Earth's Future

Supporting Information for

Biogeophysical impacts of land use change on climate extremes in low emission scenarios: Results from HAPPI-Land

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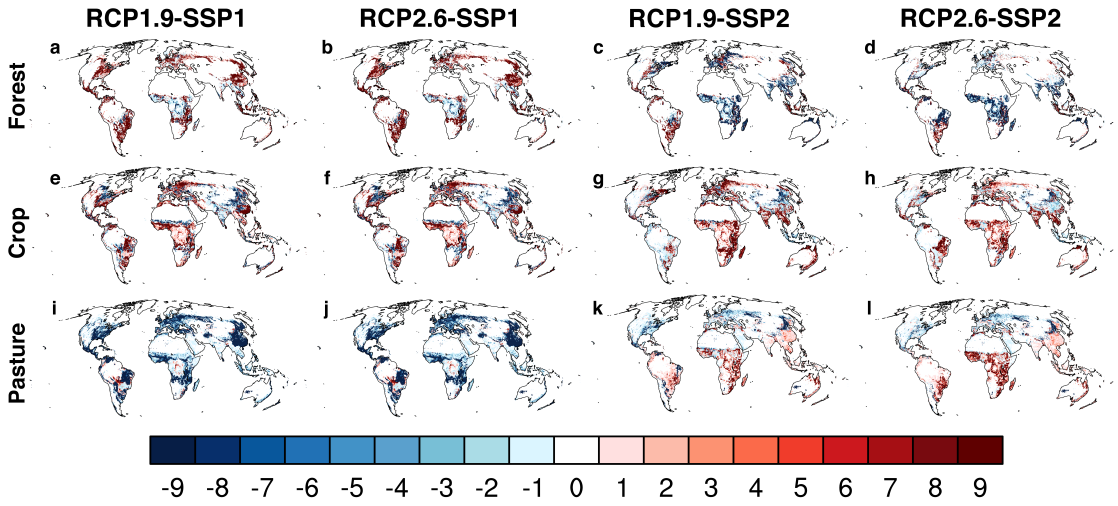

Figure S1: Percent fraction change (2100 minus 2010) in main land cover types taken from four different IMAGE land use scenarios. For forests (a-d), cropland (e-h), and pasture (i-l) for the scenarios RCP1.9-SSP1 (a, e, and i), RCP2.6-SSP1 (b, f, and j), RCP1.9-SSP2 (c, g, and k), and RCP2.6-SSP2 (d, h, and l).

