

Supplemental Figures
for
Quantifying and Understanding Forced Changes to Unforced Modes of
Atmospheric Circulation Variability over the North Pacific in a Coupled
Model Large Ensemble

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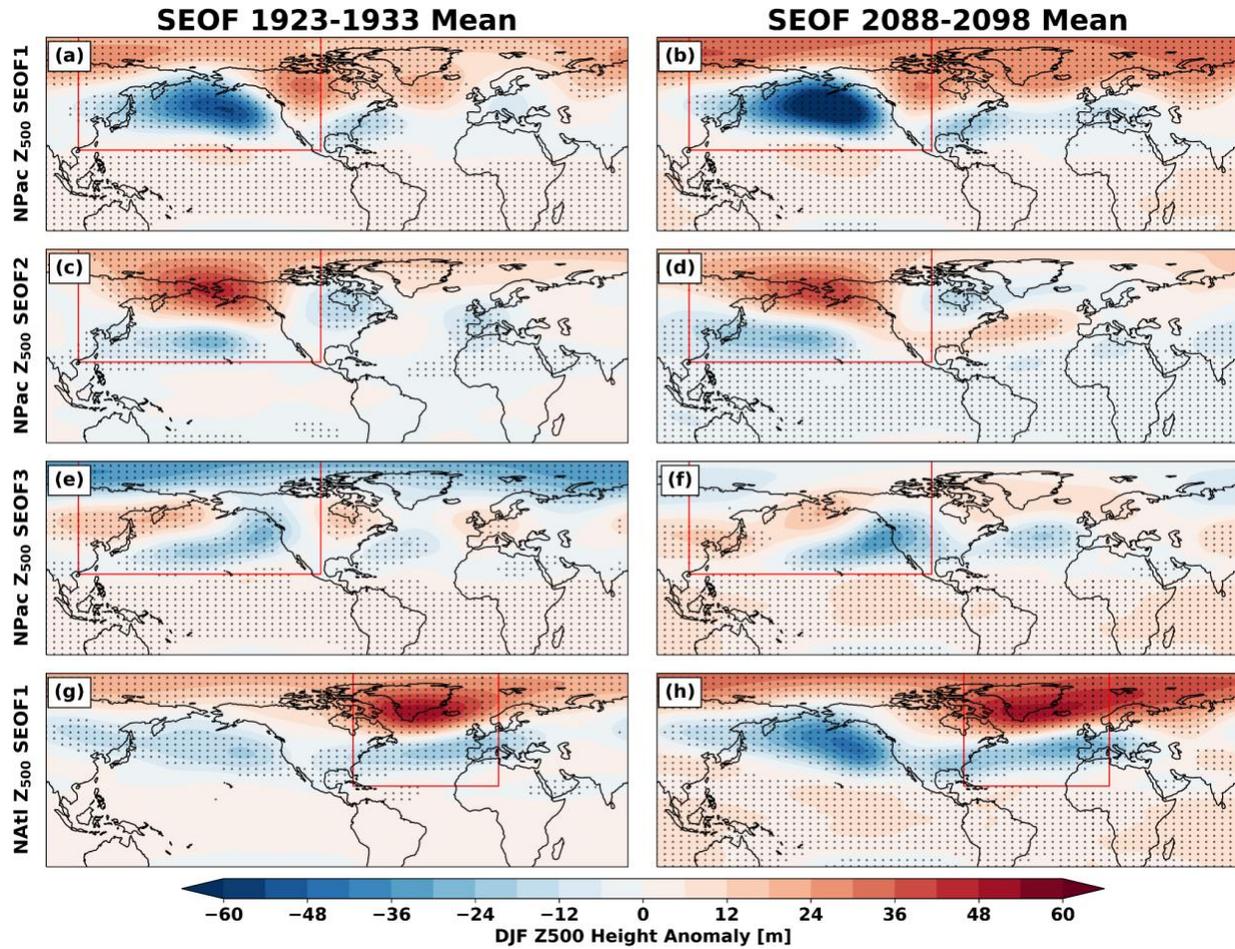


Figure S1: DJF Z500 regressions (color shading; m) during 1923-1933 (left) and 2088-2098 (right) for the 3 leading SEOFs of North Pacific Z500 variability (top 3 rows) and the leading SEOF of North Atlantic Z500 variability (bottom row). Stippling indicates statistically significant values (99th percentile confidence level) in at least 7 of 10 years. Red boxes show the domains over which the modes are calculated.

