# Supporting Information for "Does increasing horizontal resolution improve the simulation of intense tropical rainfall?"

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September 25, 2023, 3:28pm

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**(a)** c96-gpcp

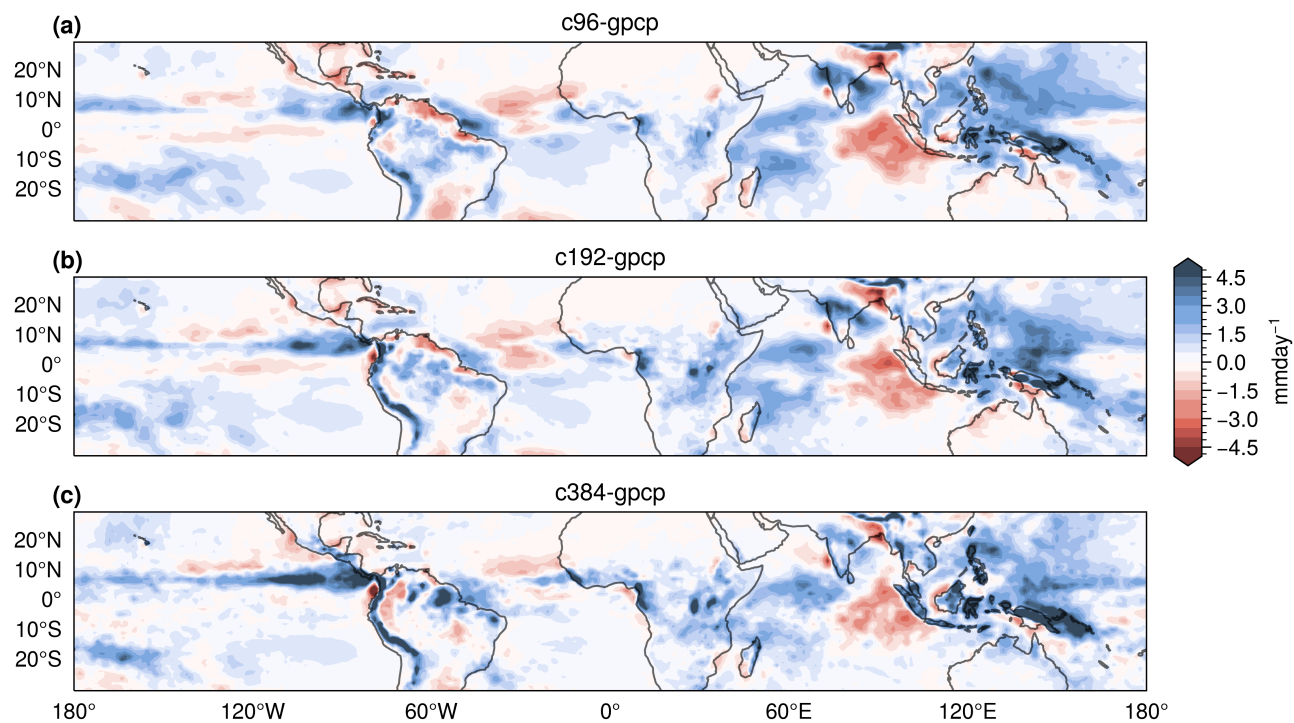**(b)** c192-gpcp

**(c)** c384-gpcp

**Figure S1.** The difference in the mean rainfall between (a) c96 , (b) c192, and (c) c384 and the mean GPCP rainfall averaged over a period of 1998-2000.
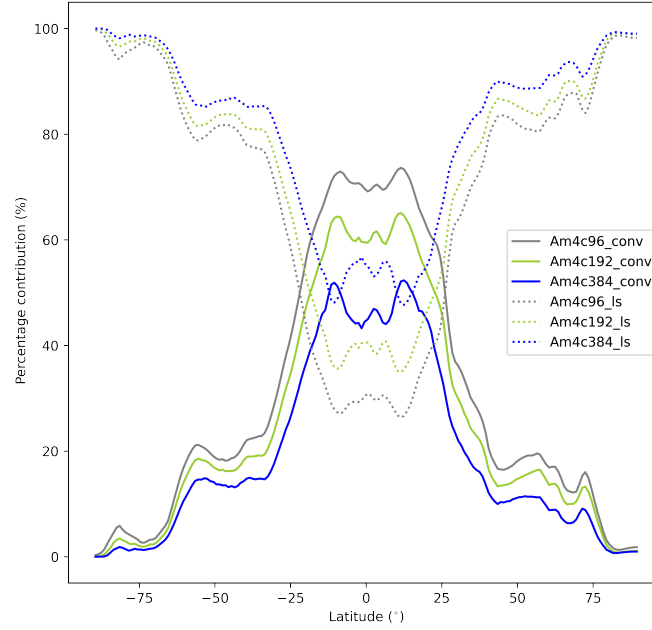
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**Figure S2.** Percentage contribution by convective (solid) and large-scale rainfall (dotted lines) to zonally averaged mean rainfall for c96 (grey), c192 (green) and c384 (blue), respectively. The figure is obtained from the model runs over a period of 1980-2000.

