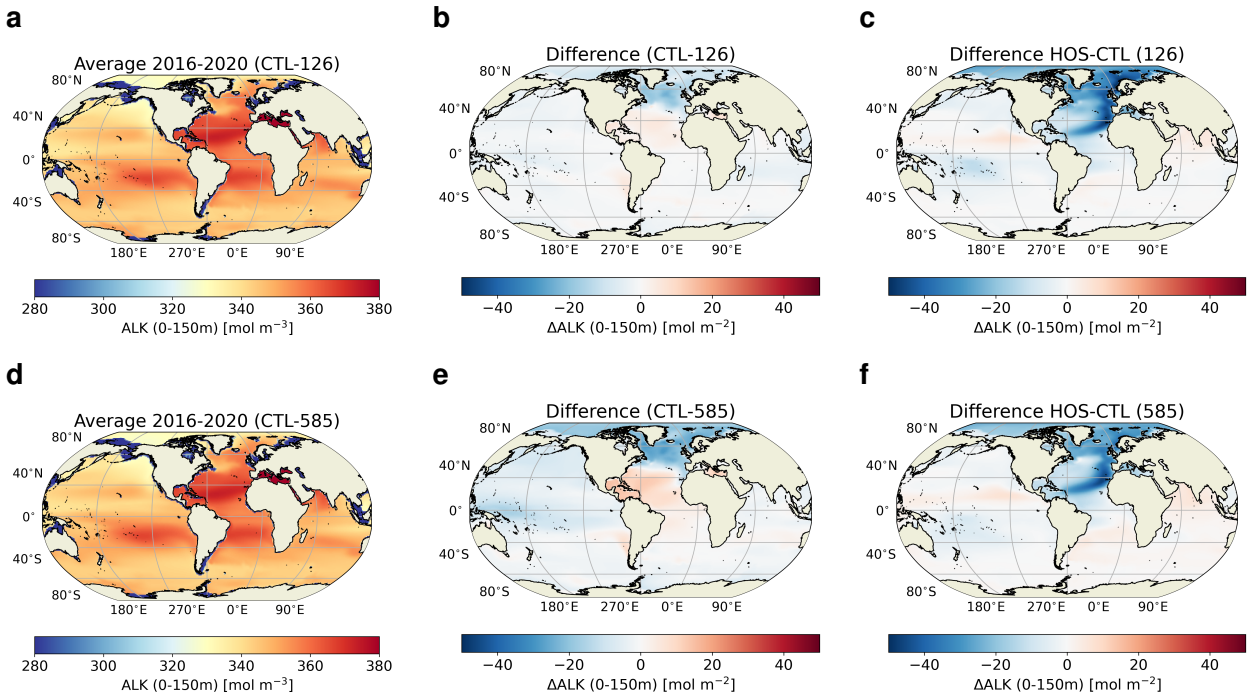

Figure S13. Results for alkalinity concentrations integrated over the surface layer (0-150 m) in mol m^{-2}. Panels represent the same as in Fig. S2. Note the different scaling in e.

