

# Supporting Information for "E3SMv2 Slab Ocean model: Evaluation and sensitivity to ocean heat transports"

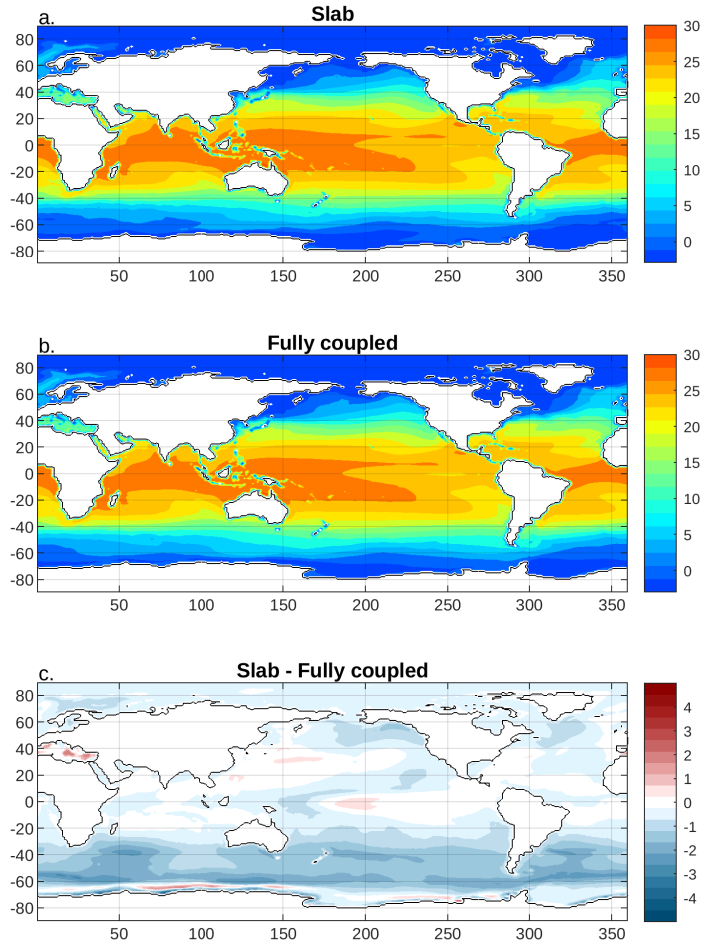
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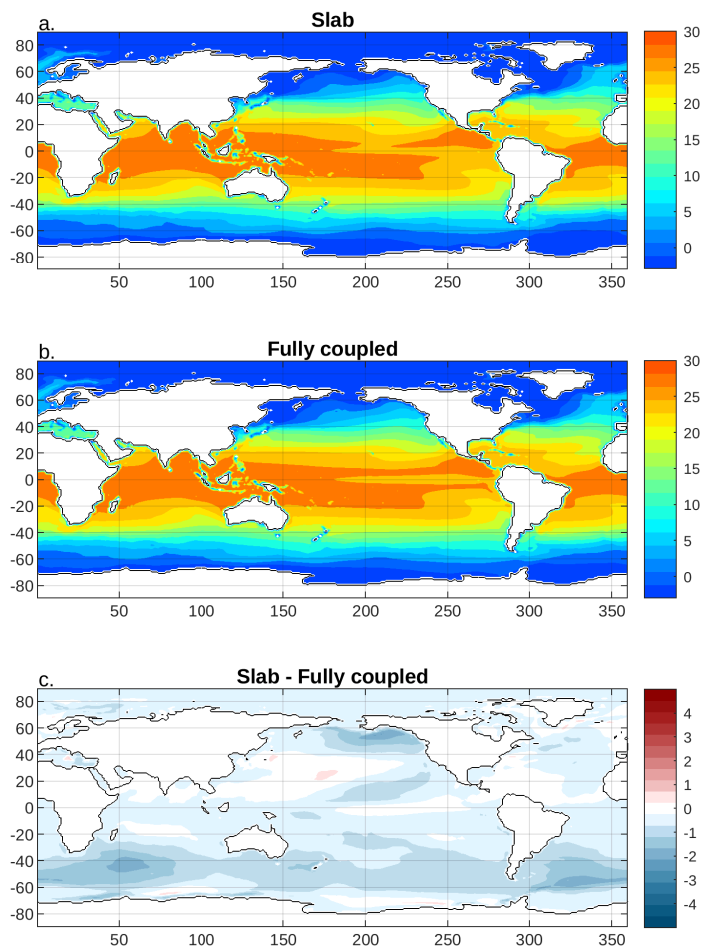
<sup>1</sup>Richland Washington, 99354

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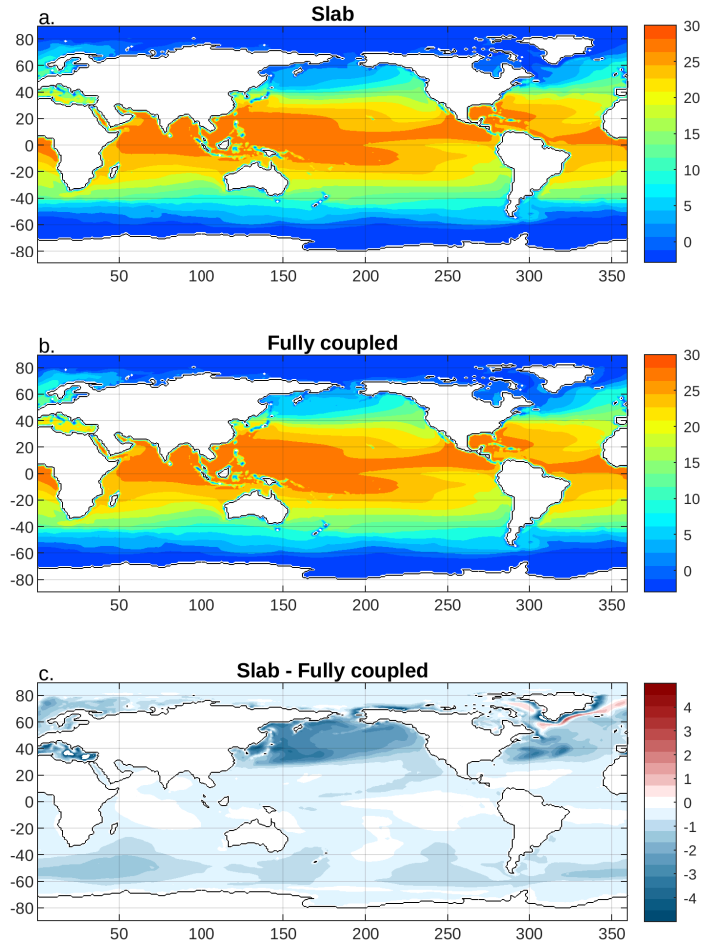
1. Figures S1 to S18