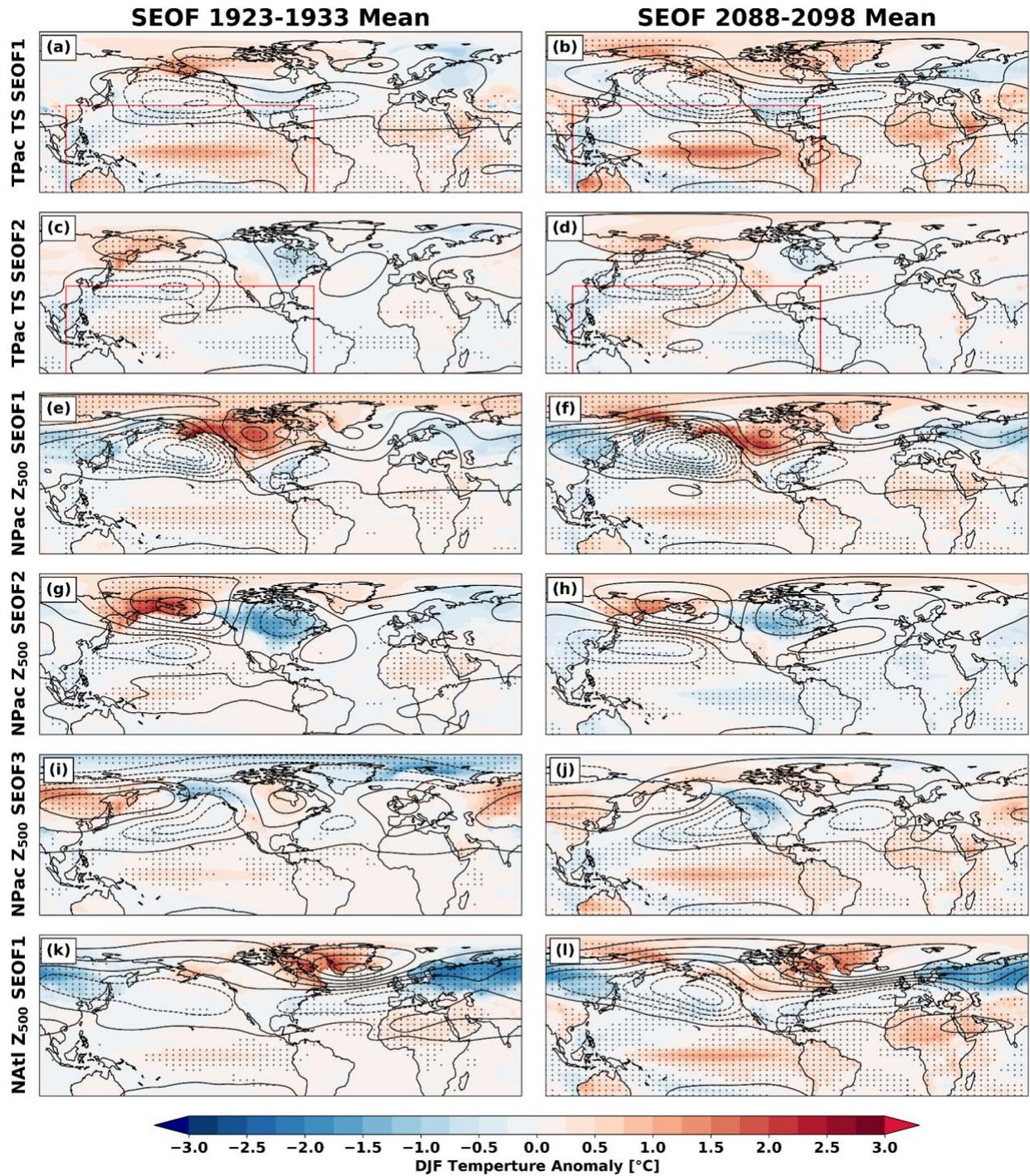


Figure S2: (e-l): As in Fig. S1 but for TS (°C; color shading) and Z500 (contour interval = 10m; negative values shown as dashed contours). (a-d) Regressions based on the two leading SEOFs of Tropical Pacific SST variability (red boxes show the domains over which the modes are calculated).

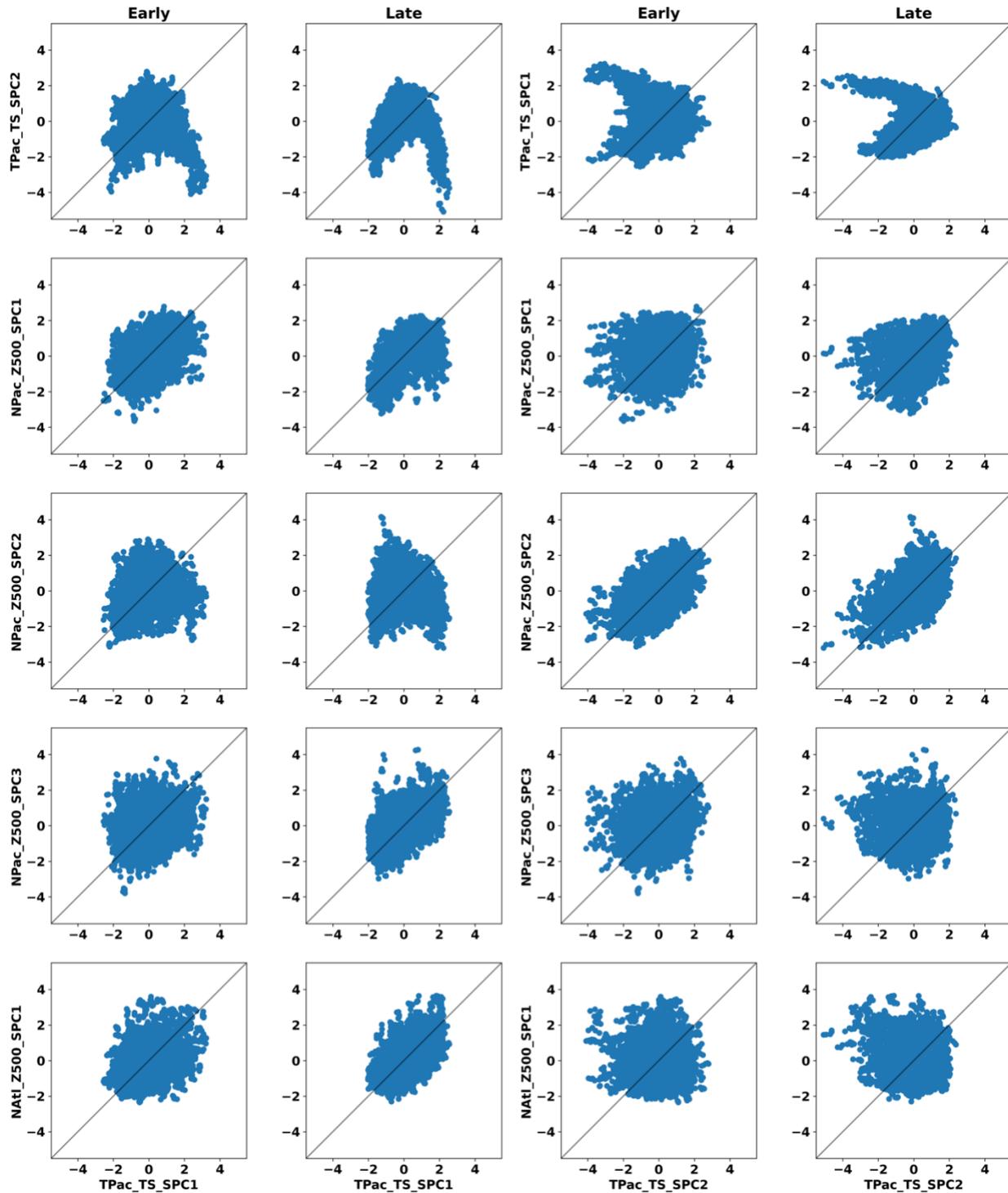


Figure S3: Scatter plots of all modes considered in this study plotted against TPac_TS_SEOF1 (left pane) and TPac_TS_SEOF2 (right pane). Each column corresponds to the data representing the first 30 years (early) and the last 30 years (late) periods. Axes and aspect ratios are set such that the 1-to-1 lines are the 45 degree diagonal bisecting each panel.

