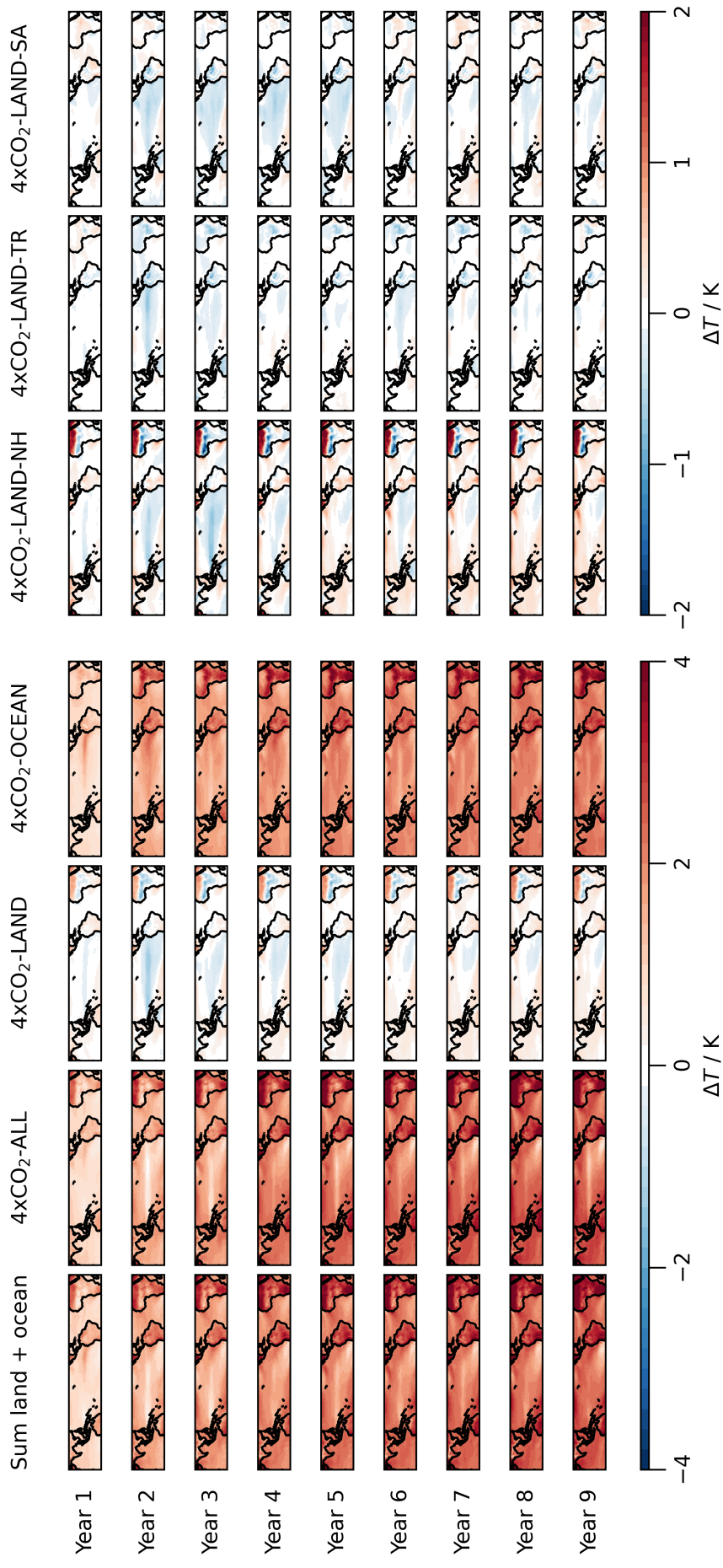
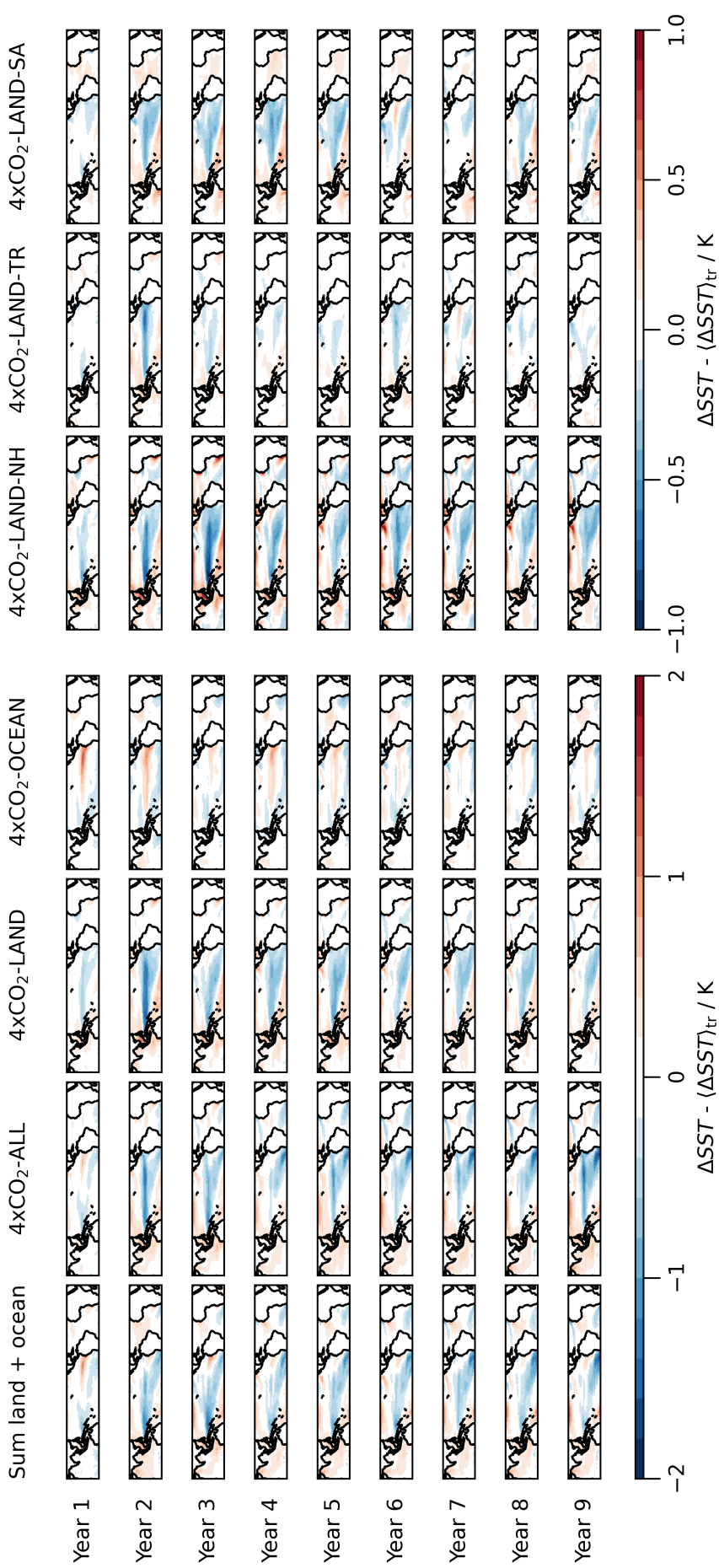


Supplementary Information for “Heating the land cools the eastern and equatorial Pacific”

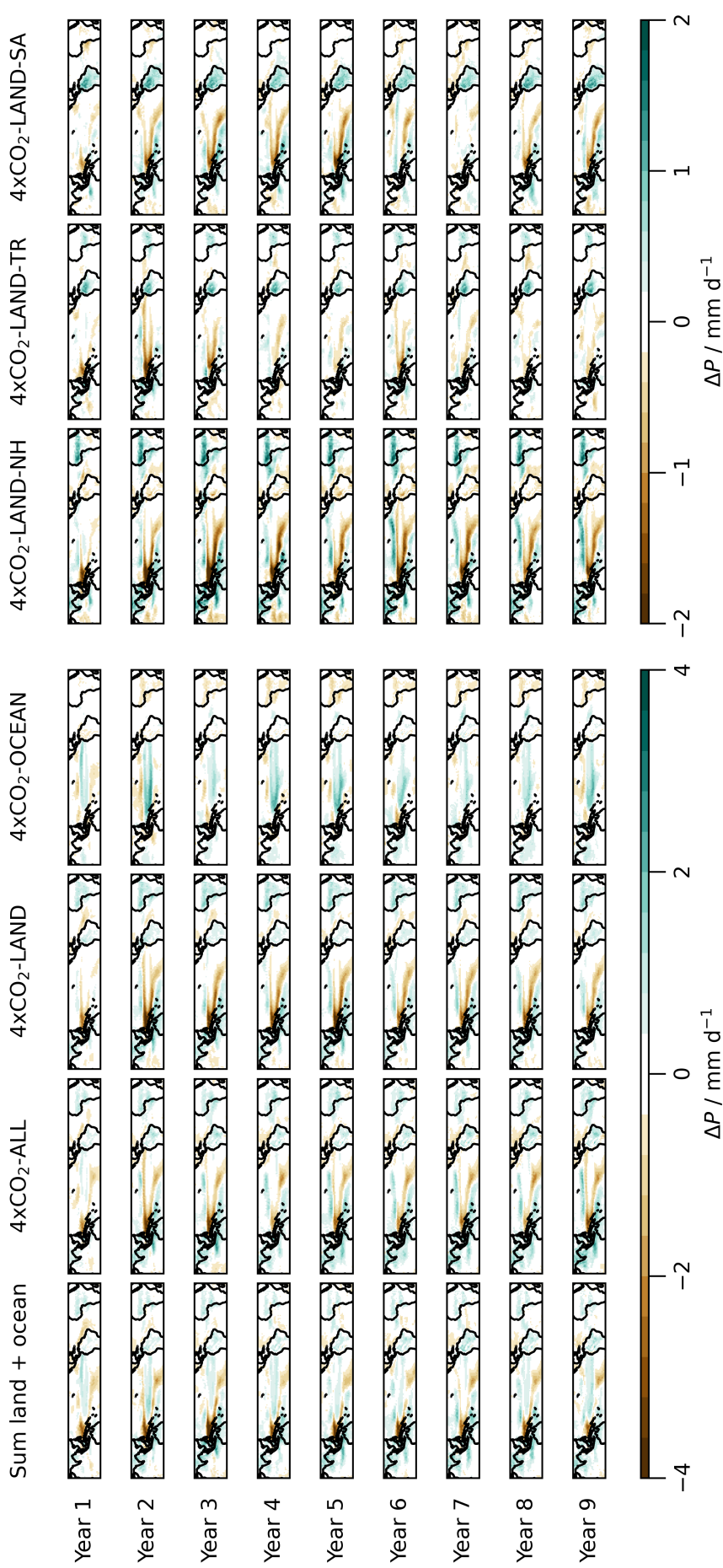
Moritz Günther, Sarah Kang, Yohai Kaspi



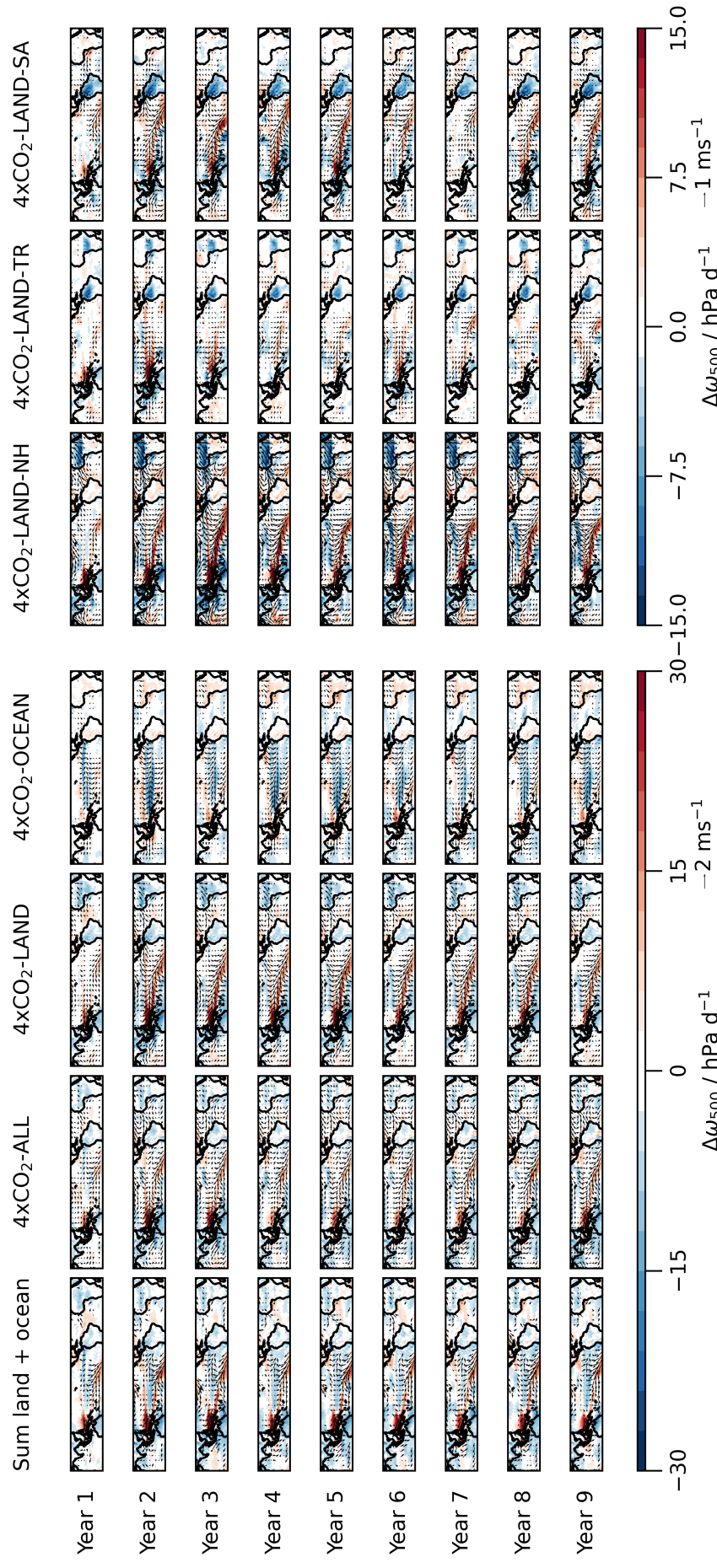