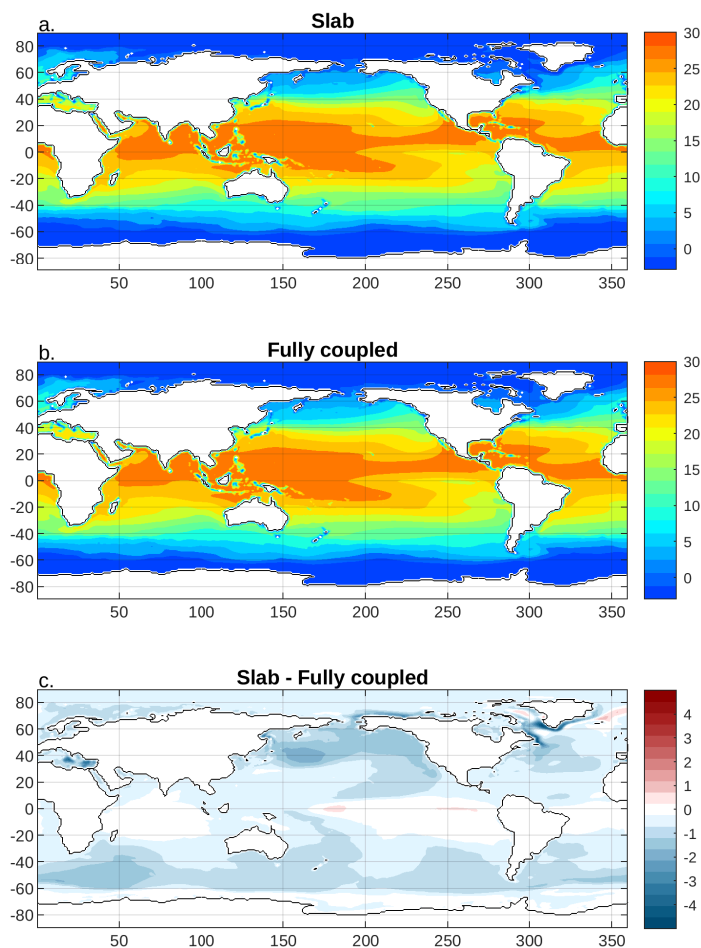
**Figure S1.** DJF season Sea Surface Temperature in the SOM.v2.LR-OHC experiment (Years 26-50; a) and in the v2.LR.piControl fully coupled experiment (Years 481-500; b) and their difference (c)



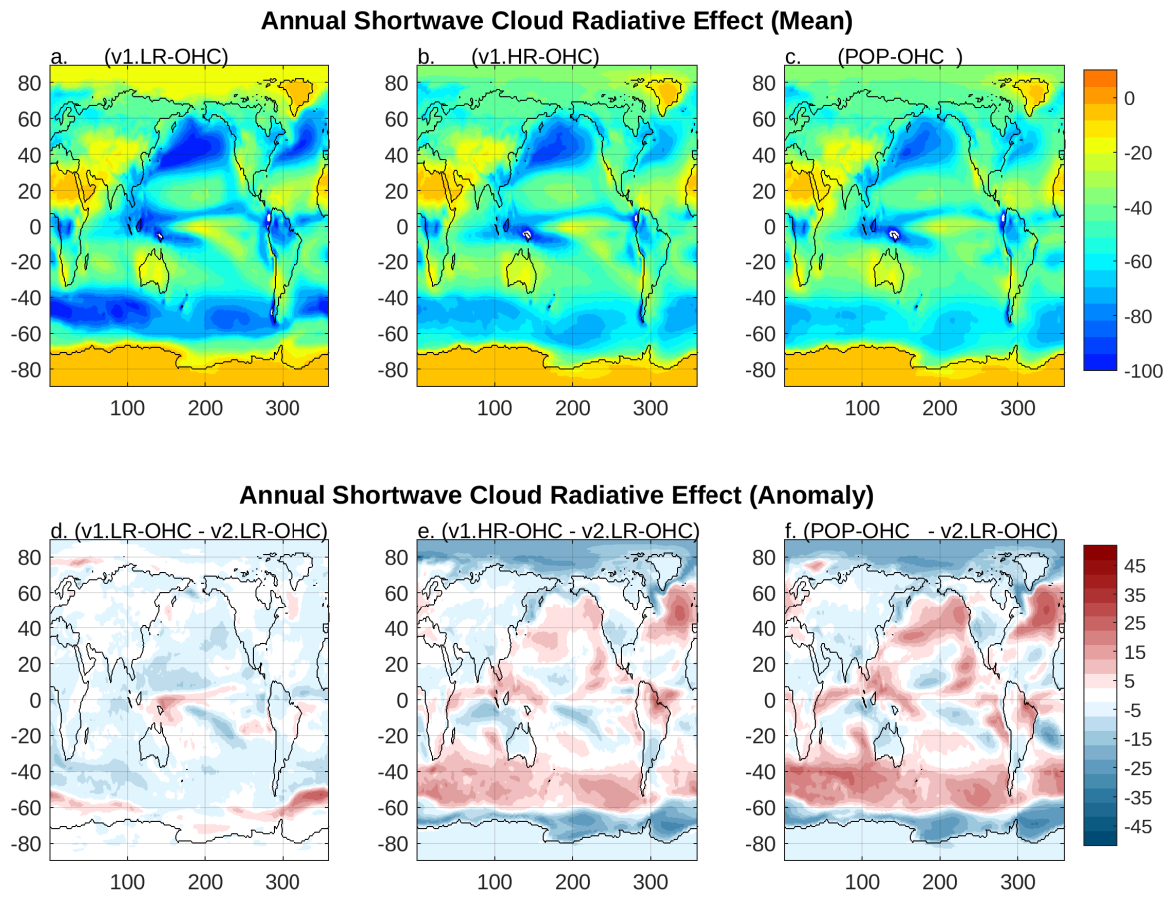
**Figure S2.** MAM season Sea Surface Temperature in the SOM.v2.LR-OHC experiment (Years 26-50; a) and in the v2.LR.piControl fully coupled experiment (Years 481-500; b) and their difference (c)



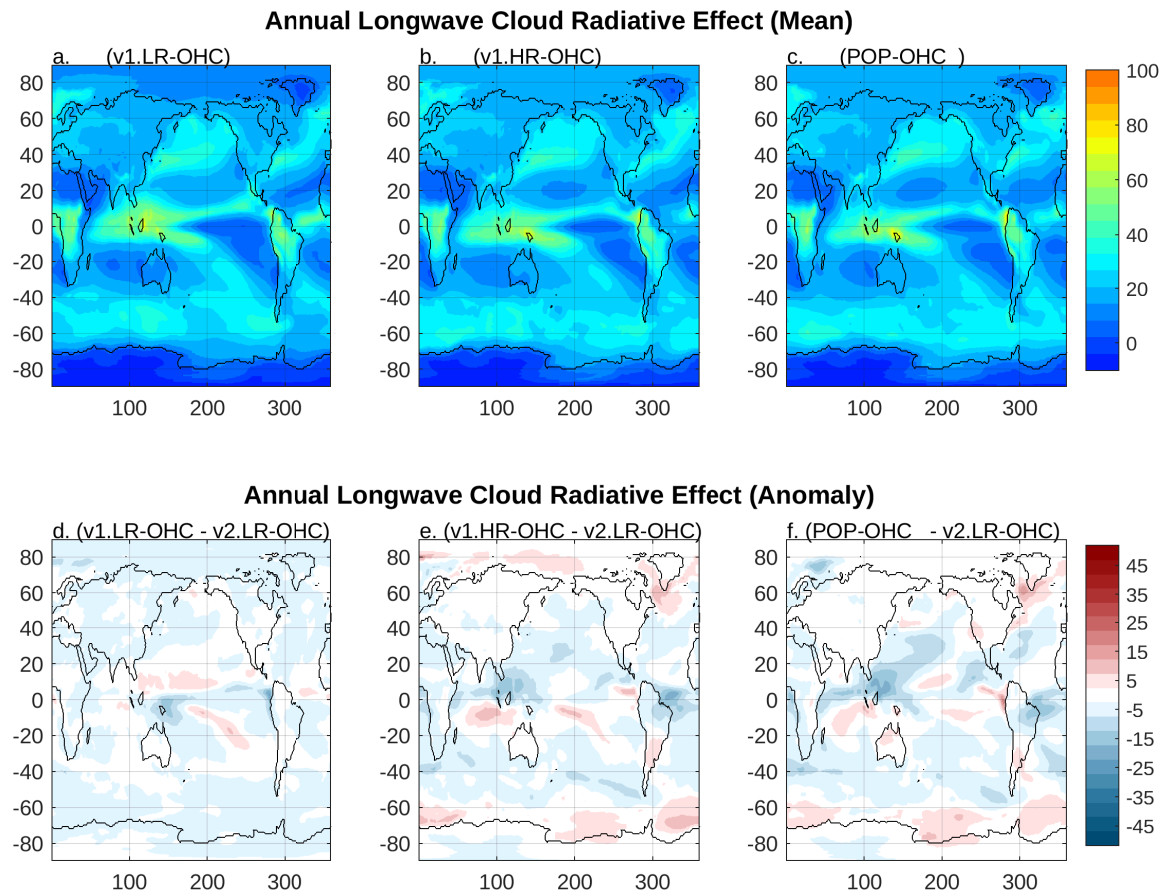
**Figure S3.** JJA season Sea Surface Temperature in the SOM.v2.LR-OHC experiment (Year 26-50; a) and in the v2.LR.piControl fully coupled experiment (Years 481-500; b) and their difference (c)



