Table S1 Climatic characteristics (mean±SD) of the studied regions (annual and during the fire season): maximum temperature (TMAX), precipitation (PP), potential evapotranspiration (PET), actual evapotranspiration (AET), aridity index (AI). Regions are sorted by the mean annual Aridity Index.

		Annual					**Fire season (June - September)**				
Region label	**Region code**	**TMAX (ºC)**	**PP (mm)**	**PET (mm)**	**AET (mm)**	**AI**	**TMAX (ºC)**	**PP (mm)**	**AET (mm)**	**PET (mm)**	**AI**
Galicia	1	18.1 ± 0.6	1392 ± 285	680 ± 19	534 ± 28	0.21 ± 0.05	24.1 ± 0.8	220 ± 15	247 ± 24	376 ± 13	0.34 ± 0.08
Cantabria	2	17.7 ± 0.6	1222 ± 158	709 ± 20	511 ± 28	0.28 ± 0.05	23.0 ± 0.8	240 ± 18	212 ± 27	386 ± 14	0.45 ± 0.09
Northern Ebro	3	18.0 ± 0.9	912 ± 149	784 ± 23	520 ± 46	0.34 ± 0.07	26.8 ± 1.3	288 ± 20	236 ± 37	444 ± 17	0.47 ± 0.10
Catalonia	4	19.6 ± 0.9	726 ± 145	801 ± 24	528 ± 49	0.34 ± 0.08	27.1 ± 1.2	243 ± 18	229 ± 38	446 ± 17	0.48 ± 0.10
Duero	5	17.4 ± 0.6	755 ± 134	775 ± 22	471 ± 40	0.39 ± 0.06	26.5 ± 1.0	140 ± 10	182 ± 33	454 ± 16	0.60 ± 0.08
Southern Ebro	6	18.9 ± 0.6	546 ± 92	757 ± 21	435 ± 54	0.42 ± 0.08	27.8 ± 1.1	161 ± 12	176 ± 39	434 ± 15	0.59 ± 0.10
Tajo	7	20.4 ± 0.7	649 ± 138	964 ± 25	471 ± 53	0.51 ± 0.06	30.3 ± 1.1	105 ± 9	137 ± 34	560 ± 18	0.76 ± 0.07
Júcar	8	21.7 ± 0.6	509 ± 106	958 ± 26	422 ± 71	0.56 ± 0.08	29.3 ± 0.8	116 ± 11	126 ± 39	538 ± 17	0.77 ± 0.09
Guadiana	9	22.2 ± 0.7	573 ± 146	1037 ± 27	443 ± 66	0.57 ± 0.07	31.7 ± 1.0	66 ± 7	88 ± 34	594 ± 19	0.85 ± 0.07
Guadalquivir	10	22.3 ± 0.7	618 ± 157	1006 ± 29	429 ± 62	0.57 ± 0.07	31.7 ± 1.0	67 ± 8	90 ± 34	573 ± 18	0.84 ± 0.07
Baleares	11	21.4 ± 0.6	561 ± 138	963 ± 27	406 ± 78	0.58 ± 0.09	28.5 ± 1.0	105 ± 12	112 ± 44	534 ± 18	0.79 ± 0.09
Gibraltar	12	22.0 ± 0.6	847 ± 237	1292 ± 33	507 ± 72	0.61 ± 0.06	29.2 ± 0.9	53 ± 8	64 ± 32	680 ± 22	0.91 ± 0.06
Segura	13	22.5 ± 0.6	329 ± 88	1013 ± 26	299 ± 68	0.70 ± 0.07	30.1 ± 0.8	56 ± 8	58 ± 27	553 ± 16	0.90 ± 0.06

Table S2 Fire statistics for each of the studied regions: annual area burnt (%, in relation to the total wildland area); fire season area burnt (%, in relation to total annual area burnt) for all fires and for lighting-caused fires; estimated variance of monthly area burnt (fire season only) explained by years and by months within each year (computed by mixed models using restricted maximum likelihood estimation). Regions are sorted by the mean annual Aridity Index. For names of regions see Table S1.

		Fire season area burnt (%)		Variance of monthly area burnt	
Region	**Average annual area burnt (%)**	**All fires**	**Lightning -caused**	**Years**	**Months**
1	2.10	69	85	0.16	0.48
2	1.27	27	80	0.32	0.47
3	0.16	60	91	0.20	0.71
4	0.86	72	94	0.21	0.63
5	0.63	67	97	0.15	0.56
6	0.14	65	95	0.21	0.62
7	0.37	88	97	0.15	0.64
8	0.99	73	92	0.18	0.57
9	0.34	93	80	0.08	0.44
10	0.36	92	96	<0.01	0.65
11	0.49	75	62	0.17	0.48
12	0.77	85	51	0.07	0.47
13	0.24	83	62	0.12	0.64

Table S3 Between and within region variability in temperature and precipitation at annual and fire season scales. Except for annual maximum temperature, variability between regions was higher than variability within regions. For each region, number of weather stations ranged from 0.04 to 0.24 per 1000 ha. Variance components were computed by mixed models using restricted maximum likelihood estimation.

