

# Supporting Information for “Non-monotonic Response of the Climate System to Abrupt CO<sub>2</sub> Forcing”

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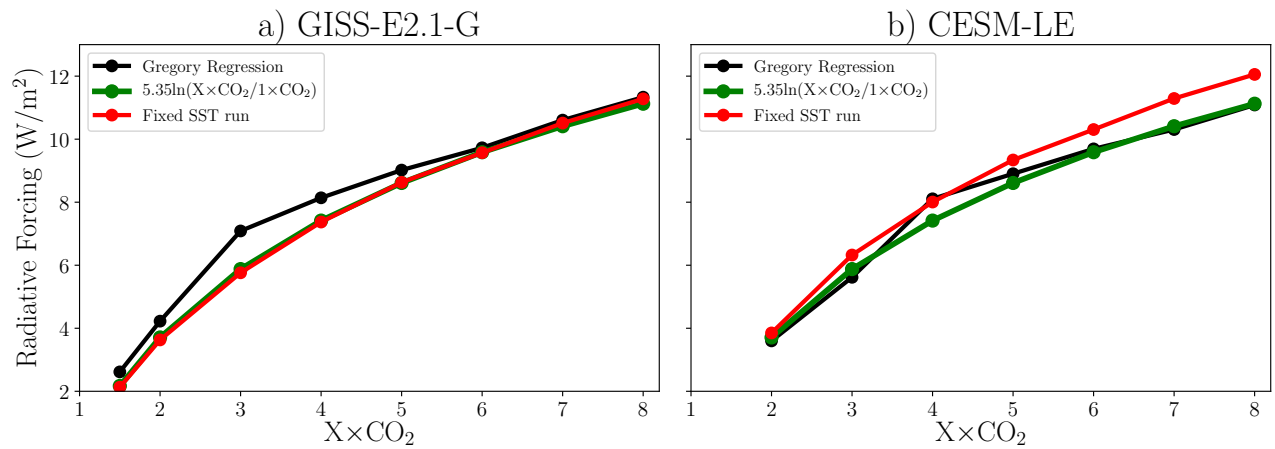
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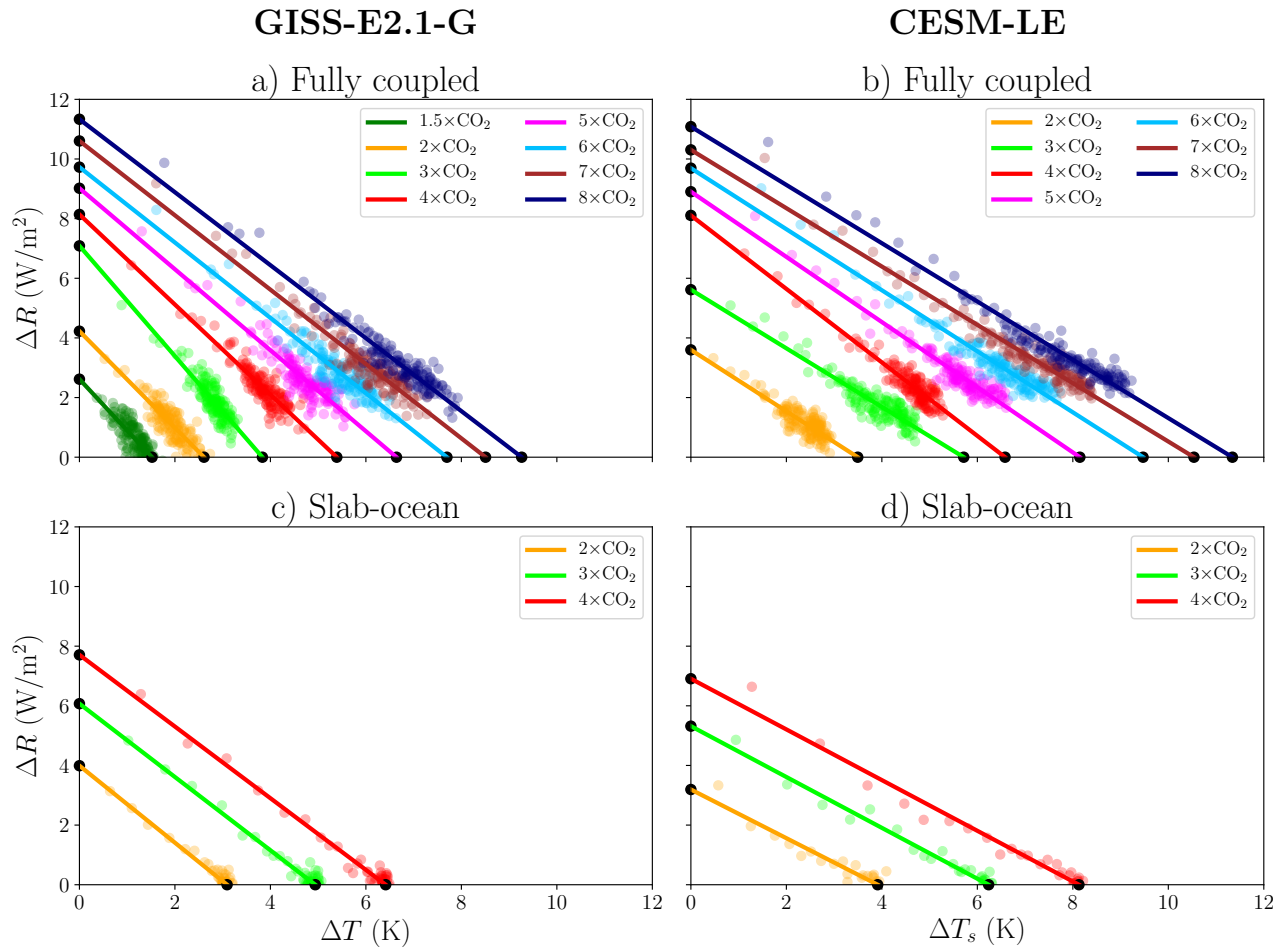
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## Contents of this file

