The Fire Modeling Intercomparison Project (FireMIP), phase 1: Experimental and analytical protocols

Supplementary tables describing fire models

List of symbols

α_m Per-capita ignition frequency (ignitions person^{-1} month^{-1}). See Table S1. 11, 34

β Packing ratio (unitless). See Table S11. 21

β_{op} Optimal packing ratio (unitless). See Table S11. 21

Γ' Optimal reaction velocity (min^{-1}). See Table S11. 3, 21, 25

Γ'_E Maximum reaction velocity as used by MC-Fire for energy release equations (min^{-1}). See Table S11. 3, 21

$\Gamma'_{E,max}$ Maximum reaction velocity as used by MC-Fire for energy release equations (min^{-1}). See Table S11. 21

Γ'_{max} Maximum reaction velocity (min^{-1}). See Table S11. 21

Γ'_R Maximum reaction velocity as used by MC-Fire for rate of spread equations (min^{-1}). See Table S11. 3, 21

$\Gamma'_{R,max}$ Maximum reaction velocity as used by MC-Fire for rate of spread equations (min^{-1}). See Table S11. 21

ϵ Effective heating number (unitless). See Table S11. 15, 21

η_M Moisture damping coefficient (unitless, range [0,1]). See Table S11. 21, 25

$\eta_{M,d}$ Moisture damping coefficient for dead fuels (unitless, range [0,1]). See Table S11. 21

$\eta_{M,l}$ Moisture damping coefficient for live fuels (unitless, range [0,1]). See Table S11. 21

η_S Mineral damping coefficient (unitless, range [0,1]). See Table S8. 18, 21, 25

θ Soil moisture (unitless, range [0,1]). 14, 22

θ_1 Soil moisture in uppermost soil layer (unitless, range [0,1]). 4, 14–16, 19

θ_{5cm} Soil moisture in uppermost 5 cm of soil (unitless, range [0,1]). 14

θ_e Soil moisture of extinction (unitless, range [0,1]). 14, 30

θ_{mm} Plant-available soil moisture (mm). 19

θ_{root} Soil moisture in rooting zone (unitless, range [0,1]). 14, 15

μ_S Mineral content fraction of dead fuels (0.055). See Table S11. 21, 23

ξ Propagating flux ratio (unitless, range [0,1]). See Table S11. 2, 15, 21

ρ_b Fuel bulk density ($\mathrm{kg\,C\,m^{-3}}$). See Table S11. 15, 21, 28, 30, 33

$\rho_{b,lg}$ Fuel bulk density of live grass($\mathrm{kg\,C\,m^{-3}}$). See Table S16. 15, 26

ρ_p Oven-dry particle density ($\mathrm{kg\,C\,m^{-3}}$). See Table S8. 18, 21

σ Fuel surface-area-to-volume ratio (cm^{-1}). See Table S11. 15, 19, 21

$\sigma_{d,1h}$ Fuel surface-area-to-volume ratio: 1-hour dead fuels (cm^{-1}). 15, 19, 21, 32

$\sigma_{d,10h}$ Fuel surface-area-to-volume ratio: 10-hour dead fuels (cm^{-1}). 15, 19, 21

$\sigma_{d,100h}$ Fuel surface-area-to-volume ratio: 100-hour dead fuels (cm^{-1}). 15, 19, 21

$\sigma_{d,1000h}$ Fuel surface-area-to-volume ratio: 1000-hour dead fuels (cm^{-1}). 15, 21

σ_E Fuel surface-area-to-volume ratio (cm^{-1}) as used by MC-Fire for energy release equations. See Table S11. 21, 25

$\sigma_{l,h}$ Fuel surface-area-to-volume ratio: Live herbaceous vegetation (cm^{-1}). See Table S27. 21, 32

$\sigma_{l,s}$ Fuel surface-area-to-volume ratio: Live shrubby vegetation (cm^{-1}). See Table S27. 21, 32

σ_R Fuel surface-area-to-volume ratio (cm^{-1}) as used by MC-Fire for rate of spread equations. See Table S11. 21

τ Fire residence time (min). See Table S15. 12, 21, 25

τ_* Critical fire residence time (min). See Table S15. 25

Φ_s Effect (unitless) of slope on increasing ξ. See Table S11. 15, 21

Φ_w Effect (unitless) of wind on increasing ξ. See Table S11. 3, 4, 15, 21

Ψ Effect (unitless) fire coalescence on N_f. See Table S16. 16, 26

ω Fuel moisture (unitless). See Table S9. 15, 19, 21

ω_* Fuel moisture of extinction (unitless). See Table S9. 2, 19, 21, 28, 30–33

$\omega_{d,1h}$ Fuel moisture: Dead 1-hour fuels (unitless). See Table S9. 2, 19, 21, 23

$\omega_{d,1h/*}$ Fuel moisture of dead 1-hour fuels relative to moisture of extinction (unitless): $\frac{\omega_{d,1h}}{\omega_*}$. 23

$\omega_{d,100h}$ Fuel moisture: Dead 100-hour fuels (unitless). See Table S9. 3, 19, 23, 26

$\omega_{d,1000h}$ Fuel moisture: Dead 1000-hour fuels (unitless). See Table S9. 3, 19, 23, 26

$\omega_{d,10h}$ Fuel moisture: Dead 10-hour fuels (unitless). See Table S9. 19, 23

ω_{duff} Fuel moisture: Duff (unitless). See Table S9. 19, 23

ω_{ff} Combined fuel moisture: Fine fuels (i.e., live grass and dead 1-hour fuels; unitless). See Table S9. 2, 19

$\omega_{ff/*}$ Combined fuel moisture of fine fuels relative to moisture of extinction (unitless): $\frac{\omega_{ff}}{\omega_*}$. 23

ω_l Surface-area-weighted moisture of live fuels (unitless). See Table S9. 19, 21

$\omega_{l,g}$ Fuel moisture: Live grass (unitless). See Table S9. 2, 19, 20

$\omega_{l,g/*}$ Fuel moisture of live grass relative to moisture of extinction (unitless): $\frac{\omega_{l,g}}{\omega_*}$. 23

$\omega_{l,s}$ Fuel moisture: Live shrubby vegetation (unitless). See Table S9. 19, 25

ω_o Combined fuel moisture: 1-, 10-, and 100-hour fuels (unitless). See Table S9. 2, 19, 21

$\omega_{o/*}$ Combined fuel moisture of 1-, 10-, and 100-hour fuels relative to moisture of extinction (unitless): $\frac{\omega_o}{\omega_*}$. 14, 21, 23

$\omega_{x/*}$ General fuel moisture relative to moisture of extinction (unitless). See Table S9. 14, 15, 19

$\widehat{a}$ Used by LPJ-GUESS-BLAZE to compute burned area. See Table S23. 16, 29

A Used to compute Γ'. See Table S11. 21

A_c Average contiguous non-cropland area (km^2). 15

A_E Used to compute Γ'_E. See Table S11. 21

A_g Area of grid cell (km^2). Only includes land on which the described fire model runs. For example, if the fire model excludes cropland and pasture, then A_g is the area of land outside those land covers.. 3, 11, 15, 16, 26

A_R Used to compute Γ'_R. See Table S11. 21

B Used to compute Γ'. See Table S11. 21

BA_y Total gridcell burned area so far this year (km^2). 11, 16

BA Total gridcell burned area (km^2 timestep $^{-1}$), excluding special fire types described in Table S3. 16, 26

BA_{20} Mean annual gridcell burned area over the past 20 years (km^2). 11

BA_{pf} Burned area per fire (km^2), accounting for suppressive effects of population density ($S_{PD,ba}$ or q), GDP ($S_{GDP,ba}$), and/or environmental conditions (S_{env}) as described in Tables S2 and S4. 11, 15, 16, 28

$BA_{pf,uns}$ Unsuppressed burned area per fire (km^2). Does not consider suppressive effects of population density ($S_{PD,ba}$ or q), GDP ($S_{GDP,ba}$), and/or environmental conditions (S_{env}) as described in Tables S2 and S4. 9, 15, 16

$bnd_{d,100h}$ Used by MC-Fire to calculate $\omega_{d,100h}$. See Table S16. 19, 26

$bnd_{d,1000h}$ Used by MC-Fire to calculate $\omega_{d,1000h}$. See Table S16. 26

BT Bark thickness (cm). See Table S15. 8, 25, 30, 32

BUI Fuel build-up index (van Wagner and Pickett, 1985; van Wagner, 1987). See Table S16. 15, 26

$\widehat{BUI_*}$ PFT-specific threshold build-up index (unitless). See Table S27. 15, 32

C Used to compute Φ_w. See Table S11. 21

CF Fraction of crown in flaming zone (unitless). See Table S15. 8, 23, 25, 28, 30, 32, 33

CL Crown length (m). See Table S15. 3, 25, 28, 30–33

$\widehat{CL_f}$ PFT-specific value (unitless) for crown length as fraction of woody vegetation height (ht_w). Used in Table S15. 25, 28, 30–33

d_{1000h} Drying parameter ($^\circ\mathrm{C}^{-2}$): 1000-hour fuels. See Table S10. 20

d_{100h} Drying parameter ($^\circ\mathrm{C}^{-2}$): 100-hour fuels. See Table S10. 20

$d_{l,g}$ Drying parameter ($^\circ\mathrm{C}^{-2}$): Live grass. See Table S10. 20

d_{10h} Drying parameter ($^\circ\mathrm{C}^{-2}$): 10-hour fuels. See Table S10. 20

d Drying parameter ($^{\circ}\mathrm{C}^{-2}$). 3, 4, 19, 20

d_{1h} Drying parameter ($^{\circ}\mathrm{C}^{-2}$): 1-hour fuels. See Table S10. 20

$\widehat{D_1}$ Parameter used by LPJ-LMfire for calculating DBH ($\mathrm{cm\,m^{-1}}$). See Table S26. 25, 31

$\widehat{D_2}$ Parameter used by LPJ-LMfire for calculating DBH (cm). See Table S26. 25, 31

DBH Tree diameter at breast height (cm). See Table S15. 4, 7, 8, 25, 29, 30

$depth$ Fuel bed depth (ft). See Table S16. 7, 10, 21, 26

DF Drought factor used by LPJ-GUESS-BLAZE to compute FDI_{McA}. See Table S16. 26

$\widehat{DFF}_{1h}$ Dead fuel fraction (unitless): 1-hour fuels. Used by MC-Fire; see Tables S7, S27. 17, 32

$\widehat{DFF}_{10h}$ Dead fuel fraction (unitless): 10-hour fuels. Used by MC-Fire; see Tables S7, S27. 17, 32

$\widehat{DFF}_{100h}$ Dead fuel fraction (unitless): 100-hour fuels. Used by MC-Fire; see Tables S7, S27. 17, 32

$\widehat{DFF}_{1000h}$ Dead fuel fraction (unitless): 1000-hour fuels. Used by MC-Fire; see Tables S7, S27. 17, 32

$\widehat{DR}$ PFT-specific ratio (unitless) of "decomposable" to "resistant" litter. Used by JULES-INFERNO; see Table S21. 14, 28

E Used to compute Φ_w. See Table S11. 21

e^* Saturation water vapor pressure (hPa), after Goff and Gratch (1946). 14

emc_c Corrected equilibrium moisture content (unitless). See Table S16. 26

$emc_{coarse,min}$ Minimum equilibrium moisture content, coarse fuels (unitless). See Table S16. 19, 26

emc_u Uncorrected equilibrium moisture content (unitless). See Table S16. 26

$emc_{u,max}$ Uncorrected equilibrium moisture content: daily maximum (unitless). See Table S16. 26

$emc_{u,min}$ Uncorrected equilibrium moisture content: daily minimum (unitless). See Table S16. 26

f_{θ_1} A function (dimensionless) of the moisture of the uppermost soil layer (θ_1). See Table S4. 14, 16

f_{NI} A function (dimensionless) of Nesterov Index (NI). See Table S4. 14, 16

f_{PD} A function (dimensionless) of population density (PD). See Table S2. 12, 16

f_r A function (dimensionless) of F_{APAR}. See Table S4. 14, 16

$\widehat{F}$ Used to calculate scorch height (SH). See Tables S20, S25, and S28. 25, 28, 30, 31, 33

$FA_{w,Ca}$ Fraction of woody vegetation affected by cambial scorch. See Table S15. 25, 32

$FA_{w,Ca+Cr}$ Fraction of woody vegetation affected by crown scorch OR cambial scorch. See Table S15. 22, 23, 25

$FA_{w,Cr}$ Fraction of woody vegetation affected by crown scorch. See Table S15. 8, 23, 25, 32

F_{APAR} Fraction absorbed of photosynthetically active radiation (unitless). 4, 14

F_{C2G} Daily cloud-to-ground lightning flash rate ($\mathrm{km^{-2}\,d^{-1}}$). 11

$F_{C2G,yr}$ Annual cloud-to-ground lightning flash rate ($\mathrm{km^{-2}\,y^{-1}}$). 11

F_{total} Daily total (cloud-to-ground plus within-cloud) lightning flash rate ($\mathrm{km^{-2}\,d^{-1}}$), calibrated according to LIS/OTD lightning flash rate climatology. Used by ORCHIDEE-SPITFIRE; see model description paragraph and Table S1.. 11

$FC_{d,1h}$ Fractional combustion: Dead 1-hour fuels. See Tables S12 and S13. 23

$FC_{d,10h}$ Fractional combustion: Dead 10-hour fuels. See Tables S12 and S13. 23

$FC_{d,100h}$ Fractional combustion: Dead 100-hour fuels. See Tables S12 and S13. 23

$FC_{d,1000h}$ Fractional combustion: Dead 1000-hour fuels. See Tables S12 and S13. 23

$\widehat{FC}_{d,1000h,max}$ PFT-specific maximum fractional combustion: Dead 1000-hour fuels. Used by ORCHIDEE-SPITFIRE; see Table S28. 23, 33

$\widehat{FC}_{d,100h,max}$ PFT-specific maximum fractional combustion: Dead 100-hour fuels. Used by ORCHIDEE-SPITFIRE; see Table S28. 23, 33

$FC_{d,root}$ Fractional combustion: Fine root litter. See Tables S12 and S13. 22

$FC_{d,leaf}$ Fractional combustion: Leaf litter. See Table S12. 22

$FC_{d,litter}$ Fractional combustion: All litter. See Table S12. 22, 27, 28

$FC_{d,stem}$ Fractional combustion: Stem litter. See Table S12. 22

$FC_{l,1h}$ Fractional combustion: Live 1-hour fuels. Note that this applies only to woody PFTs, not grasses. See Table S13. 23, 25

$FC_{l,10h}$ Fractional combustion: Live 10-hour fuels. See Table S13. 23, 25

$FC_{l,100h}$ Fractional combustion: Live 100-hour fuels. See Table S13. 23

$FC_{l,1000h}$ Fractional combustion: Live 1000-hour fuels. See Table S13. 23

$FC_{l,grass}$ Fractional combustion: Live grass. See Tables S12 and S13. 22, 23

$FC_{l,leaf}$ Fractional combustion: Live leaves. See Tables S12 and S13. 22–24, 27, 28

$\widehat{FC}_{l,leaf,max}$ PFT-specific maximum fractional combustion: Live leaves. Used by JULES-INFERNO. See Table S21. 22

$\widehat{FC}_{l,leaf,min}$ PFT-specific minimum fractional combustion: Live leaves. Used by JULES-INFERNO. See Table S21. 22, 28

$FC_{l,root}$ Fractional combustion: Live fine roots. See Tables S12 and S13. 22

$FC_{l,stem}$ Fractional combustion: Live stems. See Tables S12 and S13. 22–24, 27, 28

$\widehat{FC}_{l,stem,max}$ PFT-specific maximum fractional combustion: Live stems. Used by JULES-INFERNO. See Table S21. 22, 28

$\widehat{FC}_{l,stem,min}$ PFT-specific minimum fractional combustion: Live stems. Used by JULES-INFERNO. See Table S21. 22, 28

$FC_{l,ts}$ Fractional combustion: Live transfer and storage carbon. See Table S17. 27

FDI Fire Danger Index (unitless). See Table S4. 11, 14–16

FDI_{McA} McArthur Fire Danger Index (unitless, Noble et al., 1980). See Table S16. 4, 15, 26

$FFMC$ Fine fuel moisture code (unitless). See Table S16. 15, 26

$\widehat{FFMC}_*$ PFT-specific threshold fine fuel moisture code (unitless). See Table S27. 15

FK_w Total fraction killed, woody PFTs only. See Table S15. 25

FK_{grass} Fraction killed: Grass. See Table S15. 25

FK_{leaf} Fraction killed: Leaves. See Table S14. 24, 27, 28

$FK_{w,1h}$ Fraction killed: Live 1-hour fuels. Applies to woody PFTs only. See Table S15. 25

$FK_{w,10h}$ Fraction killed: Live 10-hour fuels. Applies to woody PFTs only. See Table S15. 25

$FK_{w,100h}$ Fraction killed: Live 100-hour fuels. Applies to woody PFTs only. See Table S15. 25

$FK_{w,1000h}$ Fraction killed: Live 1000-hour fuels. Applies to woody PFTs only. See Table S15. 25

FK_{root} Fraction killed: Roots. See Table S14. 24, 27, 28

FK_{stem} Fraction killed: Stems. See Table S14. 24, 27, 28

FK_{StoH} Fraction of sapwood carbon transferred to heartwood (i.e., from the live portion of the stem to the dead portion) due to fire, after previous combustion and mortality factors are applied. See Table S17. 24, 27

FK_{tree} Total fraction killed: Trees. See Table S15. 25, 29

FK_{ts} Fraction killed: Transfer and storage C. See Table S17. 27

FLA Fuel loading adjustment (unitless). See Table S16. 7, 21, 26

$\widehat{FRI}_{max}$ Maximum fire return interval (yr). Used by MC-Fire; see Table S27. 15, 32

$\widehat{FRI}_{min}$ PFT-specific minimum fire return interval (yr). Used by MC-Fire; see Table S27. 15, 32

