SUPPLEMENTARY INFORMATION

Model spread in multidecadal NAO variability connected to stratosphere-troposphere coupling

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Additional Supplementary Figures S1 to S7
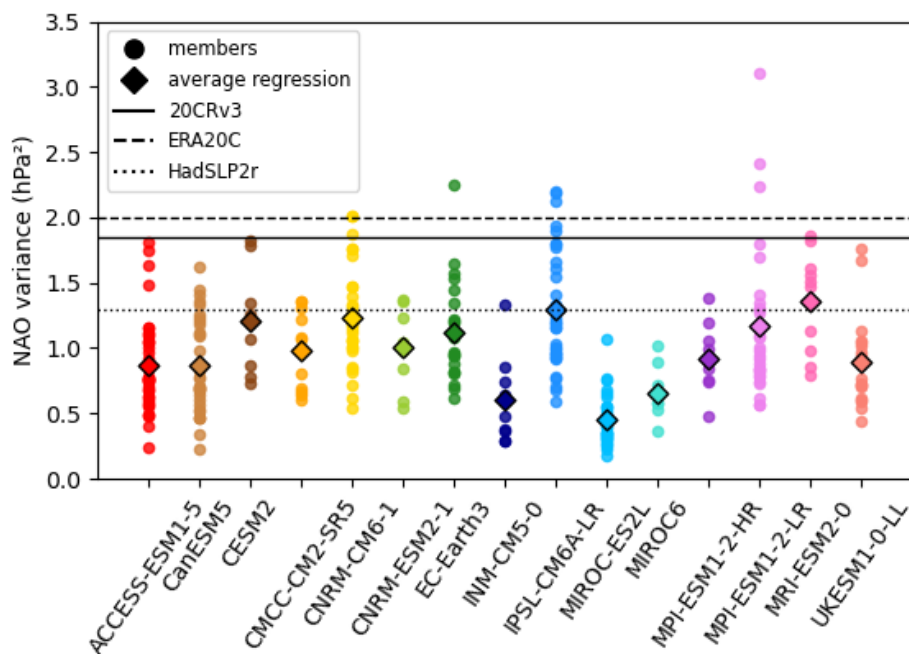
Figure S1: December to March (DJFM) detrended 10-yr running mean NAO variance (hPa²) for each member (dot) and the ensemble mean (diamond) and for the three observational dataset 20CRv3 (solid line), ERA20C (dashed line) and HadSLP2r (dotted line) calculated over the 1900-2010 period.
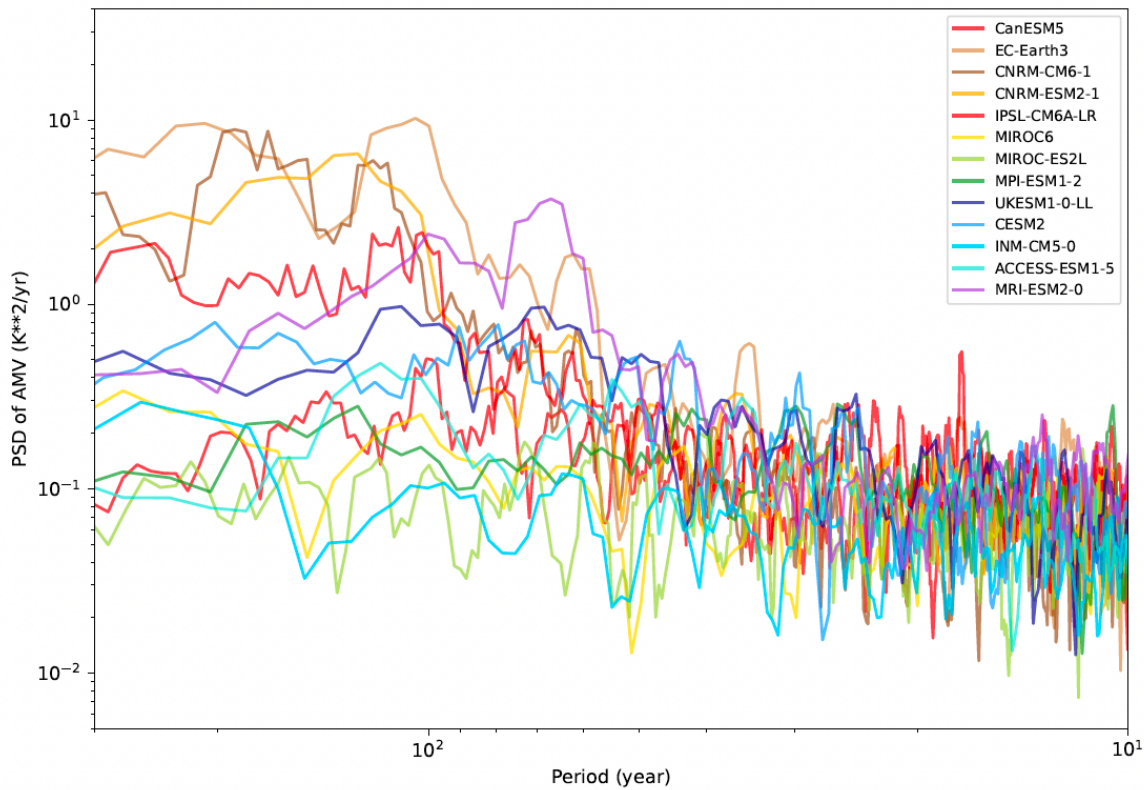
Figure S2: Power spectra of the Atlantic Multidecadal Variability (AMV) calculated over the 1900-2014 period for the 15 CMIP6 model ensembles analyzed in this study. The AMV is calculated as the average SST over the North Atlantic with the external forcing removed. The ensemble mean of each model is used as an estimation of the forced response.

