

SUPPLEMENTARY MATERIALS of *Burn severity drivers in Italian large wildfires*

Table S1 - List of Landsat records used in the analysis (complete names of locations are listed in Table S2).

Landsat sensor	WRS-2 Path/Row	Acquisition date (dd/mm/yyyy)	Landsat archive	Study area acronym
OLI	187/33	24/06/2017	USGS	LON17; CAM17; CAN17
OLI	187/33	13/07/2018	USGS	LON17; CAM17; CAN17
OLI	188/32	15/06/2017	USGS	TRE17; EPI17; PAM17, SDT17; MOT17; MOG17; GDP17; TTA17; PAP17; MOM17; MAR17
OLI	188/32	02/06/2018	USGS	TRE17
OLI	188/32	06/09/2018	USGS	EPI17; PAM17, SDT17; MOT17; MOG17; GDP17; TTA17; PAP17; MOM17
TM	188/33	19/07/2006	USGS	MAL07; ACR07; SCO07; ACA07, CLE07; BAD07; SCI07, SCL07; SAA07; LON07; MES07
TM	188/33	22/06/2008	USGS	MAL07; ACR07; SCO07; ACA07, CLE07; BAD07; SCI07, SCL07; SAA07; LON07; MES07
OLI	188/33	15/06/2017	USGS	MLO17; GRI17; LTE17; DR117; DR217; AC217; ROS17; ROV17; DOM17; RCA17; PAL17; AC117; PIP17
OLI	188/33	20/07/2018	USGS	DR117; DR217; AC217; ROS17; ROV17; DOM17; RCA17; PAL17; AC117; PIP17
OLI	188/33	06/09/2018	USGS	MLO17; GRI17; LTE17
TM	188/34	05/09/2006	USGS	CDS07; PAT07; MRE07, SMA07
TM	188/34	06/06/2008	USGS	CDS07; PAT07; MRE07, SMA07
OLI	188/34	15/06/2017	USGS	MES17; CDS17; EN217; CGU17
OLI	188/34	20/07/2018	USGS	MES17; CDS17; EN217; CGU17
TM	189/31	24/06/2006	USGS	SGL07; SDA07
TM	189/31	13/07/2007	USGS	MNF07; CAV07; VIE07; PES07; VAG07
TM	189/31	31/07/2008	USGS	SGL07; SDA07; MNF07; CAV07; VIE07; PES07; VAG07
OLI	189/31	08/07/2017	USGS	SDA17; CAV17; PES17
OLI	189/31	11/07/2018	USGS	SDA17; CAV17; PES17
TM	189/32	27/06/2007	USGS	SAL07; CET07; TEG07; ASC07
TM	189/32	31/07/2008	USGS	SAL07; CET07; TEG07; ASC07
OLI	189/32	22/06/2017	USGS	MSS17, VEQ17; ROR17; SAL17; SGP17; SAT17
OLI	189/32	28/08/2018	USGS	MAR17; MSS17; VEQ17; ROR17; SAL17; SGP17; SAT17
TM	189/34	27/06/2007	USGS	SSC07; COL07; MRL07; SCG07
TM	189/34	29/06/2008	USGS	SSC07; COL07; MRL07; SCG07
OLI	189/34	08/07/2017	USGS	EN117; BIS17; COR17
OLI	189/34	11/07/2018	USGS	EN117; BIS17; COR17
TM	190/31	18/06/2007	USGS	AQU07; NAV07; RMO07; ODM07; SER07