G_{ag} Fraction of biomass that is aboveground. Additions to subscripts can specify pool-specific fractions.. 14, 17, 22, 23, 25

G_{bg} Fraction of biomass that is belowground. Additions to subscripts can specify pool-specific fractions.. 17, 25

GDP_{pc} Gross domestic product per capita (2005 US$ person^{-1}). 9, 12

g_W Reduction (unitless, range [0,1]) of forward rate of spread (ROS_f) based on wind speed. See Table S5. 15

h Fuel heat content (kJ kg^{-1}). See Table S8. 18, 32

HB Ellipse head-to-back ratio (unitless). See Table S5. 15

H_h Fraction of gridcell that is herbaceous (unitless). 15, 19

ht_w Height of woody vegetation (m). See Table S15. 3, 25, 29, 32, 33

H_w Fraction of gridcell that is woody (unitless). 15

I_A Anthropogenic ignition rate (ignitions km^{-2} day^{-1}). See Table S1. Does not consider suppressive effects of population density ($S_{PD,nf}$) or GDP ($S_{GDP,nf}$) as described in Table S2, nor of environmental conditions ($S_{env,nf}$) as described in Table S4. 11, 16

I_L Lightning ignition rate (ignitions km^{-2} day^{-1}). See Table S1. Does not consider suppressive effects of population density ($S_{PD,nf}$) or GDP ($S_{GDP,nf}$) as described in Table S2, nor of environmental conditions ($S_{env,nf}$) as described in Table S4. 11, 16

I_{Le} Lightning ignition efficiency (unitless). See Table S1. 11, 31

I_R Reaction intensity ($\mathrm{kJ\,m^{-2}\,min^{-1}}$). See Table S11. 15, 21

$I_{R,E}$ Reaction intensity as used by MC-Fire for energy release equations ($\mathrm{kJ\,m^{-2}\,min^{-1}}$). See Table S11. 21

$I_{R,R}$ Reaction intensity as used by MC-Fire for rate of spread equations ($\mathrm{kJ\,m^{-2}\,min^{-1}}$). See Table S11. 15, 21

I_{surf} Intensity of surface fire at flaming front ($\mathrm{kW\,m^{-1}}$). See Table S11. 12, 14, 21, 22, 25, 29

$\widehat{k_2}$ Used for calculating tree diameter at breast height (DBH). See Table S25. 25, 30

$\widehat{k_3}$ Used for calculating tree diameter at breast height (DBH). See Table S25. 25, 30

$KBDI$ Keetch-Byram Drought Index (Keetch and Byram, 1968). 26

LB Ellipse length-to-breadth ratio (unitless). See Table S5. 15

L Fuel loading: All biomass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 9, 14–17, 19, 21, 26

$L_{b,g}$ Fuel loading: Brown grass ($\mathrm{kg\,C\,m^{-2}}$). Used by CTEM as an intermediate pool between grass turnover and the litter pool (Melton and Arora, 2016). 14, 15

$\widehat{LD}$ PFT-specific fuel bed load-to-depth ratio (ft $\left(\mathrm{T\,DM\,ac^{-1}}\right)^{-1}$). Used by MC-Fire to calculate $depth$; see Table S27. 26, 32

L_d Fuel loading: Dead biomass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 15, 25

$L_{d,1h}$ Fuel loading: Dead 1-hour fuels ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. $+$ subscript, used by MC-Fire, indicates that fuel loading adjustment (FLA, Table S16) has been added. 15, 17, 19, 21, 26

$L_{d,10h}$ Fuel loading: Dead 10-hour fuels ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. $+$ subscript, used by MC-Fire, indicates that fuel loading adjustment (FLA, Table S16) has been added. 15, 17, 21, 23

$L_{d,100h}$ Fuel loading: Dead 100-hour fuels ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. $+$ subscript, used by MC-Fire, indicates that fuel loading adjustment (FLA, Table S16) has been added. 17, 21, 23

$L_{d,1000h}$ Fuel loading: Dead 1000-hour fuels ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. $+$ subscript, used by MC-Fire, indicates that fuel loading adjustment (FLA, Table S16) has been added. 17, 21

$L_{dc,n}$ Fuel loading: Combined dead fuels not including mineral content (kg dry matter $\mathrm{m^{-2}}$). Note that the units of $L_{dc,n}$ are different from the other fuel loading variables, which use $\mathrm{kg\,C\,m^{-2}}$. See Table S11. 7, 21, 25

$L_{+dc,n,E}$ Fuel loading: Combined dead fuels not including mineral content, for use in energy release equations ($\mathrm{kg\,C\,m^{-2}}$). Used by MC-Fire. See Table S11. 21

$L_{+dc,n,R}$ Fuel loading: Combined dead fuels not including mineral content, for use in rate of spread equations ($\mathrm{kg\,C\,m^{-2}}$). Used by MC-Fire. See Table S11. 21

$L_{d,g}$ Fuel loading: Dead grass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 15

$L_{d+l,g}$ Fuel loading: Grass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 30

$L_{d,litter}$ Fuel loading: Aboveground litter ($\mathrm{kg\,C\,m^{-2}}$). 14, 15, 21

$L_{d,SOM1}$ Fuel loading: Soil organic matter in top (first) layer, i.e., organic horizon ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 19

L_{duff} Fuel loading: Duff ($\mathrm{kg\,C\,m^{-2}}$). 14, 15

L_l Fuel loading: Live biomass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 15, 25

$L_{+lc,n}$ Fuel loading: Combined live fuels not including mineral content ($\mathrm{kg\,C\,m^{-2}}$). Used by MC-Fire. See Table S11. 21

$L_{l,g}$ Fuel loading: Live grass or herbaceous vegetation ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 14, 15, 19, 21

$L_{l,leaf}$ Fuel loading: Live leaves ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 14, 15

$L_{l,s}$ Fuel loading: Live shrubby vegetation ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 21

$L_{l,stem}$ Fuel loading: Live stems ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 14, 15

N_f Number of fires ($\mathrm{km^{-2}}$ timestep^{-1}). See Table S6. 2, 15, 16

NI Nesterov Index ($^{\circ}\mathrm{C}^2$), a proxy for fuel moisture: $NI = \sum_d T_{max,d}(T_{max,d} - T_{dew,d})$, where the summation occurs over consecutive days leading up to the current day with ≤ 3 mm of precipitation (Nesterov, 1949). 4, 8, 14, 16, 19, 20

$NI_{max,y}$ Maximum Nesterov Index (NI, $^{\circ}\mathrm{C}^2$) in the fire year. "Fire year" is defined for each grid cell so as to avoid splitting its fire season in two. See Knorr et al. (2014). 14

$\widehat{p}$ Used for calculating fraction killed by crown scorch ($FA_{w,Cr}$). See Tables S20, S25, and S28. 25, 28, 30, 33

P_i Probability of fire (unitless). See Table S1. 11, 15, 16

$P_{i,h}$ Probability of fire ignited by humans (unitless). See Table S1. 11

$P_{i,n}$ Probability of fire ignited by lightning (unitless). See Table S1. 11

P_m Probability of mortality from fire. Used by MC-Fire. See Table S15. 25, 32

$\widehat{par}_1$ Used for calculating tree diameter at breast height (DBH). See Tables S20, S25, and S28. 25, 28, 31–33

$\widehat{par}_2$ Used for calculating bark thickness (BT). See Tables S20 and S28. 25, 28, 31, 33

PD Human population density (people $\mathrm{km^{-2}}$). 4, 9, 11, 12, 15, 16

PET Potential evapotranspiration (mm). 19

q Probability that a fire is extinguished on any given day (unitless). See Table S2. 3, 12, 15, 16

Q_{ig} Heat of fuel pre-ignition ($\mathrm{kJ\,kg^{-1}}$). See Table S11. 15, 21

$\widehat{r}$ Resistance parameter for calculation of combustion and mortality. See Table S24. 22, 24, 30

$\widehat{r_{CF}}$ Resistance parameter for calculation of crown scorch. See Tables S20, S25, and S28. 25, 28, 30, 33

R_d Daily precipitation (mm). 19, 26

RH Relative humidity (unitless, range [0,1]). 9, 14, 15, 26

RH_{30} Relative humidity, 30-day running mean (unitless, range [0,1]). 14

R_m Monthly precipitation (mm). 19

ROS Rate of fire spread ($\mathrm{m\,s^{-1}}$). See Table S5. 15, 21

ROS_b Rate of fire spread, backward (i.e., upwind; $\mathrm{m\,s^{-1}}$). See Table S5. 11, 15

ROS_f Rate of fire spread, forward (i.e., downwind; $\mathrm{m\,s^{-1}}$). See Table S5. 6, 11, 12, 15, 21

$\widehat{ROS}_{max}$ Maximum rate of forward (i.e., downwind) fire spread ($\mathrm{m\,s^{-1}}$). See Tables S17 and S18. 27, 28

R_r Precipitation rate ($\mathrm{mm\,d^{-1}}$). 14

R_t Duration of precipitation (h). 26

S General anthropogenic suppressive effect (unitless, value 0 or 1) on fire occurrence. Used by MC-Fire. See Table S2. 12, 16

s Slope angle (deg). 15, 21

S_θ Suppressive effect of soil moisture (dimensionless, range [0,1]). Additional subscripts denote model-specific functions. See Table S4. 14, 15

S_{bare} Suppressive effect of bare ground cover (dimensionless, range [0,1]). See Table S4. 14

S_{env} Suppressive effect (unitless, range [0,1]) of environmental conditions on number of fires, burned area per fire, total gridcell burned area, and/or fire intensity. See Table S4. 3, 14, 16, 21

$S_{env,nf}$ Suppressive effect (unitless, range [0,1]) of environmental conditions on number of fires (or for CTEM, the fraction of "representative areas" that burn). See Table S4. 6, 7, 14, 16

$S_{GDP,ba}$ Suppressive effect (unitless, range [0,1]) of gross domestic product per capita (GDP_{pc}) on burned area per fire ($BA_{pf,uns}$). See Table S2. 3, 12, 16

$S_{GDP,nf}$ Suppressive effect (unitless, range [0,1]) of gross domestic product per capita (GDP_{pc}) on number of fires. See Table S2. 6, 7, 12, 16

S_L Suppressive effect of fuel loading (dimensionless, range [0,1]). Additional subscripts denote model-specific functions. See Table S4. 14, 16, 17

$S_{PD,ba}$ Suppressive effect (unitless, range [0,1]) of population density (PD) on burned area per fire ($BA_{pf,uns}$). See Table S2. 3, 12, 16

$S_{PD,nf}$ Suppressive effect (unitless, range [0,1]) of population density (PD) on number of fires. See Table S2. 6, 7, 12, 16

S_{RH} Suppressive effect of relative humidity (dimensionless, range [0,1]). Additional subscripts denote model-specific functions. See Table S4. 14, 15

S_T Suppressive effect of temperature (dimensionless, range [0,1]). Additional subscripts denote model-specific functions. See Table S4. 14, 15

S_{GFED} Scaling factor for number of fires, specific to each GFED region (van der Werf et al., 2006). Used by ORCHIDEE-SPITFIRE. See Table S4. 14, 35

SH Scorch height (m). See Table S15. 4, 25

$T_{dew,d}$ Daily dew-point air temperature (°C). 8, 19

$T_{max,d}$ Maximum daily air temperature (°C). 8, 19

T Air temperature (°C). 14

t_{dl} Duration of daylight (h). 26

t_{fire} Fire duration (s). See Table S5. 12, 15

t_m Month length (d). 11

$TFBB$ Total fuel bed biomass ($\mathrm{T\,DM\,ac^{-1}}$). Alternative measure of total fuel loading, used only in calculation of $depth$ by MC-Fire. See Table S16. 26

TSF Time since last fire (yr). 15

TSR Time since last rainfall (d). 26

W Wind speed at 10 m elevation ($\mathrm{m\,s^{-1}}$). 15, 21, 25, 26

W' Wind speed at elevation relevant for fire model ($\mathrm{ft\,min^{-1}}$). See Table S11. 21

W'_{ef} Effective wind speed for use in fire model ($\mathrm{ft\,min^{-1}}$). See Table S11. 21

$W'_{ef,mph}$ Effective wind speed for use in fire model ($\mathrm{mi\,h^{-1}}$). See Table S11. 21

wf Fraction of vegetated area ("foliar projective cover;" unitless) that is a woody PFT. 21

$\widehat{WRF}$ PFT-specific wind reduction factor (unitless) used by MC-Fire. See Table S27. 21, 32

Table S1. Model treatment of ignitions. Note that, although individual fire models might have their own setup to generate cloud-to-ground lightning strikes, those are provided for the FireMIP runs (see Section 2.2). “Distributed F_{C2G}?” indicates whether and how the model distributes monthly lightning flash rate F_{C2G} to sub-monthly time steps. “Anthropogenic” ignitions are excluding those explicitly modeled for land use management such as deforestation (Table S3). “Low-population threshold?” column indicates whether there is some population density below which no ignitions occur, and if so what that is. For CTEM, “probability of fire” refers to the probability of fire in each 300-km^2 “representative area” in a grid cell. LPJ-GUESS-SIMFIRE-BLAZE and LPJ-GUESS-GlobFIRM are excluded because they are purely empirical models with no concept of ignition count or fire probability in the sense used here. MC-Fire is excluded because it assumes at most one fire per grid cell, with an ignition source always present.

Model	Lightning		Anthropogenic	
	Ignitions km^{-2} day^{-1} (I_L)	Distributed F_{C2G}?	Ignitions person^{-1} month^{-1} (α_m)	Ignitions km^{-2} day^{-1} (I_A)
CLM-Li*	$F_{C2G} \times 0.22$	Linear to half-hourly	0.012	$\frac{\alpha_m}{t_m} \times 6.8 \times PD^{0.4}$
JSBACH-SPITFIRE	$F_{C2G} \times 0.04$	Linear to daily	Regional (Fig. S1), after Thonicke et al. (2010)	$\frac{\alpha_m}{t_m} \times Y \times PD \times exp(-0.5\sqrt{PD})$, with $Y = 0.65$
JULES-INFERNO	F_{C2G}	None	0.03	See CLM-Li*
LM3-FINAL*	$F_{C2G} \times 0.25$	None	$\begin{cases} 0.002 & \text{Boreal} \\ 0.005 & \text{Non-boreal} \end{cases}$	$\frac{\alpha_m}{t_m} \times Y \times PD^Z$, with boreal $Y = 4.3$ and $Z = 0.1$, and non-boreal $Y = 8.7$ and $Z = 0.22$.
LPJ-GUESS-SPITFIRE	See JSBACH-SPITFIRE	None	Regional (Fig. S1), after Thonicke et al. (2010)	As JSBACH-SPITFIRE, but with $Y = 0.35$.
LPJ-LMfire	$\begin{cases} 0 & rand_U \leq I_{Le} \text{ or } F_{C2G} \leq 1 \\ 1 & rand_U > I_{Le} \text{ and } F_{C2G} > 1 \end{cases}$, where $rand_U$ is a random number drawn from a uniform distribution in the range [0,1], and $I_{Le} = FDI \times \frac{1-\frac{BA_y}{A_g}}{1+25 \times \frac{BA_y}{A_g}} \times \frac{\sum_{i \in PFTs} A_i \times \widehat{I_{Lei}}}{\sum_{i \in PFTs} A_i}$	Monthly values downscaled to daily by weather generator. Lightning only occurs on days with precipitation; total monthly strikes distributed randomly (uniform) across days with precipitation.	n/a	People light fires on non-agricultural land according to annual burned fraction targets BF_{yt} that vary depending on whether the dominant livelihood (Fig. S3) is farming ($BF_{yt} = 0.05$), pastoralism ($BF_{yt} = 0.2$), or hunting/gathering ($BF_{yt,hg}$). (If farming, people do not light fires if there is no cropland in the grid cell.) The target for hunter-gatherers is intended to reflect a desire to maintain an intermediate level of disturbance as measured by the fraction of the landscape that is grass (f_g, with subscripts y and $y-1$ representing the current and previous years, respectively): $BF_{yt,hg} = max(0, min[1, 20 \times (1-f_{g,y}) \times max(0, f_{g,y-1} - [0.9 \times f_{g,y-1} + 0.1 \times f_{g,y}])])$. The number of ignitions each day, I_A, is zero if the day's $BA_{pf} > 1$ km^2. Otherwise, $I_A = min(I_{A,max}, min[I_{A,max} \times 0.1 \times PD \times A_g, \frac{BA_{dt}}{BA_{pf} \times A_g} \times RF])$, where maximum human ignitions $I_{A,max} = \frac{10^4}{A_g} \times \frac{LB}{ROS_f + ROS_b}$, the day's target burned area $BA_{dt} = max(0, BF_{yt} \times A_g - BA_{20} - BA_y)$, and risk factor $RF = \begin{cases} 1 & FDI \leq 0.25 \\ \frac{exp\left(-\frac{(ln[FDI]+1.29)^2}{0.18}\right)}{1.22 \times FDI} & FDI > 0.25 \end{cases}$.
ORCHIDEE-SPITFIRE	$F_{total} \times 0.03$, where $F_{total} = 16.0 \times F_{C2G}$.	None	0.22	As JSBACH-SPITFIRE, but with $Y = 0.003$.

	Probability of fire: Lightning ($P_{i,n}$)	Probability of fire: Humans ($P_{i,h}$)	Total probability of fire (P_i)
CTEM	$P_{i,n} = y(\eta_F) - y(0)(1-\eta_F) + \eta_F(1-y[1])$, where $y(\eta_F) = \left(1 + exp\left[\frac{0.8-\eta_F}{0.1}\right]\right)^{-1}$ and $\eta_F = max\left(0, min\left[1, \frac{F_{C2G,yr} - 0.025}{1.0 - 0.025}\right]\right)$. $F_{C2G,yr}$ not interpolated from monthly.	$min\left(1, \left[\frac{PD}{300}\right]^{0.43}\right)$	$max\left(0, min\left[1, P_{i,n} + (1 - P_{i,n}) P_{i,h}\right]\right)$

Table S2. Model treatment of anthropogenic suppression. Functions in "# fires" columns are multiplied onto ignitions, along with other functions in this table and Table S4, to determine number of fires (Table S6). Functions in "Fire size" columns are multiplied onto mean fire size as determined by functions given in Table S5. In CTEM, population density affects fire duration (t_{fire}, Table S5) via extinguishing probability (q). MC-Fire has at most one fire per grid cell per timestep. Gr./Shr.: Grass/Shrub. LPJ-GUESS-GlobFIRM is excluded because it has no anthropogenic suppression.