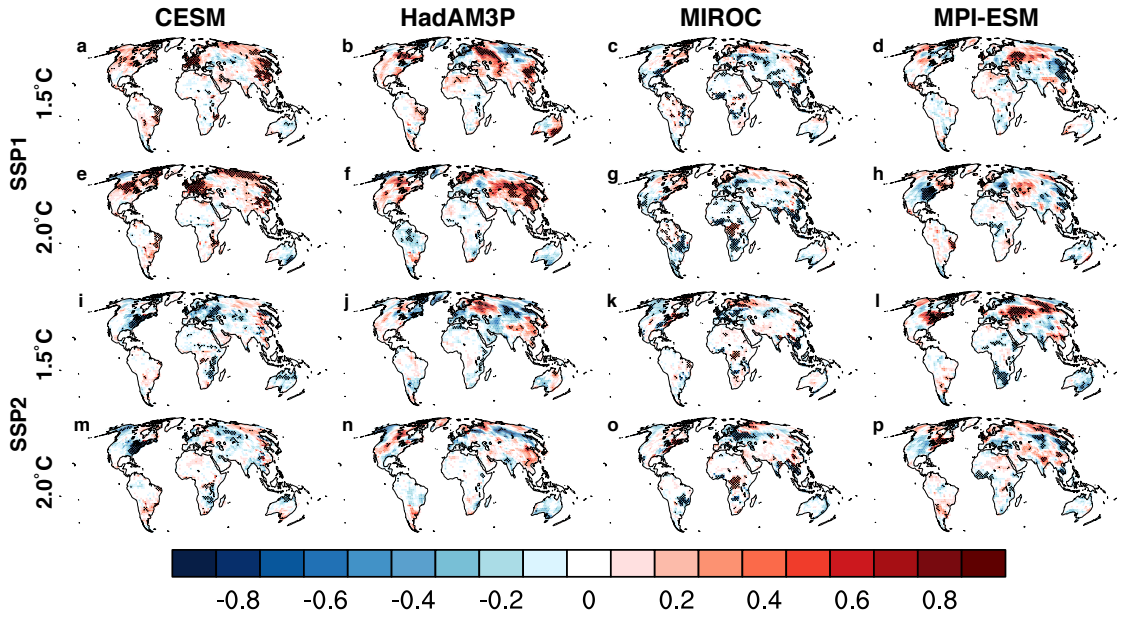

Figure S2: Mean change in annual maximum daytime 2m air temperature [TXx; ˚C] for all models and future scenarios expressed as: PlusZZ_{LU} minus PlusZZ_{Hist} where ZZ is either 1.5 or 2 and LU is either SSP1 or SSP2. For CESM (a, e, i, and m), HadAM3P (b, f, j, and n), MIROC (c, g, k, and o), and MPI-ESM (d, h, l, and p). For $Plus15_{SSP1}$ minus $Plus15_{Hist}$ (a-d), $Plus20_{SSP1}$ minus $Plus20_{Hist}$ (e-h), $Plus15_{SSP2}$ minus $Plus15_{Hist}$ (i-l), and $Plus20_{SSP2}$ minus $Plus20_{Hist}$ (m-p). Note that stippling denotes where the change is statistically significant at the 95% confidence level (determined from a 1000 bootstrap sampling procedure with a two-sided test of the paired difference between two means). Note that oceans are masked in white.

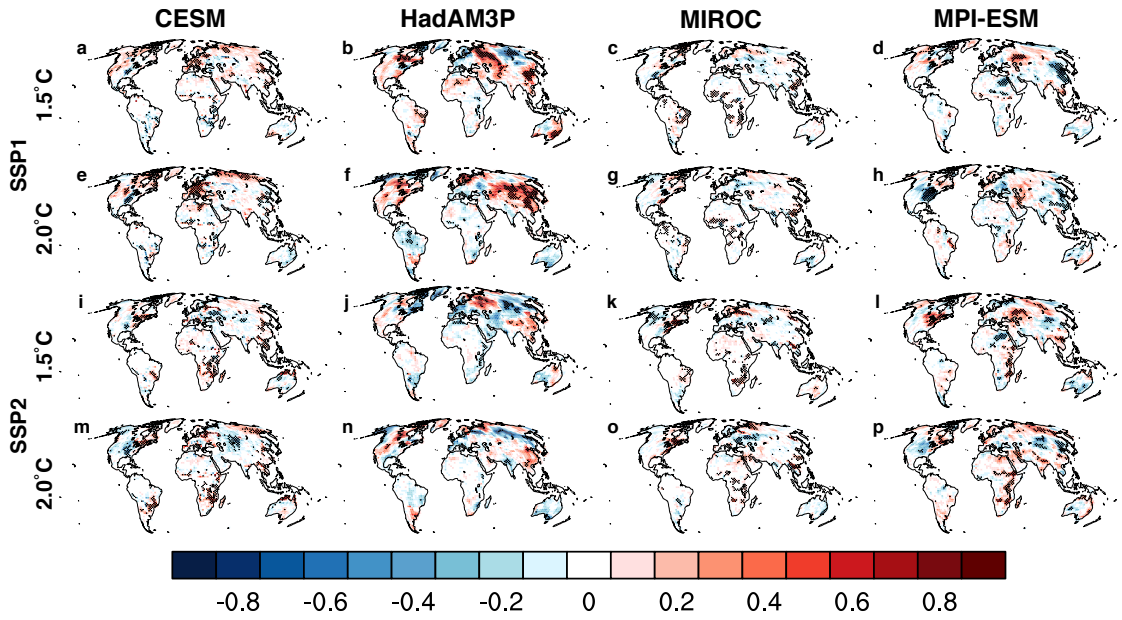

Figure S3: As in Figure S2 but for the annual minimum night-time 2m air temperature [TNn; ˚C].

