

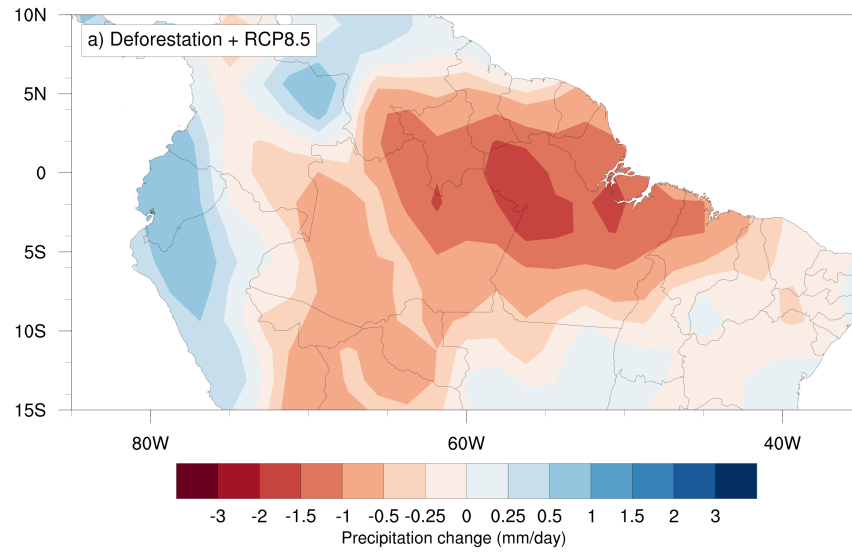
*Supplement of*

**CO<sub>2</sub> physiological effect can cause rainfall decrease as strong as large-scale deforestation in the Amazon**

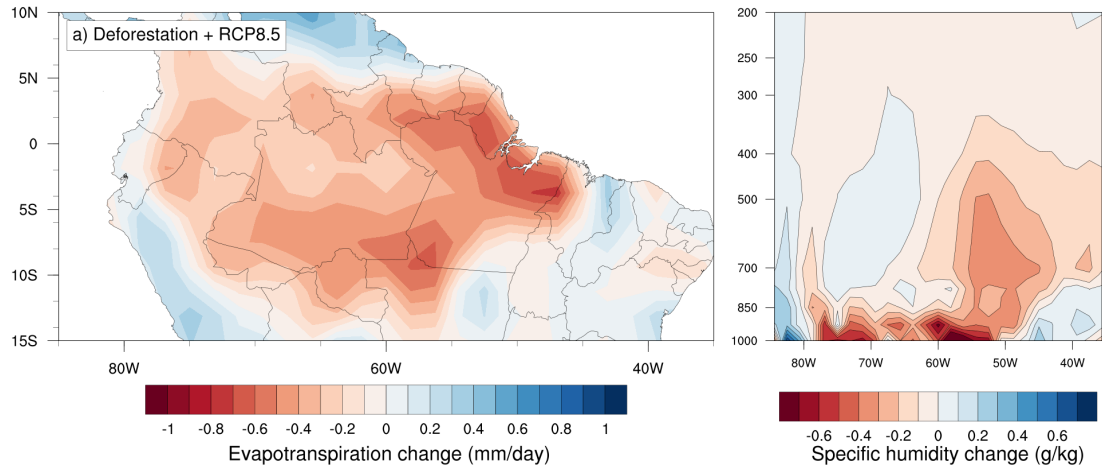
**Gilvan Sampaio et al.**

*Correspondence to:* David M. Lapola ([dmlapola@unicamp.br](mailto:dmlapola@unicamp.br))

