

Table S1. The upper (θ_{up}) and lower (θ_{low}) thresholds of root zone soil moisture for PFTs in SSiB4/TRIFFID-Fire

Vegetation Types	θ_{up}	θ_{low}
BET	0.80	0.30
NET	0.80	0.30
BDT	0.80	0.30
C3 grasses	0.75	0.30
C4 plants	0.75	0.30
Shrubs	0.60	0.30
Tundra	0.60	0.30

Table S2. The maximum fire spread rate u_{max} (m s⁻¹) for PFTs in SSiB4/TRIFFID-Fire

Vegetation Types	u_{max}
BET	0.13
NET	0.15
BDT	0.13
C3 grasses	0.25
C4 plants	0.25
Shrubs	0.18
Tundra	0.25

Table S3. PFT-dependent combustion completeness factors for leaves (CC_{leaf}), stems (CC_{wood}), roots (CC_{root}), and mortality factors for leaves (M_{leaf}), stems (M_{wood}), roots (M_{root}).

PFT	CC_{leaf}	CC_{wood}	CC_{root}	M_{leaf}	M_{wood}	M_{root}
BET	0.70	0.08	0.00	0.70	0.10	0.10
NET	0.70	0.13	0.00	0.70	0.15	0.15
BDT	0.70	0.08	0.00	0.70	0.10	0.10
C3 grasses	0.80	0.50	0.00	0.80	0.50	0.30
C4 plants	0.80	0.50	0.00	0.80	0.50	0.30
Shrubs	0.70	0.18	0.00	0.70	0.20	0.15
Tundra	0.70	0.18	0.00	0.70	0.20	0.15

Table S4. Emission factors, EM_x (g species (kg dm)⁻¹), for PFTs in SSiB4/TRIFFID-Fire

EM	BET	NET	BDT	C3 grasses	C4 plants	Shrubs	Tundra
EM _{CO2}	1613	1549	1566	1647	1647	1647	1647
EM _{CO}	108	124	108	70	70	70	70
EM _{CH4}	6.3	5.1	5.8	2.5	2.5	2.5	2.5
EM _{NMHC}	7.1	5.3	14.6	5.7	5.7	5.7	5.7
EM _{H2}	3.11	1.66	2.09	0.97	0.97	0.97	0.97
EM _{NOx}	2.55	1.69	2.90	2.58	2.58	2.58	2.58
EM _{N2O}	0.2	0.25	0.25	0.18	0.18	0.18	0.18
EM _{PM25}	8.3	20.2	18.1	7.5	7.5	7.5	7.5
EM _{TPM}	10.9	15.3	18.1	8.5	8.5	8.5	8.5
EM _{TPC}	6.0	10.6	8.4	3.4	3.4	3.4	3.4
EM _{OC}	4.5	10.1	8.9	3.1	3.1	3.1	3.1
EM _{BC}	0.49	0.50	0.66	0.51	0.51	0.51	0.51