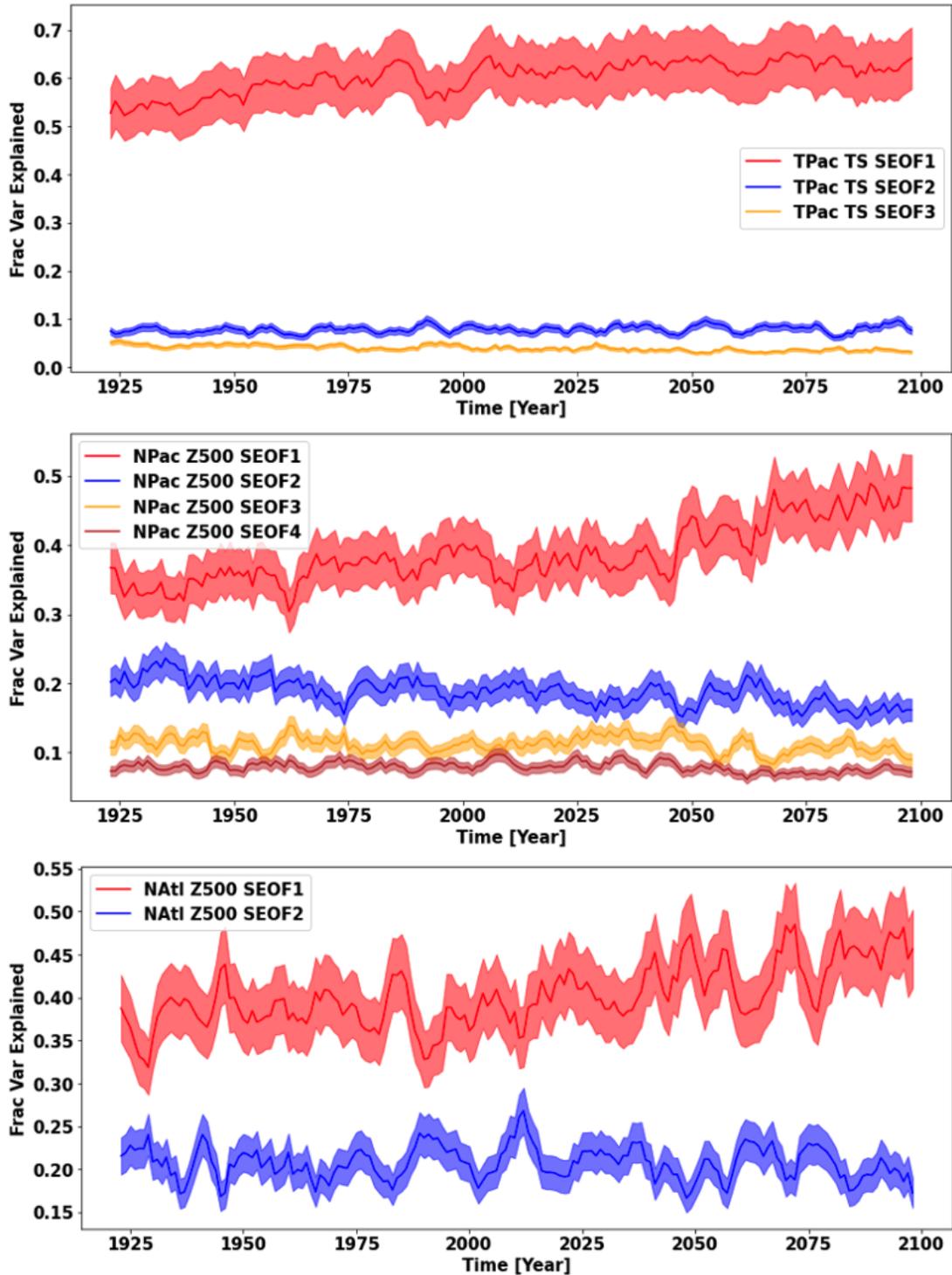


Figure S4: Fraction of variance explained for the SEOFs used in this study with associated North Test Errors plotted as filled shading. Top panel: TPac Domain; Middle panel: NPac Domain; Bottom panel: NATl Domain. The lowest order SEOF shown for each domain is the first SEOF excluded for this study. We show the first excluded SEOFs here to allow for comparison (in terms of separation in variance explained space) to the last included SEOFs.

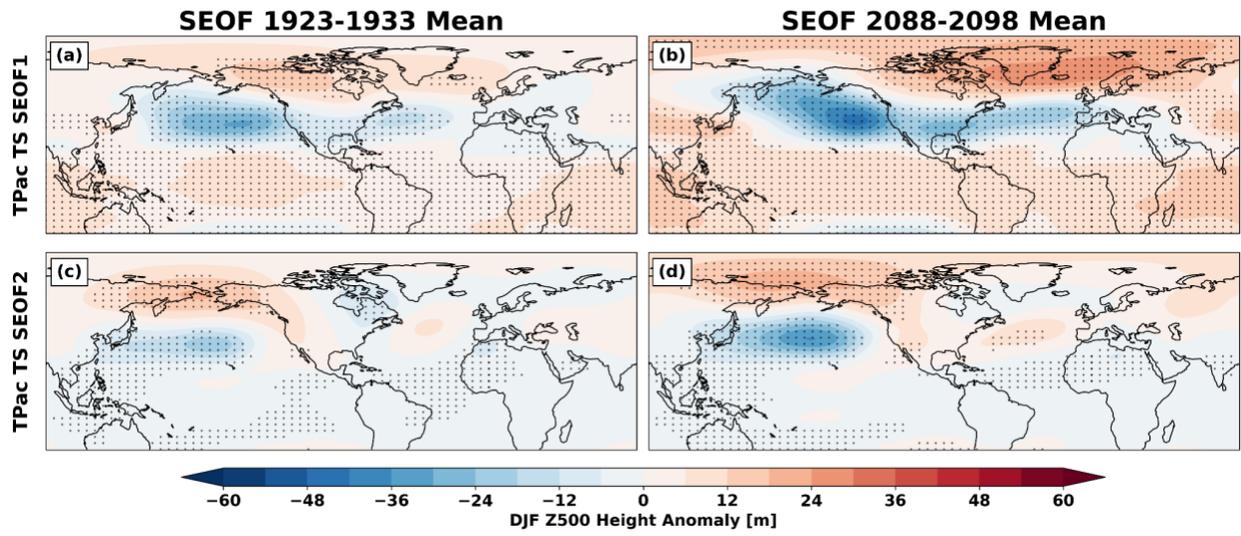


Figure S5: As in Fig. S1, but for the first two SEOFs of tropical SST variability (see panels a and b in Fig. S2 for domains of the SEOF calculations).

