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Supplementary material

Assessing the effect of a fuel break network to reduce burnt area and wildfire risk transmission

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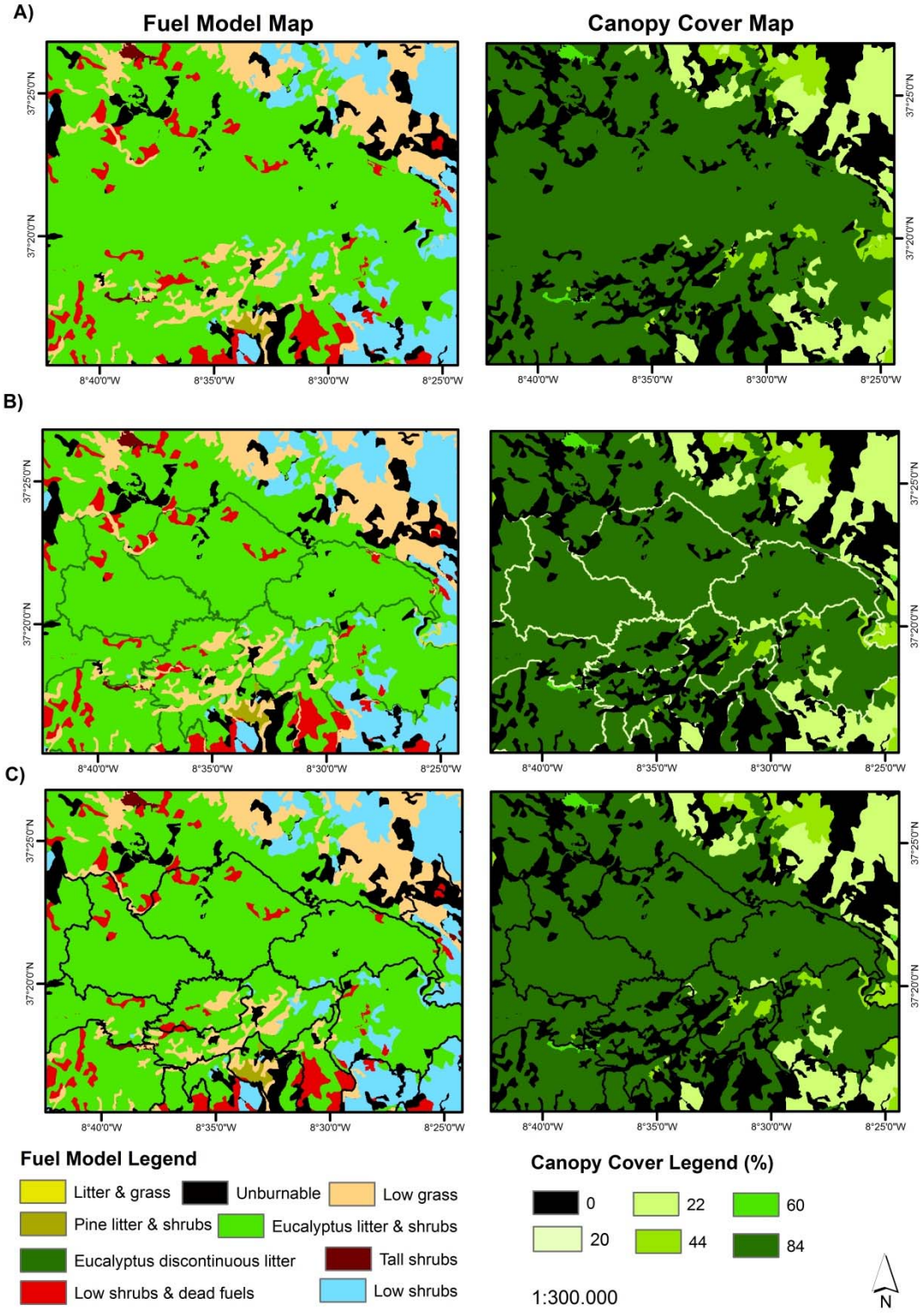

Fig. S1. Fuel model and canopy cover maps for three treatment scenarios: A) non-treated landscape, B) shaded fuel break network and C) full reduction fuel break network. All maps represented at same scale and location.