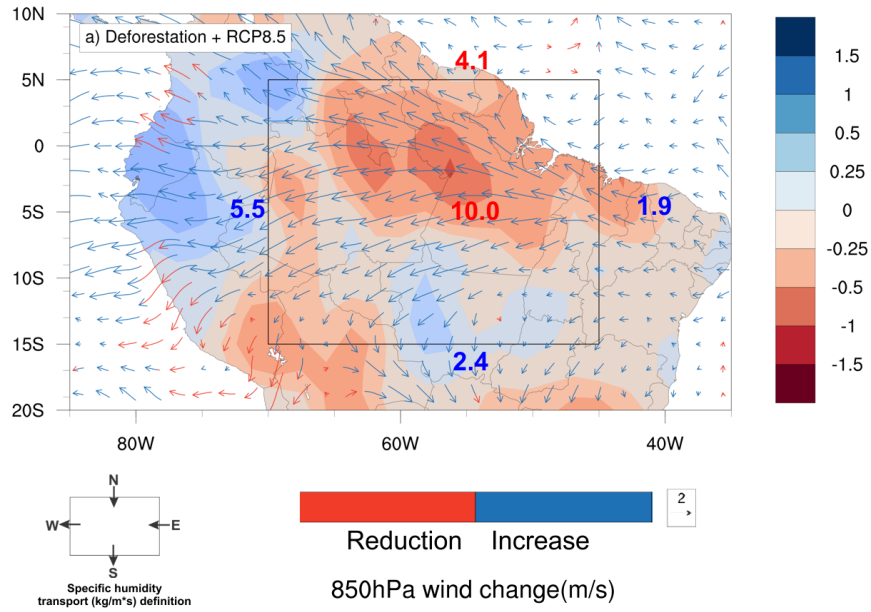
## S1. Supplementary figures



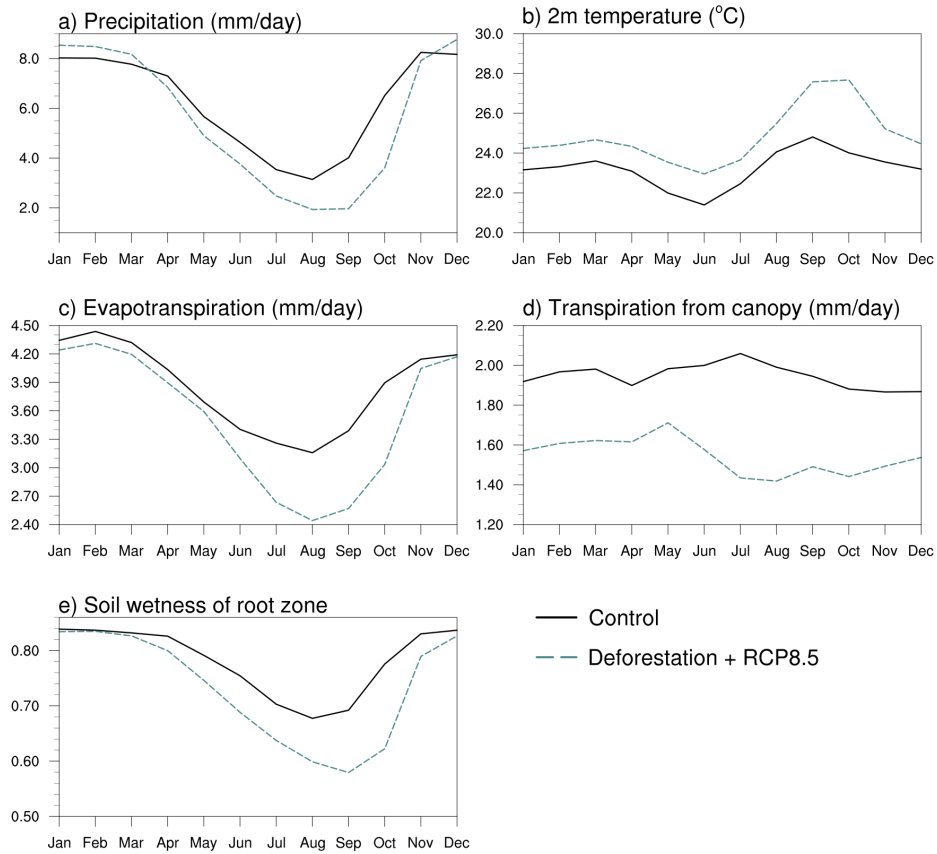
**Fig. S1:** Annual mean precipitation change relative to control simulations using the CPTEC-BAM in tropical South America under an atmospheric CO<sub>2</sub> concentration of +150 ppmv (RCP8.5 in 2050) affecting both plant physiology and atmospheric radiative balance, and with concomitant complete substitution of the Amazon forest by pasture grasslands and a control CO<sub>2</sub> concentration of 388ppm (Deforestation).



