



Supplement of

Representation of the terrestrial carbon cycle in CMIP6

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S1 Tables for Data from Scatterplots

Table S1: LAI Mean for 1986-2005 [1]

Model	Global	NH	SH	Tropics
BNU-ESM CMIP5e	3.64 ± 0.08	2.13 ± 0.06	5.04 ± 0.1	6.37 ± 0.1
BNU-ESM CMIP5c	3.75 ± 0.06	2.4 ± 0.09	4.98 ± 0.04	6.34 ± 0.06
CESM1-BGC CMIP5e	2.68 ± 0.06	2.03 ± 0.06	3.31 ± 0.09	3.78 ± 0.1
CESM1-BGC CMIP5c	2.64 ± 0.04	1.99 ± 0.05	3.27 ± 0.05	3.72 ± 0.05
CanESM2 CMIP5e	1.71 ± 0.06	1.11 ± 0.02	2.26 ± 0.11	2.65 ± 0.13
CanESM2 CMIP5c	1.72 ± 0.04	1.13 ± 0.02	2.26 ± 0.08	2.65 ± 0.1
FIO-ESM CMIP5e	2.23 ± 0.01	1.69 ± 0.01	2.73 ± 0.0	3.14 ± 0.0
GFDL-ESM2G CMIP5e	3.1 ± 0.06	2.65 ± 0.02	3.48 ± 0.1	4.09 ± 0.1
GFDL-ESM2G CMIP5c	3.02 ± 0.04	2.62 ± 0.05	3.35 ± 0.06	3.96 ± 0.05
GFDL-ESM2M CMIP5e	3.17 ± 0.05	2.88 ± 0.02	3.4 ± 0.1	4.05 ± 0.11
GFDL-ESM2M CMIP5c	3.05 ± 0.07	2.72 ± 0.04	3.31 ± 0.12	3.9 ± 0.12
HadGEM2-CC CMIP5c	2.48 ± 0.02	1.52 ± 0.03	3.38 ± 0.02	4.15 ± 0.02
HadGEM2-ES CMIP5c	2.57 ± 0.03	1.6 ± 0.03	3.48 ± 0.04	4.28 ± 0.04
IPSL-CM5A-LR CMIP5c	2.18 ± 0.03	2.05 ± 0.02	2.28 ± 0.06	2.84 ± 0.07
IPSL-CM5A-MR CMIP5c	2.13 ± 0.03	2.04 ± 0.03	2.2 ± 0.04	2.7 ± 0.05
IPSL-CM5B-LR CMIP5c	2.0 ± 0.02	1.93 ± 0.03	2.04 ± 0.05	2.43 ± 0.07
MIROC-ESM-CHEM CMIP5c	2.66 ± 0.03	2.0 ± 0.02	3.25 ± 0.06	3.56 ± 0.07
MIROC-ESM CMIP5e	2.66 ± 0.05	2.05 ± 0.03	3.2 ± 0.08	3.48 ± 0.09
MIROC-ESM CMIP5c	2.65 ± 0.03	2.06 ± 0.02	3.16 ± 0.05	3.45 ± 0.05
MPI-ESM-LR CMIP5e	2.27 ± 0.02	1.59 ± 0.02	2.92 ± 0.04	3.32 ± 0.04
MPI-ESM-LR CMIP5c	2.26 ± 0.03	1.59 ± 0.01	2.89 ± 0.07	3.29 ± 0.07
MPI-ESM-MR CMIP5c	2.3 ± 0.02	1.64 ± 0.02	2.93 ± 0.04	3.32 ± 0.05
MRI-ESM1 CMIP5e	3.61 ± 0.07	2.16 ± 0.06	4.95 ± 0.1	5.98 ± 0.13
NorESM1-ME CMIP5e	2.8 ± 0.05	2.16 ± 0.07	3.41 ± 0.07	3.85 ± 0.08
NorESM1-ME CMIP5c	2.8 ± 0.05	2.12 ± 0.07	3.43 ± 0.06	3.87 ± 0.06
inmcm4 CMIP5c	1.62 ± 0.02	1.26 ± 0.02	1.95 ± 0.03	2.27 ± 0.03
ACCESS-ESM1-5 CMIP6e	1.64 ± 0.02	1.43 ± 0.03	1.82 ± 0.03	2.09 ± 0.04
ACCESS-ESM1-5 CMIP6c	1.65 ± 0.02	1.46 ± 0.02	1.82 ± 0.05	2.07 ± 0.06
CESM2-WACCM CMIP6c	1.78 ± 0.04	1.49 ± 0.05	2.02 ± 0.03	2.35 ± 0.04
CESM2 CMIP6c	1.79 ± 0.05	1.53 ± 0.06	2.0 ± 0.04	2.33 ± 0.06
CMCC-CM2-SR5 CMIP6c	2.17 ± 0.06	2.33 ± 0.07	1.98 ± 0.08	2.18 ± 0.07
CMCC-ESM2 CMIP6c	2.2 ± 0.05	2.3 ± 0.06	2.06 ± 0.07	2.28 ± 0.06
CNRM-ESM2-1 CMIP6e	1.59 ± 0.03	1.33 ± 0.03	1.82 ± 0.05	2.13 ± 0.04
CNRM-ESM2-1 CMIP6c	1.59 ± 0.03	1.34 ± 0.05	1.81 ± 0.04	2.12 ± 0.03
CanESM5-CanOE CMIP6e	1.71 ± 0.04	1.14 ± 0.03	2.24 ± 0.06	2.64 ± 0.07
CanESM5-CanOE CMIP6c	1.69 ± 0.04	1.15 ± 0.03	2.2 ± 0.07	2.58 ± 0.08
CanESM5 CMIP6e	1.71 ± 0.04	1.16 ± 0.03	2.22 ± 0.06	2.61 ± 0.06
CanESM5 CMIP6c	1.72 ± 0.02	1.18 ± 0.03	2.22 ± 0.03	2.6 ± 0.03
EC-Earth3-CC CMIP6e	2.59 ± 0.06	1.6 ± 0.06	3.53 ± 0.08	3.93 ± 0.08
EC-Earth3-CC CMIP6c	2.54 ± 0.05	1.58 ± 0.05	3.45 ± 0.09	3.82 ± 0.07
EC-Earth3-Veg CMIP6c	2.55 ± 0.04	1.57 ± 0.06	3.47 ± 0.05	3.87 ± 0.04

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Table S1: LAI Mean for 1986-2005 [1]

Model	Global	NH	SH	Tropics
GFDL-ESM4 CMIP6e	2.33 ± 0.04	2.0 ± 0.03	2.61 ± 0.06	3.17 ± 0.08
GFDL-ESM4 CMIP6c	2.27 ± 0.04	1.92 ± 0.03	2.58 ± 0.09	3.13 ± 0.09
INM-CM4-8 CMIP6c	1.86 ± 0.02	1.5 ± 0.02	2.18 ± 0.02	2.53 ± 0.02
INM-CM5-0 CMIP6c	1.85 ± 0.02	1.48 ± 0.03	2.18 ± 0.02	2.53 ± 0.01
IPSL-CM6A-LR CMIP6c	1.85 ± 0.04	1.16 ± 0.04	2.49 ± 0.05	2.97 ± 0.06
MIROC-ES2L CMIP6e	1.55 ± 0.01	1.01 ± 0.02	2.05 ± 0.01	2.56 ± 0.01
MIROC-ES2L CMIP6c	1.59 ± 0.02	1.03 ± 0.03	2.11 ± 0.02	2.62 ± 0.02
MPI-ESM1-2-HAM CMIP6c	2.03 ± 0.04	1.43 ± 0.03	2.59 ± 0.07	2.96 ± 0.08
MPI-ESM1-2-LR CMIP6e	1.94 ± 0.04	1.46 ± 0.02	2.38 ± 0.08	2.82 ± 0.09
MPI-ESM1-2-LR CMIP6c	1.94 ± 0.03	1.46 ± 0.02	2.38 ± 0.05	2.83 ± 0.06
MRI-ESM2-0 CMIP6e	2.97 ± 0.09	2.02 ± 0.1	3.84 ± 0.15	4.81 ± 0.2
MRI-ESM2-0 CMIP6c	2.99 ± 0.07	2.04 ± 0.11	3.85 ± 0.09	4.83 ± 0.12
NorESM2-LM CMIP6e	1.75 ± 0.04	1.48 ± 0.04	1.98 ± 0.04	2.35 ± 0.05
NorESM2-LM CMIP6c	1.7 ± 0.04	1.44 ± 0.05	1.93 ± 0.03	2.28 ± 0.04
NorESM2-MM CMIP6c	1.71 ± 0.04	1.41 ± 0.04	1.98 ± 0.05	2.32 ± 0.06
SAM0-UNICON CMIP6c	2.65 ± 0.06	2.09 ± 0.07	3.19 ± 0.1	3.87 ± 0.12
TaiESM1 CMIP6c	2.55 ± 0.04	2.04 ± 0.04	3.03 ± 0.07	3.44 ± 0.07
UKESM1-0-LL CMIP6e	2.82 ± 0.02	2.19 ± 0.04	3.42 ± 0.03	3.94 ± 0.02
UKESM1-0-LL CMIP6c	2.81 ± 0.02	2.19 ± 0.03	3.39 ± 0.02	3.9 ± 0.02
GIMMS-LAI4g	1.74 ± 0.01	1.22 ± 0.01	2.22 ± 0.02	2.72 ± 0.02
GLASS	1.69 ± 0.06	1.19 ± 0.04	2.14 ± 0.08	2.6 ± 0.1
LAI3g	1.69 ± 0.03	1.11 ± 0.02	2.22 ± 0.04	2.74 ± 0.05
Ncycle MMM CMIP5e	2.74 ± 0.05	2.09 ± 0.05	3.36 ± 0.07	3.81 ± 0.07
non-Ncycle MMM CMIP5e	2.52 ± 0.02	1.99 ± 0.02	3.0 ± 0.04	3.46 ± 0.04
Ncycle MMM CMIP5c	2.72 ± 0.04	2.06 ± 0.05	3.35 ± 0.04	3.8 ± 0.04
non-Ncycle MMM CMIP5c	2.36 ± 0.02	1.86 ± 0.02	2.81 ± 0.02	3.29 ± 0.02
Ncycle MMM CMIP6c	2.12 ± 0.03	1.71 ± 0.04	2.49 ± 0.02	2.87 ± 0.02
non-Ncycle MMM CMIP6c	1.98 ± 0.02	1.46 ± 0.03	2.45 ± 0.02	2.92 ± 0.02
Ncycle MMM CMIP6e	2.05 ± 0.02	1.53 ± 0.03	2.53 ± 0.02	2.95 ± 0.02
non-Ncycle MMM CMIP6e	2.06 ± 0.03	1.53 ± 0.04	2.54 ± 0.04	3.07 ± 0.05