**Table S1.** Global mean values for rainfall and terms in the radiation budget for the model runs over the period of 1980-2000. The values in blue indicate an increase with respect to c96 and red indicates the decrease. The statistically insignifacant change with respect to c96 ($pvalue \geq 0.05$ using student's t-test) is indicated by an asterisk (*).

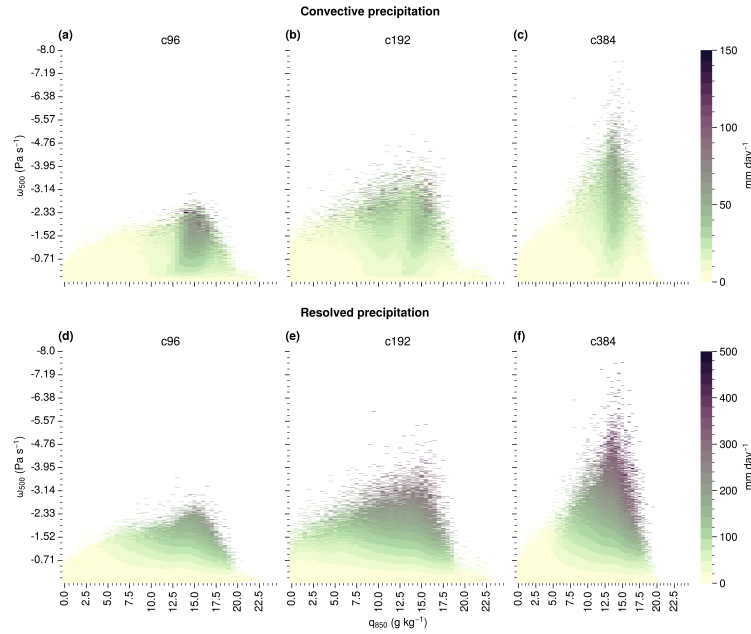|  | c96 | c192 | c384 |
|---|---|---|---|
| Net rainfall | 2.92 | 2.96 | 2.99 |
| Net TOA | 2.14 | 1.79 | 2.29 |
| SWUP_sfc | 23.95 | 24.33 | 25.22 |
| SWDN_sfc | 187.80 | 189.28 | 192.06 |
| LW_up_sfc | 398.61 | 398.20 | 397.93 |
| LW_dn_sfc | 340.10 | 339.47 | 338.23 |
| latent_sfc | 84.51 | 85.70 | 86.55 |
| sensible_sfc | 17.93 | 17.96* | 17.47 |

