

# Supporting Information for “CO<sub>2</sub>-plant effects do not account for the gap between dryness indices and projected dryness impacts”

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## Introduction

Table S1 specifies the CMIP6 models used in the main text, including Figures 1-4. Table S2 specifies the CMIP5 models used in Figures S3-S6. Figures S1-S2 reproduce Figures 1-2 from the main text, but with each model's changes normalized by that model's year-to-year standard deviation. Figures S3-S6 reproduce Figures 1-4 from the main text, but for CMIP5.

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**Table S1.** CMIP6 climate models analyzed in this study

Model name	Institution	Data citations
ACCESS-ESM1.5	CSIRO	Ziehn et al. (2019a, 2019b)
BCC-CSM2MR	BCC	Wu et al. (2018, 2019)
CanESM5	CCCma	Swart et al. (2019a, 2019b)
CNRM-ESM2-1 <sup>a</sup>	CNRM-CERFACS	Seferian (2018a, 2018b)
GFDL-ESM4 <sup>a</sup>	NOAA-GFDL	Krasting, John, et al. (2018); Krasting, Blanton, et al. (2018)
GISS-E2.1G <sup>b</sup>	NASA-GISS	
IPSL-CM6A-LR	IPSL	Boucher, Denvil, Caubel, and Foujols (2018a, 2018b)
MPI-ESM1.2-LR	MPI-M	Wieners et al. (2019); Brovkin et al. (2019)
MRI-ESM2.0 <sup>c</sup>	MRI	Yukimoto et al. (2020a, 2020b)
NorESM2-LM <sup>d</sup>	NCC	Seland et al. (2019); Schwinger et al. (2020)
UKESM1.0-LL	MOHC	Tang et al. (2019); Jones (2019)

<sup>a</sup>SM<sub>d</sub> is not available.

<sup>b</sup>We use r101 for 1pctCO<sub>2</sub>, since it is the most up-to-date and matches 1pctCO<sub>2</sub>-rad.

<sup>c</sup>We use i2, since i1 lacks carbon cycle variables (S. Yukimoto, pers. comm.)

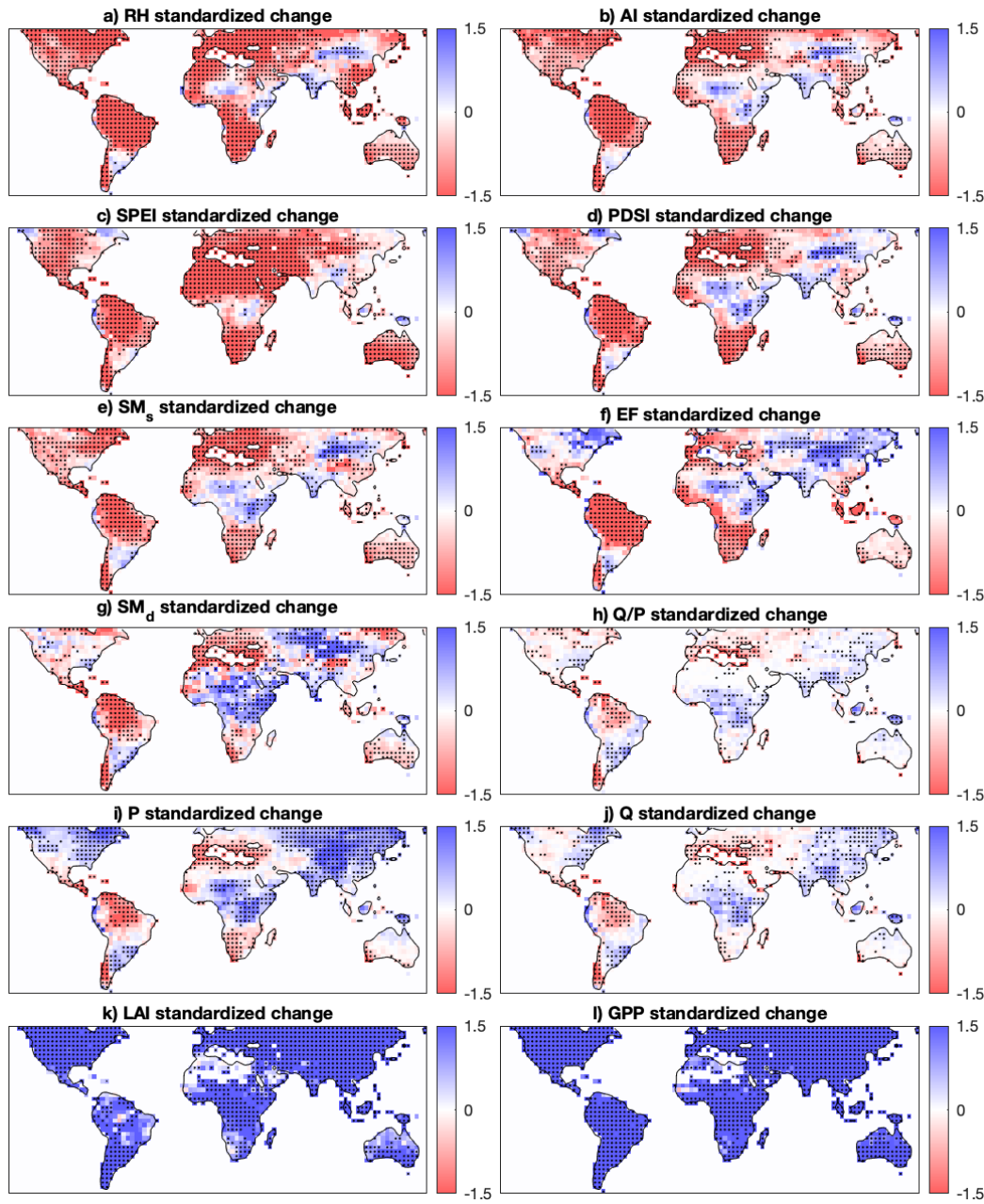
<sup>d</sup>Base period is years 2-31, since part of year 1 is missing for some variables.