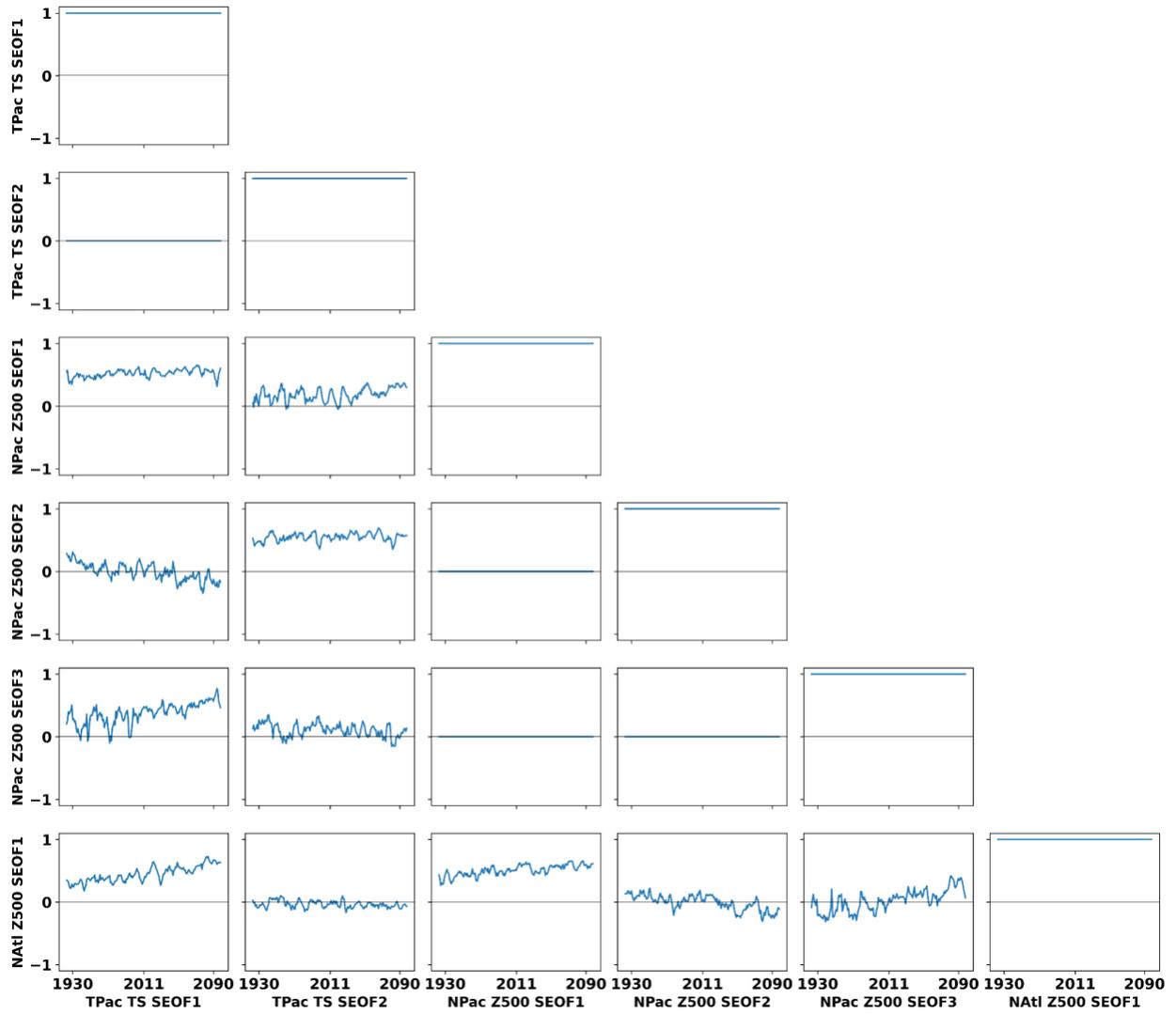


Figure S6: Correlations for each pair of SPCs defined in the main text.

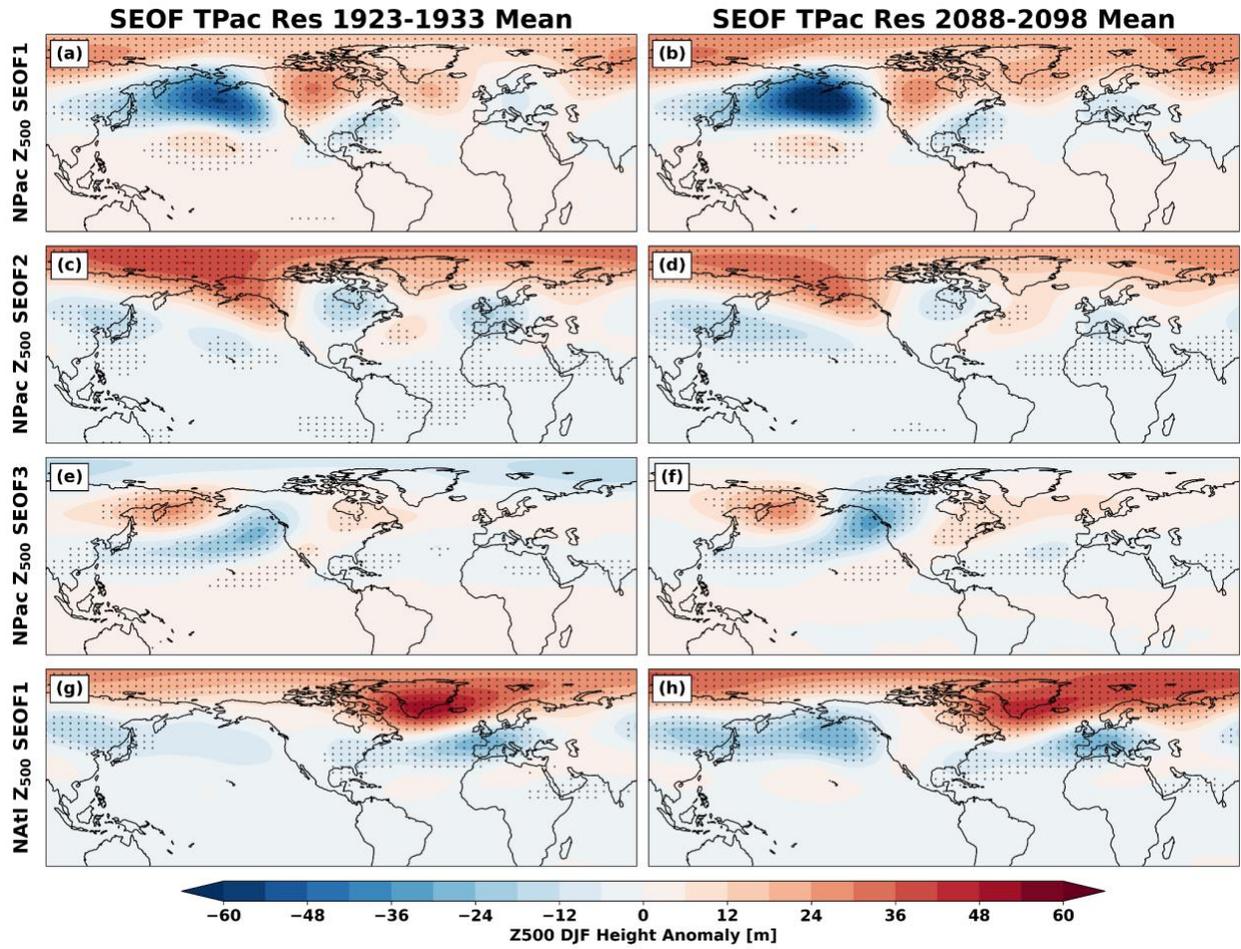


Figure S7: As in Fig. S1 after removal of the two leading SEOFs of tropical Pacific SST variability.

