Supplemental Material

Supplementary Material for "Improved Extratropical North Atlantic Atmosphere–Ocean Variability with Increasing Model Resolution"

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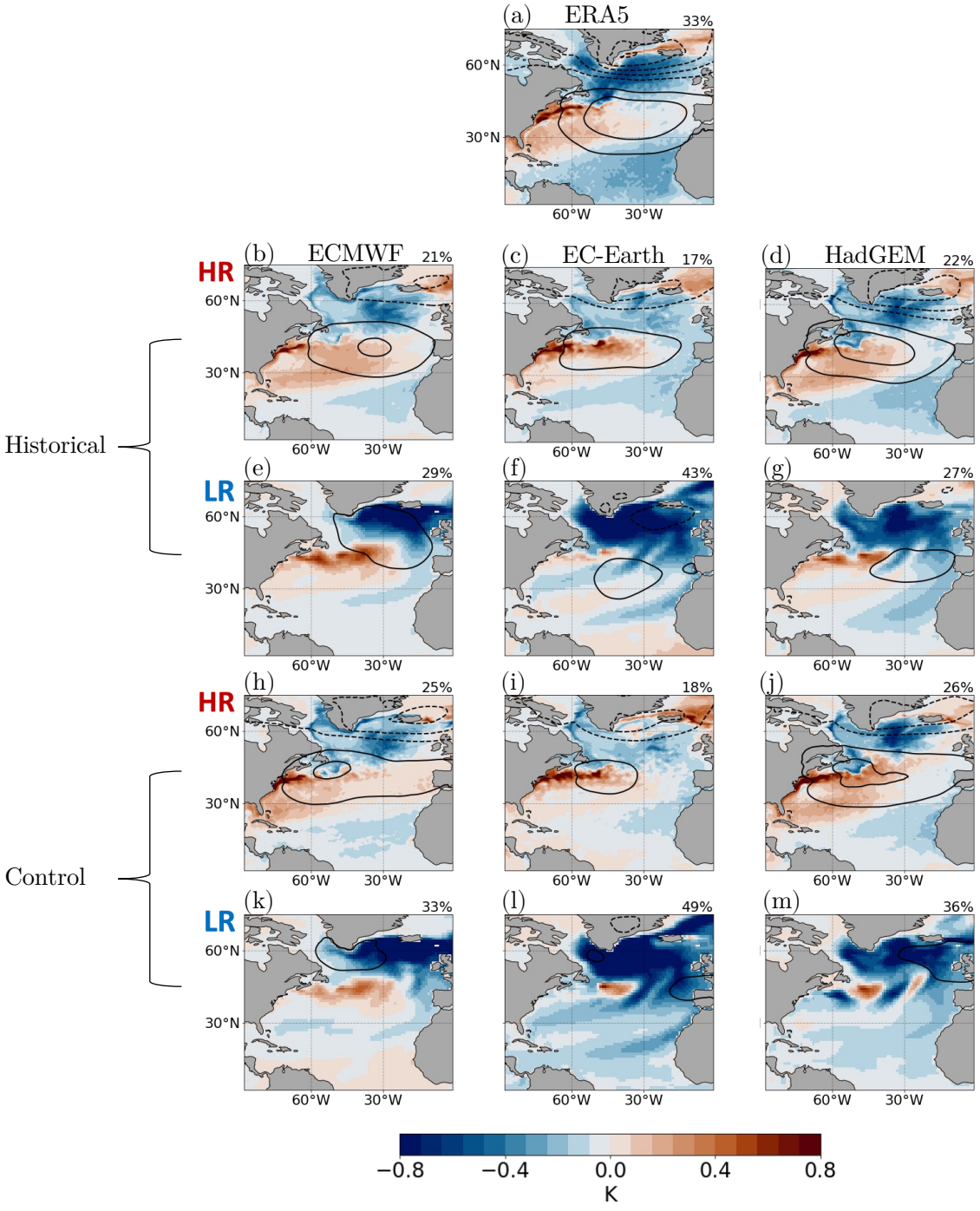

FIG. S1. (a–g) As in Figure 1a–g of the main text, except a 7-year low-pass filter as been applied to the fields before calculating the leading EOF of SST and the SLP regression pattern. (h-m) As in (a–g), except for the control runs from ECMWF, EC-Earth and HadGEM.

