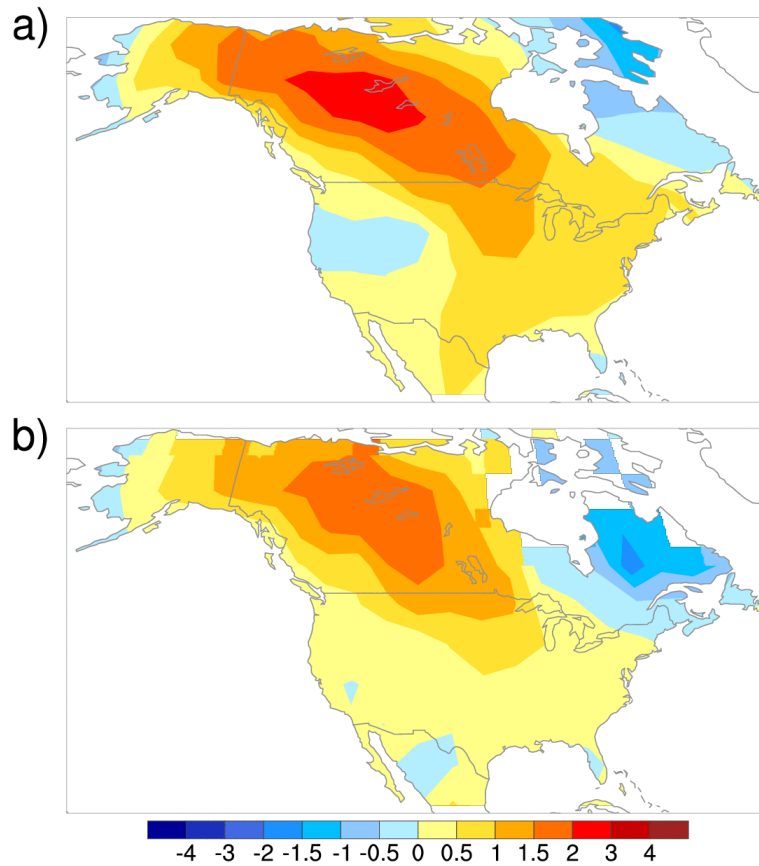**Supplementary Materials for**

"Forced and Internal Components of Winter Air Temperature Trends over North America

During the Past 50 Years: Mechanisms and Implications" by Clara Deser, Laurent Terray

and Adam S. Phillips. Submitted to *Journal of Climate*, revised 12 October 2015.

This document contains Supplemental Figures referenced in the main text.

Figure S1. Total dynamical contribution to DJF SAT trends (1963-2011) based on the a) constructed analogue approach used in this study, and b) point-wise partial least-squares regression used in Smoliak et al. (2015). Units are $^{\circ}$C 49yrs^{-1}.