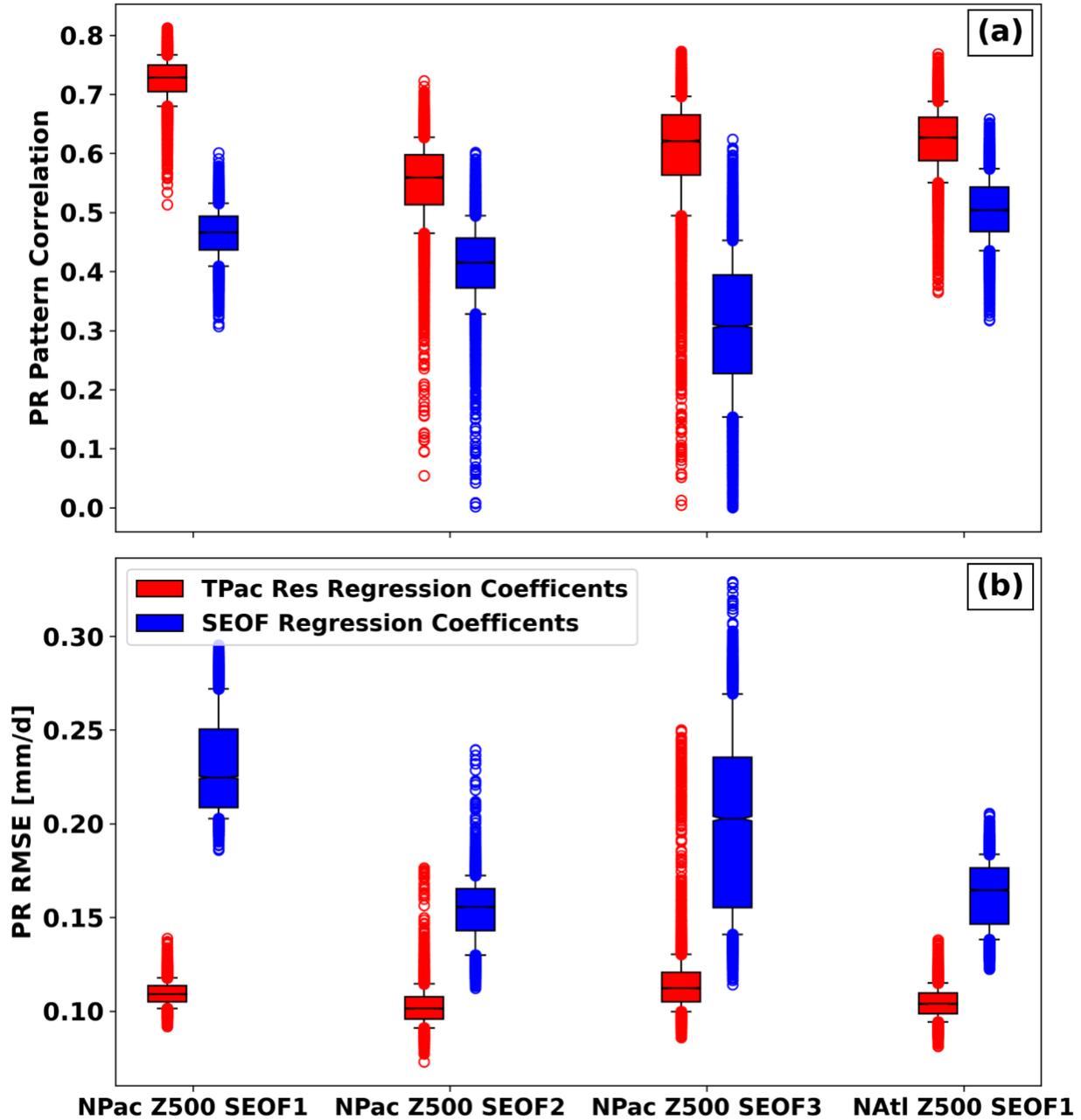


Figure S8: Distribution of (a) pattern correlations and (b) rmse between precipitation regression maps for each Z500 SEOF mode during 1923-1933 (full fields in blue and tropical-residual fields in red) against the corresponding EOF mode from the atmosphere-only control simulation (circles: <5th and > 95th percentiles; whiskers: 5th-to-95th percentiles; box: 25th-to-75th percentiles; black notch in box: 50th percentile). 10,000 samples were generated for each EOF mode of the 2600-year atmosphere-only control simulation by randomly resampling 200 years (without replacement).