Table S2: LAI Trend for 1986-2005 [yr^{-1}]

Model	Global	NH	SH	Tropics
BNU-ESM CMIP5e	0.012 ± 0.0013	0.0072 ± 0.002	0.016 ± 0.0013	0.0158 ± 0.0015
BNU-ESM CMIP5c	0.0102 ± 0.0008	0.0136 ± 0.0016	0.0057 ± 0.0012	0.0087 ± 0.0012
CESM1-BGC CMIP5e	0.004 ± 0.0022	0.0067 ± 0.002	0.0011 ± 0.0034	0.0006 ± 0.0039
CESM1-BGC CMIP5c	0.0035 ± 0.0016	0.0027 ± 0.0017	0.004 ± 0.0017	0.0057 ± 0.0016
CanESM2 CMIP5e	0.0019 ± 0.0022	0.003 ± 0.0005	0.0005 ± 0.0043	0.0012 ± 0.005
CanESM2 CMIP5c	0.0018 ± 0.0017	0.002 ± 0.0006	0.0012 ± 0.0033	0.0028 ± 0.0038
FIO-ESM CMIP5e	0.0005 ± 0.0002	0.0009 ± 0.0003	-0.0001 ± 0.0001	-0.0001 ± 0.0001
GFDL-ESM2G CMIP5e	0.0055 ± 0.0019	0.0028 ± 0.0008	0.0077 ± 0.0035	0.008 ± 0.0035

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Table S2: LAI Trend for 1986-2005 [yr^{-1}]

Model	Global	NH	SH	Tropics
GFDL-ESM2G CMIP5c	0.0045 ± 0.0012	0.0071 ± 0.001	0.0015 ± 0.0022	0.0011 ± 0.002
GFDL-ESM2M CMIP5e	0.0034 ± 0.0019	0.0008 ± 0.0008	0.0056 ± 0.0038	0.0087 ± 0.004
GFDL-ESM2M CMIP5c	0.0024 ± 0.0026	0.0057 ± 0.0006	-0.0013 ± 0.0049	0.0023 ± 0.0049
HadGEM2-CC CMIP5c	0.0031 ± 0.0005	0.0036 ± 0.0007	0.0022 ± 0.0006	0.002 ± 0.0008
HadGEM2-ES CMIP5c	0.0046 ± 0.0006	0.0033 ± 0.0008	0.0052 ± 0.001	0.0055 ± 0.0009
IPSL-CM5A-LR CMIP5c	-0.0022 ± 0.001	0.0024 ± 0.0008	-0.0067 ± 0.0018	-0.0056 ± 0.0022
IPSL-CM5A-MR CMIP5c	0.0015 ± 0.001	0.0032 ± 0.0011	-0.0003 ± 0.0017	0.0017 ± 0.0021
IPSL-CM5B-LR CMIP5c	0.0008 ± 0.0009	0.0043 ± 0.0007	-0.0027 ± 0.0019	-0.0029 ± 0.0025
MIROC-ESM-CHEM CMIP5c	0.0038 ± 0.0011	0.0016 ± 0.0008	0.0054 ± 0.0019	0.008 ± 0.0022
MIROC-ESM CMIP5e	0.0039 ± 0.0017	0.0044 ± 0.0009	0.003 ± 0.0031	0.0044 ± 0.0033
MIROC-ESM CMIP5c	0.0015 ± 0.0011	0.0013 ± 0.0008	0.0013 ± 0.002	0.0023 ± 0.002
MPI-ESM-LR CMIP5e	-0.0003 ± 0.0008	0.0021 ± 0.0004	-0.0029 ± 0.0016	-0.0033 ± 0.0015
MPI-ESM-LR CMIP5c	0.0014 ± 0.0013	0.0011 ± 0.0004	0.0015 ± 0.0028	0.0004 ± 0.0028
MPI-ESM-MR CMIP5c	0.0 ± 0.0008	0.0023 ± 0.0005	-0.0025 ± 0.0015	-0.0031 ± 0.0017
MRI-ESM1 CMIP5e	0.0063 ± 0.0023	0.0036 ± 0.0023	0.0084 ± 0.0034	0.0107 ± 0.0047
NorESM1-ME CMIP5e	0.006 ± 0.0015	0.0075 ± 0.0024	0.0041 ± 0.0024	0.0037 ± 0.0029
NorESM1-ME CMIP5c	0.005 ± 0.0014	0.0092 ± 0.0019	0.0006 ± 0.0024	0.0019 ± 0.0022
inmcm4 CMIP5c	0.0007 ± 0.0007	0.0014 ± 0.0009	-0.0 ± 0.0012	-0.0009 ± 0.0013
ACCESS-ESM1-5 CMIP6e	0.001 ± 0.0006	0.0051 ± 0.0006	-0.0031 ± 0.0011	-0.0043 ± 0.0014
ACCESS-ESM1-5 CMIP6c	-0.0014 ± 0.0008	0.0029 ± 0.0004	-0.0057 ± 0.0015	-0.0071 ± 0.0018
CESM2-WACCM CMIP6c	0.0059 ± 0.0005	0.0074 ± 0.0006	0.0043 ± 0.0007	0.0065 ± 0.0007
CESM2 CMIP6c	0.0082 ± 0.0005	0.0096 ± 0.0008	0.0066 ± 0.0008	0.0087 ± 0.0011
CMCC-CM2-SR5 CMIP6c	0.0047 ± 0.0021	0.0049 ± 0.0025	0.0044 ± 0.003	0.0043 ± 0.0026
CMCC-ESM2 CMIP6c	0.0047 ± 0.0016	0.0074 ± 0.0017	0.0021 ± 0.0028	0.0024 ± 0.0023
CNRM-ESM2-1 CMIP6e	-0.0002 ± 0.0011	0.0027 ± 0.001	-0.003 ± 0.0019	-0.0025 ± 0.0016
CNRM-ESM2-1 CMIP6c	0.0037 ± 0.0009	0.006 ± 0.0013	0.0012 ± 0.0015	0.0007 ± 0.0013
CanESM5-CanOE CMIP6e	0.0048 ± 0.0011	0.0045 ± 0.0007	0.0048 ± 0.0021	0.0056 ± 0.0025
CanESM5-CanOE CMIP6c	0.0039 ± 0.0013	0.004 ± 0.0006	0.0035 ± 0.0025	0.0046 ± 0.003
CanESM5 CMIP6e	0.005 ± 0.0009	0.0044 ± 0.0006	0.0053 ± 0.0019	0.0042 ± 0.0022
CanESM5 CMIP6c	0.0032 ± 0.0006	0.0043 ± 0.0006	0.0019 ± 0.001	0.0027 ± 0.0011
EC-Earth3-CC CMIP6e	0.0069 ± 0.0016	0.0089 ± 0.0011	0.0044 ± 0.003	0.0059 ± 0.0029
EC-Earth3-CC CMIP6c	0.0053 ± 0.0017	0.008 ± 0.001	0.0023 ± 0.0034	0.0029 ± 0.0029
EC-Earth3-Veg CMIP6c	0.0041 ± 0.0013	0.0085 ± 0.0009	-0.0007 ± 0.0021	0.0009 ± 0.0016
GFDL-ESM4 CMIP6e	0.0044 ± 0.0012	0.0037 ± 0.0008	0.0046 ± 0.0023	0.0047 ± 0.0029
GFDL-ESM4 CMIP6c	-0.0004 ± 0.0017	0.0033 ± 0.0007	-0.0045 ± 0.0032	-0.0069 ± 0.0034
INM-CM4-8 CMIP6c	0.0018 ± 0.0005	0.0018 ± 0.0008	0.0017 ± 0.0006	0.002 ± 0.0008
INM-CM5-0 CMIP6c	0.0023 ± 0.0005	0.0041 ± 0.0007	0.0003 ± 0.0006	0.0005 ± 0.0006
IPSL-CM6A-LR CMIP6c	0.0052 ± 0.0008	0.0052 ± 0.0007	0.0049 ± 0.0017	0.0064 ± 0.0018
MIROC-ES2L CMIP6e	0.0022 ± 0.0003	0.0033 ± 0.0005	0.0008 ± 0.0004	0.0016 ± 0.0005
MIROC-ES2L CMIP6c	0.0033 ± 0.0003	0.0043 ± 0.0005	0.0022 ± 0.0005	0.0032 ± 0.0006
MPI-ESM-1-2-HAM CMIP6c	0.0041 ± 0.0014	0.0038 ± 0.0005	0.0042 ± 0.0025	0.0049 ± 0.0031
MPI-ESM1-2-LR CMIP6e	0.0014 ± 0.0015	0.0033 ± 0.0004	-0.0006 ± 0.003	-0.0005 ± 0.0037
MPI-ESM1-2-LR CMIP6c	0.0026 ± 0.0011	0.0032 ± 0.0004	0.0019 ± 0.0021	0.0023 ± 0.0024