**Figure S3.** 2D bin mean convective and resolved precipitation intensity (in $mm\ day^{-1}$) as a function of midlevel vertical velocity ($\omega_{500}$) and low-level moisture ($q_{850}$). The figure is obtained from the model simulations over a period of 1980-2000.
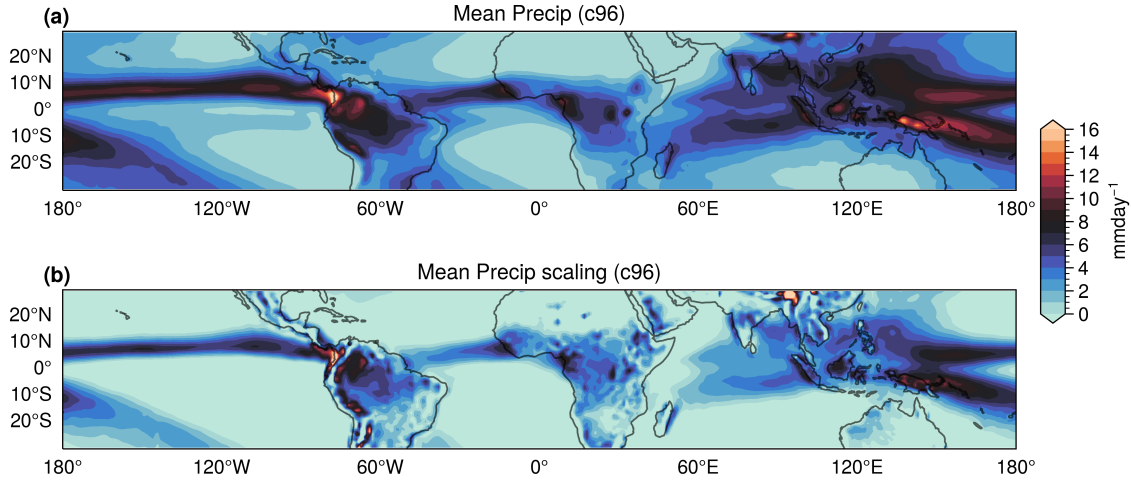