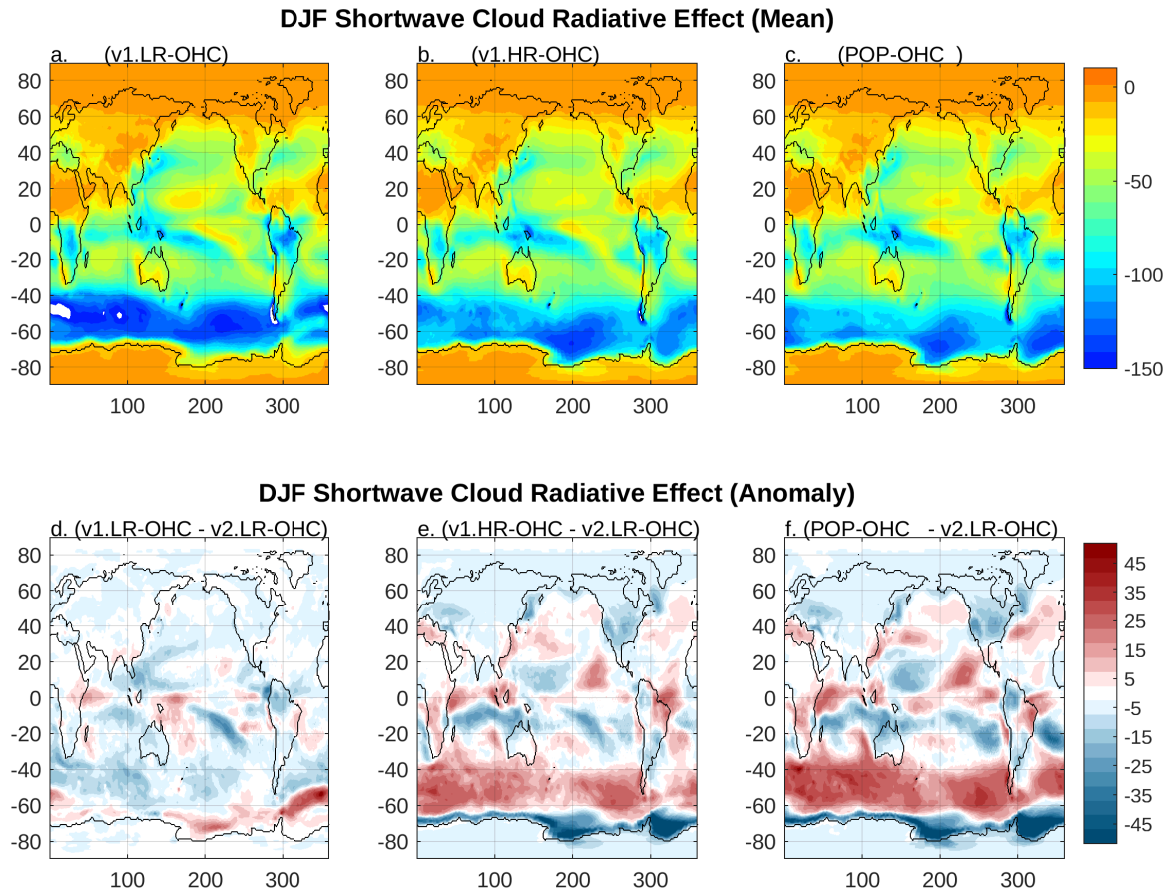
**Figure S4.** SON season Sea Surface Temperature in the SOM.v2.LR-OHC experiment (Years 26-50; a) and in the v2.LR.piControl fully coupled experiment (Years 481-500; b) and their difference (c)



**Figure S5.** Annual mean Shortwave Cloud Radiative Effect in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the Annual mean Shortwave Cloud Radiative effect in the SOM.v2.LR-OHC experiment (d-f).

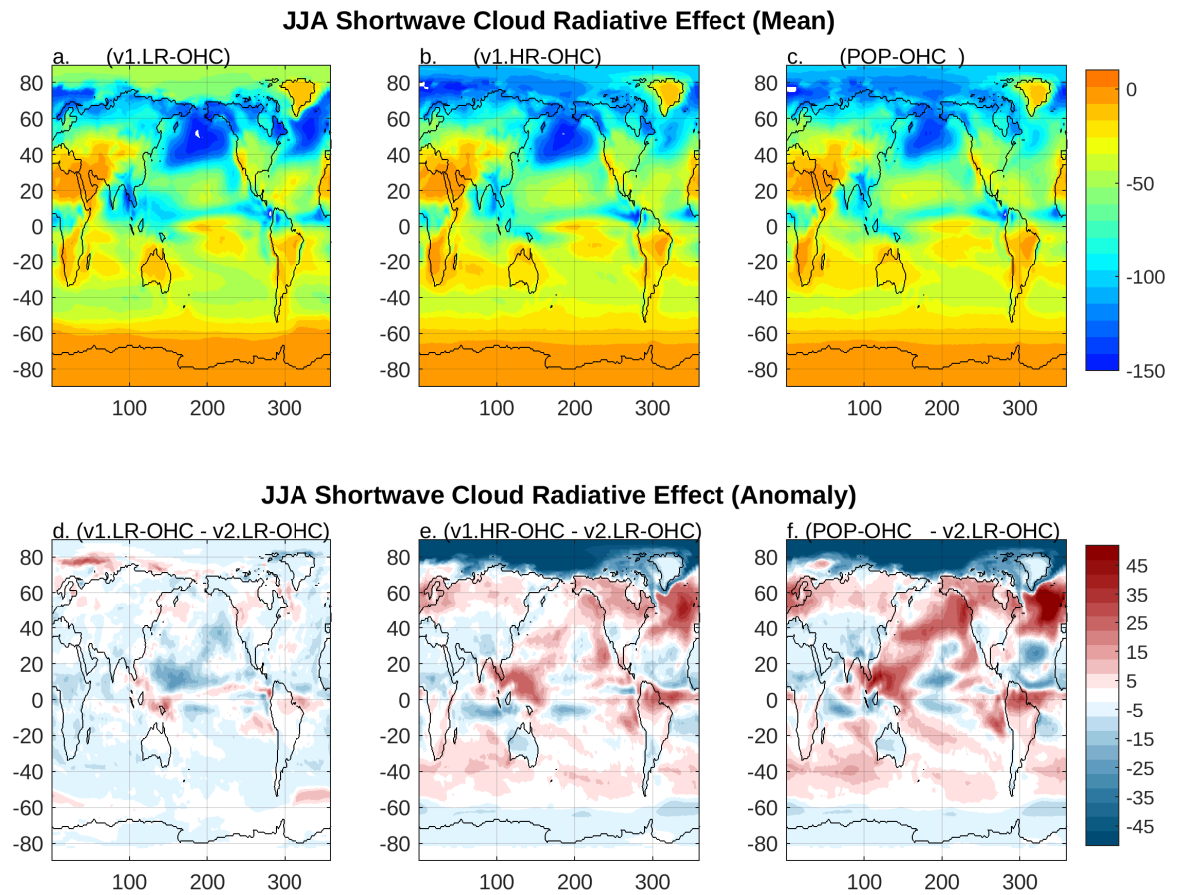


**Figure S6.** Annual mean Longwave Cloud Radiative Effect in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the Annual mean Shortwave Cloud Radiative effect in the SOM.v2.LR-OHC experiment (d-f).

