

Calibration of the Fire Danger Classes over the Mediterranean region, based on the CFFWIS and the Fire Released Energy from SEVIRI/MSG.

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Rationale

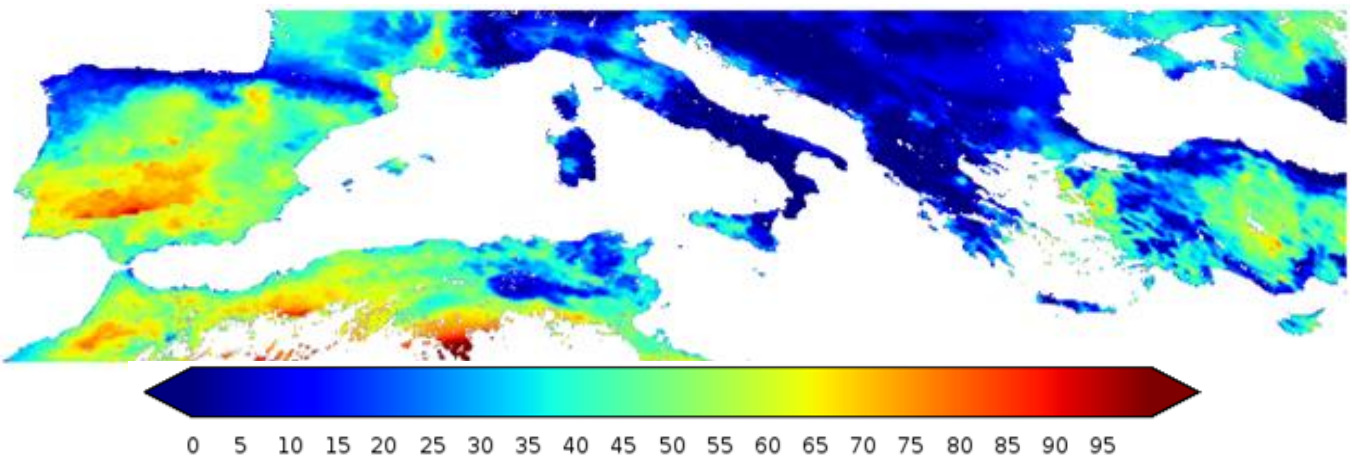
To find the most suitable thresholds for each fire danger class of the FWI system based on fire energy emitted by each registered fire, over the Mediterranean region.

Fire Radiative Energy (FRE)

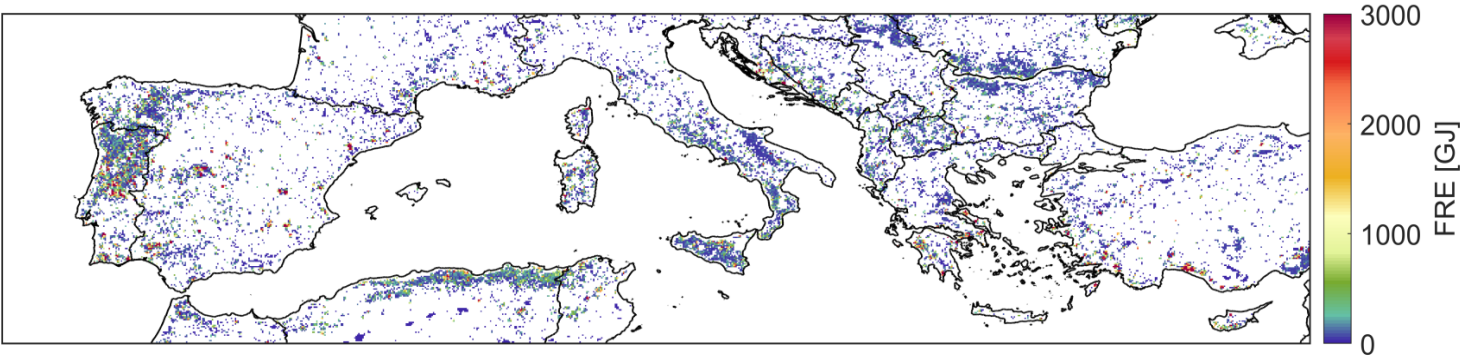
emitted radiant energy by a fire, given by integrating the Fire Radiative Power over time from MSG/SEVIRI (LSA-SAF project)