Model	Population density		GDP	
	# fires ($S_{PD,nf}$)	Fire size ($S_{PD,ba}$)	# fires ($S_{GDP,nf}$)	Fire size ($S_{GDP,ba}$)
CLM-Li*	$1-(0.99-0.98\times exp[-0.025PD])$	1 if $PD \leq 0.1$. Otherwise: $\begin{cases} \text{Gr./Shr.:} & 0.2+0.8\times exp\left(-\pi\sqrt{\frac{PD}{450}}\right) \\ \text{Tree:} & 0.4+0.6\times exp\left(-\frac{\pi\times PD}{125}\right) \end{cases}$	1 if $PD \leq 0.1$. Otherwise: $\begin{cases} \text{Gr./Shr.:} & 0.1+0.9\times exp\left(-\pi\sqrt{\frac{GDP_{pc}}{8000}}\right) \\ \text{Tree:} & \begin{cases} 1 & GDP_{pc} < 20,000 \\ 0.39 & GDP_{pc} \geq 20,000 \end{cases} \end{cases}$	1 if $PD \leq 0.1$. Otherwise: $\begin{cases} \text{Gr./Shr.:} & 0.2+0.8\times exp\left(-\pi\times \frac{GDP_{pc}}{7000}\right) \\ \text{Tree:} & \begin{cases} 1 & GDP_{pc} \leq 8,000 \\ 0.83 & 8,000 < GDP_{pc} \leq 20,000 \\ 0.62 & GDP_{pc} > 20,000 \end{cases} \end{cases}$
JULES-INFERNO	$1-(0.05+0.9\times exp[-0.05PD])$	—	—	—
JSBACH-SPITFIRE	Implicit (see Table S1). Also affects duration (see Table S5).	—	—	—
LM3-FINAL*	$1-(0.99-0.98\times exp[-Y\times PD])$, with $Y=\begin{cases} 0.32 & \text{Boreal} \\ 0.03 & \text{Non-boreal} \end{cases}$	See CLM-Li*	See CLM-Li*	See CLM-Li*
LPJ-GUESS-SPITFIRE	Implicit (see Table S1)	—	—	—
ORCHIDEE-SPITFIRE	Implicit (see Table S1)	—	—	—

Other anthropogenic suppression

Model	Description	Equation
CTEM	Extinguishing probability (q) – the probability that a fire is extinguished on any given day – increases with population density, meaning that fires are shorter in duration where population density is high.	$q = 0.5 + \frac{max(0, 0.9 - exp[-0.025\times PD])}{2}$
LPJ-GUESS-SIMFIRE-BLAZE	A function of population density.	$f_{PD} = exp(0.0168\times PD)$
MC-Fire	Beginning in 1951, fire can only occur if certain thresholds having to do with energy release are reached. Otherwise, it is assumed that human suppression efforts prevent burning.	No fire ($S=0$) if $I_{surf} < 900\times(1.055\times 3.28)$, $0.04\times I_{surf}\times\tau < 60\times(1.055\times 3.28)$, or $ROS_f < 100\times(60\times 3.28)^{-1}$. Otherwise, $S=1$.

Table S3. Model treatment of agricultural fire and other special fire types. “n/a” indicates that the land-use or -cover type is not simulated, whereas “None” indicates that the land-use or -cover type is simulated but does not burn.

Model	Cropland fire?	Pasture fire?	Deforestation fire?	Peat fire?
CLM-Li	Based on GDP, population density, and observed timing of peak cropland burning (van der Werf et al., 2010)	n/a	Tropical closed forests: Based on deforestation rate and climate	Based on climate (long-term precipitation for tropics; soil moisture and temperature for boreal zone) and fractional coverage of peatland exposed to the air.
CTEM	None	n/a	None	n/a
JULES-INFERNO	None	None	None	n/a
JSBACH-SPITFIRE	None	Same as grassland	None	n/a
LM3-FINAL*	Based on monthly climatology of burned area from Rabin et al. (2015)	Based on monthly climatology of burned area from Rabin et al. (2015)	None	n/a
LPJ-GUESS-GlobFIRM	None	None	None	n/a
LPJ-GUESS-SIMFIRE-BLAZE	None	None	None	n/a
LPJ-LMfire	In grid cells where the dominant livelihood is agriculture (farming), people burn 20% of cropland annually. They also attempt to burn 5% of non-agricultural land annually, as described in Table S1.	In grid cells where the dominant livelihood is pastoralism, people attempt to burn 20% of non-agricultural land (i.e., everything except cropland) annually, as described in Table S1.	None	n/a
LPJ-GUESS-SPITFIRE	None	Same as grassland	None	n/a
MC-Fire	None	Same as grassland	None	n/a
ORCHIDEE-SPITFIRE	None	n/a	None	n/a

Table S4. How do environmental conditions and/or region of the world affect burning? $S_{env,nf}$ affects the fraction of ignitions becoming fires (see Table S6), while FDI acts on fire duration (Table S5) and total gridcell burned area (Table S6). Note that the definition of $S_{env,nf}$ does not apply well to CTEM, where the maximum number of fires is essentially set at the number of “representative areas” that fit in a grid cell. Instead, consider $S_{env,nf}$ a measure of the fraction of representative areas that burn.

<table>
<tr><th>Model</th><th>Function</th></tr>
<tr><td>CLM-Li*</td><td>$S_{env,nf} = S_\theta \times S_{RH} \times S_T \times S_L$,
where: $S_\theta = 1 - max\left(0, min\left[1, \frac{\theta_{root}-0.6}{0.25}\right]\right)$,
$S_{RH} = (1-v) \times \left(1 - max\left[0, min\left(1, \frac{RH-0.3}{0.8-0.3}\right)\right]\right) + v \times \left(1 - max\left[0.75, min\left(1, \frac{RH_{30}}{0.9}\right)\right]\right)$,
$S_T = min\left(1, exp\left[0.1T\pi\right]\right)$,
$S_L = max\left(0, min\left[1, \frac{L-0.075}{1.050-0.075}\right]\right)$ with $L = L_{l,stem} + L_{l,leaf} + L_{d,litter}$,
and $v = max\left(0, min\left[1, \frac{L-2.5}{2.5}\right]\right)$.</td></tr>
<tr><td>CTEM</td><td>$S_{env,nf} = S_\theta \times S_L$,
where: $S_\theta = \left(\left[1 - tanh\left(\left[\frac{1.75\theta_{root}}{0.30}\right]\right)\right]\left[1 - \frac{L_{duff}}{L}\right] + \left[1 - tanh\left(\left[\frac{1.75\theta_1}{0.50}\right]\right)\right]\frac{L_{duff}}{L}\right)$,
$S_L = max\left(0, min\left[1, \frac{L-0.4}{1.2-0.4}\right]\right)$ with $L = L_{l,leaf} + L_{l,stem} + L_{d,litter}$,
and $L_{duff} = L_{b,g} + L_{d,litter}$.</td></tr>
<tr><td>JULES-INFERNO</td><td>$S_{env,nf} = 7.7 \times e^* \times S_{RH} \times exp(-2R_r) \times S_\theta \times S_L$,
where: $S_\theta = 1 - \theta$,
$S_{RH} = max\left(1, min\left[0, \frac{0.9-RH}{0.9-0.1}\right]\right)$,
$S_L = max\left(0, min\left[1, \frac{L-0.02}{0.2-0.02}\right]\right)$,
$L = L_{l,leaf} + L_{DPM} \times G_{ag}$, and L_{DPM} is the fraction $\frac{\widehat{DR}}{1+\widehat{DR}}$ of the soil carbon pool.</td></tr>
<tr><td>JSBACH-SPITFIRE</td><td>$FDI = max\left(0, \left[1 - \omega_{o/*}\right]\right)$
$S_{env} = \begin{cases} 1 & I_{surf} \geq 50\ \mathrm{kW\,m^{-2}} \\ 0 & I_{surf} < 50\ \mathrm{kW\,m^{-2}} \end{cases}$</td></tr>
<tr><td>LM3-FINAL*</td><td>$S_{env,nf} = S_\theta \times S_{RH} \times S_T \times S_L$,
where:
<table>
<tr><th></th><th>Y</th><th></th><th>Z</th><th></th></tr>
<tr><th></th><th>Boreal</th><th>Non-bor.</th><th>Boreal</th><th>Non-bor.</th></tr>
<tr><td>$S_\theta = exp(-Y \times exp[-Z \times \theta_{5cm}])$</td><td>0.019</td><td>0.01</td><td>–7.9</td><td>–4</td></tr>
<tr><td>$S_{RH} = exp(-Y \times exp[-Z \times RH])$</td><td>0.005</td><td>0.005</td><td>–4</td><td>-8.15</td></tr>
<tr><td>$S_T = max\left(0, min\left[1, \frac{T--10}{10}\right]\right)$</td><td>—</td><td>—</td><td>—</td><td>—</td></tr>
<tr><td>$S_L = exp(-Y \times exp[-Z \times L])$</td><td>5.13</td><td>12.4</td><td>3.18</td><td>3</td></tr>
</table>
and $L = L_{l,stem} \times G_{ag} + L_{l,leaf} + L_{d,litter}$.</td></tr>
<tr><td>LPJ-GUESS-GlobFIRM</td><td>$f_{\theta_1} = X \times exp\left(\frac{X-1}{0.45(X-1)^3 + 2.83(X-1)^2 + 2.96(X-1)}\right)$,
where $X = \frac{1}{365}\sum_{d=1}^{365} exp\left(-\pi\left[\frac{\theta_{1,d}}{\widehat{\theta_e}}\right]^2\right)$ summed over each day d of the year,
and $S_L = \begin{cases} 1 & L > 0.2\,\mathrm{kg\,C\,m^{-2}} \\ 0 & L \leq 0.2\,\mathrm{kg\,C\,m^{-2}} \end{cases}$, with $L = L_{l,stem} \times G_{ag} + L_{l,leaf} + L_{d,litter}$.</td></tr>
<tr><td>LPJ-GUESS-SIMFIRE-BLAZE</td><td>$f_{NI} = NI_{max,y}{}^{0.860}$
$f_r = F_{APAR}{}^{0.905}$</td></tr>
<tr><td>LPJ-GUESS-SPITFIRE</td><td>$FDI = max\left(0, \left[1 - \omega_{o/*}\right]\right)$</td></tr>
<tr><td>LPJ-LMfire</td><td>$FDI = max\left(0, \left[1 - \omega_{x/*}\right]\right)$
$S_{env} = S_{bare} \times S_L \times \begin{cases} 1 & I_{surf} \geq 50\ \mathrm{kW\,m^{-2}} \\ 0 & I_{surf} < 50\ \mathrm{kW\,m^{-2}} \end{cases}$,
where $S_L = \begin{cases} 1 & L \geq 1\ \mathrm{kg\,C\,m^{-2}} \\ 0 & L < 1\ \mathrm{kg\,C\,m^{-2}} \end{cases}$ with $L = L_{l,stem} + L_{l,leaf} + L_{d,litter} + L_{d,O\text{-}horiz}$.
and $S_{bare} = \begin{cases} 1 & f_{bare} \geq 0.5 \\ 0 & f_{bare} < 0.5 \end{cases}$ with f_{bare} the fraction of the grid cell that is bare ground</td></tr>
<tr><td>MC-Fire</td><td>See Table S2</td></tr>
<tr><td>ORCHIDEE-SPITFIRE</td><td>$S_{env} = S_L \times S_{GFED} \times \begin{cases} 1 & I_{surf} \geq 50\ \mathrm{kW\,m^{-2}} \\ 0 & I_{surf} < 50\ \mathrm{kW\,m^{-2}} \end{cases}$,
where region-specific values of S_{GFED} are mapped in Figure S2,
and $S_L = max\left(0, min\left[1, \frac{L-0.2}{1-0.2}\right]\right)$ with $L = L_{d,litter} + L_{l,g,leaf}$.</td></tr>
</table>

Table S5. Aside from any functions given in Table S2, how do models determine fire size? Column "Duration" describes, for models with multi-day burning, the function for fire spread duration during any one day. Note that, for CTEM, "burned area per fire" actually describes the burned area that would occur in each "representative area" of a grid cell if the probability of fire (P_i, Table S1) were 1. "n/a" indicates concepts that are not used by certain models. LPJ-GUESS-GlobFIRM is excluded because it does not use any of the concepts described in this table.

Model	Ellipse shape	$ROS\,(\mathrm{m\,s^{-1}})$	Duration (t_{fire}, s)	Average contiguous area (A_c, $\mathrm{km^2}$)	Unsuppressed fire size ($BA_{pf,uns}$, $\mathrm{km^2}$)
CLM-Li*	$LB = 1 + 10 \times (1 - exp[-0.06 \times W])$ $HB = \frac{LB+\sqrt{LB^2-1}}{LB-\sqrt{LB^2-1}}$	$ROS_f = \widehat{ROS}_{max} \times g_W \times \sqrt{S_\theta \times S_{RH} \times S_T}$, where $g_W = 0.05 \times \frac{2 \times LB}{1 + HB^{-1}}$.	86400	n/a	$\frac{\pi}{4 \times LB} \times \left(ROS_f \times t_{fire} \times \left[1 + HB^{-1}\right]\right)^2 \times 10^{-6}$
CTEM	See CLM-Li*	$ROS_f = \widehat{ROS}_{max} \times g_W \times g_\theta$, with g_W formulated the same as in CLM-Li*, $g_\theta = \left(1 - min\left[1, \frac{\theta_{root}}{0.3}\right]\right)^2$ $\times \left(1 - \frac{L_{duff}}{L}\right) + \left(1 - min\left[1, \frac{\theta_1}{0.5}\right]\right)^2 \times \frac{L_{duff}}{L}$, $L = L_{l,leaf} + L_{l,stem} + L_{d,litter}$, and $L_{duff} = L_{b,g} + L_{d,litter}$.	$86400 \times \frac{1-q}{q}$; burns longer than one day are allowed, but the model simulates them as happening all at once.	n/a	See CLM-Li*
JULES-INFERNO	n/a	n/a	n/a	n/a	$\widehat{BA}_{pf}$
JSBACH-SPITFIRE	$LB = \begin{cases} 1.0 + 8.729 \times (1 - exp[-1.8W])^{2.155} & \text{Trees} \\ 1.1 \times (60W)^{0.464} & \text{Grasses} \end{cases}$	$ROS_f = \frac{I_R \times \xi \times (1 + \Phi_w)}{\widehat{\rho_b} \times \epsilon \times Q_{ig} \times 60}$ $ROS_b = ROS_f \times exp(-0.012 \times W \times 60)$	$\frac{60 \times 241}{1 + 240 \times exp(-11.06 \times FDI)} \times max\left(1, min[3, (4 - log_{10}PD) \times 0.5]\right)$	n/a	$\frac{\pi}{4 \times LB}\left([ROS_f + ROS_b] \times t_{fire}\right)^2 \times 10^{-6}$
LM3-FINAL*	See CLM-Li*	With g_W as CLM-Li*, Ground fires: $ROS_f = \widehat{ROS}_{max} \times g_W \times S_\theta \times S_{RH}$, Crown fires: $ROS_f = \widehat{ROS}_{max} \times g_W \times S_\theta \times S_{RH} \times 3.34$,	$min\,(86400, t_{ter})$, where t_{ter} is the time (s) until $N_f \times 48 < 1$	As LPJ-LMfire, with f_{nat} the fraction of vegetated land that is not cropland or pasture.	$min(A_c, \frac{\pi}{4 \times LB} \times [ROS_f \times t_{fire} \times (1 + HB^{-1})]^2 \times 10^{-6})$
LPJ-GUESS-SIMFIRE-BLAZE	n/a	$3.3333 \times 10^{-5} \times FDI_{McA} \times (L_{d,litter} + L_{l,g})$ (only used for fireline intensity calculation)	n/a	n/a	n/a
LPJ-GUESS-SPITFIRE	As JSBACH-SPITFIRE, with $LB = 1$ when wind speed $W < 1$.	See JSBACH-SPITFIRE	$\frac{60 \times 241}{1 + 240 \times exp(-11.06 \times FDI)}$	n/a	See JSBACH-SPITFIRE
LPJ-LMfire	See JSBACH-SPITFIRE	$ROS_f = \frac{ROS_{f,tree} \times H_w + ROS_{f,grass} \times H_h}{H_w + H_h}$, where $ROS_{f,tree} = \frac{I_R \times \xi \times (1 + \Phi_w)}{\widehat{\rho_b} \times \epsilon \times Q_{ig} \times 60} \times WF$, $ROS_{f,grass} = (0.165 + 0.534 \times W) \times exp\left(10.8 \times \omega_{x/*}\right) \times g_s$, wind factor $WF = min(2, 1 + exp[2 \times W - 20])$, and $g_s = -0.0848 \times min\,(\rho_{b,lg}, 12) + 1.0848$. ROS_b as JSBACH-SPITFIRE.	As LPJ-GUESS-SPITFIRE for each day of spread. Fires are extinguished by any snowfall, or by rainfall totals on consecutive days: 10 mm for cells with ≥ 60% herbaceous cover, 3 mm otherwise.	$max(0.1, [1.003 + exp(16.607 - 41.503 f_{nat})]^{-2.169} \times A_g)$, with f_{nat} the fraction of vegetated land that is not cropland.	$min(A_c, \frac{\pi}{4 \times LB}[(ROS_f + ROS_b) \times t_{fire}]^2 \times 10^{-6} \times SF)$, where slope factor $SF = \begin{cases} 1 & s < 1.7 \\ \left(\frac{5}{9}\pi \times s - 2\right)^{-1} & s \geq 1.7 \end{cases}$.
MC-Fire	n/a	$\frac{I_{R,R} \times \xi \times (1 + \Phi_w + \Phi_s)}{htsink}$, where $htsink$ ($\mathrm{kJ\,m^{-3}}$) $= 37.2589 \times$ $\rho_b \times \left(\frac{L_d}{L}\sum_i\left[\frac{L_i}{L_d} \times exp\left(-\frac{1.38}{\sigma_i}\right) \times (250 + 1116\omega_i)\right]\right.$ $\left. + \frac{L_l}{L}\sum_j\left[\frac{L_j}{L_l} \times exp\left(-\frac{1.38}{\widehat{\sigma_j}}\right) \times (250 + 1116\omega_j)\right]\right)$, i (dead fuel classes) ∈ {1h, 10h, 100h} ($L_d = \sum_i L_i$), j (live fuel classes) ∈ {herb, wood} ($L_l = \sum_j L_j$), $\sigma_{d,1h} = \widehat{\sigma_{d,1h}}$, $\sigma_{d,10h} = 1.09$, $\sigma_{d,100h} = 0.3$, and $\sigma_{d,1000h} = 0.08$.	n/a	n/a	$\frac{A_g \times (TSF + 1)}{\widehat{FRI}_{max} - dscalar \times \left(\widehat{FRI}_{max} - \widehat{FRI}_{min}\right)}$, where $dscalar = \begin{cases} \frac{BUI - \widehat{BUI}_*}{\widehat{BUI}_*} & \frac{L_{l,g} + L_{d,g}}{L_{l,g} + L_{d,g} + L_{d,1h} + L_{d,10h}} < 0.7 \\ \frac{FFMC - \widehat{FFMC}_*}{\widehat{FFMC}_*} & \frac{L_{l,g} + L_{d,g}}{L_{l,g} + L_{d,g} + L_{d,1h} + L_{d,10h}} \geq 0.7 \end{cases}$
ORCHIDEE-SPITFIRE	$LB = \begin{cases} 1.0 + 8.729 \times (1 - exp[-0.108W])^{2.155} & \text{Trees} \\ 1.1 \times (3.6W)^{0.464} & \text{Grasses} \end{cases}$	See JSBACH-SPITFIRE	See LPJ-GUESS-SPITFIRE	n/a	See JSBACH-SPITFIRE

Table S6. How do the different models calculate total gridcell burned area (BA)? Units are km^2 per timestep. Note that this does not include special fire types described in Table S3.