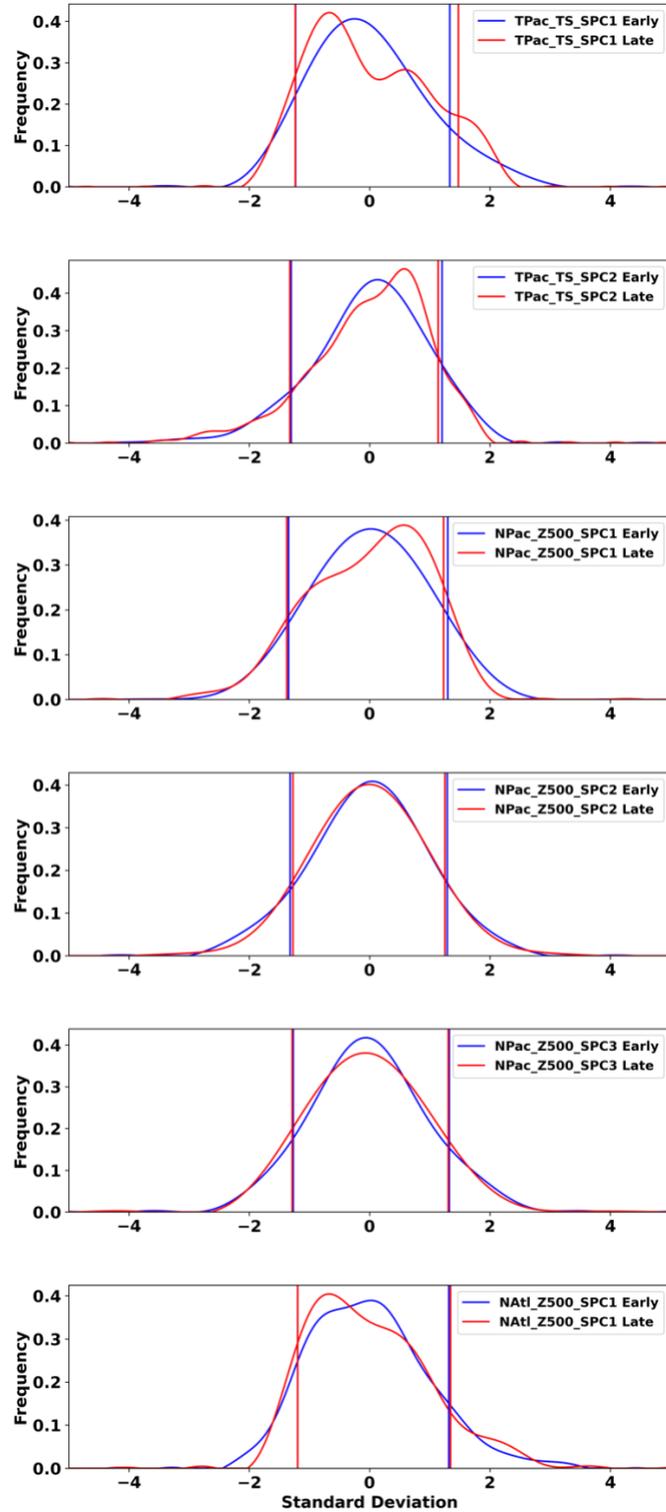


Figure S9: Probability distributions for each of the modes included in this study. Blue/red distributions correspond to the first/last 30 years of the 1921-2100 analysis period. Blue/red vertical lines indicate the 10th and 90th percentiles of the early/late distributions.

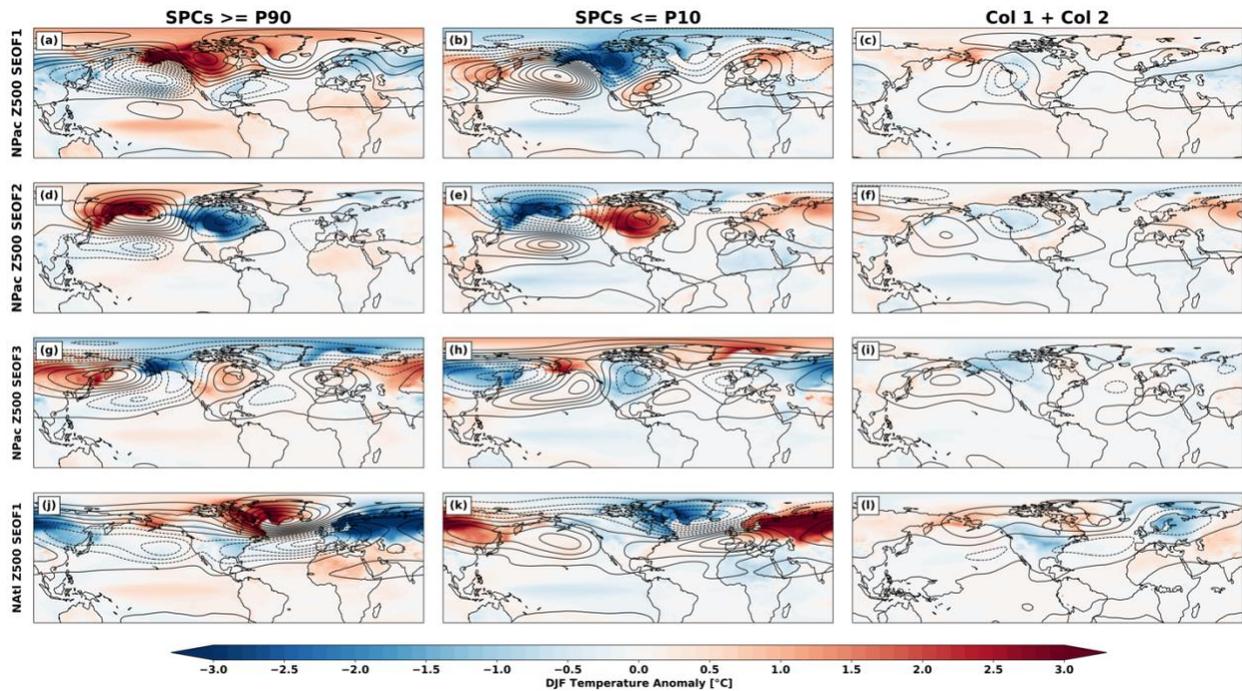


Figure S10: Early period (first 30 years) composites of the four extratropical modes considered in this study (rows) according to where their respective SPCs exceed the 90th percentile (left column), the 10th percentile (middle column), and their sum (right column). Color-filled data show the DJF temperature anomaly. Solid/dashed black contours denote positive/negative Z500 heights at 10 meter intervals ranging from -150 to 150 meters.

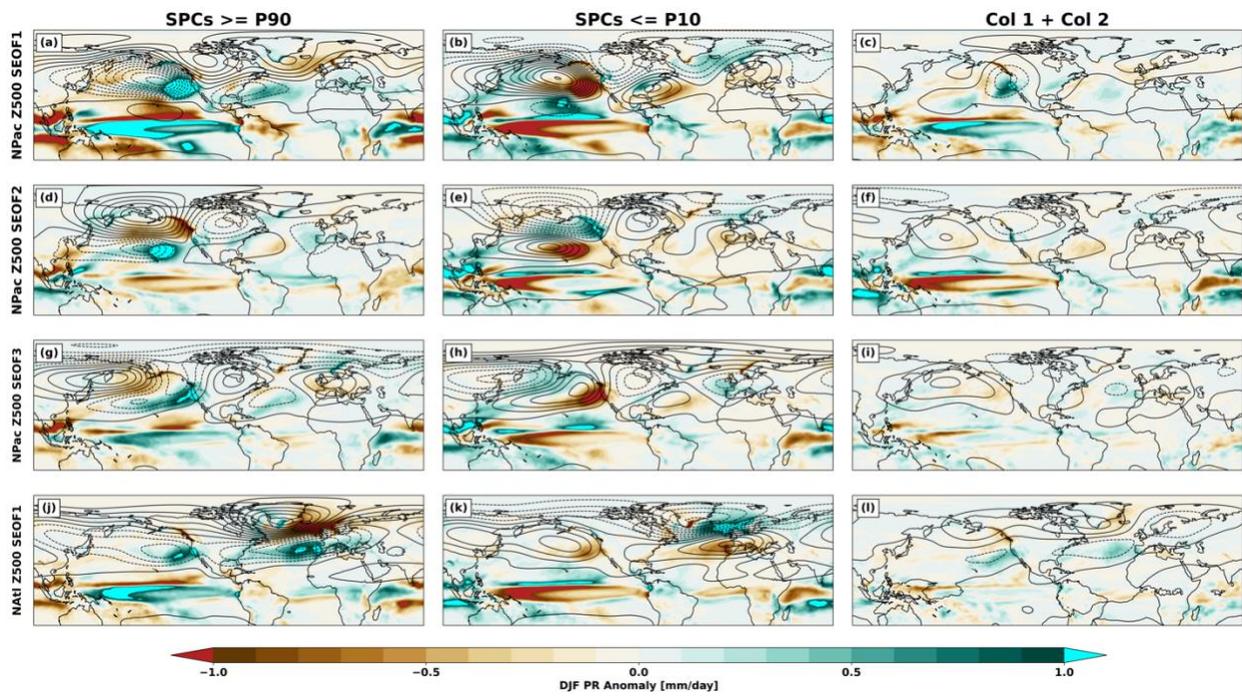


Figure S11: As in Fig. S10, but for precipitation.