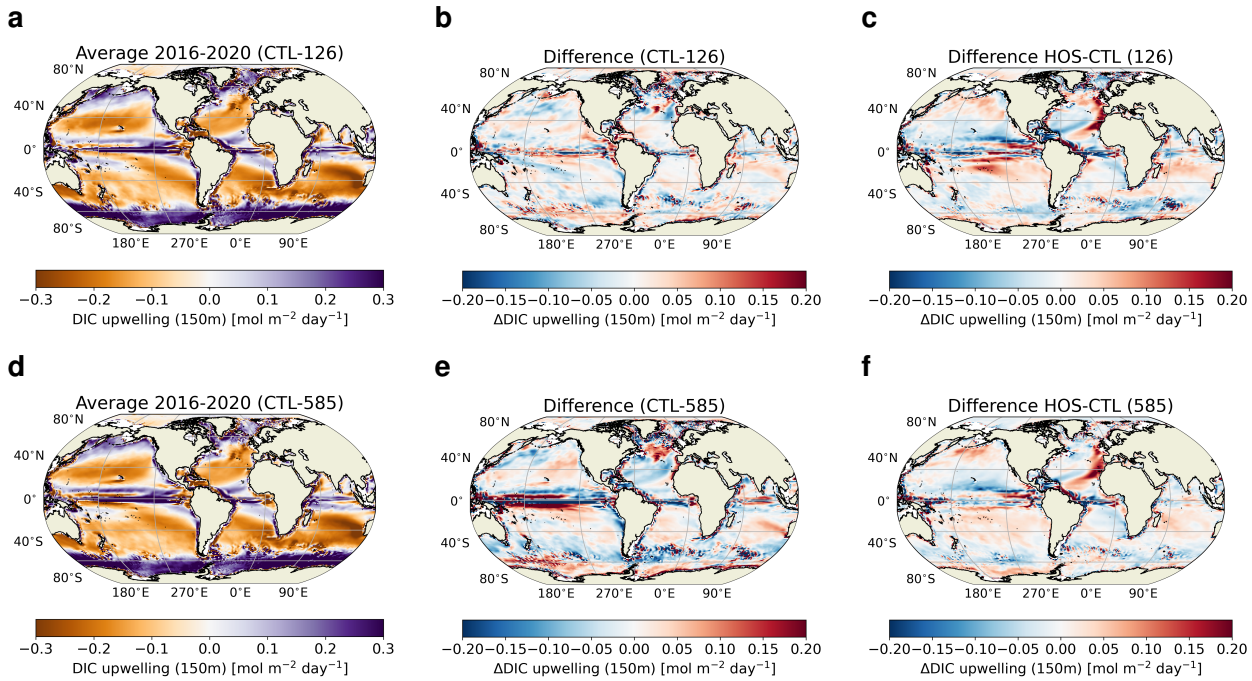

Figure S14. Results for upwelling of DIC at 150 m depth in mol m^{-2} day^{-1}. Panels represent the same as in Fig. S2. Positive values (purple colors) in a and d represent a flux going into the surface layer (top 150 m).

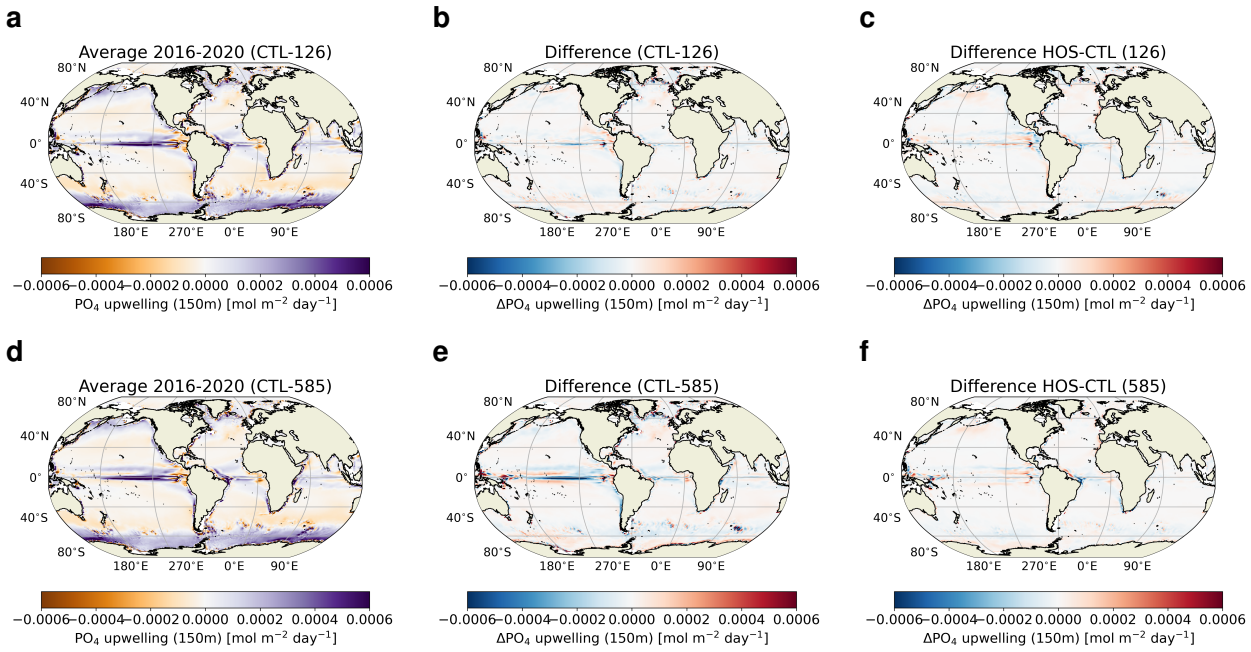

Figure S15. Results for upwelling of PO_4 at 150 m depth in mol m^{-2} day^{-1}. Panels represent the same as in Fig. S2.