TM	190/31	18/08/2008	USGS	AQU07; NAV07; RMO07; ODM07; SER07
OLI	190/31	13/06/2017	USGS	ANT17; RAI17; SUL17; VNL17, SOR17; MOD17, CAR17; GVE17; FAI17; TDG17
OLI	190/31	02/07/2018	USGS	ANT17; RAI17; SUL17; VNL17, SOR17; MOD17, CAR17; GVE17; FAI17; TDG17
TM	190/34	04/07/2007	USGS	SLM07; CUS07
TM	190/34	20/06/2008	USGS	SLM07; CUS07
OLI	190/34	13/06/2017	USGS	CAR17; SVC17; CGO17; CSE17
OLI	190/34	18/07/2018	USGS	CAR17; SVC17; CGO17; CSE17
TM	191/30	25/06/2007	USGS	ROC07; FAB07
TM	191/30	30/08/2008	USGS	ROC07; FAB07
OLI	191/30	20/06/2017	USGS	URB17
OLI	191/30	09/07/2018	USGS	URB17
OLI	192/30	11/06/2017	USGS	MON17
OLI	192/30	30/06/2018	USGS	MON17
TM	192/32	18/07/2007	USGS	ARZ07
TM	192/32	20/07/2008	USGS	ARZ07
OLI	192/32	27/06/2017	USGS	VIS17
OLI	192/32	30/06/2018	USGS	VIS17
TM	192/33	18/07/2007	USGS	VSA07
TM	192/33	04/07/2008	USGS	VSA07
TM	193/32	23/06/2007	USGS	NUO07; ARB07; PLO07
TM	193/32	25/06/2008	USGS	NUO07; ARB07; PLO07
OLI	193/32	04/07/2017	USGS	ADS17; BUD17
OLI	193/32	07/07/2018	USGS	ADS17; BUD17
TM	193/33	09/07/2007	USGS	PSC07; IGL07; SAN07; TEU07
TM	193/33	12/08/2008	USGS	PSC07; IGL07; SAN07; TEU07
OLI	193/33	04/07/2017	USGS	ARB17
OLI	193/33	07/07/2018	USGS	ARB17
TM	194/29	16/07/2007	USGS	VAR07
TM	194/29	19/08/2008	USGS	VAR07
OLI	194/29	25/08/2016	USGS	MOC17
OLI	194/29	30/07/2018	USGS	MOC17

Table S2 - List of locations and main features of wildfires selected for the analysis. Geographic coordinates (WGS84) of fire centroids are expressed in decimal degrees. The name assigned to each fire event refers to the municipality where wildfire mostly occurred.

ID	Location	Acronym	Year	Region	x WGS84	y WGS84	Area ha	Perimeter km
1	Moconesi	MOC17	2017	Liguria	9.21	44.44	235.6	24.8
2	Varazze	VAR07	2007	Liguria	8.60	44.39	873.4	26.4
3	Montale	MON17	2017	Toscana	11.02	43.95	330.6	20.4
4	Urbino	URB17	2017	Marche	12.72	43.71	172.3	11.1
5	Fabriano	FAB07	2007	Marche	12.86	43.32	533.9	41.3
6	Roccafluvione	ROC07	2007	Marche	13.42	42.82	3,110.8	94.9
7	Antrodoco	ANT17	2017	Lazio	13.10	42.43	1,149.1	34.6
8	L'Aquila	AQU07	2007	Abruzzo	13.40	42.38	356.7	24.0
9	Navelli	NAV07	2007	Abruzzo	13.75	42.22	7,349.3	217.2
10	Roccamorice	RMO07	2007	Abruzzo	14.07	42.20	2,260.7	82.7
11	Sulmona	SUL17	2017	Abruzzo	13.96	42.09	2,775.3	84.2
12	Raiano	RAI17	2017	Abruzzo	13.81	42.08	310.1	21.8
13	Ortona Dei Marzi	ODM07	2007	Abruzzo	13.72	41.99	461.7	33.4
14	Peschici	PES07	2007	Apulia	16.04	41.94	781.9	29.8
15	Peschici	PES17	2017	Apulia	16.05	41.90	257.2	20.3
16	San Giovanni Lipioni	SGL07	2007	Abruzzo	14.59	41.85	140.9	15.4
17	Vieste	VIE07	2007	Apulia	16.17	41.84	710.2	46.3
18	Cagnano Varano	CAV17	2017	Apulia	15.72	41.82	529.6	24.3
19	Cagnano Varano	CAV07	2007	Apulia	15.72	41.82	1,006.4	45.2
20	Vico nel Lazio	VNL17	2017	Lazio	13.36	41.80	397.9	24.2
21	Schiavi d'Abruzzo	SDA07	2007	Abruzzo	14.53	41.80	572.2	28.0
22	Schiavi d'Abruzzo	SDA17	2017	Abruzzo	14.51	41.79	352.9	24.8
23	Montorio nei Frentani	MNF07	2007	Molise	14.91	41.75	506.7	22.0
24	Sora	SOR17	2017	Lazio	13.59	41.73	212.2	21.5
25	Sermoneta	SER07	2007	Lazio	13.01	41.54	311.7	24.0
26	Valle Agricola	VAG07	2007	Campania	14.27	41.44	490.9	46.0
27	Faicchio	FAI17	2017	Campania	14.48	41.29	266.4	18.5
28	Carinola	CAR17	2017	Campania	13.95	41.21	241.8	16.9
29	Giano Vetusto	GVE17	2017	Campania	14.22	41.19	494.6	35.7
30	Mondragone	MOD17	2017	Campania	13.91	41.15	435.1	28.4
31	Roccarainola	ROR17	2017	Campania	14.50	40.99	399.4	22.8
32	Ploaghe	PLO07	2007	Sardinia	8.77	40.72	327.9	36.1
33	Budoni	BUD17	2017	Sardinia	9.68	40.74	374.5	17.1
34	Alà dei Sardi	ADS17	2017	Sardinia	9.38	40.70	1,965.2	69.0
35	Torre del Greco	TDG17	2017	Campania	14.42	40.82	3,168.4	101.6
36	Gravina di Puglia	GDP17	2017	Apulia	16.40	40.75	1,708.6	47.8
37	Mercato San Severino	MSS17	2017	Campania	14.71	40.75	410.9	26.8
38	Salerno	SAL17	2017	Campania	14.80	40.72	174.6	17.2
39	Salerno	SAL07	2007	Campania	14.81	40.71	480.9	41.4
40	Cetara	CET07	2007	Campania	14.68	40.67	365.8	25.1
41	Vico Equense	VEQ17	2017	Campania	14.48	40.65	593.5	45.4
42	Nuoro	NUO07	2007	Sardinia	9.26	40.35	7,473.5	187.4