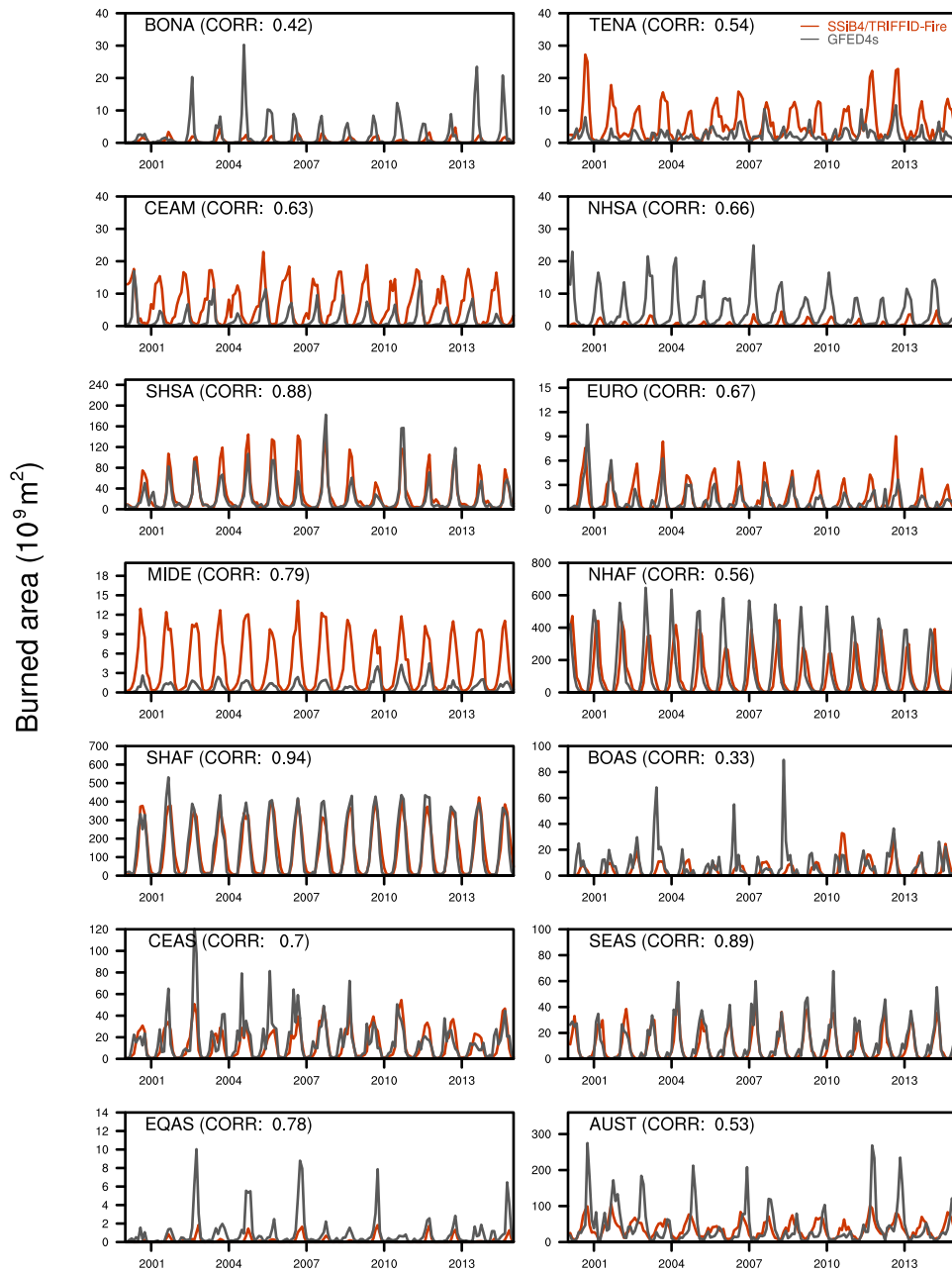


Figure S1. Monthly burned area (0.1 Mha) for 2000–2014 for GFED4s and SSiB4/TRIFFID-Fire in 14 GFED regions

