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. 9

β Packing ratio (unitless). See Table S10. 17

β_{op} Optimal packing ratio (unitless). See Table S10. 17

Γ' Optimal reaction velocity (min^{-1}). See Table S10. 2, 17, 20

Γ'_E Maximum reaction velocity as used by MC-Fire for energy release equations (min^{-1}). See Table S10. 2, 17

$\Gamma'_{E,max}$ Maximum reaction velocity as used by MC-Fire for energy release equations (min^{-1}). See Table S10. 17

Γ'_{max} Maximum reaction velocity (min^{-1}). See Table S10. 17

Γ'_R Maximum reaction velocity as used by MC-Fire for rate of spread equations (min^{-1}). See Table S10. 2, 17

$\Gamma'_{R,max}$ Maximum reaction velocity as used by MC-Fire for rate of spread equations (min^{-1}). See Table S10. 17

ϵ Effective heating number (unitless). See Table S10. 13, 17

θ Volumetric soil moisture (unitless, range [0,1]). 12, 18

θ_1 Volumetric soil moisture in uppermost soil layer (unitless, range [0,1]). 9, 12, 13, 16

θ_e Soil moisture of extinction (unitless, range [0,1]). 9, 25

θ_{mm} Plant-available soil moisture (mm). 16

θ_{root} Volumetric soil moisture in rooting zone (unitless, range [0,1]). 12, 13

θ_{sat} Volumetric soil moisture at saturation (unitless, range [0,1]). 18

η_M Moisture damping coefficient (unitless, range [0,1]). See Table S10. 17, 20

$\eta_{M,d}$ Moisture damping coefficient for dead fuels (unitless, range [0,1]). See Table S10. 17

$\eta_{M,l}$ Moisture damping coefficient for live fuels (unitless, range [0,1]). See Table S10. 17

η_S Mineral damping coefficient (unitless, range [0,1]). See Table S8. 15, 17, 20

ξ Propagating flux ratio (unitless, range [0,1]). See Table S10. 2, 13, 17

ρ_b Fuel bulk density ($\mathrm{kg\,C\,m^{-3}}$). See Table S10. 13, 17, 23, 25, 27

ρ_p Oven-dry particle density ($\mathrm{kg\,C\,m^{-3}}$). See Table S8. 15, 17

σ Fuel surface-area-to-volume ratio (cm^{-1}). See Table S10. 13, 16, 17

$\sigma_{d,1h}$ Fuel surface-area-to-volume ratio: 1-hour dead fuels (cm^{-1}). 13, 16, 17, 26

$\sigma_{d,10h}$ Fuel surface-area-to-volume ratio: 10-hour dead fuels (cm^{-1}). 13, 16, 17

$\sigma_{d,100h}$ Fuel surface-area-to-volume ratio: 100-hour dead fuels (cm^{-1}). 13, 16, 17

$\sigma_{d,1000h}$ Fuel surface-area-to-volume ratio: 1000-hour dead fuels (cm^{-1}). 13, 17

σ_E Fuel surface-area-to-volume ratio (cm^{-1}) as used by MC-Fire for energy release equations. See Table S10. 17, 20

$\sigma_{l,h}$ Fuel surface-area-to-volume ratio: Live herbaceous vegetation (cm^{-1}). See Table S23. 17, 26

$\sigma_{l,s}$ Fuel surface-area-to-volume ratio: Live shrubby vegetation (cm^{-1}). See Table S23. 17, 26

σ_R Fuel surface-area-to-volume ratio (cm^{-1}) as used by MC-Fire for rate of spread equations. See Table S10. 17

τ Fire residence time (min). See Table S13. 5, 10, 17, 20

τ_* Critical fire residence time (min). See Table S13. 20

Φ_s Effect (unitless) of slope on increasing ξ. See Table S10. 13, 17

Φ_w Effect (unitless) of wind on increasing ξ. See Table S10. 3, 13, 17

ω Fuel moisture (unitless). See Table S9. 13, 16, 17

ω_* Fuel moisture of extinction (unitless). 12, 17, 19, 23, 25–27

$\omega_{d,1h}$ Fuel moisture: Dead 1-hour fuels (unitless). See Table S9. 16, 17, 19

$\omega_{d,10h}$ Fuel moisture: Dead 10-hour fuels (unitless). See Table S9. 16

$\omega_{d,100h}$ Fuel moisture: Dead 100-hour fuels (unitless). See Table S9. 3, 16, 19, 21

$\omega_{d,1000h}$ Fuel moisture: Dead 1000-hour fuels (unitless). See Table S9. 3, 16, 21

ω_{duff} Fuel moisture: Duff (unitless). See Table S9. 16, 19

ω_{ff} Combined fuel moisture: Fine fuels (i.e., live grass and dead 1-hour fuels; unitless). See Table S9. 16, 19

ω_l Surface-area-weighted moisture of live fuels (unitless). See Table S9. 16, 17

$\omega_{l,g}$ Fuel moisture: Live grass (unitless). See Table S9. 16, 19

$\omega_{l,s}$ Fuel moisture: Live shrubby vegetation (unitless). See Table S9. 16, 20

ω_o Combined fuel moisture: 1-, 10-, and 100-hour fuels (unitless). See Table S9. 12, 16, 17, 19

$\widehat{a}$ Used by LPJ-GUESS-BLAZE to compute burned area. See Table S20. 14, 24

A Used to compute Γ'. See Table S10. 17

A_E Used to compute Γ'_E. See Table S10. 17

A_g Area of grid cell (km^2). 13, 14

A_R Used to compute Γ'_R. See Table S10. 17

B Used to compute Γ'. See Table S10. 17

BA_{pf} Burned area per fire (km^2). Does not consider suppressive effects of population density ($S_{PD,ba}$) or GDP ($S_{GDP,ba}$) as described in Table S2. 8, 13, 14, 23

$bnd_{d,100h}$ Used by MC-Fire to calculate $\omega_{d,100h}$. See Table S14. 16, 21

$bnd_{d,1000h}$ Used by MC-Fire to calculate $\omega_{d,1000h}$. See Table S14. 21

BT Bark thickness (cm). See Table S13. 7, 20, 25, 26

BUI Fuel build-up index (van Wagner and Pickett, 1985; van Wagner, 1987). See Table S14. 13, 21

$\widehat{BUI_*}$ PFT-specific threshold build-up index (unitless). See Table S23. 13, 26

C Used to compute Φ_w. See Table S10. 17

CL Crown length (m). See Table S13. 7, 20, 23, 25–27

CS Fractional crown scorch (unitless). See Table S13. 5, 7, 19, 20, 23, 25, 27

DBH Tree diameter at breast height (cm). See Table S13. 6, 7, 20, 24, 25

$depth$ Fuel bed depth (ft). See Table S14. 6, 8, 17, 21

DF Drought factor used by LPJ-GUESS-BLAZE to compute FDI_{McA}. See Table S14. 21

$\widehat{DFF}_{1h}$ Dead fuel fraction (unitless): 1-hour fuels. Used by MC-Fire; see Tables S7, S23. 15, 26

$\widehat{DFF}_{10h}$ Dead fuel fraction (unitless): 10-hour fuels. Used by MC-Fire; see Tables S7, S23. 15, 26

$\widehat{DFF}_{100h}$ Dead fuel fraction (unitless): 100-hour fuels. Used by MC-Fire; see Tables S7, S23. 15, 26

$\widehat{DFF}_{1000h}$ Dead fuel fraction (unitless): 1000-hour fuels. Used by MC-Fire; see Tables S7, S23. 15, 26

$\widehat{DR}$ PFT-specific ratio (unitless) of "decomposable" to "resistant" litter. Used by INFERNO; see Table S17. 12, 23

E Used to compute Φ_w. See Table S10. 17

e^* Saturation water vapor pressure (hPa), after Goff and Gratch (1946). 12

emc_c Corrected equilibrium moisture content (unitless). See Table S14. 21

$emc_{coarse,min}$ Minimum equilibrium moisture content, coarse fuels (unitless). See Table S14. 16, 21

emc_u Uncorrected equilibrium moisture content (unitless). See Table S14. 21

$emc_{u,max}$ Uncorrected equilibrium moisture content: daily maximum (unitless). See Table S14. 21

$emc_{u,min}$ Uncorrected equilibrium moisture content: daily minimum (unitless). See Table S14. 21

$\widehat{F}$ Used to calculate scorch height (SH). See Tables S18, S22, and S24. 20, 23, 25, 27

f_θ A function of soil moisture (dimensionless, range [0,1]). Additional subscripts denote model-specific functions. See Table S4. 12, 13

f_{RH} A function of relative humidity (dimensionless, range [0,1]). Additional subscripts denote model-specific functions. See Table S4. 12, 13

f_T A function of temperature (dimensionless, range [0,1]). Additional subscripts denote model-specific functions. See Table S4. 12, 13

f_L A function of fuel loading (dimensionless, range [0,1]). Additional subscripts denote model-specific functions. See Table S4. 12

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

F_{C2G} Lightning flash rate ($\mathrm{km}^{-2}\,\mathrm{month}^{-1}$). 9

$FC_{d,1h}$ Fractional combustion: Dead 1-hour fuels. See Tables S11 and S12. 19

$FC_{d,10h}$ Fractional combustion: Dead 10-hour fuels. See Tables S11 and S12. 19

$FC_{d,100h}$ Fractional combustion: Dead 100-hour fuels. See Tables S11 and S12. 19

$FC_{d,1000h}$ Fractional combustion: Dead 1000-hour fuels. See Tables S11 and S12. 19

$\widehat{FC}_{d,1000h,max}$ PFT-specific maximum fractional combustion: Dead 1000-hour fuels. Used by ORCHIDEE-SPITFIRE; see Table S24. 19, 27

$\widehat{FC}_{d,100h,max}$ PFT-specific maximum fractional combustion: Dead 100-hour fuels. Used by ORCHIDEE-SPITFIRE; see Table S24. 19, 27

$FC_{d,fineroot}$ Fractional combustion: Fine root litter. See Tables S11 and S12. 18