**Table S2.** CMIP5 climate models used for Figs. S3-S6

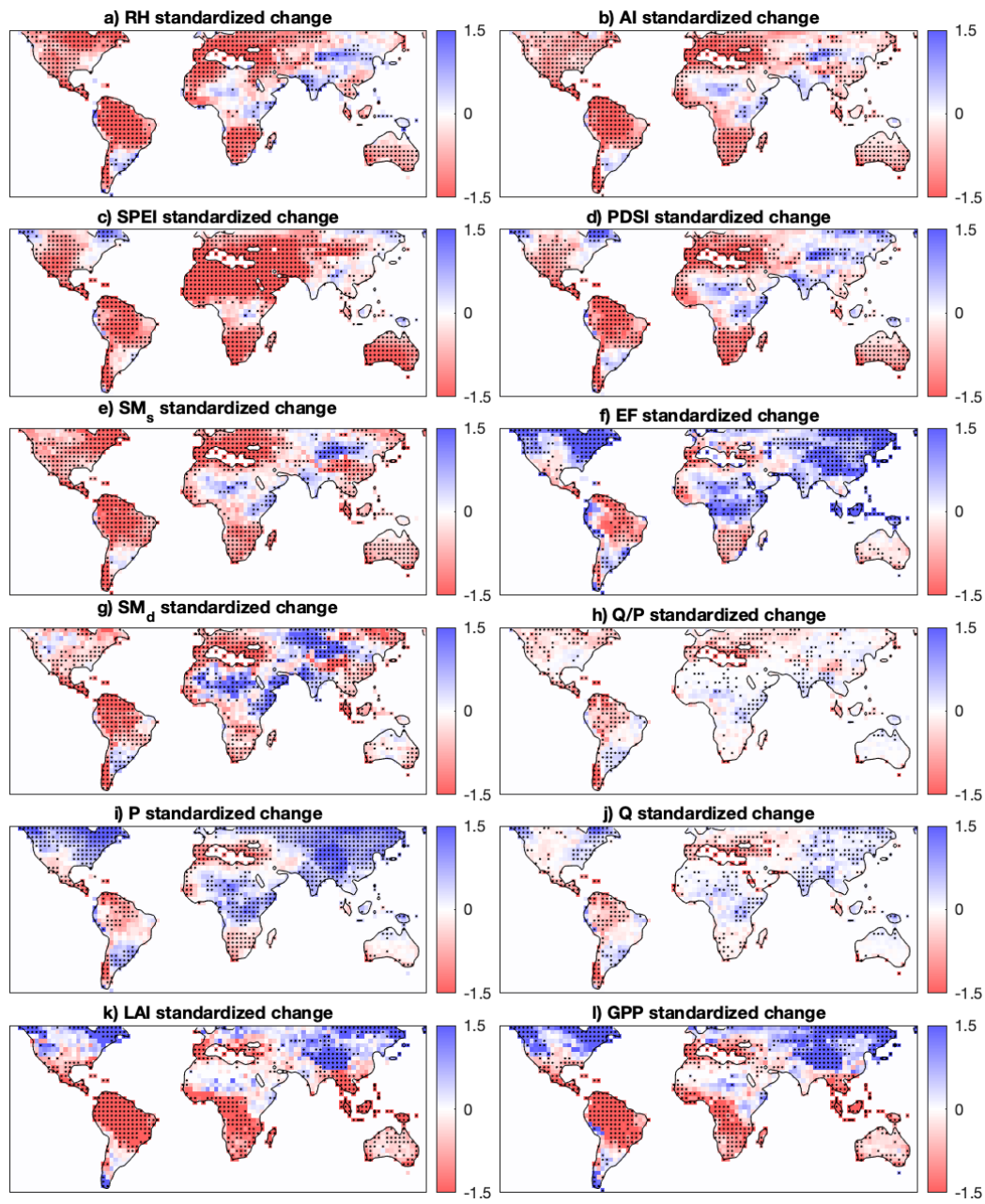
Model name	Institution
BCC-CSM1.1	Beijing Climate Center, China Meteorological Administration
CanESM2	Canadian Centre for Climate Modelling and Analysis
CESM1(BGC)	Community Earth System Model Contributors
GFDL-ESM2M	NOAA Geophysical Fluid Dynamics Laboratory
HadGEM2-ES	Met Office Hadley Centre
IPSL-CM5A-LR <sup>a</sup>	Institut Pierre-Simon Laplace
IPSL-CM5A-MR <sup>a</sup>	
MPI-ESM-LR <sup>a,b</sup>	Max Planck Institute for Meteorology
NorESM1-ME	Norwegian Climate Centre