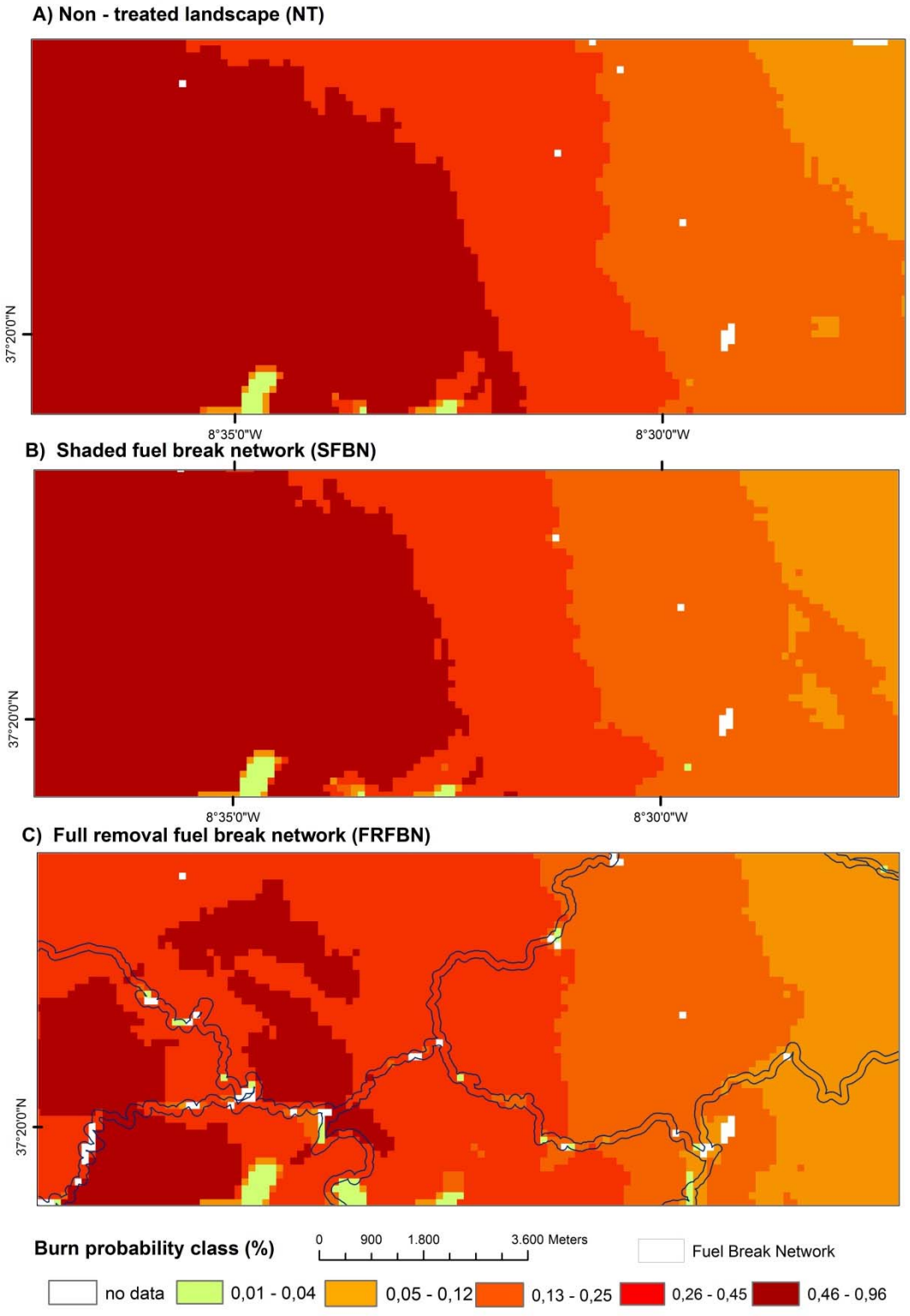

Fig. S2. Pixel-scale difference of burn probability maps for three treatment scenarios between A) non-treated landscape, B) shaded fuel break network and C) full reduction fuel break network. All maps represented at 120-m pixel size for same scale and location.