$FC_{d,leaf}$ Fractional combustion: Leaf litter. See Table S11. 18

$FC_{d,litter}$ Fractional combustion: All litter. See Table S11. 18, 22

$FC_{d,stem}$ Fractional combustion: Stem litter. See Table S11. 18

$FC_{l,1h}$ Fractional combustion: Live 1-hour fuels. See Table S12. 19

$FC_{l,10h}$ Fractional combustion: Live 10-hour fuels. See Table S12. 19

$FC_{l,100h}$ Fractional combustion: Live 100-hour fuels. See Table S12. 19

$FC_{l,1000h}$ Fractional combustion: Live 1000-hour fuels. See Table S12. 19

$FC_{l,grass}$ Fractional combustion: Live grass. See Tables S11 and S12. 18, 19

$FC_{l,leaf}$ Fractional combustion: Live leaves. See Tables S11 and S12. 18, 19, 22

$\widehat{FC}_{l,leaf,max}$ PFT-specific maximum fractional combustion: Live leaves. Used by INFERNO. See Table S17. 18

$\widehat{FC}_{l,leaf,min}$ PFT-specific minimum fractional combustion: Live leaves. Used by INFERNO. See Table S17. 18, 23

$FC_{l,stem}$ Fractional combustion: Live stems. See Tables S11 and S12. 18, 19, 22

$\widehat{FC}_{l,stem,max}$ PFT-specific maximum fractional combustion: Live stems. Used by INFERNO. See Table S17. 18, 23

$\widehat{FC}_{l,stem,min}$ PFT-specific minimum fractional combustion: Live stems. Used by INFERNO. See Table S17. 18, 23

$FC_{l,ts}$ Fractional combustion: Live transfer and storage carbon. See Table S15. 22

FDI Fire Danger Index (unitless). See Table S4. 12–14

FDI_{McA} McArthur Fire Danger Index (unitless, Noble et al., 1980). See Table S14. 3, 13, 21

$FFMC$ Fine fuel moisture code (unitless). See Table S14. 13, 20, 21

$\widehat{FFMC}_*$ PFT-specific threshold fine fuel moisture code (unitless). See Table S23. 13, 26

FK Total fraction killed. See Table S13. 20

$FK(\tau)$ Fraction killed by cambial scorch. See Table S13. 20

$FK(CS)$ Fraction killed by crown scorch. See Table S13. 7, 20

FK_{leaf} Fraction killed: Leaves. See Table S13. 20, 22

FK_{root} Fraction killed: Roots. See Table S13. 20, 22

FK_{stem} Fraction killed: Stems. See Table S13. 20, 22

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 S15. 20, 22

FK_{tree} Total fraction killed: Trees. See Table S13. 20, 24

FK_{ts} Fraction killed: Transfer and storage C. See Table S15. 22

FLA Fuel loading adjustment (unitless). See Table S14. 6, 17, 21

$\widehat{FRI}_{max}$ Maximum fire return interval (yr). Used by MC-Fire; see Table S23. 13, 26

$\widehat{FRI}_{min}$ PFT-specific minimum fire return interval (yr). Used by MC-Fire; see Table S23. 13, 26

GDP_{pc} Gross domestic product per capita (2005 US\$ person^{-1}). 8, 10

g_W Reduction (unitless, range [0,1]) of forward rate of spread (ROS_f) based on wind speed. See Table S5. 13

h Fuel heat content ($\mathrm{kJ\,kg^{-1}}$). See Table S8. 15, 26

HB Ellipse head-to-back ratio (unitless). See Table S5. 13

ht_w Height of woody vegetation (m). See Table S13. 20, 24, 27

I_A Anthropogenic ignition rate (ignitions km^{-2} month^{-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. 9, 14

I_L Lightning ignition rate (ignitions km^{-2} month^{-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. 9, 14

I_R Reaction intensity ($\mathrm{kJ\,m^{-2}\,min^{-1}}$). See Table S10. 13, 17

$I_{R,E}$ Reaction intensity as used by MC-Fire for energy release equations ($\mathrm{kJ\,m^{-2}\,min^{-1}}$). See Table S10. 17

$I_{R,R}$ Reaction intensity as used by MC-Fire for rate of spread equations ($\mathrm{kJ\,m^{-2}\,min^{-1}}$). See Table S10. 13, 17

I_{surf} Intensity of surface fire at flaming front ($\mathrm{kW\,m^{-1}}$). See Table S10. 10, 12, 17, 18, 20, 24

$\widehat{k_2}$ Used for calculating tree diameter at breast height (DBH). See Table S22. 20, 25

$\widehat{k_3}$ Used for calculating tree diameter at breast height (DBH). See Table S22. 20, 25

$KBDI$ Keetch-Byram Drought Index (Keetch and Byram, 1968). 21

LB Ellipse length-to-breadth ratio (unitless). See Table S5. 13

L Fuel loading: All biomass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 4, 12–14, 16, 17, 21

$L_{b,g}$ 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, 2015). 12, 13

$\widehat{LD}$ PFT-specific fuel bed load-to-depth ratio ($\mathrm{ft}\left(\mathrm{T\,DM\,ac^{-1}}\right)^{-1}$). Used by MC-Fire to calculate $depth$; see Table S23. 21, 26

L_d Fuel loading: Dead biomass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 13

$L_{d,1h}$ 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 S14) has been added. 13, 15–17, 21

$L_{d,10h}$ 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 S14) has been added. 13, 15, 17, 19

$L_{d,100h}$ 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 S14) has been added. 15, 17, 19

$L_{d,1000h}$ 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 S14) has been added. 15, 17

$L_{dc,n}$ Fuel loading: Combined dead fuels not including mineral content ($\mathrm{kg\,C\,m^{-2}}$). See Table S10. 17, 20

$L_{+dc,n,E}$ 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 S10. 17

$L_{+dc,n,R}$ 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 S10. 17

$L_{d,g}$ Fuel loading: Dead grass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 13

$L_{d+l,g}$ Fuel loading: Grass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 25

$L_{d,litter}$ Fuel loading: Litter ($\mathrm{kg\,C\,m^{-2}}$). 12–14, 17

L_{duff} Fuel loading: Duff ($\mathrm{kg\,C\,m^{-2}}$). 12, 13

L_l Fuel loading: Live biomass ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 13, 20

$L_{+lc,n}$ Fuel loading: Combined live fuels not including mineral content ($\mathrm{kg\,C\,m^{-2}}$). Used by MC-Fire. See Table S10. 17

$L_{l,g}$ Fuel loading: Live grass or herbaceous vegetation ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 13, 16, 17

$L_{l,leaf}$ Fuel loading: Live leaves ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 12–14

$L_{l,s}$ Fuel loading: Live shrubby vegetation ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 17

$L_{l,stem}$ Fuel loading: Live stems ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 12, 13

$L_{l,stem,ag}$ Fuel loading: Aboveground live stems ($\mathrm{kg\,C\,m^{-2}}$). See Table S7. 12, 14

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 $T_{max,d}$ and $T_{dew,d}$ represent daily maximum and dew-point temperatures ($^{\circ}$C), respectively, and the summation occurs over consecutive days leading up to the current day with $\leq 3\ \mathrm{mm}$ of precipitation (Nesterov, 1949). 7, 14, 16

$NI_{max,y}$ 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 ($FK(CS)$). See Tables S18, S22, and S24. 20, 23, 25, 27

$\widehat{par}_1$ Used for calculating tree diameter at breast height (DBH). See Tables S18, S22, and S24. 20, 23, 26, 27

$\widehat{par}_2$ Used for calculating bark thickness (BT). See Tables S18 and S24. 20, 23, 27

PD Human population density (people km^{-2}). 8–10, 13, 14

PET Potential evapotranspiration (mm). 16

P_i Probability of fire (unitless). See Table S1. 9, 13, 14

$P_{i,h}$ Probability of fire ignited by humans (unitless). See Table S1. 9

$P_{i,n}$ Probability of fire ignited by lightning (unitless). See Table S1. 9

q Probability that a fire is extinguished on any given day (unitless). See Table S2. 10, 13

Q_{ig} Heat of fuel pre-ignition ($\mathrm{kJ\,kg^{-1}}$). See Table S10. 13, 17

$\widehat{r}$ Resistance parameter for calculation of combustion and mortality. See Table S21. 18, 20, 25

$\widehat{R_{CL}}$ Used in calculating crown length. See Table S23. 20, 26

$\widehat{r_{CS}}$ Resistance parameter for calculation of crown scorch. See Tables S18, S22, and S24. 20, 23, 25, 27

R_d Daily precipitation (mm). 21

RH Relative humidity (unitless, range [0,1]). 4, 12, 13, 21

RH_{30} Relative humidity, 30-day running mean (unitless, range [0,1]). 12

R_m Monthly precipitation (mm). 16

ROS Rate of fire spread ($\mathrm{m\,s^{-1}}$). See Table S5. 13, 17

ROS_b Rate of fire spread, backward (i.e., upwind; $\mathrm{m\,s^{-1}}$). See Table S5. 13

ROS_f Rate of fire spread, forward (i.e., downwind; $\mathrm{m\,s^{-1}}$). See Table S5. 5, 10, 13, 17

$\widehat{ROS}_{max}$ Maximum rate of forward (i.e., downwind) fire spread ($\mathrm{m\,s^{-1}}$). See Tables S15 and S16. 22

R_r Precipitation rate ($\mathrm{mm\,d^{-1}}$). 12

R_t Duration of precipitation (h). 21

S General anthropogenic suppressive effect (unitless, value 0 or 1) on fire occurrence. Used by MC-Fire. See Table S2. 10, 14

$S_{env,nf}$ 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. 5, 12, 14

$S_{GDP,ba}$ Suppressive effect (unitless, range [0,1]) of gross domestic product per capita (GDP_{pc}) on burned area per fire (BA_{pf}). See Table S2. 3, 10, 13, 14

$S_{GDP,nf}$ Suppressive effect (unitless, range [0,1]) of gross domestic product per capita (GDP_{pc}) on number of fires. See Table S2. 5, 10, 14

$S_{PD,ba}$ Suppressive effect (unitless, range [0,1]) of population density (PD) on burned area per fire (BA_{pf}). See Table S2. 3, 10, 13, 14

$S_{PD,nf}$ Suppressive effect (unitless, range [0,1]) of population density (PD) on number of fires. See Table S2. 5, 10, 14

SH Scorch height (m). See Table S13. 3, 20

T Air temperature ($^\circ\mathrm{C}$). 12

t_{dl} Duration of daylight (h). 21

t_{fire} Fire duration (s). See Table S5. 10, 13

t_m Month length (d). 14

$TFBB$ 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 S14. 21

TSF Time since last fire (yr). 13

TSR Time since last rainfall (d). 21

W Wind speed at 10 m elevation ($\mathrm{m\,s^{-1}}$). 13, 17, 20, 21

W' Wind speed at elevation relevant for fire model ($\mathrm{ft\,min^{-1}}$). See Table S10. 17

W'_{ef} Effective wind speed for use in fire model ($\mathrm{ft\,min^{-1}}$). See Table S10. 17

$W'_{ef,mph}$ Effective wind speed for use in fire model ($\mathrm{mi\,h^{-1}}$). See Table S10. 17

wf Fraction of vegetated area (“foliar projective cover;” unitless) that is a woody PFT. 17

$\widehat{WRF}$ PFT-specific wind reduction factor (unitless) used by MC-Fire. See Table S23. 17, 26

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). “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.