<sup>a</sup>SM<sub>d</sub> is not available.

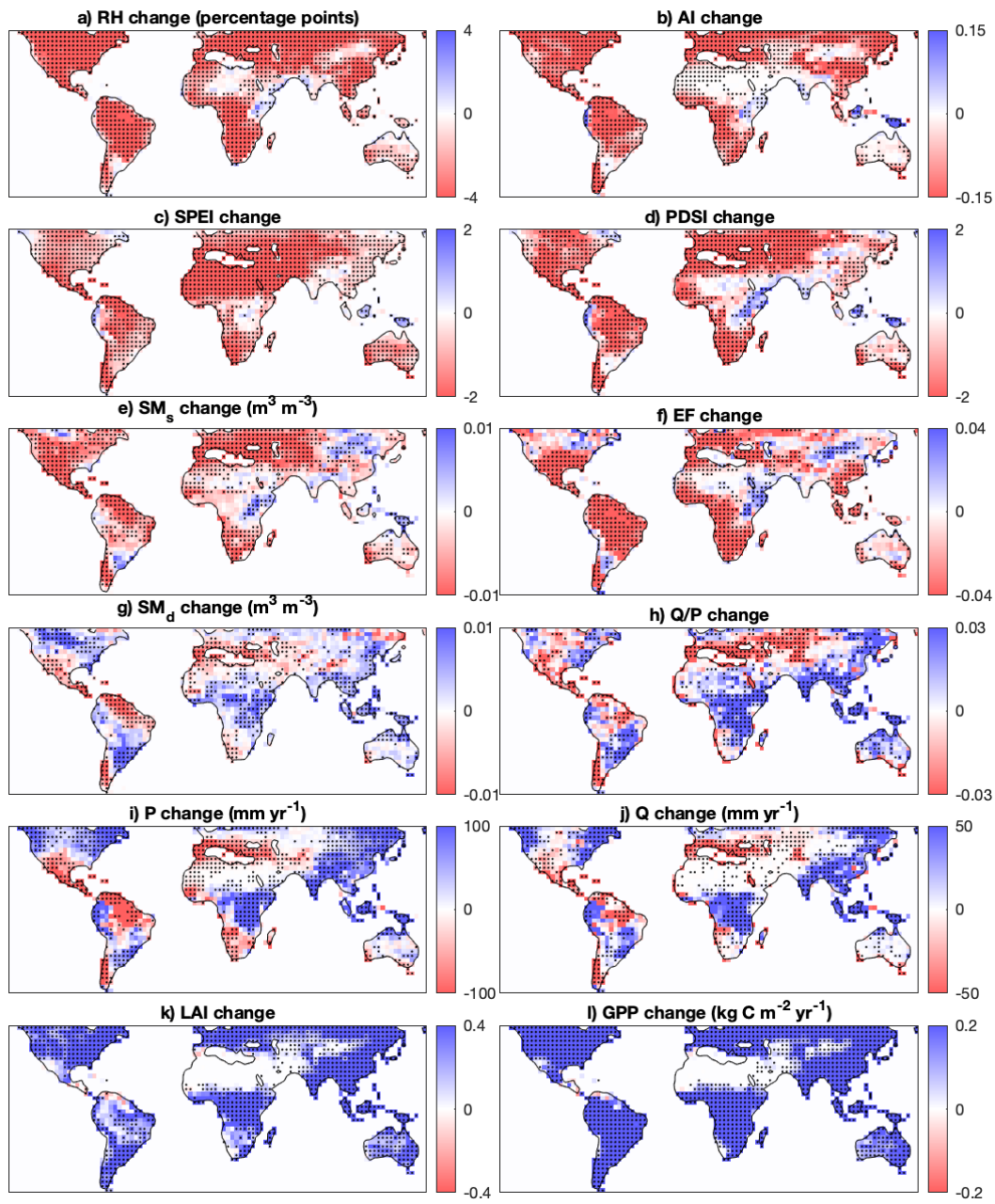
<sup>b</sup>SM<sub>s</sub> is not available.