43	Teggiano	TEG07	2007	Campania	15.51	40.37	1,429.7	46.1
44	Salento	SAT17	2017	Campania	15.17	40.24	146.6	14.8
45	Ascea	ASC07	2007	Campania	15.20	40.17	510.4	39.4
46	Episcopia	EPI17	2017	Basilicata	16.11	40.10	291.5	19.3
47	San Giovanni a Piro	SGP17	2017	Campania	15.49	40.08	206.7	21.6
48	Villagrande Strisaili	VIS17	2017	Sardinia	9.58	39.94	838.8	45.3
49	Arzana	ARZ07	2007	Sardinia	9.56	39.93	1,131.0	34.5
50	Maratea	MAR17	2017	Basilicata	15.69	40.02	209.8	10.0
51	Tortora	TTA17	2017	Calabria	15.78	39.95	498.3	32.1
52	Arbus	ARB07	2007	Sardinia	8.46	39.72	220.4	13.6
53	Praia a Mare	PAM17	2017	Calabria	15.81	39.90	504.4	45.2
54	Papasidero	PAP17	2017	Calabria	15.92	39.89	260.2	11.8
55	Trebisacce	TRE17	2017	Calabria	16.50	39.88	270.6	17.7
56	Mormanno	MOM17	2017	Calabria	15.97	39.88	250.3	11.3
57	Santa Domenica Talao	SDT17	2017	Calabria	15.85	39.84	997.0	56.8
58	Arbus	ARB17	2017	Sardinia	8.52	39.50	2,133.0	111.5
59	Mottafollone	MOT17	2017	Calabria	16.09	39.66	470.3	29.7
60	Villasalto	VSA07	2007	Sardinia	9.41	39.48	703.4	26.8
61	Malvito	MAL07	2007	Calabria	16.04	39.60	260.0	19.3
62	Paludi	PAL17	2017	Calabria	16.71	39.56	243.4	21.1
63	Acri 1	AC117	2017	Calabria	16.36	39.54	248.8	19.3
64	Mongrassano	MOG17	2017	Calabria	16.11	39.54	451.1	23.9
65	Pietrapaola	PIP17	2017	Calabria	16.81	39.47	279.5	23.1
66	Acri	ACR07	2007	Calabria	16.41	39.48	865.5	53.6
67	Longobucco	LON17	2017	Calabria	16.57	39.46	2,815.2	107.7
68	Scala Coeli	SCO07	2007	Calabria	16.93	39.46	187.3	14.4
69	Acri 2	AC217	2017	Calabria	16.37	39.46	165.3	11.9
70	Longobucco	LON07	2007	Calabria	16.63	39.43	365.9	22.8
71	Iglesias	IGL07	2007	Sardinia	8.58	39.24	208.9	11.6
72	Rose	ROS17	2017	Calabria	16.36	39.39	1,946.5	82.9
73	Portoscuso	PSC07	2007	Sardinia	8.42	39.21	484.5	35.2
74	Rovito	ROV17	2017	Calabria	16.30	39.30	209.7	13.4
75	Santadi	SAN07	2007	Sardinia	8.74	39.11	296.6	16.2
76	Domanico	DOM17	2017	Calabria	16.19	39.21	186.7	17.2
77	Teulada	TEU07	2007	Sardinia	8.67	38.94	295.0	19.1
78	Grimaldi	GRI17	2017	Calabria	16.23	39.11	407.0	31.8
79	Aiello Calabro	ACA07	2007	Calabria	16.23	39.10	1,610.2	66.0
80	Cleto	CLE07	2007	Calabria	16.17	39.08	353.8	28.6
81	Martirano Lombardo	MLO17	2017	Calabria	16.20	39.07	287.8	16.2
82	Lamezia Terme	LTE17	2017	Calabria	16.23	38.99	244.3	12.5
83	Drapia 1	DR117	2017	Calabria	15.91	38.67	250.2	19.7
84	Drapia 2	DR217	2017	Calabria	15.93	38.64	411.3	33.3
85	Badolato	BAD07	2007	Calabria	16.49	38.56	121.5	10.1
86	Santa Caterina dello Ionio	SCI07	2007	Calabria	16.50	38.53	451.4	28.7
87	Camini	CAM17	2017	Calabria	16.47	38.43	107.8	8.4
88	Canolo	CAN17	2017	Calabria	16.18	38.34	411.8	26.6
89	Messina	MES07	2007	Sicily	15.54	38.25	1,318.0	77.6