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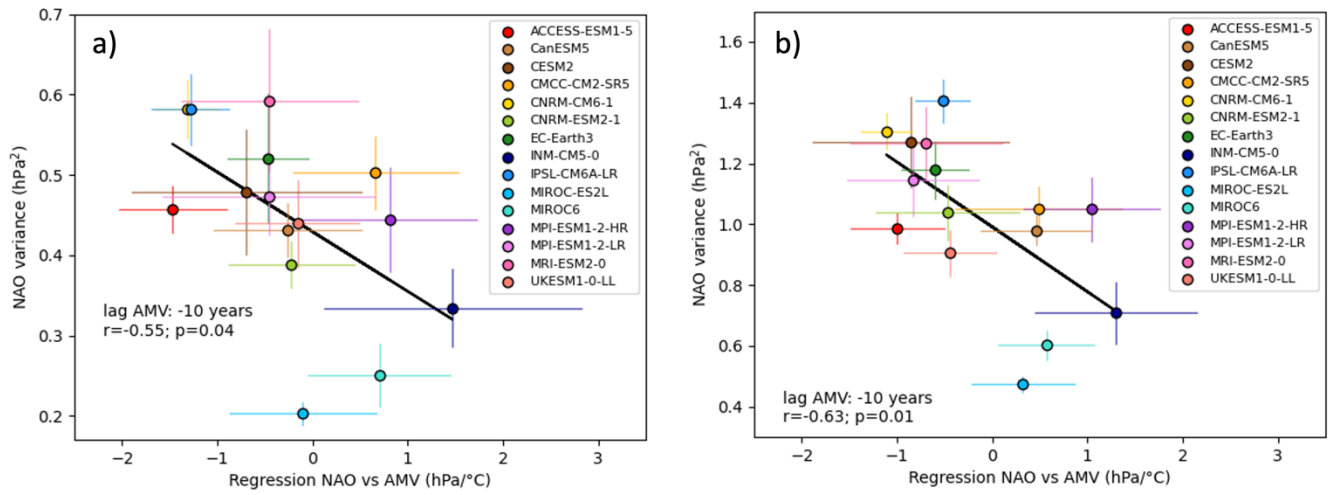
25   **Figure S3: Scatter plot of the (a) ensemble mean of the low frequency NAO variance (hPa²) and versus the regression slope calculated between the AMV and the NAO for each of the ensemble of climate model simulations for the DJFM months over the 1850-2014 period. The ensemble mean is removed for both variables. The black line represents the least square regression with Pearson correlation r and p-value (see Section 2.3). (b) Same as (a) using a 10-yr running mean.**