Model	Timestep	Description
CLM-Li*	Half-hourly	$BA = N_f \times BA_{pf} \times A_g$, where: $N_f = \frac{I_A + I_L}{48} \times S_{env,nf} \times S_{GDP,nf} \times S_{PD,nf}$ and $BA_{pf} = BA_{pf,uns} \times S_{GDP,ba} \times S_{PD,ba}$
CTEM	Daily	$BA = (P_i \times S_{env,nf}) \times BA_{pf} \times \frac{A_g}{300}$, where: $BA_{pf} = BA_{pf,uns} \times \frac{(1-q)(2-q)}{q^2}$
JULES-INFERNO	Half-hourly	$BA = N_f \times \widehat{BA_{pf}} \times A_g$, where: $N_f = \frac{I_A + I_L}{48} \times S_{env,nf} \times S_{PD,nf} \times \Psi$
JSBACH-SPITFIRE	Daily	$BA = N_f \times BA_{pf} \times FDI \times A_g$, where: $N_f = (I_A + I_L) \times S_{env}$ and $BA_{pf} = BA_{pf,uns} \times S_{env}$
LM3-FINAL*	Half-hourly	See CLM-Li*
LPJ-GUESS-GlobFIRM	Annual	$BA = f_{\theta_1} \times S_L \times A_g$
LPJ-GUESS-SIMFIRE-BLAZE	Monthly	Annual $BA = \widehat{a} \times f_{NI} \times f_{PD} \times f_r \times A_g$, distributed to individual months based on seasonality from GFED3 (Giglio et al., 2010).
LPJ-GUESS-SPITFIRE	Daily	$BA = N_f \times BA_{pf,uns} \times FDI \times A_g$, where: $N_f = I_A + I_L$
LPJ-LMfire	Daily	$BA = max\,(0, min\,[BA_y - A_g, N_{f,t} \times BA_{pf,uns} \times FDI \times A_g])$, where: Number of fires on day t $N_{f,t} = (I_A + I_L + N_{f,t-1}) \times \left(1 - \frac{BA_y}{A_g}\right)$, and $N_{f,t-1}$ is the number of fires continuing from day $t-1$.
MC-Fire	Monthly	$S \times BA_{pf,uns}$
ORCHIDEE-SPITFIRE	Daily	See JSBACH-SPITFIRE.

Table S7. How do the different models calculate fuel loads?

Model	Description	G_{ag}	G_{bg}
CLM-Li*	CLM keeps track of live leaf, stem (all of which is aboveground), and root carbon pools, as well as intermediate transfer and storage (T&S) carbon pools. Dead carbon is comprised of leaf and woody litter pools. All except live roots can be combusted when fire occurs (Table S12), and all pools experience fire-induced mortality, according to PFT- and tissue-specific fractions. An additional mortality factor describes the transfer of biomass from sapwood ("live stem") to heartwood ("dead stem") with fire.	1 Leaf 0 Root 1 Stem 1 T&S	0 Leaf 1 Root 0 Stem 1 T&S
CTEM	CTEM tracks carbon in its three live vegetation components (leaves, stem, and roots) and two dead carbon pools (litter and soil carbon). Specified fractions of leaves, aboveground stem, and litter pools are combusted, and release emissions to the atmosphere, when fire occurs (Table S12). In addition, fire generates litter due to plant mortality based on specified fractions of leaves, stems, and roots (Table S14).	1 Leaf 0 Root 1 Stem	0 Leaf 1 Root 1 Stem
JSBACH-SPITFIRE	Live biomass in JSBACH is divided into green, wood, and reserve pools. Dead biomass contributes to the green and wood litter pools. Combustion affects aboveground biomass only, which consists of 70% of the live woody pool and 50% of the live green pool (plus equivalent fractions of the litter derived from those pools). Aboveground fuel is partitioned into fuel class sizes after Thonicke et al. (2010): 1-hour fuel (leaves and twigs) is all green biomass plus 4.5% of woody biomass, 10-hour fuel (small branches) is 7.5% of woody biomass, 100-hour fuel (large branches) is 21% of woody biomass, and 1000-hour fuel (trunks) is 67% of woody biomass.	0.5 Green 0.7 Woody	0.5 Green 0.3 Woody
JULES-INFERNO	JULES keeps track of live leaf, stem, and root carbon pools, in addition to a pool of soil carbon. Leaves, stems (all of which are considered to be "aboveground"), and the fraction of soil carbon that is aboveground "decomposable plant material" (DPM; Best et al., 2011) contribute to fuel loading for the purposes of calculating the fraction of ignitions becoming fires (Table S4). Only leaves and stems contribute to emissions when fire occurs (Table S13). Note, however, that because JULES-INFERNO is not interactive with its DGVM, burning has no effect on biomass – emissions are only calculated as diagnostic variables.	1 Leaf 1 Stem 0 Root 0.7 DPM	0 Leaf 0 Stem 1 Root 0.3 DPM
LM3-FINAL*	LM3 tracks five live vegetation carbon pools: leaves, hardwood, sapwood, labile carbon, and fine roots. Here, "stem" biomass refers to the hardwood, sapwood, and labile carbon pools. LM3 also includes leaf and coarse wood litter pools. 80% of stem biomass is aboveground and therefore considered part of fuel loading for the purposes of S_L, along with live leaves and leaf litter. (Although only aboveground stem biomass matters for fuel loading, all stem biomass is susceptible to combustion and mortality.)	0 Fine root 1 Leaf 0.8 Stem	1 Fine root 0 Leaf 0.2 Stem
LPJ-GUESS-GlobFIRM	LPJ-GUESS partitions both live vegetation and litter C into branches, bark, trunks, leaves, and fine roots. All except fine roots are combusted when fire occurs (Table S12), with fine roots getting killed instead (Table S14). In these tables, "aboveground stem" refers to biomass in branches, bark, and trunks.	0 Fine root 1 Leaf 1 Stem	1 Fine root 0 Leaf 0 Stem
LPJ-GUESS-SIMFIRE-BLAZE	LPJ-GUESS partitions live vegetation carbon into heartwood, sapwood, leaves, and roots. Together, heartwood and sapwood are referred to as stem biomass, all of which is considered to be above ground. Stem biomass is further subdivided: 5% as branches, 1% as bark, and the remaining 94% as trunks. Dead biomass is partitioned into metabolic C, structural C, and fine and coarse woody debris – together referred to here as litter. All living and dead biomass, except belowground stem (i.e., coarse roots) and fine roots, can be combusted when fire occurs (Table S12).	0 Fine root 1 Leaf 1 Stem	1 Fine root 0 Leaf 0 Stem
LPJ-GUESS-SPITFIRE	LPJ-GUESS partitions live vegetation carbon into heartwood, sapwood, leaves, and roots. Together, heartwood and sapwood are referred to as stem biomass – all of which is considered to be above ground for fire modeling purposes. Leaf and woody litter pools are converted to fuel class loadings after Thonicke et al. (2010), as described for JSBACH-SPITFIRE.	0 Fine root 1 Leaf 1 Stem	1 Fine root 0 Leaf 0 Stem
LPJ-LMfire	Biomass pools and fuel loading are as described for LPJ-GUESS-SPITFIRE, with the addition of a soil organic horizon (O-horiz.), which for fire modeling purposes is only considered when considering whether there is enough fuel for fire to occur. The soil organic horizon is not combusted and does not contribute to fuel moisture. However, it does serve to effectively remove fuel from other dead fuel classes.	0 Fine root 1 Leaf 1 Stem	1 Fine root 0 Leaf 0 Stem
MC-Fire	Live fuel in MC-Fire consists of all live grass and tree biomass. Stem wood is partitioned into aboveground and belowground biomass – and aboveground wood is partitioned into fine branches, large branches, and trunks – based on equations in the vegetation model. Total dead fuel load is partitioned into leaf litter (structural and metabolic carbon), standing dead grass, fine dead wood, and coarse dead wood. The amounts of dead 1-hour ($L_{d,1h}$), 10-hour ($L_{d,10h}$), 100-hour ($L_{d,100h}$), and 1000-hour ($L_{d,1000h}$) fuels are calculated by multiplying total dead fuel load by a respective dead fuel fraction: $\widehat{DFF}_{1h}$, $\widehat{DFF}_{10h}$, $\widehat{DFF}_{100h}$, and $\widehat{DFF}_{1000h}$ (Table S27).	0 Fine root 1 Leaf $G_{ag,s}$ Stem	1 Fine root 0 Leaf $G_{bg,s}$ Stem
ORCHIDEE-SPITFIRE	Live biomass in ORCHIDEE is divided into leaves, sapwood, heartwood, fine roots, a reproductive pool, and a carbohydrate reserve pool. The fraction of live biomass in all except heartwood is determined dynamically by an allocation scheme; heartwood is derived from sapwood, and together these are referred to as "wood." Dead fuels are comprised of the fast and slow litter pools, named for their respective rates of decomposition. The amount of each litter pool that is derived from each of the plant biomass pools is calculated as a diagnostic based on conversion ratios. The loading of each fuel class is calculated after Thonicke et al. (2010), similarly to JSBACH-SPITFIRE: Wood and carbohydrate reserves are divided into 1-hour fuel (4.5%, plus all leaf and reproductive biomass), 10-hour fuel (7.5%), 100-hour fuel (21%), and 1000-hour fuel (67%).	0 Fine root 1 Leaf $G_{ag,s}$ Stem	1 Fine root 0 Leaf $G_{bg,s}$ Stem

Table S8. Constants relating to Rothermel-style processes. CLM-Li*, CTEM, LM3-FINAL*, JULES-INFERNO, and LPJ-GUESS-GlobFIRM are excluded because they do not include these processes. h: Fuel heat content ($\mathrm{kJ\,kg^{-1}}$). η_S is rounded to five decimal places. Note that MC-FIRE uses $32\ \mathrm{lb.\,ft^{-3}}$ for ρ_p, which rounds to $513\ \mathrm{kg\,m^{-3}}$. "n/a" indicates variables that are not used by LPJ-GUESS-SIMFIRE-BLAZE.

Model	h	ρ_p	η_S
JSBACH-SPITFIRE	18,000	513	0.41739
LPJ-GUESS-SIMFIRE-BLAZE	20,000	n/a	n/a
LPJ-GUESS-SPITFIRE	18,000	513	0.41739
LPJ-LMfire	18,000	513	0.41739
MC-FIRE	$\widehat{h}$	513	0.41739
ORCHIDEE-SPITFIRE	18,000	513	0.41740

Table S9. Fuel moisture (ω) functions for models that calculate moisture of different fuel classes separately. "n/a" indicates models that do not include the indicated variable or concept, whereas "n/c" indicates models that include the concept but do not explicitly calculate the variable in question.

Component	Description	JSBACH-SPITFIRE	LPJ-GUESS-SPITFIRE	LPJ-LMfire	MC-Fire	ORCHIDEE-SPITFIRE
$\omega_{d,1h}$	Moisture content of 1-hour dead fuels	$exp(-NI \times 2.2 \times 10^{-3})$	$0.5 \times exp(-NI \times 10^{-3}) + 0.5 \times \theta_1$	See JSBACH-SPITFIRE	$\begin{cases} 1.0329 \times emc_{c,min} & T \geq 32 \text{ and no precip.} \\ 0.35 & \text{otherwise} \end{cases}$	$exp(-NI \times 10^{-3})$
$\omega_{d,10h}$	Moisture content of 10-hour dead fuels	n/c	n/c	n/c	$\begin{cases} 1.2815 \times emc_{c,min} & T \geq 32 \text{ and no precip.} \\ 0.35 & \text{otherwise} \end{cases}$	n/c
$\omega_{d,100h}$	Moisture content of 100-hour dead fuels	n/c	n/c	n/c	$0.315634 \times (bnd_{d,100h} - \omega_{d,100h,t-1}) + \omega_{d,100h,t-1}$, where subscript $t-1$ indicates the value of the variable for the previous day.	n/c
$\omega_{d,1000h}$	Moisture content of 1000-hour dead fuels	n/c	n/c	n/c	$0.306810 \times \left(\frac{\sum_{i=1}^{7} bnd_{100h,t-i}}{7} - \omega_{d,100h,t-7}\right) + \omega_{d,100h,t-7}$, where subscript $t-X$ indicates the value of the variable for X days before the current day.	n/c
ω_{duff}	Duff moisture content	n/a	n/a	n/a	$\frac{\theta_{mm} + R_m}{PET}$	n/a
ω_{ff}	Combined moisture of live grass and 1-hour dead fuel	$\frac{\omega_{l,g} \times L_{l,g} + \omega_{d,1h} \times L_{d,1h}}{L_{l,g} + L_{d,1h}}$	n/c	$\frac{\omega_{d,1h} \times L_{d,1h} + \omega_{l,g} \times (L_{l,g} + L_{d,SOM1})}{L_{l,g} + L_{d,1h} + L_{d,SOM1}}$	n/a	$\omega_{d,1h} + \omega_{l,g} \frac{L_{l,g}}{L_{d,1h}}$
ω_l	Surface area-weighted moisture of live fuels	n/a	n/a	n/a	$\frac{\sum_i L_i \times \hat{\sigma}_i \times \omega_i}{\sum_i L_i \times \hat{\sigma}_i}$, where $i \in \{l,h;l,s\}$	n/a
$\omega_{l,g}$	Moisture content of live grass	$max\left(0, \frac{10}{9}\theta_1 - \frac{1}{9}\right)$	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$0.3 + 0.9 \times \left(0.1699365 + \frac{0.8459560}{1 + exp\left[\frac{\omega_{duff} - 39.88160}{5.19634}\right]}\right)$	See JSBACH-SPITFIRE
$\omega_{l,s}$	Moisture content of live shrubby veg.	n/a	n/a	n/a	$0.8 + 0.5 \times \left(0.1699365 + \frac{0.8459560}{1 + exp\left[\frac{\omega_{duff} - 39.88160}{5.19634}\right]}\right)$	n/a
ω_o	A composite fuel moisture measurement	$exp\left(-\frac{NI}{\sum_i L_i} \times \sum_i [d_i \times L_i]\right)$, where $i \in \{d,1h;d,10h;d,100h;l,g\}$.	See JSBACH-SPITFIRE	$max\,(0, min\,[1, \omega_{o,d-1} - dry_o + wet])$, where $dry_o = T_{max,d}\,(T_{max,d} - T_{dew,d}) \times \frac{\sum_i d_i \times L_i}{\sum_i L_i} \times \omega_{o,d-1}$, $wet = min\,(1, 0.02 \times R_d)$, $\omega_{o,d-1}$ is ω_o from the previous day, and $i \in \{1h, 10h, 100h, 1000h\}$.	$\frac{\sum_i L_i \times \sigma_i \times \omega_i}{\sum_i L_i \times \sigma_i}$, where $i \in \{d,1h;d,10h;d,100h\}$, $\sigma_{d,1h} = \widehat{\sigma_{d,1h}}$, $\sigma_{d,10h} = 1.09$, and $\sigma_{d,100h} = 0.3$.	As JSBACH-SPITFIRE, but with $i \in \{d,1h;d,10h;d,100h\}$
ω_*	Fuel moisture of extinction	$\widehat{\omega_{*l}}$	$\widehat{\omega_{*l}}$	$\begin{cases} \frac{\widehat{\omega_{*l}}_{d,1h} \times L_{d,1h} + \widehat{\omega_{*l}} \times (L_{l,g} + L_{d,SOM1})}{L_{d,1h} + L_{l,g} + L_{d,SOM1}} & H_h \geq 0.6 \\ \frac{\widehat{\omega_{*l}} \times L_{l,g} + \sum_i L_{d,i} \times \widehat{\omega_{*l}}_{d,i}}{L} & H_h < 0.6 \end{cases}$, where $i \in \{1h, 10h, 100h, 1000h\}$ and $\widehat{\omega_{*l}}_{d,i} \in \{0.404, 0.487, 0.525, 0.544\}$.	$\widehat{\omega_{*l}}$	$\widehat{\omega_{*l}}$
$\omega_{x/*}$	Fuel moisture relative to moisture of extinction	n/a	n/a	$\begin{cases} \frac{\omega_{ff}}{\omega_*} & H_h \geq 0.6 \\ \frac{\omega_o}{\omega_*} & H_h < 0.6 \end{cases}$	n/a	n/a

Table S10. Drying parameters for models that use them in calculating fuel moisture (Table S9). "n/a" indicates models that do not include the indicated variable.