90	Scilla	SCL07	2007	Calabria	15.78	38.24	829.0	52.1
91	Messina	MES17	2017	Sicily	15.54	38.24	641.4	32.6
92	Sant' Alessio in Aspromonte	SAA07	2007	Calabria	15.77	38.18	347.5	33.8
93	San Vito Lo Capo	SVC17	2017	Sicilia	12.77	38.10	3,742.4	70.0
94	Carini	CAR17	2017	Sicilia	13.21	38.11	583.9	31.8
95	Reggio Calabria	RCA17	2017	Calabria	15.74	38.11	309.1	20.0
96	Patti	PAT07	2007	Sicily	15.04	38.11	1,666.0	94.8
97	Montagnareale	MRE07	2007	Sicily	14.93	38.10	1,303.0	104.0
98	Monreale	MRL07	2007	Sicily	13.21	38.08	2,794.6	147.8
99	Custonaci	CUS07	2007	Sicily	12.76	38.06	1,116.5	43.3
100	San Marco d'Alunzio	SMA07	2007	Sicily	14.71	38.06	1,511.4	71.6
101	Castellammare del Golfo	CGO17	2017	Sicily	12.86	38.02	651.4	26.6
102	Santo Stefano di Camastra	SSC07	2007	Sicily	14.37	37.99	1,921.7	83.3
103	Santa Cristina Gela	SCGR07	2007	Sicily	13.38	37.96	301.3	20.8
104	Collesano	COL07	2007	Sicily	13.96	37.96	5,087.4	157.1
105	Calatafini-Segesta	CSE17	2017	Sicily	12.88	37.94	138.2	11.2
106	Salemi	SLM07	2007	Sicily	12.79	37.86	402.5	29.8
107	Castiglione di Sicilia	CDS07	2007	Sicily	15.05	37.85	554.9	25.8
108	Corleone	COR17	2017	Sicily	13.36	37.84	686.0	28.9
109	Castiglione di Sicilia	CDS17	2017	Sicily	15.05	37.85	288.9	15.6
110	Bisacquino	BIS17	2017	Sicily	13.28	37.72	953.4	36.2
111	Enna 1	EN117	2017	Sicily	14.32	37.45	654.8	31.0
112	Enna 2	EN217	2017	Sicily	14.39	37.44	3,610.4	106.9
113	Chiaramonte Gulfi	CGU17	2017	Sicily	14.70	37.02	840.5	77.1