$$E_{pd} = 0.9 \times \left(\sum_{k=1}^{96} FRP_{kp} \right)_d,$$

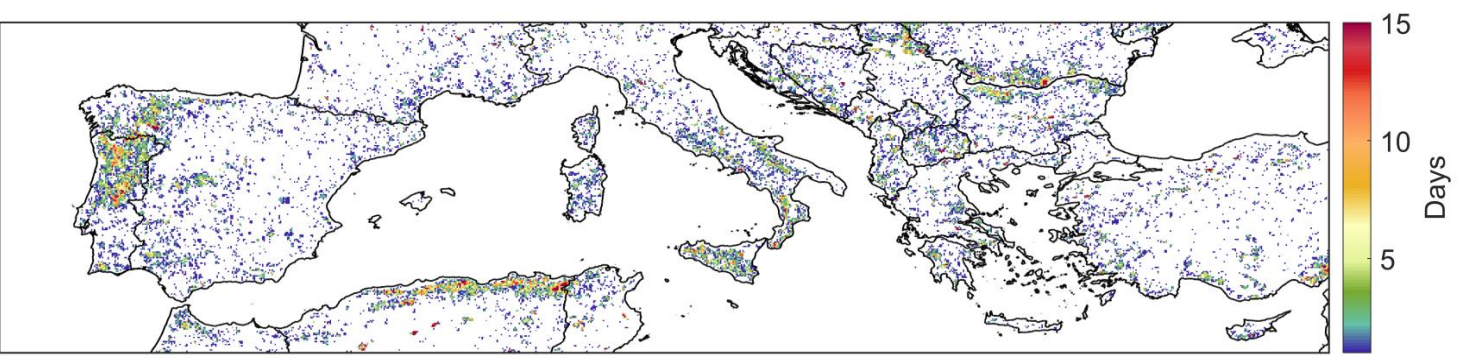
Pinto *et al* (2018)*



FWI, 5th August 2018



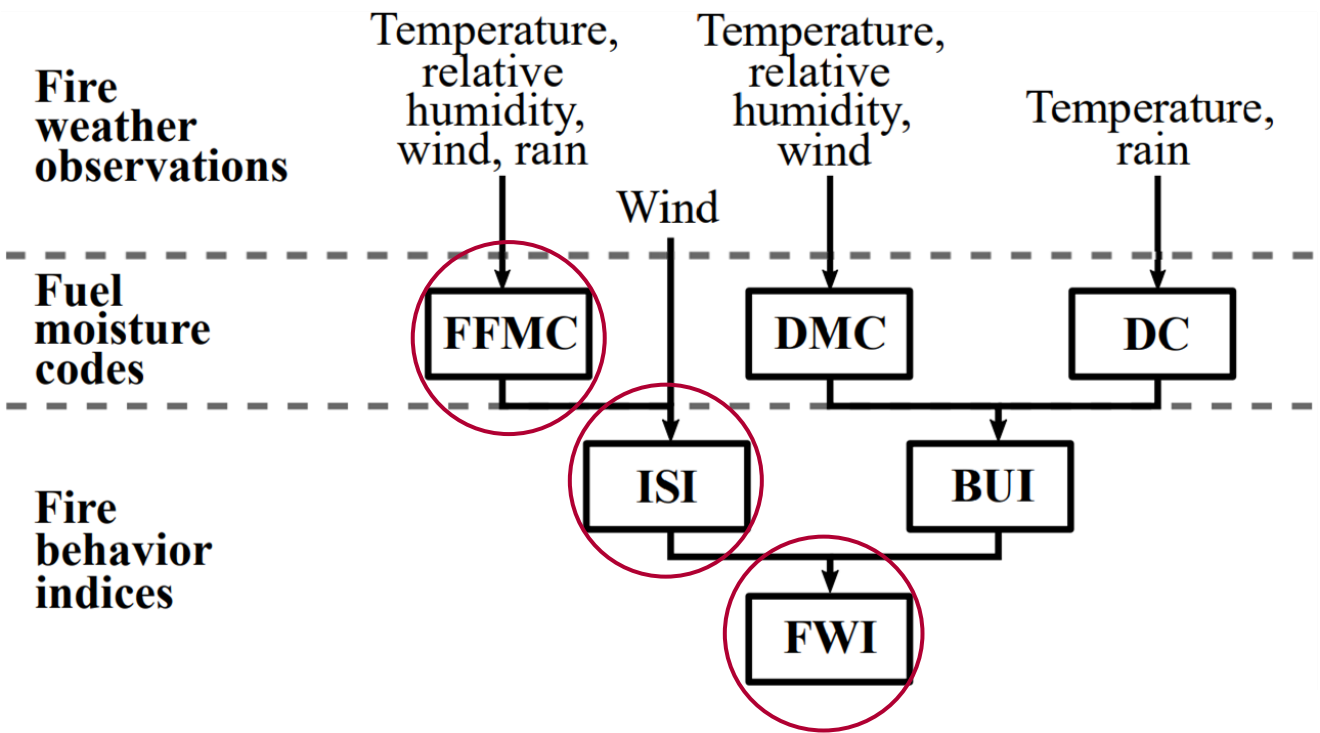
FRP Median over 2017-2021



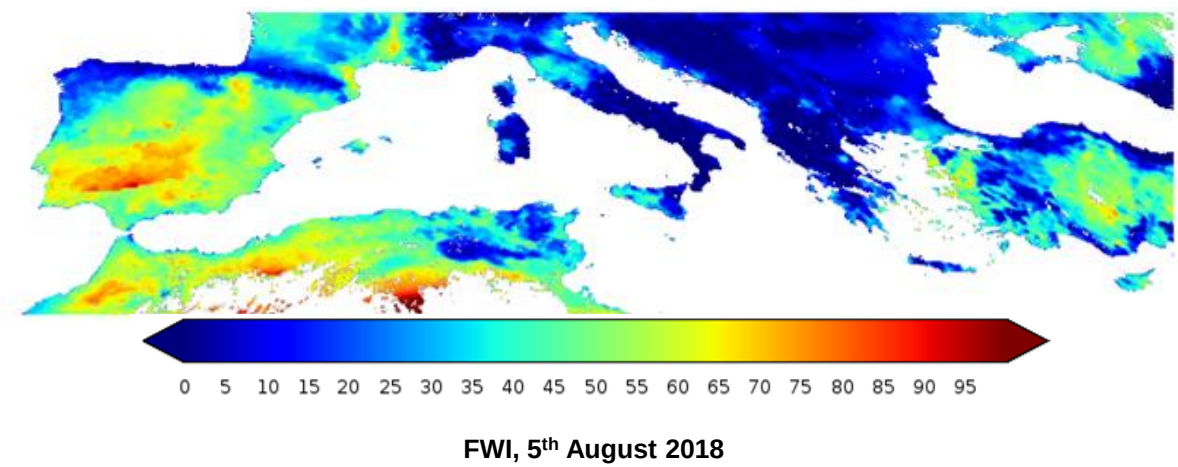
N° Days with FRP ≥ 0 over 2017-2021

*<https://doi.org/10.5194/nhess-18-515-2018>

