Multi-annual variability of a new proxy-constrained modeled AMOC from 1450-1780 CE

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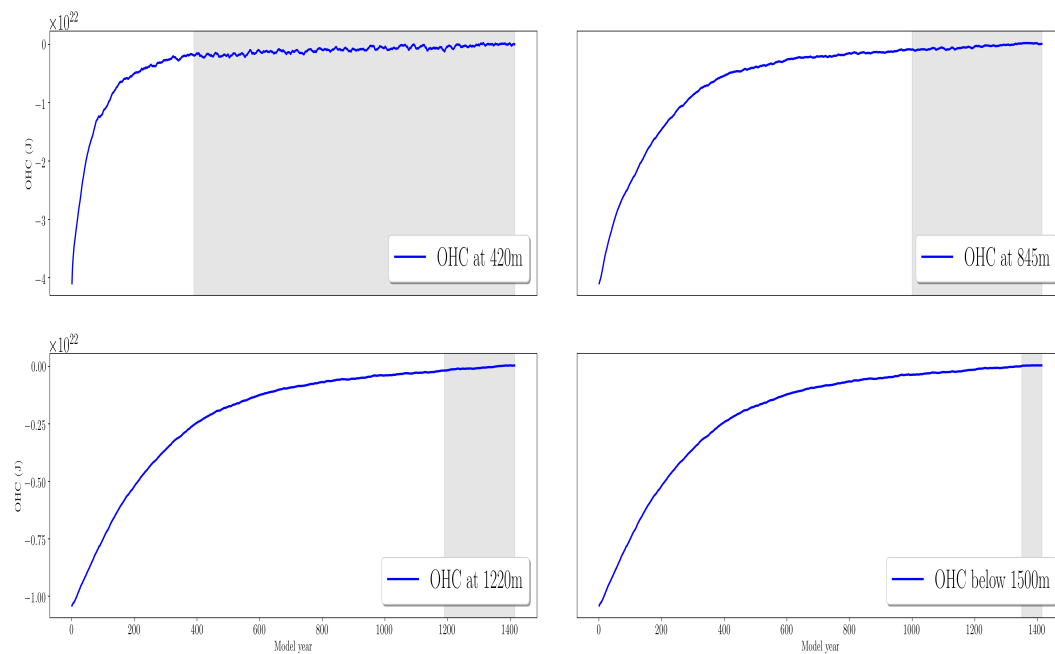
Supplementary Material:

Figure S1. Time series of globally averaged changes in Ocean Heat Content OHC (J) showing that quasi-steady state is reached for 420, 825, 1220, and 1525 m, respectively.
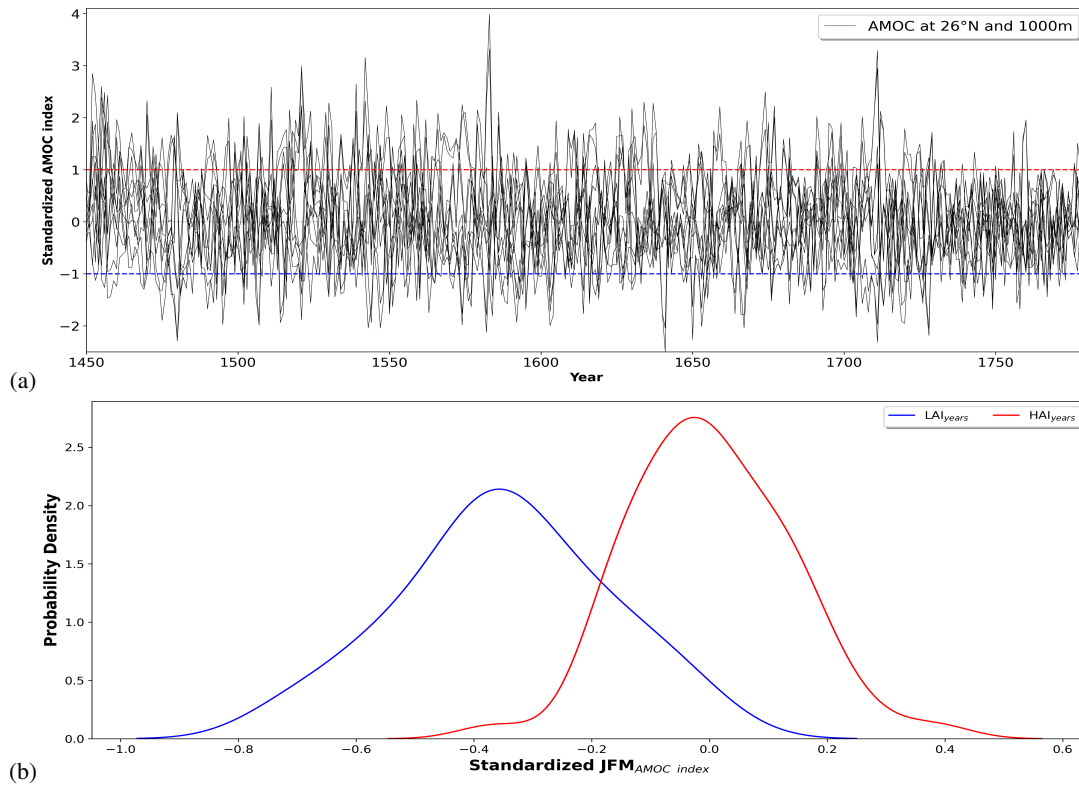
Figure S2. (a) Standardized AMOC index at 26°N and 1000 m depth, calculated for each ensemble member. The dashed red (blue) line delineates the years with the threshold of greater (smaller) than 1 (-1) standardized values. (b) Probability density distributions of standardized time series of the AMOC index at 26.5°N and 1000 m depth, for LAI_{year} (blue; N=329) and HAI_{year} (red; N=428).