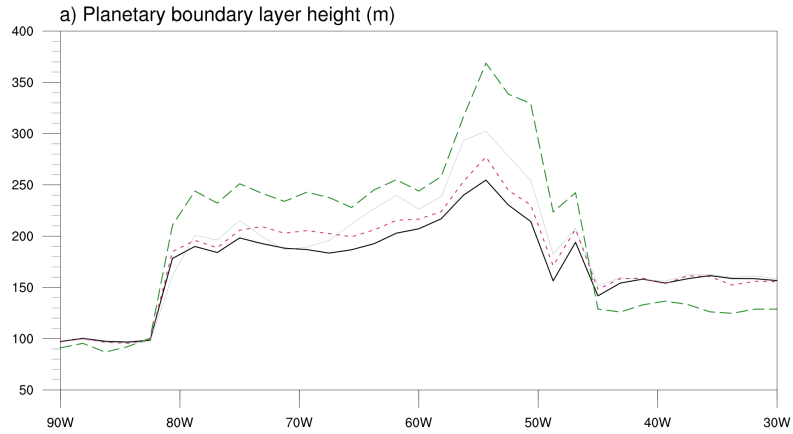
**Fig. S2:** Annual mean changes in evapotranspiration (a) and meridional mean specific humidity vertical profile (with pressure in hPa as vertical coordinate) (b) in tropical South America under an atmospheric concentration of +150 ppmv (RCP8.5 in 2050) affecting both plant physiology and atmospheric radiative balance, and with concomitant complete substitution of the Amazon forest by pasture grasslands.



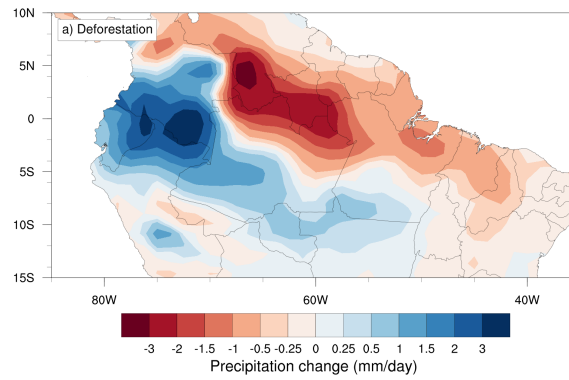
**Fig. S3:** Annual mean changes in 850 mb horizontal wind in tropical South America under an atmospheric concentration of +150 ppmv (RCP8.5 in 2050) affecting both plant physiology and atmospheric radiative balance, and with concomitant complete substitution of the Amazon forest by pasture grasslands. Black square depicts the region over the Amazon for which changes in the specific humidity flux balance ( $\text{kg m}^{-1} \text{s}^{-1}$ , integrated up to 500hPa) is calculated. Red and blue arrows/numbers represent respectively decrease and increase of the given variable.



**Fig. S4:** Mean monthly precipitation, 2m-temperature, evapotranspiration, canopy transpiration and topsoil water content in the Amazon region (black line square in Fig. 5) in the control simulation and under an atmospheric concentration of +150 ppmv (RCP8.5 in 2050) affecting both plant physiology and atmospheric radiative balance, and with concomitant complete substitution of the Amazon forest by pasture grasslands.



**Fig. S5:** Meridional mean atmospheric boundary layer height over the Equator above on the Amazon region under different scenarios: green: Physiology; red: Deforestation; black: Physiology control; grey: Deforestation control.



**Figure S6:** Annual mean precipitation change relative to control simulation using CESM in tropical South America with complete substitution of the Amazon forest by pasture grasslands.