Extended Data Figure 1: 2-m-air temperature change in the tropics, compared to control. Since the signal is smaller in the simulations in which not at least the total land surface is forced, we use a differently scaled colorbar for showing 4xCO<sub>2</sub>-LAND-NH, 4xCO<sub>2</sub>-LAND-TR and 4xCO<sub>2</sub>-LAND-SA.



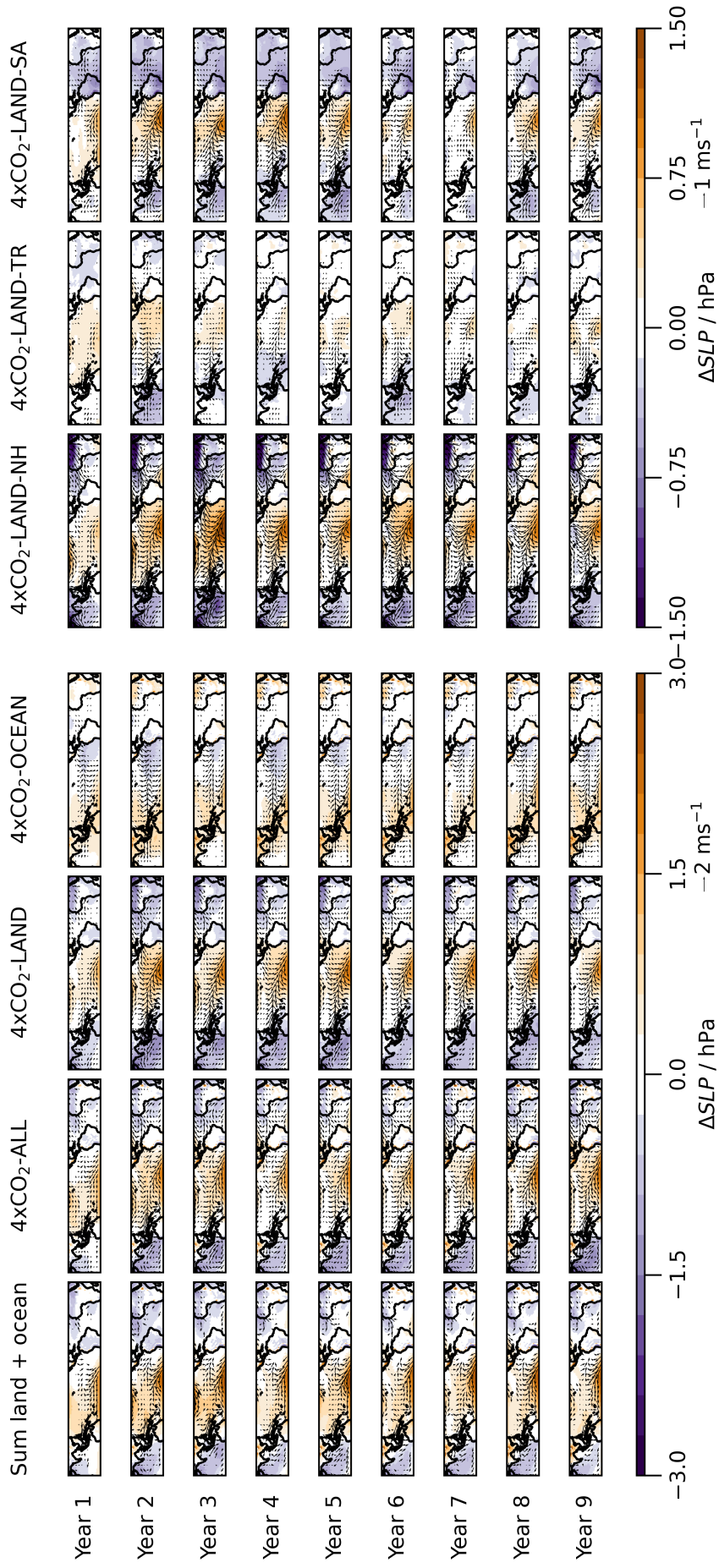
Extended Data Figure 2: SST change in the tropics with the tropical mean removed, compared to control. Since the signal is smaller in the simulations in which not at least the total land surface is forced, we use a differently scaled colorbar for showing 