Canadian Forest Fire Weather Index System (Pyne, 1987)



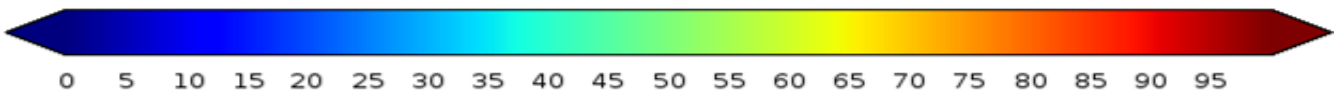
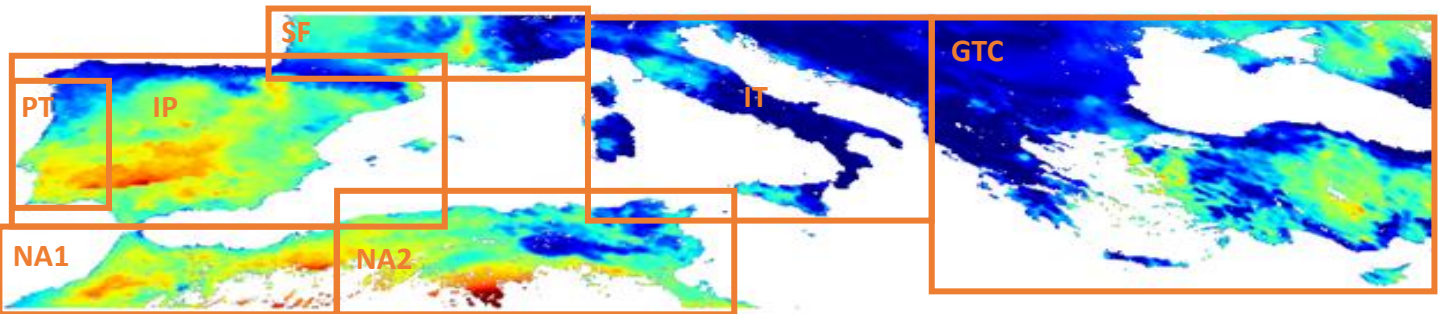
FWIS data (ECMWF) interpolated into the MSG grid, generated and distributed as layers of the Fire Risk Map (FRM) product of the LSA-SAF under the framework of the Land Surface Analysis Satellite Applications Facility (LSA-SAF) project.