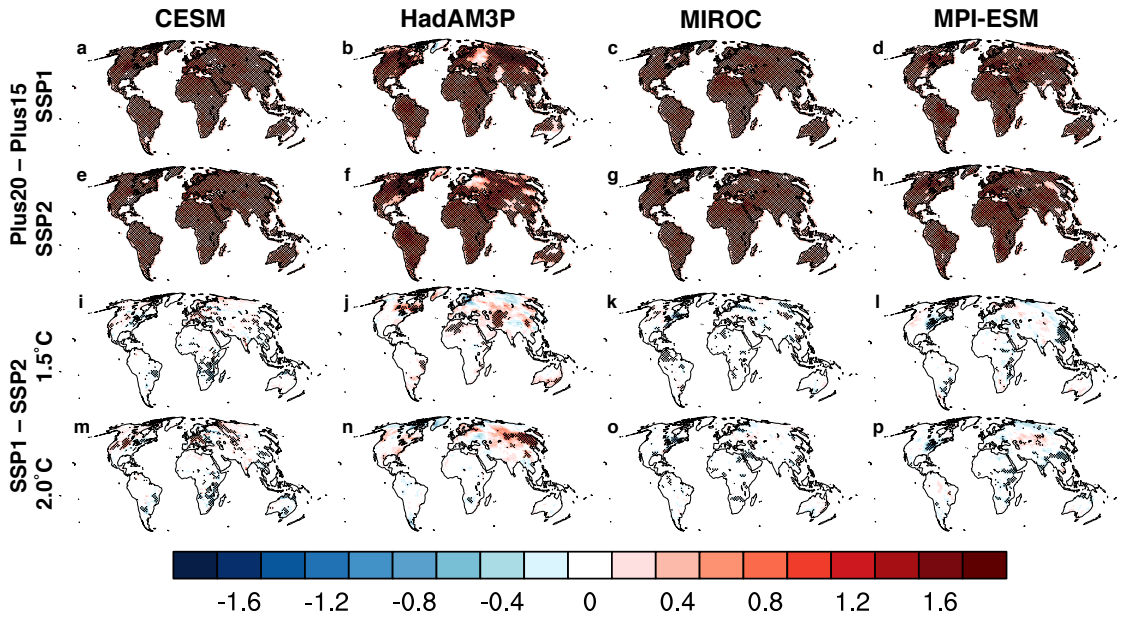

Figure S4: Impact of climate target and land use scenario. Mean change in annual minimum night-time temperature [TNn; ˚C] for all models and future scenarios expressed as: PlusZZ_{LU1} minus PlusZZ_{LU2} where ZZ is either 1.5 or 2 and LU is either SSP1 or SSP2. For CESM (a, e, i, and m), HadAM3P (b, f, j, and n), MIROC (c, g, k, and o), and MPI-ESM (d, h, l, and p). For $Plus20_{SSP1}$ minus $Plus15_{SSP1}$ (a-d), $Plus20_{SSP2}$ minus $Plus15_{SSP2}$ (e-h), $Plus15_{SSP1}$ minus $Plus15_{SSP2}$ (i-l), and $Plus20_{SSP1}$ minus $Plus20_{SSP2}$ (m-p). Note that stippling denotes where the change is statistically significant at the 95% confidence level (determined from a 1000 bootstrap sampling procedure with a two-sided test of the paired difference between two means). Note that oceans are masked in white.