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Table S2: LAI Trend for 1986-2005 [yr^{-1}]

Model	Global	NH	SH	Tropics
MRI-ESM2-0 CMIP6e	0.0068 ± 0.003	0.0137 ± 0.0022	-0.0006 ± 0.0058	0.0004 ± 0.0079
MRI-ESM2-0 CMIP6c	0.0094 ± 0.0019	0.0156 ± 0.0023	0.0024 ± 0.0034	0.0047 ± 0.0045
NorESM2-LM CMIP6e	0.0064 ± 0.0007	0.0069 ± 0.0007	0.0059 ± 0.001	0.0076 ± 0.0012
NorESM2-LM CMIP6c	0.0059 ± 0.0007	0.0076 ± 0.001	0.0042 ± 0.001	0.0042 ± 0.0013
NorESM2-MM CMIP6c	0.0056 ± 0.0008	0.0067 ± 0.0005	0.0046 ± 0.0015	0.0055 ± 0.0018
SAM0-UNICON CMIP6c	0.0063 ± 0.0021	0.0075 ± 0.0022	0.005 ± 0.0039	0.0078 ± 0.0046
TaiESM1 CMIP6c	0.0038 ± 0.0012	0.004 ± 0.0013	0.0036 ± 0.0025	0.0049 ± 0.0026
UKESM1-0-LL CMIP6e	0.0036 ± 0.0005	0.0052 ± 0.0008	0.0018 ± 0.0009	0.0022 ± 0.0006
UKESM1-0-LL CMIP6c	0.0014 ± 0.0006	0.0031 ± 0.0009	-0.0005 ± 0.0009	-0.0001 ± 0.0006
GIMMS-LAI4g	0.002 ± 0.0003	0.0014 ± 0.0003	0.0021 ± 0.0006	0.0027 ± 0.0006
GLASS	0.0082 ± 0.0015	0.0047 ± 0.0013	0.0112 ± 0.002	0.0128 ± 0.0023
LAI3g	0.0019 ± 0.0011	0.0018 ± 0.0008	0.0017 ± 0.0017	0.0019 ± 0.0021
Ncycle MMM CMIP5e	0.005 ± 0.0015	0.0071 ± 0.0012	0.0026 ± 0.0026	0.0022 ± 0.0028
non-Ncycle MMM CMIP5e	0.0025 ± 0.0007	0.0023 ± 0.0003	0.0023 ± 0.0014	0.0031 ± 0.0015
Ncycle MMM CMIP5c	0.0042 ± 0.0011	0.006 ± 0.0012	0.0023 ± 0.0017	0.0038 ± 0.0015
non-Ncycle MMM CMIP5c	0.0018 ± 0.0004	0.003 ± 0.0003	0.0004 ± 0.0008	0.001 ± 0.0007
Ncycle MMM CMIP6c	0.0043 ± 0.0003	0.0061 ± 0.0004	0.0024 ± 0.0005	0.0033 ± 0.0005
non-Ncycle MMM CMIP6c	0.0037 ± 0.0004	0.0053 ± 0.0004	0.0017 ± 0.0006	0.0022 ± 0.0008
Ncycle MMM CMIP6e	0.0036 ± 0.0004	0.0054 ± 0.0004	0.0015 ± 0.0007	0.0021 ± 0.0008
non-Ncycle MMM CMIP6e	0.0041 ± 0.0008	0.0058 ± 0.0005	0.0022 ± 0.0015	0.0025 ± 0.0019

Table S3: GPP Mean for 1986-2005 [PgC yr^{-1}]

Model	Global	NH	SH	Tropics
BNU-ESM CMIP5e	83.54 ± 2.48	30.35 ± 1.3	53.19 ± 1.54	47.13 ± 1.18
BNU-ESM CMIP5c	86.26 ± 2.0	33.66 ± 1.35	52.6 ± 0.92	46.93 ± 0.92
CESM1-BGC CMIP5e	107.42 ± 2.23	34.94 ± 1.1	72.49 ± 1.3	61.98 ± 1.12
CESM1-BGC CMIP5c	106.12 ± 1.7	34.5 ± 0.78	71.62 ± 1.06	61.24 ± 0.93
CanESM2 CMIP5e	103.74 ± 2.72	32.32 ± 0.86	71.42 ± 2.76	56.61 ± 2.07
CanESM2 CMIP5c	104.37 ± 2.41	32.66 ± 0.74	71.71 ± 2.09	56.66 ± 1.78
FIO-ESM CMIP5e	151.2 ± 2.28	44.86 ± 0.99	106.34 ± 1.69	91.94 ± 1.59
GFDL-ESM2G CMIP5e	139.01 ± 4.89	46.29 ± 1.23	92.72 ± 4.42	75.82 ± 2.78
GFDL-ESM2G CMIP5c	134.03 ± 3.53	44.88 ± 1.67	89.15 ± 2.86	73.24 ± 1.98
GFDL-ESM2M CMIP5e	137.59 ± 5.15	46.76 ± 1.42	90.83 ± 5.5	75.22 ± 3.86
GFDL-ESM2M CMIP5c	132.97 ± 5.94	44.11 ± 1.4	88.86 ± 6.12	72.58 ± 4.27
HadGEM2-CC CMIP5c	111.57 ± 3.19	36.26 ± 1.82	75.31 ± 2.08	64.71 ± 2.07
HadGEM2-ES CMIP5c	116.03 ± 3.77	37.6 ± 1.35	78.44 ± 3.04	67.96 ± 2.77
IPSL-CM5A-LR CMIP5c	133.84 ± 2.22	58.96 ± 1.67	74.87 ± 1.59	67.0 ± 1.47
IPSL-CM5A-MR CMIP5c	131.41 ± 3.23	58.77 ± 1.99	72.64 ± 2.0	64.27 ± 1.9
IPSL-CM5B-LR CMIP5c	115.58 ± 2.65	51.95 ± 1.69	63.63 ± 1.87	54.03 ± 1.64
MIROC-ESM-CHEM CMIP5c	109.79 ± 2.5	41.62 ± 0.96	68.17 ± 1.95	57.0 ± 1.64
MIROC-ESM CMIP5e	110.68 ± 2.51	42.76 ± 1.43	67.93 ± 1.85	56.45 ± 1.52

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Table S3: GPP Mean for 1986-2005 [PgC yr⁻¹]