Fire Danger Classes	FWI	FFMC	ISI
Very Low	FWI < 5,2	FFMC < 82,7	ISI < 3,2
Low	5,2 ≤ FWI < 11,2	82,7 ≤ FFMC < 86,1	3,2 ≤ ISI < 5,0
Moderate	11,2 ≤ FWI < 21,3	86,1 ≤ FFMC < 89,2	5,0 ≤ ISI < 7,5
High	21,3 ≤ FWI < 38,0	89,2 ≤ FFMC < 93	7,5 ≤ ISI < 13,4
Very High	38,0 ≤ FWI < 50,0	FFMC ≥ 93,0	ISI ≥ 13,4
Extreme	50,0 ≤ FWI < 70,0		
Very Extreme	FWI ≥ 70,0		

Fire Danger Classes accordingly to the European Fire Forecast Information System (EFFIS)

Methodology



FRE Intensity thresholds

- FRE > 0 GJ (all ignitions)
- FRE > 1500 GJ

Study Period:

- March 2010 to October 2021

Study Areas:

Iberian Peninsula (IP), Portugal (PT), North Africa 1 (NA1), North Africa 2 (NA2), Southern France (SF), Italy (IT), Greece, Turkey & Cyprus (GTC).

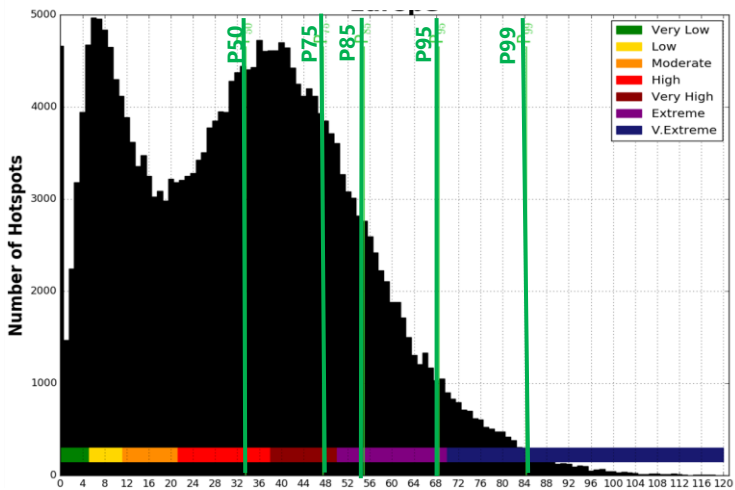
Region	Hotspots			
	FRE≥0		FRE≥1500	
	#	%	#	%
EU	246444	100	16366	100
Greece, Turkey and Cyprus GTC	87157	35,4	2710	16,6
Iberian Peninsula IP	73533	29,8	8310	50,8
Italy IT	51916	21,1	2992	18,3
Portugal PT	39636	16,1	5595	34,2
North Africa 2 NA2	36582	14,8	2963	18,1
Southern France SF	9652	3,9	464	2,8
North Africa 1 NA1	6779	2,8	519	3,2