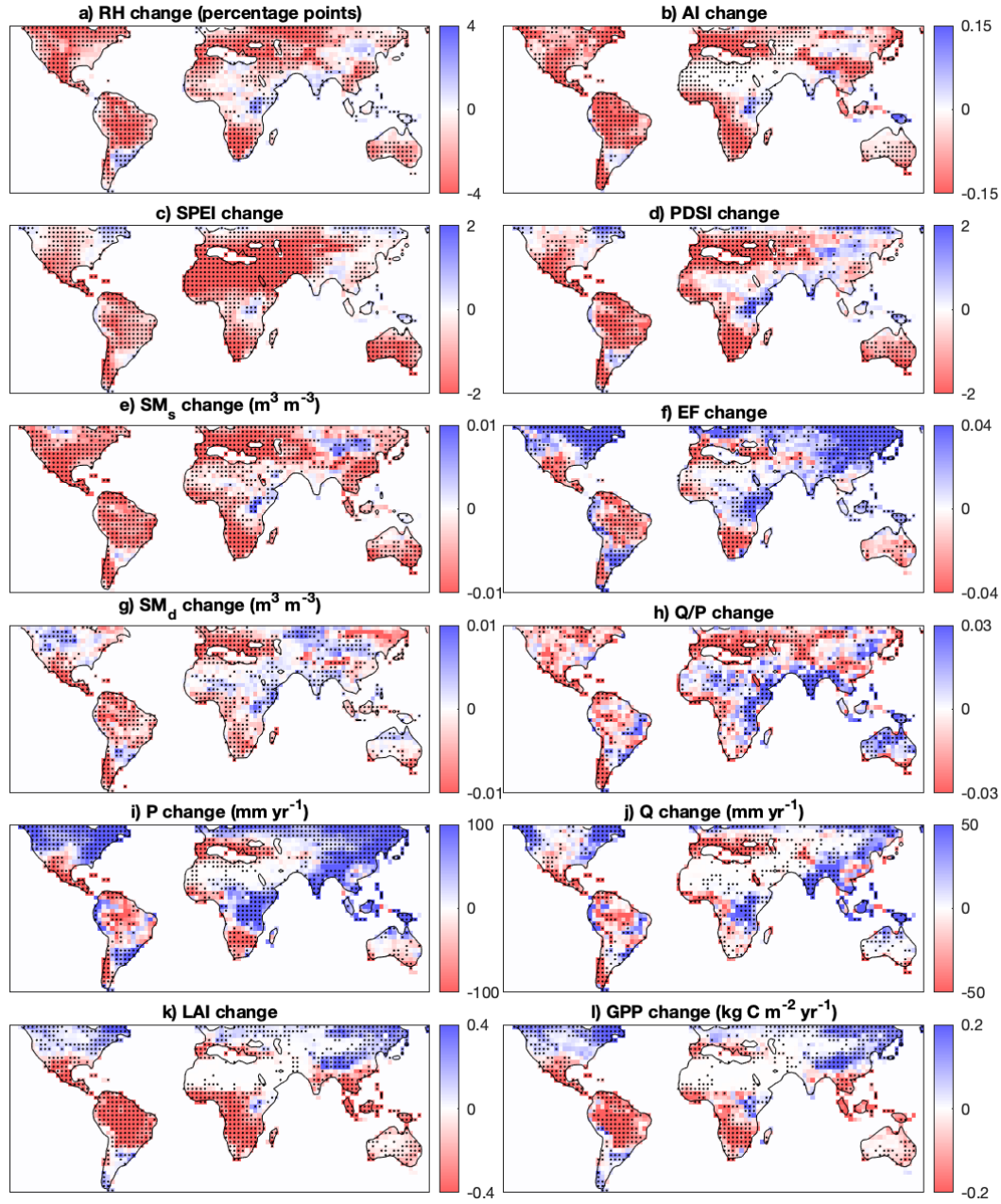
**Figure S1.** As Fig. 1 of the main text, but each model's response is normalized by that model's interannual standard deviation before the multi-model median is taken. Annual  $Q$  each year is defined as annual  $P$  minus annual  $ET$ ; this is not strictly correct (due to storage) but should capture the magnitude of interannual standard deviation