Supplementary Materials

# Impact of ocean eddy resolution on the projection of precipitation change

Jie He [1,2,3*]

Ben Kirtman [4]

Brian J. Soden [4]

Gabriel A. Vecchi [5,6]

Honghai Zhang [1,2]

Michael Winton [2]

1. Program in Atmospheric and Oceanic Sciences, Princeton University, Princeton, New Jersey 08544

2. Geophysical Fluid Dynamics Laboratory, Princeton, New Jersey 08540

3. School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, Georgia 30318

4. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Miami, Florida 33149

5. Geosciences Department, Princeton University, Princeton, New Jersey 08544

6. Princeton Environmental Institute, Princeton, New Jersey 08544

* *Corresponding author* E-mail: Jie.He@noaa.gov

**Table S1.** Spatial correlation of SST and precipitation changes between the CM2.6 and FLOR-A06 simulations.

| | Ocean | | | | | Land | |
|---|---|---|---|---|---|---|---|
| | Tropics | Extratropics | Gulf Stream | Kuroshio | Agulhas | Tropics | Extratropics |
| SST | 0.74* | 0.49* | -0.08 | 0.12 | 0.63 | | |
| Precip | 0.50* | 0.68* | 0.14 | 0.48 | 0.66 | 0.63 | 0.86 |

*Neither the difference between the tropical and extratropical SST correlations nor the difference between the tropical and extratropical precipitation correlations is significant at the 90% level (two-tailed), using the Fisher r-to-z transformation for the significance test and the chi-square method for estimating the degree of freedom.

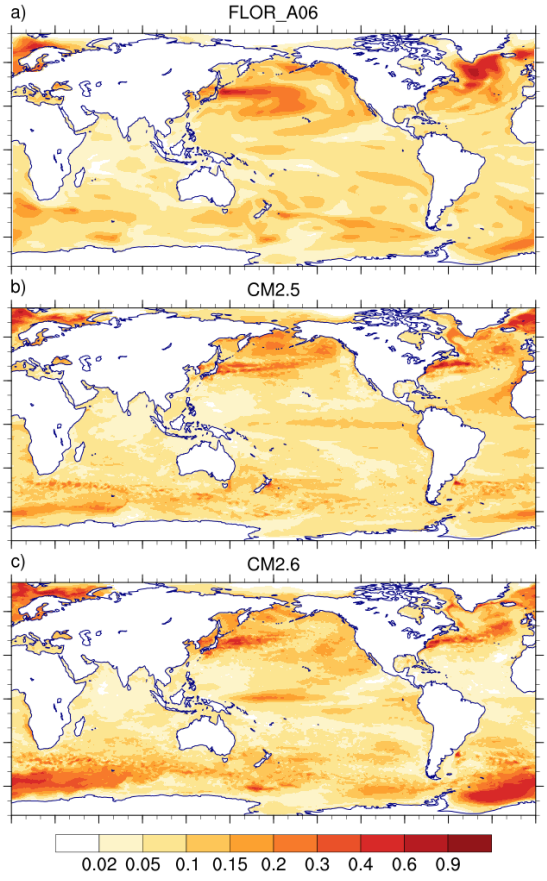


Figure S1. Internal SST variability calculated as the standard deviation of 8 non-overlapping 20-year SST segments taken from the 80-year CPL_ctrl run (after the spin-up) and the detrended 80-year CPL_1pct run (assuming linear SST response to $CO_2$

forcing). By comparing this figure with Figure 1 (right), one can estimate the relative contribution of internal variability to SST changes.

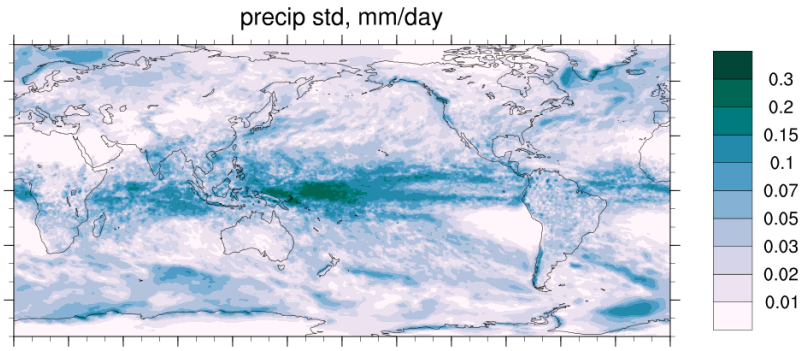


Figure S2. Internal precipitation variability calculated as the standard deviation of 6 non-overlapping 200-year SST segments taken from a 1200-year coupled 1990 control run with FLOR-A06. Note that the amplitude of the internal variability is generally smaller than the precipitation changes shown in the main text figures.