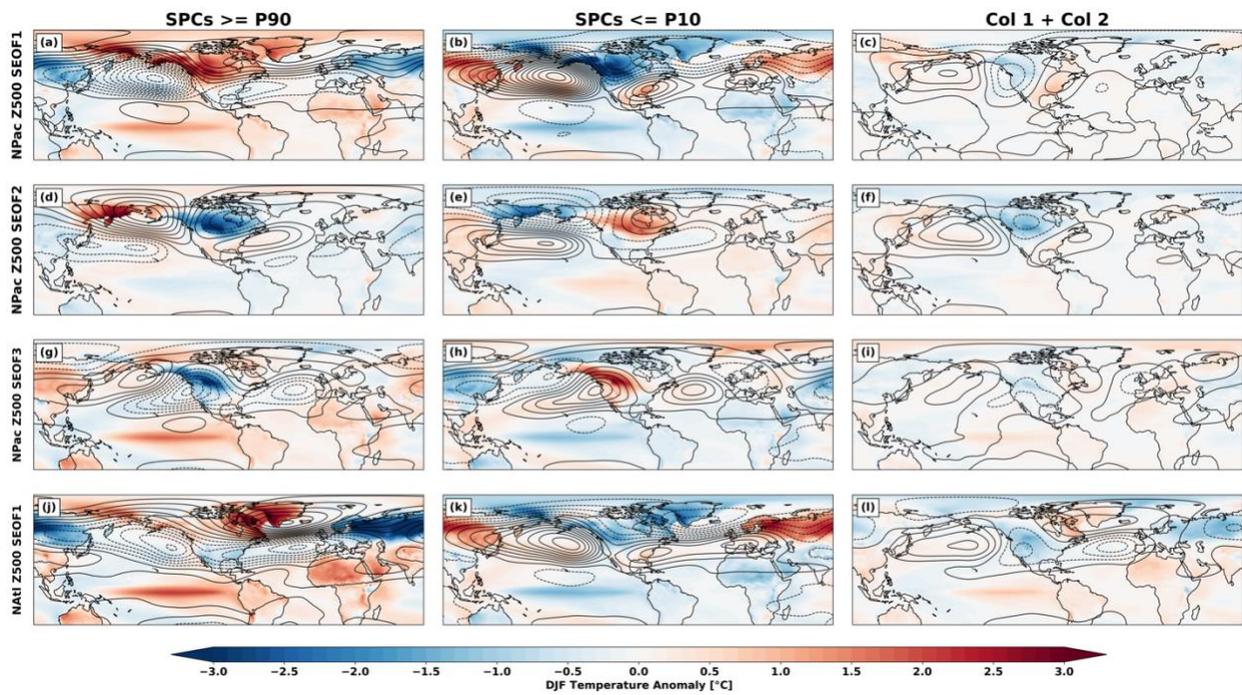


Figure S12: As in Fig. S10, but for data corresponding to the late period (last 30 years).

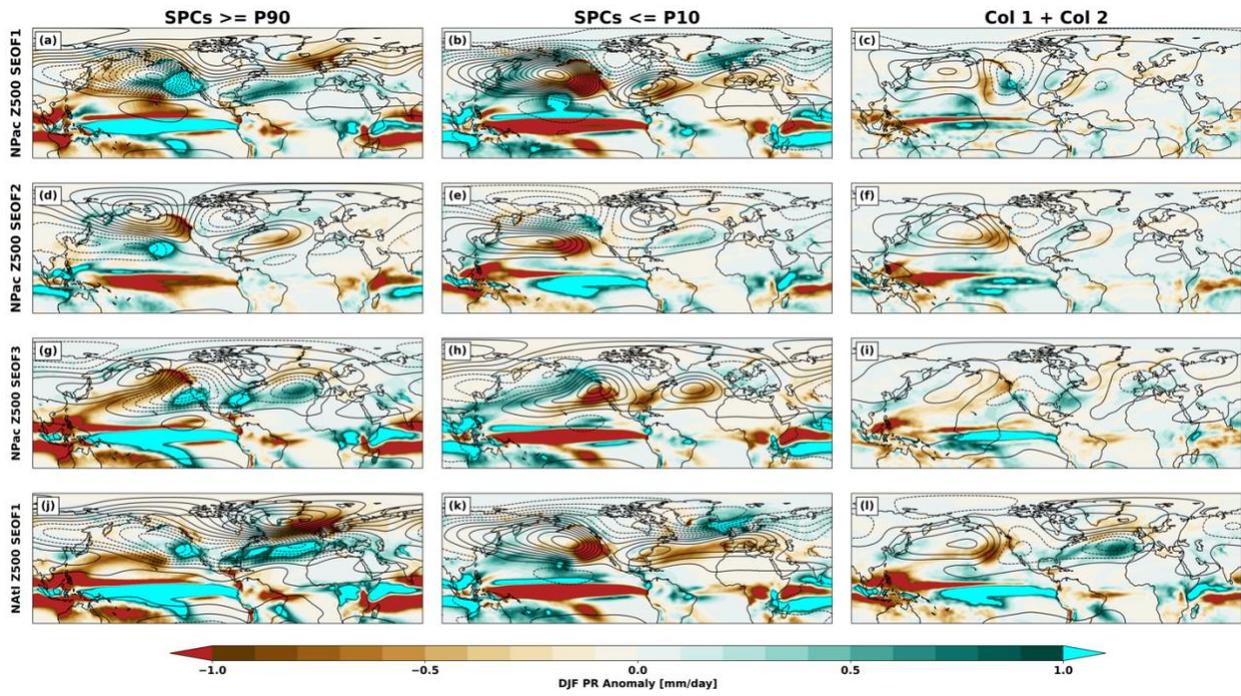


Figure S13: As in Fig. S11, but for data corresponding to the late period (last 30 years).