Model	Lightning	Anthropogenic		
	Ignitions km^{-2} month^{-1} (I_L)	Ignitions person^{-1} month^{-1} (α_m)	Ignitions km^{-2} month^{-1} (I_A)	Does I_A implicitly include suppression at high PD?
CLM-Li*	$0.22 \times F_{C2G}$	0.012	$\alpha_m \times 6.8 \times PD^{0.4}$	No
INFERNO	F_{C2G}	0.03	See CLM-Li*	No
JSBACH-SPITFIRE	$0.04 \times F_{C2G}$	Regionally varying, after Thonicke et al. (2010)	$\alpha_m \times Y \times PD \times exp(-0.5\sqrt{PD})$, where $Y = 0.65$	Yes
LPJ-GUESS-SPITFIRE	See JSBACH-SPITFIRE	Regionally varying, after Thonicke et al. (2010)	As JSBACH-SPITFIRE, but with $Y = 0.35$.	Yes
MC-FIRE	n/a	n/a	n/a	n/a
ORCHIDEE-SPITFIRE	$0.03 \times F_{C2G}$	Regionally varying, after Thonicke et al. (2010)	As JSBACH-SPITFIRE, but with $Y = 0.003$.	Yes

	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 $\eta_F = max\left(0, min\left[1, \frac{12F_{C2G}-0.025}{1.0-0.025}\right]\right)$.	$min\left(1, \left[\frac{PD}{300}\right]^{0.43}\right)$	$max\left(min\left[1, P_{i,n} + (1-P_{i,n})\, P_{i,h}\right]\right)$
LPJ-GUESS-BLAZE	n/a	n/a	n/a
LPJ-GUESS-GlobFIRM	n/a	n/a	$exp\left(-\pi\left[\frac{\theta_1}{\widehat{\theta_e}}\right]^2\right)$

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.

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: $\begin{cases} \text{Gr./Shr.:} & 0.2+0.8\times exp\left(-\pi\times\frac{GDP_{pc}}{7000}\right) \\ \text{Tree:} & \begin{cases} 1 & GDP_{pc} \leq 8{,}000 \\ 0.83 & 8{,}000 < GDP_{pc} \leq 20{,}000 \\ 0.62 & GDP_{pc} > 20{,}000 \end{cases} \end{cases}$
INFERNO	$1-(0.05+0.9\times exp[-0.05PD])$	—	—	—
JSBACH-SPITFIRE	Implicit (see Table S1). Also affects duration (see Table S5).	—	—	—
LPJ-GUESS-BLAZE	n/a	n/a	n/a	n/a
LPJ-GUESS-GlobFIRM	n/a	n/a	n/a	n/a
LPJ-GUESS-SPITFIRE	Implicit (see Table S1)	—	—	—
ORCHIDEE-SPITFIRE	$1-(0.99-0.98\times exp[-0.025PD])$	—	—	—

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.	$q = 0.5 + \frac{max(0, 0.9 - exp[-0.025\times PD])}{2}$
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.

Model	Cropland fire?	Pasture fire?	Deforestation fire?	Peat fire?
CLM-Li	Based on GDP, population density, fuel load, 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
INFERNO	None	None	None	n/a
JSBACH-SPITFIRE	None	Same as grassland	None	n/a
LPJ-GUESS-BLAZE	None	None	None	n/a
LPJ-GUESS-GlobFIRM	None	None	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 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.

Model	Function
CLM-Li*	$S_{env,nf} = f_{\theta,CLM} \times f_{RH,CLM} \times f_{T,CLM} \times f_{L,CLM}$, where: $f_{\theta,CLM} = 1 - max\left(0, min\left[1, \frac{\theta_{root}-0.6}{0.25}\right]\right)$, $f_{RH,CLM} = (1-v) \times \left(1 - max\left[0, min\left(1, \frac{RH-0.3}{0.8-0.3}\right)\right]\right) + v \times \left(1 - max\left[0.75, min\left(1, \frac{RH_{30}}{0.9}\right)\right]\right)$, $f_{T,CLM} = min(1, exp[0.1T\pi])$, $f_{L,CLM} = max\left(0, min\left[1, \frac{L-0.075}{1.050-0.075}\right]\right)$, $v = max\left(0, min\left[1, \frac{L-2.5}{2.5}\right]\right)$, and $L = L_{l,stem,ag} + L_{l,leaf} + L_{d,litter}$.
CTEM	$S_{env,nf} = f_{\theta,CTEM} \times f_{L,CTEM}$, where: $f_{\theta,CTEM} = \left(\left[1 - tanh\left(\left[\frac{1.75\theta_{root}}{0.30}\right]\right)\right]\left[1 - \frac{L_{duff}}{L}\right] + \left[1 - tanh\left(\left[\frac{1.75\theta_{1}}{0.50}\right]\right)\right]\frac{L_{duff}}{L}\right)$, $f_{L,CTEM} = max\left(0, min\left[1, \frac{L-0.2}{1.0-0.2}\right]\right)$, $L = L_{l,leaf} + L_{l,stem} + L_{d,litter}$, and $L_{duff} = L_{b,g} + L_{d,litter}$.
INFERNO	$S_{env,nf} = 7.7 \times e^{*} \times f_{RH,INFERNO} \times exp(-2R_{r}) \times f_{\theta,INFERNO} \times f_{L,INFERNO}$, where: $f_{\theta,INFERNO} = 1 - \theta$, $f_{RH,INFERNO} = max\left(1, min\left[0, \frac{0.9-RH}{0.9-0.1}\right]\right)$, $f_{L,INFERNO} = max\left(0, min\left[1, \frac{L-0.02}{0.2-0.02}\right]\right)$, $L = L_{l,leaf} + L_{DPM}$, and L_{DPM} is the fraction $\frac{\widehat{DR}}{1+\widehat{DR}}$ of the soil carbon pool.
JSBACH-SPITFIRE	$FDI = \begin{cases} max\left(0, \left[1 - \frac{\omega_{o}}{\widehat{\omega_{*}}}\right]\right) & I_{surf} \geq 50\,\mathrm{kW\,m^{-2}} \\ 0 & I_{surf} < 50\,\mathrm{kW\,m^{-2}} \end{cases}$
LPJ-GUESS-BLAZE	n/a
LPJ-GUESS-GlobFIRM	n/a
LPJ-GUESS-SPITFIRE	$FDI = max\left(0, \left[1 - \frac{\omega_{o}}{\widehat{\omega_{*}}}\right]\right)$
MC-Fire	n/a
ORCHIDEE-SPITFIRE	See JSBACH-SPITFIRE

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.

Model	Ellipse shape	$ROS\,(\mathrm{m\,s^{-1}})$	Duration (t_{fire}, s)	Multi-day burning?	BA per fire (BA_{pf}, $\mathrm{km^2}$)
CLM-Li*	$LB = 1 + 10 \times (1 - exp[-0.06 \times W])$ $HB = \frac{LB+\sqrt{LB^2-1}}{LB-\sqrt{LB^2-1}}$	$ROS_f = \widehat{ROS}_{max} \times g_W \times \sqrt{f_{\theta,CLM} \times f_{RH,CLM} \times f_{T,CLM}}$, where $g_W = 0.05 \times \frac{2 \times LB}{1+HB^{-1}}$,	86400	No	$\frac{\pi}{4 \times LB} \times \left(ROS_f \times t_{fire} \times \left[1 + HB^{-1}\right]\right)^2 \times 10^{-6} \times S_{GDP,ba} \times S_{PD,ba}$
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 $L_{duff} = L_{b,g} + L_{d,litter}$.	$86400 \times \frac{1-q}{q}$	Yes (all burns at once)	$\frac{\pi}{4 \times LB} \times \left(ROS_f \times t_{fire} \times \left[1 + HB^{-1}\right]\right)^2 \times 10^{-6}$ $\times \frac{(1-q)(2-q)}{q^2}$
INFERNO	n/a	n/a	n/a	No	$\widehat{BA_{pf}}$
JSBACH-SPITFIRE	$LB = \begin{cases} 1.0 + 8.729 \times (1 - exp[-1.8W])^{2.155} & \text{Trees} \\ 1.1 \times (60W)^{0.464} & \text{Grasses} \end{cases}$	$ROS_f = \frac{I_R \times \xi \times (1 + \Phi_w)}{\widehat{\rho_b} \times \epsilon \times Q_{ig} \times 60}$ $ROS_b = ROS_f \times exp(-0.012 \times W \times 60)$	$\frac{60 \times 241}{1 + 240 \times exp(-11.06 \times FDI)} \times max(1, min[3, (4 - log_{10}PD) \times 0.5])$	No	$\frac{\pi}{4 \times LB}\left([ROS_f + ROS_b] \times t_{fire}\right)^2 \times 10^{-6}$
LPJ-GUESS-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-GlobFIRM	n/a	n/a	n/a	n/a	n/a
LPJ-GUESS-SPITFIRE	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	$\frac{60 \times 241}{1 + 240 \times exp(-11.06 \times FDI)}$	No	See JSBACH-SPITFIRE
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) $\in$ {1h, 10h, 100h} ($L_d = \sum_i L_i$), j (live fuel classes) $\in$ {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	$\frac{A_g \times (TSF + 1)}{\widehat{FRI}_{max} - dscalar \times \left(\widehat{FRI}_{max} - \widehat{\widehat{FRI}_{min}}\right)}$, where $dscalar =$ $\begin{cases} \frac{BUI - \widehat{BUI}_*}{\widehat{BUI}_*} & \frac{L_{l,g}+L_{d,g}}{L_{l,g}+L_{d,g}+L_{d,1h}+L_{d,10h}} < 0.7 \\ \frac{FFMC - FF\widehat{M}C_*}{FF\widehat{M}C_*} & \frac{L_{l,g}+L_{d,g}}{L_{l,g}+L_{d,g}+L_{d,1h}+L_{d,10h}} \geq 0.7 \end{cases}$
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	No	See JSBACH-SPITFIRE