Daily Percentiles FWI, FFMC, ISI & FRE > 1500 GJ

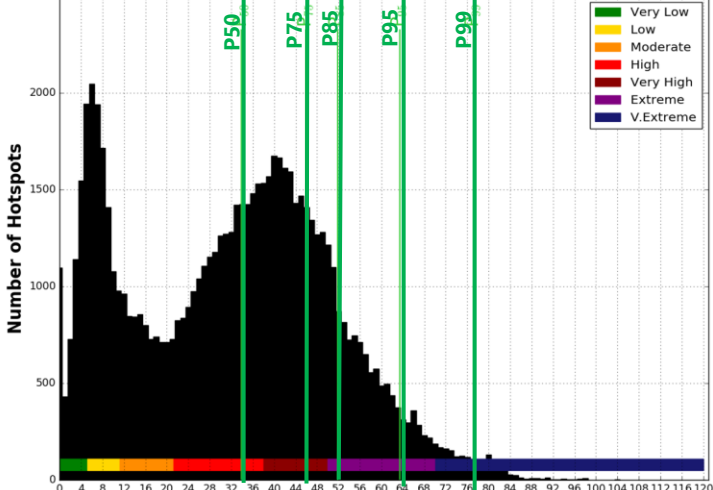
	FWI					FFMC					ISI				
P _k	P ₅₀	P ₇₅	P ₈₅	P ₉₅	P ₉₉	P ₅₀	P ₇₅	P ₈₅	P ₉₅	P ₉₉	P ₅₀	P ₇₅	P ₈₅	P ₉₅	P ₉₉
Med	46,19	58,48	65,71	79,16	91,47	96,40	96,60	97,70	98,90	99,70	14,51	20,20	24,17	31,82	40,03
IP	43,85	53,50	59,66	70,53	81,01	94,00	95,60	96,40	97,90	99,30	13,28	17,60	20,76	28,09	33,25
PT	43,27	50,78	55,83	64,38	80,07	93,80	95,20	95,80	96,60	97,60	12,81	15,80	18,25	22,49	30,98
NA ₁	50,34	57,77	63,03	74,87	106,9	96,10	97,00	97,93	98,70	99,08	15,47	19,89	21,63	30,42	53,76
NA ₂	59,03	69,58	76,27	84,32	95,52	97,70	98,70	99,10	99,80	100,01	20,07	25,33	29,01	34,15	39,93
SF	42,18	61,43	69,12	93,25	106,69	93,10	94,80	95,80	96,20	97,15	15,15	24,65	27,03	41,62	54,30
IT	40,29	57,21	65,18	77,73	86,99	94,10	96,70	97,73	98,90	100,00	13,32	19,14	23,16	30,59	37,09
GTC	48,70	64,82	72,33	85,71	96,56	95,00	97,00	98,00	98,96	99,60	17,24	23,54	28,10	36,71	44,43