Model	Global	NH	SH	Tropics
MIROC-ESM CMIP5c	108.34 ± 2.73	42.38 ± 1.05	65.96 ± 2.05	54.98 ± 1.75
MPI-ESM-LR CMIP5e	145.6 ± 3.12	55.14 ± 1.81	90.46 ± 2.43	72.51 ± 1.3
MPI-ESM-LR CMIP5c	145.66 ± 3.99	55.28 ± 1.19	90.38 ± 3.64	71.76 ± 1.91
MPI-ESM-MR CMIP5c	149.88 ± 3.69	57.58 ± 2.1	92.29 ± 2.32	73.62 ± 1.58
MRI-ESM1 CMIP5e	191.82 ± 3.1	64.52 ± 1.47	127.31 ± 2.0	110.68 ± 1.73
NorESM1-ME CMIP5e	107.22 ± 1.74	35.87 ± 0.89	71.34 ± 1.16	61.16 ± 1.09
NorESM1-ME CMIP5c	106.83 ± 1.66	35.42 ± 1.0	71.4 ± 0.95	61.12 ± 0.82
inmcm4 CMIP5c	109.19 ± 1.97	37.4 ± 0.8	71.78 ± 1.69	62.96 ± 1.45
ACCESS-ESM1-5 CMIP6e	100.33 ± 1.3	33.27 ± 1.15	67.06 ± 0.93	57.17 ± 0.88
ACCESS-ESM1-5 CMIP6c	101.48 ± 1.28	34.39 ± 0.91	67.09 ± 1.45	56.94 ± 1.3
CESM2-WACCM CMIP6c	90.96 ± 1.73	34.31 ± 1.12	56.66 ± 0.88	47.18 ± 0.77
CESM2 CMIP6c	91.09 ± 2.44	35.39 ± 1.39	55.7 ± 1.38	46.66 ± 1.13
CMCC-CM2-SR5 CMIP6c	83.79 ± 2.16	37.64 ± 1.26	46.15 ± 1.4	38.25 ± 0.89
CMCC-ESM2 CMIP6c	84.36 ± 1.65	37.06 ± 1.23	47.3 ± 0.93	39.37 ± 0.63
CNRM-ESM2-1 CMIP6e	84.11 ± 2.15	33.15 ± 1.12	50.96 ± 2.05	41.88 ± 1.15
CNRM-ESM2-1 CMIP6c	84.18 ± 2.36	33.49 ± 1.67	50.7 ± 1.62	41.55 ± 0.93
CanESM5-CanOE CMIP6e	114.7 ± 2.8	40.82 ± 1.31	73.88 ± 1.76	60.75 ± 1.44
CanESM5-CanOE CMIP6c	113.66 ± 3.02	40.84 ± 1.3	72.83 ± 2.08	59.87 ± 1.72
CanESM5 CMIP6e	114.73 ± 2.6	41.34 ± 1.21	73.39 ± 1.74	60.32 ± 1.21
CanESM5 CMIP6c	114.82 ± 2.16	41.68 ± 1.09	73.15 ± 1.25	60.19 ± 1.02
EC-Earth3-CC CMIP6e	121.52 ± 3.19	47.03 ± 2.28	74.49 ± 1.47	56.11 ± 0.96
EC-Earth3-CC CMIP6c	119.45 ± 2.5	46.11 ± 1.75	73.34 ± 1.47	55.17 ± 1.11
EC-Earth3-Veg CMIP6c	117.81 ± 2.27	45.46 ± 1.53	72.36 ± 1.28	54.63 ± 1.0
GFDL-ESM4 CMIP6e	92.19 ± 2.39	34.82 ± 1.26	57.38 ± 1.56	50.38 ± 1.34
GFDL-ESM4 CMIP6c	88.07 ± 1.89	32.36 ± 1.01	55.71 ± 1.61	49.03 ± 1.2
INM-CM4-8 CMIP6c	123.16 ± 4.08	41.22 ± 1.16	81.94 ± 3.0	71.68 ± 2.69
INM-CM5-0 CMIP6c	126.98 ± 2.59	42.43 ± 1.25	84.54 ± 1.51	74.08 ± 1.36
IPSL-CM6A-LR CMIP6c	97.25 ± 2.63	32.08 ± 1.14	65.17 ± 1.86	54.93 ± 1.54
MIROC-ES2L CMIP6e	88.02 ± 1.45	37.68 ± 1.03	50.33 ± 0.59	43.68 ± 0.53
MIROC-ES2L CMIP6c	91.73 ± 1.73	39.27 ± 1.16	52.46 ± 0.84	45.33 ± 0.76
MPI-ESM-1-2-HAM CMIP6c	128.61 ± 5.77	46.29 ± 2.63	82.32 ± 3.65	67.99 ± 2.89
MPI-ESM1-2-LR CMIP6e	123.7 ± 3.79	48.04 ± 1.64	75.66 ± 3.0	64.42 ± 2.21
MPI-ESM1-2-LR CMIP6c	122.46 ± 3.66	47.92 ± 1.83	74.55 ± 2.43	63.63 ± 1.91
MRI-ESM2-0 CMIP6e	151.86 ± 4.17	63.44 ± 3.0	88.42 ± 2.98	79.52 ± 2.71
MRI-ESM2-0 CMIP6c	151.98 ± 4.62	63.74 ± 3.92	88.25 ± 2.09	79.5 ± 1.83
NorESM2-LM CMIP6e	88.78 ± 2.01	33.03 ± 1.0	55.75 ± 1.19	47.44 ± 1.03
NorESM2-LM CMIP6c	86.71 ± 1.82	32.15 ± 1.12	54.56 ± 1.04	46.21 ± 0.91
NorESM2-MM CMIP6c	88.13 ± 1.8	32.6 ± 0.91	55.53 ± 1.36	46.37 ± 1.09
SAM0-UNICON CMIP6c	106.57 ± 2.12	34.85 ± 0.94	71.72 ± 1.77	64.01 ± 1.77
TaiESM1 CMIP6c	106.56 ± 1.48	35.05 ± 1.03	71.51 ± 0.8	60.03 ± 0.65
UKESM1-0-LL CMIP6e	108.72 ± 3.39	38.47 ± 1.76	70.25 ± 2.79	59.24 ± 2.45
UKESM1-0-LL CMIP6c	106.73 ± 2.97	38.3 ± 1.47	68.43 ± 2.69	57.66 ± 2.18
GLASS	108.26 ± 3.43	39.19 ± 1.34	69.08 ± 2.28	59.14 ± 1.7

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Table S3: GPP Mean for 1986-2005 [PgC yr^{-1}]

Model	Global	NH	SH	Tropics
FLUXCOM	93.04 ± 0.41	31.09 ± 0.2	61.95 ± 0.49	55.34 ± 0.31
MTE	102.63 ± 1.17	37.5 ± 0.75	65.13 ± 0.68	56.72 ± 0.5
Ncycle MMM CMIP5e	107.32 ± 1.88	35.4 ± 0.9	71.92 ± 1.12	61.57 ± 0.98
non-Ncycle MMM CMIP5e	132.9 ± 2.07	45.37 ± 0.91	87.52 ± 1.53	73.29 ± 1.18
Ncycle MMM CMIP5c	106.47 ± 1.6	34.96 ± 0.82	71.51 ± 0.87	61.18 ± 0.78
non-Ncycle MMM CMIP5c	120.64 ± 2.23	45.22 ± 1.1	75.41 ± 1.26	63.41 ± 1.1
Ncycle MMM CMIP6c	99.85 ± 1.59	37.89 ± 1.05	61.95 ± 0.64	51.53 ± 0.57
non-Ncycle MMM CMIP6c	114.3 ± 2.6	41.57 ± 1.45	72.73 ± 1.22	62.09 ± 1.04
Ncycle MMM CMIP6e	105.18 ± 2.15	39.59 ± 1.32	65.59 ± 1.09	54.68 ± 0.91
non-Ncycle MMM CMIP6e	111.52 ± 2.12	42.71 ± 1.38	68.81 ± 1.05	58.57 ± 0.87

Table S4: GPP Trend for 1986-2005 [PgC yr^{-2}]