of  $Q$ . Annual  $EF$  and  $Q/P$  are each defined as the ratio of the yearly values of their numerator and denominator. "Interannual variability of  $AI$ " is represented by interannual standard deviation of  $P$  over climatological  $E_0$ .



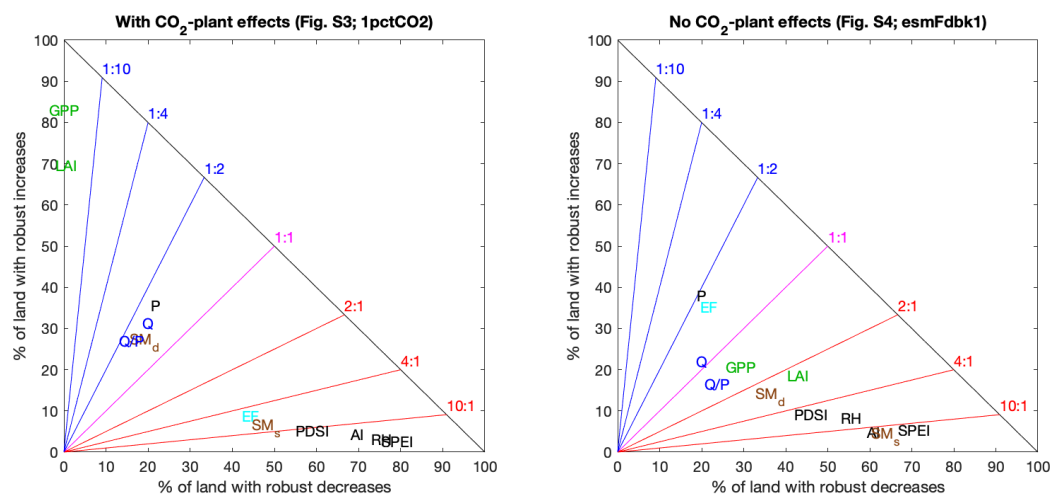
**Figure S2.** As Fig. S1, but for Fig. 2 of the main text (1pctCO<sub>2</sub>-rad experiment.)