4xCO<sub>2</sub>-LAND-NH, 4xCO<sub>2</sub>-LAND-TR and 4xCO<sub>2</sub>-LAND-SA.



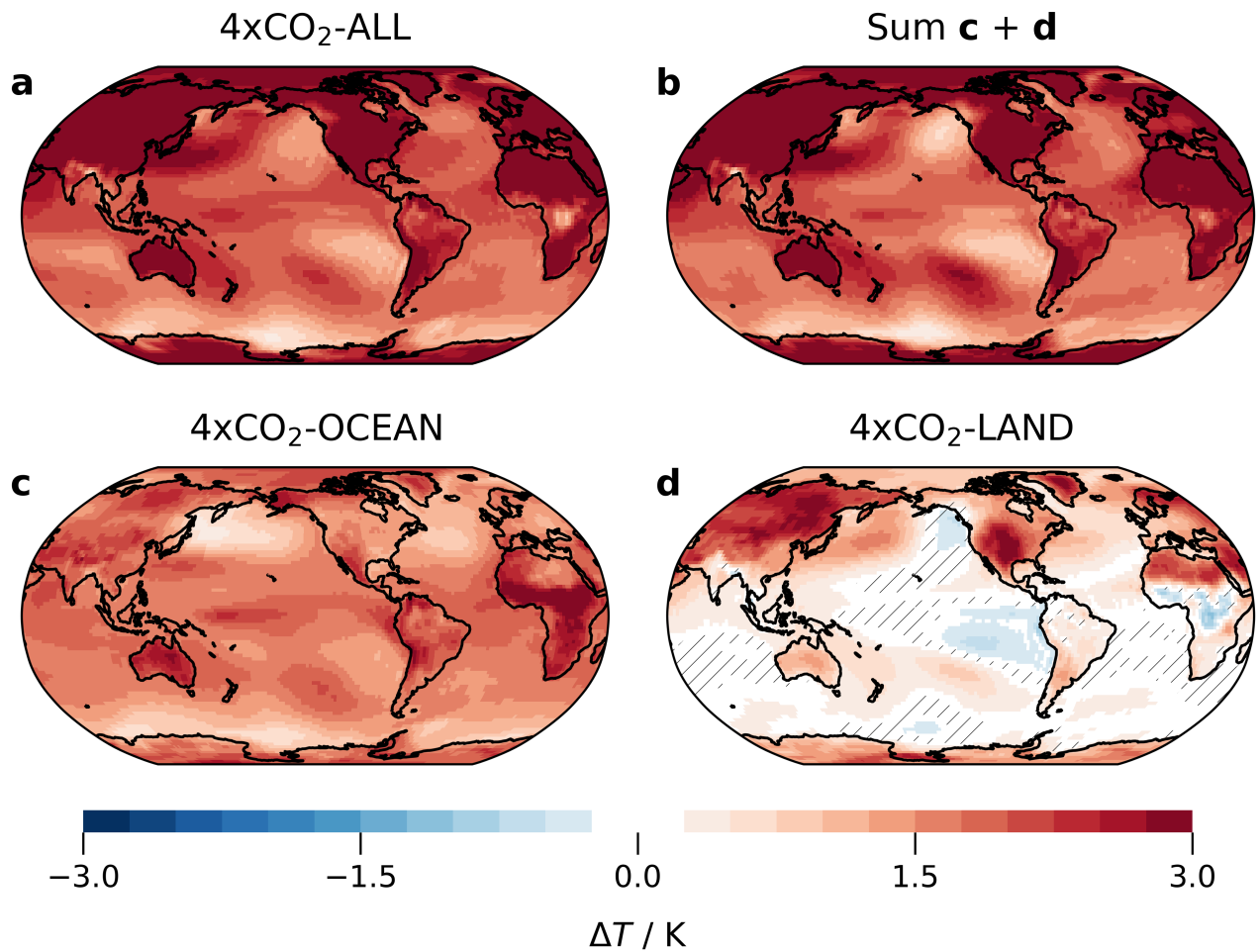
Extended Data Figure 3: Precipitation change in the tropics, compared to control. Since the signal is smaller in the simulations in which not at least the total land surface is