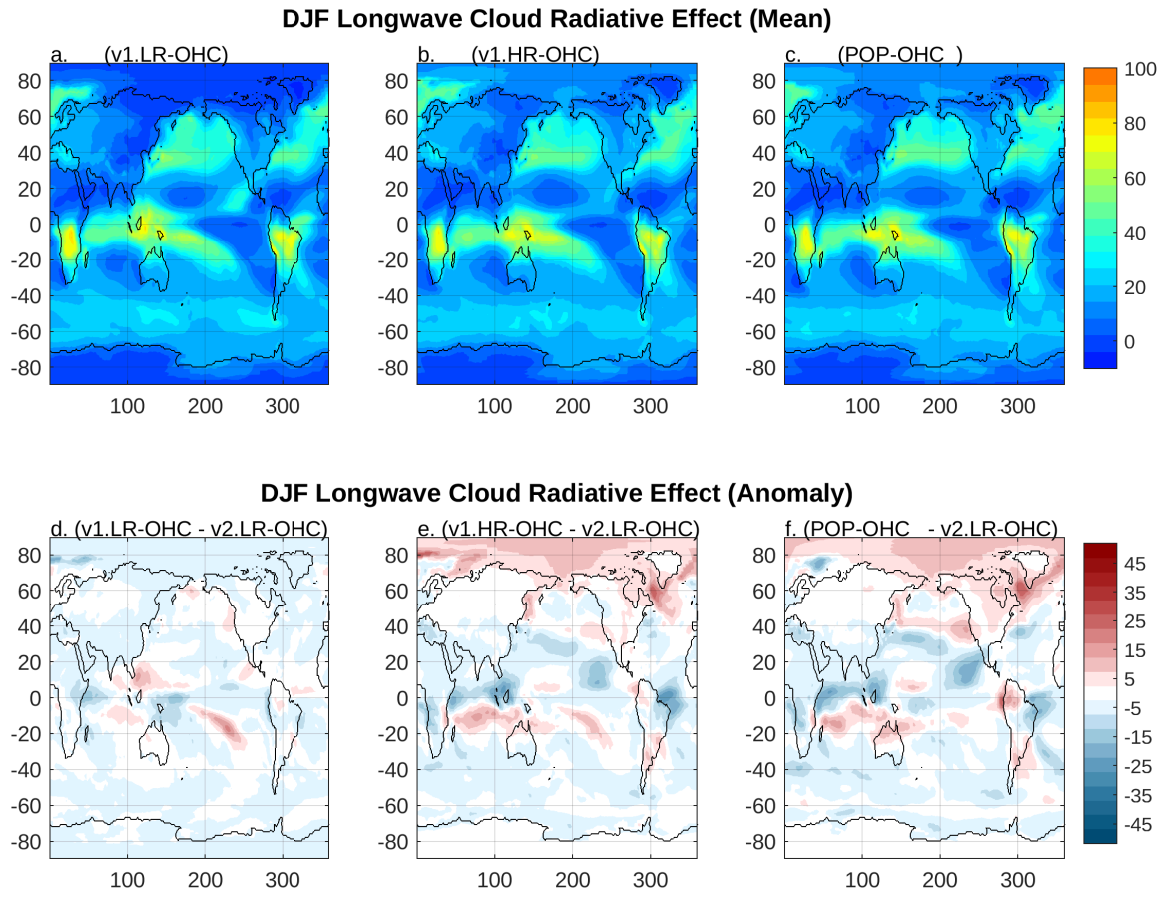


**Figure S7.** DJF seasoanal mean Shortwave Cloud Radiative Effect in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the DJF seasonal mean Shortwave Cloud Radiative effect in the SOM.v2.LR-OHC experiment (d-f).