Model	Global	NH	SH	Tropics
BNU-ESM CMIP5e	0.3915 ± 0.0353	0.1594 ± 0.0357	0.2321 ± 0.0283	0.1665 ± 0.026
BNU-ESM CMIP5c	0.3177 ± 0.0272	0.2067 ± 0.023	0.111 ± 0.0258	0.1123 ± 0.0257
CESM1-BGC CMIP5e	0.2964 ± 0.0552	0.1536 ± 0.0246	0.1428 ± 0.0395	0.1127 ± 0.0359
CESM1-BGC CMIP5c	0.2269 ± 0.0419	0.0828 ± 0.0242	0.1441 ± 0.0254	0.1322 ± 0.02
CanESM2 CMIP5e	0.1535 ± 0.1023	0.113 ± 0.0215	0.0405 ± 0.1098	0.0422 ± 0.0818
CanESM2 CMIP5c	0.1575 ± 0.0886	0.0826 ± 0.0222	0.075 ± 0.0812	0.0879 ± 0.0681
FIO-ESM CMIP5e	0.3111 ± 0.0536	0.1364 ± 0.0228	0.1746 ± 0.0536	0.1641 ± 0.0502
GFDL-ESM2G CMIP5e	0.4753 ± 0.1595	0.161 ± 0.0312	0.3143 ± 0.1598	0.2258 ± 0.0971
GFDL-ESM2G CMIP5c	0.4292 ± 0.098	0.2338 ± 0.0376	0.1955 ± 0.1043	0.1751 ± 0.0672
GFDL-ESM2M CMIP5e	0.1855 ± 0.2006	0.0493 ± 0.0553	0.1362 ± 0.2171	0.1544 ± 0.1496
GFDL-ESM2M CMIP5c	0.2511 ± 0.2294	0.1939 ± 0.0321	0.0571 ± 0.2438	0.1613 ± 0.166
HadGEM2-CC CMIP5c	0.4561 ± 0.0713	0.2295 ± 0.0498	0.2266 ± 0.0649	0.2017 ± 0.069
HadGEM2-ES CMIP5c	0.5642 ± 0.0741	0.159 ± 0.0395	0.4051 ± 0.0774	0.3473 ± 0.0763
IPSL-CM5A-LR CMIP5c	0.2351 ± 0.0689	0.2287 ± 0.0394	0.0064 ± 0.0635	0.0757 ± 0.0559
IPSL-CM5A-MR CMIP5c	0.4459 ± 0.0747	0.2547 ± 0.0519	0.1913 ± 0.0657	0.2099 ± 0.0574
IPSL-CM5B-LR CMIP5c	0.3361 ± 0.0697	0.2477 ± 0.0336	0.0884 ± 0.0716	0.0885 ± 0.0619
MIROC-ESM-CHEM CMIP5c	0.3517 ± 0.0552	0.1065 ± 0.0287	0.2452 ± 0.0517	0.2028 ± 0.0443
MIROC-ESM CMIP5e	0.3434 ± 0.0589	0.1697 ± 0.0404	0.1738 ± 0.0613	0.1635 ± 0.0469
MIROC-ESM CMIP5c	0.3824 ± 0.061	0.129 ± 0.0285	0.2534 ± 0.0556	0.2379 ± 0.0416
MPI-ESM-LR CMIP5e	0.3901 ± 0.0835	0.2193 ± 0.0505	0.1709 ± 0.0881	0.1509 ± 0.0378
MPI-ESM-LR CMIP5c	0.5023 ± 0.1059	0.1328 ± 0.0358	0.3695 ± 0.1157	0.2491 ± 0.0484
MPI-ESM-MR CMIP5c	0.5187 ± 0.0816	0.2771 ± 0.0523	0.2415 ± 0.0727	0.2042 ± 0.0405
MRI-ESM1 CMIP5e	0.2532 ± 0.1083	0.0754 ± 0.0558	0.1777 ± 0.0678	0.1459 ± 0.0596
NorESM1-ME CMIP5e	0.249 ± 0.037	0.12 ± 0.0214	0.129 ± 0.0349	0.1087 ± 0.0349
NorESM1-ME CMIP5c	0.2346 ± 0.0367	0.1483 ± 0.0192	0.0862 ± 0.0318	0.0794 ± 0.0268
inmcm4 CMIP5c	0.1868 ± 0.0651	0.0665 ± 0.0276	0.1203 ± 0.0611	0.0776 ± 0.0546
ACCESS-ESM1-5 CMIP6e	0.1563 ± 0.0361	0.1833 ± 0.0153	-0.0269 ± 0.0366	-0.0358 ± 0.034
ACCESS-ESM1-5 CMIP6c	0.03 ± 0.0503	0.146 ± 0.011	-0.116 ± 0.0509	-0.0997 ± 0.046

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Table S4: GPP Trend for 1986-2005 [PgC yr^{-2}]

Model	Global	NH	SH	Tropics
CESM2-WACCM CMIP6c	0.2483 ± 0.0368	0.1584 ± 0.0245	0.0899 ± 0.028	0.0957 ± 0.0206
CESM2 CMIP6c	0.3699 ± 0.0433	0.2041 ± 0.0273	0.1658 ± 0.0385	0.1402 ± 0.0306
CMCC-CM2-SR5 CMIP6c	0.275 ± 0.0566	0.1526 ± 0.0351	0.1224 ± 0.0477	0.0931 ± 0.0278
CMCC-ESM2 CMIP6c	0.2432 ± 0.032	0.1699 ± 0.0283	0.0732 ± 0.0328	0.0556 ± 0.0212
CNRM-ESM2-1 CMIP6e	0.0254 ± 0.0855	0.1013 ± 0.0376	-0.0759 ± 0.0795	-0.0334 ± 0.045
CNRM-ESM2-1 CMIP6c	0.2927 ± 0.0639	0.2179 ± 0.0424	0.0749 ± 0.062	0.0456 ± 0.0354
CanESM5-CanOE CMIP6e	0.3806 ± 0.0666	0.1786 ± 0.0312	0.2019 ± 0.0517	0.1724 ± 0.0406
CanESM5-CanOE CMIP6c	0.4188 ± 0.0691	0.1931 ± 0.0252	0.2256 ± 0.0636	0.1936 ± 0.051
CanESM5 CMIP6e	0.3736 ± 0.0545	0.1698 ± 0.0268	0.2038 ± 0.0499	0.1356 ± 0.0364
CanESM5 CMIP6c	0.3238 ± 0.0402	0.143 ± 0.0272	0.1808 ± 0.026	0.1474 ± 0.0211
EC-Earth3-CC CMIP6e	0.4508 ± 0.0697	0.335 ± 0.0451	0.1159 ± 0.052	0.1045 ± 0.029
EC-Earth3-CC CMIP6c	0.2899 ± 0.0724	0.2531 ± 0.0357	0.0369 ± 0.0578	0.0732 ± 0.0407
EC-Earth3-Veg CMIP6c	0.2826 ± 0.0613	0.2198 ± 0.0319	0.0628 ± 0.0489	0.097 ± 0.0325
GFDL-ESM4 CMIP6e	0.3558 ± 0.0449	0.1912 ± 0.0223	0.1645 ± 0.0485	0.1283 ± 0.0438
GFDL-ESM4 CMIP6c	0.1299 ± 0.069	0.1378 ± 0.0236	-0.0079 ± 0.0643	-0.0335 ± 0.0472
INM-CM4-8 CMIP6c	0.5962 ± 0.0823	0.1647 ± 0.0249	0.4314 ± 0.0631	0.3916 ± 0.0546
INM-CM5-0 CMIP6c	0.3037 ± 0.0746	0.1643 ± 0.0314	0.1394 ± 0.0504	0.1419 ± 0.0427
IPSL-CM6A-LR CMIP6c	0.4168 ± 0.0369	0.1655 ± 0.0233	0.2512 ± 0.0446	0.2223 ± 0.0316
MIROC-ES2L CMIP6e	0.2258 ± 0.0223	0.1439 ± 0.0232	0.0819 ± 0.0134	0.078 ± 0.0103
MIROC-ES2L CMIP6c	0.2643 ± 0.0295	0.1505 ± 0.0295	0.1138 ± 0.0201	0.105 ± 0.0173
MPI-ESM1-2-HAM CMIP6c	0.7854 ± 0.136	0.3564 ± 0.0625	0.429 ± 0.1046	0.371 ± 0.075
MPI-ESM1-2-LR CMIP6e	0.4284 ± 0.1123	0.2526 ± 0.0273	0.1758 ± 0.1121	0.1707 ± 0.0784
MPI-ESM1-2-LR CMIP6c	0.5008 ± 0.0854	0.2469 ± 0.044	0.2539 ± 0.0763	0.2459 ± 0.0491
MRI-ESM2-0 CMIP6e	0.4292 ± 0.1318	0.4558 ± 0.0525	-0.0266 ± 0.1186	-0.0055 ± 0.108
MRI-ESM2-0 CMIP6c	0.6198 ± 0.1118	0.5943 ± 0.069	0.0254 ± 0.083	0.0384 ± 0.0723
NorESM2-LM CMIP6e	0.2863 ± 0.0433	0.1435 ± 0.0213	0.1429 ± 0.0332	0.1232 ± 0.029
NorESM2-LM CMIP6c	0.2658 ± 0.0363	0.1524 ± 0.0266	0.1135 ± 0.0317	0.0902 ± 0.0296
NorESM2-MM CMIP6c	0.2231 ± 0.0491	0.1395 ± 0.0152	0.0836 ± 0.0505	0.0667 ± 0.0406
SAM0-UNICON CMIP6c	0.2424 ± 0.0624	0.1189 ± 0.0247	0.1234 ± 0.0642	0.1242 ± 0.064
TaiESM1 CMIP6c	0.2062 ± 0.0334	0.1346 ± 0.0259	0.0716 ± 0.0269	0.0599 ± 0.0216
UKESM1-0-LL CMIP6e	0.461 ± 0.0834	0.2334 ± 0.0454	0.2277 ± 0.0993	0.2065 ± 0.0864
UKESM1-0-LL CMIP6c	0.1936 ± 0.1111	0.1672 ± 0.0442	0.0264 ± 0.1086	0.0476 ± 0.0874
GLASS	0.4466 ± 0.0871	0.1759 ± 0.0337	0.2707 ± 0.0646	0.1939 ± 0.0502
FLUXCOM	-	-	-	-
MTE	-	-	-	-
Ncycle MMM CMIP5e	0.2727 ± 0.0388	0.1368 ± 0.0158	0.1359 ± 0.031	0.1107 ± 0.0293
non-Ncycle MMM CMIP5e	0.3127 ± 0.0367	0.1354 ± 0.0176	0.1774 ± 0.0444	0.1516 ± 0.0306
Ncycle MMM CMIP5c	0.2307 ± 0.0332	0.1156 ± 0.0179	0.1152 ± 0.0217	0.1058 ± 0.0187
non-Ncycle MMM CMIP5c	0.3657 ± 0.0224	0.1816 ± 0.0092	0.1841 ± 0.0251	0.1731 ± 0.0163
Ncycle MMM CMIP6c	0.2594 ± 0.0162	0.1722 ± 0.0098	0.0871 ± 0.0148	0.0853 ± 0.0106
non-Ncycle MMM CMIP6c	0.4317 ± 0.0191	0.2374 ± 0.014	0.1943 ± 0.0164	0.1686 ± 0.012
Ncycle MMM CMIP6e	0.3336 ± 0.0335	0.2147 ± 0.0146	0.119 ± 0.0334	0.1073 ± 0.0258
non-Ncycle MMM CMIP6e	0.3128 ± 0.0413	0.2193 ± 0.0187	0.0935 ± 0.0357	0.0794 ± 0.0293