**Figure S4.** (a) Climatological daily mean precipitation intensity (in $mm\ day^{-1}$) in c96 (b) the mean rainfall intensity ($mm\ day^{-1}$) obtained from the precipitation scaling using equation (1). The figure is obtained from the model simulations over a period of 1980-2000.
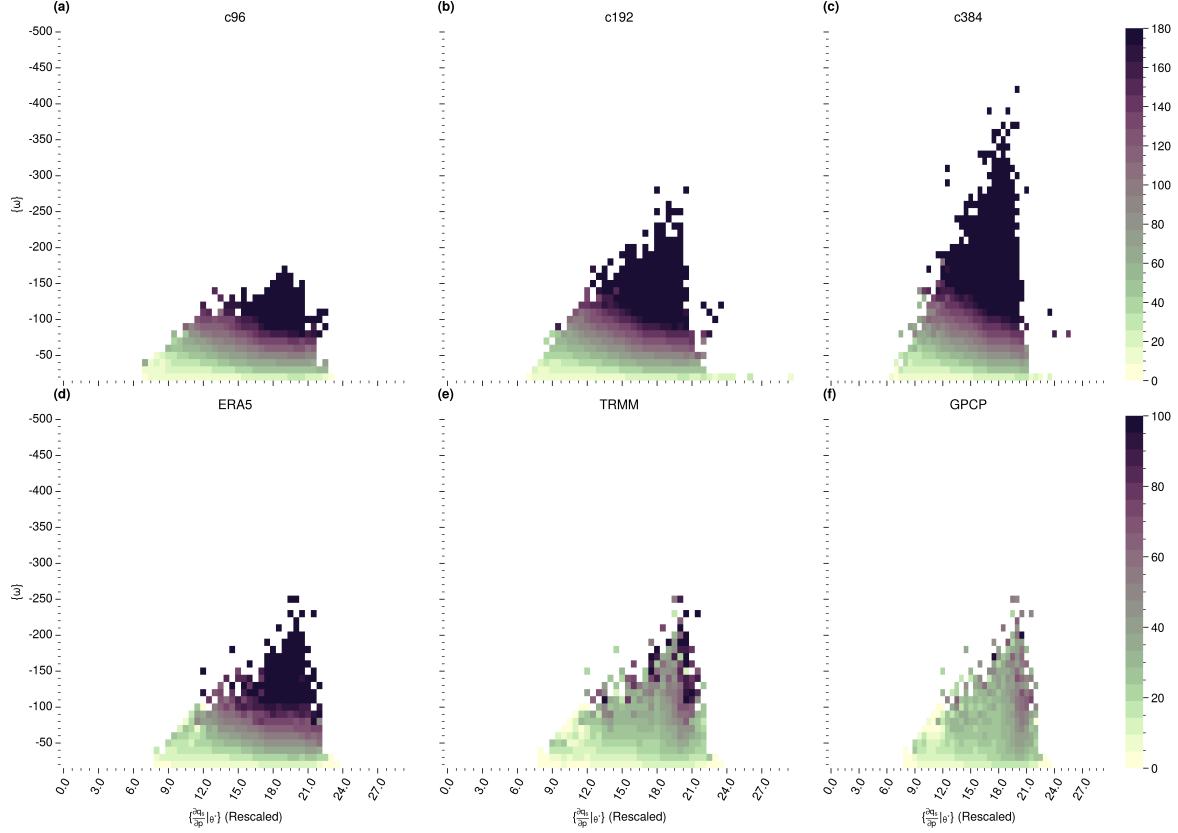
**Figure S5.** 2D bin mean of normalized precipitation intensity $(mm\ day^{-1})$ as a function of column-integrated pressure velocity $\{\omega\}$ and the column-integrated vertical derivative of saturated specific humidity along the moist adiabat $\left\{\frac{\partial q_s}{\partial p}|_{\theta*}\right\}$. The x-axis is scaled by a constant multiplier of $10^5$. The figure is plotted using the data for an overlap period of 1998-2000.
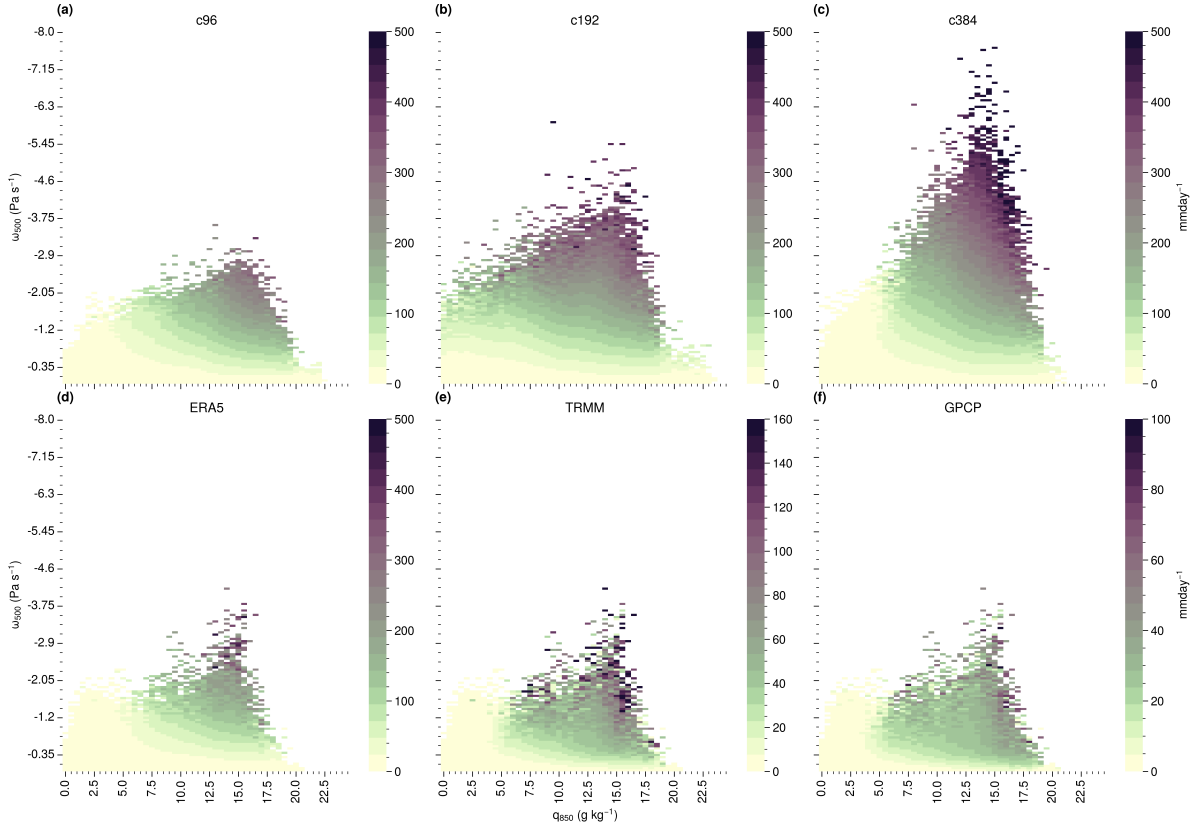
**Figure S6.**    2D bin mean of normalized precipitation intensity as a function of low-level moisture ($q_{850}$) and midtropospheric pressure velocity ($\omega_{500}$). The figure is plotted using the data for an overlap period of 1998-2000.