	Fire season	**Annual**
Maximum temperature		
Between	7.26	3.86
Within	5.16	4.25
Mean temperature		
Between	5.38	3.99
Within	3.89	3.62
Precipitation		
Between	0.06	0.03
Within	0.02	0.02

Table S4 Result of the Pearson's Chi-square tests for homogeneity comparing the relative area of different forest potential productivity classes (FPP) and vegetation types among the 13 regions studied. The significant association suggests that there are more differences in both FPP and vegetation between than within regions.

	χ^2	df	P
FPP classes*	27378	72	<0.0001
Vegetation types†	9235	48	<0.0001

* Seven FPP classes following Sánchez & Sánchez (2000): from non-limiting (class I) to not supporting the growth of productive forest (class VII).

† Woodland, shrubland, grassland, transitional areas (including both agro-forestry and transitional woodland-scrub areas) and sparsely vegetated areas.

Table S5 Moran's Spatial Autocorrelation Index (and P-values) for the variables studied.

	Moran's I	**P**
Annual aridity index	0.14	<0.001
Fire season aridity index	0.16	<0.001
Annual actual evapotranspiration	0.01	0.098
Forest potential productivity	0.04	0.026
Wildland area	-0.01	0.185
Woodland area	0.15	<0.001
Landscape fragmentation	0.08	0.006
Aridity threshold	0.12	<0.001
Frequency of flammable months	0.11	<0.001
Standardized area burnt	0.10	0.002

Table S6 Moran's Spatial Autocorrelation Index (and P-values) of the residual of the linear regressions relating indicators of fuel load/structure to the mean Annual Aridity Index, the Aridity Threshold (i.e., the switch to high flammability) and the Standardized Area Burnt (for months drier than the threshold; log-transformed) (see Table 1 in the main text). For the latter, linear mixed models were conducted. Fuel indicators: annual actual evapotransipiration (AET, mm), forest potential productivity index (FPP; log-transformed), proportion of total area occupied by wildland, proportion of wildland area covered by woodlands (tree canopy cover ≥ 30%), landscape fragmentation (estimated as the mean distance between wildland patches).

	Aridity Index		**Aridity Threshold**		**Anomaly in Area Burnt**	
	Moran's I	**P**	**Moran's I**	**P**	**Moran's I**	**P**
AET	-0.08	0.899	0.03	0.046	0.12	<0.001
FPP	<0.01	0.133	0.11	<0.001	0.06	0.019
Wildland area	-0.09	0.891	0.07	0.009	0.02	0.054
Woodland area	0.06	0.005	<-0.01	0.150	0.12	0.001
Wildland + Woodland	-0.11	0.646	-0.16	0.199	0.03	0.052
Fragmentation	-0.03	0.306	0.01	0.117	0.10	0.001

Table S7 Results of the mixed models comparing the fire-climate relationships along the aridity gradient (i.e., mean annual Aridity Index). The response variables tested were the frequency of flammable conditions (i.e., months drier than the aridity threshold) and the standardised anomaly in area burnt (for both months drier and wetter than the threshold). The Akaike information criterion (AIC), Bayesian information criterion (BIC) and log-likelihood criterion (logLik) of both the null models (including years as a random factor only) and the alternative models (adding the Aridity Index as a fixed factor) are shown. Results of the likelihood ratio test used to evaluate the significance of the contribution of the spatial aridity gradient on the variability of each fire-climate variable are also included. For the alternative models, the estimated coefficient of the explanatory variable (SE in brackets) and the Moran's Spatial Autocorrelation Index of the residual (P-values in brackets) are also shown.