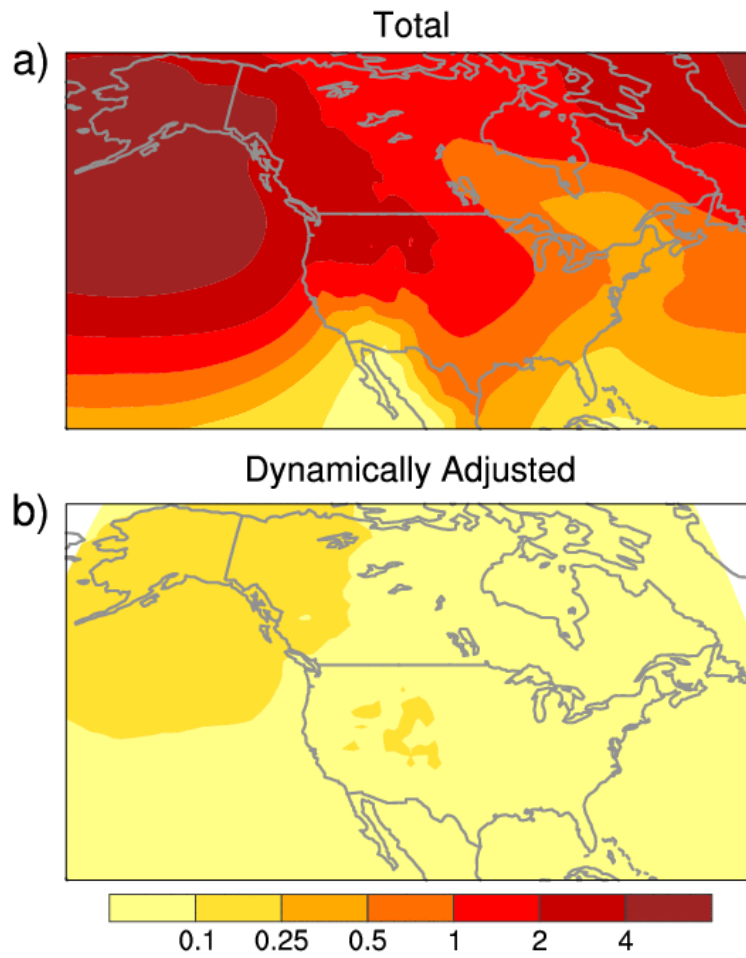
Figure S2. Variance of DJF SLP trends [1963-2012; (hPa 50yrs^{-1})^2] across the CESM-LE (a) before and (b) after dynamical adjustment.
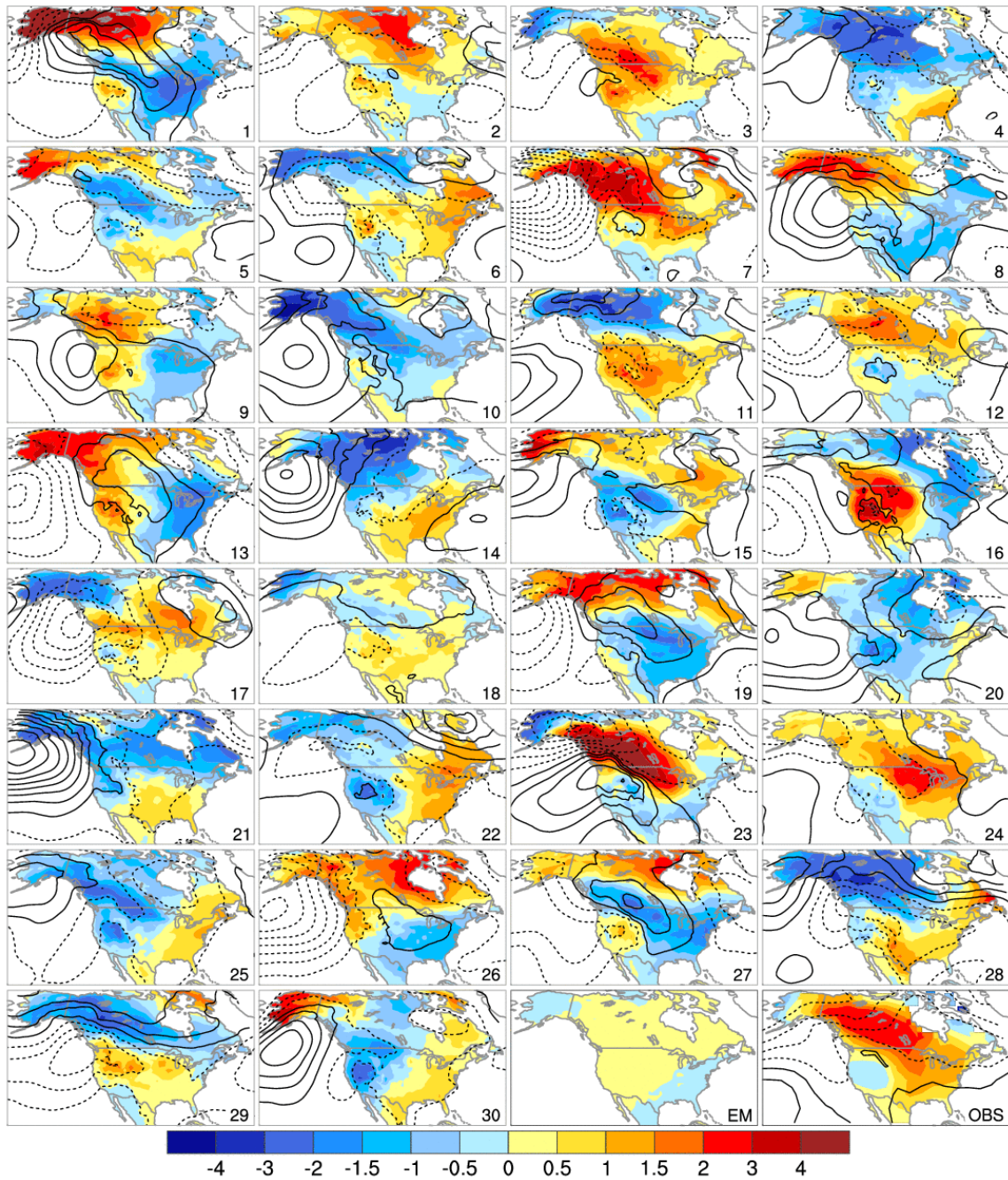
Figure S3. Internal dynamical contribution to DJF SAT (color shading; ◦C 50yrs[-1]) and SLP (contours; hPa 50yrs[-1]) trends (1963-2012) for each member of the CESM-LE (labeled 1-30), the CESM-LE ensemble-mean trend (labeled "EM"), and observations (labeled "OBS"). SLP contour interval is 1 hPa 50yrs[-1] starting