Supplementary Information

Table S1. Overview of LPJ-GUESS simulation set-up. The simulation protocol using IMAGE and MAgPIE scenarios differed slightly from the other simulations.

	CLUMondo, LUH1, LUH2	**IMAGE, MAgPIE**
Simulation reference	This study	Krause et al. (2017)
Model period	1850-2099 (only until 2040 for CLUMondo)	1901-2099
Model spin-up	500 years (longer spin-up for soil C stocks, see Smith et al., 2014), using land-use fractions and CO_2 mixing ratio as in 1850 and repeated 1850-1870 climate	500 years (longer spin-up for soil C stocks, see Smith et al., 2014), using land-use fractions and CO_2 mixing ratio as in 1901 and repeated 1901-1930 climate
Atmospheric CO_2 mixing ratio	Ice core and later atmospheric measurements after Tans and Keeling (2015), with constant value of 286 ppmv before 1860 and following RCP 2.6 for the future period, with 440 ppmv in 2040	
Climate 1950-2099	IPSL-CM5A-LR model from ISI-MIP project (Warszawski et al., 2014), following RCP 2.6 for future period, bias-corrected after Hempel et al. (2013)	
Climate before 1950	De-trended climate data from 1950-1979 used repeatedly to generate data for 1850-1949	Random chose of years from 1950–1959 to generate data for 1901–1949
N deposition	Lamarque et al. (2011, 2010), with future values following RCP 2.6	
Representation of natural vegetation and vegetation dynamics	ten woody and C3 and C4 grass plant functional types, as in (Smith et al., 2014), 10 replicate patches to capture stochastic processes of vegetation dynamics in LPJ-GUESS (establishment, mortality)	
Crop functional types	3: C3 crops, C4 crops and rice	4: C3 winter cereals, other C3 crops, C4 crops, rice
Crop fractions	MIRCA2000 after Portmann et al. (2010) with time-variant fractions of rain-fed vs. irrigated management for 1950-2005 Fader et al. (2010). 13 Fader CFTs were summarized by their photosynthetic pathways (C3 or C4) and their physiological characteristics to three CFTs (see above, each rain-fed and irrigated). Crop distributions were assumed to stay constant after 2006.	
N fertilization	Zaehle et al. (2011), with future values following RCP 8.5	From IMAGE and MAgPIE models
Representation of bioenergy area and crops in scenarios including BECCS	None. Bioenergy land fractions of LUH1_26Be and LUH2_SSP1-26 were aggregated to cropland	C4 crops

Table S2. Total area of cropland, pasture and natural land and change therein from 2000-2004 to 2036-2040 for 16 land-use scenarios. The first line gives the global total area for 2000-2004, second row is 2036-2040 and third and fourth rows give the change from 2000-2004 until 2036-2040 in absolute terms and in % relative to the level in 2000-2004. Total area under change from 2000 to 2040 is given in absolute terms and as % of the global ice-free land area considered in this study (see methods). Minor deviations in numbers may occur due to rounding.

	CLUMondo FAOref	**CLUMondo Cstor**	**CLUMondo Bdiv**	**IMAGE Base**	**IMAGE ADAFF**	**IMAGE BECCS**	**MAgPIE Base**	**MAgPIE ADAFF**	**MAgPIE BECCS**	**LUH1 26Be**	**LUH1 45Aff**	**LUH1 60Stab**	**LUH1 85Pop**	**LUH2 SSP1-26**	**LUH2 SSP3-70**	**LUH2 SSP5-85**	**Average and uncertainty across 16 LU scenarios**
Cropland [10^6 km^2]	15.4	15.4	15.4	15.6	15.6	15.6	15.8	15.8	15.8	15.2	15.2	15.2	15.2	14.9	14.9	14.9	15.4 ± 0.3
	17.5	17.3	17.1	16.2	15.9	18.1	19.2	18.6	20.0	19.1	12.9	16.0	16.6	15.3	17.4	17.7	17.2 ± 1.8
	+2.1	+1.9	+1.7	+0.6	+0.3	+2.5	+3.4	+2.7	+4.2	+3.9	-2.3	+0.9	+1.4	+0.3	+2.5	+2.7	+1.8 ± 1.6
	+13.7%	+12.3%	+11.3%	+3.8%	+1.9%	+15.9%	+21.6%	+17.4%	+26.4%	+26.1%	-15%	+5.6%	+9.6%	+2.1%	+15.5%	+18.3%	+11.7% ± 10.5%
Pasture [10^6 km^2]	27.4	27.4	27.4	35.8	35.8	35.8	33.4	33.4	33.4	33.2	33.2	33.2	33.2	32.8	32.8	32.8	32.6 ± 2.8
	26.5	26.2	26.4	38.6	35.0	38.6	31.6	31.0	31.3	32.4	29.0	25.7	35.2	30.8	33.8	31.6	31.5 ± 4.1
	-0.9	-1.2	-1.0	+2.8	-0.8	+2.8	-1.7	-2.4	-2.4	-0.8	-4.2	-7.5	+2.0	-2.1	+1.0	-1.2	-1.0 ± 2.6
	-3.3%	-4.3%	-3.8%	+7.7%	-2.3%	+7.8%	-5.2%	-7.2%	-7.2%	-2.5%	-12.5%	-22.7%	+6.1%	-6.2%	+2.9%	-3.7%	-3.5% ± 7.6 %
Natural [10^6 km^2]	89.3	89.4	89.4	80.8	80.8	80.7	83.0	83.0	83.0	83.8	83.8	83.8	83.8	79.8	79.8	79.8	83.4 ± 3.4
	88.1	88.7	88.7	77.4	81.3	75.4	81.3	82.6	80.9	80.7	90.3	90.5	80.4	81.5	76.4	78.3	82.7 ± 5.0
	-1.2	-0.7	-0.7	-3.4	+0.5	-5.3	-1.7	-0.3	-2.1	-3.1	+6.4	+6.7	-3.5	+1.7	-3.4	-1.5	-0.7 ± 3.3
	-1.3%	-0.8%	-0.8%	-4.2%	+0.7%	-6.5%	-2.0%	-0.4%	-2.6%	-3.7%	+7.7%	+8.0%	-4.1%	+2.2%	-4.3%	-1.9%	-0.9% ± 4.0%
Total area under change between 2000 and 2040 [10^6 km^2]	9.4	10.2	12.7	10.5	9.8	12.8	5.1	6.0	6.0	8.5	8.9	15.1	5.9	10.6	13.7	10.4	9.7 ± 2.9
	7.1%	7.7%	9.6%	8.0%	7.4%	9.7%	3.9%	4.5%	4.6%	6.4%	6.7%	11.4%	4.5%	8.0%	10.3%	7.8%	7.4% ± 2.2%