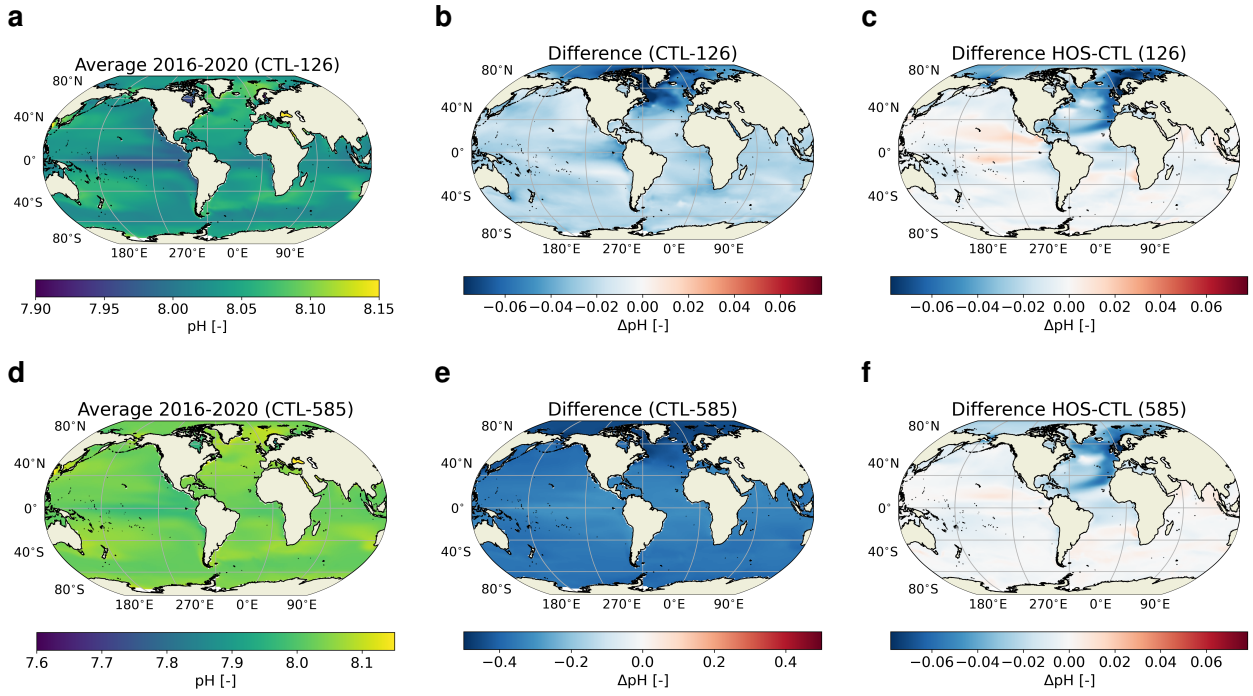

Figure S16. Results for surface pH. Panels represent the same as in Fig. S2. Note that the scaling of the colorbar is different for the subplots.

