

Supplementary figures for EGU22-3628 presentation: “Exploring independent spatial controls on the global distribution of **burnt area**, **fire size** and **fire intensity** through **generalized linear modelling**”.

1) Datasets

Vegetation type and load WFDE5 (Cucchi et al., 2020), ESA CCI Landcover, P-model (Stocker et al., 2020)			Landscape fragmentation GRIP (Meijer et al., 2018), HYDE 3.2 (Klein Goldewijk et al., 2017), (Amatulli et al., 2018)		
	Abbreviation	Transformation		Abbreviation	Transformation
Annual gross primary production (g C m ⁻² a ⁻¹)	GPP	logarithmic	Road Density (km ⁻²)	Roads	square root
Gross primary production seasonality (unitless)	GPP_seasonality	Logarithmic	Fractional cropland cover	Crop	none
Fractional shrubland cover	Shrub	none	Vector Ruggedness Measure	VRM	none
Fractional grassland cover	Grass	none	Topographic Position Index	TPI	none
Fractional tree cover	Tree	none			
Climate WFDE5 (Cucchi et al., 2020)			Ignition sources HYDE 3.2 (Klein Goldewijk et al., 2017), WGLC WLLN (Kaplan et al., 2021)		
	Abbreviation	Transformation		Abbreviation	Transformation
Maximum monthly number of dry days	DD	logarithmic	Population density (km ⁻²)	Popd	square-root
Seasonality of monthly number of dry days (unitless)	DD_seasonality	logarithmic	Mean monthly lightning ground-strikes (km ⁻²)	Light	square-root
Maximum mean monthly vapour pressure deficit (Pa)	VPD	logarithmic			
Maximum mean monthly diurnal temperature range (K)	DTR	logarithmic			
Mean wind speed of the hottest month (m s ⁻¹)	Wind	logarithmic			

Table 1. Table of 16 predictor variables included in the analysis along with their abbreviations and transformations

Fire variables	Data source	Time-frame	Transformation
Monthly mean burnt area (fraction)	GFEDv4 (Randerson et al., 2018)	2010-2015, seasonal climatology, 0.5° grid	none (logit link function)
Monthly median fire size (km ²)	Global Fire Atlas (Andela et al., 2019)	2010-2015, seasonal climatology, 0.5° grid	min-max normalized (log link function)
Monthly median fire intensity (W. km ⁻¹)	MCD14ML (Giglio et al., 2006)	2010-2015, seasonal climatology, 0.5° grid	Median FRP divided by square root of median fire size, min-max normalized (log link function)

Table 2. Table of the fire variables included in the analysis along with their transformations

2) Results

Table 3. Summary statistics with regression coefficients, *t*-values, and variance inflation factors (VIF) for each of the final models. Predictors included were all significant at $t > 4.5$ ($p < 10^{-5}$).

Predictors	Burnt area			Fire size			Fire intensity		
	Coefficient	<i>t</i> -value	VIF	Coefficient	<i>t</i> -value	VIF	Coefficient	<i>t</i> -value	VIF
(intercept)	-48.25	-103.6		-13.09	-25.75		6.43	44.85	
Gross primary production (g C m ⁻² a ⁻¹)	1.76	63.00	4.13	–	–	–	-0.21	-18.47	3.04
Seasonality of gross primary production	0.59	14.78	2.43	0.30	5.18	3.29	–	–	–
Fractional tree cover	-0.93	-18.74	2.92	-0.42	-5.25	2.19	0.19	9.08	2.20
Fractional shrubland cover	1.39	26.35	1.70	0.64	7.61	1.29	–	–	–
Fractional grassland cover	2.93	52.91	1.56	–	–	–	-0.35	-11.91	1.18
Road density (km ⁻²)	-0.05	-37.32	1.44	-0.04	-16.47	1.40	0.00	8.58	1.80
Fractional cropland cover	-0.79	-10.05	2.15	-3.51	-22.42	1.42	–	–	–
Vector Ruggedness Measure	-188.70	-21.39	1.55	-62.28	-5.78	1.50	–	–	–
Topographic Position Index	0.43	18.86	1.33	–	–	–	–	–	–
Maximum monthly number of dry days	4.54	70.23	2.89	1.14	11.16	2.30	-0.31	-14.27	1.95
Seasonality of monthly number of dry days	1.33	59.26	2.57	–	–	–	-0.15	-16.18	1.97
Maximum mean monthly vapour pressure deficit (Pa)	1.35	39.11	1.78	0.31	5.12	3.72	-0.66	-47.55	2.03
Maximum mean monthly diurnal temperature range (K)	0.87	19.82	1.78	1.24	14.46	1.91	–	–	–
Mean wind speed of the hottest month (m s ⁻¹)	-0.20	-6.80	1.93	0.80	14.41	2.20	–	–	–
Mean monthly lightning ground-strikes (km ⁻²)	0.94	12.35	1.66	0.83	5.50	2.06	-0.30	-7.15	2.11
Population density (km ⁻²)	0.02	10.64	1.71	–	–	–	-0.01	-13.49	1.56
<i>R</i> ² (McFadden, 1974)	0.69			0.29			0.27		
Normalized mean error (NME)	0.51			0.86			0.86		