Tab S3. Global totals and change in ES indicators from 2000-2004 to 2036-2040 simulated with LPJ-GUESS for 16 land-use scenarios. The first line give the ES indicator level averaged globally for 2000-2004, second row is 2036-2040 and third and fourth rows give the change from 2000-2004 until 2036-2040 in absolute terms and in % relative to the level in 2000-2004. Total C stock is the sum of vegetation, soil and litter and product C (wood removed from deforestation but not oxidized immediately) and C stored via CCS for BECCS scenarios. Minor deviations in numbers may occur due to rounding.

	CLUMondo FAOref	CLUMondo Cstor	CLUMondo Bdiv	IMAGE Base	IMAGE ADAFF	IMAGE BECCS	MAgPIE Base	MAgPIE ADAFF	MAgPIE BECCS	LUH1 26Be	LUH1 45Aff	LUH1 60Stab	LUH1 85Pop	LUH2 SSP1-26	LUH2 SSP3-70	LUH2 SSP5-85	Average and uncertainty across 16 LU scenarios
NPP [PgC/yr]	58.9 65.5 +6.7 +11.3%	58.8 65.5 +6.7 +11.4	58.8 65.5 +6.7 +11.3%	59.6 64.8 +5.1 +8.6%	59.6 64.5 +4.8 +8.1%	59.6 64.9 +5.2 +8.8%	61.2 66.5 +5.3 +8.7%	61.2 66.5 +5.3 +8.7%	61.2 67.0 +5.8 +9.4%	59.4 65.4 +6.0 +10.2%	59.4 67.2 +7.8 +13.2%	59.4 65.8 +6.5 +10.9%	59.4 66.2 +6.8 +1.5	55.5 61.5 +6.0 +10.8%	55.5 61.5 +5.9 +10.7%	55.5 61.1 +5.6 +10.0%	58.9 ± 1.9 65.0 ± 1.9 +6.0 ± 0.8 +10.2% ± 1.4%
Vegetation C stocks [PgC]	426 474 +48.1 +11.3%	426 477 +51.5 +12.1%	426 473 +47.7 +11.2%	378 387 +9.2 +2.4%	378 408 +29.6 +7.8%	378 377 -1.1 -0.3%	390 428 +32.1 +8.2%	390 428 +38.0 +9.8%	390 419 +29.0 +7.4%	423 460 +37.6 +8.9%	423 494 +70.8 +16.7	423 494 +57.1 +13.5	423 467 +44.3 +10.5%	392 441 +48.9 +12.5%	392 421 +28.9 +7.4%	392 424 +32.5 +8.3%	403 ± 19.8 441 ± 3528 +37.8 ± 17.6 +9.2% ± 4.1%
Soil and litter C stocks [PgC]	1626 1622 -3.3 -0.2%	1626 1624 -2.6 -0.2%	1626 1623 -3.0 -0.2%	1576 1560 -15.5 -1.0%	1576 1562 -14.0 -0.9%	1576 1558 -18.0 -1.1%	1584 1569 -16.4 -1.0%	1586 1571 -14.9 -0.9%	1586 1568 -17.4 -1.1%	1633 1624 -9.0 -0.6%	1633 1635 +2.4 +0.2%	1633 1627 -5.0 -0.3%	1633 1628 -4.9 -0.3%	1513 1513 -0.2 -0.0%	1513 1509 -3.8 -0.3%	1513 1509 -4.4 -0.3%	1590 ± 45 1581 ± 46 -8.1 ± 6.8 -0.5% ± 0.4%
Total C stocks [PgC]	2056 2099 +43.3 +2.1%	2056 2103 +47.2 +2.3%	2056 2099 +43.5 +2.1%	1960 1953 -6.9 -0.4%	1960 1972 +12.4 +0.6%	1960[2] 1949[2] -10.7 -0.6%	1980 1993 +13.2 +0.7%	1980 2000 +20.2 +1.0%	1981[2] 1997[2] +16.0 +0.8%	2059 2087 +28.0 +1.4%	2059 2130 +70.5 +3.4%	2059 2110 +50.2 +2.4%	2059 2098 +38.1 +1.9%	1908 1955 +47.2 +2.5%	1908 1934 +25.9 +1.4%	1908 1936 +28.3 +1.5%	1997 ± 60 2026 ± 74 +29.2 ± 21.6 +1.5% ± 1.1%