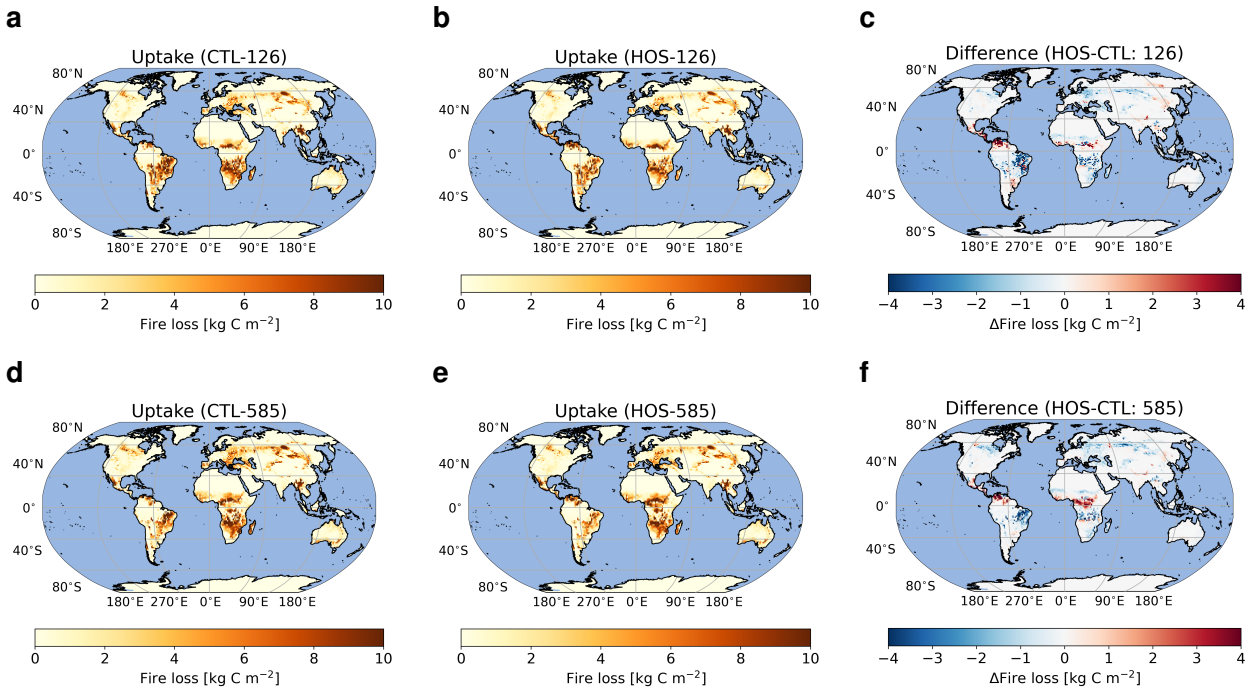

Figure S17. Results for biomass loss due to fire integrated over the entire simulation period in kg C m^{-2}. The top row (a-c) represents SSP1-2.6 and the bottom row (d-f) represents SSP5-8.5. The left column (a, d) represents the uptake in the control simulations, the middle column (b, e) the uptake in the hosing simulations, and the right column (c, f) the difference between the hosing and control simulations.

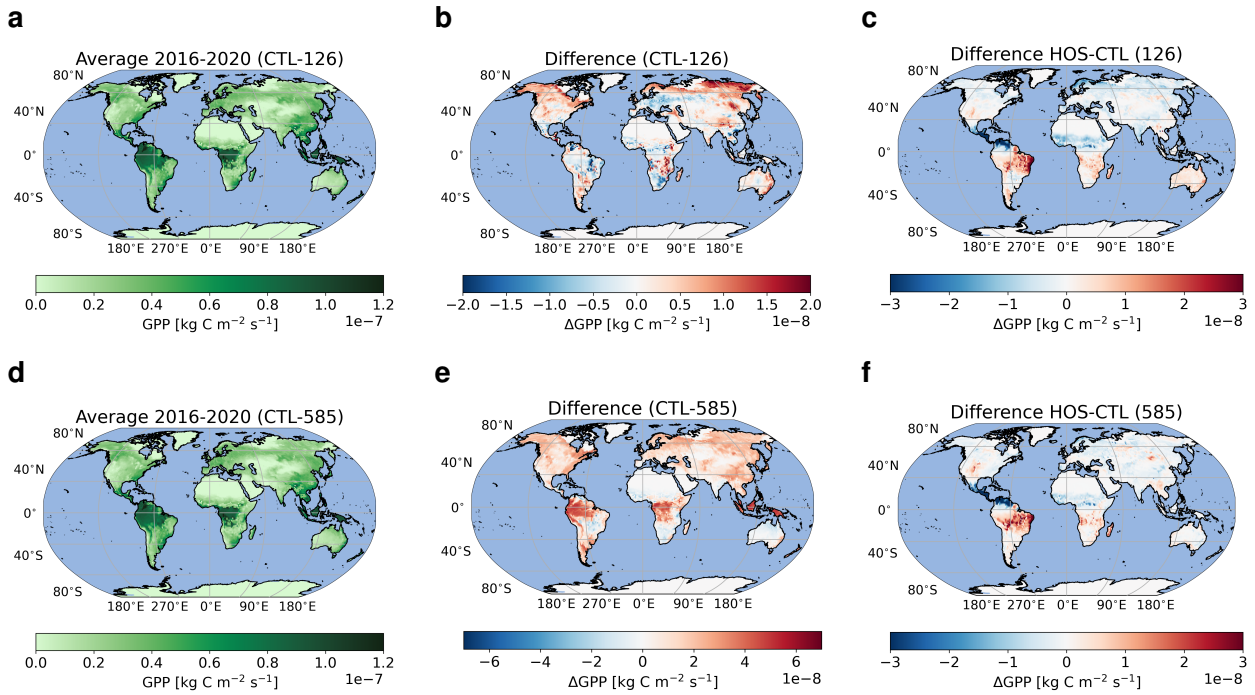

Figure S18. Results for Gross Primary Production (GPP) in kg C m^{-2} s^{-1}. Panels represent the same as in Fig. S2. Note the different scaling in e.