at +/- 0.5 hPa 50yrs[-1], with solid (dashed) contours for positive (negative) values. SAT and SLP observation are from MLOST and 20CR, respectively.
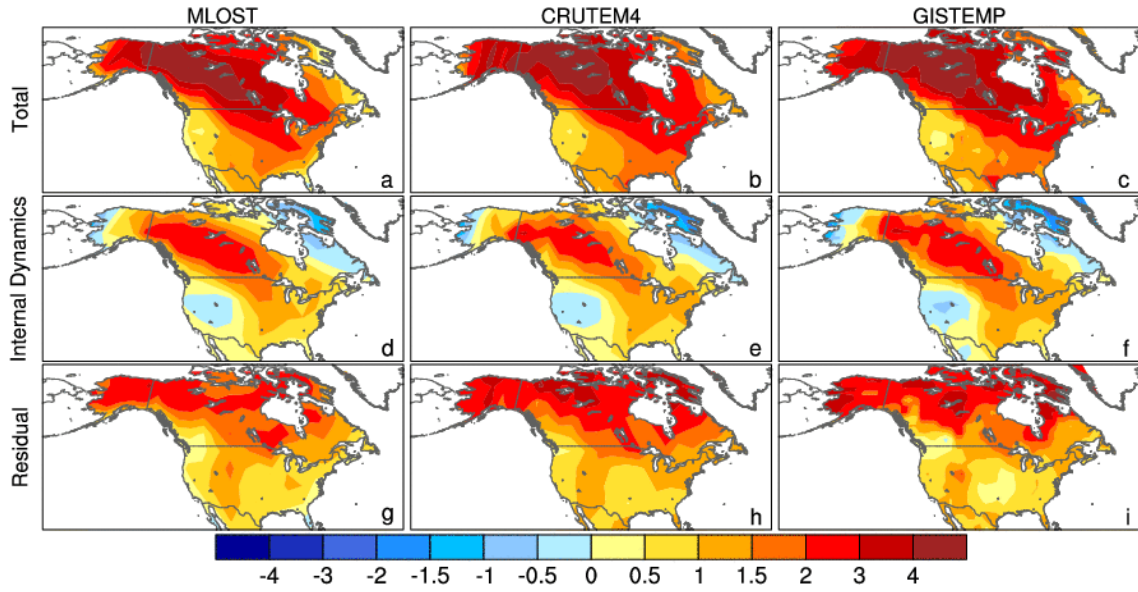
Figure S4. Sensitivity of observed DJF SAT trends (1963-2012; $^{\circ}$C 50yrs^{-1}) to choice of data set. "Total" indicates the total trend, "Internal Dynamics" indicates the trend due to internal dynamics, and "Residual" indicates their difference ("Total" minus "Internal Dynamics"). Data sets are: MLOST, CRUTEM4, and GISTEMP.