Table S6. How do the different models calculate total gridcell burned area? 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	$A_g \times \left(\dfrac{I_A + I_L}{t_m \times 48} \times S_{env,nf} \times S_{GDP,nf} \times S_{PD,nf}\right) \times (BA_{pf} \times S_{GDP,ba} \times S_{PD,ba})$
CTEM	Daily	$\dfrac{A_g}{300} \times (P_i \times S_{env,nf}) \times BA_{pf}$
INFERNO	Half-hourly	$A_g \times \left(\dfrac{I_A + I_L}{t_m \times 48} \times S_{env,nf} \times S_{PD,nf}\right) \times BA_{pf}$
JSBACH-SPITFIRE	Daily	$A_g \times \dfrac{I_A + I_L}{t_m} \times FDI \times BA_{pf}$
LPJ-GUESS-BLAZE	Monthly	$A_g \times \dfrac{\widehat{a}}{12} \times F_{APAR}{}^{0.905} \times NI_{max,y}{}^{0.860} \times exp(0.0168 \times PD)$
LPJ-GUESS-GlobFIRM	Annual	$A_g \times \begin{cases} s \times exp\left(\dfrac{s-1}{0.45\,(s-1)^3 + 2.83\,(s-1)^2 + 2.96\,(s-1)}\right) & L > 0.2\,\mathrm{kg\,C\,m^{-2}} \\ 0 & L \leq 0.2\,\mathrm{kg\,C\,m^{-2}} \end{cases},$ where $s = \frac{1}{365}\sum_{d=1}^{365} P_{i,d}$ and $L = L_{l,stem,ag} + L_{l,leaf} + L_{d,litter}$.
LPJ-GUESS-SPITFIRE	Daily	See JSBACH-SPITFIRE
MC-Fire	Monthly	$S \times BA_{pf}$
ORCHIDEE-SPITFIRE	Daily	$A_g \times \left(\dfrac{I_A + I_L \times S_{PD,nf}}{t_m}\right) \times FDI \times BA_{pf}$

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

Model	Description
CLM-Li*	CLM keeps track of live leaf, stem, and root carbon pools, as well as intermediate transfer and storage carbon pools. Dead carbon is comprised of leaf and woody litter pools. All except live roots are combusted when fire occurs (Table S11), 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.
CTEM	CTEM tracks carbon in its three live vegetation components (leaves, aboveground stem, and roots) and two dead carbon pools (litter and soil carbon). Specified fractions of leaves, stem, and litter pools are combusted, and release emissions to the atmosphere, when fire occurs (Table S11). In addition, fire generates litter due to plant mortality based on specified fractions of leaves, stems, and roots (Table S13).
INFERNO	INFERNO keeps track of live leaf, stem, and root carbon pools, in addition to a pool of soil carbon. Leaves, stems (all of which is considered to be "aboveground"), and the fraction of soil carbon that is "decomposable plant material" (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 S12). Note, however, that because INFERNO is not interactive with its DGVM, burning has no effect on biomass – emissions are only calculated as diagnostic variables.
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 and mortality affects aboveground biomass only, which consists of 70% of the live woody pool and 50% of the live green pool (plus, for combustion, equivalent fractions of the litter derived from those pools). Aboveground litter is partitioned into fuel class sizes after Thonicke et al. (2010): 1-hour fuel (leaves and twigs) is all green litter plus 4.5% of wood litter, 10-hour fuel (small branches) is 7.5% of wood litter, 100-hour fuel (large branches) is 21% of wood litter, and 1000-hour fuel (trunks) is 67% of wood litter.
LPJ-GUESS-BLAZE	LPJ-GUESS partitions both live vegetation and litter C into branches, bark, trunks, leaves, and fine roots. All except belowground stem (i.e., coarse roots) and fine roots are combusted when fire occurs (Table S11). In these tables, "aboveground stem" refers to biomass in branches, bark, and trunks.
LPJ-GUESS-GlobFIRM	See LPJ-GUESS-BLAZE.
LPJ-GUESS-SPITFIRE	Leaf and woody litter pools are converted to fuel class loadings after Thonicke et al. (2010), as described for JSBACH-SPITFIRE.
MC-Fire	Live fuel in MC-Fire consists of all live grass and tree biomass. 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 S23).
ORCHIDEE-SPITFIRE	Live biomass in ORCHIDEE is divided into leaves, sapwood, heartwood, fine roots, and a transfer and storage pool. The fraction of sapwood and heartwood in the aboveground stem (i.e., not in coarse roots) is determined dynamically by an allocation scheme. 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 then calculated after (Thonicke et al., 2010, see LPJ-GUESS-SPITFIRE above).

Table S8. Constants relating to Rothermel-style processes. CLM-Li*, CTEM, 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 $513\ \mathrm{kg\,m^{-3}}$.

Model	h	ρ_p	η_S
JSBACH-SPITFIRE	18,000	513	0.41739
LPJ-GUESS-BLAZE	20,000	n/a	n/a
LPJ-GUESS-SPITFIRE	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/c: Not explicitly calculated.

Component	Description	JSBACH-SPITFIRE	LPJ-GUESS-SPITFIRE	MC-Fire	ORCHIDEE-SPITFIRE
$\omega_{d,1h}$	Moisture content of 1-hour dead fuels	$exp(-NI \times 2.2 \times 10^{-3})$	$0.5 \times exp(-NI \times 10^{-3}) + 0.5 \times \theta_1$	$\begin{cases} 1.0329 \times emc_{c,min} & T \geq 32 \text{ and no precip.} \\ 0.35 & \text{otherwise} \end{cases}$	$exp(-NI \times 10^{-3})$
$\omega_{d,10h}$	Moisture content of 10-hour dead fuels	n/c	n/c	$\begin{cases} 1.2815 \times emc_{c,min} & T \geq 32 \text{ and no precip.} \\ 0.35 & \text{otherwise} \end{cases}$	n/c
$\omega_{d,100h}$	Moisture content of 100-hour dead fuels	n/c	n/c	$0.315634 \times (bnd_{d,100h} - \omega_{d,100h,t-1}) + \omega_{d,100h,t-1}$, 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	$0.306810 \times \left(\frac{\sum_{i=1}^{7} bnd_{100h,t-i}}{7} - \omega_{d,100h,t-7}\right) + \omega_{d,100h,t-7}$, 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	$\frac{\theta_{mm} + R_m}{PET}$	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	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	$\frac{\sum_i L_i \times \widehat{\sigma}_i \times \omega_i}{\sum_i L_i \times \widehat{\sigma}_i}$, 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	$0.3 + 0.9 \times \left(0.1699365 + \frac{0.8459560}{1 + exp\left[\frac{\omega_{duff} - 39.88160}{5.19634}\right]}\right)$	See JSBACH-SPITFIRE
$\omega_{l,s}$	Moisture content of live shrubby veg.	n/a	n/a	$0.8 + 0.5 \times \left(0.1699365 + \frac{0.8459560}{1 + exp\left[\frac{\omega_{duff} - 39.88160}{5.19634}\right]}\right)$	n/a
ω_o	A composite fuel moisture measurement	$exp\left(-\frac{NI}{\sum_i L_i} \times \sum_i [\alpha_i \times L_i]\right)$, where $i \in \{d,1h;d,10h;d,100h;l,g\}$, $\alpha_{d,1h} = 2.2 \times 10^{-3}$, $\alpha_{d,10h} \approx 1.193 \times 10^{-4}$, $\alpha_{d,100h} \approx 3.27 \times 10^{-5}$, and $\alpha_{l,g} = 2.2 \times 10^{-3}$.	As JSBACH-SPITFIRE, but with $i \in \{d,1h;d,10h;d,100h;l,g\}$, $\alpha_{d,1h} = 1.0 \times 10^{-3}$, $\alpha_{d,10h} = 5.42 \times 10^{-5}$, $\alpha_{d,100h} = 1.49 \times 10^{-5}$, and $\alpha_{l,g} = -\frac{log(\omega_{l,g})}{NI}$.	$\frac{\sum_i L_i \times \sigma_i \times \omega_i}{\sum_i L_i \times \sigma_i}$, 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 LPJ-GUESS-SPITFIRE, but with $i \in \{d,1h;d,10h;d,100h\}$

Table S10. Other functions for fire models that calculate energy release. $\beta = \frac{\rho_b}{\rho_p}$. T_{max} refers to daily maximum air temperature (°C).