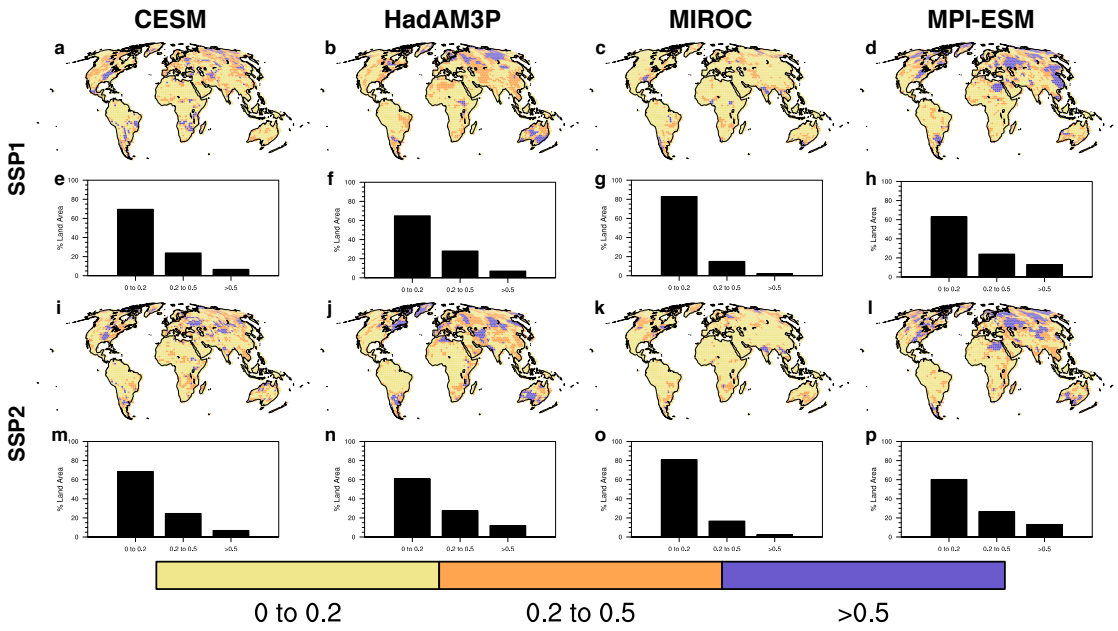

Figure S5: Evaluation of the LUC effect vs. total effect of all forcings on TNn for all models and land use scenarios for the Plus15 climate target expressed as: | $Plus15_{LU}$ minus $Plus15_{Hist}$ / $Plus15_{LU}$ minus Hist | where LU is either SSP1 or SSP2. For CESM (a, e, i, and m), HadAM3P (b, f, j, and n), MIROC (c, g, k, and o), and MPI-ESM (d, h, l, and p). Panels (a-d) and (i-l) depict the spatial pattern and panels (e-h) and (m-p) depict a histogram of the fraction of land grid cells of this diagnostic. For $Plus15_{SSP1}$ minus $Plus15_{Hist}$ (a-h), and $Plus15_{SSP2}$ minus $Plus15_{Hist}$ (i-p). Note that oceans are masked in white.