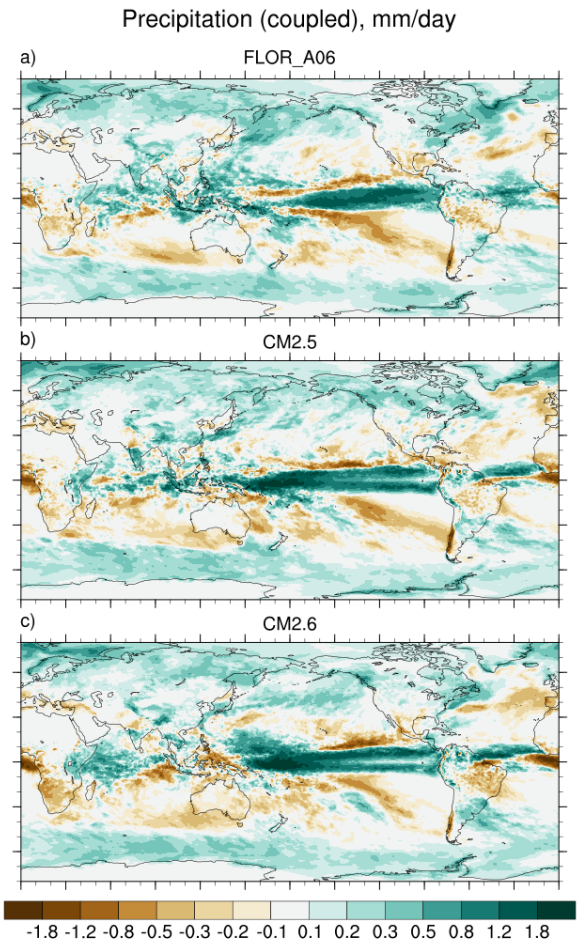


Figure S3. Precipitation changes from each coupled model calculated as the difference between years 61-80 of CPL_1pct and the corresponding years of CPL_ctrl.

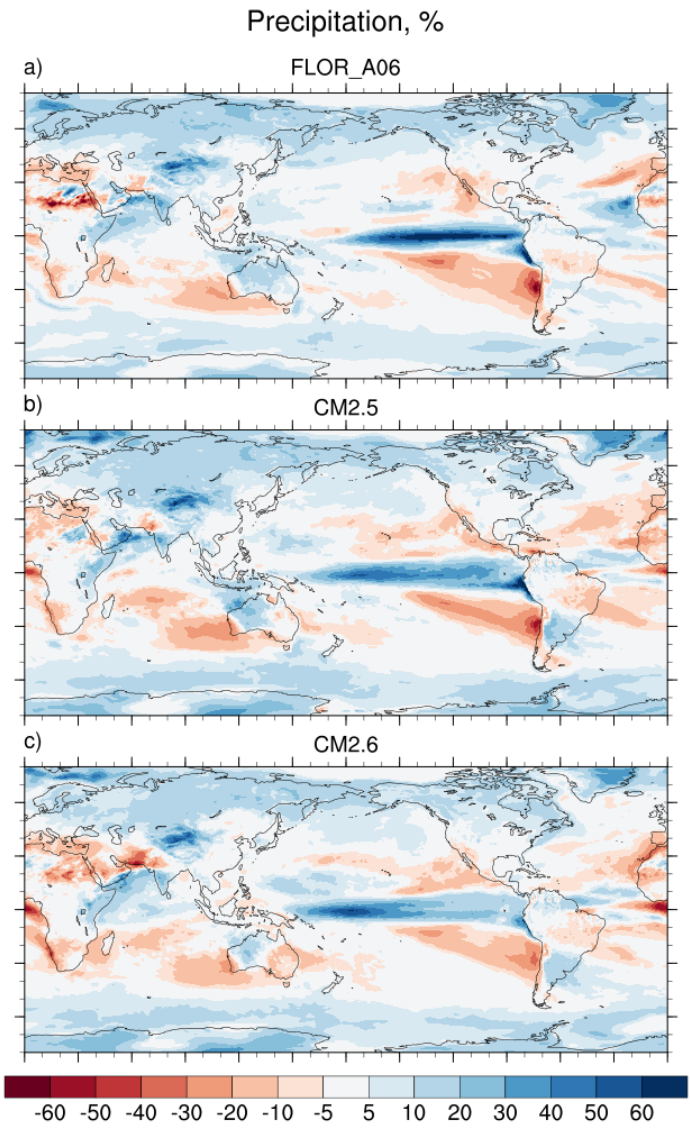


Figure S4. Precipitation changes normalized by the climatological precipitation from each model. The unit is percentage.

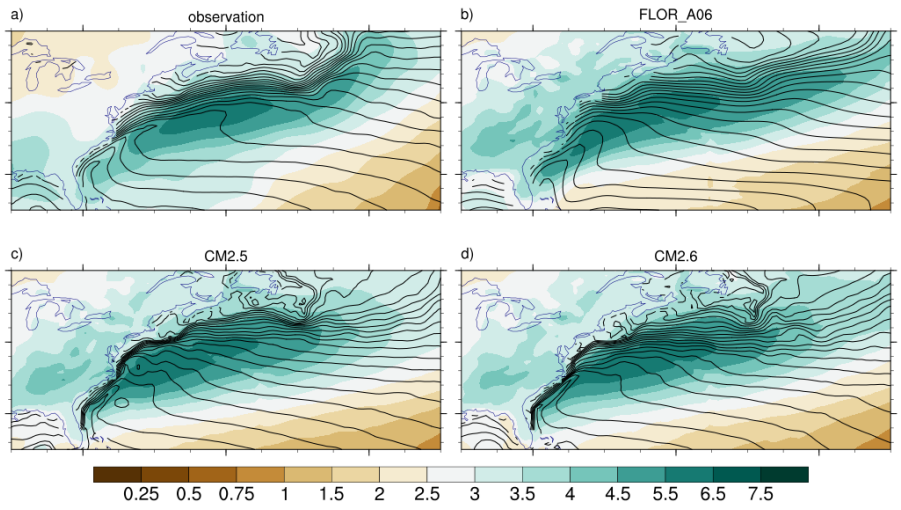


Figure S5. Climatological precipitation (shading, unit: mm/day) and SST (contours) from observations and the GFDL models, using the same data as Figures 2a-c. Contour interval is 1$^{o}$C.