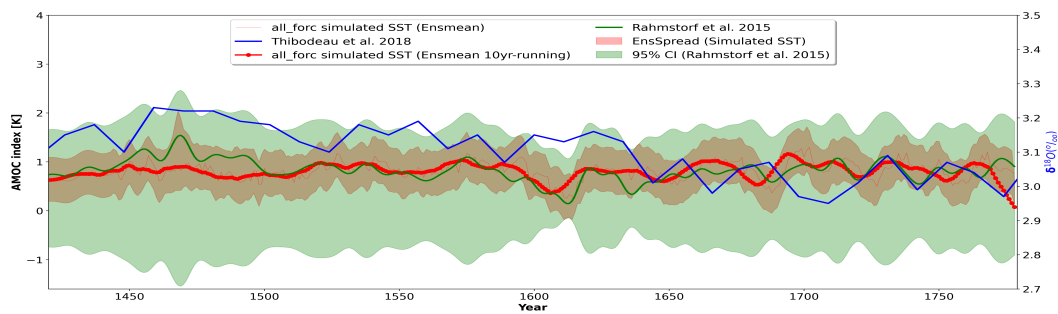

Figure S3. Comparison of SST-based AMOC index with available AMOC datasets covering 1421 - 1780. Shown are Rahmstorf et al., (2015) AMOC index (green) and its 95% confidence interval (shaded green), the corresponding values estimated from our simulated SST (red) from which 10-year running mean is calculated (thick red), and the ensemble spread (shaded red). We also show an AMOC proxy reconstruction based on $\delta^{18}O$ (blue) in benthic foraminifera from sediment cores (Thibodeau et al., 2018).
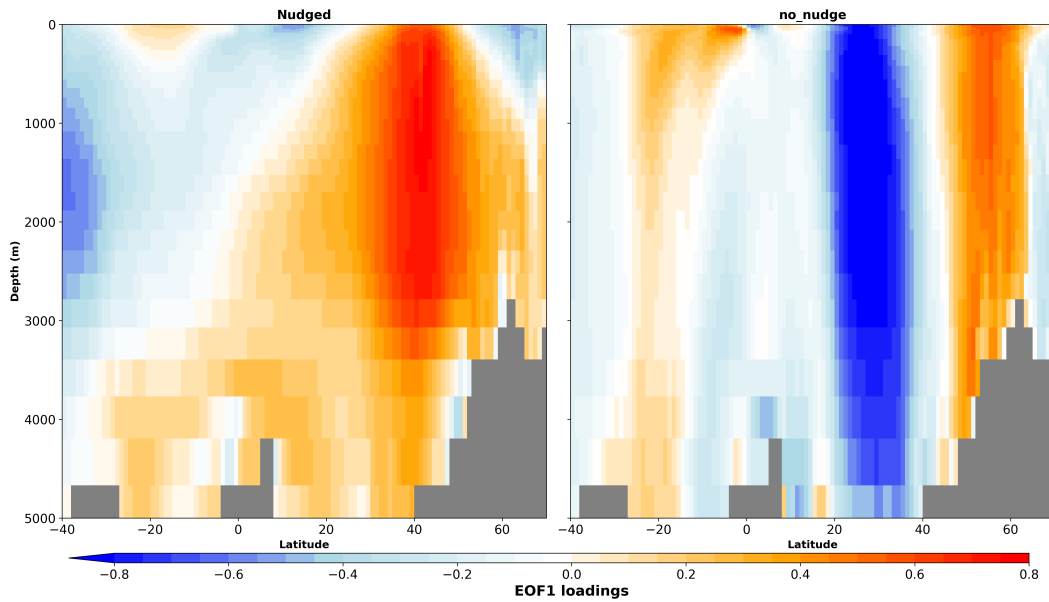
Figure S4. Leading Empirical Orthogonal Function (EOF1) of the meridional overturning stream function for SST *nudged* and Constant SST *(no_nudge)* simulation, respectively. The amplitude corresponds to a normalized PC with unit variance.