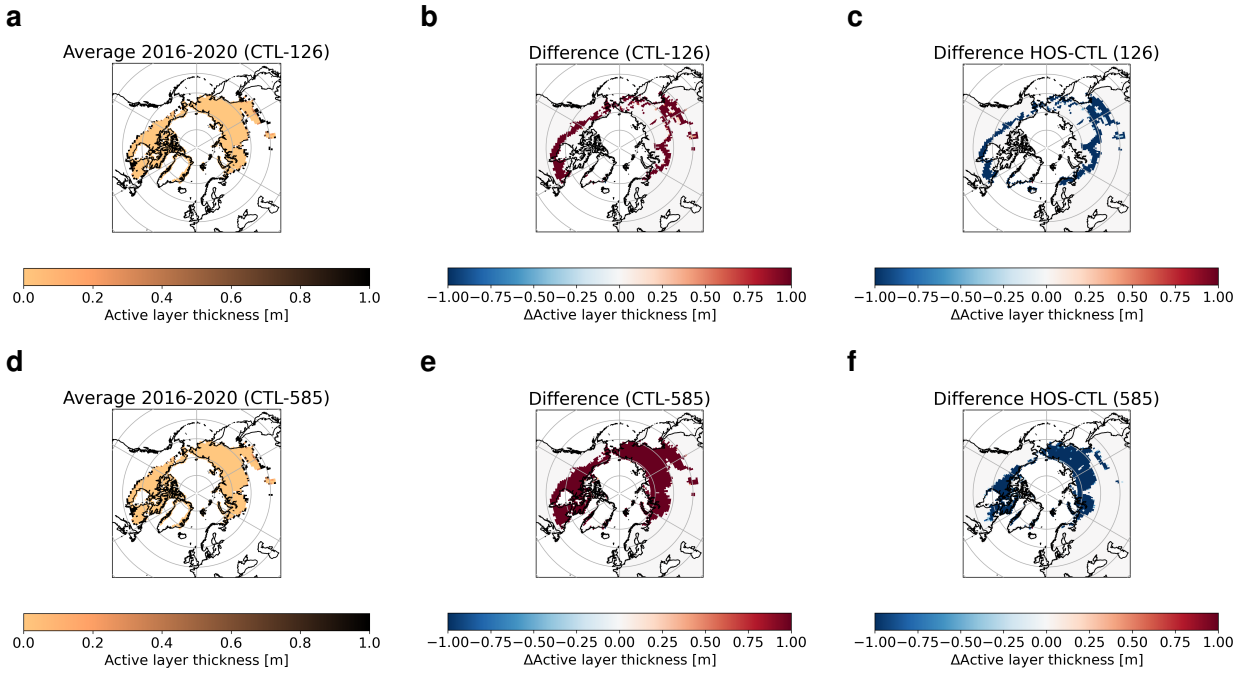

Figure S19. Results for Active Layer Thickness (ALT) in m, which serves as a proxy for annually minima of (horizontal) permafrost extent. Panels represent the same as in Fig. S2.