Table S5: NBP Mean for 1986-2005 [PgC yr⁻¹]

Model	Global	NH	SH	Tropics
BNU-ESM CMIP5e	0.36 ± 0.92	0.39 ± 0.69	-0.03 ± 0.94	0.01 ± 0.96
BNU-ESM CMIP5c	1.32 ± 1.15	0.89 ± 0.59	0.43 ± 1.04	0.39 ± 0.99
CESM1-BGC CMIP5e	-0.08 ± 0.97	0.06 ± 0.52	-0.14 ± 0.65	-0.11 ± 0.55
CESM1-BGC CMIP5c	-0.14 ± 0.67	0.02 ± 0.36	-0.17 ± 0.6	-0.12 ± 0.41
CanESM2 CMIP5e	0.3 ± 2.47	0.23 ± 0.54	0.08 ± 2.59	0.12 ± 1.94
CanESM2 CMIP5c	0.21 ± 2.07	0.11 ± 0.34	0.1 ± 1.89	0.07 ± 1.4
FIO-ESM CMIP5e	1.84 ± 0.64	0.78 ± 0.17	1.06 ± 0.61	0.91 ± 0.62
GFDL-ESM2G CMIP5e	0.9 ± 2.95	0.39 ± 0.78	0.5 ± 2.83	0.23 ± 2.01
GFDL-ESM2G CMIP5c	0.62 ± 2.16	0.39 ± 0.9	0.23 ± 1.86	0.01 ± 1.3
GFDL-ESM2M CMIP5e	0.31 ± 3.0	0.22 ± 1.09	0.08 ± 3.54	0.02 ± 2.74
GFDL-ESM2M CMIP5c	0.55 ± 3.91	0.29 ± 0.94	0.26 ± 4.04	0.09 ± 3.22
HadGEM2-CC CMIP5c	0.98 ± 1.29	0.82 ± 0.67	0.16 ± 1.06	0.09 ± 1.02
HadGEM2-ES CMIP5c	1.35 ± 1.21	0.76 ± 0.39	0.58 ± 1.17	0.53 ± 1.09
IPSL-CM5A-LR CMIP5c	0.73 ± 1.16	0.45 ± 0.6	0.27 ± 1.07	0.36 ± 0.99
IPSL-CM5A-MR CMIP5c	0.97 ± 1.46	0.44 ± 0.77	0.53 ± 1.26	0.63 ± 1.12
IPSL-CM5B-LR CMIP5c	1.57 ± 1.31	0.84 ± 0.48	0.73 ± 1.33	0.75 ± 1.22
MIROC-ESM-CHEM CMIP5c	1.68 ± 1.41	0.91 ± 0.51	0.77 ± 1.27	0.61 ± 1.1
MIROC-ESM CMIP5e	1.19 ± 1.66	1.28 ± 0.59	-0.1 ± 1.53	-0.16 ± 1.31
MIROC-ESM CMIP5c	0.65 ± 1.52	1.14 ± 0.61	-0.49 ± 1.37	-0.44 ± 1.06
MPI-ESM-LR CMIP5e	1.28 ± 1.16	1.2 ± 0.69	0.08 ± 0.94	-0.02 ± 0.45
MPI-ESM-LR CMIP5c	1.49 ± 1.72	1.08 ± 0.64	0.41 ± 1.39	0.11 ± 0.77
MPI-ESM-MR CMIP5c	1.69 ± 1.25	1.24 ± 0.63	0.45 ± 1.01	0.19 ± 0.64
MRI-ESM1 CMIP5e	2.05 ± 0.98	1.76 ± 0.54	0.29 ± 0.8	0.29 ± 0.74
NorESM1-ME CMIP5e	-0.11 ± 0.55	-0.02 ± 0.42	-0.1 ± 0.55	-0.09 ± 0.45
NorESM1-ME CMIP5c	-0.08 ± 0.84	-0.04 ± 0.37	-0.04 ± 0.71	-0.05 ± 0.58
inmcm4 CMIP5c	2.18 ± 1.15	0.72 ± 0.5	1.46 ± 1.07	1.27 ± 0.97
ACCESS-ESM1-5 CMIP6e	1.31 ± 0.72	0.84 ± 0.34	0.47 ± 0.75	0.36 ± 0.64
ACCESS-ESM1-5 CMIP6c	0.77 ± 1.13	0.78 ± 0.31	-0.01 ± 0.97	-0.06 ± 0.84
CESM2-WACCM CMIP6c	1.03 ± 0.54	0.51 ± 0.34	0.52 ± 0.35	0.5 ± 0.23
CESM2 CMIP6c	1.08 ± 0.58	0.6 ± 0.32	0.49 ± 0.4	0.46 ± 0.35
CMCC-CM2-SR5 CMIP6c	0.89 ± 1.12	0.19 ± 0.58	0.7 ± 0.89	0.63 ± 0.54
CMCC-ESM2 CMIP6c	0.89 ± 0.63	0.22 ± 0.52	0.67 ± 0.57	0.62 ± 0.35
CNRM-ESM2-1 CMIP6e	1.86 ± 1.02	1.46 ± 0.45	0.4 ± 0.82	0.25 ± 0.52
CNRM-ESM2-1 CMIP6c	1.89 ± 0.69	1.55 ± 0.53	0.34 ± 0.65	0.16 ± 0.44
CanESM5-CanOE CMIP6e	0.51 ± 1.46	0.13 ± 0.51	0.38 ± 1.15	0.41 ± 1.0
CanESM5-CanOE CMIP6c	0.08 ± 1.87	-0.05 ± 0.52	0.13 ± 1.54	0.21 ± 1.36
CanESM5 CMIP6e	0.62 ± 1.29	0.19 ± 0.32	0.43 ± 1.12	0.39 ± 0.95
CanESM5 CMIP6c	0.44 ± 0.69	0.15 ± 0.32	0.29 ± 0.51	0.35 ± 0.47
EC-Earth3-CC CMIP6e	0.62 ± 1.77	0.6 ± 0.86	0.01 ± 1.48	0.28 ± 1.02
EC-Earth3-CC CMIP6c	0.44 ± 1.8	0.51 ± 1.0	-0.07 ± 1.73	0.16 ± 1.36
EC-Earth3-Veg CMIP6c	0.49 ± 1.69	0.41 ± 0.79	0.08 ± 1.36	0.27 ± 1.12
GFDL-ESM4 CMIP6e	0.28 ± 1.28	0.19 ± 0.35	0.09 ± 1.12	0.12 ± 1.04
GFDL-ESM4 CMIP6c	-0.13 ± 1.63	-0.08 ± 0.38	-0.05 ± 1.44	0.05 ± 1.15

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Table S5: NBP Mean for 1986-2005 [PgC yr⁻¹]