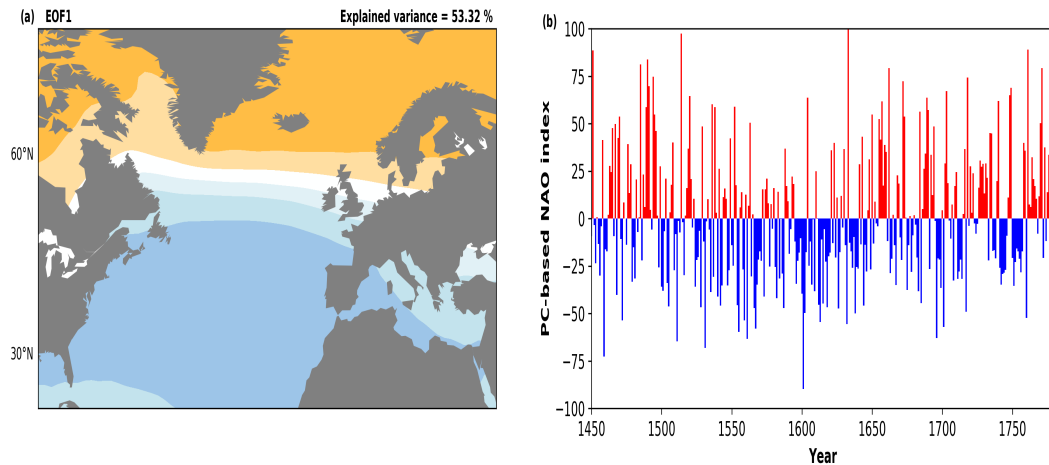

Figure S5. Empirical Orthogonal Function (EOF1) and PC-based NAO index calculated as the first principal component over the Atlantic sector (20°-80°N, 90°W-40°E) for JFM mean SLP for 1450 – 1780.
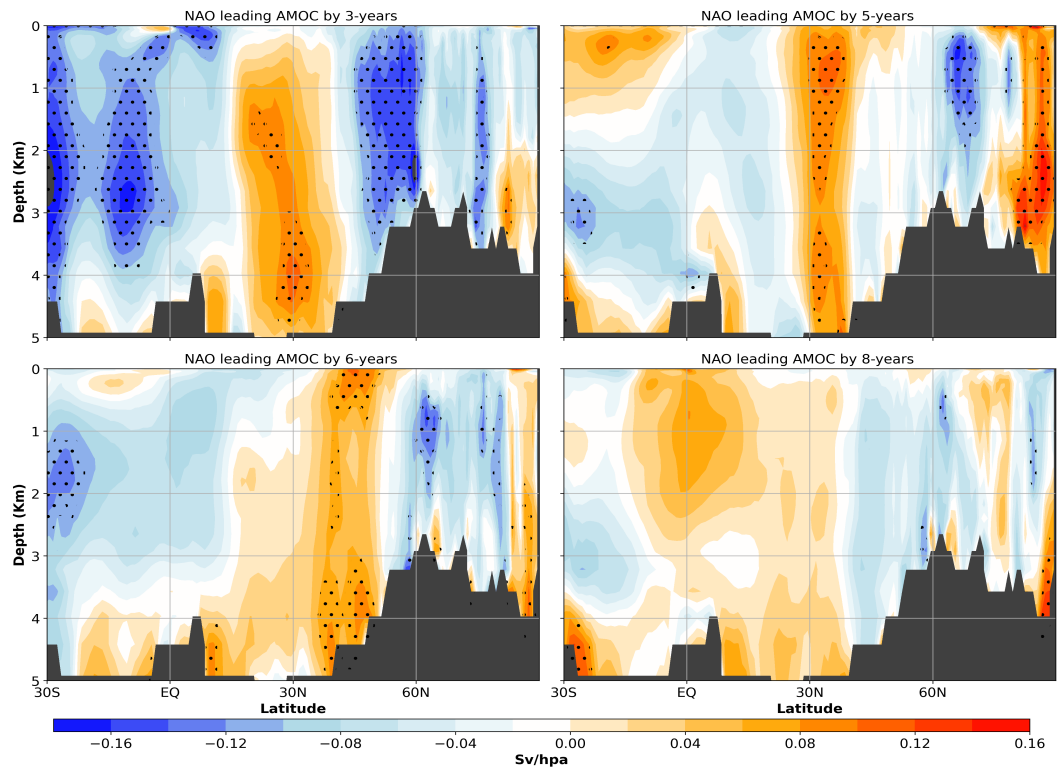
Figure S6. Lag-regression of the normalized NAO-index on the Atlantic meridional overturning stream function for 3, 5, 6, and 8 years, respectively. Stippling indicates significance at the 95% confidence interval.