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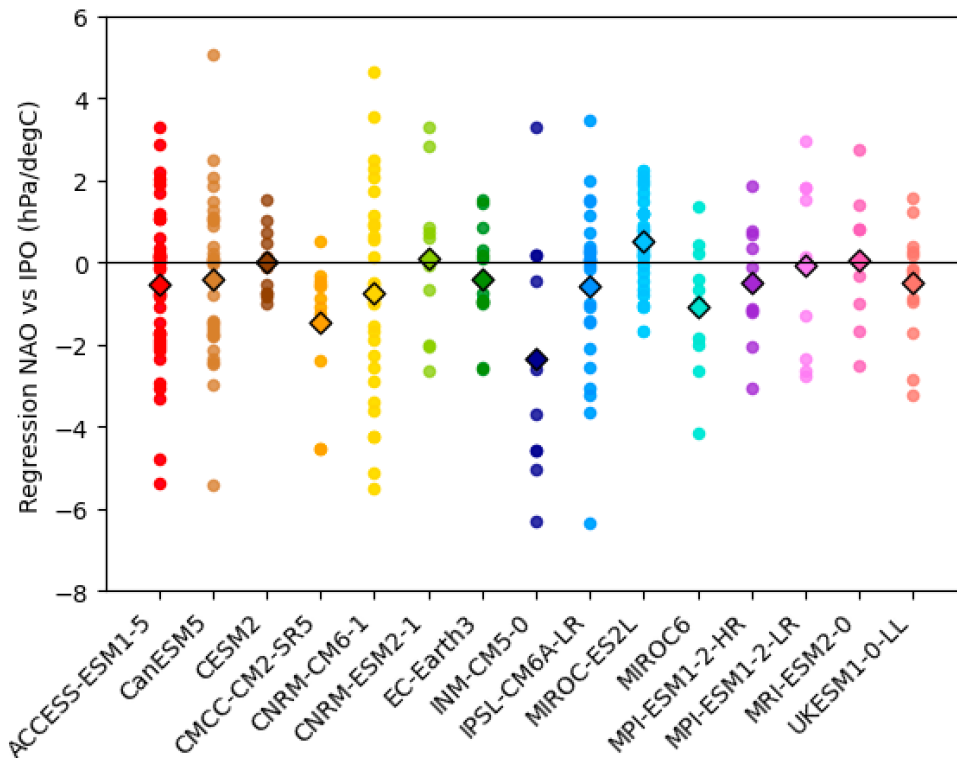
Figure S4: Regression slope between the 20-year running mean NAO and TPI IPO index for DJFM over 1900-2010 for each model ensemble member (dot) and the ensemble mean (diamond).

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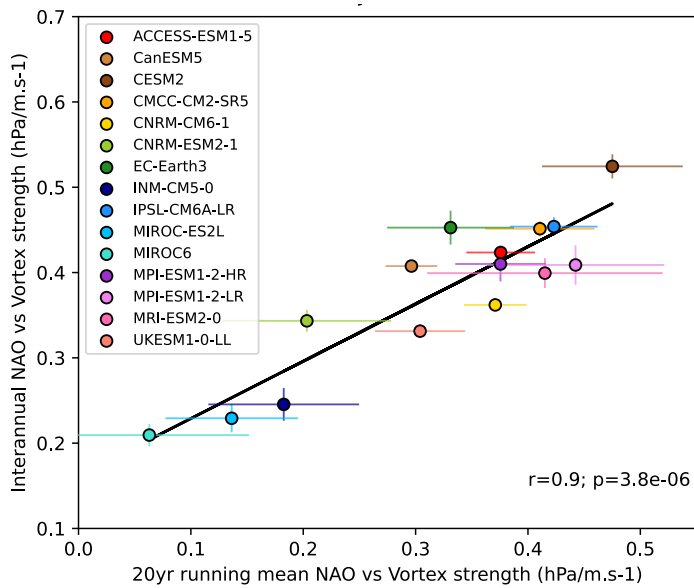
Figure S5: Scatter plot of the ensemble mean coupling parameter between the NAO and the polar vortex in each model calculated for 20 year running mean and interannual timescales for DJFM over 1900-2010. The black line represents the least square regression with Pearson correlation r and p-value (see Section 2.3).

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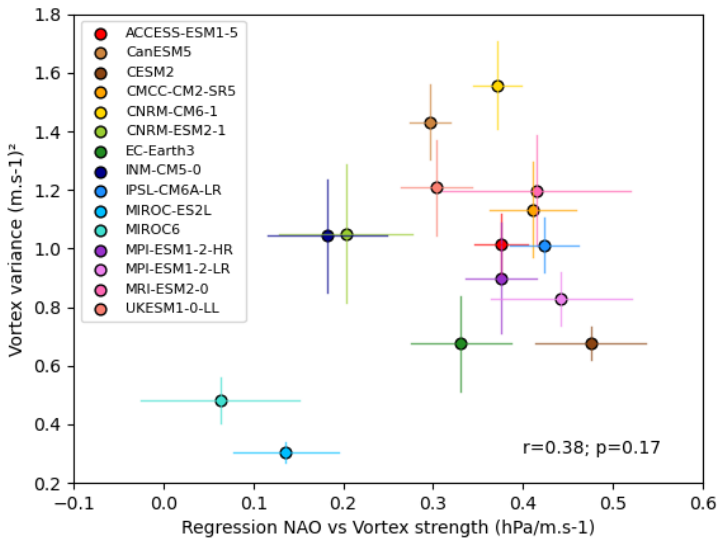
Figure S6: Scatter plot of the ensemble mean of the 20-year running mean polar vortex variance versus the multidecadal coupling between the NAO and the polar vortex calculated for DJFM over 1900-2010. The black line represents the least square regression with Pearson correlation r and p-value (see Section 2.3).