Fire Weather Index & Fire Release Energy

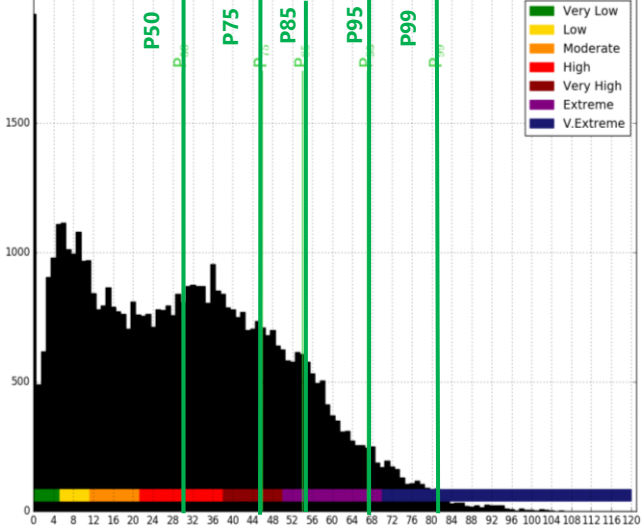
Mediterranean



Iberian Peninsula

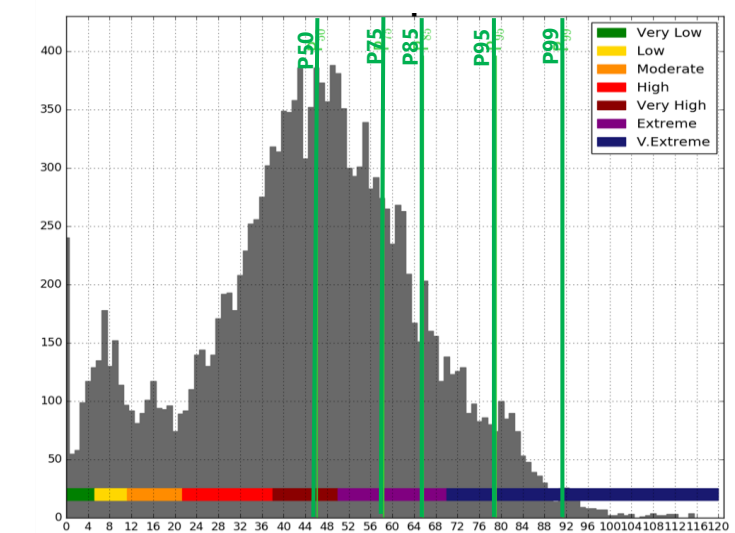


Italy

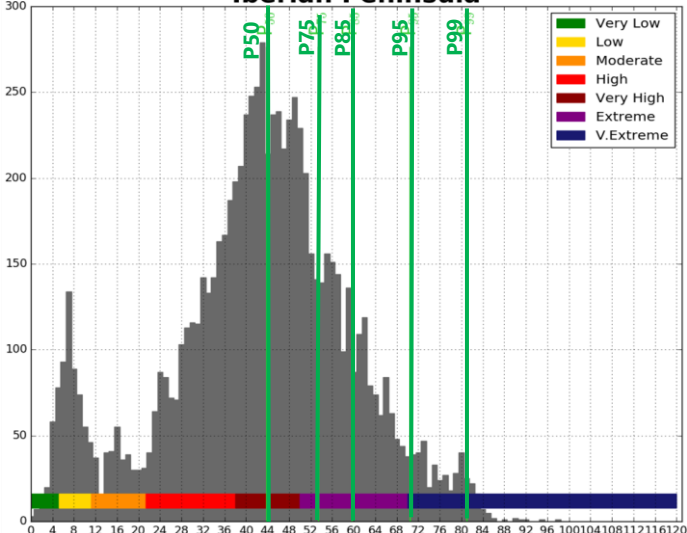


$\text{FRE} \geq 0 \text{ GJ}$