Model	Global	NH	SH	Tropics
INM-CM4-8 CMIP6c	4.46 ± 2.21	1.55 ± 0.75	2.91 ± 1.54	2.55 ± 1.23
INM-CM5-0 CMIP6c	3.7 ± 2.05	1.44 ± 0.85	2.25 ± 1.36	1.94 ± 1.19
IPSL-CM6A-LR CMIP6c	1.06 ± 0.72	0.83 ± 0.21	0.22 ± 0.71	0.19 ± 0.57
MIROC-ES2L CMIP6e	1.61 ± 0.64	1.38 ± 0.34	0.23 ± 0.52	0.27 ± 0.42
MIROC-ES2L CMIP6c	1.99 ± 1.24	1.49 ± 0.4	0.5 ± 1.03	0.46 ± 0.95
MPI-ESM1-1-2-HAM CMIP6c	1.04 ± 1.31	0.33 ± 0.4	0.71 ± 1.19	0.58 ± 0.91
MPI-ESM1-2-LR CMIP6e	1.09 ± 1.47	0.59 ± 0.42	0.5 ± 1.46	0.45 ± 1.15
MPI-ESM1-2-LR CMIP6c	0.89 ± 1.06	0.44 ± 0.52	0.45 ± 1.03	0.42 ± 0.82
MRI-ESM2-0 CMIP6e	1.33 ± 1.42	1.42 ± 0.65	-0.09 ± 1.3	-0.16 ± 1.25
MRI-ESM2-0 CMIP6c	1.54 ± 1.21	1.56 ± 0.72	-0.02 ± 1.16	-0.05 ± 1.05
NorESM2-LM CMIP6e	1.08 ± 0.66	0.53 ± 0.37	0.55 ± 0.39	0.52 ± 0.36
NorESM2-LM CMIP6c	0.94 ± 0.53	0.44 ± 0.3	0.5 ± 0.39	0.46 ± 0.39
NorESM2-MM CMIP6c	1.07 ± 0.69	0.58 ± 0.25	0.49 ± 0.5	0.44 ± 0.44
SAM0-UNICON CMIP6c	0.06 ± 1.02	-0.01 ± 0.58	0.07 ± 1.14	0.09 ± 0.97
TaiESM1 CMIP6c	-0.11 ± 0.8	0.13 ± 0.45	-0.24 ± 0.83	-0.19 ± 0.4
UKESM1-0-LL CMIP6e	1.0 ± 1.06	0.63 ± 0.38	0.38 ± 1.18	0.3 ± 0.96
UKESM1-0-LL CMIP6c	0.63 ± 1.01	0.37 ± 0.29	0.26 ± 1.1	0.22 ± 0.93
CAMS	1.72 ± 0.98	1.86 ± 0.47	-0.14 ± 0.74	-0.47 ± 0.59
Jena_CarboScope	0.71 ± 0.94	1.25 ± 0.36	-0.54 ± 0.72	-0.24 ± 0.62
GCP	1.0 ± 0.84	NaN	NaN	NaN
Ncycle MMM CMIP5e	-0.09 ± 0.59	0.02 ± 0.36	-0.12 ± 0.45	-0.1 ± 0.41
non-Ncycle MMM CMIP5e	1.0 ± 0.68	0.71 ± 0.3	0.29 ± 0.76	0.22 ± 0.59
Ncycle MMM CMIP5c	-0.11 ± 0.48	-0.01 ± 0.29	-0.1 ± 0.43	-0.09 ± 0.34
non-Ncycle MMM CMIP5c	1.14 ± 0.66	0.67 ± 0.29	0.47 ± 0.52	0.37 ± 0.43
Ncycle MMM CMIP6c	0.84 ± 0.34	0.48 ± 0.16	0.37 ± 0.28	0.34 ± 0.22
non-Ncycle MMM CMIP6c	1.56 ± 0.62	0.81 ± 0.25	0.76 ± 0.47	0.66 ± 0.39
Ncycle MMM CMIP6e	1.22 ± 0.57	0.79 ± 0.24	0.43 ± 0.54	0.38 ± 0.42
non-Ncycle MMM CMIP6e	0.92 ± 0.48	0.68 ± 0.27	0.24 ± 0.39	0.2 ± 0.36

Table S6: NBP Trend for 1986-2005 [PgC yr⁻²]

Model	Global	NH	SH	Tropics
BNU-ESM CMIP5e	0.0343 ± 0.0358	0.0217 ± 0.0269	0.0127 ± 0.0373	-0.0003 ± 0.0385
BNU-ESM CMIP5c	-0.0049 ± 0.0457	-0.0067 ± 0.0235	0.0018 ± 0.0415	0.0087 ± 0.0396
CESM1-BGC CMIP5e	0.0468 ± 0.037	0.0331 ± 0.0192	0.0137 ± 0.0256	0.0117 ± 0.0219
CESM1-BGC CMIP5c	0.0251 ± 0.0259	0.0255 ± 0.0131	-0.0003 ± 0.024	0.0037 ± 0.0164
CanESM2 CMIP5e	-0.0427 ± 0.0979	0.0048 ± 0.0216	-0.0475 ± 0.1028	-0.0404 ± 0.0767
CanESM2 CMIP5c	-0.0579 ± 0.0815	-0.0105 ± 0.0135	-0.0473 ± 0.0746	-0.0264 ± 0.0555
FIO-ESM CMIP5e	0.0323 ± 0.0243	0.0128 ± 0.006	0.0195 ± 0.024	0.0218 ± 0.0242
GFDL-ESM2G CMIP5e	0.0966 ± 0.1154	0.0597 ± 0.0276	0.037 ± 0.1126	0.0378 ± 0.0796
GFDL-ESM2G CMIP5c	0.0726 ± 0.0845	0.0578 ± 0.0332	0.0148 ± 0.074	0.0319 ± 0.0514
GFDL-ESM2M CMIP5e	-0.0084 ± 0.1195	0.0012 ± 0.0434	-0.0096 ± 0.1412	-0.0308 ± 0.1091

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Table S6: NBP Trend for 1986-2005 [PgC yr^{-2}]

Model	Global	NH	SH	Tropics
GFDL-ESM2M CMIP5c	0.0941 ± 0.1543	0.0595 ± 0.0349	0.0347 ± 0.1607	0.047 ± 0.1277
HadGEM2-CC CMIP5c	0.1189 ± 0.0439	0.0694 ± 0.0214	0.0495 ± 0.0411	0.034 ± 0.0405
HadGEM2-ES CMIP5c	0.1342 ± 0.0374	0.0448 ± 0.0118	0.0893 ± 0.0422	0.0667 ± 0.0411
IPSL-CM5A-LR CMIP5c	0.0674 ± 0.0435	0.0511 ± 0.0209	0.0162 ± 0.0424	0.0205 ± 0.0391
IPSL-CM5A-MR CMIP5c	0.0369 ± 0.0575	0.0219 ± 0.0302	0.0151 ± 0.0503	0.0138 ± 0.0446
IPSL-CM5B-LR CMIP5c	0.0204 ± 0.0518	0.0379 ± 0.0169	-0.0175 ± 0.0527	-0.0116 ± 0.0484
MIROC-ESM-CHEM CMIP5c	0.0672 ± 0.054	0.0082 ± 0.0201	0.0591 ± 0.0484	0.0493 ± 0.0424
MIROC-ESM CMIP5e	0.1939 ± 0.0477	0.0203 ± 0.0229	0.1736 ± 0.0453	0.1644 ± 0.035
MIROC-ESM CMIP5c	0.105 ± 0.0553	0.0004 ± 0.0242	0.1046 ± 0.0487	0.0925 ± 0.0364
MPI-ESM-LR CMIP5e	0.0116 ± 0.046	0.0065 ± 0.0275	0.0051 ± 0.0372	0.0074 ± 0.0179
MPI-ESM-LR CMIP5c	0.0878 ± 0.0655	0.0575 ± 0.0218	0.0303 ± 0.0551	0.033 ± 0.0296
MPI-ESM-MR CMIP5c	0.0474 ± 0.0487	0.0335 ± 0.0236	0.0139 ± 0.0402	0.0119 ± 0.0254
MRI-ESM1 CMIP5e	-0.0085 ± 0.0391	-0.0036 ± 0.0215	-0.0049 ± 0.0318	-0.0103 ± 0.0294
NorESM1-ME CMIP5e	0.0399 ± 0.0198	0.0158 ± 0.0162	0.024 ± 0.0211	0.0238 ± 0.0172
NorESM1-ME CMIP5c	0.0213 ± 0.033	0.0286 ± 0.0132	-0.0073 ± 0.0282	-0.0087 ± 0.0232
inmcm4 CMIP5c	0.0176 ± 0.0457	0.0135 ± 0.0198	0.0042 ± 0.0427	-0.0169 ± 0.0384
ACCESS-ESM1-5 CMIP6e	-0.0457 ± 0.0266	0.0185 ± 0.0129	-0.0642 ± 0.0257	-0.0521 ± 0.0222
ACCESS-ESM1-5 CMIP6c	-0.11 ± 0.0366	-0.0195 ± 0.0115	-0.0906 ± 0.0323	-0.0735 ± 0.0288
CESM2-WACCM CMIP6c	0.0307 ± 0.0202	0.0203 ± 0.0127	0.0105 ± 0.0137	0.011 ± 0.0088
CESM2 CMIP6c	0.0631 ± 0.0179	0.0302 ± 0.0104	0.0329 ± 0.0141	0.0292 ± 0.0122
CMCC-CM2-SR5 CMIP6c	0.0156 ± 0.0447	-0.0046 ± 0.0233	0.0202 ± 0.0351	0.0145 ± 0.0213
CMCC-ESM2 CMIP6c	0.0217 ± 0.0246	0.011 ± 0.0206	0.0107 ± 0.0226	0.0091 ± 0.0137
CNRM-ESM2-1 CMIP6e	-0.0198 ± 0.0405	0.0175 ± 0.0174	-0.0373 ± 0.0315	-0.0247 ± 0.0201
CNRM-ESM2-1 CMIP6c	0.0343 ± 0.0263	0.0406 ± 0.0189	-0.0064 ± 0.0259	-0.0063 ± 0.0175
CanESM5-CanOE CMIP6e	0.0559 ± 0.0568	0.0509 ± 0.0162	0.005 ± 0.046	0.01 ± 0.0399
CanESM5-CanOE CMIP6c	0.0923 ± 0.0712	0.0572 ± 0.0159	0.0352 ± 0.0608	0.0353 ± 0.0535
CanESM5 CMIP6e	-0.0218 ± 0.0512	0.0109 ± 0.0124	-0.0327 ± 0.0439	-0.0484 ± 0.0362
CanESM5 CMIP6c	-0.0028 ± 0.0273	0.0117 ± 0.0127	-0.0145 ± 0.0198	-0.0122 ± 0.0184
EC-Earth3-CC CMIP6e	0.0115 ± 0.0703	0.033 ± 0.0332	-0.0216 ± 0.0587	-0.0121 ± 0.0406
EC-Earth3-CC CMIP6c	0.0138 ± 0.0715	-0.0066 ± 0.0397	0.0205 ± 0.0686	0.0151 ± 0.0539
EC-Earth3-Veg CMIP6c	-0.0126 ± 0.0672	0.0324 ± 0.0306	-0.045 ± 0.0533	-0.0237 ± 0.0444
GFDL-ESM4 CMIP6e	0.0603 ± 0.0492	0.0292 ± 0.0119	0.0311 ± 0.0442	0.0304 ± 0.0409
GFDL-ESM4 CMIP6c	-0.0066 ± 0.0649	0.0197 ± 0.0143	-0.0263 ± 0.057	-0.0383 ± 0.045
INM-CM4-8 CMIP6c	0.0267 ± 0.088	0.004 ± 0.0298	0.0228 ± 0.0611	0.0229 ± 0.0487
INM-CM5-0 CMIP6c	-0.0705 ± 0.0801	-0.002 ± 0.034	-0.0685 ± 0.0519	-0.0462 ± 0.0462
IPSL-CM6A-LR CMIP6c	0.0542 ± 0.0255	0.0158 ± 0.0077	0.0384 ± 0.0269	0.0305 ± 0.0217
MIROC-ES2L CMIP6e	0.0081 ± 0.0253	0.0155 ± 0.0131	-0.0074 ± 0.0208	-0.0078 ± 0.0165
MIROC-ES2L CMIP6c	-0.0516 ± 0.0477	-0.0141 ± 0.0156	-0.0375 ± 0.0402	-0.0319 ± 0.037
MPI-ESM-1-2-HAM CMIP6c	0.0718 ± 0.0496	0.021 ± 0.0152	0.0508 ± 0.0459	0.0473 ± 0.0344
MPI-ESM1-2-LR CMIP6e	0.0644 ± 0.0565	0.0436 ± 0.0134	0.0208 ± 0.0578	0.0212 ± 0.0456
MPI-ESM1-2-LR CMIP6c	0.0487 ± 0.0407	0.0327 ± 0.0191	0.016 ± 0.041	0.0279 ± 0.0319
MRI-ESM2-0 CMIP6e	0.0356 ± 0.0561	0.0595 ± 0.0215	-0.0239 ± 0.0514	-0.0229 ± 0.0494
MRI-ESM2-0 CMIP6c	0.0425 ± 0.0473	0.0975 ± 0.0169	-0.055 ± 0.0444	-0.0489 ± 0.0404