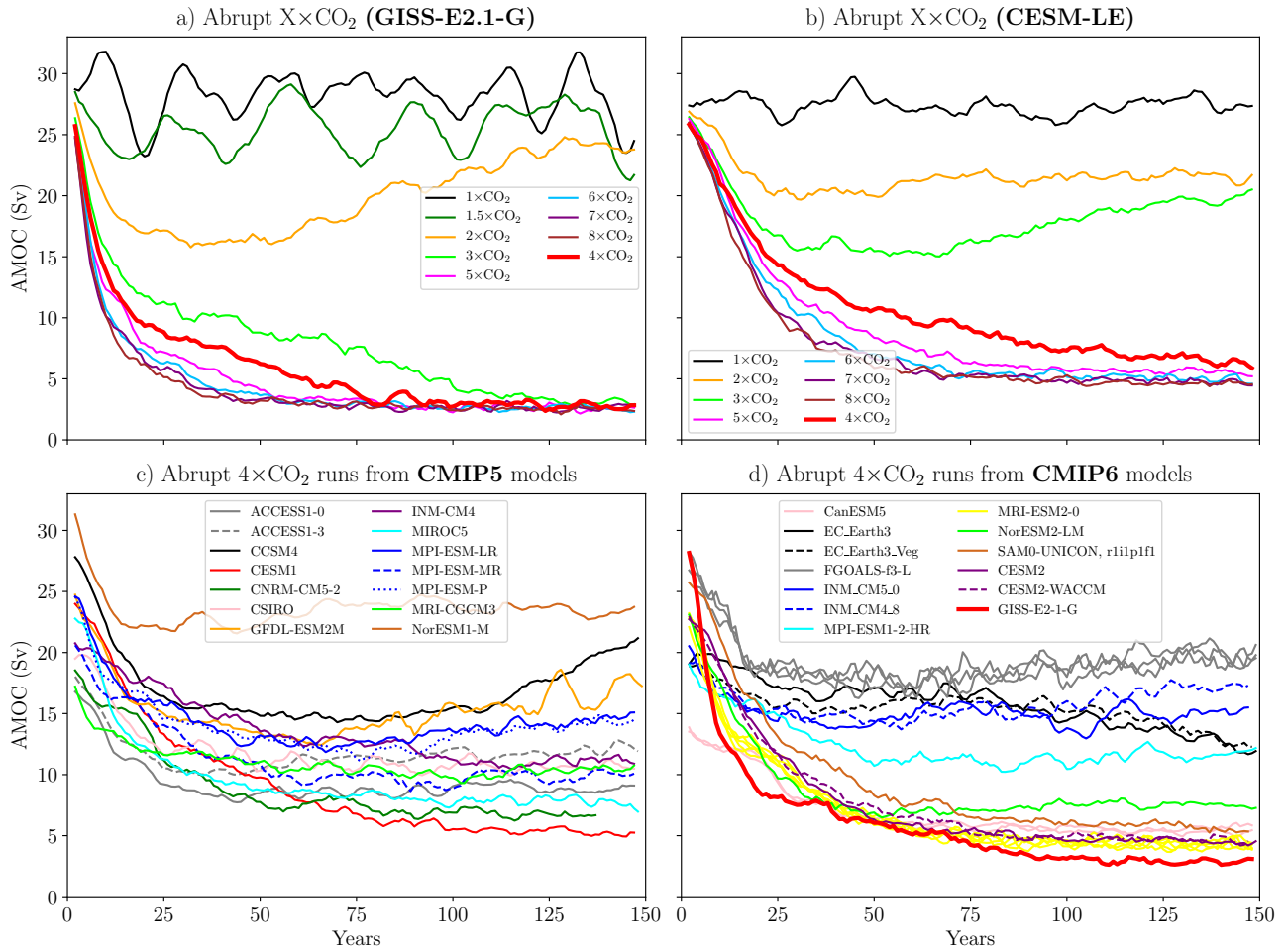
Figures S1-S5.