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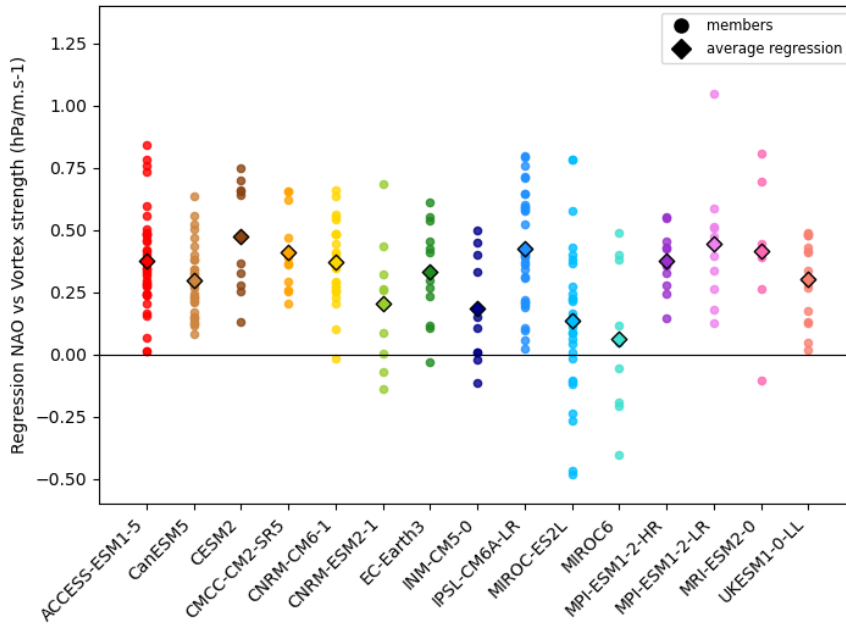
Figure S7: Regression slope of the relationship between the 20-year running mean polar vortex strength and the NAO for DJFM over 1900-2010 for each ensemble member (dot) and the ensemble means (diamond).

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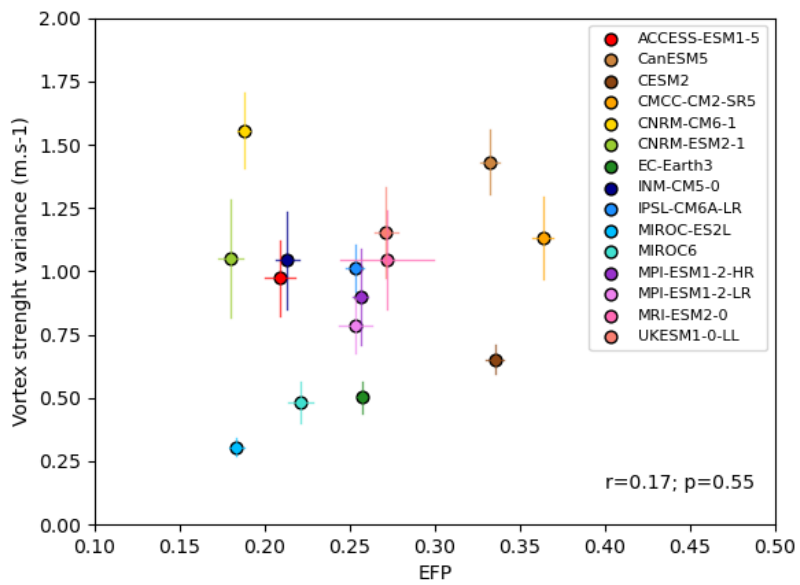
60 **Figure S8: Scatter plot of the ensemble mean of the 20-year running mean polar vortex variance (1900-2010) versus the EFP calculated for DJFM over the 1850-2014 period for all the models except MRI-ESM2-0 and ACCESS-ESM1-5. The black line represents the least square regression with Pearson correlation r and p-value (see Section 2.3).**