Component	Description	JSBACH-SPITFIRE	LPJ-GUESS-BLAZE	LPJ-GUESS-SPITFIRE	MC-Fire	ORCHIDEE-SPITFIRE
A	Used to compute Γ'	$8.9033 \times \sigma^{-0.7913}$	n/a	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	$0.02526 \times (\sigma_R \times 100)^{0.54}$	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	$7.47 \times exp\left(-0.133 \times [\sigma_R \times 100]^{0.55}\right)$	See JSBACH-SPITFIRE
E	Used to compute Φ_w	$7.7515 \times exp(-0.01094\sigma)$	n/a	See JSBACH-SPITFIRE	$0.715 \times exp\left(\sigma_R \times -359 \times 10^{-4}\right)$	See JSBACH-SPITFIRE
I_R	Reaction intensity ($\mathrm{kJ\,m^{-2}\,min^{-1}}$)	$\Gamma' \times L_{dc,n} \times h \times \eta_M \times \eta_S$	n/a	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	$ROS \times \tau \times I_{R,E}$	See JSBACH-SPITFIRE
Q_{ig}	Heat of pre-ignition ($\mathrm{kJ\,kg^{-1}}$)	$581 + 2594\omega_o$	n/a	See JSBACH-SPITFIRE	$max(344, 144.5 - 0.266T_{adj} - 0.0058{T_{adj}}^2 - (T_{adj} \times \omega_{d,1h}) +$ $18.54(1.0 - exp[-15.1\omega_{d,1h}]) + 640\omega_{d,1h})$, where $T_{adj} = 1.8T_{max} + 47$	See JSBACH-SPITFIRE
$L_{dc,n}$	Net fuel loading (i.e., without mineral content; $\mathrm{kg\,m^{-2}}$)	$(1 - 0.055)\sum_i L_{d,i}$, where $i \in \{1h; 10h; 100h\}$.	n/a	See JSBACH-SPITFIRE	$L_{+dc,n,R} = (1 - 0.055) \times (L_{d,1h+} + L_{d,10h+} + L_{d,100h+})$ $L_{+dc,n,E} = (1-0.055) \times (L_{d,1h+} + L_{d,10h+} + L_{d,100h+} + L_{d,1000h+})$ $L_{+lc,n} = (1 - 0.055) \times (L_{l,g} + L_{l,s})$	See JSBACH-SPITFIRE
β_{op}	Used to compute Φ_w	$0.200395 \times \sigma^{-0.8189}$	n/a	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	$\Gamma'_R = \Gamma'_{R,max} \times \left(\frac{\beta}{\beta_{op}}\right)^{A_R} \times exp\left(A_R\left[1 - \frac{\beta}{\beta_{op}}\right]\right)$ $\Gamma'_E = \Gamma'_{E,max} \times \left(\frac{\beta}{\beta_{op}}\right)^{A_E} \times exp\left(A_E\left[1 - \frac{\beta}{\beta_{op}}\right]\right)$	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	$\Gamma'_{R,max} = \frac{(\sigma_R \times 100)^{1.5}}{495 + 0.0594 \times (\sigma_R \times 100)^{1.5}}$ $\Gamma'_{E,max} = \frac{(\sigma_E \times 100)^{1.5}}{495 + 0.0594 \times (\sigma_E \times 100)^{1.5}}$	See JSBACH-SPITFIRE
ϵ	Effective heating number	$exp\left(\frac{-4.528}{\sigma}\right)$	n/a	See JSBACH-SPITFIRE	$\epsilon_i = (1 - 0.055) \times L_{i(+)} \times exp\left(-\frac{1.38}{\widehat{\sigma_i}}\right)$, 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	$1 - 2.59\frac{\omega_o}{\widehat{\omega_*}} + 5.11\left(\frac{\omega_o}{\widehat{\omega_*}}\right)^2 - 3.52\left(\frac{\omega_o}{\widehat{\omega_*}}\right)^3$	n/a	See JSBACH-SPITFIRE	$\eta_{M,d} = 1 - 2.59\frac{\omega_o}{\widehat{\omega_*}} + 5.11\left(\frac{\omega_o}{\widehat{\omega_*}}\right)^2 - 3.52\left(\frac{\omega_o}{\widehat{\omega_*}}\right)^3$ $\eta_{M,l} = 1 - 2.59\frac{\omega_l}{\omega_{l*}} + 5.11\left(\frac{\omega_l}{\omega_{l*}}\right)^2 - 3.52\left(\frac{\omega_l}{\omega_{l*}}\right)^3$, 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	$\frac{exp\left(0.792 + 3.7597\sqrt{\sigma}\right)(\beta + 0.1)}{192 + 7.9095\sigma}$	n/a	See JSBACH-SPITFIRE	$\frac{exp\left([0.792 \times 6.81\sqrt{\sigma_R}] \times [\beta + 0.1]\right)}{192 + 25.95 \times \sigma_R}$	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	$(L_{d,1h+} + L_{d,10h+} + L_{d,100h+}) \times depth^{-1}$	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	$\sigma_R = 100 \times \frac{\sum_i \left(L_i\sigma_i^2\right) + \sum_j \left(L_j\sigma_j^2\right)}{\sum_k L_k\sigma_k}$ 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	$\beta^{0.3} \times \begin{cases} 0.267 & \text{slope } \leq 25^\circ \\ 0.533 & 25^\circ < \text{slope } \leq 40^\circ \\ 1.066 & 40^\circ < \text{slope } \leq 55^\circ \\ 2.134 & 55^\circ < \text{slope } \leq 75^\circ \\ 4.273 & \text{slope } > 75^\circ \end{cases}$	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	$C \times \left(\frac{\beta}{\beta_{op}}\right)^{-E} \times \begin{cases} \left(88 \times W'_{ef,mph}\right)^B & 88 \times W'_{ef,mph} \leq I_{R,E} \times 0.0881 \\ (0.9 \times I_{R,E})^B & 88 \times W'_{ef,mph} > I_{R,E} \times 0.0881 \end{cases}$, 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 S11. Calculation of combustion for fire models that do not classify dead fuels by size. PFT-specific values (Tables S15–S17, S19, and S21) are denoted with a "hat."

Component	CLM-Li*	CTEM	INFERNO	LPJ-GUESS-BLAZE	LPJ-GUESS-GlobFIRM
$FC_{l,leaf}$	$\widehat{FC_{l,leaf}}$	$\widehat{FC_{l,leaf}}$	$\widehat{FC}_{l,leaf,min} + (1 - \frac{\theta}{\theta_{sat}})$ $\times(\widehat{FC}_{l,leaf,max} - \widehat{FC}_{l,leaf,min})$	$\begin{cases} 0.02 & I_{surf} \leq 0.75 \\ 0.05 & 0.75 < I_{surf} \leq 3 \\ 0.10 & 3 < I_{surf} \leq 7 \\ 0.60 & I_{surf} > 7 \end{cases}$	$1 - \widehat{r}$
$FC_{l,grass}$	$\widehat{FC_{l,leaf}}$	$\widehat{FC_{l,leaf}}$	See $FC_{l,leaf}$	0.99	$1 - \widehat{r}$
$FC_{l,stem}$	$\widehat{FC_{l,stem}}$	$\widehat{FC_{l,stem}}$	$\widehat{FC}_{l,stem,min} + \left(1 - \frac{\theta}{\theta_{sat}}\right)$ $\times\left(\widehat{FC}_{l,stem,max} - \widehat{FC}_{l,stem,min}\right)$	Branches: $\begin{cases} 0.00 & I_{surf} \leq 0.75 \\ 0.00 & 0.75 < I_{surf} \leq 3 \\ 0.15 & 3 < I_{surf} \leq 7 \\ 0.20 & I_{surf} > 7 \end{cases}$ Bark: $\begin{cases} 0.03 & I_{surf} \leq 0.75 \\ 0.13 & 0.75 < I_{surf} \leq 3 \\ 0.25 & 3 < I_{surf} \leq 7 \\ 0.50 & I_{surf} > 7 \end{cases}$ Stem wood: $\begin{cases} 0.00 & I_{surf} \leq 0.75 \\ 0.00 & 0.75 < I_{surf} \leq 3 \\ 0.05 & 3 < I_{surf} \leq 7 \\ 0.20 & I_{surf} > 7\text{, sprouters} \\ 0.80 & I_{surf} > 7\text{, seeders} \end{cases}$	$1 - \widehat{r}$
$FC_{d,leaf}$	0.6	$\widehat{FC_{d,litter}}$	n/a	$\begin{cases} 0.60 & I_{surf} \leq 0.75 \\ 0.65 & 0.75 < I_{surf} \leq 3 \\ 0.80 & 3 < I_{surf} \leq 7 \\ 1.00 & I_{surf} > 7 \end{cases}$	$1 - \widehat{r}$
$FC_{d,stem}$	0.4	$\widehat{FC_{d,litter}}$	n/a	Bark: $\begin{cases} 0.60 & I_{surf} \leq 0.75 \\ 0.65 & 0.75 < I_{surf} \leq 3 \\ 0.85 & 3 < I_{surf} \leq 7 \\ 1.00 & I_{surf} > 7 \end{cases}$ Branches, stem wood $\begin{cases} 0.50 & I_{surf} \leq 0.75 \\ 0.75 & 0.75 < I_{surf} \leq 3 \\ 0.75 & 3 < I_{surf} \leq 7 \\ 0.80 & I_{surf} > 7 \end{cases}$	$1 - \widehat{r}$
$FC_{fineroot}$	0.6	n/a	n/a	n/a	$1 - \widehat{r}$

Table S12. Calculation of 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 S18, S22–S24) are denoted with a “hat.”