	AIC	BIC	logLik	Likelihood ratio test			Estimated Coefficient (SE)	Moran's I (P)
				χ^2	df	P		
Frequency of flammable conditions								
Null	2498.7	2510	-1247.3					
+ Aridity Index	2407.1	2424	-1200.6	93.58	1	<0.001	3.51 (0.37)	-0.02 (0.233)
Standardised anomaly in area burnt (dry months)								
Null	-45.887	-32.507	25.943					
+ Aridity Index	-64.449	-46.609	36.224	20.56	1	<0.001	-0.33 (0.07)	-0.04 (0.450)
Standardised anomaly in area burnt (wet months)								
Null	-612.28	-596.46	309.14					
+ Aridity Index	-610.42	-589.32	309.21	0.14	1	0.711	-0.01 (0.04)	-0.17 (0.113)

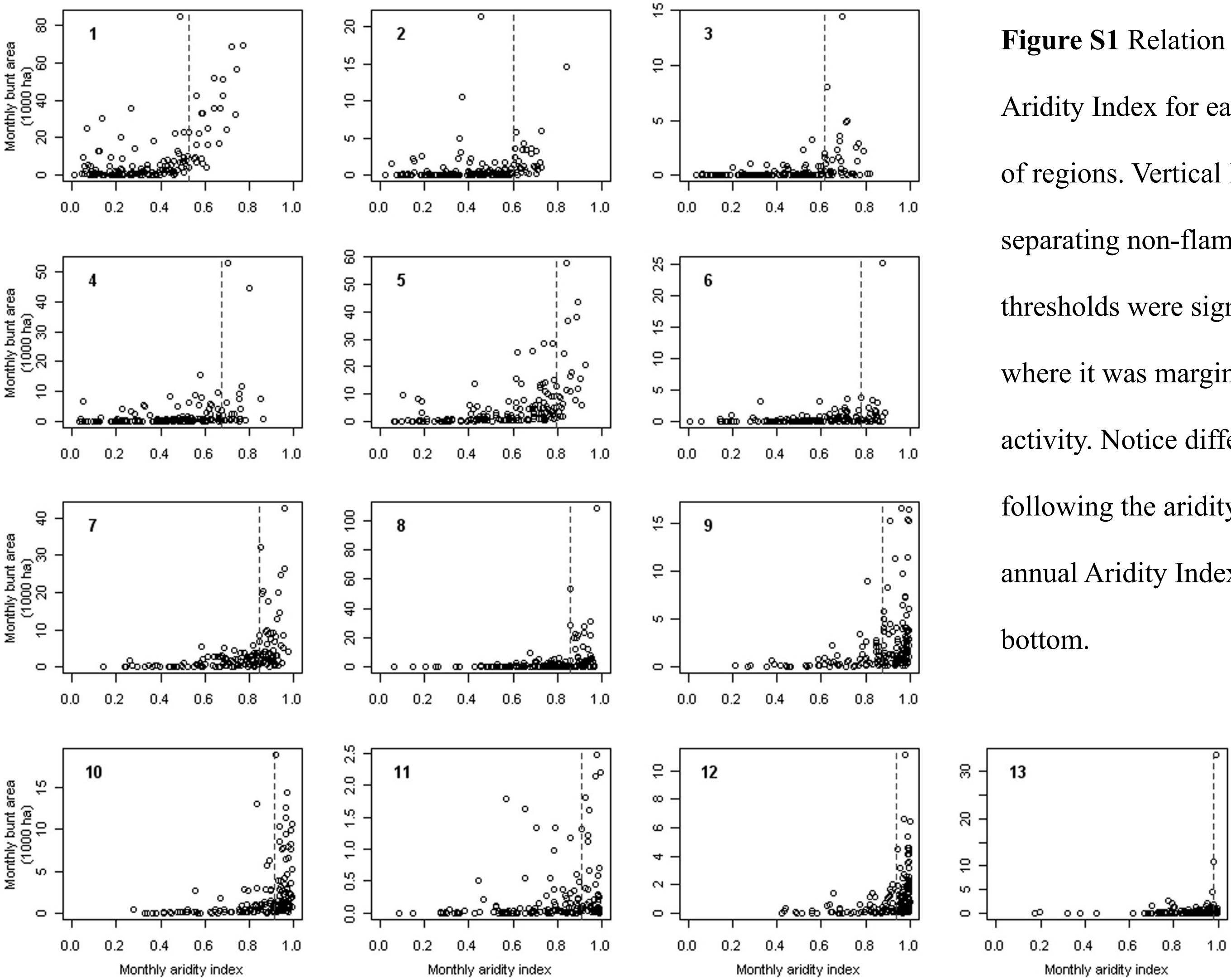

Figure S1 Relation between monthly area burnt and monthly Aridity Index for each Iberian region. See Table S1 for names of regions. Vertical lines show the estimated Aridity Threshold separating non-flammable from flammable conditions. All thresholds were significant at $P < 0.05$ except for region 13, where it was marginally significant ($P < 0.1$) due to low fire activity. Notice differences in the y-axis. Figures are arranged following the aridity gradient in such a way that the mean annual Aridity Index increases from left to right and from top to bottom.