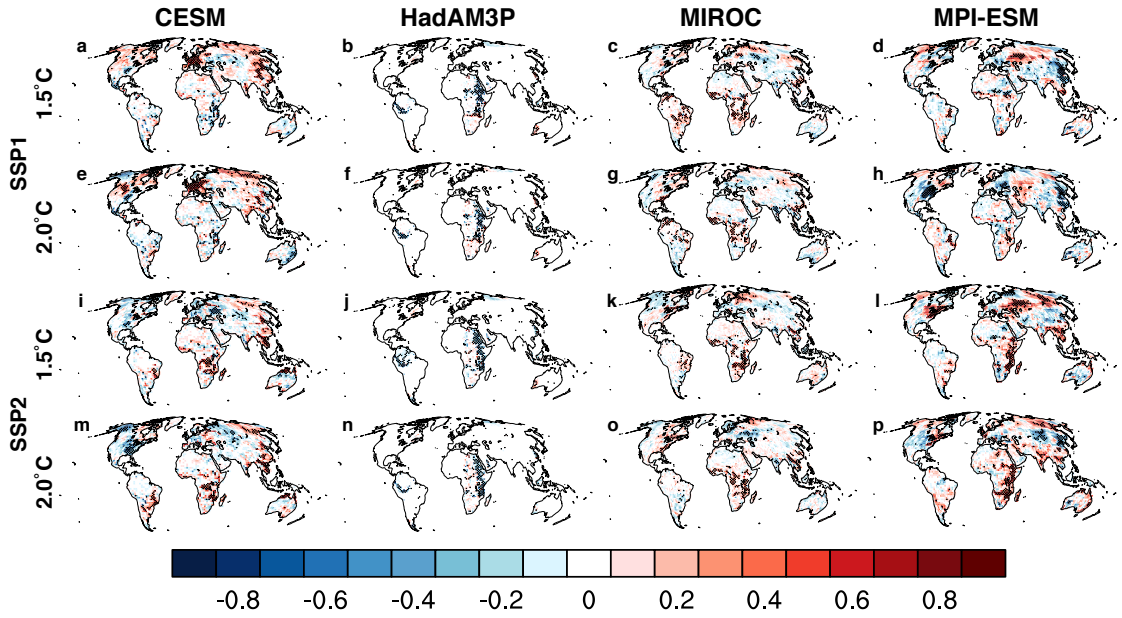

Figure S6: As in Figure S2 but for the surface temperature corresponding to the day that TXx occurs [T_s; ˚C].

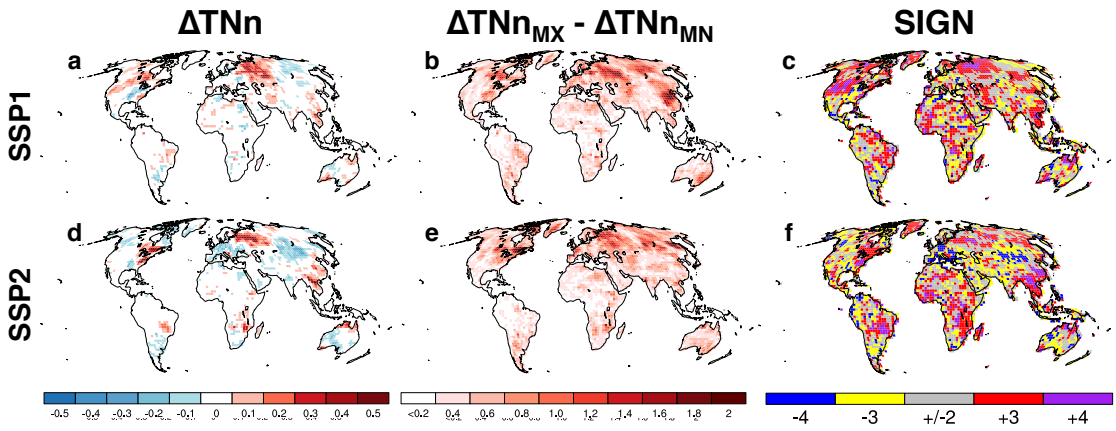

Figure S7: Multi-model response in annual minimum night-time 2m air temperature [TNn; ˚C] for the different SSPs for the 1.5˚C climate target. For the multi-model mean change (a and d), the multi-model range (b and e) and the agreement on the sign of the TNn change (c and f). For Plus15$_{SSP1}$ minus Plus15$_{Hist}$ (a-c) and Plus15$_{SSP2}$ minus Plus15$_{Hist}$ (d-f). Interpretation for the sign agreement: blue = all models show a temperature decrease, yellow = 3 models show a temperature decrease, grey regions = no consensus, red = 3 models show a temperature increase, and purple = all models show a temperature increase. Note that oceans are masked in white.