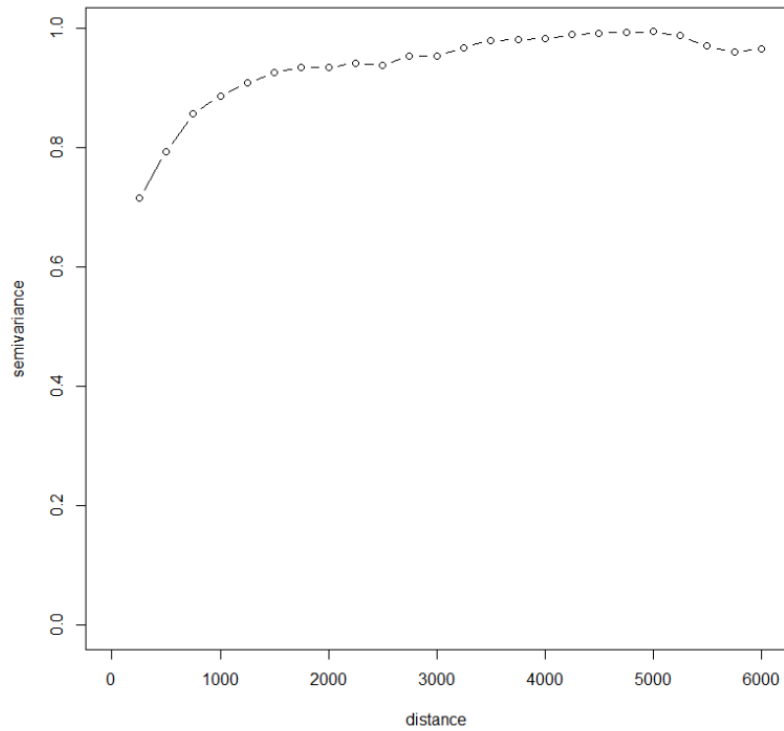


Figure S1 - Semivariogram of the random forest model residuals. The semivariance was divided by the sample variance.

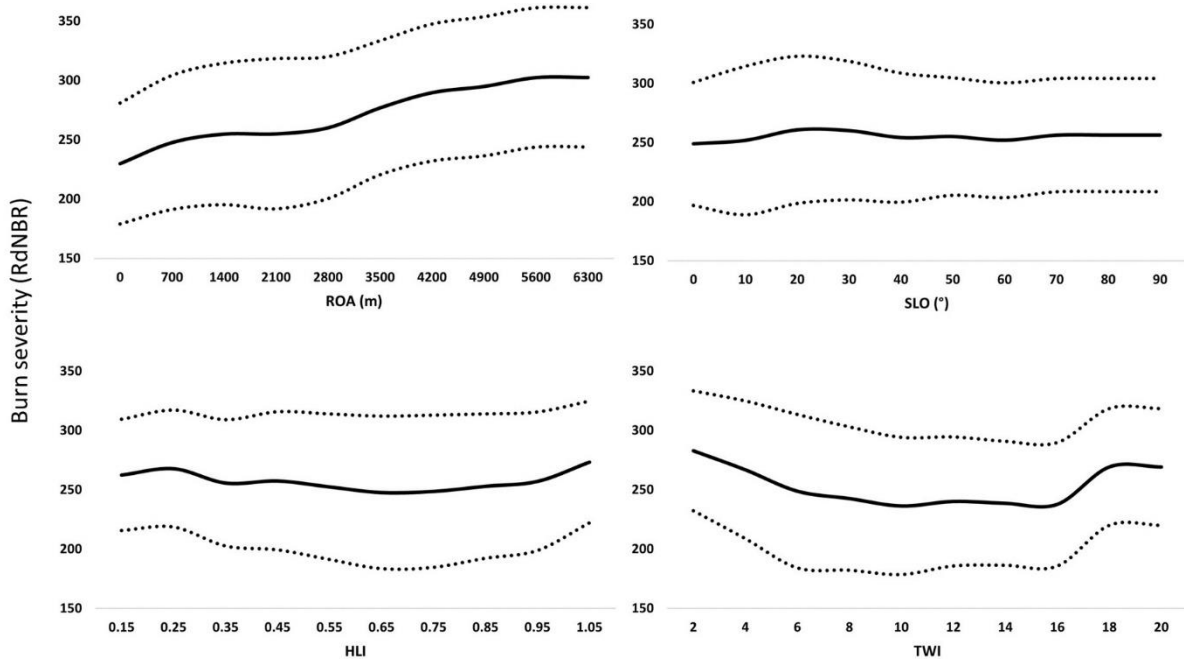


Figure S2 – Partial dependence plots showing relative influences of the four predictors with lower important rate of burn severity across the respective input data ranges. Solid lines indicate the average over individual marginal effects of each selected explanatory variable (ROA = distance to roads; SLO = slope; HLI = Heat Load Index ; TWI = Topographic wetness index) whereas dotted lines are the standard deviations of individual marginal effects (± 1 SD).