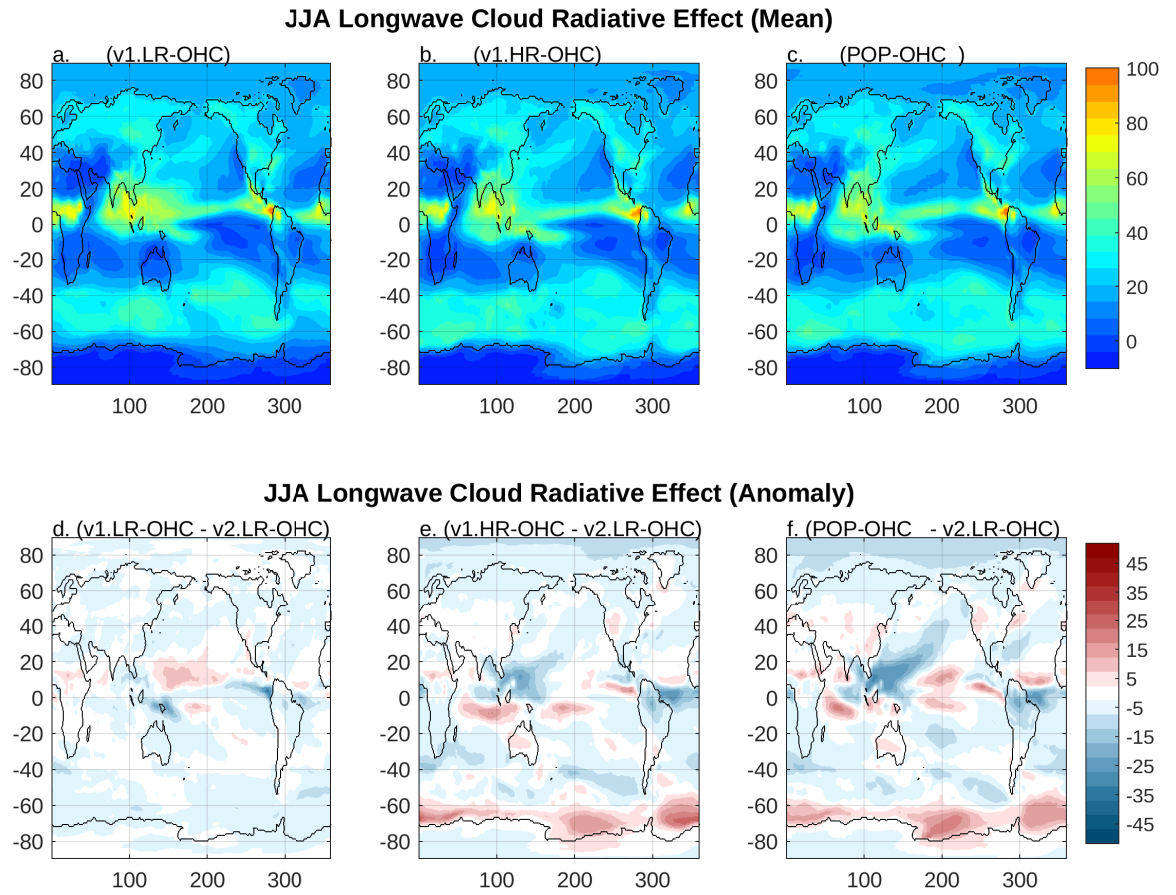




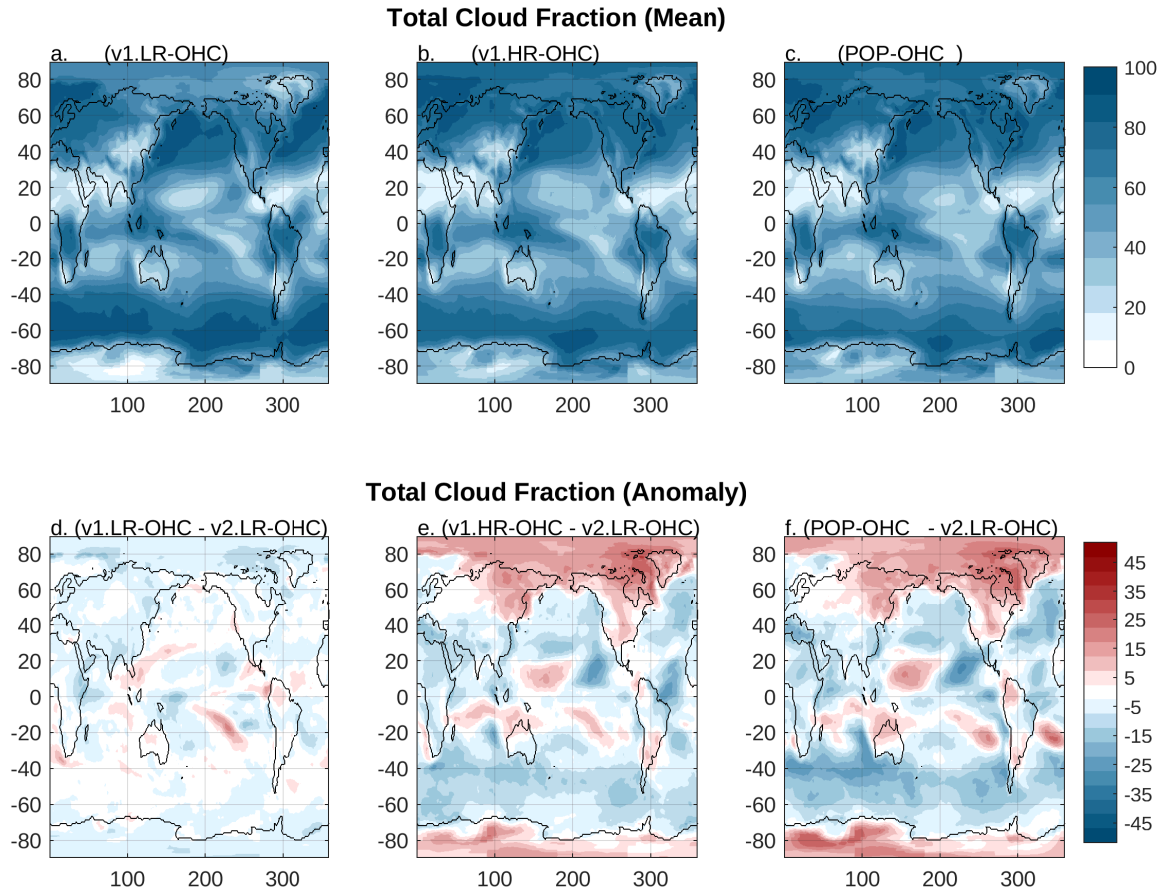
**Figure S8.** JJA Seasonal mean Shortwave Cloud Radiative Effect in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the JJA seasonal mean Shortwave Cloud Radiative effect in the SOM.v2.LR-OHC experiment (d-f).



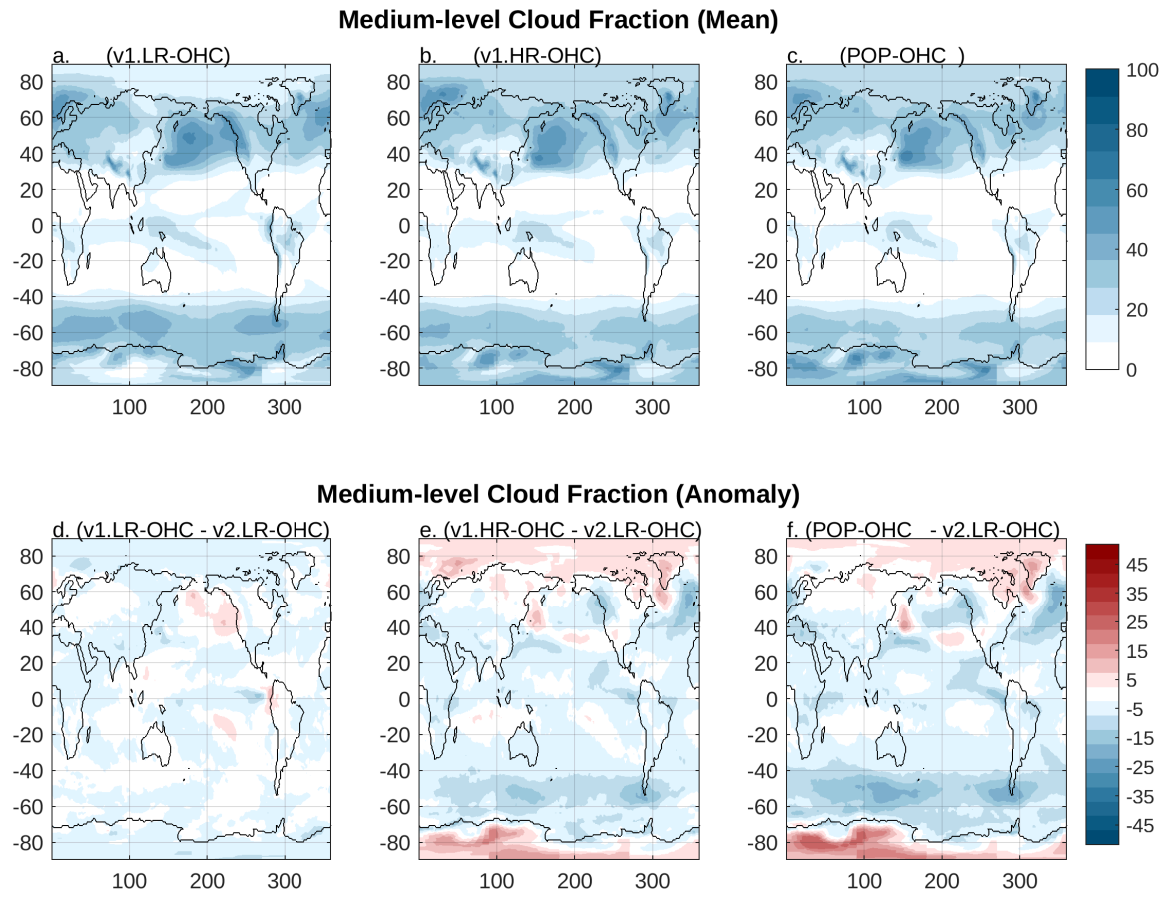
**Figure S9.** DJF seasonal mean Longwave Cloud Radiative Effect in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the DJF Seasonal mean Longwave Cloud Radiative effect in the SOM.v2.LR-OHC experiment (d-f).