Variable	JSBACH-SPITFIRE	LPJ-GUESS-SPITFIRE	LPJ-LMfire	ORCHIDEE-SPITFIRE
d_{1h}	2.2×10^{-3}	1×10^{-3}	1.5×10^{-3}	See JSBACH-SPITFIRE
d_{10h}	$\sim 1.193 \times 10^{-4}$	5.42×10^{-5}	8.13×10^{-5}	See JSBACH-SPITFIRE
d_{100h}	$\sim 3.27 \times 10^{-5}$	1.49×10^{-5}	2.22×10^{-5}	See JSBACH-SPITFIRE
d_{1000h}	n/a	n/a	1.5×10^{-6}	n/a
$d_{l,g}$	$\sim 2.2 \times 10^{-3}$	$-\frac{log(\omega_{l,g})}{NI}$	n/a	See JSBACH-SPITFIRE

Table S11. Other functions for fire models that calculate energy release. $\beta = \frac{\rho_b}{\rho_p}$. T_{max} refers to daily maximum air temperature (°C). "n/a" indicates models that do not use the indicated variable.

Component	Description	JSBACH-SPITFIRE	LPJ-GUESS-SIMFIRE-BLAZE	LPJ-GUESS-SPITFIRE	LPJ-LMfire	MC-Fire	ORCHIDEE-SPITFIRE
A	Used to compute Γ'	$8.9033 \times \sigma^{-0.7913}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$A_R = 133 \times (\sigma_R \times 100)^{-0.7913}$ $A_E = 133 \times (\sigma_E \times 100)^{-0.7913}$	See JSBACH-SPITFIRE
B	Used to compute Φ_w	$0.15988 \times \sigma^{0.54}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$0.02526 \times (\sigma_R \times 100)^{0.54}$	See JSBACH-SPITFIRE
C	Used to compute Φ_w	$7.47 \times exp\left(-0.8711\sigma^{0.55}\right)$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$7.47 \times exp\left(-0.133 \times [\sigma_R \times 100]^{0.55}\right)$	See JSBACH-SPITFIRE
E	Used to compute Φ_w	$7.7515 \times exp\left(-0.01094\sigma\right)$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$0.715 \times exp\left(\sigma_R \times -359 \times 10^{-4}\right)$	See JSBACH-SPITFIRE
I_R	Reaction intensity ($\mathrm{kJ\,m^{-2}\,min^{-1}}$)	$\Gamma' \times L_{dc,n} \times h \times \eta_M \times \eta_S \times S_{env}$	n/a	$\Gamma' \times L_{dc,n} \times h \times \eta_M \times \eta_S$	See JSBACH-SPITFIRE	$I_{R,R} = \Gamma'_R \times \widehat{h} \times ([L_{+dc,n,R} \times \eta_{M,d}] + [L_{+lc,n} \times \eta_{M,l}])$ $I_{R,E} = \Gamma'_E \times \widehat{h} \times ([L_{+dc,n,E} \times \eta_{M,d}] + [L_{+lc,n} \times \eta_{M,l}])$	See JSBACH-SPITFIRE
I_{surf}	Intensity of surface fire at flaming front (fireline intensity; $\mathrm{kW\,m^{-1}}$)	$h \times \frac{\sum_i FC_i}{1000 \times BF} \times \frac{ROS_f}{60}$, where $i \in \{1h, 10h, 100h\}$	$h \times ROS \times (L_{d,litter} + L_{l,g}) \times 10^{-3}$	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$ROS \times \tau \times I_{R,E}$	See JSBACH-SPITFIRE
Q_{ig}	Heat of pre-ignition ($\mathrm{kJ\,kg^{-1}}$)	$581 + 2594\omega_o$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$max(344, 144.5 - 0.266T_{adj} - 0.0058T_{adj}{}^2 - (T_{adj} \times \omega_{d,1h}) +$ $18.54(1.0 - exp[-15.1\omega_{d,1h}]) + 640\omega_{d,1h})$, where $T_{adj} = 1.8T_{max} + 47$	See JSBACH-SPITFIRE
$L_{dc,n}$	Net fuel loading (i.e., without mineral content; kg dry matter $\mathrm{m^{-2}}$)	$(1-\mu_S)\frac{\sum_i L_{d,i}}{X}$, where $i \in \{1h; 10h; 100h\}$ and $X = 0.5$.	n/a	See JSBACH-SPITFIRE	As JSBACH-SPITFIRE, but with $X = 0.45$.	$L_{+dc,n,R} = (1-\mu_S) \times (L_{d,1h+} + L_{d,10h+} + L_{d,100h+})$ $L_{+dc,n,E} = (1-\mu_S) \times (L_{d,1h+} + L_{d,10h+} + L_{d,100h+} + L_{d,1000h+})$ $L_{+lc,n} = (1-\mu_S) \times (L_{l,g} + L_{l,s})$	As JSBACH-SPITFIRE, but with $X = 0.45$.
β_{op}	Used to compute Φ_w	$0.200395 \times \sigma^{-0.8189}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$3.348 \times (\sigma_R \times 100)^{-0.8189}$	See JSBACH-SPITFIRE
Γ'	Optimum reaction velocity ($\mathrm{min^{-1}}$)	$\Gamma'_{max}\left(\frac{\beta}{\beta_{op}}\right)^A \times exp\left(A\left[1-\frac{\beta}{\beta_{op}}\right]\right)$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\Gamma'_R = \Gamma'_{R,max} \times \left(\frac{\beta}{\beta_{op}}\right)^{A_R} \times exp\left(A_R\left[1-\frac{\beta}{\beta_{op}}\right]\right)$ $\Gamma'_E = \Gamma'_{E,max} \times \left(\frac{\beta}{\beta_{op}}\right)^{A_E} \times exp\left(A_E\left[1-\frac{\beta}{\beta_{op}}\right]\right)$	See JSBACH-SPITFIRE
Γ'_{max}	Maximum reaction velocity ($\mathrm{min^{-1}}$)	$\left(0.0591 + 2.926 \times \sigma^{-1.5}\right)^{-1}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\Gamma'_{R,max} = \frac{(\sigma_R \times 100)^{1.5}}{495 + 0.0594 \times (\sigma_R \times 100)^{1.5}}$ $\Gamma'_{E,max} = \frac{(\sigma_E \times 100)^{1.5}}{495 + 0.0594 \times (\sigma_E \times 100)^{1.5}}$	See JSBACH-SPITFIRE
ϵ	Effective heating number	$exp\left(\frac{-4.528}{\sigma}\right)$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\epsilon_i = (1-\mu_S) \times L_{i(+)} \times exp\left(-\frac{1.38}{\sigma_i}\right)$, where $i \in \{d,1h; d,10h; d,100h; l,h; l,s\}$ and $L_{i(+)}$ is the fuel loading with FLA applied for the dead fuel classes.	See JSBACH-SPITFIRE
η_M	Moisture damping coefficient	$1 - 2.59\omega_{o/*} + 5.11\left(\omega_{o/*}\right)^2 - 3.52\left(\omega_{o/*}\right)^3$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\eta_{M,d} = 1 - 2.59\omega_{o/*} + 5.11\left(\omega_{o/*}\right)^2 - 3.52\left(\omega_{o/*}\right)^3$ $\eta_{M,l} = 1 - 2.59\frac{\omega_l}{\omega_{l*}} + 5.11\left(\frac{\omega_l}{\omega_{l*}}\right)^2 - 3.52\left(\frac{\omega_l}{\omega_{l*}}\right)^3$, where $\omega_{l*} = max\left(\widehat{\omega_*}, 2.9\frac{\sum_i \epsilon_i}{\sum_j \epsilon_j}\left[1 - \frac{\sum_i \omega_i \epsilon_i}{\widehat{\omega_*}\left(\sum_i \epsilon_i\right)}\right] - 0.226\right)$, $i \in \{d,1h; d,10h; d,100h\}$, and $j \in \{l,h; l,s\}$	See JSBACH-SPITFIRE
ξ	Propagating flux ratio	$\frac{exp(0.792 + 3.7597\sqrt{\sigma})(\beta + 0.1)}{192 + 7.9095\sigma}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\frac{exp([0.792 \times 6.81\sqrt{\sigma_R}] \times [\beta + 0.1])}{192 + 25.95 \times \sigma_R}$	See JSBACH-SPITFIRE
ρ_b	Fuel bulk density ($\mathrm{kg\,m^{-3}}$)	$N^{-1}\sum_{i=1}^{N}\widehat{\rho_{b,i}} \times (L_{d,1h,i} + 1.2L_{d,10h,i} + 1.4L_{d,100h,i})$, summing over the N simulated PFTs in the gridcell.	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$(L_{d,1h+} + L_{d,10h+} + L_{d,100h+}) \times depth^{-1}$	See JSBACH-SPITFIRE
σ	Fuel surface-area-to-volume ratio ($\mathrm{cm^{-1}}$)	$\begin{cases} 0.0001 & L_{dc,n} = 0 \\ \sum_i \sigma_i \frac{L_{dc,n,i}}{L_{dc,n}} & L_{dc,n} > 0 \end{cases}$, where $i \in \{d,1h; d,10h; d,100h\}$, $\sigma_{d,1h} = 66.0$, $\sigma_{d,10h} = 3.58$, and $\sigma_{d,100h} = 0.98$.	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\sigma_R = 100 \times \frac{\sum_i \left(L_i\sigma_i^2\right) + \sum_j \left(L_j\sigma_j^2\right)}{\sum_k L_k\sigma_k}$ and $\sigma_E = 100 \times \frac{\sum_m \left(L_m\sigma_m^2\right) + \sum_j \left(L_j\sigma_j^2\right)}{\sum_n L_{dc,n}\sigma_n}$, where $i \in \{d,1h; d,10h; d,100h\}$, $j \in \{l,h; l,s\}$, $k \in \{i; j\}$, $m \in \{d,1h; d,10h; d,100h; d,1000h\}$, $n \in \{m; j\}$, $\sigma_{d,1h} = \widehat{\sigma_{d,1h}}$, $\sigma_{d,10h} = 1.09$, $\sigma_{d,100h} = 0.3$, $\sigma_{d,1000h} = 0.08$, $\sigma_{l,h} = \widehat{\sigma_{l,h}}$, and $\sigma_{l,s} = \widehat{\sigma_{l,s}}$.	See JSBACH-SPITFIRE
Φ_s	Effect of slope on increasing ξ	n/a	n/a	n/a	n/a	$\beta^{0.3} \times \begin{cases} 0.267 & s \leq 25 \\ 0.533 & 25 < s \leq 40 \\ 1.066 & 40 < s \leq 55 \\ 2.134 & 55 < s \leq 75 \\ 4.273 & s > 75 \end{cases}$	n/a
Φ_w	Effect of wind on increasing ξ	$C\left(W'_{ef}\right)^B \times \left(\frac{\beta}{\beta_{op}}\right)^{-E}$, where $W'_{ef} = \begin{cases} W' & W' \leq 150 \\ max(225 - 0.5W', 0) & W' > 150 \end{cases}$ and $W' = W \times (0.4wf + 0.6[1 - wf]) \times (3.281 \times 60)$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$C \times \left(\frac{\beta}{\beta_{op}}\right)^{-E} \times \begin{cases} \left(88 \times W'_{ef,mph}\right)^B & 88 \times W'_{ef,mph} \leq I_{R,E} \times 0.0881 \\ \left(0.9 \times I_{R,E}\right)^B & 88 \times W'_{ef,mph} > I_{R,E} \times 0.0881 \end{cases}$, where $W'_{ef,mph} = W \times \widehat{WRF} \times 2.237$	As JSBACH-SPITFIRE, but with $W'_{ef} = min(100, 60 \times W \times [wf \times 0.4 + (1 - wf) \times 0.6])$

Table S12. Calculation of combustion for fire models that do not classify dead fuels by size. PFT-specific values (Tables S17–S21, S22, and S24) are denoted with a "hat." "n/a" indicates models that do not include the indicated variable or concept. Models have n/a for $FC_{l,grass}$ if grass PFTs are not affected differently from woody PFTs.

Component	CLM-Li*	CTEM	JULES-INFERNO	LM3-FINAL	LPJ-GUESS-GlobFIRM	LPJ-GUESS-SIMFIRE-BLAZE
$FC_{l,leaf}$	$\widehat{FC_{l,leaf}}$	$\widehat{FC_{l,leaf}}$	$\widehat{FC}_{l,leaf,min} + (1-\theta)$ $\times(\widehat{FC}_{l,leaf,max} - \widehat{FC}_{l,leaf,min})$	$\widehat{FC_{l,leaf}}$	$1-\widehat{r}$	$FA_{w,Ca+Cr} \times \begin{cases} 0.02 & I_{surf} \leq 0.75 \\ 0.05 & 0.75 < I_{surf} \leq 3 \\ 0.10 & 3 < I_{surf} \leq 7 \\ 0.60 & I_{surf} > 7 \end{cases}$
$FC_{l,root}$	0	0	0	0	0	$FA_{w,Ca+Cr} \times \begin{cases} 0 & I_{surf} \leq 0.75 \\ 0.02 & 0.75 < I_{surf} \leq 7 \\ 0.04 & I_{surf} > 7 \end{cases}$
$FC_{l,stem}$	$\widehat{FC_{l,stem}}$	$\widehat{FC_{l,stem}}$ $\times G_{ag}$	$\widehat{FC}_{l,stem,min} + (1-\theta)$ $\times\left(\widehat{FC}_{l,stem,max} - \widehat{FC}_{l,stem,min}\right)$	$\widehat{FC_{l,stem}}$	$1-\widehat{r}$	Branches: $FA_{w,Ca+Cr} \times \begin{cases} 0.00 & I_{surf} \leq 3 \\ 0.15 & 3 < I_{surf} \leq 7 \\ 0.20 & I_{surf} > 7 \end{cases}$ Bark: $FA_{w,Ca+Cr} \times \begin{cases} 0.03 & I_{surf} \leq 0.75 \\ 0.13 & 0.75 < I_{surf} \leq 3 \\ 0.25 & 3 < I_{surf} \leq 7 \\ 0.50 & I_{surf} > 7 \end{cases}$ Trunks: $FA_{w,Ca+Cr} \times \begin{cases} 0 & I_{surf} \leq 3 \\ 0.05 & 3 < I_{surf} \leq 7 \\ 0.20 & I_{surf} > 7 \end{cases}$
$FC_{l,grass}$	n/a	$\widehat{FC_{l,leaf}}$	n/a	n/a	$1-\widehat{r}$	$0.99 \times G_{ag}$
$FC_{d,leaf}$	0.5	$\widehat{FC_{d,litter}}$	n/a	$\widehat{FC_{d,litter}}$	$1-\widehat{r}$	$\begin{cases} 0.60 & I_{surf} \leq 0.75 \\ 0.65 & 0.75 < I_{surf} \leq 3 \\ 0.85 & 3 < I_{surf} \leq 7 \\ 1.00 & I_{surf} > 7 \end{cases}$
$FC_{d,stem}$	0.35	$\widehat{FC_{d,litter}}$	n/a	$\widehat{FC_{d,litter}}$	$1-\widehat{r}$	Bark: See $FC_{d,leaf}$ Branches, trunks $\begin{cases} 0.50 & I_{surf} \leq 0.75 \\ 0.75 & 0.75 < I_{surf} \leq 7 \\ 0.80 & I_{surf} > 7 \end{cases}$
$FC_{d,root}$	n/a	n/a	n/a	0	0	0

Table S13. Calculation of fractional combustion for models that classify dead fuels by size. Note that differences among SPITFIRE-based models in combustion of live fuels arose as a result of inconsistencies in Thonicke et al. (2010). PFT-specific values (Tables S20, S25–S28) are denoted with a "hat." "n/a" indicates models that do not include the indicated variable or concept.