Crop production [Ecal]	23.7 32.1 +8.4 +35.2%	23.7 31.4 +7.7 +32.5%	23.7 31.6 +7.9 +33.3%	22.9[1] 27.6[1] +4.7 +20.7%	22.0[1] 25.7[1] +3.7 +16.8%	22.0[1] 25.8[1] +3.8 +17.1%	20.8[1] 29.0[1] +8.2 +39.5%	20.8[1] 27.7[1] +6.9 +33.4%	20.8[1] 28.4[1] +7.6 +36.8%	23.2[3] 33.8[3] +10.6 +45.7%	23.2 23.8 +0.6 +2.6%	23.2 28.8 +5.6 +24.1%	23.2 29.8 +6.6 +28.4%	20.8[3] 32.7[3] +9.9 +43.5%	22.8 32.8 +10.0 +44.0%	22.8 33.0 +10.2 +45.0%	22.6 ±1.0 29.6 ± 3.0 +7.0 ± 2.8 +31.2% ± 12.2%
Annual water runoff [1000 km³/yr]	50.0 54.0 +4.0 +8.0%	50.0 +54.0 +4.0 +7.9%	50.0 54.0 +4.0 +8.0%	50.5 56.5 +6.0 +11.8%	50.5 56.1 +5.6 +11.1%	50.5 56.6 +6.1 +12.1%	50.2 55.7 +5.5 +11.0%	50.2 55.7 +5.4 +10.8%	50.2 55.7 +5.5 +10.9%	50.1 54.2 +4.2 +8.3%	50.1 53.7 +3.7 +7.3%	50.1 53.8 +3.7 +7.4%	50.1 54.2 +4.1 +8.2%	47.7 51.7 +4.0 +8.3%	47.7 52.0 +4.3 +8.9%	47.7 51.8 +4.1 +8.6%	49.7 ± 1.0 54.3 ± 1.6 +4.6 ± 0.9 +9.3% ± 1.7%
Evapotranspiration [1000 km³/yr]	58.5 60.0 +1.5 +2.6%	58.5 60.0 +1.6 +2.7%	58.5 60.0 +1.5 +2.6%	58.4 57.7 -0.7 -1.2%	58.4 58.1 -0.4 -0.6%	58.4 57.6 -0.9 -1.5%	58.7 58.6 -0.2 -0.3%	58.7 58.6 -0.1 -0.2%	58.7 58.6 -0.1 -0.3%	58.4 59.8 +1.4 +2.4%	58.4 60.3 +1.9 +3.2%	58.4 60.2 +1.8 +3.1%	58.4 59.8 +1.4 +2.4%	55.9 57.3 +1.4 +2.5%	55.9 57.1 +1.2 +2.1%	55.9 57.2 +1.3 +2.3%	58.0 ± 1.0 58.8 ± 1.2 +0.8 ± 1.0 +1.4% ± 1.7%

[1]IMAGE and MAgPIE models follow different crop type and management (fertilization) pathways than the other scenarios. [2]Total C stocks are already higher for 2000-2004 for MAgPIE_BECCS because CCS in MAgPIE model starts in 1995 (see Krause et al., 2017). [3]For LUH1 and LUH2, bioenergy area was merged to cropland, respectively in LUH2 it was not extracted from cropland area. Therefore, crop yield production includes crops planted on bioenergy areas. Contribution from those areas is estimated to be on average about 1.6 Ecal per year (average for 2000-2040) assuming similar bioenergy areas and productivity as croplands as in IMAGE_BECCS and MAgPIE_BECCS scenarios.

Table S4. Land use changes and change rates in historical reconstructions and other available databases.

