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## Supplemental Material

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# Precipitation Sensitivity to Local Variations in Tropical Sea Surface Temperature

Jie He,<sup>a,b,c</sup> Nathaniel C. Johnson,<sup>a,b</sup> Gabriel A. Vecchi,<sup>d,e</sup> Ben Kirtman,<sup>f</sup> Andrew T. Wittenberg,<sup>b</sup> and Stephan Sturm<sup>g</sup>

<sup>a</sup> *Program in Atmospheric and Oceanic Sciences, Princeton University, Princeton, New Jersey*

<sup>b</sup> *Geophysical Fluid Dynamics Laboratory, Princeton, New Jersey*

<sup>c</sup> *School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, Georgia*

<sup>d</sup> *Geosciences Department, Princeton University, Princeton, New Jersey*

<sup>e</sup> *Princeton Environmental Institute, Princeton, New Jersey*

<sup>f</sup> *Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Miami, Florida*

<sup>g</sup> *Department of Mathematical Sciences, Worcester Polytechnic Institute, Worcester, Massachusetts*

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\* *Corresponding author* E-mail: [Jie.He@noaa.gov](mailto:Jie.He@noaa.gov)

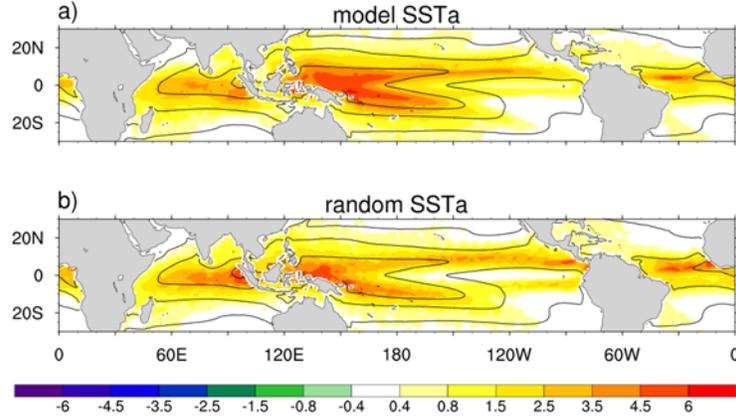


Figure S1. Point-wise regression coefficients of anomalous monthly precipitation on SST from the uncoupled GFDL-FLOR simulation with SST anomalies taken from the coupled GFDL-FLOR simulation (a) and random SST anomalies (b). Both simulations have the same climatological SSTs from the coupled GFDL-FLOR simulation. In the random SST simulation, we specify a patch of time-varying ( $t$ ) SST anomalies centered at each grid point ( $i$ ):  $SST'_i(x, y, t) = A_i(t) \cdot \cos^2\left(\frac{\pi}{2} \frac{y-y_i}{y_w}\right) \cdot \cos^2\left(\frac{\pi}{2} \frac{x-x_i}{x_w}\right)$ , where the amplitude of the anomalous SST patch is determined by Gaussian white noise  $A_i$  with an amplitude of 0.7 °C.  $x_w$  and  $y_w$  determine the zonal and meridional width of the patch and are set to 4° and 2°, respectively. The SST anomaly at each grid point is the sum of all patches that encompass that grid point.

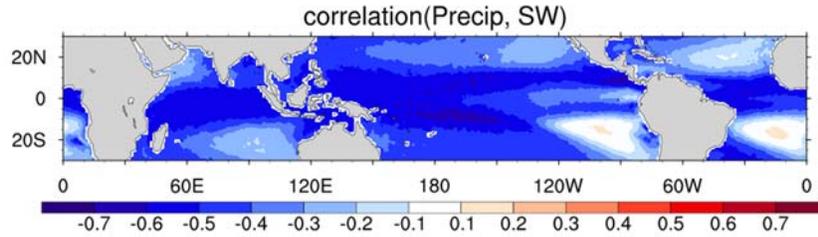


Figure S2. Correlation between anomalous daily surface net shortwave radiation and precipitation. Data are taken from the GFDL-FLOR AMIP\_fullSST simulation. Note that the absolute value of the correlation is above 0.5 for most convective regions.

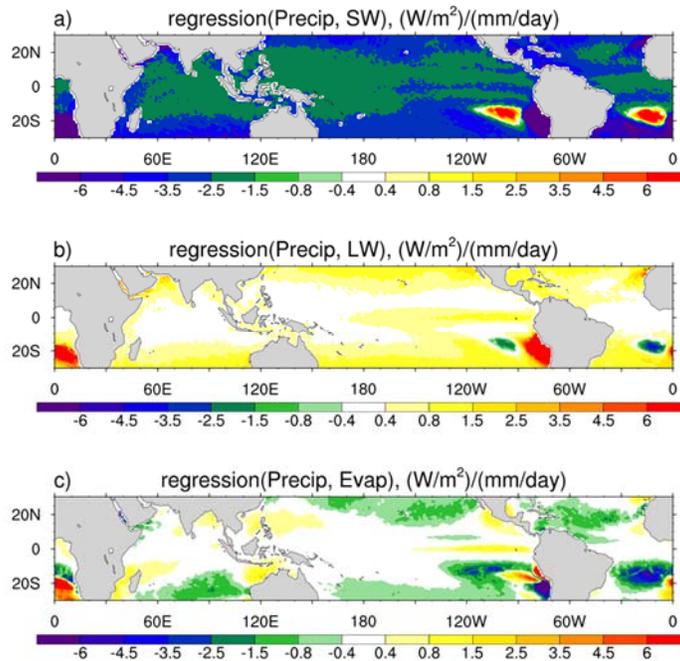


Figure S3. Point-wise regression coefficients of daily surface shortwave radiation (a), downwelling longwave radiation (b) and evaporation (c) anomalies onto daily precipitation anomalies from the GFDL-FLOR AMIP\_fullSST simulation.