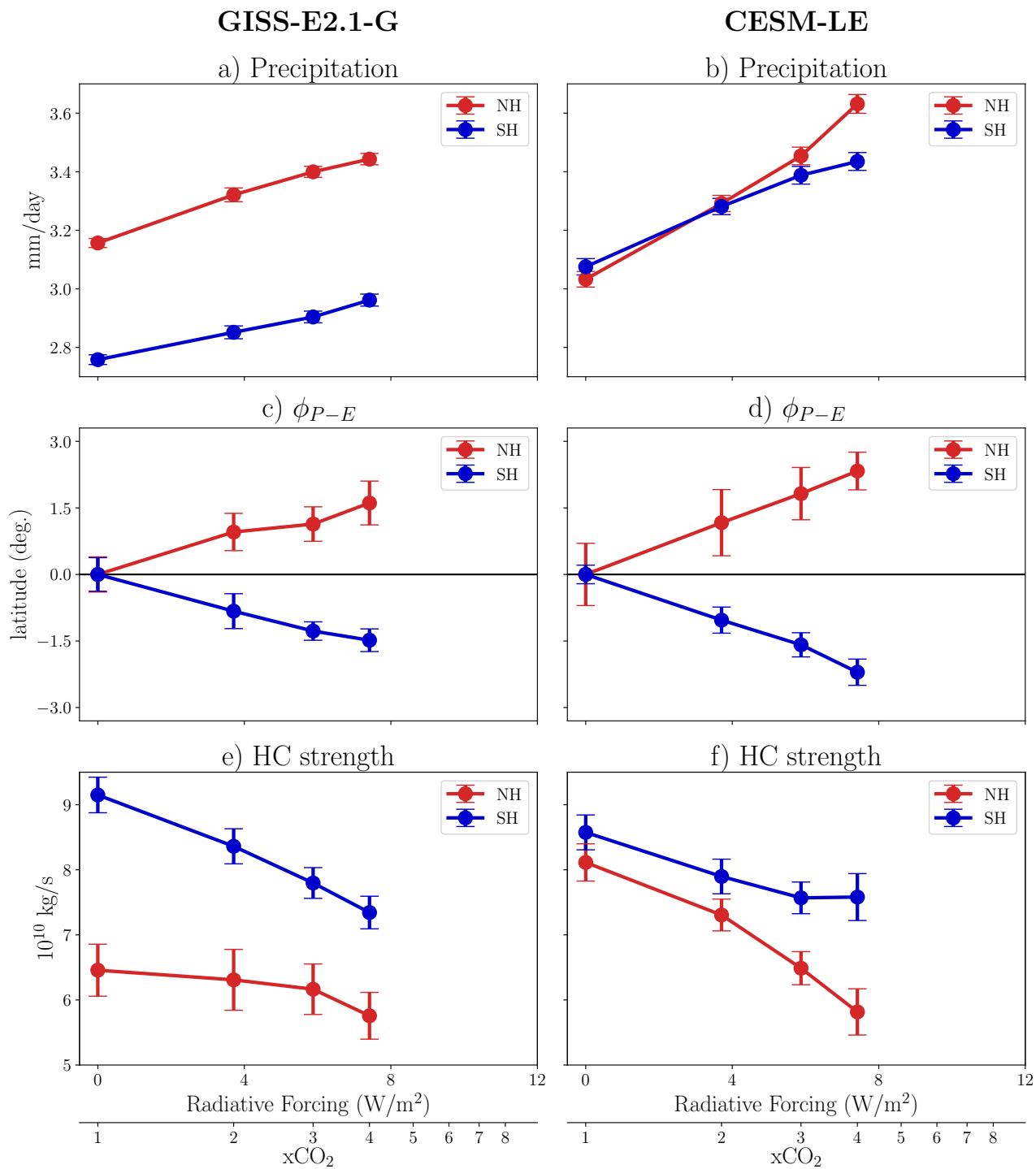
**Figure S1.** Radiative forcing calculation comparison of the y-intercept from the Gregory regressions (black), the logarithmic approximation (green), and 30 year fixed SST experiments (red) for a) GISS-E2.1-G and b) CESM-LE.