Table S1. Land cover and fuel models in the region

Corine land cover level 3 nomenclature (EEA, 2012) and common designations, and fuel model and canopy cover percentage for the reference non-treated and shaded fuel break network (SFBN) scenarios. In the full removal fuel break network (FRFBN) scenario, fuel model and canopy cover are set to zero. Custom fuel models are described in Table S2

Corine land cover level 3 nomenclature	Common designation for land cover	Non-treated landscape		SFBN	
		Fuel model type	Canopy cover (%)	Fuel model type	Canopy cover (%)
111 to 142	Artificial surfaces	99	0	0	0
212 and 213	Irrigated agricultural and rice fields	99	0	0	0
211, 242 and 243	Annual crops, arable land and natural pastures	232	0	232	0
221, 222 and 223	Vineyards, fruit trees and olive groves	232	0	232	0
231	Permanent pastures	232	0	232	0
244	Agro-forestry systems	232	22	232	22
313	Helm oak and cork oak forests	237	22	232	22
311	Cork oak forests	237	22	232	22
311	Other broad-leaved forests	237	44	226	20
312	Other coniferous forests	227	84	226	20
312	Maritime pine forests	237	44	226	0
312	Stone pine forests	236	60	226	0
311	Eucalyptus forest	223	84	224	20
313	Mixed forest stands (Helm oak X Eucalyptus)	237	44	226	20

313	Mixed forest stands (Cork oak X Eucalyptus)	237	44	226	20
313	Mixed forest stands (Eucalyptus X Stone pine)	223	84	226	20
313	Mixed forest stands (Eucalyptus X Cork oak)	223	84	226	20
313	Mixed forest stands (Maritime pine X Eucalyptus)	237	44	226	20
313	Mixed forest stands (Maritime Pine X Stone pine)	237	44	226	20
313	Mixed forest stands (Stone pine X Cork oak)	237	44	226	20
323 & 324	Sclerophyllous vegetation	234	0	232	0
321 & 333	Natural grasslands and sparsely vegetated	232	0	232	0
331, 332 & 334	Spaces with little or no vegetation and burnt areas	99	0	99	0

Table S2. Description of fuel models used in the study

Fuel models describe fuel bed characteristics quantitatively as inputs to fire behaviour models and their applications. In this study we assigned a custom fuel model to each land cover type from the fuel model collection develop for Portugal by Fernandes *et al.* (2009) plus the model for eucalypt slash of Cruz (2005)

Fuel model code	Fuel model no.	Land cover types	Fuel model description
No burn	99	Unburnable	Bare soil, rocks or paved
M-EUC	223	Eucalyptus plantations	Eucalypt litter and woody understorey
M-EUCd	224	Eucalyptus plantations	Discontinuous eucalypt litter
M-H	226	Forest types with a grassy understorey	Litter and grass
M-PIN	227	Pine forest	Pine litter and woody understorey
V-Hb	232	Non-irrigated agriculture, agroforestry	Low grass (<0.5 m)
V-MAb	234	Shrubland	Low shrubs (<1m), dead fuels are important
V-MMa	236	Shrubland, pine forest	Tall shrubs (>1 m)
V-MMb	237	Shrubland, oak woodland	Low shrubs (<1 m), dead fuels are unimportant

Table S3. Fire response summary statistics

Fire frequency, basal area (BA) and fire size statistics (mean, median, coefficient of variation (CV) and quantiles) for the shaded fuel break network (SFBN) and full removal fuel break network (FRFBN) treatments and the non-treated reference situation (NT) for each fire size class

					Fire size (ha)						
Fire size class (ha)	Treatments	# fires	BA (Mha)	Change in BA (%)	Median	CV	Mean	Q.90	Q.95	Q.97.5	Q.99
<100	NT	89 255	1.1		8	112.8	12	12	24	69	86
	SFBN	89 813	1.1	–2.9	8	115.2	12	12	33	72	87
	FRFNB	90 894	1.1	–1.5	8	114.2	12	12	28	67	87
100–499	NT	24 820	7.4		298	39.2	300	463	482	492	496
	SFBN	26 621	8.0	–7.8	300	39.1	301	463	482	491	496
	FRFNB	27 517	8.3	–11.7	305	38.7	302	462	480	491	496
500–999	NT	21 060	14.9		686	21.6	710	937	967	983	993
	SFBN	20 246	14.3	4.1	691	20.8	708	927	961	980	993
	FRFNB	19 665	13.8	7.4	685	20.6	704	920	956	977	992
1000–9999	NT	14 590	32.9		1483	88.3	2252	5132	7695	8862	9492
	SFBN	13 235	30.1	8.3	1474	85.5	2276	5543	7310	8368	9132
	FRFNB	11 950	25.8	21.5	1463	80.2	2159	4917	6563	7517	8641
>10 000	NT	274	3.1		10 894	9.3	11 181	12 582	12 985	13 856	14 502
	SFBN	121	1.3	57.7	10 617	5.3	10 701	11 379	11 645	12 032	12 840
	FRFNB	24	0.3	91.6	10 435	8.4	10 731	11 846	13 583	14 088	14 088