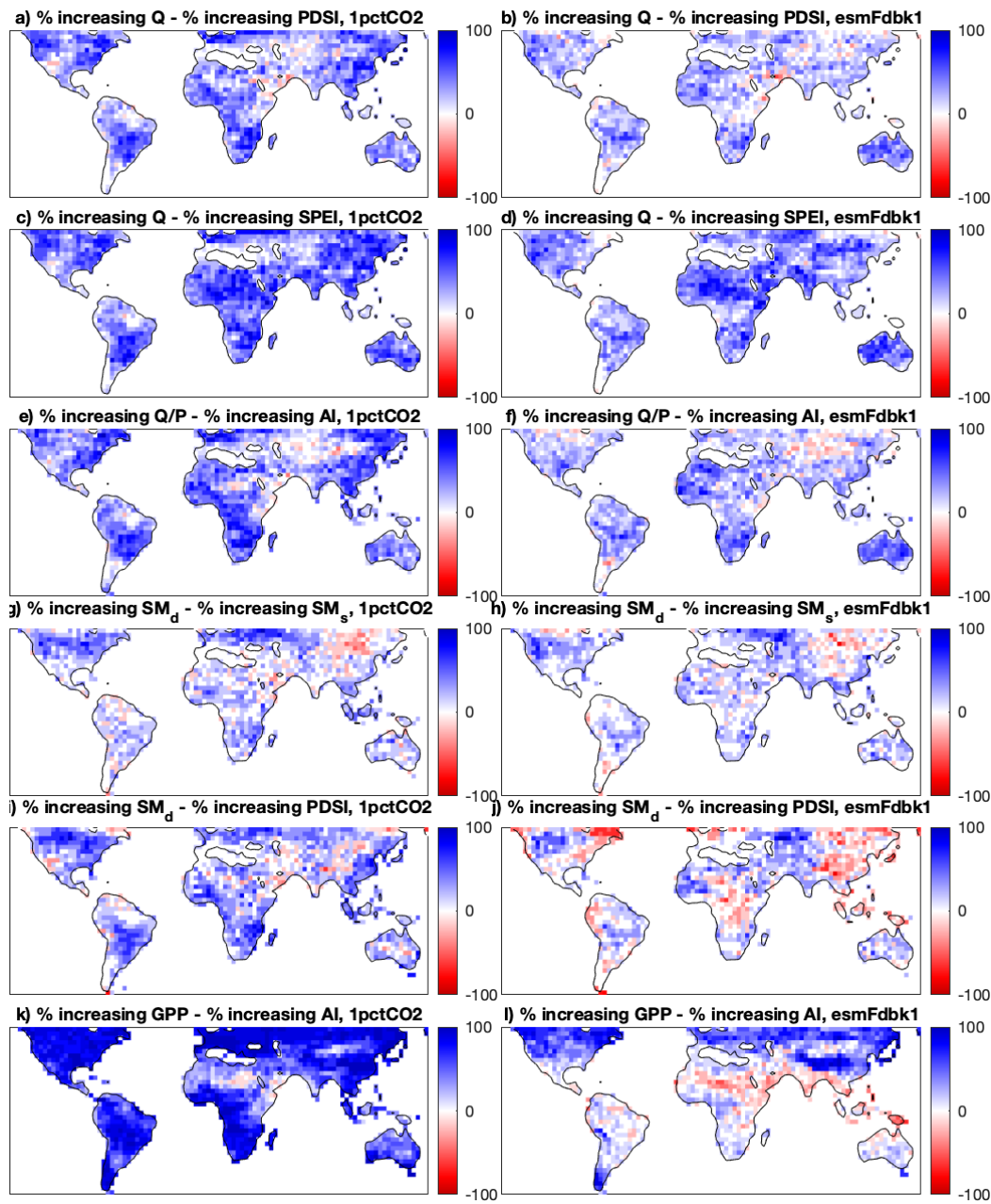
**Figure S3.** As Fig. 1 of the main text, but for the CMIP5 models in Table S2.



**Figure S4.** As Fig. 2 of the main text, but for the CMIP5 models in Table S2, using the esmFdbk1 experiment (identical to 1pctCO2-rad, except for the name.)



**Figure S5.** As Fig. 3 of the main text, but for Figs. S3 and S4.



**Figure S6.** As Fig. 4 of the main text, but for the CMIP5 models in Table S2.