	Ramankutty (Ramankutty et al., 2008)	**HYDE 3.1 (Klein Goldewijk et al., 2010, 2011)**	**HYDE 3.2 (Klein Goldewijk, 2016)**	**LUH1 (Hurtt et al., 2011)**	**HILDA+ (net changes) (Winkler et al., in prep.)**	**ESA CCI Land Cover (Liu et al., 2018)**
Time period (T), number of classes (C) and spatial resolution (S)	T: 1960-2000 C: 3 S: 0.5° x 0.5°				T: 1960-2015 C: 6 S: 1 km.	T: 1992-2015 C: 8 S: 300m/0.5° x 0.5°
Total area under change between 2000 and 2040 [10^6 km²]	16.98 12.84%	16.08 12.11%	10.86 7.53%	12.95 9.80%	18.20 13.8%	5.99 3.4%

Table S5. Total area of cropland, pasture and natural land and change therein from 2000-2004 to 2036-2040 averaged across 16 land-use scenarios and split across seven biomes (see Fig. S4 for biome classification). The first line gives the global total area for 2000-2004, second row is 2036-2040 and third and fourth rows give the change from 2000-2004 until 2036-2040 in absolute terms and in % relative to the level in 2000-2004. Total area under change from 2000 to 2040 is given in absolute terms and as % of the biome/global land area (see methods of main text). Minor deviations in numbers may occur due to rounding.

	Tropical forest	**Temperate forest**	**Boreal forest**	**Tropical savanna**	**Temperate shrubland and grassland**	**Tundra**	**Desert**	**Global average and uncertainty across 16 LU scenarios**
Cropland [10^6 km²]	2.6 3.4 +0.8 +30.5%	3.4 3.6 +0.2 +6.9%	2.1 2.0 -0.0 -1.7%	4.4 4.9 +0.5 +10.3%	2.6 3.0 +0.3 +12.2%	0.0 0.0 +0.0 +3.6%	0.2 0.2 +0.0 +12.7%	15.4 ± 0.3 17.2 ± 1.8 +1.8 ± 1.6 +11.7% ± 10.5%
Pasture [10^6 km²]	4.4 4.4 +0.1 +1.2%	2.7 2.4 -0.3 -10.9%	3.8 3.7 -0.2 -3.8%	5.6 5.4 -0.2 -4.3%	13.6 13.2 -0.4 -3.1%	0.01 0.01 0.00 +7.7%	2.4 2.3 -0.0 -1.7%	32.6 ± 2.8 31.5 ± 4.1 -1.0 ± 2.6 -3.5% ± 7.6 %
Natural [10^6 km²]	17.5 16.7 -0.9 -4.9%	6.6 6.6 +0.1 +0.9%	20.2 20.4 +0.2 +0.9%	7.1 6.9 -0.2 -3.0%	14.8 14.9 +0.1 +0.6%	4.8 4.8 -0.00 -0.02%	12.5 12.6 +0.0 +0.1%	83.4 ± 3.4 82.7 ± 5.0 -0.7 ± 3.3 -0.9% ± 4.0%
Total area under change between 2000 and 2040 [10^6 km²]	2.5 10.2%	1.5 11.8%	1.0 3.7%	2.3 13.1%	2.3 7.3%	0.0 0.1%	0.2 1.3%	9.7 ± 2.9 7.4% ± 2.2%

Table S6. Uncertainty in ES indicators due to climatic pathways from IPSL-CM5A-LR, GFDL-ESM2M, HadGEM2-ES, MIROC-ESM-CHEM and NorESM1-M models (RCP 2.6 for all climate models) investigated for the four diverse LUH1 scenarios. First row gives average ES indicator level for 2000-2004 averaged across the five GCMs and the standard deviation across GCMs in % and second row is for 2036-2040.

	LUH1_26Be	**LUH1_45Aff**	**LUH1_60Stab**	**LUH1_85Pop**
NPP [PgC/yr]	61.20 ±4.0% 66.28 ± 3.8%	61.20 ± 4.0% 67.99 ± 3.7%	61.20 ± 4.0% 66.70 ± 3.8%	61.20 ± 4.0% 67.03 ± 3.7%
Vegetation C stocks [PgC]	438 ± 8.2% 472 ± 8.6%	438 ± 8.2% 507 ± 8.6%	438 ± 8.2% 493 ± 8.6%	438 ± 8.2% 479 ± 8.6%
Soil and litter C stocks [PgC]	1642 ± 1.9% 1634 ± 1.4%	1642 ± 1.9% 1646 ± 1.4%	1642 ± 1.9% 1638 ± 1.4%	1642 ± 1.9% 1638 ± 1.4%
Total C stocks [PgC]	2084 ± 3.2% 2109 ± 3.0%	2084 ± 3.2% 2154 ± 3.1%	2084 ± 3.2% 2133 ± 3.0%	2084 ± 3.2% 2120 ± 3.0%
Crop production [Ecal]	22.96 ± 0.1% 24.97 ± 0.2%	22.96 ± 0.1% 24.56 ± 0.2%	22.96 ± 0.1% 23.67 ± 0.2%	22.96 ± 0.1% 24.25 ± 0.2%
Annual water runoff [1000 km³/yr]	52.56 ± 2.7% 53.67 ± 4.2%	52.56 ± 2.7% 53.17 ±4.2%	52.56 ± 2.7% 53.22 ± 4.2%	52.56 ± 2.7% 53.62 ± 4.2%
Evapotranspiration [1000 km³/yr]	60.15 ± 3.5% 60.68 ± 4.5%	60.15 ± 3.5% 61.12 ± 4.5%	60.15 ± 3.5% 61.09 ± 4.5%	60.14 ± 3.6 60.76 ± 4.1 %