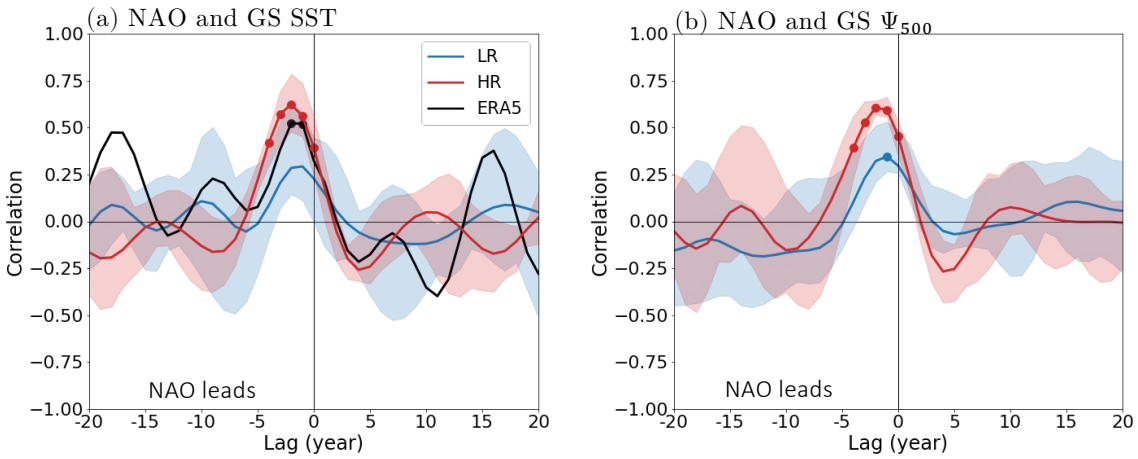

FIG. S2. The cross-correlation between low-pass filtered (a) NAO and SST anomalies averaged over the Gulf Stream region (37–47°N, 30–70°W), and (b) NAO and Ψ_{500} anomalies averaged over the Gulf Stream region. Multi-model ensemble-mean correlations are calculated from the LR model runs (blue lines) and HR model runs (red lines) with the associated spread across the model runs indicated by transparent shading. The black line in (a) shows results for ERA5.

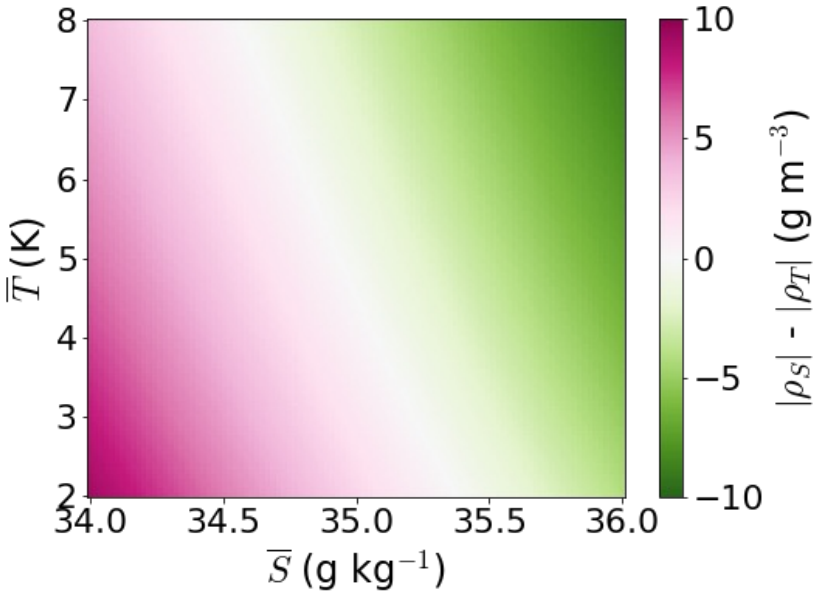

FIG. S3. The impact of mean temperature (vertical axis; K) and mean salinity (horizontal axis; g kg^{-1}) on density anomalies (shading; g m^{-3}). A perturbation of $\delta T = 0.8$K is applied to equation of state for range of mean S and T to produce density perturbation ρ_T. A perturbation of $\delta S = 0.38$ g kg^{-1} is applied to the equation of state for the same range of mean S and T to produce density perturbation ρ_S. Note that the perturbation values and range of mean T and S are chosen to approximate typical conditions in the subpolar region. The difference between the magnitudes of ρ_S and ρ_T is shown. Pink shading indicates that the magnitude of ρ_S exceeds the magnitude of ρ_T and green shading indicates vice versa.

