



## Supplement of

## Nonlinearity in the tropospheric pathway of ENSO to the North Atlantic

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## Supplement



**Figure S1.** Same as Figures 1-4 of the main text but for the Rossby wave source anomalies.



**Figure S2.** Box plot displaying the 95(50)% confidence intervals (indicated by the whiskers and solid boxes respectively) of the DJF model SLP response to the four ENSO forcings (shown in color) and four different regions when the winter anomalies in these experiments are randomly sub-sampled in groups of increasing size (shown in the x-axis). Colors indicate the different ENSO forcing, where moderate events response has been doubled and the LN response multiplied by -1 to better visualize the nonlinearity. (a) for the Aleutian low, (b) the NAO, (c) the Azores high and (d) the Icelandic low SLP averages. When the whiskers do not touch the zero-line for a specific sample size and magnitude, then the response is statistically detectable from climatology at the 95% confidence interval.



**Figure S3.** DJF mean SLP (in hPa) regressed onto the first (a) and second (b) EOF calculated over the North Atlantic sector [20-80N,60-0W] using the JRA-55 reanalysis dataset (1958-2016, Kobayasi et al., 2015). (c,d) the same as (a,b) but for the climatological SST model simulation with stratospheric nudging applied (80 years). (e,f) the same as (c,d) but for the control run without stratospheric nudging (130 years).



**Figure S4.** (a) average, (b) standard deviation and (c) skewness of the Aleutian low (white bar) and NAO (grey bar) PDFs of winter months (December to March) represented in Figure 7c,d in the manuscript.



**Figure S5.** The same as Figure 8 in the main text but for the JRA-55 reanalysis dataset (1958-2016). Here the strength of ENSO is shown in terms of the DJF NINO3.4 SST and is represented by the different color code. The correlation coefficient (r) as well as the slope of the linear regression (black line) is shown at the top left corner. The slope error corresponds to a 95% confidence interval assuming a Gaussian distribution.