Supplemental Material for

Dryness over the US Southwest, a Springboard for Cold Season Pacific SST to Influence Warm Season Drought over the US Great Plains

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Supplemental Figures

**Fig. S1.** Annual cycle of a) ERAI precipitation, b) ERAI evaporation, c) ERAI MFC, d) CPC precipitation, e) GLEAM evaporation, and f) GLEAM surface soil moisture averaged over the Great Plains region (35°-47°N, 95°-105°W) for 1979-2017 climatology (black solid line), six dry summer years over the Great Plains (colored solid line) and their average value (black dashed line) overlaid with the one standard deviation envelope (gray shade).
**Fig. S2.** Hovmöller diagram of the vertical profile of the atmospheric moisture budget components (unit: 10³ x day⁻¹) averaged over the Great Plains region (35°–47°N, 95°–105°W) for the 1979–2017 climatology (a, d, g, and j) and 2012 (b, e, h, and k). The first three rows represent the mean zonal, meridional, and vertical advection terms (ADVₓ, ADVᵧ, and ADVᵥ), respectively. The last two rows show the horizontal and vertical transient terms (TRSₓ and TRSᵥ), respectively. The annual cycle of the vertical integrals of corresponding terms (unit: mm/day) for the climatology (blue) and 2012 (orange) are shown in the 3rd column (c, f, i, l, and o).
**Fig. S3.** Same as Fig. S1, but for the Southwest region (30°–43°N, 105°–112°W).
**Fig. S4.** Same as Fig. S2, but for the Southwest region (30°–43°N, 105°–112°W).
**FIG. S5.** Post-LASSO regression analysis with MAM moisture terms as predictors and JJA precipitation as predictand (1992-2017). (a) – (j) regression coefficients for zonal thermodynamic (TH$_x$), zonal dynamic (DN$_x$), zonal non-linear (NL$_x$), meridional thermodynamic (TH$_y$), meridional dynamic (DN$_y$), meridional non-linear (NL$_y$), vertical thermodynamic (TH$_z$), vertical dynamic (DN$_z$), vertical non-linear (NL$_z$), and evapotranspiration (ET) terms. (k) Coefficient of determination ($R^2$) for the post-LASSO regression model. (l) $R^2$ statistic for a simple regression model with TH$_x$ as the sole predictor. Grid points with correlation significant at 0.05 level are marked with dots.
**Fig. S6.** Same as Fig. S5, but for the post-LASSO regression model with JJA moisture terms as predictors.
**Fig. S7.** Results for the top five REOF modes for the Z500 over the region of 180°–20°W, 20°–80°N: Correlation between RPC in March–May (MAM) and (1st column) Z500 in MAM; (2nd column) SST in MAM; (3rd column) SST in December–February (DJF); (4th column) precipitation in MAM; (5th column) zonal thermodynamic advection term at 700 hPa in MAM; (6th column) precipitation in June–August (JJA) for the period of 1992-2017. Grid points with correlation significant at 0.05 level are marked with dots. Percentage of explained variance by each REOF mode is also labeled besides the figure.
**Fig. S8.** Results for the top five EOF modes for the Z500 over the region of 120°E–20°W, 20°–80°N: correlation between PC time series and (1st column) Z500 in June – July (JJ); (2nd column) SST in JJ; and (3rd column) precipitation in JJ. All correlation coefficients are calculated for the period of 1992-2017. Grid points with correlation significant at 0.05 level are marked with dots. Percentage of explained variance by each EOF mode is also labeled besides the figure.
**Fig. S9.** Correlation maps between RPC2 in MAM and $Z_{500}$ in JJ. Correlation coefficients are calculated for the period of 1992-2017. Grid points with correlation significant at 0.05 level are marked with dots.