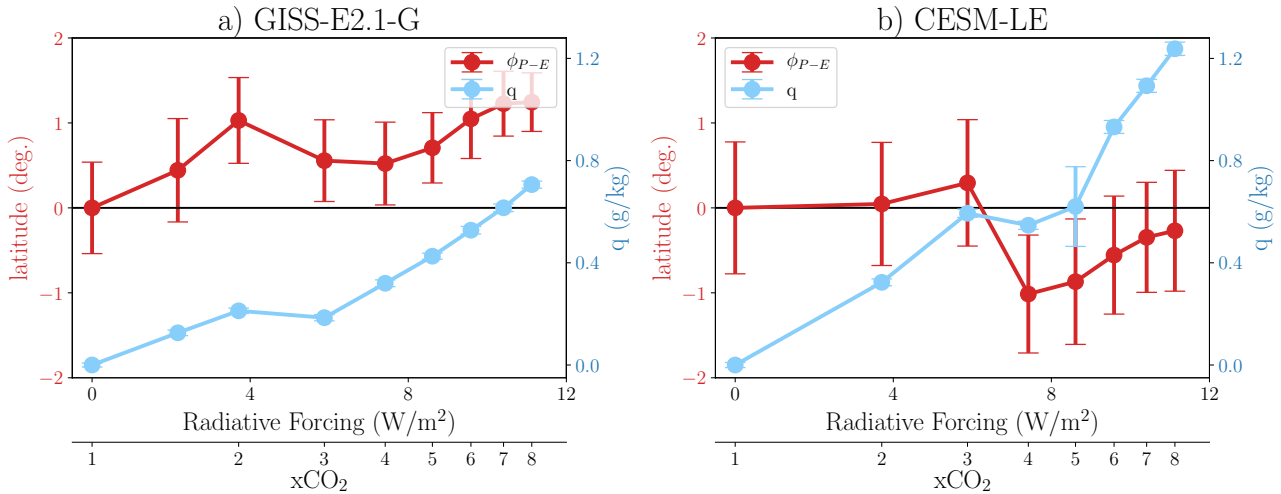
**Figure S2.** Gregory regression plots for a,b) fully coupled (FOM) and c,d) slab-ocean (SOM) runs using annual averages for both GISS-E2.1-G (left) and CESM-LE (right). Intercepts are shown with larger black dots.



**Figure S3.** Time evolution of the Atlantic Meridional Overturning Circulation (AMOC) in a,b) abrupt CO<sub>2</sub> forcings in fully coupled (FOM) GISS-E2.1-G and CESM-LE; c,d) abrupt 4×CO<sub>2</sub> runs in CMIP5 and CMIP6 models. Time series are smoothed with a 5 year running mean.



**Figure S4.** As in Fig. 4 except shown here using output from the slab-ocean runs.



**Figure S5.** NH subtropics response to abrupt CO<sub>2</sub> forcing. Edge of dry zones ( $\phi_{P-E}$ , red) and specific humidity ( $q$ , light blue) for a) GISS-E2.1-G and b) CESM-LE fully coupled (FOM) models.  $q$  is averaged over 30°N to 45°N. Error bars denote 95% confidence intervals calculated using Student's  $t$ -distribution.