Table S4. Expected area burned in non-treated landscape from origin X and destination Y (values expressed in hectares)

Albufeira (ALB), Alcoutim (ALC), Aljezur (ALJ), Almodôvar (ALM), Castro Marim (CAS), Faro (FAR), Lagoa (LAO), Lagos (LAG), Loulé (LOU), Mértola (MER),Monchique (MON), Odemira (ODE), Olhão (OLH), Ourique (OUR), Portimão (POR), São Brás de Alportel (SBA), Silves (SIL), Tavira (TAV), Vila do Bispo (VBP), and Vila Real de Santo António (VRS)

	ALB	ALC	ALJ	ALM	CAS	FAR	LAO	LAG	LOU	MER	MON	ODM	OLH	OUR	POR	SBA	SIL	TAV	VBP	VRS
ALB									4											
ALC					7				3	10								40		
ALJ								19			192				5				5	
ALM									12					2			4			
CAS		5																19		15
FAR									5											
LAO																				
LAG			6								2				3				2	
LOU	1			3		3										6	2	1		
MER		24		3																
MON			161					19				161			92		25			
ODE			4								369			1			5			
OLH						9										1		2		
OUR				8								14					14			
POR			9					13			93						13			
SBA									30				1					52		

SIL				1					2		41	5			5				
TAV		6			3				2				1			14			1
VBP			4					2											
VRS					24												27		

Table S5. Expected area burned in Shaded fuel break network (SFBN) from origin X and destination Y (values expressed in hectares)

Albufeira (ALB), Alcoutim (ALC), Aljezur (ALJ), Almodôvar (ALM), Castro Marim (CAS), Faro (FAR), Lagoa (LAO), Lagos (LAG), Loulé (LOU), Mértola (MER),Monchique (MON), Odemira (ODE), Olhão (OLH), Ourique (OUR), Portimão (POR), São Brás de Alportel (SBA), Silves (SIL), Tavira (TAV), Vila do Bispo (VBP), and Vila Real de Santo António (VRS)

	ALB	ALC	ALJ	ALM	CAS	FAR	LAO	LAG	LOU	MER	MON	ODM	OLH	OUR	POR	SBA	SIL	TAV	VBP	VRS
ALB									6											
ALC				1	7				2	10								36		
ALJ								20			176	1			3				4	
ALM									10					2			4			
CAS		6																20		16
FAR									6				2							
LAO											2				2					
LAG			6																	
LOU	1			2		3										5	2	1		
MER		25		3																
MON			131					16				144			84		22			
ODE			5								285			1			5			
OLH						8										1		1		
OUR				7								13					6			
POR			4					10			74						11			
SBA									22									45		

SIL									2		34	3			3					
TAV		5			3				2				1			12				1
VBP			2					1												
VRS					21													29		

Table S6. Expected area burned in full reduction fuel break network (FRFBN) from origin X and destination Y (values expressed in hectares)

Albufeira (ALB), Alcoutim (ALC), Aljezur (ALJ), Almodôvar (ALM), Castro Marim (CAS), Faro (FAR), Lagoa (LAO), Lagos (LAG), Loulé (LOU), Mértola (MER),Monchique (MON), Odemira (ODE), Olhão (OLH), Ourique (OUR), Portimão (POR), São Brás de Alportel (SBA), Silves (SIL), Tavira (TAV), Vila do Bispo (VBP), and Vila Real de Santo António (VRS)

	ALB	ALC	ALJ	ALM	CAS	FAR	LAO	LAG	LOU	MER	MON	ODM	OLH	OUR	POR	SBA	SIL	TAV	VBP	VRS
ALB									5											
ALC				1	6				3	10								32		
ALJ								11			131								5	
ALM									9					2			1			
CAS		5																17		13
FAR									5											
LAO																				
LAG			4								2				2				1	
LOU	1			2		3										4	1	1		
MER		22		3																
MON			89					13				120			62		16			
ODE			1								249			1			3			
OLH						9										1		1		
OUR				8								9					5			
POR			2					9			56						10			
SBA									21				1					47		

SIL									1		23	3			3				
TAV		5			3				1				1			11			
VBP			2					1											
VRS					19													24	