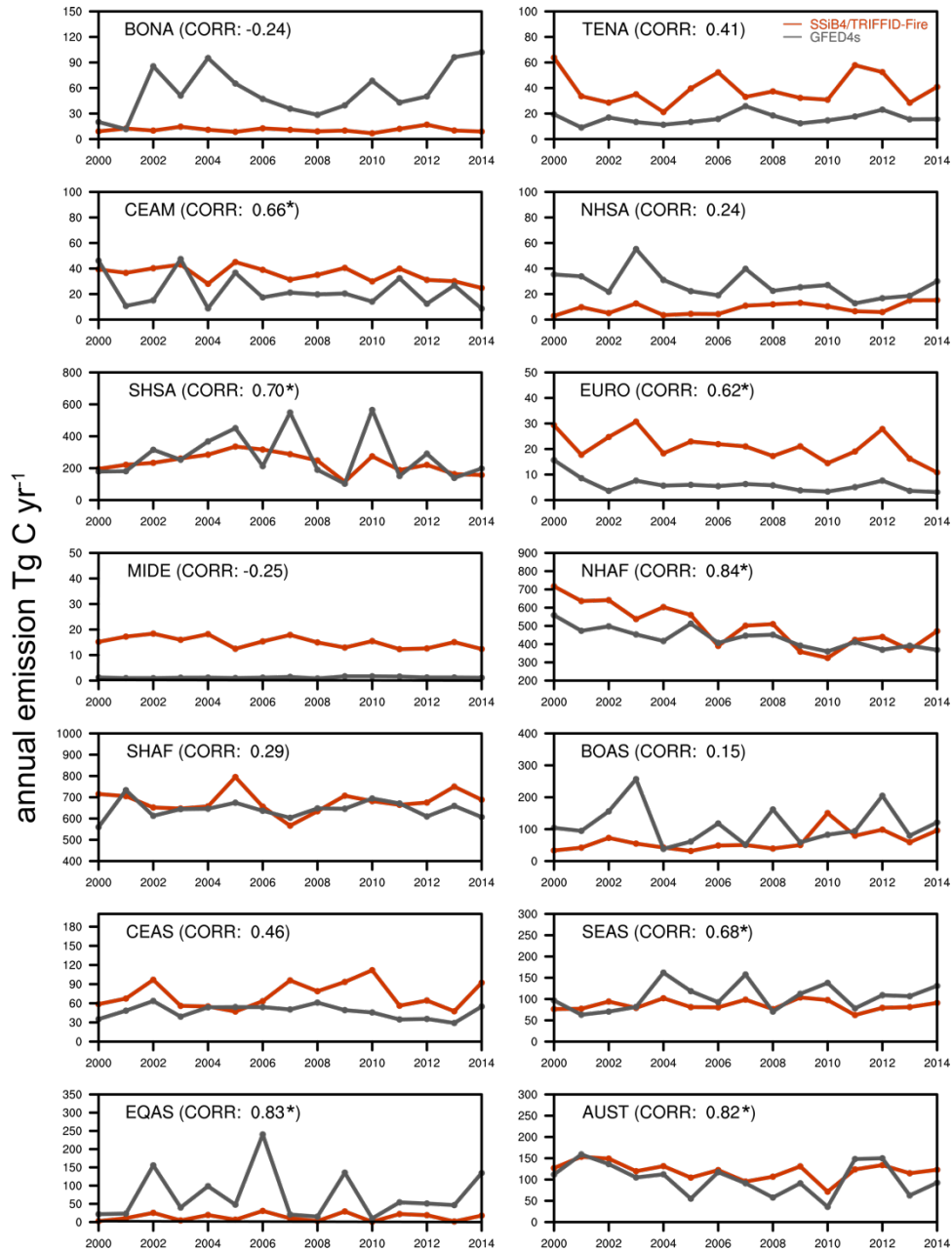


Figure S2. Annual carbon emission (Tg C yr^{-1}) for 2000-2014 for GFED4s and SSiB4/TRIFFID-Fire in 14 GFED regions. The “*” indicates the correlation is significant at $p < 0.05$.