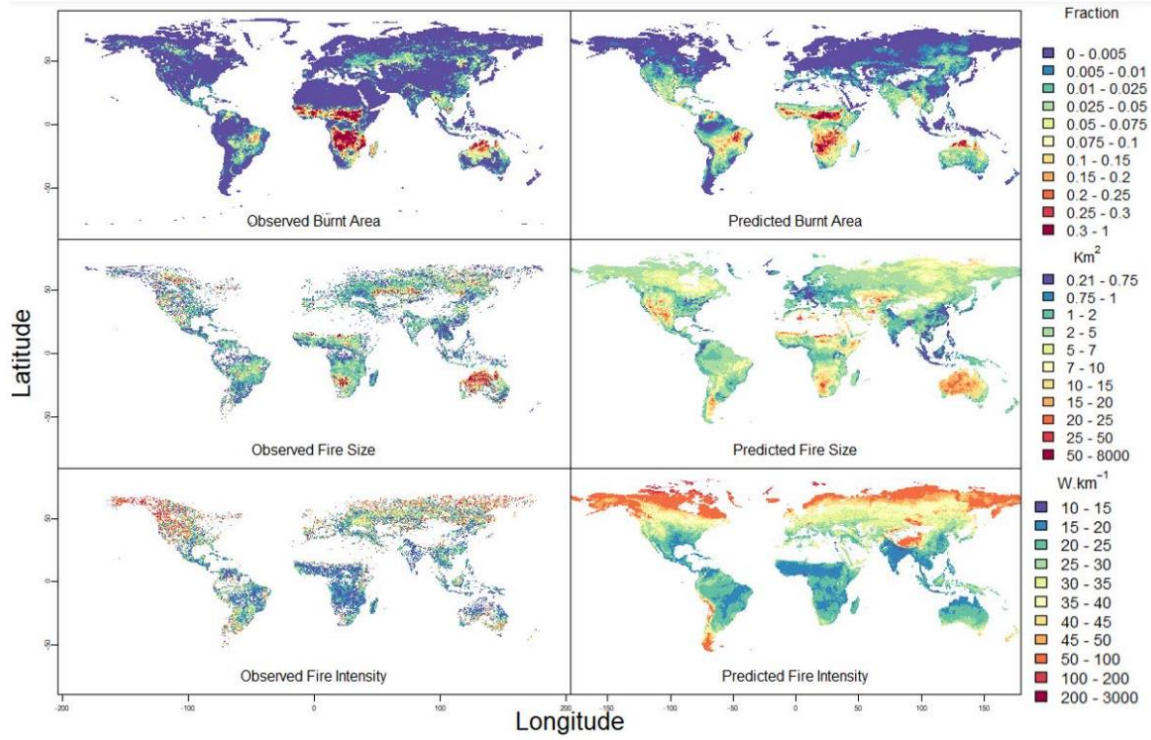


Figure 1. Observed (left) and predicted (right) annual burnt area (fraction), monthly median fire size (km^2) and monthly median fire intensity (W km^{-1}) (Haas et al., 2022).