Component	JSBACH-SPITFIRE	LPJ-GUESS-SPITFIRE	MC-Fire	ORCHIDEE-SPITFIRE
$FC_{d,1h}$	$\begin{cases} 1.0 & \frac{\omega_{ff}}{\widehat{\omega_*}} < 0.18 \\ 1.11 - 0.62\frac{\omega_{ff}}{\widehat{\omega_*}} & 0.18 \le \frac{\omega_{ff}}{\widehat{\omega_*}} \le 0.73 \\ 2.45 - 2.45\frac{\omega_{ff}}{\widehat{\omega_*}} & \frac{\omega_{ff}}{\widehat{\omega_*}} > 0.73 \end{cases}$	$\begin{cases} 1.0 & \frac{\omega_{d,1h}}{\widehat{\omega_*}} < 0.18 \\ 1.2 - 0.62\frac{\omega_{d,1h}}{\widehat{\omega_*}} & 0.18 \le \frac{\omega_{d,1h}}{\widehat{\omega_*}} \le 0.73 \\ 2.45 - 2.45\frac{\omega_{d,1h}}{\widehat{\omega_*}} & \frac{\omega_{d,1h}}{\widehat{\omega_*}} > 0.73 \end{cases}$	0.9	$\begin{cases} 0.9 & \frac{\omega_{ff}}{\widehat{\omega_*}} < 0.18 \\ min\left(0.9, 1.2 - 0.62\frac{\omega_{ff}}{\widehat{\omega_*}}\right) & 0.18 \le \frac{\omega_{ff}}{\widehat{\omega_*}} \le 0.73 \\ 2.45 - 2.45\frac{\omega_{ff}}{\widehat{\omega_*}} & \frac{\omega_{ff}}{\widehat{\omega_*}} > 0.73 \end{cases}$
$FC_{d,10h}$	$\begin{cases} 1.0 & \frac{\omega_o}{\widehat{\omega_*}} < 0.13 \\ 1.09 - 0.72\frac{\omega_o}{\widehat{\omega_*}} & 0.13 \le \frac{\omega_o}{\widehat{\omega_*}} \le 0.51 \\ 1.47 - 1.47\frac{\omega_o}{\widehat{\omega_*}} & \frac{\omega_o}{\widehat{\omega_*}} > 0.51 \end{cases}$	$\begin{cases} 1.0 & \frac{\omega_o}{\widehat{\omega_*}} < 0.12 \\ 1.09 - 0.72\frac{\omega_o}{\widehat{\omega_*}} & 0.12 \le \frac{\omega_o}{\widehat{\omega_*}} \le 0.51 \\ 1.47 - 1.47\frac{\omega_o}{\widehat{\omega_*}} & \frac{\omega_o}{\widehat{\omega_*}} > 0.51 \end{cases}$	$\frac{-0.048132 + (0.917393 \times L_{d,10h} \times CF)}{L_{d,10h} \times CF}$, where conversion factor $CF = 0.5 \times 0.224170$ converts from $\mathrm{kg\,C\,m^{-2}}$ to $\mathrm{T\,DM\,ac^{-1}}$.	$\begin{cases} 0.9 & \frac{\omega_o}{\widehat{\omega_*}} < 0.12 \\ min\left(0.9, 1.09 - 0.72\frac{\omega_o}{\widehat{\omega_*}}\right) & 0.12 \le \frac{\omega_o}{\widehat{\omega_*}} \le 0.51 \\ 1.47 - 1.47\frac{\omega_o}{\widehat{\omega_*}} & \frac{\omega_o}{\widehat{\omega_*}} > 0.51 \end{cases}$
$FC_{d,100h}$	$min\left(0.45, [0.98 - 0.85 \times \omega_{d,100h}]\right)$	$\begin{cases} 0.98 - 0.85\frac{\omega_o}{\widehat{\omega_*}} & \frac{\omega_o}{\widehat{\omega_*}} \le 0.38 \\ 1.06 - 1.06\frac{\omega_o}{\widehat{\omega_*}} & \frac{\omega_o}{\widehat{\omega_*}} > 0.38 \end{cases}$	$\frac{-0.124649 + (0.869309 \times L_{d,100h} \times CF) - (48.04 \times \omega_{duff})}{L_{d,100h} \times CF}$, where conversion factor $CF = 0.5 \times 0.224170$ converts from $\mathrm{kg\,C\,m^{-2}}$ to $\mathrm{T\,DM\,ac^{-1}}$.	$\begin{cases} \widehat{FC}_{d,100h,max} - 0.85\frac{\omega_o}{\widehat{\omega_*}} & \frac{\omega_o}{\widehat{\omega_*}} < 0.38 \\ 1.06 - 1.06\frac{\omega_o}{\widehat{\omega_*}} & \frac{\omega_o}{\widehat{\omega_*}} > 0.38 \end{cases}$
$FC_{d,1000h}$	$min\left(0.45, [0.8 - 0.8 \times \omega_{d,100h}]\right)$	$max\left(1, 0.8 - 0.8\frac{\omega_o}{\widehat{\omega_*}}\right)$	$1 - \left(\frac{6.6 - dia\_reduc}{6.6}\right)^2$, where $dia\_reduc =$ $\begin{cases} 1.6107058 - (1.4756 \times \omega_{duff}), & \omega_{duff} \le 0.7 \\ 0.5579 \times exp\left(-3\left[\omega_{duff} - 0.7\right]\right), & \omega_{duff} > 0.7 \end{cases}$	$\widehat{FC}_{d,1000h,max} - 0.8 \times \frac{\omega_o}{\widehat{\omega_*}}$
$FC_{l,1h}$	CS (woody PFTs only)	See JSBACH-SPITFIRE	n/a	See JSBACH-SPITFIRE
$FC_{l,10h}$	$0.05CS$	See JSBACH-SPITFIRE	n/a	CS
$FC_{l,100h}$	0	See JSBACH-SPITFIRE	n/a	CS
$FC_{l,1000h}$	0	See JSBACH-SPITFIRE	n/a	$0.05CS$
$FC_{l,leaf}$	n/a	n/a	1 if crown fire, 0 otherwise (woody PFTs only).	n/a
$FC_{l,grass}$	$\begin{cases} 1.0 & \frac{\omega_{l,g}}{\widehat{\omega_*}} < 0.18 \\ 1.11 - 0.62\frac{\omega_{l,g}}{\widehat{\omega_*}} & 0.18 \le \frac{\omega_{l,g}}{\widehat{\omega_*}} \le 0.73 \\ 2.45 - 2.45\frac{\omega_{l,g}}{\widehat{\omega_*}} & \frac{\omega_{l,g}}{\widehat{\omega_*}} > 0.73 \end{cases}$	See JSBACH-SPITFIRE	0.9	See JSBACH-SPITFIRE
$FC_{l,stem}$	n/a	n/a	Branches: 1 if crown fire, 0 otherwise. Trunks, roots: 0.	n/a

Table S13. Calculation of fire-induced mortality. INFERNO does not calculate fire-induced mortality and is thus excluded. Note that LPJ-GUESS-SPITFIRE translates fractional mortality into a probability for use in stochastic burning of individual stands within a grid cell (Section **??**). PFT-specific values (Tables S15–S24) are denoted with a "hat."

Component	Description	CLM-Li*	CTEM	JSBACH-SPITFIRE	LPJ-GUESS-GlobFIRM	LPJ-GUESS-BLAZE	LPJ-GUESS-SPITFIRE	MC-Fire	ORCHIDEE-SPITFIRE
SH	Scorch height (m)	n/a	n/a	$\widehat{F} \times {I_{surf}}^{0.667}$	n/a	n/a	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)	n/a	n/a	$\widehat{CL}$	n/a	n/a	$\widehat{CL}$	$DBH \times \widehat{R_{CL}}$	$\widehat{CL}$
CS	Fraction of crown scorched	n/a	n/a	$\frac{SH - ht_w + CL}{CL}$	n/a	n/a	See JSBACH-SPITFIRE	$\begin{cases} 0 & SH < ht_w - CL \\ 1 - \left(\frac{ht_w - SH}{CL}\right)^2 & ht_w - CL < SH \leq ht_w \\ 1 & SH > ht_w \end{cases}$	See JSBACH-SPITFIRE
$FK(CS)$	Fractional mortality from crown scorch	n/a	n/a	$\widehat{r_{CS}} \times CS^{\widehat{p}}$	n/a	n/a	See JSBACH-SPITFIRE	$\begin{cases} 0 & f(CS) \leq \widehat{FFMC_*} \\ 1 & f(CS) > \widehat{FFMC_*} \text{ or crown fire occurs} \end{cases}$, where $f(CS) = \left(1 + exp\left[-1.466 + 1.910 min(BT,5) - 0.1775 min(BT,5)^2 - 5.4CS^2\right]\right)^{-1}$ and crown fire occurs if $I_{surf} > (0.010 \times [ht_w - CL] \times [460 + 26 \times \omega_{l,s}])^{1.5}$	See JSBACH-SPITFIRE
$FK(\tau)$	Fractional mortality from cambial damage	n/a	n/a	$\begin{cases} 0 & \frac{\tau}{\tau_*} \leq 0.22 \\ 0.563 \times \frac{\tau}{\tau_*} - \frac{1}{8} & 0.22 < \frac{\tau}{\tau_*} < 2.0 \\ 1 & \frac{\tau}{\tau_*} \geq 2.0 \end{cases}$	n/a	n/a	See JSBACH-SPITFIRE	$\begin{cases} 0 & FK(CS) = 1 \\ CS & FK(CS) = 0 \end{cases}$	See JSBACH-SPITFIRE
τ	Fire residence time (min)	n/a	n/a	$5 \sum_i \frac{FC_i}{\Gamma' \eta_M \eta_S L_{dc,n}}$, where $i \in \{1h, 10h, 100h\}$	n/a	n/a	$2 \sum_i \frac{FC_i}{\Gamma' \eta_M \eta_S L_{dc,n}}$, where $i \in \{1h, 10h, 100h\}$	$\frac{3.84}{\sigma_E}$	See LPJ-GUESS-SPITFIRE
τ_*	Critical residence time (min)	n/a	n/a	$2.9BT^2$	n/a	n/a	See JSBACH-SPITFIRE	n/a	See JSBACH-SPITFIRE
BT	Bark thickness (cm)	n/a	n/a	$\widehat{par_1} \times DBH + \widehat{par_2}$	n/a	n/a	$\widehat{BT}$	$\widehat{par_1} \times DBH$	See JSBACH-SPITFIRE
DBH	Diameter at breast height (cm)	n/a	n/a	$100 \times \left(\frac{ht_w}{40}\right)^{\frac{1}{0.67}}$	n/a	Calculated by LPJ-GUESS	$\left(\frac{100ht_w}{\widehat{k_2}}\right)^{\widehat{k_3}^{-1}}$	$\begin{cases} 1.2 \times ht_w & \text{if deciduous broadleaf and } ht_w < 0.16 \\ 0.30 \times {ht_w}^{1.5} & \text{if deciduous broadleaf and } ht_w \geq 0.16 \\ 1.3 \times ht_w & \text{if evergreen needleleaf and } ht_w < 0.1552 \\ 0.33 \times {ht_w}^{1.5} & \text{if evergreen needleleaf and } ht_w \geq 0.1552 \end{cases}$	$\left(\frac{100ht_w}{40}\right)^2$
FK	Total fraction killed	n/a	n/a	$FK(\tau) + FK(CS) - FK(\tau) \times FK(CS)$	$1 - \widehat{r}$	$\widehat{FK_{tree}}$ (tree PFTs only)	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE	See JSBACH-SPITFIRE
FK_{leaf}	Fractional mortality: Leaves	$\widehat{FK_{leaf}}$	$\widehat{FK_{leaf}}$	n/a	n/a	n/a	n/a	n/a	n/a
FK_{root}	Fractional mortality: Roots	$\widehat{FK_{root}}$	$\widehat{FK_{root}}$	n/a	n/a	n/a	n/a	n/a	n/a
FK_{stem}	Fractional mortality: Stem	$\widehat{FK_{stem}}$, $\widehat{FK_{StoH}}$	$\widehat{FK_{stem}}$	n/a	n/a	n/a	n/a	n/a	n/a
ht_w	Height of woody vegetation (m)	n/a	n/a	$24.19(1 - exp[0.19 \times L_l])$	Calculated by LPJ-GUESS	Calculated by LPJ-GUESS	Calculated by LPJ-GUESS	$\begin{cases} min\left(35, 0.4523 \times [\sum_i L_{l,i}]^{0.33333}\right) & \text{if deciduous and } [\sum_i L_{l,i}] < 4 \\ min\left(35, 0.03484 \times [\sum_i L_{l,i}]^{0.64242}\right) & \text{if deciduous and } [\sum_i L_{l,i}] \geq 4 \\ min\left(70, 0.4074 \times [\sum_i L_{l,i}]^{0.33333}\right) & \text{if evergreen and } [\sum_i L_{l,i}] < 4 \\ min\left(70, 0.03771 \times [\sum_i L_{l,i}]^{0.62027}\right) & \text{if evergreen and } [\sum_i L_{l,i}] \geq 4 \end{cases}$ where $i \in \{10h, 100h, 1000h\}$	$\widehat{ht_w}$