Tab S7. Biome and global totals and change in ES indicators from 2000-2004 to 2036-2040 simulated with LPJ-GUESS across 16 land-use scenarios (see Fig. S4 for biome classification). The first line gives the ES indicator level summed across each biome area for 2000-2004, second row is 2036-2040 and third and fourth row gives the change from 2000-2004 until 2036-2040 in absolute terms and in % relative to the level in 2000-2004. The fifth row gives the regional variability for each biome as the biome-wide average of the per-cell standard deviation in relative ES indicator changes across the 16 scenarios (same methodology as in main text Fig. 4). Here, cells where the base value in 2000-2004 was below 1% of the global average were not included in calculation of regional variability. Global totals (from Table S3) are shown in comparison. Total C stocks is the sum of vegetation, soil and litter and product C (wood removed from deforestation but not oxidized immediately) and C stored via CCS in BECCS scenarios. Minor deviations in numbers may occur due to rounding.

	Tropical forest	**Temperate forest**	**Boreal forest**	**Tropical savanna**	**Temperate shrubland and grassland**	**Tundra**	**Desert**	**Global average and uncertainty across 16 LU scenarios**
NPP [PgC/yr]	21.4 22.2 +0.9 +4.1% ± 7.6%	7.0 7.7 +0.7 +10.4% ±7.4%	12.9 14.7 +1.8 +14.3% ± 5.3%	8.5 9.3 +0.9 +10.5% ±9.1%	7.4 8.5 +1.1 +14.5% ±20.2%	1.4 1.8 +0.4 +29.7% ±6.8%	0.5 0.7 +0.2 +43.4% ±36.5%	58.9 ± 1.9 65.0 ± 1.9 +6.0 ± 0.8 +10.2% ± 1.4% ± 11.5%
Vegetation C stocks [PgC]	212.1 214.3 +2.2 +1.1% ± 25.8%	44.3 48.2 +3.8 +8.7% ±27.4%	112.2 136.1 +23.9 +21.3% ±22.4%	18.3 21.2 +2.9 +16.0% ± 30.4%	13.1 14.6 +1.5 +11.7% ± 20.1%	2.2 4.7 +2.5 +118.4% ± 24.1%	0.9 1.6 +0.8 +84.7% ±38.9%	403 ± 19.8 441 ± 3528 +37.8 ± 17.6 +9.2% ± 4.1 ± 25.2%
Soil and litter C stocks [PgC]	261.7 258.4 -3.3 -1.3% ±7.1%	156.1 154.2 -2.0 -1.3% ±4.0%	728.5 722.7 -5.8 -0.8% ±1.8%	132.9 132.4 -0.5 -0.4% ±2.3%	173.9 174.8 +1.8 +1.0% ±1.9%	113.1 113.6 +0.5 +0.4% ±1.0%	24.3 25.5 +1.2 +4.8% ±5.4.0%	1590 ± 45 1581 ± 46 -8.1 ± 6.8 -0.5% ± 0.4% ± 3.1%
Total C stocks [PgC]	476.2 475.1 -1.1 -0.2% ±9.6%	201.2 203.0 +1.8 +0.9% ± 5.9%	841.1 859.0 +17.9 +2.1% ±1.9%	151.6 154.0 +2.4 +1.6% ±4.5%	186.3 189.5 +3.3 +1.8% ± 2.7%	115.2 118.3 +3.0 +2.6% ±1.1%	25.2 27.1 +1.9 +7.7% ±6.0%	1997 ± 60 2026 ± 74 +29.2 ± 21.6 +1.5% ± 1.1% ± 4.2%
Crop production [Ecal]	5.53 8.09 +2.56 +46.3% ±334.0%	5.8 7.1 +1.4 +23.5% ±131.0%	2.3 2.7 +0.04 +17.4% ±88.2%	5.5 7.2 +1.7 +31.3% ±180.4%	3.4 4.3 +1.0 +28.9% ± 139.1%	0.01 0.01 +0.0 +7.7% ± 29.0%	0.2 0.2 +0.0 +18.4% ± 57.8%	22.6 ±1.0 29.6 ± 3.0 +7.0 ± 2.8 +31.2% ± 12.2% ±169.8%
Annual water runoff [1000 km³/yr]	25.0 27.5 +2.5 +10.0% ±6.2%	7.2 7.1 -0.1 -1.6% ±4.4%	7.4 7.6 +0.2 +2.3% ± 7.2%	5.1 6.4 +1.3 +24.7% ± 14.5%	2.7 3.3 +0.6 +23.8% ± 30.7%	1.2 1.3 +0.1 +5.2% ± 3.3%	1.0 1.1 +0.1 +10.1% ± 9.9%	49.7 ± 1.0 54.3 ± 1.6 +4.6 ± 0.9 +9.3% ± 1.7% ± 11.5%
Evapotranspiration [1000 km³/yr]	22.3 21.9 -0.5 -2.2% ±4.7%	8.3 8.4 +0.0 +0.5% ±2.8%	8.9 9.5 +0.6 +6.5% ±2.9%	8.7 8.8 +0.2 +1.9% ±4.2%	8.2 8.4 +0.2 +2.1% ±5.6%	0.7 0.8 +0.1 +16.5% ±3.2%	0.9 1.1 +0.2 +22.7% ±10.6%	58.0 ± 1.0 58.8 ± 1.2 +0.8 ± 1.0 +1.4% ± 1.7% ± 4.7%

