

Supplementary Information

List of CMIP6 simulations source IDs used:

ACCESS-ESM1-5_historical_r1i1p1f1

AWI-ESM1-1-LR_historical_r1i1p1f1

CESM2_historical_r11i1p1f1

CMCC-CM2-SR5_historical_r1i1p1f1

EC-Earth3-Veg_historical_r4i1p1f1s

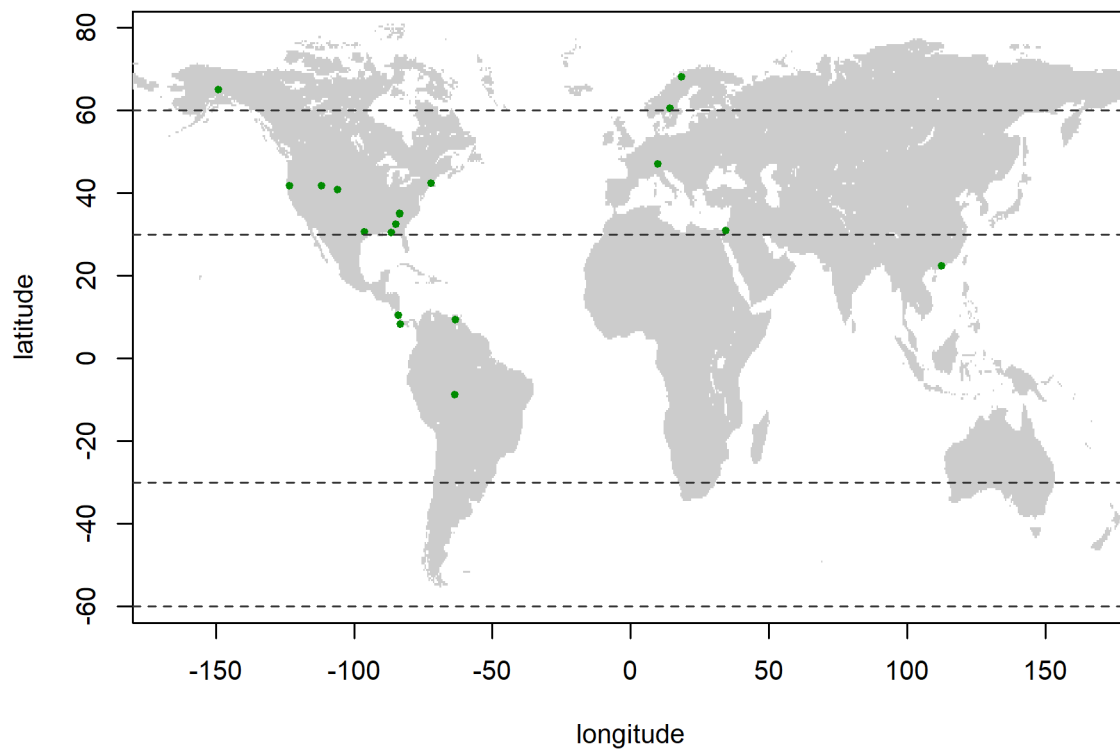
MIROC-ES2L_historical_r1i1p1f2

MPI-ESM1-2-LR_historical_r5i1p1f1

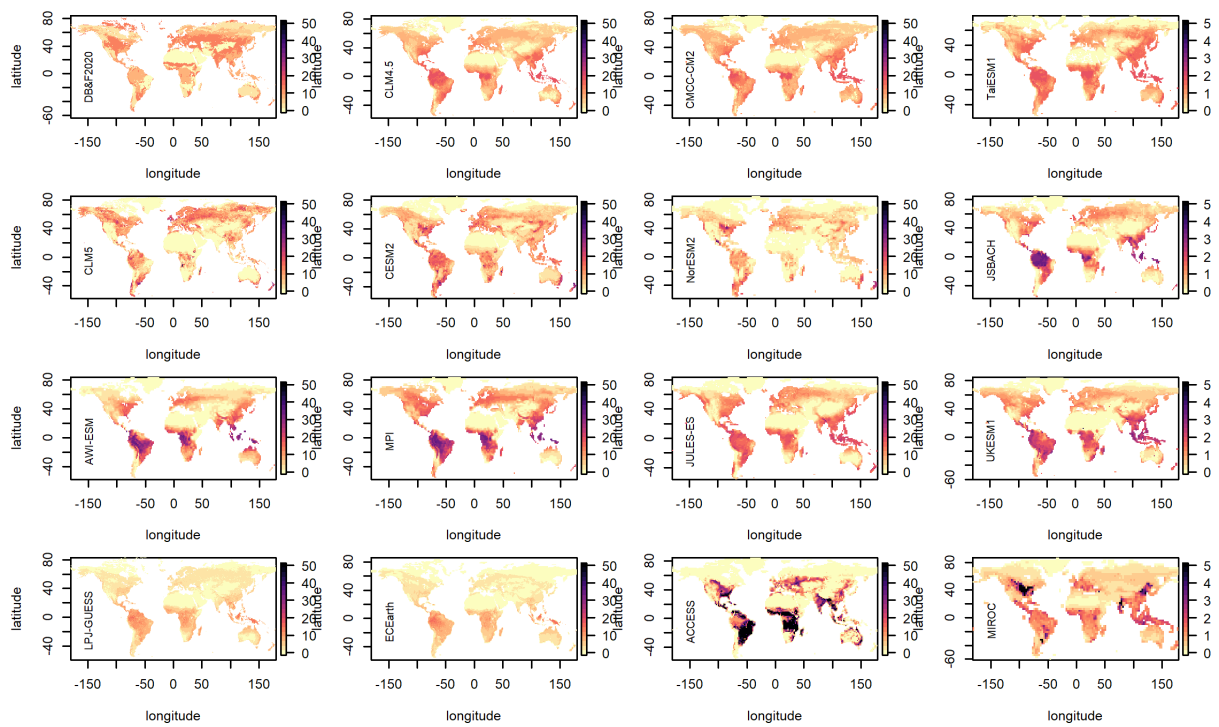
NorESM2-LM_historical_r1i1p1f1

TaiESM1_historical_r1i1p1f1

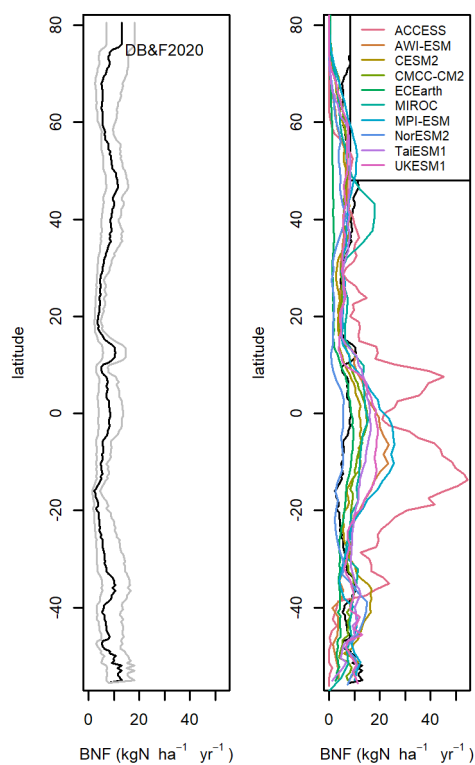
UKESM1-0-LL_esm-hist_r1i1p1f2



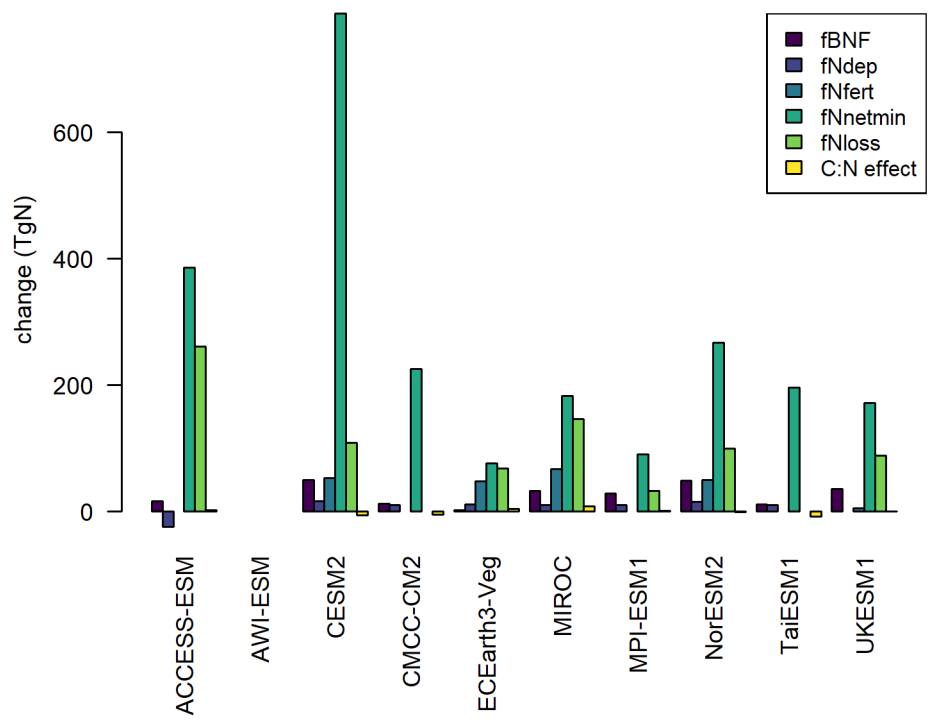
SI Figure 1. Locations of the field site BNF measurements.



SI Figure 2. The mean annual BNF ($\text{kg ha}^{-1} \text{ yr}^{-1}$) for the average of the period 2005 – 2014, for all models including the land surface models available (CLM4.5, CM5, LPJ-GUESS, JULES, JSBACH). All values above $50 \text{ kg ha}^{-1} \text{ yr}^{-1}$ are allocated the same colour.



SI Figure 3. a) DB&F2020 is the biome upscaled observations from Davies-Barnard and Friedlingstein (2020), latitudinally averaged. b) the CMIP6 models 1980 – 2014 mean annual BNF.



SI Figure 4. Change in N variables occurring between the first and last decade in the SSP370 future climate change scenarios, as annual values. The C:N effect is the change in required nitrogen due to the change in C:N ratio, divided by the 76 years in between the middle of the two decades used to calculate the mean. Where bars are absent, the data is not available for that model.