Table S14. Miscellaneous equations.

Abbrv.	Name	Models using	Equation	See also	References
$bnd_{d,100h}$	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-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 mininum	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-BLAZE	$2.0 \times exp\left(-0.450 + 0.987ln[DF] - 3.45RH + 0.0338(1.8T + 32) + 0.0234[W \times 3.6]\right)$	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	$min\left(10500, [L] \times 4.4409\right)$, where L is the sum of live grass, standing dead grass, and aboveground dead wood.		

Table S15. 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	0.9	0.27	0.45	0.8	0.13	0.13	0.55	0.37	0.3
NET Boreal	0.9	0.3	0.5	0.8	0.15	0.15	0.55	0.4	0.32
NDT Boreal	0.9	0.3	0.5	0.8	0.15	0.15	0.5	0.4	0.32
BET Tropical	0.9	0.27	0.45	0.8	0.13	0.13	0.5	0.37	0.3
BET Temperate	0.9	0.27	0.45	0.8	0.13	0.13	0.5	0.37	0.3
BDT Tropical	0.9	0.27	0.45	0.8	0.1	0.1	0.5	0.3	0.3
BDT Temperate	0.9	0.27	0.45	0.8	0.1	0.1	0.5	0.3	0.3
BDT Boreal	0.9	0.27	0.45	0.8	0.13	0.13	0.5	0.37	0.3
BES Temperate	0.9	0.35	0.55	0.8	0.17	0.17	0.6	0.43	0.34
BDS Temperate	0.9	0.35	0.55	0.8	0.17	0.17	0.6	0.43	0.34
BDS Boreal	0.9	0.35	0.55	0.8	0.17	0.17	0.6	0.43	0.34
C3 Arctic grass	0.9	0.9	0.9	0.8	0.2	0.2	0.8	0.6	0.44
C3 grass	0.9	0.9	0.9	0.8	0.2	0.2	0.8	0.6	0.44
C4 grass	0.9	0.9	0.9	0.8	0.2	0.2	0.8	0.6	0.44
Crop1	0.9	0.9	0.9	0.8	0.2	0.2	0.8	0.6	0.44
Crop2	0.9	0.9	0.9	0.8	0.2	0.2	0.8	0.6	0.44

Table S16. 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	$0.54 \times \frac{1}{3.6}$	0.21	0.06	0.15	0.06	0.15	0.03
NDL-DCD	$0.54 \times \frac{1}{3.6}$	0.21	0.06	0.15	0.06	0.15	0.03
BDL-EVG	$0.40 \times \frac{1}{3.6}$	0.21	0.06	0.18	0.06	0.15	0.03
BDL-DCD-COLD	$0.40 \times \frac{1}{3.6}$	0.21	0.06	0.18	0.06	0.15	0.03
BDL-DCD-DRY	$0.40 \times \frac{1}{3.6}$	0.21	0.06	0.18	0.06	0.15	0.03
C3 grass	$0.72 \times \frac{1}{3.6}$	0.24	n/a	0.21	$\begin{cases} 0.03 & \text{if green} \\ 0.02 & \text{if brown} \end{cases}$	n/a	0.08
C4 grass	$0.72 \times \frac{1}{3.6}$	0.24	n/a	0.21	$\begin{cases} 0.03 & \text{if green} \\ 0.02 & \text{if brown} \end{cases}$	n/a	0.08

Table S17. PFT-specific information for 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 S11). 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 S18. PFT-specific information for JSBACH-SPITFIRE.

Plant functional type	$\widehat{\omega_*}$	$\widehat{\rho_b}$	$\widehat{F}$	$\widehat{CL}$	$\widehat{par_1}$	$\widehat{par_2}$	$\widehat{r_{CS}}$	$\widehat{p}$
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 S19. Biome-specific information for mortality in LPJ-GUESS-BLAZE. $ht_{w,min} = 3.7 \times (1 - exp[-0.19 \times I_{surf}])$.

Biome	$\widehat{FK_{tree}} = max(0.0001, min[...$
Savanna, Australia	$\begin{cases} -(-0.0011 \times I_{surf} - 0.00002) \times ht_w - 0.0075 \times I_{surf} & ht_w > 8.5 \text{ and } ht_w > ht_{w,min} \\ 1 - ([0.0178 \times I_{surf} + 0.0144] \times ht_w - 0.1174 \times I_{surf} + 0.9158) & ht_w \leq 8.5 \text{ and } ht_w > ht_{w,min} \\ 0.9999 & ht_w \leq ht_{w,min} \end{cases}$
Savanna, elsewhere	$-exp(1.5[ht_w - 0.5 \times I_{surf} - 1])$
Tropical forest	$\begin{cases} 1 - exp\left(\frac{I_{surf}}{3} \times ln\left[1 - \left(0.82 - 0.035 \times DBH^{0.7}\right)\right]\right) & I_{surf} < 3 \\ 0.82 - 0.035 \times DBH^{0.7} & 3 \leq I_{surf} \leq 7 \\ ln\left(\frac{I_{surf}}{7} \times \left[1 - \left(0.82 - 0.035 \times DBH^{0.7}\right)\right]\right) & I_{surf} > 7 \end{cases}$
Temperate forest, Australia	$\begin{cases} 1 - exp\left(\frac{I_{surf}}{3} \times ln\left[0.95 - \frac{1}{1+\left(\frac{DBH}{0.04}\right)^{1.5}}\right]\right) & I_{surf} < 3 \\ 1 - \left(0.95 \times \frac{1}{1+\left(\frac{DBH}{0.04}\right)^{1.5}}\right) & 3 \leq I_{surf} \leq 7 \\ 0.9999 & I_{surf} > 7 \end{cases}$
Temperate forest, elsewhere	$\begin{cases} 1 - exp\left(\frac{I_{surf}}{3} \times ln\left[0.95 - \frac{1}{1+\left(\frac{DBH}{0.07}\right)^{1.5}}\right]\right) & I_{surf} < 3 \\ 1 - \left(0.95 \times \frac{1}{1+\left(\frac{DBH}{0.07}\right)^{1.5}}\right) & 3 \leq I_{surf} \leq 7 \\ 0.9999 & I_{surf} > 7 \end{cases}$
Boreal forest	$exp(-2 \times I_{surf})$

Table S20. PFT-specific information for burned area parameter in LPJ-GUESS-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 S21. 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 S22. 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	$\widehat{k_2}$	$\widehat{k_3}$	$\widehat{BT}$	$\widehat{CL}$	Max crown area	$\widehat{\rho_b}$	$\widehat{\omega_*}$	$\widehat{F}$	$\widehat{r_{CS}}$	$\widehat{p}$
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 S23. PFT-specific information for MC-Fire.