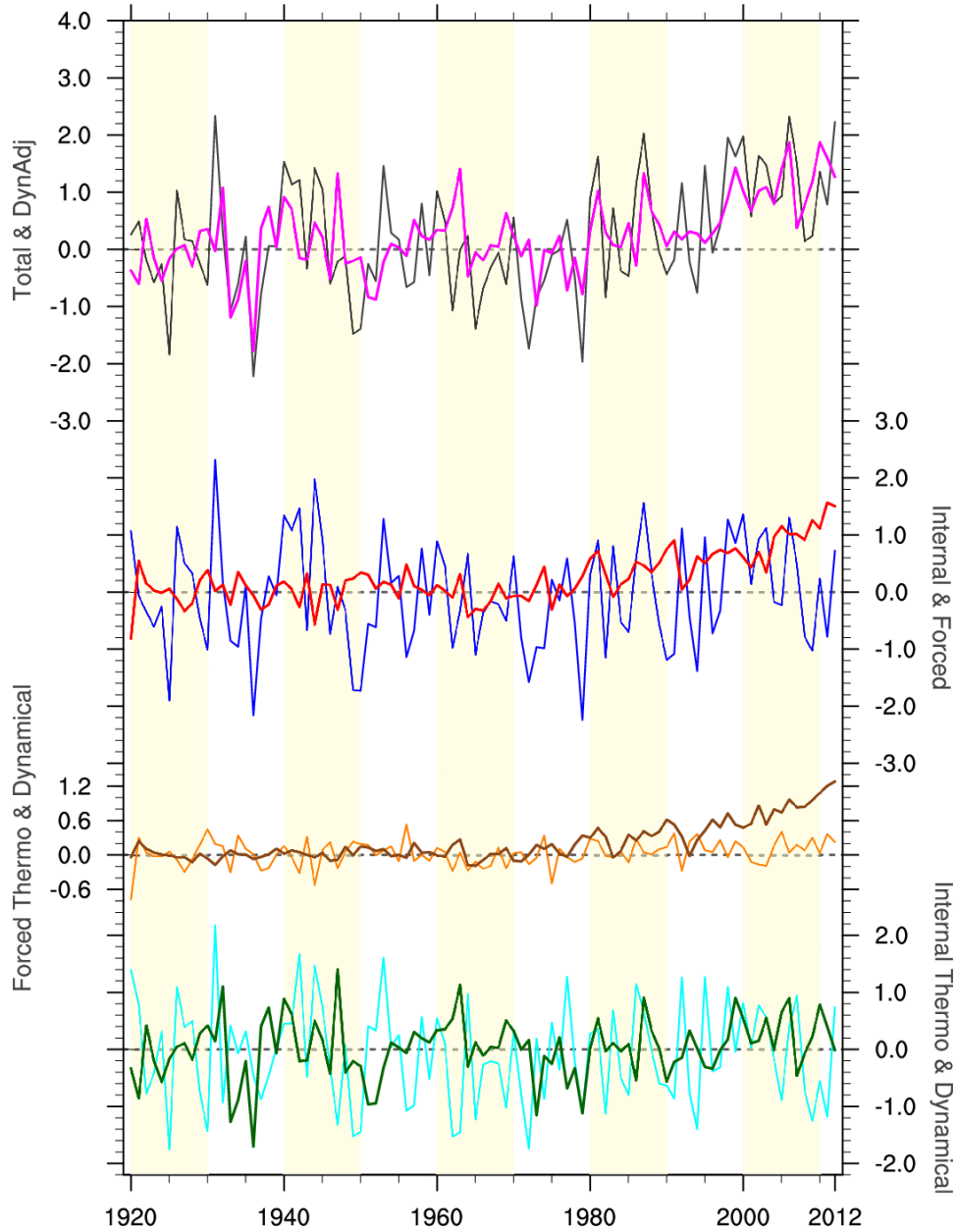
Figure S5. Timeseries decomposition of DJF SAT anomalies (˚C) averaged over North America for observations (MLOST) into internal, forced, dynamical and thermodynamic components. The top panel shows the raw (black) and dynamically-adjusted (magenta; internal dynamics removed) components. The second panel from the top shows the internal (blue) and forced (red) components. The second panel from the bottom shows the forced thermodynamics (brown) and forced