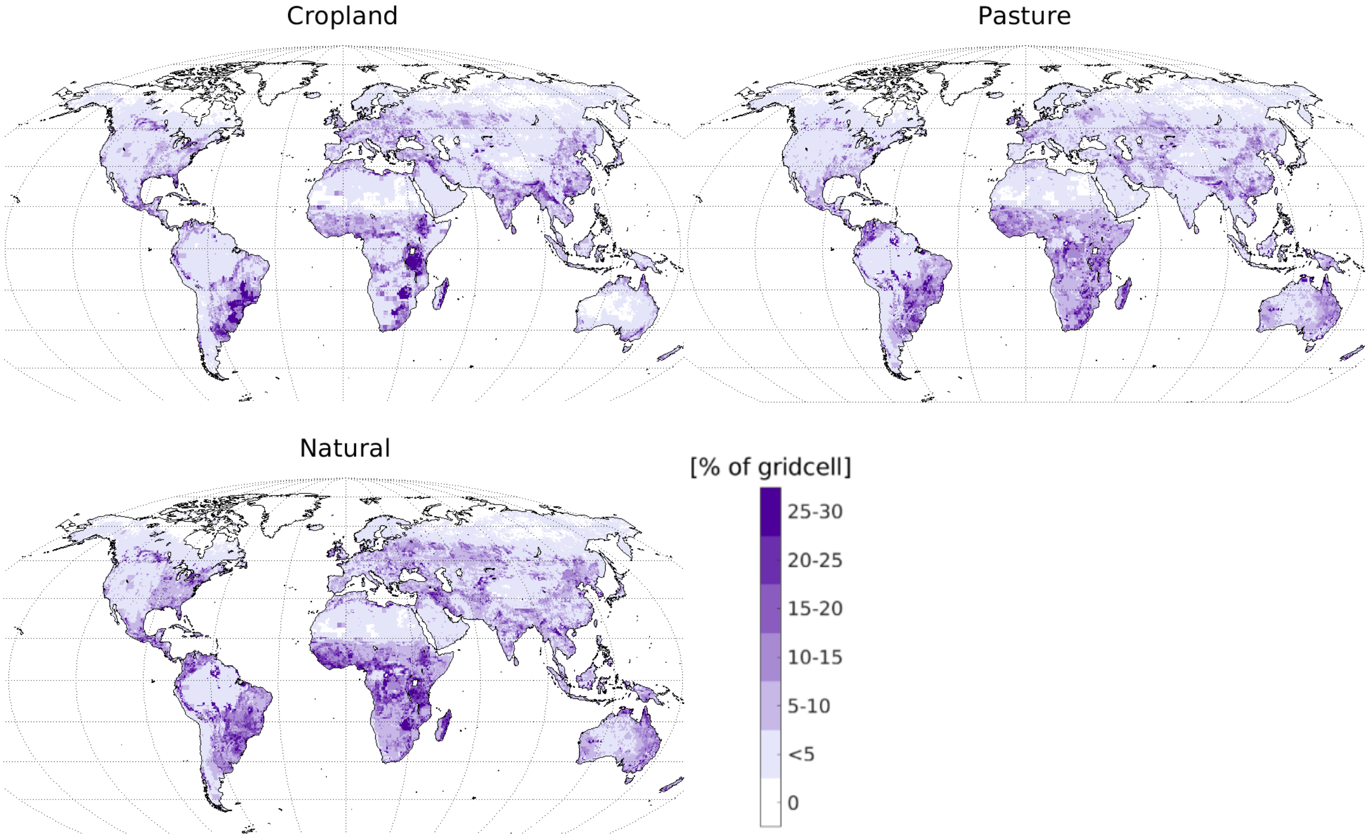

Fig. S1. Maps show the disagreement between 16 LULC scenarios for cropland, pasture and natural areas, calculated as the standard deviation of LULC changes from 2000-2004 to 2036-2040 across 16 scenarios. High deviations in cropland fractions in SE Africa and SE Brazil are caused by extreme changes in this class in all three scenarios of the MAgPIE model.