Veg. type	$\widehat{CL}$	$\widehat{DFF}_{1h}$	$\widehat{DFF}_{10h}$	$\widehat{DFF}_{100h}$	$\widehat{DFF}_{1000h}$	$\widehat{LD}$	$\widehat{FRI_{min}}$	$\widehat{FRI}_{max}$	$\widehat{h} = \frac{1.066}{0.454} \times \ldots$	$\widehat{par_1}$	$\widehat{R_{BT}}$	$\widehat{R_{CL}}$	$\widehat{WRF}$	$\widehat{\sigma_{d,1h}}$	$\widehat{\sigma_{l,h}}$	$\widehat{\sigma_{l,s}}$	$\widehat{\omega_*}$	$\widehat{FFMC_*}$	$\widehat{BUI_*}$
Tundra/arctic or alpine	0.8	0.25	0.25	0.25	0.25	0.4	1000	1000	8001	0.022	0.022	0.8	0.5	19.59	19.50	14.62	0.3	94	147
Taiga-tundra	0.8	0.27	0.2	0.24	0.29	0.042	1000	1000	8039	0.022	0.022	0.8	0.4	18.52	19.84	14.7	0.3	94	147
Boreal evergreen needleleaf forest	0.8	0.27	0.2	0.24	0.29	0.042	50	50	8039	0.022	0.022	0.8	0.4	18.52	19.84	14.7	0.3	83.95	38.2
Boreal mixed woodland	0.5	0.37	0.26	0.27	0.1	0.042	25	25	8026	0.043	0.043	0.5	0.4	16.34	19.67	14.78	0.3	83.95	38.2
Subalpine forest	0.8	0.27	0.2	0.24	0.29	0.042	300	300	8039	0.022	0.022	0.8	0.4	18.52	19.84	14.7	0.3	89.13744	245
Maritime evergreen needleleaf forest	0.7	0.2	0.17	0.2	0.43	0.042	150	150	8068	0.062	0.062	0.7	0.4	19.6	20.45	14.88	0.23	89.13744	245
Temperate evergreen needleleaf forest	0.5	0.39	0.28	0.14	0.19	0.042	50	50	8053	0.043	0.043	0.5	0.4	19.37	21.20	14.89	0.21	89.13744	245
Temperate deciduous broadleaf forest	0.4	0.62	0.2	0.18	0	0.042	155	237	8006	0.033	0.033	0.4	0.5	17.3	20.03	14.99	0.3	92	150
Temperate cool mixed forest	0.5	0.37	0.26	0.27	0.1	0.042	100	100	8026	0.043	0.043	0.5	0.4	16.34	19.67	14.78	0.3	92	150
Temperate warm mixed forest	0.5	0.45	0.37	0.16	0.02	0.042	75	75	8210	0.043	0.043	0.5	0.4	16.7	20.12	14.99	0.3	91.42	223.11
Temperate evergreen needleleaf woodland	0.4	0.61	0.31	0.06	0.02	0.042	15	15	8293	0.062	0.062	0.4	0.6	20.72	20.59	14.51	0.16	89.13744	245
Temperate deciduous broadleaf woodland	0.4	0.83	0.07	0.05	0.05	0.4	15	15	8016	0.033	0.033	0.4	0.6	19.06	19.09	14.42	0.17	92	150
Temperate cool mixed woodland	0.4	0.83	0.07	0.05	0.05	0.4	15	15	8016	0.033	0.033	0.4	0.6	19.06	19.09	14.42	0.17	92	150
Temperate warm mixed woodland	0.4	0.7	0.18	0.12	0	0.4	39	75	8680	0.033	0.033	0.4	0.6	14.33	20.00	13.86	0.15	91.42	223.11
C3/Temperate shrubland	0.7	0.72	0.24	0.02	0.02	0.4	15	15	8020	0.043	0.043	0.7	0.6	23.26	19.78	14.97	0.16	92	150
C3/Temperate grassland	0.8	0.93	0.05	0.01	0.01	1	15	32	8014	0.022	0.022	0.8	0.6	20.2	20.21	14.98	0.16	92	150
Temperate desert	0.7	0.75	0.24	0.01	0	0.042	200	200	8072	0.043	0.043	0.7	0.6	24.25	17.50	14.88	0.15	92	150
Subtropical evergreen needleleaf forest	0.5	0.39	0.28	0.14	0.19	0.042	50	50	8053	0.043	0.043	0.5	0.5	19.37	21.20	14.89	0.21	89.13744	245
Subtropical deciduous broadleaf forest	0.4	0.62	0.2	0.18	0	0.042	100	100	8006	0.033	0.033	0.4	0.5	17.3	20.03	14.99	0.3	92	150
Subtropical evergreen broadleaf forest	0.5	0.45	0.37	0.16	0.02	0.042	40	40	8210	0.043	0.043	0.5	0.4	16.34	20.12	14.99	0.3	91.42	223.11
Subtropical mixed forest	0.5	0.45	0.37	0.16	0.02	0.042	40	40	8210	0.043	0.043	0.5	0.4	16.7	20.12	14.99	0.3	92	150
Subtropical evergreen needleleaf woodland	0.4	0.78	0.19	0.01	0.02	0.4	15	15	8001	0.062	0.062	0.4	0.6	22.32	20.23	15	0.16	89.13744	245
Subtropical deciduous broadleaf woodland	0.4	0.83	0.07	0.05	0.05	0.4	15	15	8016	0.033	0.033	0.4	0.6	19.06	19.09	14.42	0.17	92	150
Subtropical evergreen broadleaf woodland	0.5	0.7	0.18	0.12	0	0.4	15	15	8680	0.043	0.43	0.5	0.6	14.33	20.00	13.86	0.15	91.42	223.11
Subtropical mixed woodland	0.5	0.7	0.18	0.12	0	0.4	39	75	8680	0.043	0.43	0.5	0.6	14.33	20.00	13.86	0.15	92	150
C4/Subtropical shrubland	0.7	0.72	0.24	0.02	0.02	0.4	15	15	8020	0.043	0.043	0.7	0.6	23.26	19.78	14.97	0.16	92	150
C4/Subtropical grassland	0.8	0.92	0.07	0.01	0	1	12	24	8028	0.022	0.022	0.8	0.6	20.4	20.03	14.95	0.15	92	150
Subtropical desert	0.7	0.75	0.24	0.01	0	0.042	200	200	8072	0.043	0.043	0.7	0.6	24.25	17.50	14.88	0.15	92	150
Tropical evergreen broadleaf forest	0.4	0.62	0.2	0.18	0	0.042	150	150	8006	0.033	0.033	0.4	0.5	17.3	20.03	14.99	0.3	91.42	223.11
Tropical deciduous woodland	0.4	0.83	0.07	0.05	0.05	0.4	15	15	8016	0.033	0.033	0.4	0.6	19.06	19.09	14.42	0.17	92	150
Tropical savanna	0.4	0.83	0.07	0.05	0.05	0.4	15	15	8016	0.033	0.033	0.4	0.6	19.06	19.09	14.42	0.17	87	110
Tropical shrubland	0.7	0.72	0.24	0.02	0.02	0.4	1000	1000	8020	0.043	0.043	0.7	0.6	23.26	19.78	14.97	0.16	87	110
Tropical grassland	0.8	0.92	0.07	0.01	0	1	15	15	8028	0.022	0.022	0.8	0.6	20.4	20.03	14.95	0.15	87	110
Tropical desert	0.7	0.75	0.24	0.01	0	0.042	200	200	8072	0.043	0.043	0.7	0.6	24.25	17.50	14.88	0.15	87	110
Cool needleleaf forest	0.5	0.39	0.28	0.14	0.19	0.042	50	150	8053	0.043	0.043	0.5	0.5	19.37	21.20	14.89	0.21	89.13744	245

Table S24. 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	$\widehat{\rho}_b$	$\widehat{ht_w}$	$\widehat{CL}$	$\widehat{par_1}$	$\widehat{par_2}$	$\widehat{r_{CS}}$	$\widehat{p}$	$\widehat{F}$	$\widehat{\omega_*}$	$\widehat{FC}_{d,100h,max}$	$\widehat{FC}_{d,1000h,max}$
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

References

Best, M. J., Pryor, M., Clark, D. B., Rooney, G. G., Essery, R. L. H., Ménard, C. B., Edwards, J. M., Hendry, M. A., Porson, A., Gedney, N., Mercado, L. M., Sitch, S., Blyth, E., Boucher, O., Cox, P. M., Grimmond, C. S. B., and Harding, R. J.: The Joint UK Land Environment Simulator (JULES), model description – Part 1: Energy and water fluxes, Geoscientific Model Development, 4, 677–699, doi:10.5194/gmd-4-677-2011, http://www.geosci-model-dev.net/4/677/2011/, 2011.

Goff, J. A. and Gratch, S.: Low-pressure properties of water from –160 to 212 ºF, Transactions of the American Society of Heating and Ventilating Engineers, pp. 95–122, 1946.

Keetch, J. J. and Byram, G. M.: A Drought Index for Forest Fire Control, Tech. Rep. USDA For. Serv. Res. Paper SE-38, http://www.treesearch.fs.fed.us/pubs/40, 1968.

Knorr, W., Kaminski, T., Arneth, A., and Weber, U.: Impact of human population density on fire frequency at the global scale, Biogeosciences, 11, 1085–1102, doi:10.5194/bg-11-1085-2014, http://www.biogeosciences.net/11/1085/2014/, 2014.

Melton, J. R. and Arora, V. K.: Competition between plant functional types in the Canadian Terrestrial Ecosystem Model (CTEM) v. 2.0, Geoscientific Model Development, 9, 323–361, doi:10.5194/gmd-9-323-2016, 2015.

Nesterov, V.: Forest fires and methods of fire risk determination, Goslesbumizdat, Moscow, 1949.

Noble, I. R., Gill, A. M., and Bary, G. A. V.: McArthur's fire-danger meters expressed as equations, Australian Journal of Ecology, 5, 201–203, doi:10.1111/j.1442-9993.1980.tb01243.x, http://doi.wiley.com/10.1111/j.1442-9993.1980.tb01243.x, 1980.

Thonicke, K., Spessa, A., Prentice, I. C., Harrison, S. P., Dong, L., and Carmona-Moreno, C.: The influence of vegetation, fire spread and fire behaviour on biomass burning and trace gas emissions: Results from a process-based model, Biogeosciences, 7, 1991–2011, 2010.

van der Werf, G. R., Randerson, J. T., Giglio, L., Collatz, G. J., Mu, M., Kasibhatla, P. S., Morton, D. C., Defries, R. S., Jin, Y., and van Leeuwen, T. T.: Global fire emissions and the contribution of deforestation, savanna, forest, agricultural, and peat fires (1997–2009), Atmospheric Chemistry and Physics, 10, 11 707–11 735, doi:10.5194/acp-10-11707-2010, http://www.atmos-chem-phys.net/10/11707/2010/, 2010.

van Wagner, C. E.: Development and Structure of the Canadian Forest Fire Weather Index System, Tech. Rep. For. Tech. Rep. 35, Ottawa, ON, 1987.

van Wagner, C. E. and Pickett, T. L.: Equations and FORTRAN Program for the Canadian Forest Fire Weather Index System, Tech. Rep. Forestry Technical Report 33, Ottawa, 1985.