forced, we use a differently scaled colorbar for showing  $4\times\text{CO}_2\text{-LAND-NH}$ ,  $4\times\text{CO}_2\text{-LAND-TR}$  and  $4\times\text{CO}_2\text{-LAND-SA}$ .



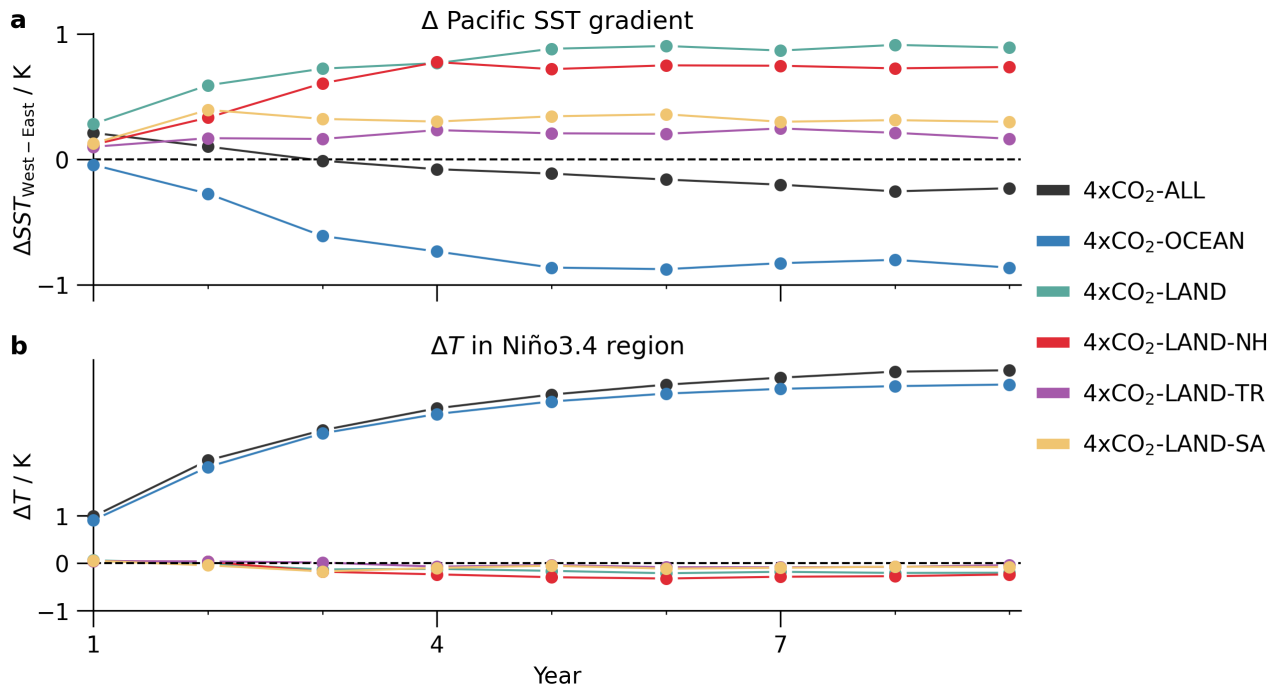
Extended Data Figure 4: Changes in vertical velocity (color, positive downward) and horizontal winds (arrows) in the tropics, compared to control. Since the signal is smaller in the simulations in which not at least the total land surface is forced, we use a differently scaled colorbar and vectors for showing 4xCO<sub>2</sub>-LAND-NH, 4xCO<sub>2</sub>-LAND-TR and 4xCO<sub>2</sub>-LAND-SA.