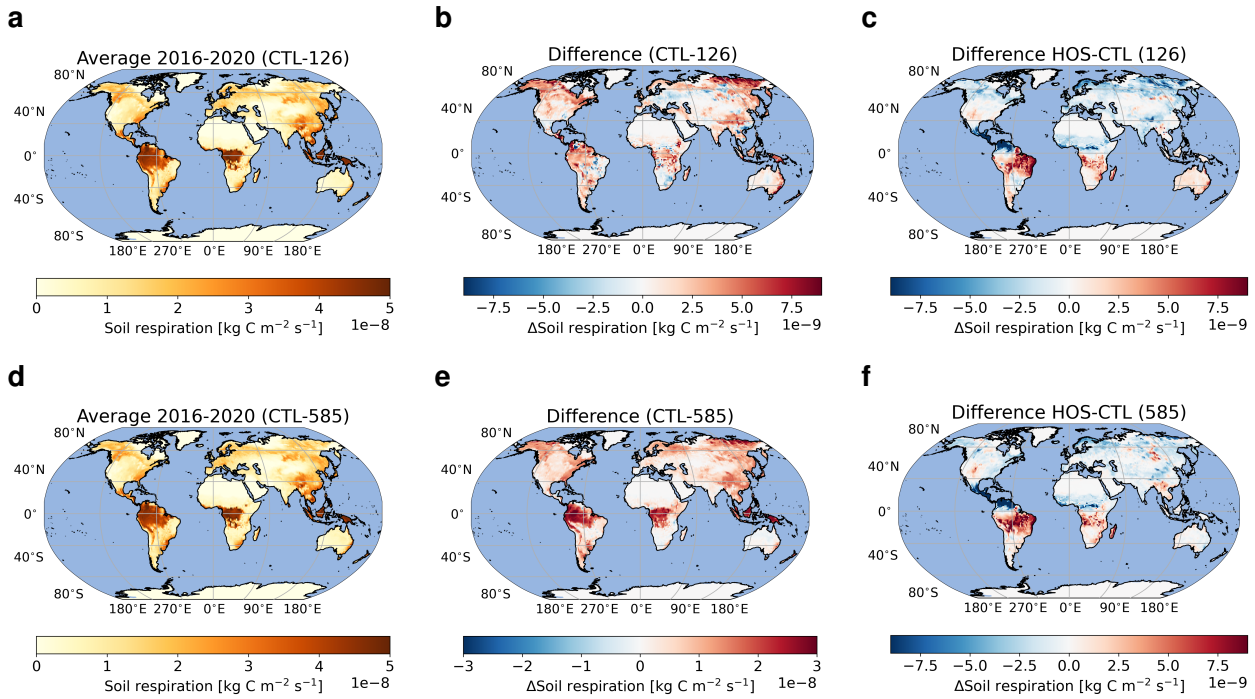

Figure S20. Results for soil respiration in kg C m^{-2} s^{-1}. Panels represent the same as in Fig. S2. Note the different scaling in e.

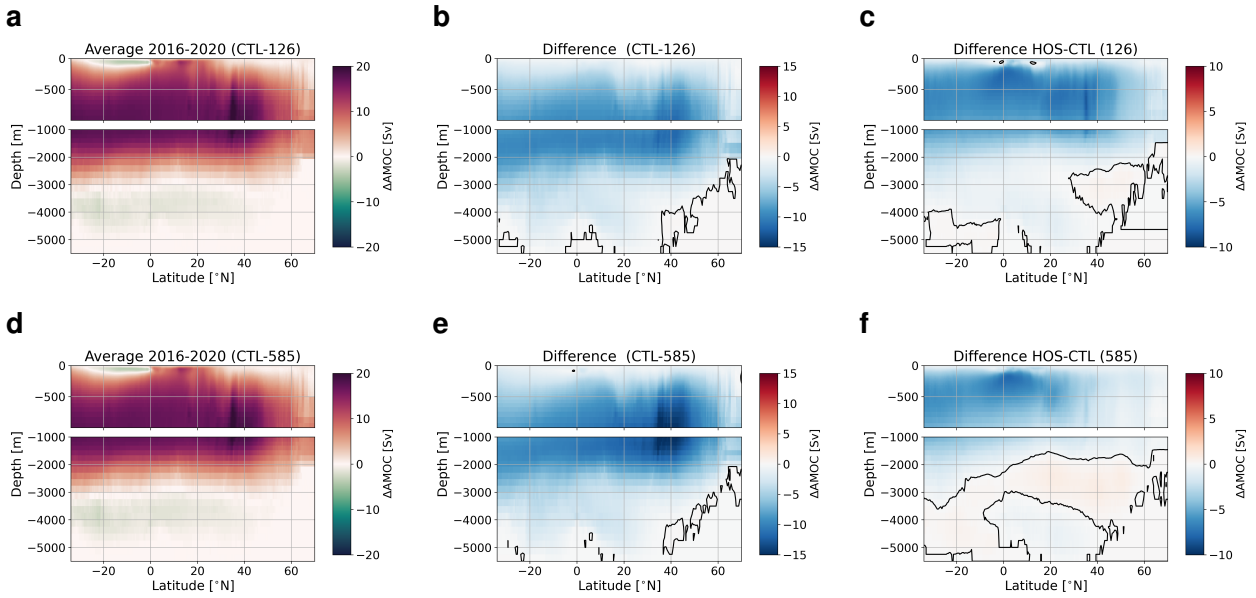

Figure S21. Results for the Atlantic Meridional Overturning Circulation in Sv. Panels represent the same as in Fig. S2. Black contour lines in b, c, e and f represent the 0 Sv contour. Note the different scaling of the surface ocean (top 1000 m) compared to the deep ocean.