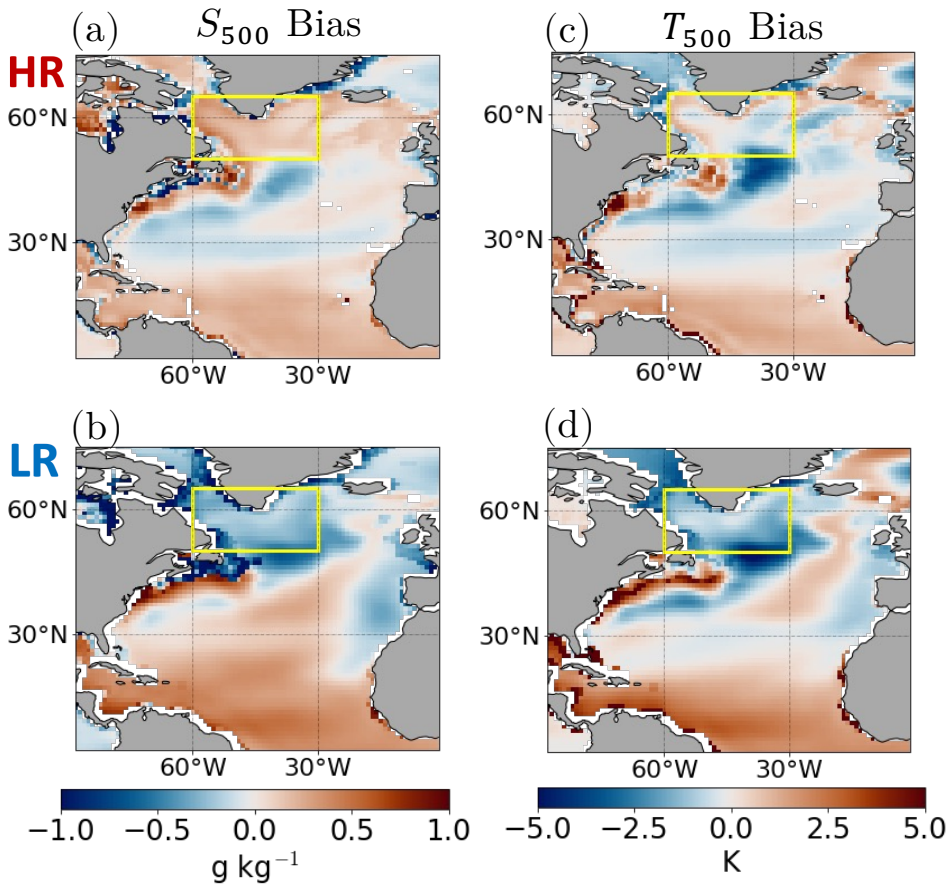

FIG. S4. Multi-model mean bias in upper-ocean salinity (S_{500}; g kg^{-1}) for the (a) HR control runs and (b) LR control runs from ECMWF, EC-Earth and HadGEM. (c, d) As in (a, b), except for upper-ocean temperature (T_{500}; K). The biases are calculated relative to observed S_{500} and T_{500} from EN4 data. The yellow box indicates the Labrador–Irminger sea region discussed in the main text.