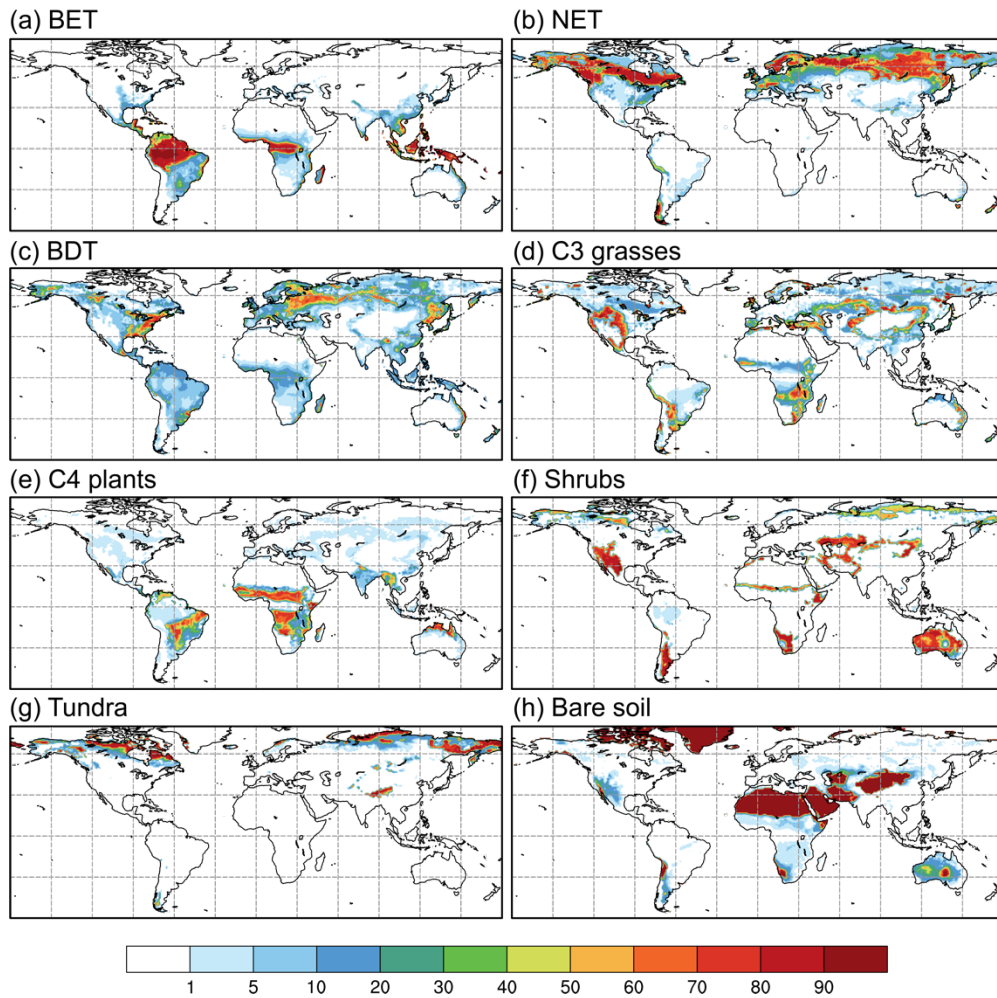


Figure S3. Fractional coverage (%) of (a) broadleaf evergreen trees (BET), (b) needleleaf evergreen trees (NET), (c) broadleaf deciduous trees (BDT), (d) C3 grasses, (e) C4 plants, (f) shrubs, (g) tundra, and (h) bare land averaged over 2000-2014 in SSiB4/TRIFFID-Fire.

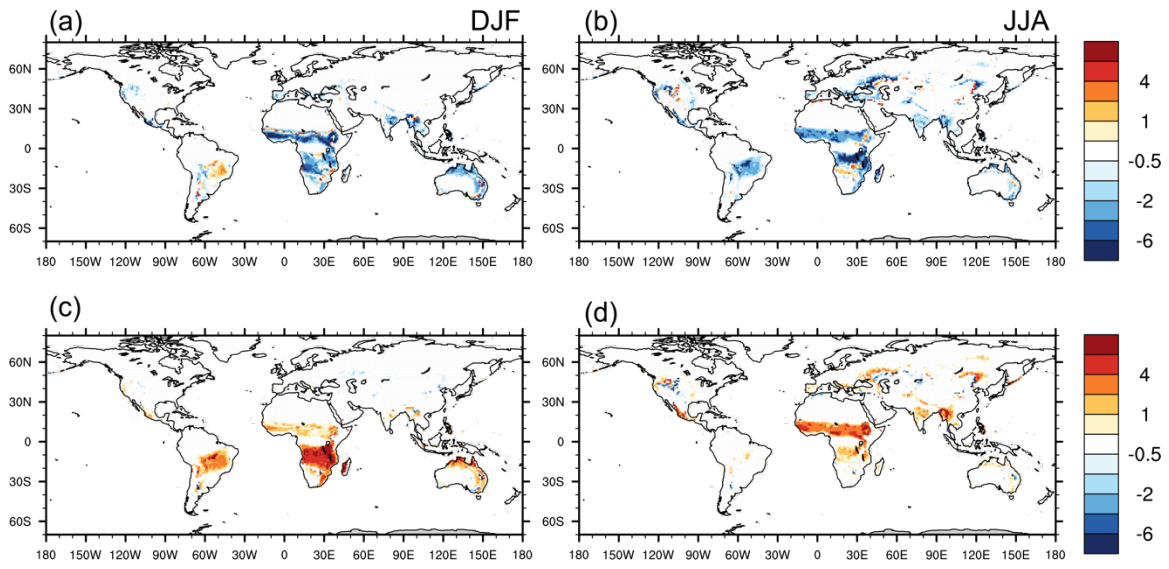


Figure S4. Difference in canopy transpiration (a, b; W m^{-2}) and ground evaporation (c, d; W m^{-2}) in DJF (a,c) and JJA (b,d) averaged over 2000-2014 between FIRE-ON and FIRE-OFF