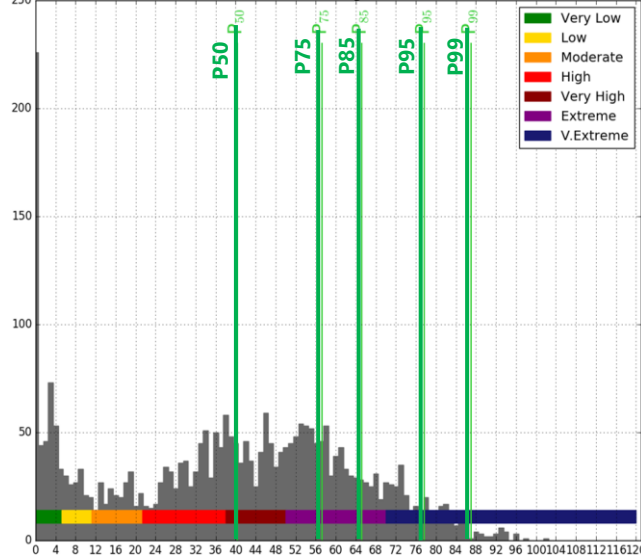
Mediterranean



Iberian Peninsula



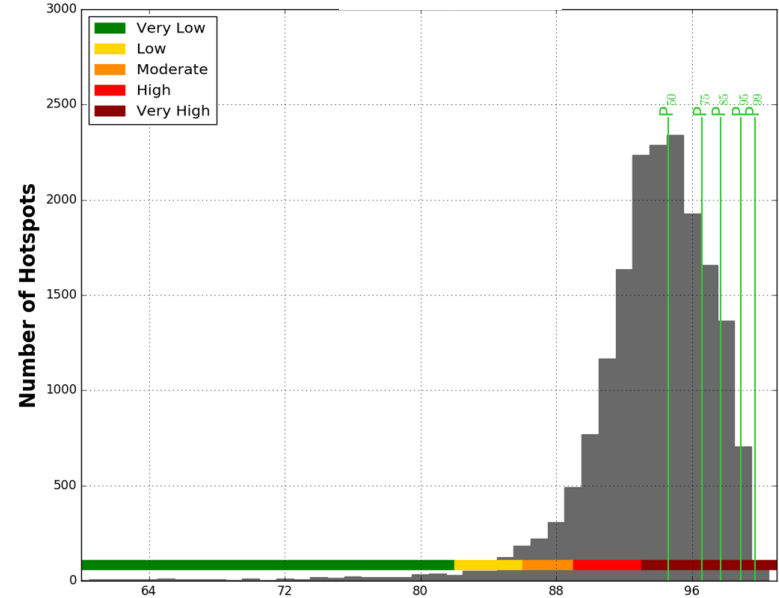
Italy



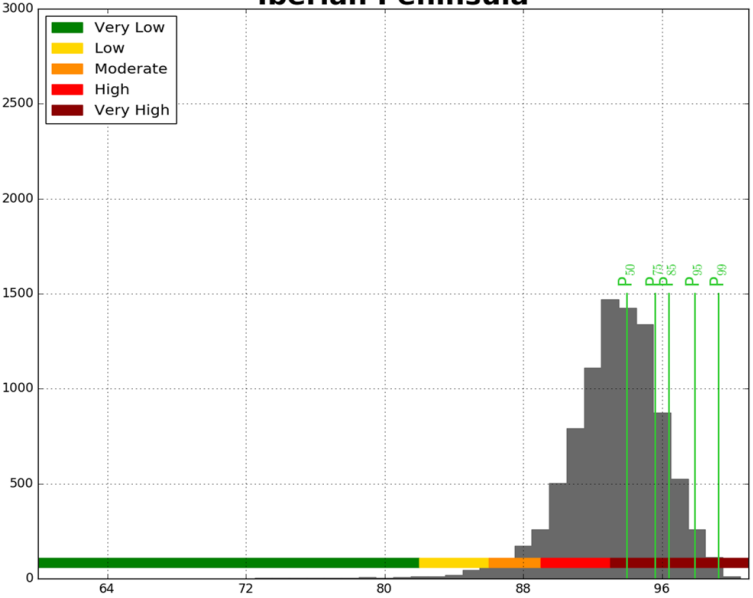
$\text{FRE} \geq 1500$

FFMC & FRE (≥ 1500 GJ)