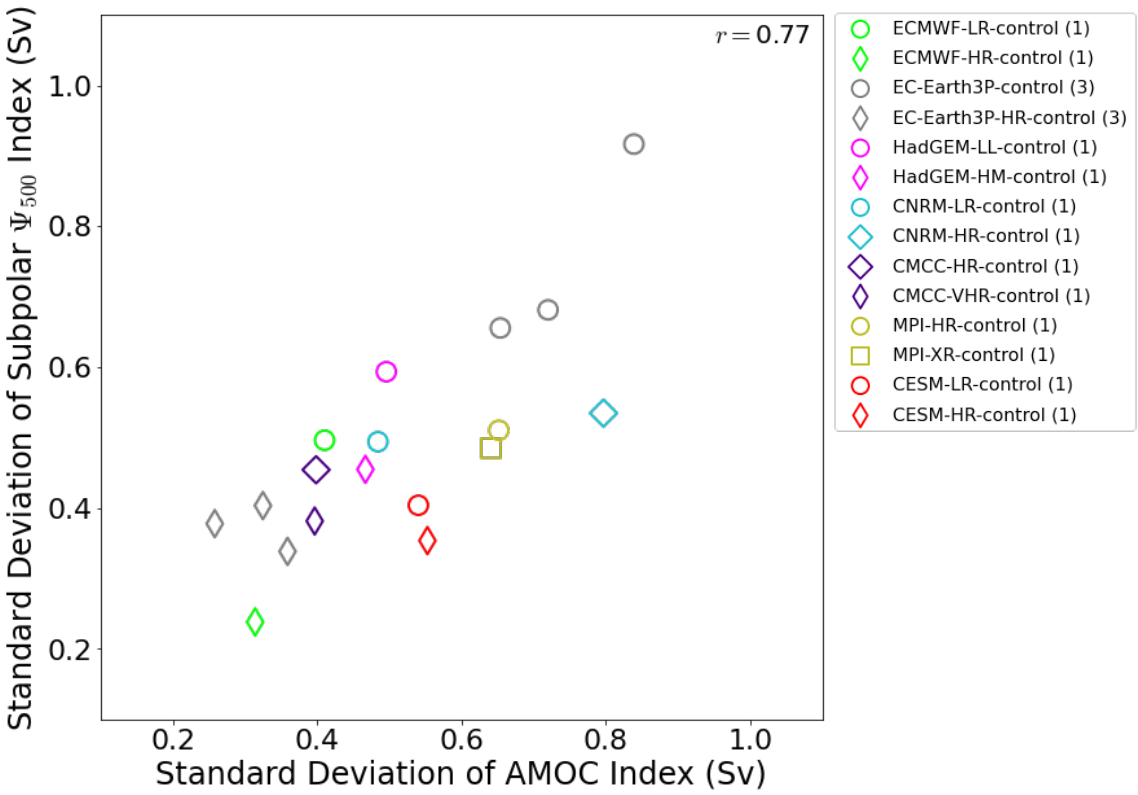

FIG. S5. As in Figure 10b of the main text, except markers have been colored by the model name.

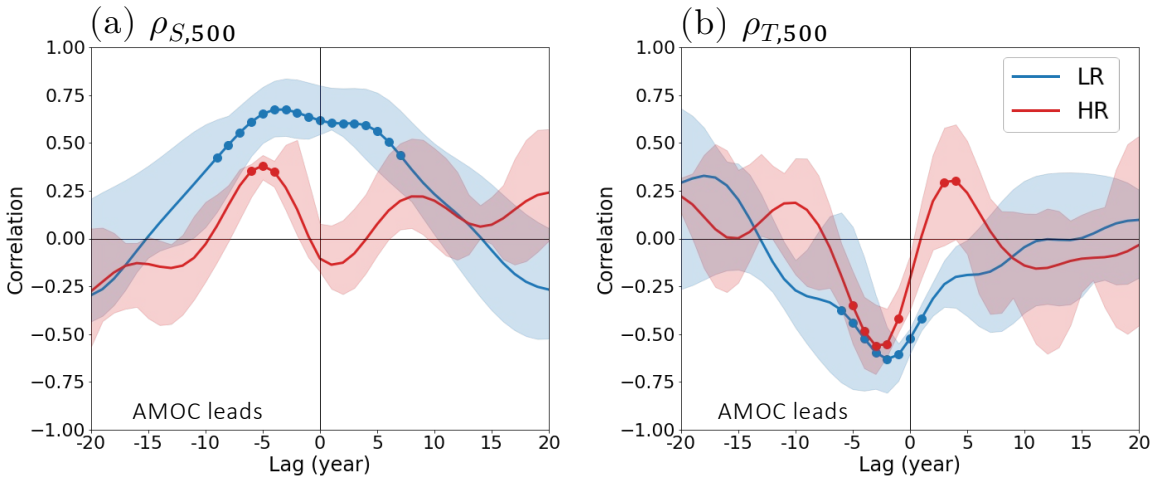

FIG. S6. As in Figure 11 of the main text, except for the cross-correlation between (a) the AMOC index and the salinity component of subpolar ρ_{500} anomalies ($\rho_{S,500}$), and (b) the AMOC index and the temperature component of subpolar ρ_{500} anomalies ($\rho_{T,500}$).