Component	JSBACH-SPITFIRE	LPJ-GUESS-SPITFIRE	LPJ-LMfire	MC-Fire	ORCHIDEE-SPITFIRE
$FC_{d,1h}$	$G_{ag} \times (1-\mu_S) \times \begin{cases} 1.0 & \omega_{ff/*} < 0.18 \\ X - 0.62\omega_{ff/*} & 0.18 \le \omega_{ff/*} \le 0.73, \\ 2.45 - 2.45\omega_{ff/*} & \omega_{ff/*} > 0.73 \end{cases}$ where $X = 1.11$.	As JSBACH-SPITFIRE, but using $\omega_{d,1h/*}$ instead of $\omega_{ff/*}$, and without multiplying by $(1-\mu_S)$.	As JSBACH-SPITFIRE, but with $X = 1.10$ and using $\frac{\omega_{d,1h}}{0.404}$ instead of $\omega_{ff/*}$.	$0.9 \times G_{ag}$	$G_{ag} \times \begin{cases} min\left(0.9, 1.11 - 0.62\omega_{ff/*}\right) & \omega_{ff/*} \le 0.73 \\ 2.45 - 2.45\omega_{ff/*} & \omega_{ff/*} > 0.73 \end{cases}$
$FC_{d,10h}$	$G_{ag} \times (1-\mu_S) \times \begin{cases} 1.0 & \omega_{o/*} < Y \\ 1.09 - 0.72\omega_{o/*} & Y \le \omega_{o/*} \le 0.51, \\ 1.47 - 1.47\omega_{o/*} & \omega_{o/*} > 0.51 \end{cases}$ where $Y = 0.13$.	As JSBACH-SPITFIRE, but with $Y = 0.12$ and without multiplying by $(1-\mu_S)$.	As JSBACH-SPITFIRE, but with $Y = 0.12$ and using $\frac{\omega_{d,10h}}{0.487}$ instead of $\omega_{o/*}$.	$\frac{-0.048132 + (0.917393 \times L_{d,10h} \times Z)}{L_{d,10h} \times Z}$, where conversion factor $Z = 0.5 \times 0.224170$ converts from $\mathrm{kg\,C\,m^{-2}}$ to $\mathrm{T\,DM\,ac^{-1}}$.	$G_{ag} \times \begin{cases} min\left(0.9, 1.09 - 0.72\omega_{o/*}\right) & \omega_{o/*} \le 0.51 \\ 1.47 - 1.47\omega_{o/*} & \omega_{o/*} > 0.51 \end{cases}$
$FC_{d,100h}$	$G_{ag} \times (1-\mu_S) \times min\left(0.45, [0.98 - 0.85 \times \omega_{d,100h}]\right)$	$\begin{cases} 0.98 - 0.85\omega_{o/*} & \omega_{o/*} \le 0.38 \\ 1.06 - 1.06\omega_{o/*} & \omega_{o/*} > 0.38 \end{cases}$	$(1-\mu_S) \times \begin{cases} 0.98 - 0.85\frac{\omega_{d,100h}}{0.525} & \frac{\omega_{d,100h}}{0.525} \le 0.38 \\ 1.06 - 1.06\frac{\omega_{d,100h}}{0.525} & \frac{\omega_{d,100h}}{0.525} > 0.38 \end{cases}$	$(-0.124649 + [0.869309 \times L_{d,100h} \times Z] - [48.04 \times \omega_{duff}]) \times (L_{d,100h} \times Z)^{-1}$, where conversion factor $Z = 0.5 \times 0.224170$ converts from $\mathrm{kg\,C\,m^{-2}}$ to $\mathrm{T\,DM\,ac^{-1}}$.	$G_{ag} \times \begin{cases} \widehat{FC}_{d,100h,max} - 0.85\omega_{o/*} & \omega_{o/*} < 0.38 \\ 1.06 - 1.06\omega_{o/*} & \omega_{o/*} > 0.38 \end{cases}$
$FC_{d,1000h}$	$G_{ag}(1-\mu_S) \times \times min\left(0.45, [0.8 - 0.8 \times \omega_{d,100h}]\right)$	$max\left(0, 0.8 - 0.8\omega_{o/*}\right)$	$(1-\mu_S) \times max\left(0, 0.8 - 0.8\frac{\omega_{d,1000h}}{0.544}\right)$	$1 - \left(\frac{6.6 - X}{6.6}\right)^2$, where $X = \begin{cases} 1.6107058 - (1.4756 \times \omega_{duff}) & \omega_{duff} \le 0.7 \\ 0.5579 \times exp(-3[\omega_{duff} - 0.7]) & \omega_{duff} > 0.7 \end{cases}$	$G_{ag} \times \left(\widehat{FC}_{d,1000h,max} - 0.8 \times \omega_{o/*}\right)$
$FC_{l,1h}$	$G_{ag} \times FA_{w,Cr}$	CF	See LPJ-GUESS-SPITFIRE	n/a	$G_{ag} \times FA_{w,Ca+Cr} \times CF$
$FC_{l,10h}$	$G_{ag} \times FA_{w,Cr} \times 0.05$	$0.05CF$	See LPJ-GUESS-SPITFIRE	n/a	$G_{ag} \times FA_{w,Ca+Cr} \times CF$
$FC_{l,100h}$	0	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	n/a	$G_{ag} \times FA_{w,Ca+Cr} \times CF$
$FC_{l,1000h}$	0	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	n/a	$G_{ag} \times FA_{w,Ca+Cr} \times 0.05CF$
$FC_{l,leaf}$	n/a	n/a	n/a	0.98 if crown fire ($FA_{w,Cr} = 1$), 0 otherwise (woody PFTs only).	n/a
$FC_{l,grass}$	$\begin{cases} 1.0 & \omega_{l,g/*} < 0.18 \\ 1.11 - 0.62\omega_{l,g/*} & 0.18 \le \omega_{l,g/*} \le 0.73 \\ 2.45 - 2.45\omega_{l,g/*} & \omega_{l,g/*} > 0.73 \end{cases}$	See JSBACH-SPITFIRE	$G_{ag} \times FC_{d,1h}$	0.9	See JSBACH-SPITFIRE
$FC_{l,stem}$	n/a	n/a	n/a	Fine branches: 0.98 if crown fire ($FA_{w,Cr} = 1$), 0 otherwise. Other wood, roots: 0.	n/a

Table S14. Calculation of fire-induced mortality for models that do not use tree size and/or fire intensity as a driver. Note that this does not include biomass killed during combustion; for these purposes "mortality" refers to biomass transferred from living to dead or soil pools. JULES-INFERNO does not calculate fire-induced mortality and is thus excluded. PFT-specific values (Tables S17–S19) are denoted with a "hat." "n/a" indicates models that do not include the indicated variable or concept.

Component	Description	CLM-Li*	CTEM	LPJ-GUESS-GlobFIRM	LM3-FINAL*
FK_{leaf}	Fractional mortality: Leaves	$(1 - \widehat{FC_{l,leaf}}) \times \widehat{FK_{leaf}}$	$\widehat{FK_{leaf}}$	0	See CLM-Li*
FK_{root}	Fractional mortality: Roots	$\widehat{FK_{root}}$	See CLM-Li*	$1 - \widehat{r}$	See CLM-Li*
FK_{stem}	Fractional mortality: Stem	$(1 - \widehat{FC_{l,stem}}) \times \widehat{FK_{stem}}$, $(1 - \widehat{FC_{l,stem}}) \times \widehat{FK_{StoH}}$	$\widehat{FK_{stem}}$	0	See CLM-Li*

Table S15. Calculation of fire-induced mortality for models that use tree size and/or fire intensity as a driver. “Mortality” here does not include biomass killed during combustion; for these purposes it refers only to biomass transferred from living to dead or soil pools. JULES-INFERNO does not calculate fire-induced mortality and is thus excluded. Note that the models using LPJ-GUESS translate fractional mortality into a probability for use in stochastic burning of individual stands within a grid cell. PFT-specific values (Tables S20–S28) are denoted with a “hat.” “n/a” indicates models that do not include the indicated variable or concept.

Var.	Description	JSBACH-SPITFIRE	LPJ-GUESS-SIMFIRE-BLAZE	LPJ-GUESS-SPITFIRE	LPJ-LMfire	MC-Fire	ORCHIDEE-SPITFIRE
SH	Scorch height (m)	$\widehat{F} \times I_{surf}{}^{0.667}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\frac{63 \times (I_{surf} \times 0.289)^{\frac{7}{6}}}{3.281 \times (158 - [1.8T + 32]) \sqrt{(I_{surf} \times 0.289) + (W \times 2.237)^3}}$, where T = daily average air temperature (°C).	See JSBACH-SPITFIRE
CL	Crown length (m)	$ht_w \times \widehat{CL_f}$	n/a	$ht_w \times \widehat{CL_f}$	$ht_w \times \widehat{CL_f}$	$ht_w \times \widehat{CL_f}$	$\widehat{CL_f}$
CF	Fraction of crown in flaming zone	$max\left(0, min\left[1, \frac{SH - ht_w + CL}{CL}\right]\right)$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$max\left(0, min\left[1, 1 - \left(\frac{ht_w - SH}{CL}\right)^2\right]\right)$	See JSBACH-SPITFIRE
$FA_{w,Cr}$	Fraction affected by crown scorch	$\widehat{r_{CF}} \times CF^{\widehat{p}}$	n/a	See JSBACH-SPITFIRE	CF	$\begin{cases} 0 & I_{surf} \leq X \\ 1 & I_{surf} > X \end{cases}$, where $X = (0.010 \times [ht_w - CL] \times [460 + 26 \times \omega_{l,s}])^{1.5}$	See JSBACH-SPITFIRE
$FA_{w,Ca}$	Fraction affected by cambial damage	$\begin{cases} 0 & \frac{\tau}{\tau_*} \leq 0.22 \\ 0.563 \times \frac{\tau}{\tau_*} - \frac{1}{8} & 0.22 < \frac{\tau}{\tau_*} < 2.0 \\ 1 & \frac{\tau}{\tau_*} \geq 2.0 \end{cases}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\begin{cases} max(0.33, CF) & P_m \leq \widehat{P_{m*}} \\ 1 & P_m > \widehat{P_{m*}} \end{cases}$, where $P_m = (1 + exp[-1.466 + 1.910 min(BT, 5) - 0.1775 min(BT, 5)^2 - 5.4CF^2])^{-1}$	See JSBACH-SPITFIRE
$FA_{w,Ca+Cr}$	Fraction affected by crown scorch OR cambial damage	$FA_{w,Ca} + FA_{w,Cr} - FA_{w,Ca} \times FA_{w,Cr}$	$\widehat{FK_{tree}}$	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	n/a	See JSBACH-SPITFIRE
τ	Fire residence time (min)	$X \sum_i \frac{FC_i}{\Gamma' \eta_M \eta_S L_{dc,n}}$, where $X = 5$ and $i \in \{1h, 10h, 100h\}$.	n/a	See JSBACH-SPITFIRE	$\sum_i \left(L_{d,i} \times \left[1 - \sqrt{1 - FC_{d,i}}\right]\right)$ $\times 0.00394$, where $i \in \{1h, 10h, 100h, 1000h\}$.	$\frac{3.84}{\sigma_E}$	As JSBACH-SPITFIRE, but with $X = 2$.
τ_*	Critical residence time (min)	$2.9BT^2$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	n/a	See JSBACH-SPITFIRE
BT	Bark thickness (cm)	$\widehat{par_1} \times DBH + \widehat{par_2}$	n/a	$\widehat{BT}$	See JSBACH-SPITFIRE	$\widehat{par_1} \times DBH$	See JSBACH-SPITFIRE
DBH	Diameter at breast height (cm)	$100 \times \left(\frac{ht_w}{40}\right)^{\frac{1}{0.67}}$	Calculated by LPJ-GUESS	$\left(\frac{100ht_w}{\widehat{k_2}}\right)^{\widehat{k_3}^{-1}}$	$\widehat{D_1} \times ht_w + \widehat{D_2}$	$\begin{cases} 1.2 \times ht_w & \text{if deciduous broadleaf and } ht_w < 0.16 \\ 0.30 \times ht_w{}^{1.5} & \text{if deciduous broadleaf and } ht_w \geq 0.16 \\ 1.3 \times ht_w & \text{if evergreen needleleaf and } ht_w < 0.1552 \\ 0.33 \times ht_w{}^{1.5} & \text{if evergreen needleleaf and } ht_w \geq 0.1552 \end{cases}$	$\left(\frac{100ht_w}{40}\right)^2$
ht_w	Height of woody vegetation (m)	$24.19(1 - exp[0.19 \times L_l])$	Calculated by LPJ-GUESS	Calculated by LPJ-GUESS	Calculated by LPJ	$\begin{cases} min\left(35, 0.4523 \times [\sum_i L_{l,i}]^{0.33333}\right) & \text{if deciduous and } [\sum_i L_{l,i}] < 4 \\ min\left(35, 0.03484 \times [\sum_i L_{l,i}]^{0.64242}\right) & \text{if deciduous and } [\sum_i L_{l,i}] \geq 4 \\ min\left(70, 0.4074 \times [\sum_i L_{l,i}]^{0.33333}\right) & \text{if evergreen and } [\sum_i L_{l,i}] < 4 \\ min\left(70, 0.03771 \times [\sum_i L_{l,i}]^{0.62027}\right) & \text{if evergreen and } [\sum_i L_{l,i}] \geq 4 \end{cases}$ where $i \in \{10h, 100h, 1000h\}$	$\widehat{ht_w}$
FK_w	Fraction killed: Woody PFTs overall	n/a	For each live biomass pool B, $(1 - \frac{FC_{l,B}}{FA_{w,Ca+Cr}}) \times$ $FA_{w,Ca+Cr}$ (see Table S12 for pools)	n/a	$FA_{w,Ca+Cr}$	/ Crown fire ($FA_{w,Cr} = 1$) / Ground fire ($FA_{w,Cr} = 0$) Leaves, fine branches / 0 / $FA_{w,Ca}$ Other wood, roots / 0.98 / $FA_{w,Ca}$	n/a
$FK_{w,1h}$	Fraction killed: Live 1-hour fuels (woody PFTs)	$G_{ag} \times FA_{w,Ca} + G_{bg} \times FA_{w,Ca+Cr}$ $- FA_{w,Cr} \times FA_{w,Ca}$	n/a	$(1 - FC_{l,1h}) \times$ $FA_{w,Ca+Cr}$	$FA_{w,Ca+Cr} - FC_{l,1h}$	n/a	$FA_{w,Ca+Cr} \times$ $([1 - CF] \times G_{ag} +$ $\times G_{bg})$
$FK_{w,10h}$	Fraction killed: Live 10-hour fuels	$G_{bg} \times FA_{w,Ca+Cr}$ $+ G_{ag} \times (FA_{w,Ca} + 0.95 \times FA_{w,Cr})$ $- FA_{w,Cr} \times FA_{w,Ca}$	n/a	$(1 - FC_{l,10h}) \times$ $FA_{w,Ca+Cr}$	$FA_{w,Ca+Cr} - FC_{l,10h}$	n/a	See $FK_{w,1h}$
$FK_{w,100h}$	Fraction killed: Live 100-hour fuels	$FA_{w,Ca+Cr}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	n/a	See $FK_{w,1h}$
$FK_{w,1000h}$	Fraction killed: Live 1000-hour fuels	$FA_{w,Ca+Cr}$	n/a	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	n/a	$FA_{w,Ca+Cr} \times$ $([1 - 0.05CF] \times$ $G_{ag} + G_{bg})$
FK_{grass}	Fraction killed: Grass	$FA_{w,Ca+Cr} \times G_{bg}$	$\begin{cases} 0.99 & \text{Roots} \\ 0 & \text{Other} \end{cases}$	0	0	0	0

Table S16. Miscellaneous equations.

Abbrv.	Name	Models using	Equation	See also	References
$\rho_{b,lg}$	Fuel bulk density of live grass	LPJ-LMfire	$\frac{20000}{GDD_{20}+1000}-1$, where GDD_{20} is the 20 yr running mean of the annual sum of degree-days with base 5°C	Table S5	Sitch et al. (2003)
Ψ	Reduces number of fires as gridcell burned fraction increases	LM3-FINAL*	$\left(1-\frac{BA}{A_g}\right)^2$	Table S6	
$bnd_{d,100h}$	Used in calculating $\omega_{d,100h}$	MC-Fire	$([24-R_t]\times\overline{emc_u}+R_t\times[0.5R_t+41])\times 24^{-1}$		
$bnd_{d,1000h}$	Used in calculating $\omega_{d,1000h}$	MC-Fire	$([24-R_t]\times\overline{emc_u}+R_t\times[2.7R_t+76])\times 24^{-1}$		
BUI	Build-up index	MC-Fire	(See references.)		van Wagner and Pickett (1985); van Wagner (1987)
DF	Drought factor	LPJ-GUESS-SIMFIRE-BLAZE	$\frac{0.191\times(KBDI+104)\times(TSR+1)^{1.5}}{2.53\times(TSR+1)^{1.5}+R_d-1}$	FDI_{McA}	Noble et al. (1980)
$depth$	Fuel bed depth (m)	MC-Fire	$min\left(2, TFBB\times\widehat{LD}\times 0.0044409\times 0.3048\times 2000\right)$		
emc_c	Corrected equilibrium fuel moisture content	MC-Fire	$\begin{cases}0.03229+0.281073(87RH)-0.000578(1.8T+47)(87RH) & \text{if } 0.87\times RH<0.1\\ 2.22749+0.160107(87RH)-0.01478714784(1.8T+47) & \text{if } 0.1\leq 0.87\times RH<0.5\\ 21.06060+0.005565(87RH)^2-0.00035(1.8T+47)(87RH)-0.483199(87RH) & \text{if } 0.87\times RH\geq 0.5\end{cases}$		
$emc_{c,min}$	Corrected equilibrium fuel moisture content: Daily minimum	MC-Fire	emc_c with T = max. daily temperature and RH = min. daily relative humidity (or $RH=1$ if $T<0°C$).		
emc_u	Uncorrected equilibrium fuel moisture content	MC-Fire	$\begin{cases}0.03229+0.281073(100RH)-0.000578(1.8T+32)(100RH) & \text{if } RH<0.1\\ 2.22749+0.160107(100RH)-0.014784(1.8T+32) & \text{if } 0.1\leq RH<0.5\\ 21.06060+0.005565(100RH)^2-0.00035(1.8T+32)(100RH)-0.483199(100RH) & \text{if } RH\geq 0.5\end{cases}$		
$emc_{u,min}$	Uncorrected equilibrium fuel moisture content: Daily minimum	MC-Fire	emc_u with T = max. daily temperature and RH = min. daily relative humidity (or $RH=1$ if $T<0°C$).	$\overline{emc_u}$	
$emc_{u,max}$	Uncorrected equilibrium fuel moisture content: Daily maximum	MC-Fire	emc_u with T = min. daily temperature and RH = max. daily relative humidity if (or $RH=1$ if $T<0°C$).	$\overline{emc_u}$	
$\overline{emc_u}$	Uncorrected equilibrium fuel moisture content: Daily mean	MC-Fire	$24^{-1}\times([t_{dl}\times emc_{u,min}]+[(24-t_{dl})\times emc_{u,max}])$	$bnd_{d,100h}$, $bnd_{d,1000h}$	
FDI_{McA}	MacArthur Fire Danger Index	LPJ-GUESS-SIMFIRE-BLAZE	$2.0\times exp(-0.450+0.987ln[DF]-3.45RH+0.0338(1.8T+32)+0.0234[W\times 3.6])$	DF	Noble et al. (1980)
$FFMC$	Fine fuel moisture code	MC-Fire	(See references.)		van Wagner and Pickett (1985); van Wagner (1987)
FLA	Fuel load adjustment distributed to each dead fuel size class proportionally (by mass).	MC-Fire	$max\left(0,[KBDI-100]\times\frac{L_{d,1h}}{700}\right)$		Keetch and Byram (1968)
$TFBB$	Alternative measure of total fuel loading	MC-Fire	$min(10500,[L]\times 4.4409)$, where L is the sum of live grass, standing dead grass, and aboveground dead wood.		