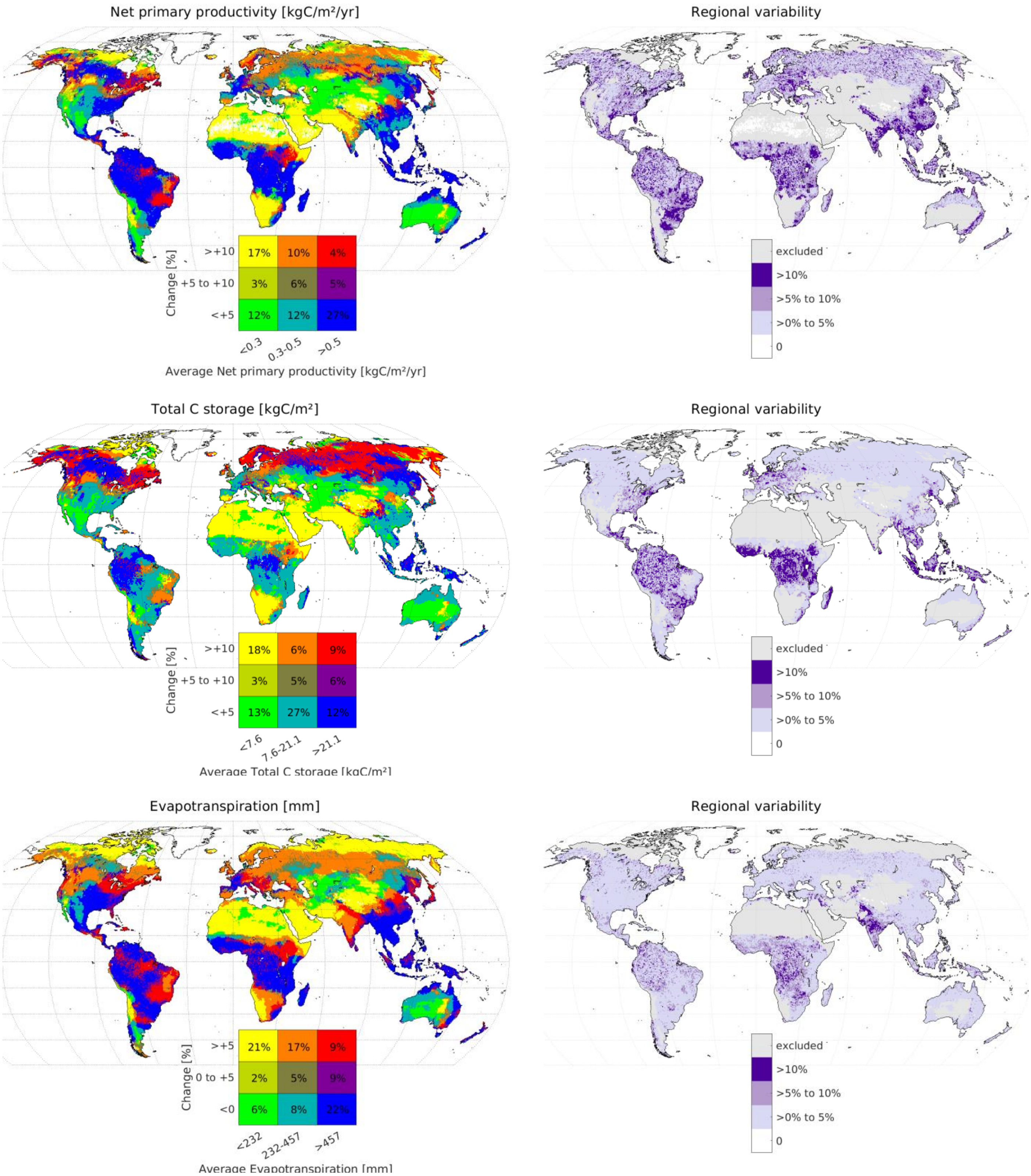

Fig. S2. Categories of the average level of the provision of NPP, total C storage and evapotranspiration in 2000-2004 and the change until 2036-2040 averaged over 16 land use scenarios and maps of regional variability in the change in ES indicators. See Fig. 4 in the main text for other ES indicators and a full description of the figure. Note that for evapotranspiration the lowest category in ES indicator change is negative.