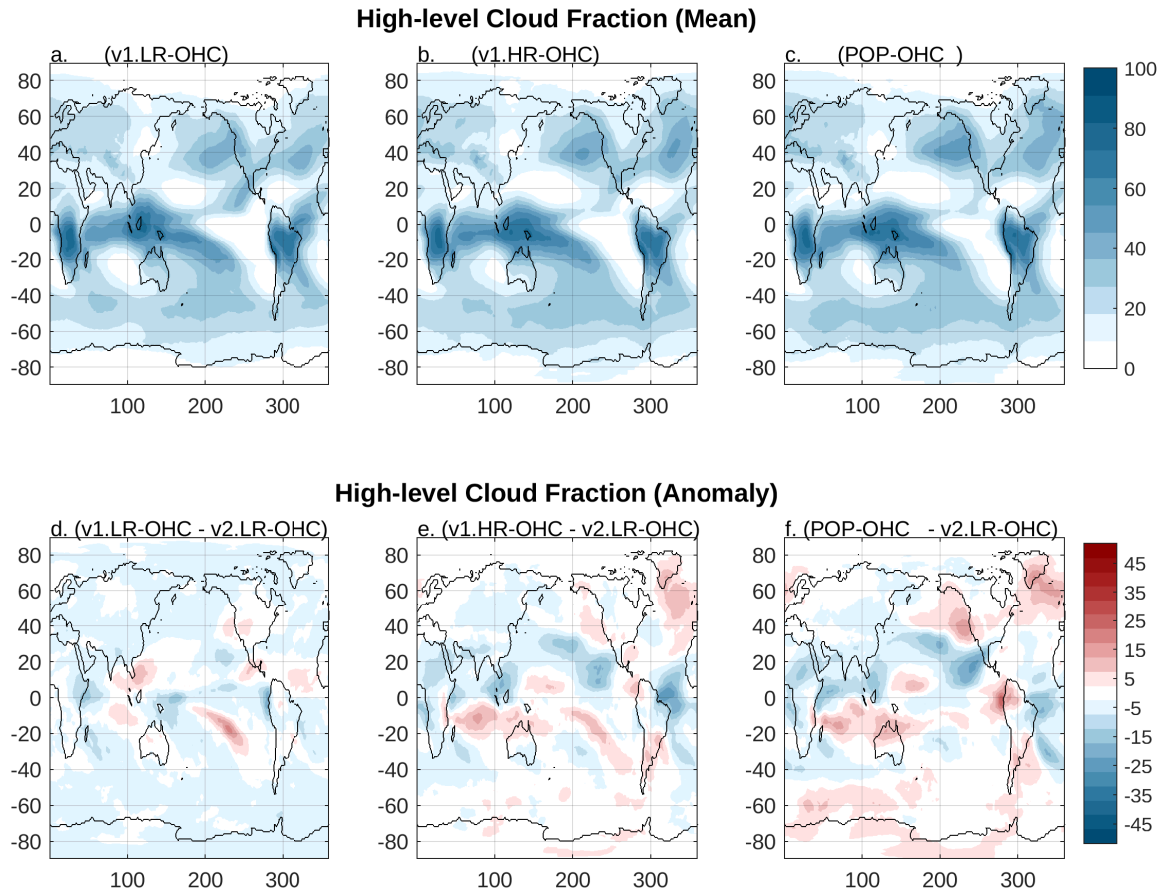
**Figure S10.** JJA Seasonal mean Longwave Cloud Radiative Effect in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the JJA seasonal mean Longwave Cloud Radiative effect in the SOM.v2.LR-OHC experiment (d-f).



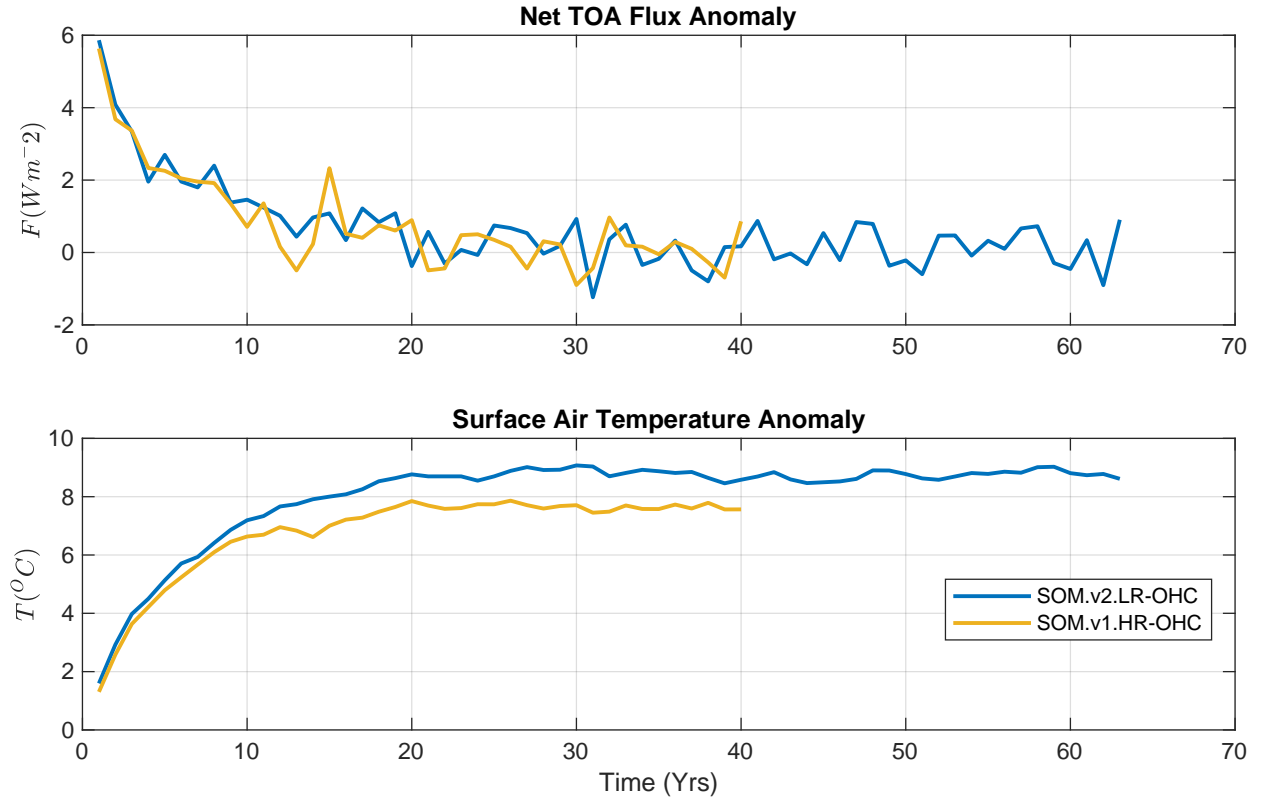
**Figure S11.** Annual mean Total cloud fraction (%) in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the Annual mean Medium cloud Fraction in the SOM.v2.LR-OHC experiment (d-f).



**Figure S12.** Annual mean Medium-level cloud fraction (%) in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the Annual mean Medium cloud Fraction in the SOM.v2.LR-OHC experiment (d-f).