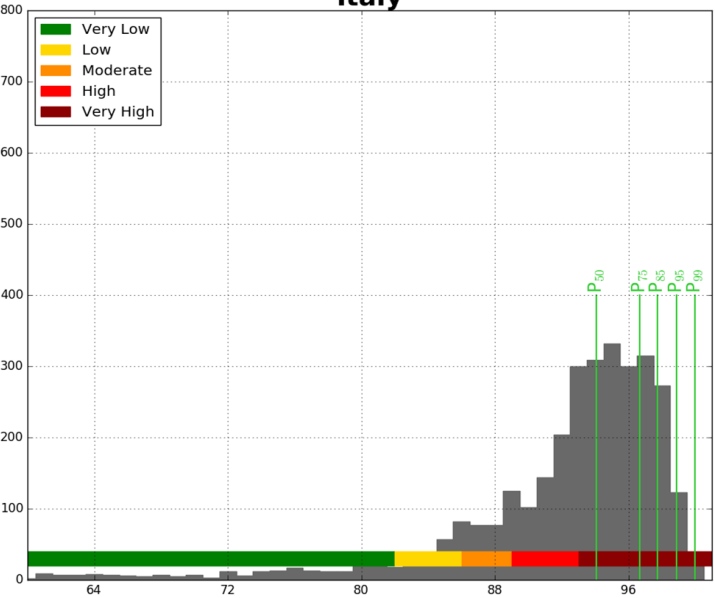
Mediterranean



Iberian Peninsula

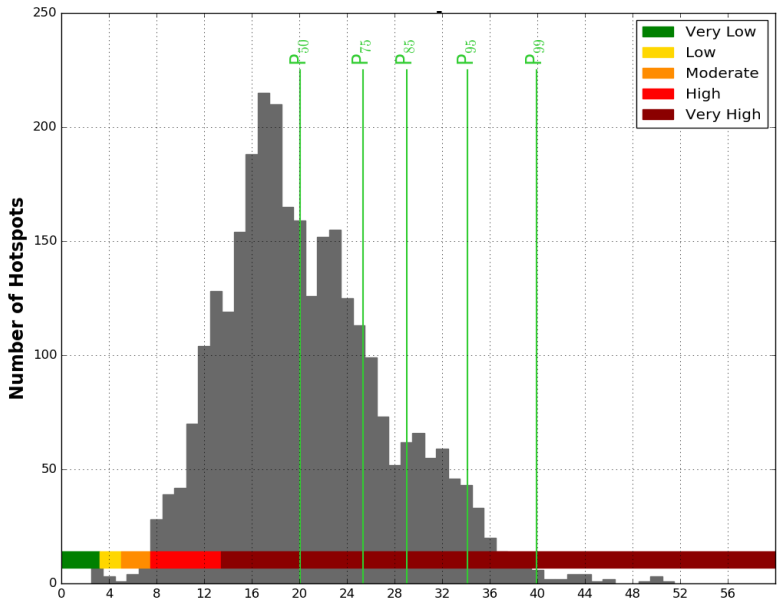


Italy

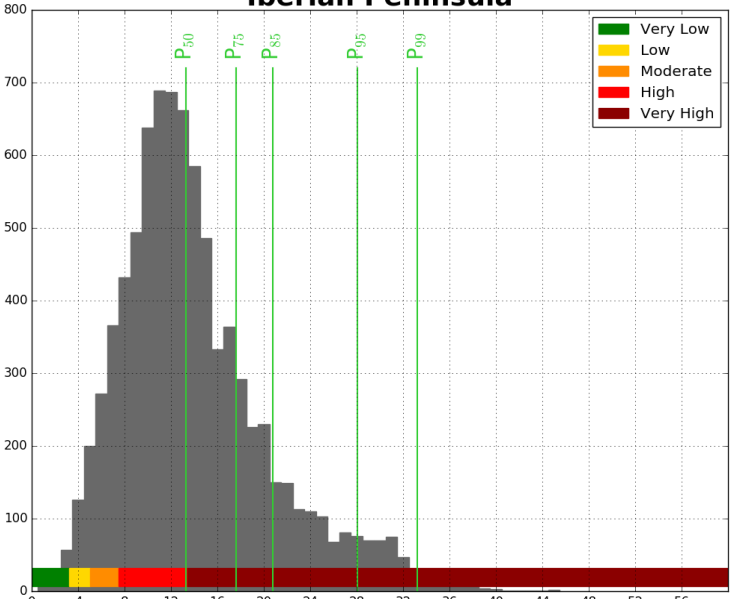


ISI & FRE (≥ 1500 GJ)

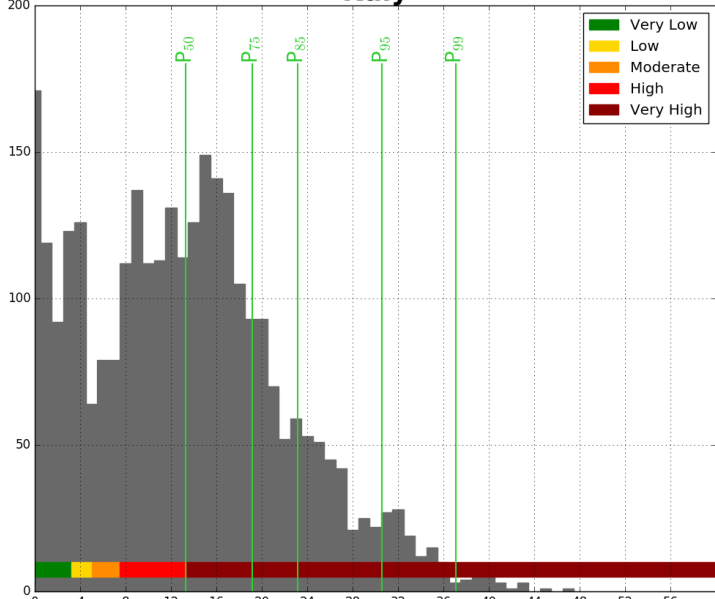
Mediterranean



Iberian Peninsula



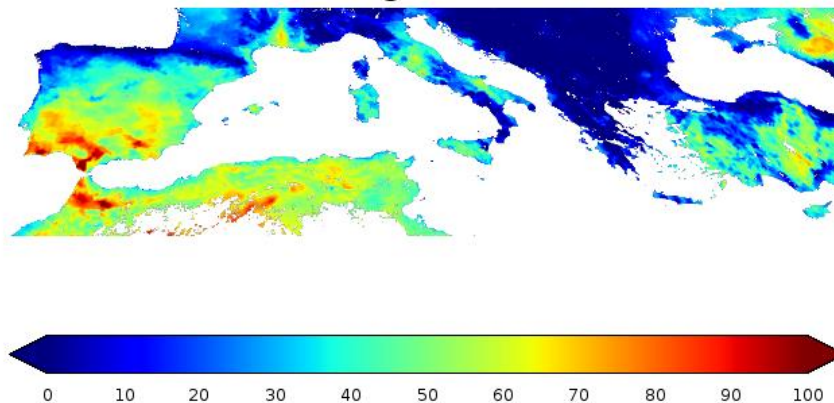
Italy



Final Remarks

Fire danger patterns revealed differences in the Mediterranean fire regimes and fire intensity patterns:

- FRP/FRE products together with fire danger rating indices are a key tool to monitor fire severity
- Regional and local calibrations should be considered locally by authorities
- Fire-related activities, such as fire danger assessment, monitoring, preparedness and mitigation activities should be adopted or taken accordingly with local patterns.



FWI 2nd August 2018

Thank you!

Acknowledgments

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