dynamics (orange) components. The bottom panel shows the internal thermodynamics (green) and internal dynamics (cyan) components. Note the different vertical scales for each set of curves. See text for explanation.
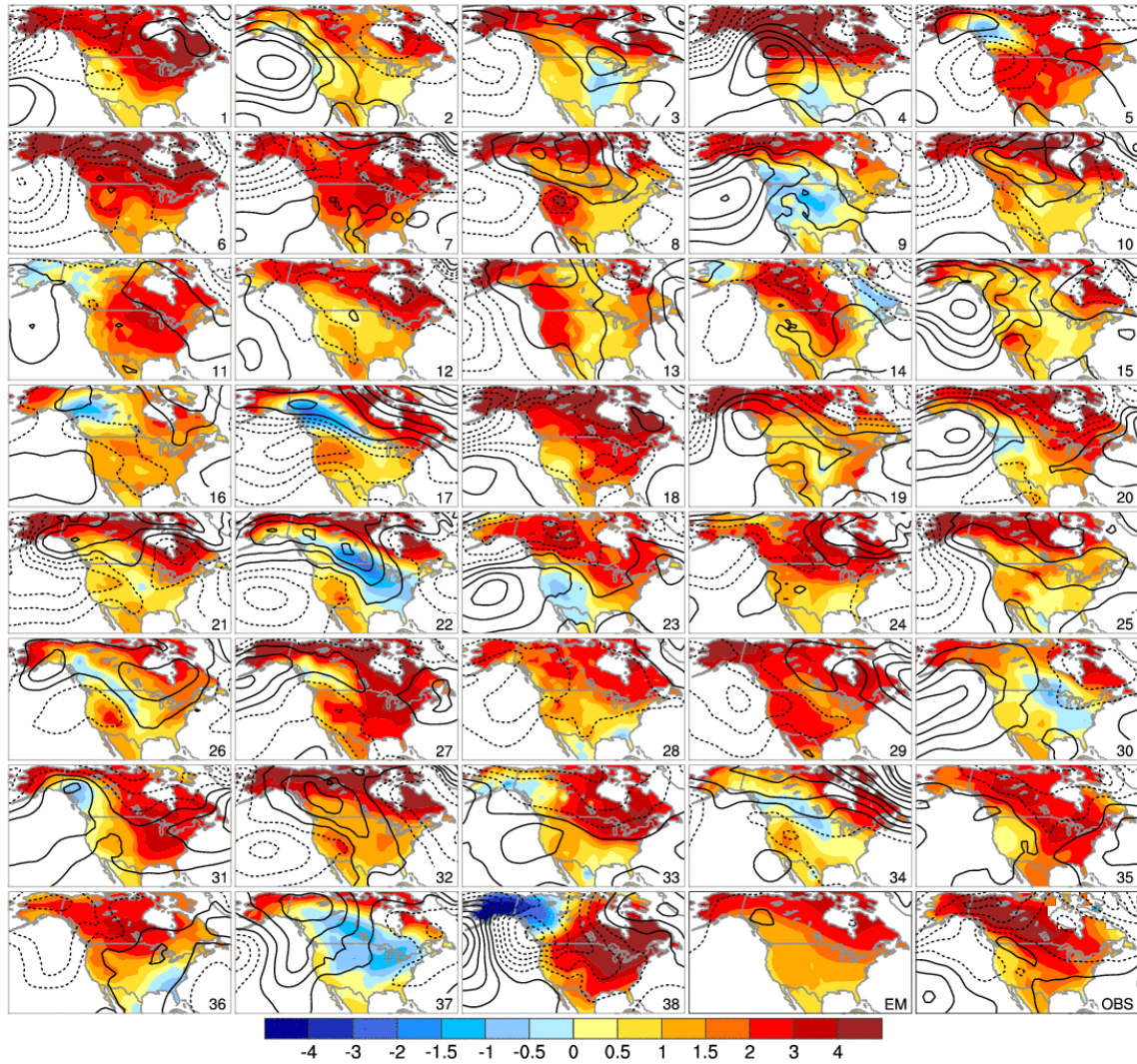
Figure S6. DJF SAT (color shading; °C 50yrs^{-1}) and SLP (contours; hPa 50yrs^{-1}) trends (1963-2012) for each of the 38 CMIP5 models (labeled 1-38), the CMIP5 ensemble-mean trend (labeled "EM"), and observations (labeled "OBS"). SLP contour