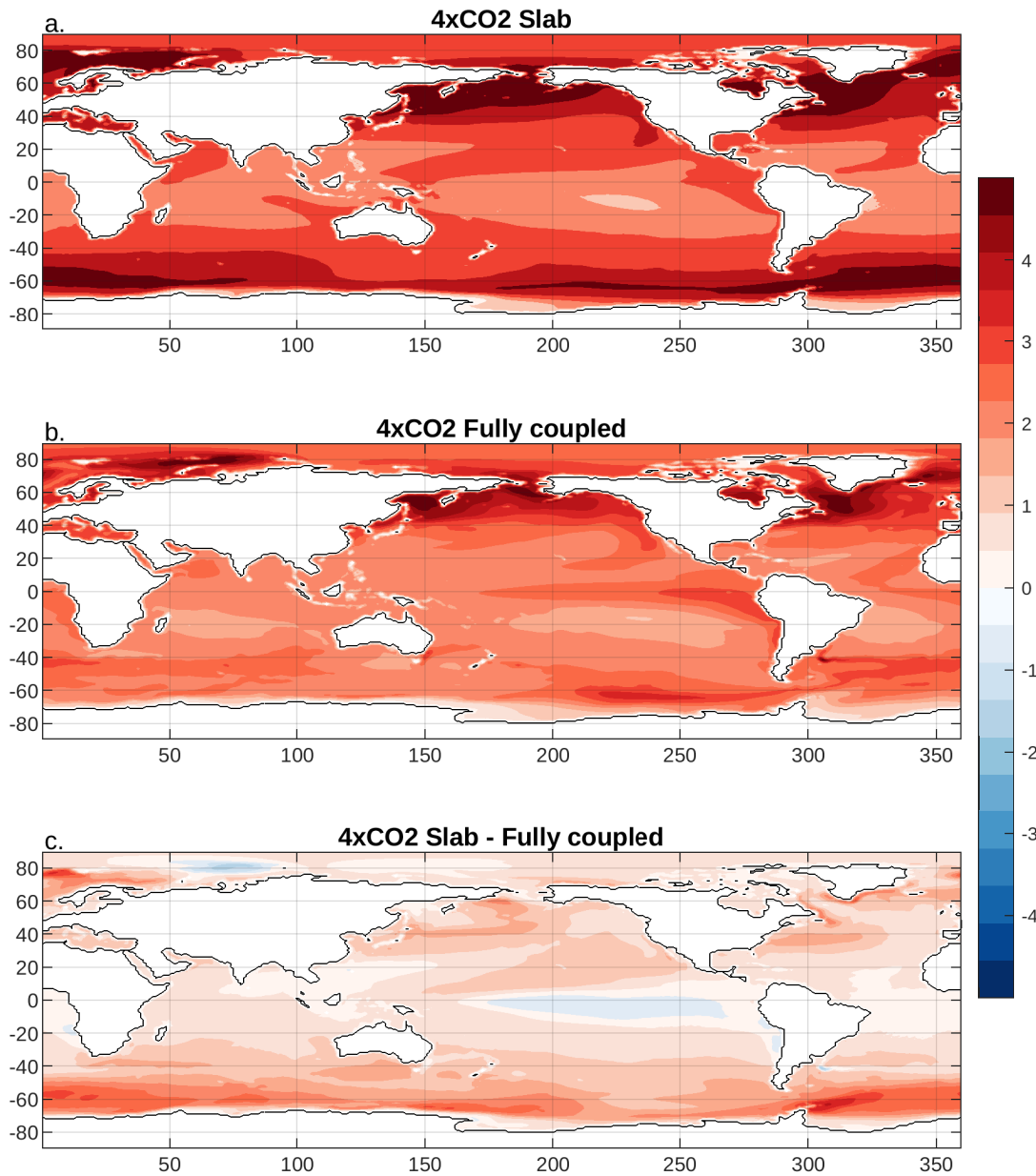


**Figure S13.** Annual mean High-level cloud fraction in the SOM.v1.LR-OHC, SOM.v1.HR-OHC, and SOM.P-OHC experiments (a- c) and their difference from the Annual mean High cloud fraction in the SOM.v2.LR-OHC experiment (d-f).



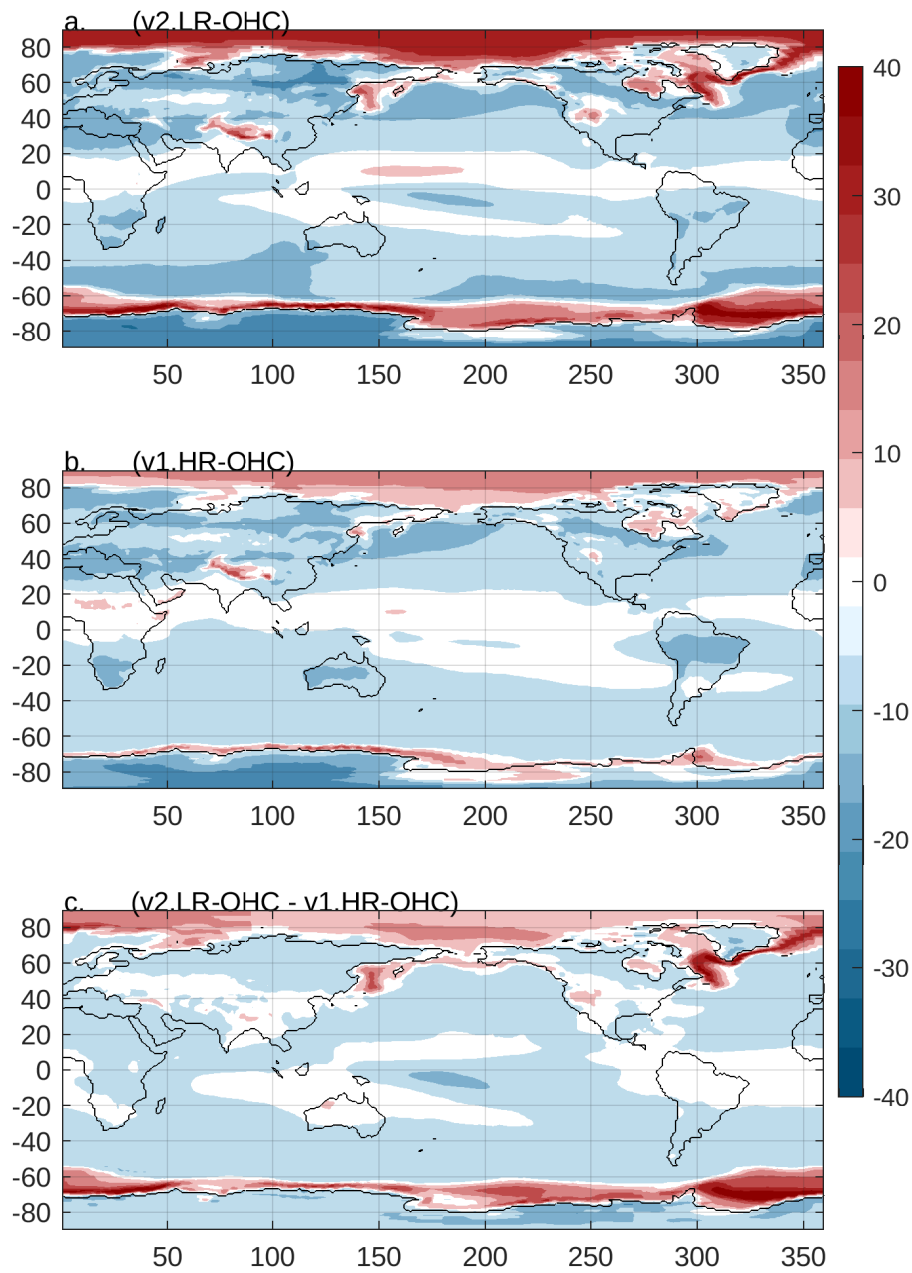
**Figure S14.** Annual mean anomalous Top of the Atmosphere heat fluxes (top panel) and Surface air temperature (bottom panel) in the SOM.v2.LR-OHC-4xCO<sub>2</sub>(Blue) and SOM.v1.HR-OHC-4xCO<sub>2</sub> simulations (Yellow). Anomalies are defined with respect to the corresponding years in their respective control simulations (i.e SOM.v2.LR-OHC and SOM.v1.HR-OHC experiments