Table S17. PFT-specific information for CLM-Li*: PFT-specific fractional combustion completeness factors for leaves ($\widehat{FC_{l,leaf}}$), stems ($\widehat{FC_{l,stem}}$), and transfer and storage carbon ($\widehat{FC_{l,ts}}$); mortality factors for leaves ($\widehat{FK_{leaf}}$), stems ($\widehat{FK_{stem}}$), roots ($\widehat{FK_{root}}$), and transfer and storage carbon ($\widehat{FK_{ts}}$). An additional "mortality" factor $\widehat{FK_{StoH}}$ describes the fire-induced transfer of carbon from sapwood to heartwood (i.e., from the live portion of the stem to the dead portion) after previous combustion and mortality factors are applied. $\widehat{ROS_{max}}$: Maximum rate of spread ($\mathrm{m\,s^{-1}}$). Abbreviations in PFT names: N (needleleaf), B (broadleaf), E (evergreen), D (deciduous), T (tree), S (shrub).

PFT	$\widehat{FC_{l,leaf}}$	$\widehat{FC_{l,stem}}$	$\widehat{FC_{l,ts}}$	$\widehat{FK_{leaf}}$	$\widehat{FK_{stem}}$	$\widehat{FK_{root}}$	$\widehat{FK_{ts}}$	$\widehat{FK_{StoH}}$	$\widehat{ROS_{max}}$
NET Temperate	0.8	0.27	0.45	0.8	0.13	0.13	0.5	0.37	0.3
NET Boreal	0.8	0.3	0.5	0.8	0.15	0.15	0.55	0.4	0.32
NDT Boreal	0.8	0.3	0.5	0.8	0.15	0.15	0.55	0.4	0.32
BET Tropical	0.8	0.27	0.45	0.8	0.13	0.13	0.5	0.37	0.3
BET Temperate	0.8	0.27	0.45	0.8	0.13	0.13	0.5	0.37	0.3
BDT Tropical	0.8	0.27	0.45	0.8	0.1	0.1	0.5	0.3	0.3
BDT Temperate	0.8	0.27	0.45	0.8	0.1	0.1	0.5	0.3	0.3
BDT Boreal	0.8	0.27	0.45	0.8	0.13	0.13	0.5	0.37	0.3
BES Temperate	0.8	0.35	0.55	0.8	0.17	0.17	0.6	0.43	0.35
BDS Temperate	0.8	0.35	0.55	0.8	0.17	0.17	0.6	0.43	0.35
BDS Boreal	0.8	0.35	0.55	0.8	0.17	0.17	0.6	0.43	0.35
C3 Arctic grass	0.8	0.8	0.8	0.8	0.2	0.2	0.8	0.6	0.45
C3 grass	0.8	0.8	0.8	0.8	0.2	0.2	0.8	0.6	0.45
C4 grass	0.8	0.8	0.8	0.8	0.2	0.2	0.8	0.6	0.45
Crop1	0.8	0.8	0.8	0.8	0.2	0.2	0.8	0.6	0.45
Crop2	0.8	0.8	0.8	0.8	0.2	0.2	0.8	0.6	0.45

Table S18. PFT-specific information for CTEM.

Plant functional type	$\widehat{ROS_{max}}$	$\widehat{FC_{l,leaf}}$	$\widehat{FC_{l,stem}}$	$\widehat{FC_{d,litter}}$	$\widehat{FK_{leaf}}$	$\widehat{FK_{stem}}$	$\widehat{FK_{root}}$
NDL-EVG	$0.54 \times \frac{1}{3.6}$	0.42	0.12	0.30	0.06	0.15	0.03
NDL-DCD	$0.54 \times \frac{1}{3.6}$	0.42	0.12	0.30	0.06	0.15	0.03
BDL-EVG	$0.40 \times \frac{1}{3.6}$	0.42	0.12	0.36	0.06	0.15	0.03
BDL-DCD-COLD	$0.40 \times \frac{1}{3.6}$	0.42	0.06	0.36	0.06	0.15	0.03
BDL-DCD-DRY	$0.40 \times \frac{1}{3.6}$	0.42	0.06	0.36	0.06	0.15	0.03
C3 grass	$0.72 \times \frac{1}{3.6}$	$\begin{cases} 0.48 & \text{if green} \\ 0.54 & \text{if brown} \end{cases}$	n/a	0.42	$\begin{cases} 0.03 & \text{if green} \\ 0.02 & \text{if brown} \end{cases}$	n/a	0.08
C4 grass	$0.72 \times \frac{1}{3.6}$	$\begin{cases} 0.48 & \text{if green} \\ 0.54 & \text{if brown} \end{cases}$	n/a	0.42	$\begin{cases} 0.03 & \text{if green} \\ 0.02 & \text{if brown} \end{cases}$	n/a	0.08

Table S19. PFT-specific information for LM3-FINAL*.

PFT	$\widehat{FC_{l,leaf}}$	$\widehat{FC_{l,stem}}$	$\widehat{FC_{d,litter}}$	$\widehat{FK_{leaf}}$	$\widehat{FK_{stem}}$	$\widehat{FK_{root}}$	$\widehat{ROS_{max}}$
C4 grass	0.85	1.0	0.85	0.85	0.0	0.20	0.4
C3 grass	0.85	1.0	0.85	0.85	0.0	0.20	0.4
Temperate deciduous tree	0.70	0.10	0.45	0.70	0.55	0.07	0.22
Tropical evergreen tree	0.70	0.15	0.50	0.70	0.60	0.10	0.22
Boreal evergreen tree	0.75	0.20	0.55	0.75	0.65	0.13	0.3

Table S20. PFT-specific information for JSBACH-SPITFIRE.

Plant functional type	$\widehat{\omega_*}$	$\widehat{\rho_b}$	$\widehat{F}$	$\widehat{CL_f}$	$\widehat{par_1}$	$\widehat{par_2}$	$\widehat{r_{CF}}$	$\widehat{p}$
Tropical evergreen tree	0.2	25	0.1487	0.33	0.0301	0.0281	1	3
Tropical deciduous tree	0.3	25	0.061	0.1	0.1085	0.212	0.05	3
Extratropical evergreen tree	0.3	20	0.1	0.33	0.0367	0.0592	1	3.75
Extratropical deciduous tree	0.3	22	0.371	0.33	0.0347	0.1086	1	3
Raingreen shrub	0.3	5	0.094	0.8	0.1085	0.212	1	3
Deciduous shrub	0.3	5	0.094	0.8	0.0347	0.1086	1	3
C3 grass	0.2	2	n/a	n/a	n/a		n/a	n/a
C4 grass	0.2	2	n/a	n/a	n/a		n/a	n/a
C3 pasture	0.2	4	n/a	n/a	n/a		n/a	n/a
C4 pasture	0.2	4	n/a	n/a	n/a		n/a	n/a

Table S21. PFT-specific information for JULES-INFERNO. $\widehat{FC}_{min}$ and $\widehat{FC}_{max}$ refer to the lower and upper bounds of fuel combustion completeness, with the $l, leaf$ and $l, stem$ subscripts referring to the live leaf and stem biomass pools, respectively (Table S12). Note that all stem biomass is considered subject to combustion – i.e., there is no distinction made between above- and below-ground stem.

Plant functional type	$\widehat{FC}_{l,leaf,min}$	$\widehat{FC}_{l,stem,max}$	$\widehat{FC}_{l,stem,min}$	$\widehat{FC}_{l,stem,max}$	$\widehat{BA_{pf}}$	$\widehat{DR}$
Broadleaf evergreen tree (tropical)	0.8	1.0	0.0	0.4	0.6	0.25
Broadleaf evergreen tree (temperate)	0.8	1.0	0.0	0.4	0.6	0.25
Broadleaf deciduous tree	0.8	1.0	0.0	0.4	0.6	0.25
Needleleaf evergreen tree	0.8	1.0	0.0	0.4	0.6	0.25
Needleleaf deciduous tree	0.8	1.0	0.0	0.4	0.6	0.25
C3 grass	0.8	1.0	0.2	0.4	1.4	0.67
C4 grass	0.8	1.0	0.2	0.4	1.4	0.67
Evergreen shrub	0.8	1.0	0.2	0.4	1.2	0.33
Deciduous shrub	0.8	1.0	0.2	0.4	1.2	0.33

Table S22. Biome-specific information for mortality in LPJ-GUESS-SIMFIRE-BLAZE. $ht_{w,min} = 3.7 \times (1 - exp[-0.19 \times I_{surf}])$.

Biome	$\widehat{FK_{tree}}$
Savanna, Australia	$min\left(0.999, max\left[0.001, \begin{cases} (0.0011 \times I_{surf} + 0.00002) \times ht_w - 0.0075 \times I_{surf} & ht_w > 8.5 \text{ and } ht_w > ht_{w,min} \\ 1 - ([0.0178 \times I_{surf} + 0.0144] \times ht_w + [-0.1174 \times I_{surf} + 0.9158]) & ht_w \leq 8.5 \text{ and } ht_w > ht_{w,min} \\ 0.999 & ht_w \leq ht_{w,min} \end{cases}\right]\right)$
Savanna, elsewhere	$min\left(0.999, [1 + exp(1.5 \times [ht_w - 0.5 \times I_{surf} - 1])]^{-1}\right)$
Tropical forest	$min\left(0.999, max\left[0, \begin{cases} 1 - exp\left(\frac{I_{surf}}{3} \times log(X)\right) & I_{surf} < 3 \\ 1 - X & 3 \leq I_{surf} \leq 7 \\ 1 - \left(1 - log\left[\frac{I_{surf}}{7}\right] \times X\right) & I_{surf} > 7 \end{cases}\right]\right)$, where $X = 1 - (0.82 - 0.035 \times DBH^{0.7})$.
Temperate forest, Australia	With $Y = 0.04$, $\begin{cases} min\left(0.999, 1 - exp\left[\frac{I_{surf}}{3} \times ln\left(0.95 - \frac{1}{1 + \left[\frac{DBH}{Y}\right]^{1.5}}\right)\right]\right) & I_{surf} < 3 \\ min\left(0.999, 1 - \left[\left(0.95 - \frac{1}{1 + \left[\frac{DBH}{Y}\right]^{1.5}}\right) \times \left(1 - \frac{I_{surf} - 3}{4}\right)\right]\right) & 3 \leq I_{surf} \leq 7 \\ 0.999 & I_{surf} > 7 \end{cases}$
Temperate forest, elsewhere	As "Temperate forest, Australia" but with $Y = 0.07$.
Boreal forest	$min(0.999, 1 - exp[-2 \times I_{surf}])$

Table S23. PFT-specific information for burned area parameter in LPJ-GUESS-SIMFIRE-BLAZE.

PFT	$\widehat{a}$
Needleleaved forest	0.095
Broadleaved forest	0.092
Mixed forest	0.127
Shrubland	0.470
Savanna/grassland	0.889
Tundra	0.059
Barren/sparsely vegetated	0.113

Table S24. PFT-specific information for LPJ-GUESS-GlobFIRM.

Vegetation type	$\widehat{r}$	$\widehat{\theta_e}$
Boreal needleleaved tree	0.3	0.3
Temperate needleleaved evergreen tree	0.3	0.3
Temperate broadleaved deciduous tree	0.1	0.3
Temperate broadleaved evergreen tree	0.3	0.3
Tropical broadleaved evergreen tree	0.1	0.3
Tropical broadleaved raingreen tree	0.3	0.3
Grass	0.5	0.2

Table S25. PFT-specific information for LPJ-GUESS-SPITFIRE. Fuel bulk density for tropical tree PFTs $\rho_{b,trop.} = max(2, 15.84 \times exp[-85 \times L_{d+l,g}] + 2.22 \times exp[-2.045 \times L_{d+l,g}])$.

Plant functional type	$\widehat{k_2}$	$\widehat{k_3}$	$\widehat{BT}$	$\widehat{CL_f}$	Max crown area	$\widehat{\rho_b}$	$\widehat{\omega_*}$	$\widehat{F}$	$\widehat{r_{CF}}$	$\widehat{p}$
Boreal needleleaved evergreen tree	60	0.67	$0.0292 \times DBH + 0.2632$	0.33	50	25	0.3	0.11	1	3
Boreal shade-intolerant needleleaved evergreen tree	60	0.67	$0.0292 \times DBH + 0.2633$	0.33	50	25	0.3	0.11	1	3
Boreal needleleaved summergreen tree	60	0.67	$0.0347 \times DBH + 0.1086$	0.33	50	25	0.3	0.094	1	3
Boreal shade-intolerant broadleaved summergreen tree	60	0.67	$0.0347 \times DBH + 0.1086$	0.33	50	22	0.3	0.094	1	3
Temperate shade-intolerant broadleaved summergreen tree	60	0.67	$0.0347 \times DBH + 0.1086$	0.33	50	22	0.3	0.094	1	3
Temperate broadleaved summergreen tree	60	0.67	$0.0347 \times DBH + 0.1087$	0.33	50	22	0.3	0.094	1	3
Temperate broadleaved evergreen tree	60	0.67	$0.0451 \times DBH + 0.1412$	0.33	50	10	0.3	0.371	0.95	3
Temperate needleleaved evergreen tree	60	0.67	$0.0367 \times DBH + 0.0592$	0.33	50	25	0.3	0.1	1	3.75
Tropical broadleaved evergreen tree	39	0.53	$15.95 - 14.23 \times 0.98456^{DBH}$	0.33	300	$\rho_{b,trop.}$	0.2	0.1487	1	3
Tropical shade-intolerant broadleaved evergreen tree	39	0.53	$15.95 - 14.23 \times 0.98456^{DBH}$	0.33	300	$\rho_{b,trop.}$	0.2	0.1487	1	3
Tropical broadleaved raingreen tree	13.18	0.61	$28.77 - 26.898 \times 0.97391^{DBH}$	0.1	300	$\rho_{b,trop.}$	0.3	0.061	0.05	3
Cool/temperate (C3) grass	n/a	n/a	n/a	n/a	n/a	2	0.2	0.05	0	0
Warm (C4) grass	n/a	n/a	n/a	n/a	n/a	2	0.2	0.05	0	0

Table S26. PFT-specific information for LPJ-LMfire: $\widehat{I_{Lei}}$ is PFT-specific lightning ignition efficiency, and $\widehat{\omega_{*l}}$ is PFT-specific moisture of extinction for live fuels.

PFT	$\widehat{I_{Lei}}$	$\widehat{\omega_{*l}}$	$\widehat{CL_f}$	$\widehat{par_1}$	$\widehat{par_2}$	$\widehat{F}$	$\widehat{D_1}$	$\widehat{D_2}$
Tropical broadleaved evergreen tree	0.05	0.2	⅓	0.0301	0.0281	0.16	1.75	–3.75
Tropical broadleaved raingreen tree	0.4	0.3	0.1	0.1085	0.2120	0.351	1.90	–4.20
Temperate needleleaved evergreen tree	0.1	0.3	⅓	0.0670	0.5590	0.094	2.57	–6.20
Temperate broadleaved evergreen tree	0.1	0.3	⅓	0.0451	0.1412	0.07	1.23	–2.20
Temperate broadleaved summergreen tree	0.5	0.3	⅓	0.0347	0.1086	0.094	1.68	–3.53
Boreal needleleaved evergreen tree	0.44	0.35	⅓	0.0292	0.1086	0.094	1.23	–2.20
Boreal summergreen tree	0.44	0.35	⅓	0.0347	0.1086	0.094	1.32	–2.46
C3 perennial grass	0.5	0.2	n/a	n/a	n/a	n/a	n/a	n/a
C4 perennial grass	0.5	0.2	n/a	n/a	n/a	n/a	n/a	n/a

Table S27. PFT-specific information for MC-Fire. $\widehat{CL}$ is the crown length used in calculating $FA_{w,Cr}$, whereas $\widehat{CL_f}$ is the fraction of tree height that is assumed to be crown when calculating $FA_{w,Ca}$ (via CF).