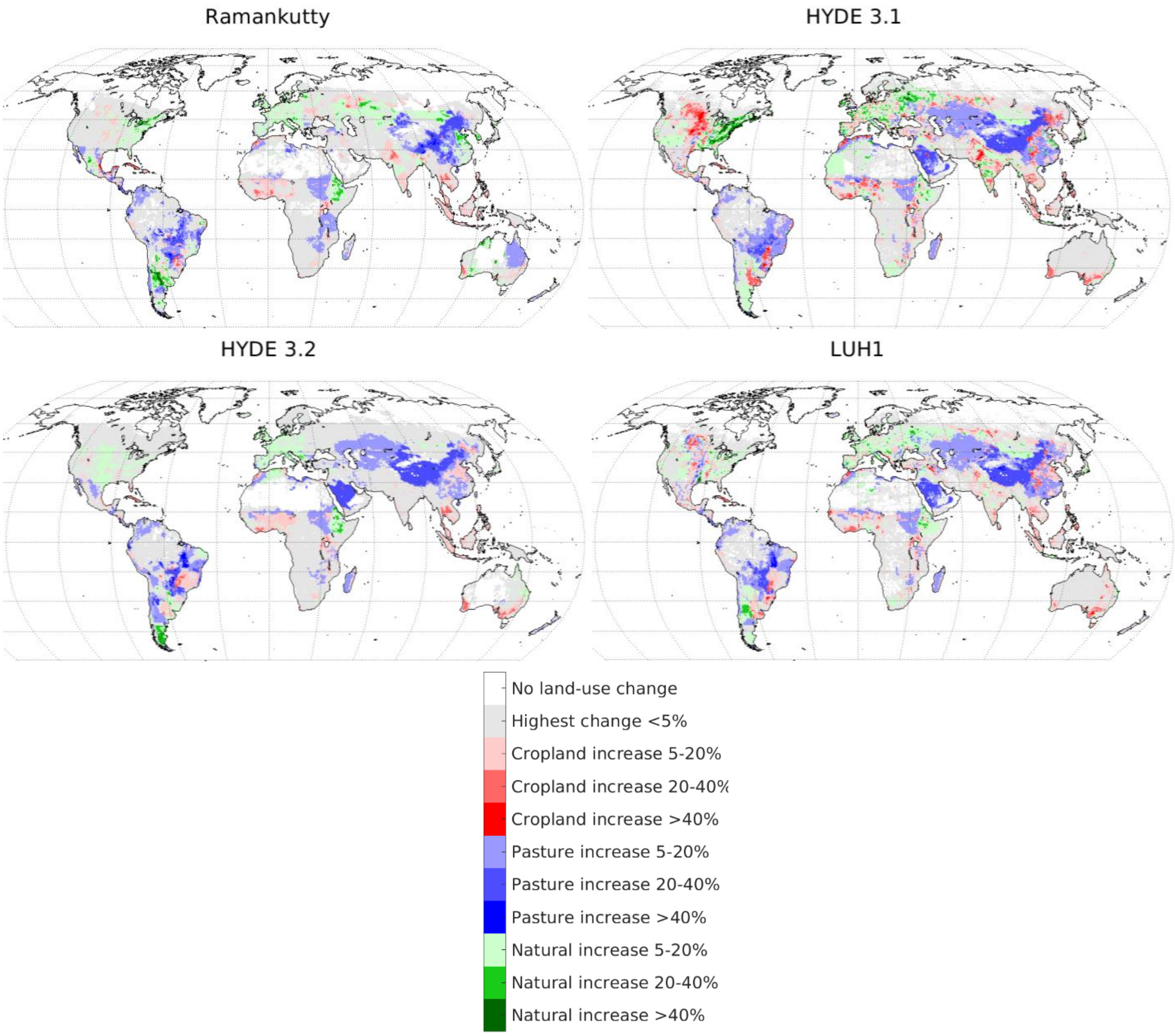

Fig. S3. Categories of dominant land-use/land-cover changes from 1960-1964 to 1996-2000 for historical reconstructions after (Hurtt et al., 2011; Klein Goldewijk, 2016; Klein Goldewijk et al., 2010, 2011; Ramankutty et al., 2008). The analysis is identical to the one of Fig. 2.

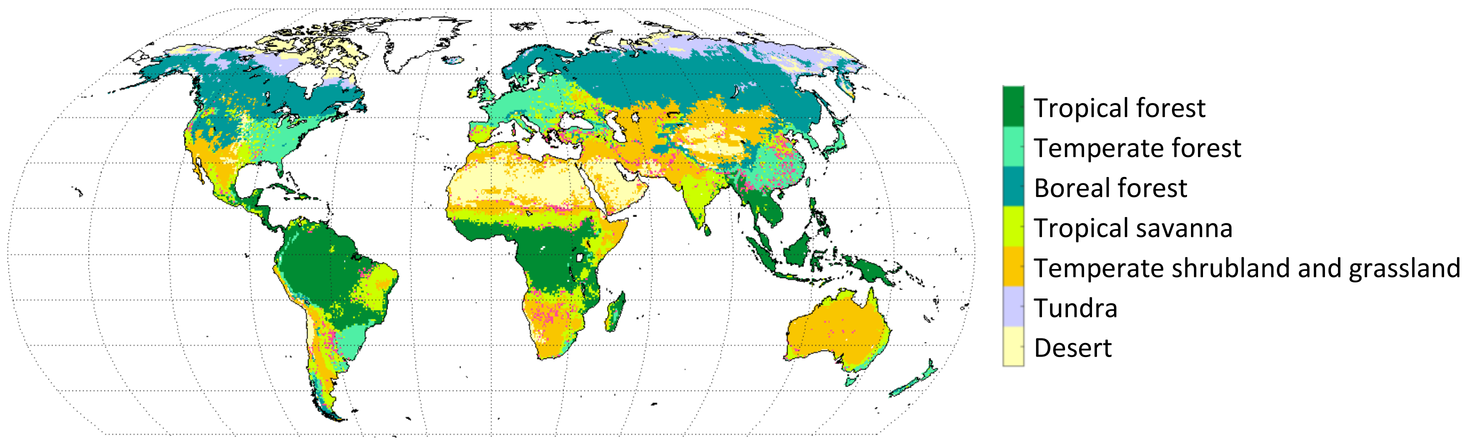

Fig. S4. Biomes classified based on leaf area index aggregated for 2000-2004 for the simulation LUH1_26Be. Classification methodology follows Smith et al. (2014).

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