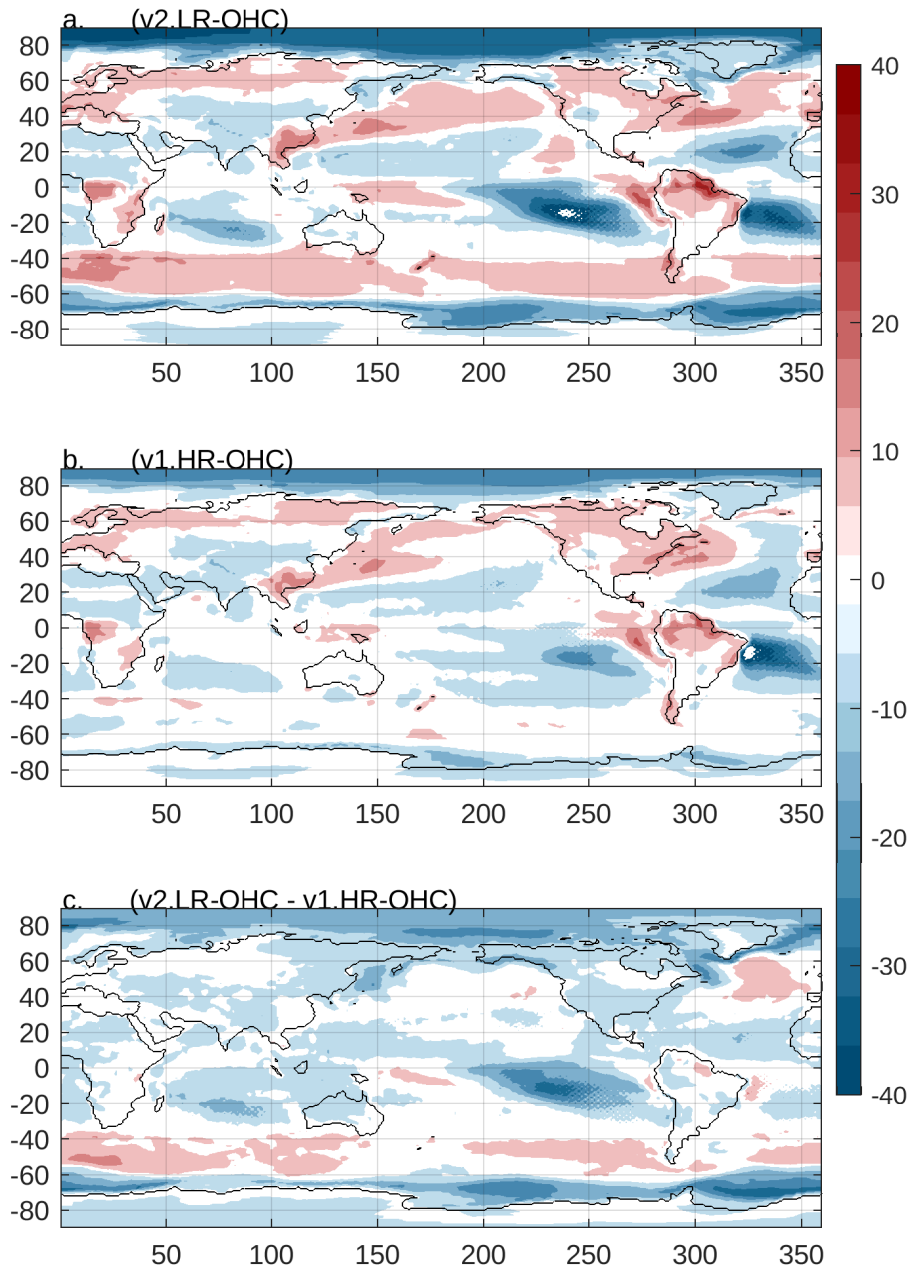


**Figure S15.** Annual mean anomalous Sea surface temperature in the SOM (SOM.v2.LR-OHC-4xCO<sub>2</sub>); a), fully coupled (v2.LR-4xCO<sub>2</sub>; b) simulations, and their difference (c). Anomalies are defined with respect to the corresponding years in the respective control simulations (SOM.v2.LR-OHC, v1.LR.Control) they are initialized from.

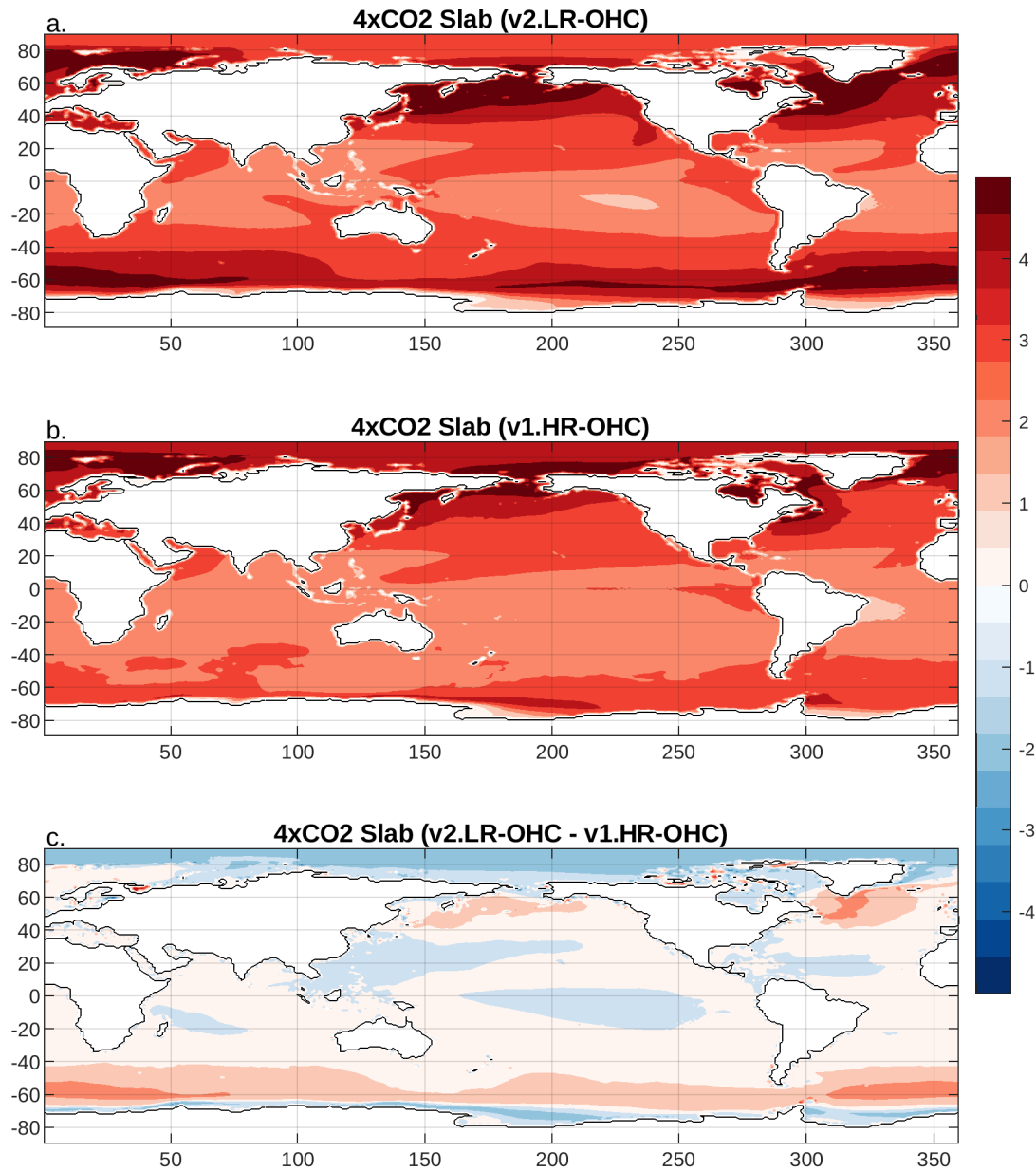




**Figure S16.** Annual mean clear sky forcing in the SOM (SOM.v2.LR-OHC-4xCO<sub>2</sub>); a), fully coupled (v2.LR-4xCO<sub>2</sub>; b) simulations, and their difference (c). Anomalies are defined with respect to the corresponding years in the respective control simulations (SOM.v2.LR-OHC, v1.LR.Control) they are initialized from.



**Figure S17.** Annual mean cloud radiative effect in the (SOM.v2.LR-OHC-4xCO<sub>2</sub>) (a) SOM.v1.HR-OHC-4xCO<sub>2</sub> (b) SOM simulations, and their difference (c). Anomalies are defined with respect to the corresponding years in the respective control simulations (SOM.v2.LR-OHC, SOM.v1.HR-OHC) they are initialized from.



**Figure S18.** Annual mean anomalous Sea Surface Temperature anomalies in the (SOM.v2.LR-OHC-4xCO<sub>2</sub>) (a) SOM.v1.HR-OHC-4xCO<sub>2</sub> (b) SOM simulations, and their difference (c). Anomalies are defined with respect to the corresponding years in the respective control simulations (SOM.v2.LR-OHC, SOM.v1.HR-OHC) they are initialized from.