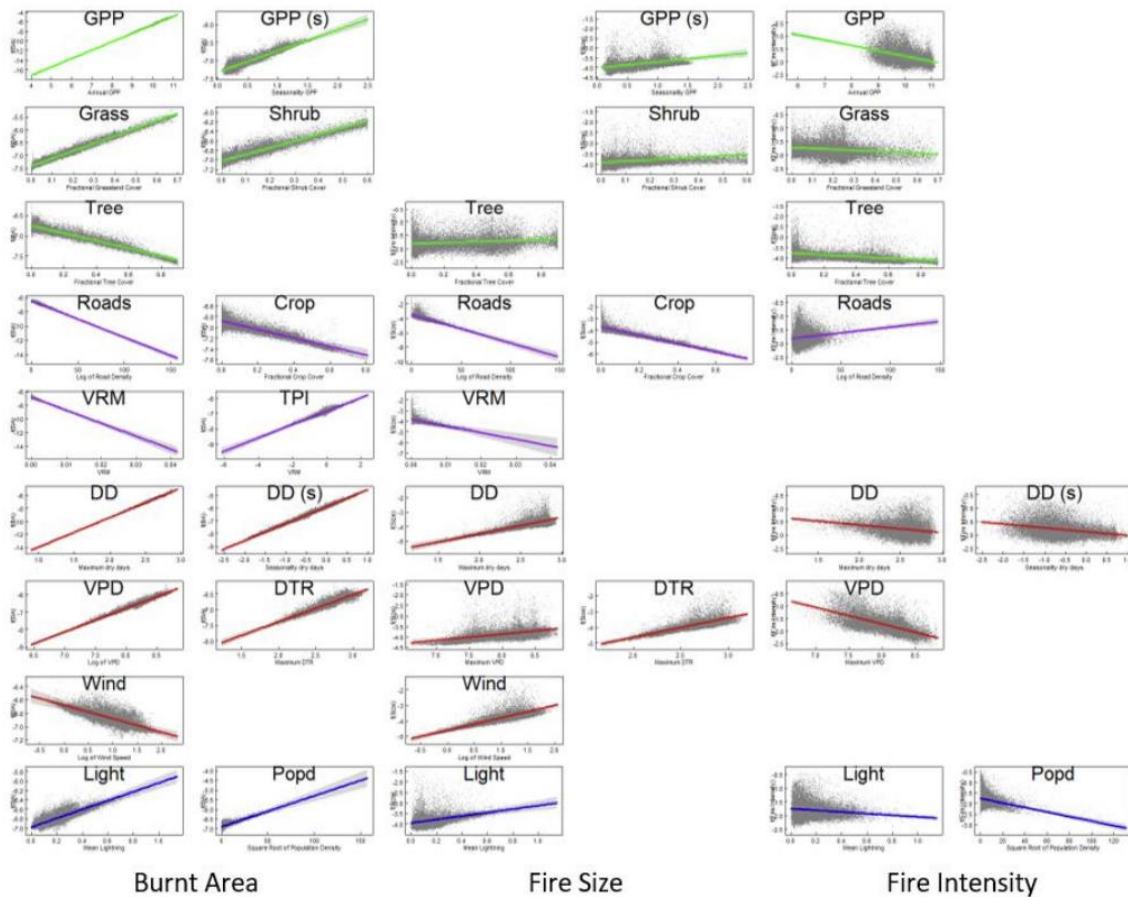


Figure 2. Partial residual plots for burnt area, fire size and fire intensity as functions of (GPP) gross primary production, (GPP (s)) seasonality of GPP, (shrub) shrubland cover, (grass) grassland cover, (tree) tree cover, (roads) road density, (crop) cropland, (VRM) vector ruggedness measure, (TPI) topographic position index, (DD) dry days, (DD (s)) dry days seasonality, (VPD) vapour pressure deficit, (DTR) diurnal temperature range, (wind) wind speed, (popd) population density and (light) lightning ground-strikes . **Green represents vegetation and land cover predictors; purple represents fragmentation predictors; red represents climate predictors; blue represents ignition source predictors** (Haas et al., 2022).