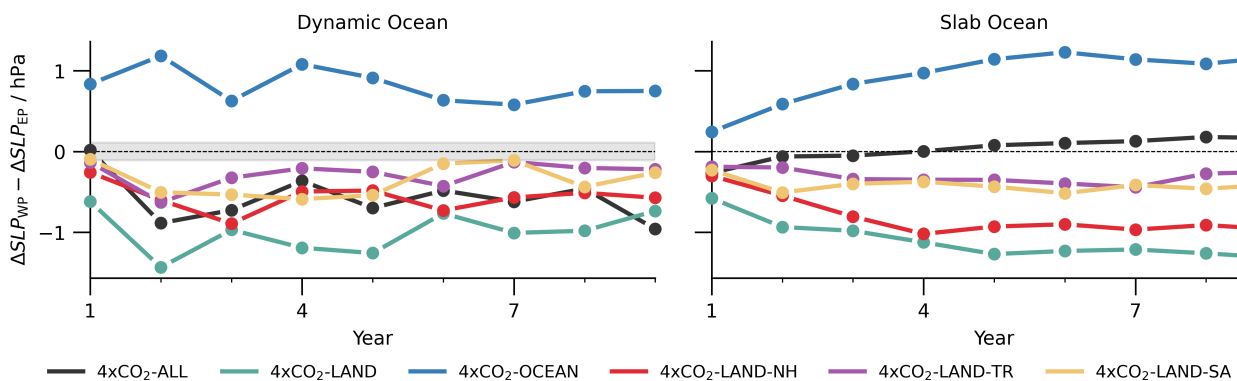
Extended Data Figure 5: Changes in sea level pressure (color) and horizontal winds (arrows) in the tropics, compared to control. Since the signal is smaller in the simulations in which not at least the total land surface is forced, we use a differently scaled colorbar for showing 4xCO<sub>2</sub>-LAND-NH, 4xCO<sub>2</sub>-LAND-TR and 4xCO<sub>2</sub>-LAND-SA.



Extended Data Figure 6: Ensemble-mean response of 2-m-air temperatures in the second year of the slab-ocean simulations compared to piControl. Hatched grid points are not significantly different from zero at the 90% confidence level, determined with a two-sided t-test. Same as Fig. 1 from the main manuscript, but for simulations coupled to a slab ocean instead of a full dynamic ocean.



Extended Data Figure 7: Time series of (a) change in Pacific West-East SST gradient (80°E - 150°E vs 155°W - 80°W, both within in 5° of the Equator), (b) 2-m-air temperature change in the Niño3.4 region. The gray-shaded areas span the standard deviation of a 24-member ensemble obtained from the control simulation. Same as Fig. 2 from the main manuscript, but for simulations coupled to a slab ocean instead of a full dynamic ocean.



Extended Data Figure 8: Changes in Walker circulation index as defined by [1] (Sea level pressure difference between the Western and Eastern Pacific (160°W-80°W vs. 80°E-160°E, both within in 5° of the Equator). The gray-shaded area in (a) spans the standard deviation of a 24-member ensemble obtained from the control simulation

## References

- [1] Gabriel A. Vecchi et al. "Weakening of tropical Pacific atmospheric circulation due to anthropogenic forcing". In: *Nature* 441.7089 (2006), pp. 73–76.