Veg. type	$\widehat{BUI_*}$	$\widehat{CL} = ht_w \times ...$	$\widehat{CL_f}$	$\widehat{DFF_{1h}}$	$\widehat{DFF_{10h}}$	$\widehat{DFF_{100h}}$	$\widehat{DFF_{1000h}}$	$\widehat{FRI_{min}}$	$\widehat{FRI_{max}}$	$\hat{h} = \frac{1.066}{0.454} \times ...$	$\widehat{LD}$	$\widehat{P_{m*}}$	$\widehat{par_1}$	$\widehat{R_{BT}}$	$\widehat{WRF}$	$\widehat{\sigma_{d,1h}}$	$\widehat{\sigma_{l,h}}$	$\widehat{\sigma_{l,s}}$	$\widehat{\omega_*}$
Tundra/arctic or alpine	147	0.8	0.8	0.25	0.25	0.25	0.25	1000	1000	8001	0.4	0.94	0.022	0.022	0.5	19.59	19.5	14.62	0.3
Taiga-tundra	147	0.8	0.8	0.27	0.2	0.24	0.29	1000	1000	8039	0.042	0.94	0.022	0.022	0.4	18.52	19.84	14.7	0.3
Boreal evergreen needleleaf forest	38.2	0.8	0.8	0.27	0.2	0.24	0.29	50	50	8039	0.042	0.8395	0.022	0.022	0.4	18.52	19.84	14.7	0.3
Boreal mixed woodland	38.2	0.5	0.5	0.37	0.26	0.27	0.1	25	25	8026	0.042	0.8395	0.043	0.043	0.4	16.34	19.67	14.78	0.3
Subalpine forest	245	0.8	0.8	0.27	0.2	0.24	0.29	300	300	8039	0.042	0.8913744	0.022	0.022	0.4	18.52	19.84	14.7	0.3
Maritime evergreen needleleaf forest	245	0.7	0.7	0.2	0.17	0.2	0.43	150	150	8068	0.042	0.8913744	0.062	0.062	0.4	19.6	20.45	14.88	0.23
Temperate evergreen needleleaf forest	245	0.5	0.5	0.39	0.28	0.14	0.19	50	50	8053	0.042	0.8913744	0.043	0.043	0.4	19.37	21.2	14.89	0.21
Temperate deciduous broadleaf forest	150	0.4	0.4	0.62	0.2	0.18	0	155	237	8006	0.042	0.92	0.033	0.033	0.5	17.3	20.03	14.99	0.3
Temperate cool mixed forest	150	0.5	0.5	0.37	0.26	0.27	0.1	100	100	8026	0.042	0.92	0.043	0.043	0.4	16.34	19.67	14.78	0.3
Temperate warm mixed forest	223.11	0.5	0.5	0.45	0.37	0.16	0.02	75	75	8210	0.042	0.9142	0.043	0.043	0.4	16.7	20.12	14.99	0.3
Temperate evergreen needleleaf woodland	245	0.4	0.4	0.61	0.31	0.06	0.02	15	15	8293	0.042	0.8913744	0.062	0.062	0.6	20.72	20.59	14.51	0.16
Temperate deciduous broadleaf woodland	150	0.4	0.4	0.83	0.07	0.05	0.05	15	15	8016	0.4	0.92	0.033	0.033	0.6	19.06	19.09	14.42	0.17
Temperate cool mixed woodland	150	0.4	0.4	0.83	0.07	0.05	0.05	15	15	8016	0.4	0.92	0.033	0.033	0.6	19.06	19.09	14.42	0.17
Temperate warm mixed woodland	223.11	0.4	0.4	0.7	0.18	0.12	0	39	75	8680	0.4	0.9142	0.033	0.033	0.6	14.33	20	13.86	0.15
C3/Temperate shrubland	150	0.7	0.7	0.72	0.24	0.02	0.02	15	15	8020	0.4	0.92	0.043	0.043	0.6	23.26	19.78	14.97	0.16
C3/Temperate grassland	150	0.8	0.8	0.93	0.05	0.01	0.01	15	32	8014	1	0.92	0.022	0.022	0.6	20.2	20.21	14.98	0.16
Temperate desert	150	0.7	0.7	0.75	0.24	0.01	0	200	200	8072	0.042	0.92	0.043	0.043	0.6	24.25	17.5	14.88	0.15
Subtropical evergreen needleleaf forest	245	0.5	0.5	0.39	0.28	0.14	0.19	50	50	8053	0.042	0.8913744	0.043	0.043	0.5	19.37	21.2	14.89	0.21
Subtropical deciduous broadleaf forest	150	0.4	0.4	0.62	0.2	0.18	0	100	100	8006	0.042	0.92	0.033	0.033	0.5	17.3	20.03	14.99	0.3
Subtropical evergreen broadleaf forest	223.11	0.5	0.5	0.45	0.37	0.16	0.02	40	40	8210	0.042	0.9142	0.043	0.043	0.4	16.34	20.12	14.99	0.3
Subtropical mixed forest	150	0.5	0.5	0.45	0.37	0.16	0.02	40	40	8210	0.042	0.92	0.043	0.043	0.4	16.7	20.12	14.99	0.3
Subtropical evergreen needleleaf woodland	245	0.4	0.4	0.78	0.19	0.01	0.02	15	15	8001	0.4	0.8913744	0.062	0.062	0.6	22.32	20.23	15	0.16
Subtropical deciduous broadleaf woodland	150	0.4	0.4	0.83	0.07	0.05	0.05	15	15	8016	0.4	0.92	0.033	0.033	0.6	19.06	19.09	14.42	0.17
Subtropical evergreen broadleaf woodland	223.11	0.5	0.5	0.7	0.18	0.12	0	15	15	8680	0.4	0.9142	0.043	0.43	0.6	14.33	20	13.86	0.15
Subtropical mixed woodland	150	0.5	0.5	0.7	0.18	0.12	0	39	75	8680	0.4	0.92	0.043	0.43	0.6	14.33	20	13.86	0.15
C4/Subtropical shrubland	150	0.7	0.7	0.72	0.24	0.02	0.02	15	15	8020	0.4	0.92	0.043	0.043	0.6	23.26	19.78	14.97	0.16
C4/Subtropical grassland	150	0.8	0.8	0.92	0.07	0.01	0	12	24	8028	1	0.92	0.022	0.022	0.6	20.4	20.03	14.95	0.15
Subtropical desert	150	0.7	0.7	0.75	0.24	0.01	0	200	200	8072	0.042	0.92	0.043	0.043	0.6	24.25	17.5	14.88	0.15
Tropical evergreen broadleaf forest	223.11	0.4	0.4	0.62	0.2	0.18	0	150	150	8006	0.042	0.9142	0.033	0.033	0.5	17.3	20.03	14.99	0.3
Tropical deciduous woodland	150	0.4	0.4	0.83	0.07	0.05	0.05	15	15	8016	0.4	0.92	0.033	0.033	0.6	19.06	19.09	14.42	0.17
Tropical savanna	110	0.4	0.4	0.83	0.07	0.05	0.05	15	15	8016	0.4	0.87	0.033	0.033	0.6	19.06	19.09	14.42	0.17
Tropical shrubland	110	0.7	0.7	0.72	0.24	0.02	0.02	1000	1000	8020	0.4	0.87	0.043	0.043	0.6	23.26	19.78	14.97	0.16
Tropical grassland	110	0.8	0.8	0.92	0.07	0.01	0	15	15	8028	1	0.87	0.022	0.022	0.6	20.4	20.03	14.95	0.15
Tropical desert	110	0.7	0.7	0.75	0.24	0.01	0	200	200	8072	0.042	0.87	0.043	0.043	0.6	24.25	17.5	14.88	0.15
Cool needleleaf forest	245	0.5	0.5	0.39	0.28	0.14	0.19	50	150	8053	0.042	0.8913744	0.043	0.043	0.5	19.37	21.2	14.89	0.21

Table S28. PFT-specific information for ORCHIDEE-SPITFIRE. ORCHIDEE is capable of simulating woody vegetation height, but height is prescribed ($\widehat{ht_w}$, m) in FireMIP runs.

Plant functional type	$\widehat{\rho_b}$	$\widehat{ht_w}$	$\widehat{CL_f}$	$\widehat{par_1}$	$\widehat{par_2}$	$\widehat{r_{CF}}$	$\widehat{p}$	$\widehat{F}$	$\widehat{\omega_*}$	$\widehat{FC}_{d,100h,max}$	$\widehat{FC}_{d,1000h,max}$
Tropical broadleaf evergreen trees	25	50	0.33	0.03	0.03	0.95	3	0.15	0.2	0.65	0.41
Tropical broadleaf raingreen trees	25	50	0.1	0.11	0.21	0.05	3	0.06	0.3	0.65	0.41
Temperate needleleaf evergreen trees	25	30	0.33	0.07	0.56	0.95	3.75	0.1	0.3	0.73	0.38
Temperate broadleaf evergreen trees	10	30	0.33	0.05	0.14	0.95	3	0.37	0.3	0.73	0.38
Temperate broadleaf summergreen trees	22	30	0.33	0.04	0.11	0.95	3	0.09	0.3	0.73	0.38
Boreal needleleaf evergreen trees	25	20	0.67	0.03	0.26	0.95	3	0.11	0.35	0.73	0.38
Boreal broadleaf summergreen trees	22	20	0.33	0.04	0.11	0.95	3	0.09	0.35	0.73	0.38
Boreal needleleaf summergreen trees	22	20	0.33	0.04	0.11	0.95	3	0.09	0.35	0.73	0.38
C3 grass	2	0.2	n/a	n/a	n/a	n/a	n/a	n/a	0.2	0.76	0.76
C4 grass	2	0.2	n/a	n/a	n/a	n/a	n/a	n/a	0.2	0.76	0.76
C3 agriculture	2	0.4	n/a	n/a	n/a	n/a	n/a	n/a	0.2	0.35	0.35
C4 agriculture	2	0.4	n/a	n/a	n/a	n/a	n/a	n/a	0.2	0.35	0.35

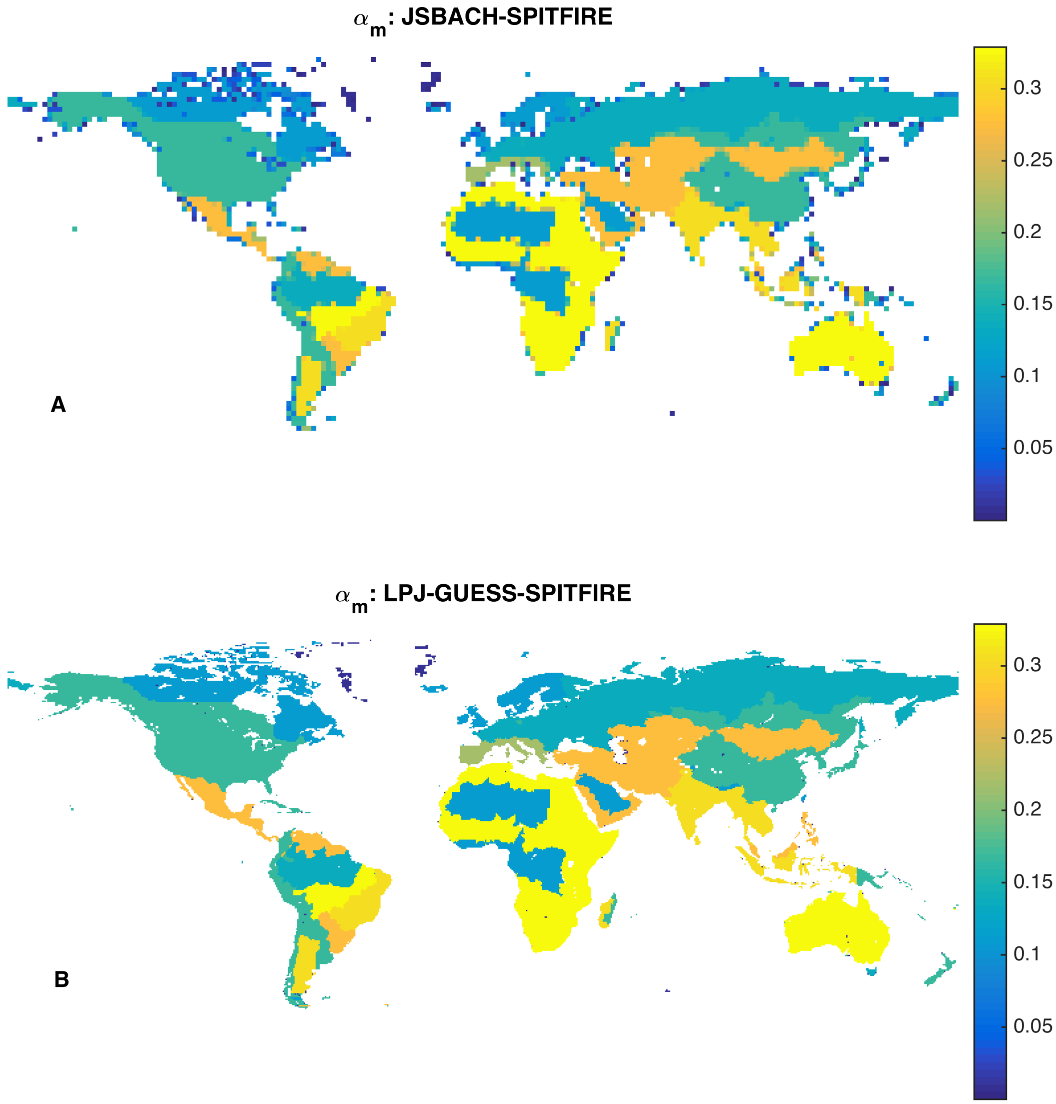

Figure S1. Monthly ignitions per person (α_m) for **(a)** JSBACH-SPITFIRE and **(b)** LPJ-GUESS-SPITFIRE. See Table S1 for usage details.

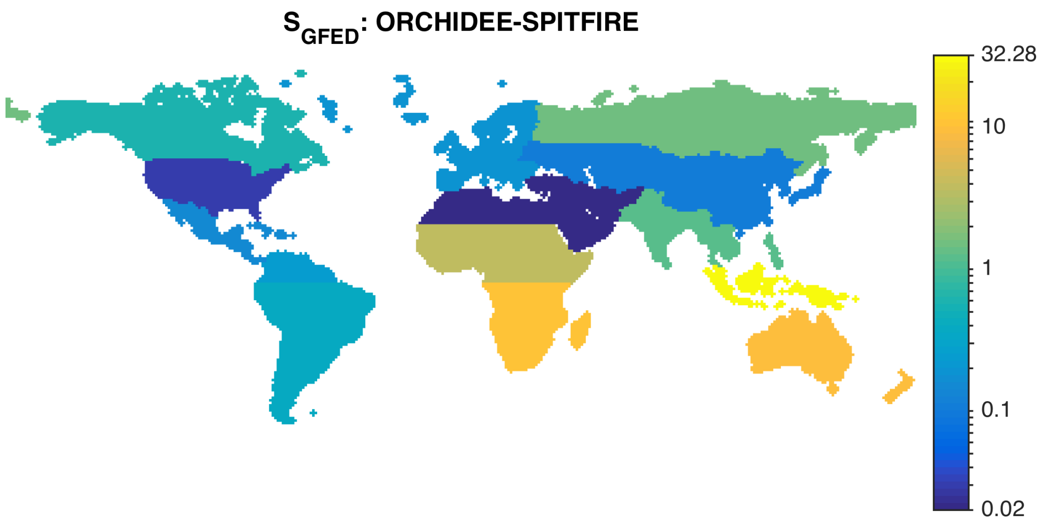

Figure S2. Scaling factor S_{GFED} (Table S4) for ORCHIDEE-SPITFIRE. Note logarithmic color scale. This map is based on the GFED regions (van der Werf et al., 2006) and does not exactly match the mask used by ORCHIDEE-SPITFIRE.

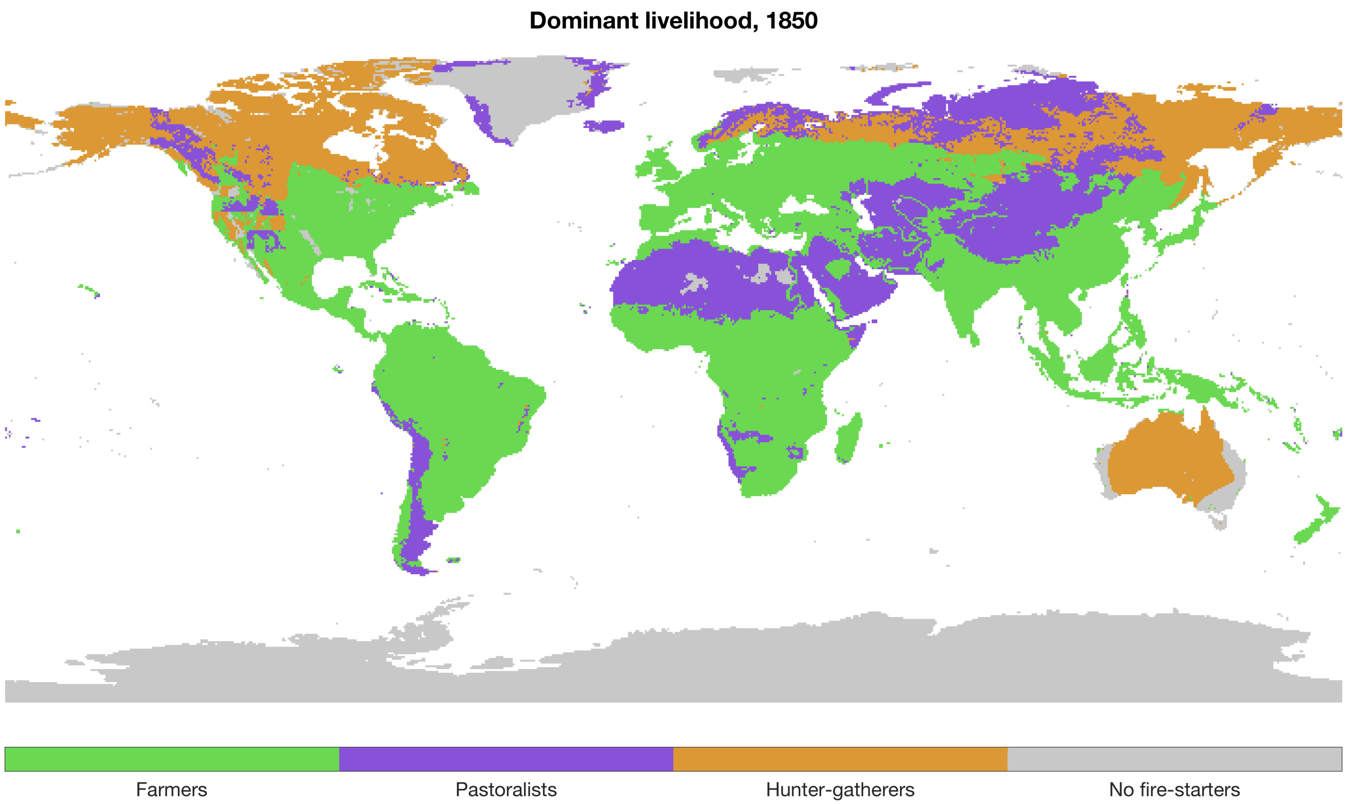

Figure S3. Dominant livelihoods used by LPJ-LMfire for 1850 onwards. Note that this is only used for calculating human ignitions (Table S1).

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