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Table S6: NBP Trend for 1986-2005 [PgC yr^{-2}]

Model	Global	NH	SH	Tropics
NorESM2-LM CMIP6e	0.0472 ± 0.024	0.0205 ± 0.0141	0.0266 ± 0.0141	0.0249 ± 0.0129
NorESM2-LM CMIP6c	0.0367 ± 0.0191	0.0206 ± 0.0111	0.0161 ± 0.0151	0.0157 ± 0.0152
NorESM2-MM CMIP6c	0.0179 ± 0.0273	0.0103 ± 0.0098	0.0076 ± 0.0198	0.0052 ± 0.0174
SAM0-UNICON CMIP6c	0.0417 ± 0.0394	0.0177 ± 0.0226	0.024 ± 0.0452	0.0219 ± 0.0383
TaiESM1 CMIP6c	-0.0034 ± 0.032	0.0129 ± 0.0176	-0.0162 ± 0.0327	-0.0092 ± 0.0159
UKESM1-0-LL CMIP6e	0.0335 ± 0.042	0.0409 ± 0.0122	-0.0074 ± 0.0475	-0.0034 ± 0.039
UKESM1-0-LL CMIP6c	-0.0341 ± 0.0399	0.0193 ± 0.011	-0.0534 ± 0.0425	-0.0504 ± 0.0356
CAMS	0.0545 ± 0.037	0.0238 ± 0.0178	0.0307 ± 0.0285	0.0186 ± 0.0232
Jena_CarboScope	0.0006 ± 0.0374	0.0085 ± 0.0143	-0.0079 ± 0.0287	-0.0038 ± 0.0246
GCP	0.0255 ± 0.033	NaN	NaN	NaN
Ncycle MMM CMIP5e	0.0433 ± 0.0213	0.0245 ± 0.0133	0.0189 ± 0.0175	0.0177 ± 0.0158
non-Ncycle MMM CMIP5e	0.0164 ± 0.027	0.0147 ± 0.0113	0.0017 ± 0.0304	-0.0021 ± 0.0236
Ncycle MMM CMIP5c	0.0232 ± 0.0185	0.0271 ± 0.0094	-0.0038 ± 0.0171	-0.0025 ± 0.0136
non-Ncycle MMM CMIP5c	0.0526 ± 0.0232	0.0357 ± 0.0082	0.0169 ± 0.0204	0.0176 ± 0.0167
Ncycle MMM CMIP6c	0.0064 ± 0.0133	0.0114 ± 0.0057	-0.0049 ± 0.0109	-0.0025 ± 0.0086
non-Ncycle MMM CMIP6c	0.0269 ± 0.024	0.0295 ± 0.007	-0.0026 ± 0.0187	-0.0018 ± 0.0155
Ncycle MMM CMIP6e	0.0214 ± 0.022	0.0277 ± 0.0068	-0.0063 ± 0.0216	-0.0034 ± 0.0168
non-Ncycle MMM CMIP6e	0.022 ± 0.0184	0.0336 ± 0.0076	-0.0116 ± 0.0153	-0.0111 ± 0.014

Table S7: Carbon Storage Totals [PgC]

	cVeg	cSoil + cLitter
BNU-ESM CMIP5e	1205	856
BNU-ESM CMIP5c	1259	913
CESM1-BGC CMIP5e	538	515
CESM1-BGC CMIP5c	532	513
GFDL-ESM2G CMIP5e	680	1434
GFDL-ESM2G CMIP5c	660	1422
GFDL-ESM2M CMIP5e	802	1292
GFDL-ESM2M CMIP5c	766	1279
HadGEM2-CC CMIP5c	445	1103
HadGEM2-ES CMIP5c	458	1109
IPSL-CM5A-LR CMIP5c	634	1355
IPSL-CM5A-MR CMIP5c	639	1400
IPSL-CM5B-LR CMIP5c	501	1267
MIROC-ESM-CHEM CMIP5c	351	2567
MIROC-ESM CMIP5e	364	2564
MIROC-ESM CMIP5c	357	2572
MPI-ESM-LR CMIP5e	341	3039
MPI-ESM-LR CMIP5c	335	3036
MPI-ESM-MR CMIP5c	345	3092
MRI-ESM1 CMIP5e	562	1419

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Table S7: Carbon Storage Totals [PgC]

	cVeg	cSoil + cLitter
NorESM1-ME CMIP5e	556	552
NorESM1-ME CMIP5c	554	550
ACCESS-ESM1-5 CMIP6e	653	904
ACCESS-ESM1-5 CMIP6c	661	914
CESM2-WACCM CMIP6c	574	1201
CESM2 CMIP6c	482	1000
CMCC-CM2-SR5 CMIP6c	406	2908
CMCC-ESM2 CMIP6c	416	2913
CNRM-ESM2-1 CMIP6e	724	2279
CNRM-ESM2-1 CMIP6c	719	2281
CanESM5-CanOE CMIP6e	508	1475
CanESM5 CMIP6e	507	1470
CanESM5 CMIP6c	513	1486
EC-Earth3-CC CMIP6e	395	1546
EC-Earth3-CC CMIP6c	382	1535
EC-Earth3-Veg CMIP6c	333	1367
GFDL-ESM4 CMIP6c	342	514
IPSL-CM6A-LR CMIP6c	352	649
MIROC-ES2L CMIP6e	512	1417
MIROC-ES2L CMIP6c	531	1481
MPI-ESM-1-2-HAM CMIP6c	382	1030
MPI-ESM1-2-LR CMIP6e	370	977
MPI-ESM1-2-LR CMIP6c	367	980
MRI-ESM2-0 CMIP6e	478	1062
MRI-ESM2-0 CMIP6c	485	1224
NorESM2-LM CMIP6e	484	1014
NorESM2-LM CMIP6c	466	950
NorESM2-MM CMIP6c	471	898
SAM0-UNICON CMIP6c	590	577
TaiESM1 CMIP6c	498	525
UKESM1-0-LL CMIP6e	711	2100
UKESM1-0-LL CMIP6c	705	2118
OBS OBS historical	478	1561
Ncycle_mmm CMIP5e	547	534
non-Ncycle_mmm CMIP5e	521	2040
Ncycle_mmm CMIP5c	543	532
non-Ncycle_mmm CMIP5c	488	1920
Ncycle_mmm CMIP6c	485	1380
non-Ncycle_mmm CMIP6c	465	1197
Ncycle_mmm CMIP6e	510	1281
non-Ncycle_mmm CMIP6e	561	1618