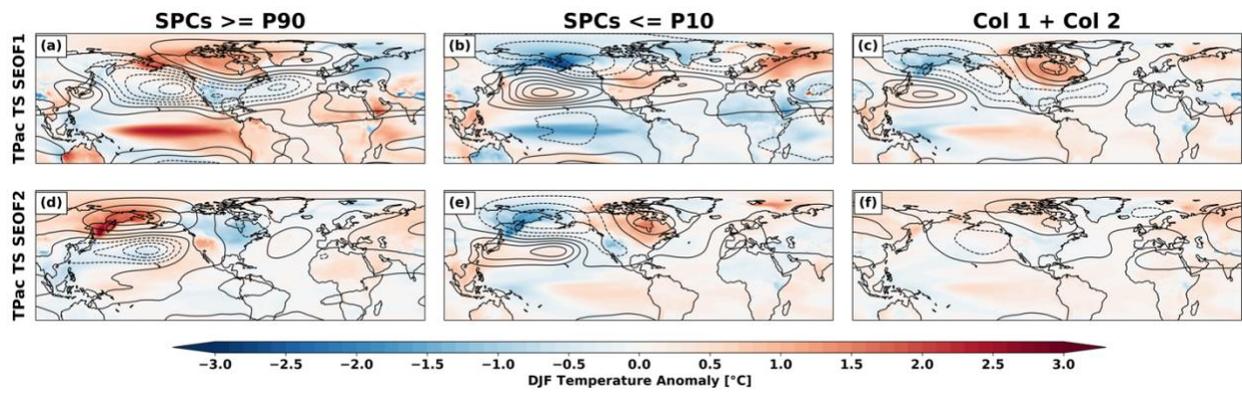


Figure S14: As in Fig. S10, but for the two tropical Pacific modes.

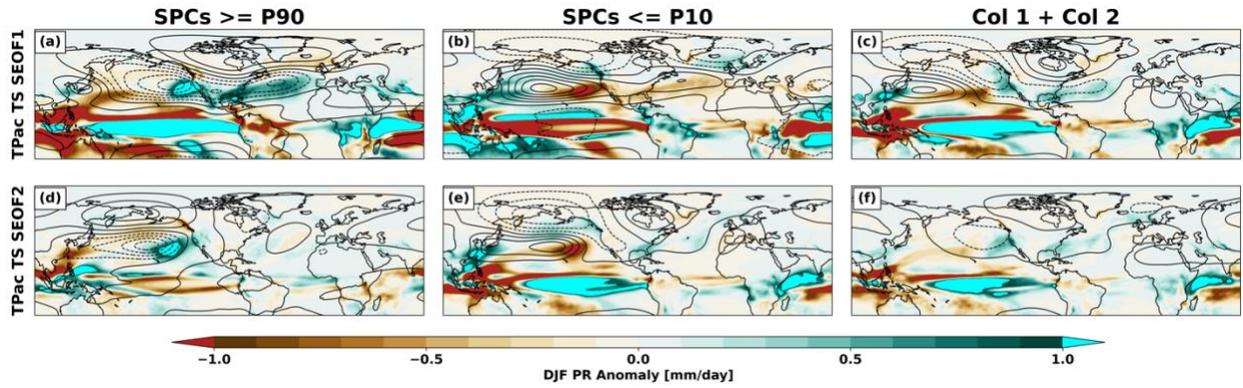


Figure S15: As in Fig. S11, but for the two tropical Pacific modes.

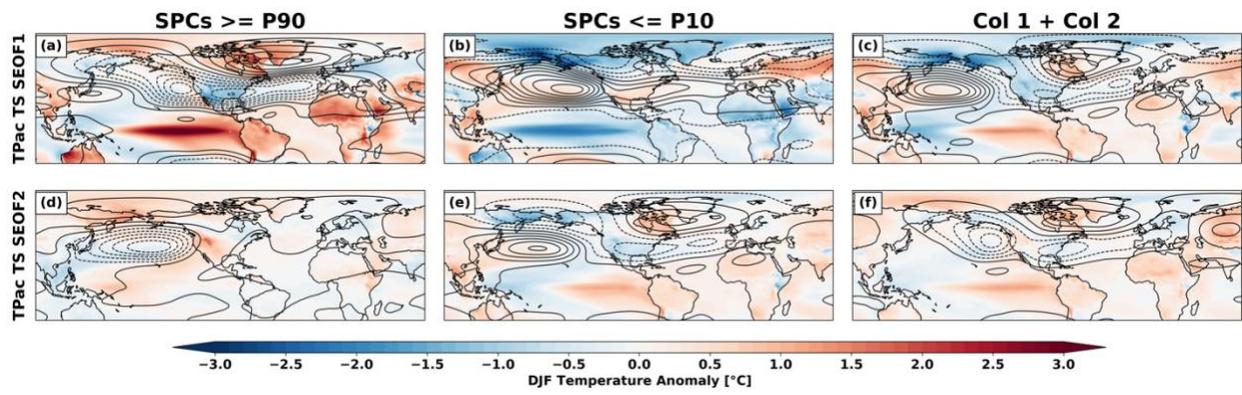


Figure S16: As in Fig. S12, but for the two tropical Pacific modes.

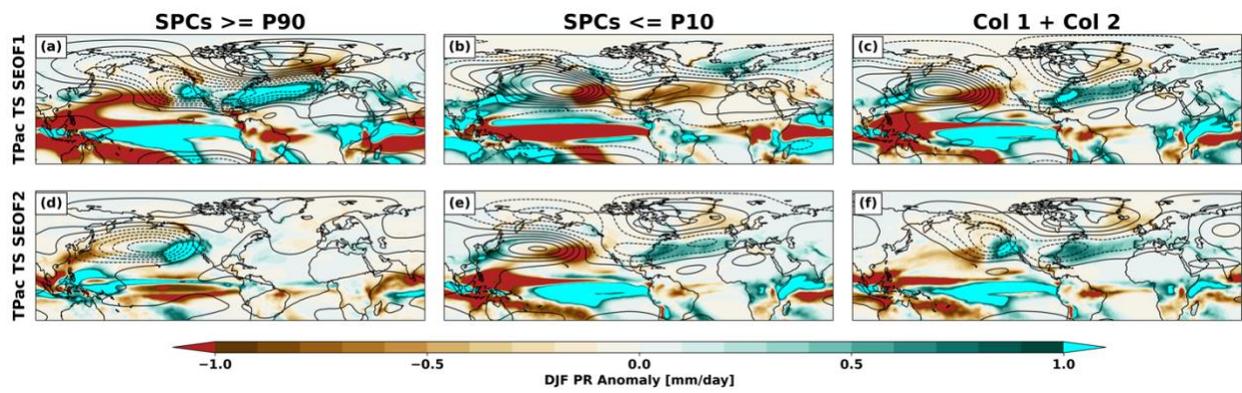


Figure S17: As in Fig. S13, but for the two tropical Pacific modes.