interval is 1 hPa 50yrs^{-1} starting at +/- 0.5 hPa 50yrs^{-1}, with solid (dashed) contours for positive (negative) values. SAT and SLP observation are from MLOST and 20CR, respectively.
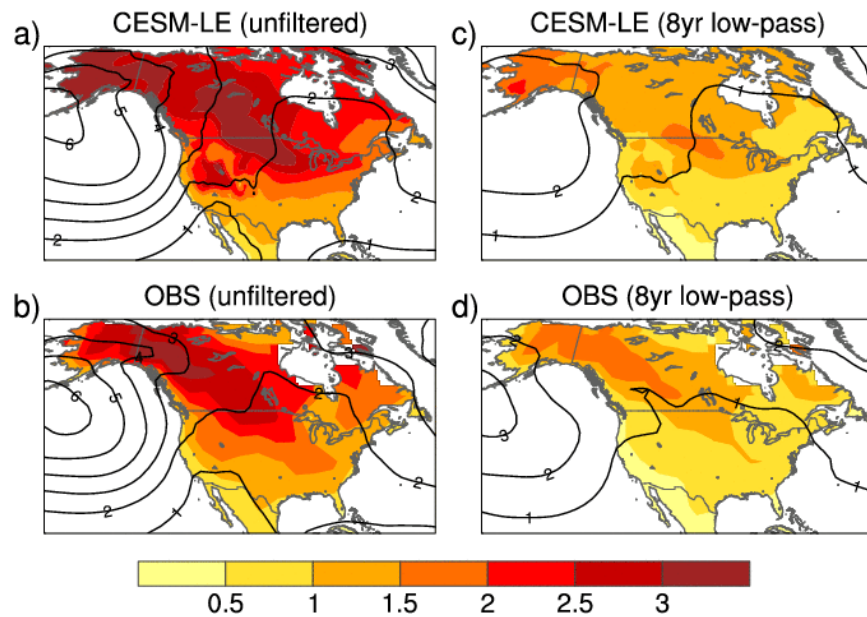
Figure S7. Standard deviation of DJF SAT (shading; °C) and SLP (contours; contour interval = 1hPa) anomalies in the CESM-LE and observations (OBS) based on (a, b) unfiltered and (c, d) 8-year low-pass filtered data. Observational datasets are MLOST for SAT and 20CR for SLP.