

**INSTITUTO  
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**UNIVERSITY OF LISBON**

# **Tailoring the LSA-SAF Fire Risk Map product to the needs of fire management and firefighting in Portugal**

**Carlos C. DaCamara**

**Covilhã, 15 August 2022**



# Introduction

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**Large** wildfire episodes steered by **extreme weather** conditions are a serious natural hazard in **Mediterranean Europe** with very **strong impacts** at the economic, social and ecological levels, even in countries that are traditionally prepared for firefighting.

This summer was conspicuous because of **very large fire events** that spread over **southern and central Europe**.

**Fire activity** was steered by an **outstanding drought** followed by **three very severe heat waves** that hit Europe in June, July and August.



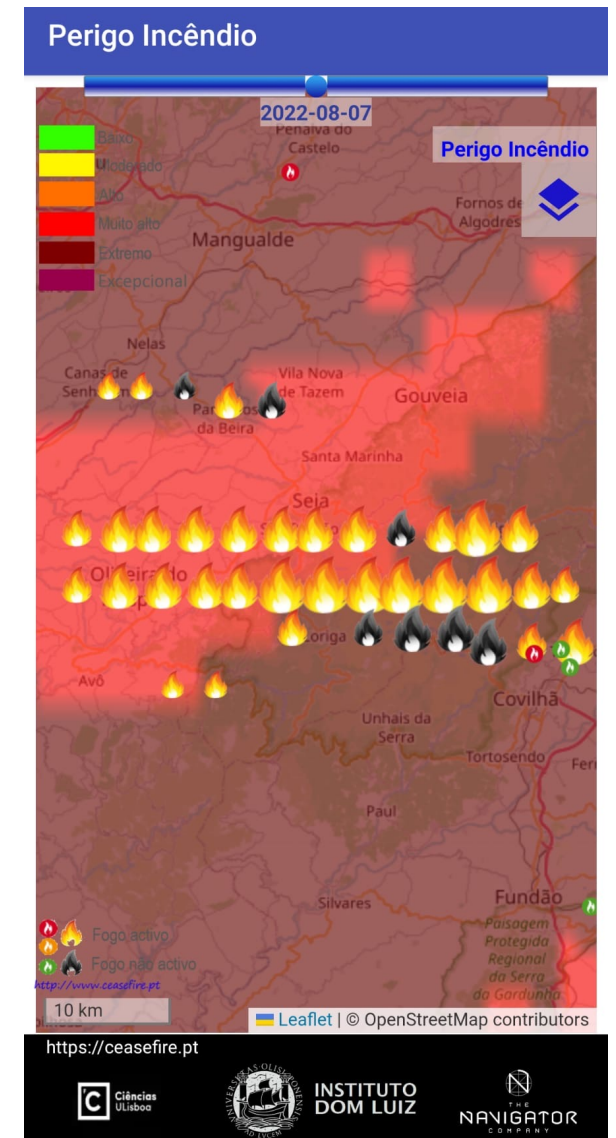
**Covilhã, 7 August 2022**

# Introduction

Although steered by **weather conditions**, wildfire episodes are **anthro-pogenic** for the vast most part.

Reasons are as varied as preparing fields for **pastures** or **agriculture**, and even **negligence** and **arson**.

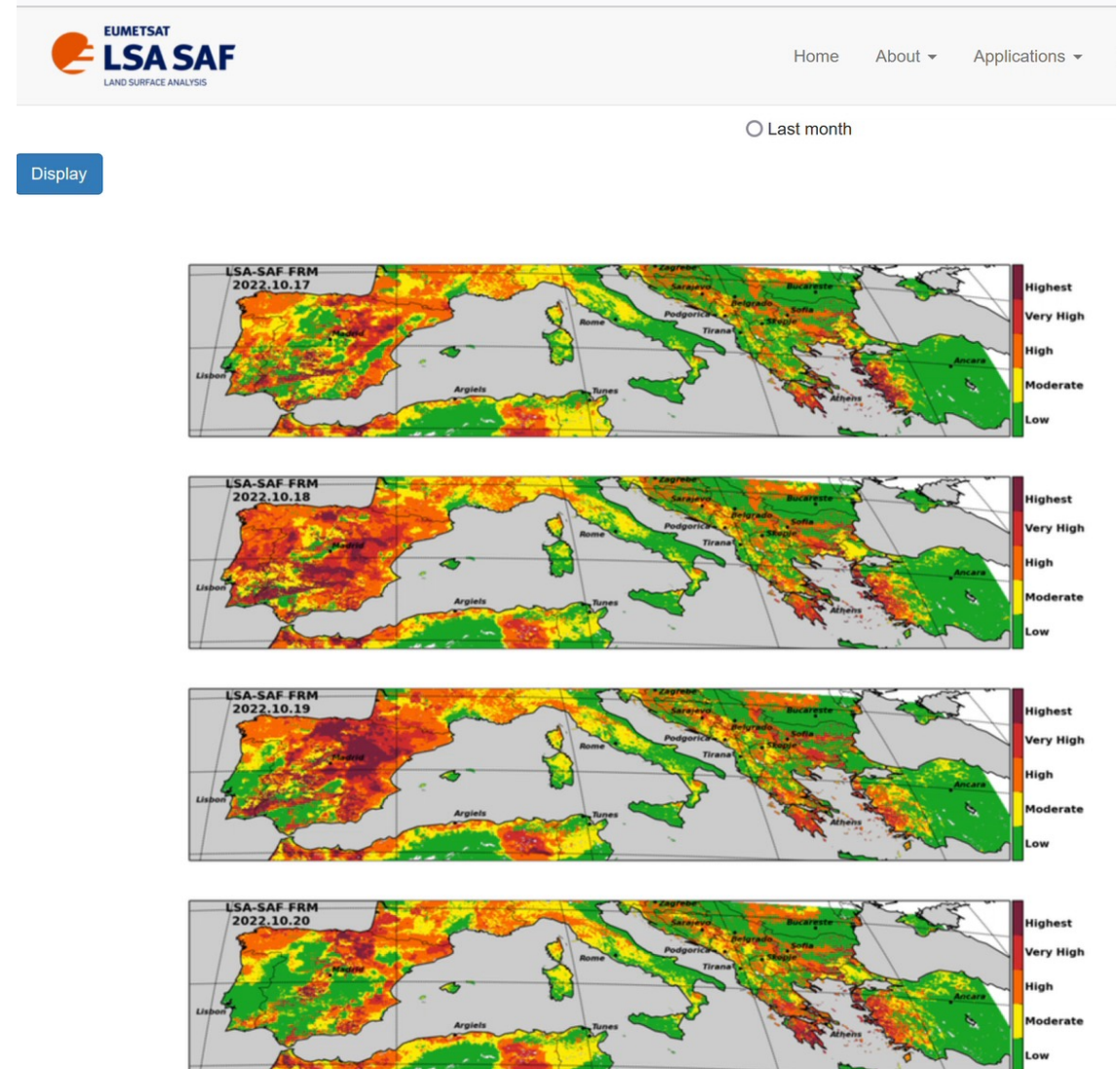
Knowing about **when** and **where** a wildfire event is likely to occur and **anticipating potential damage** is therefore crucial when **planning actions** aiming at mitigating the adverse impacts of fire activity.



Covilhã, 7 August 2022

# The Fire Risk Map product

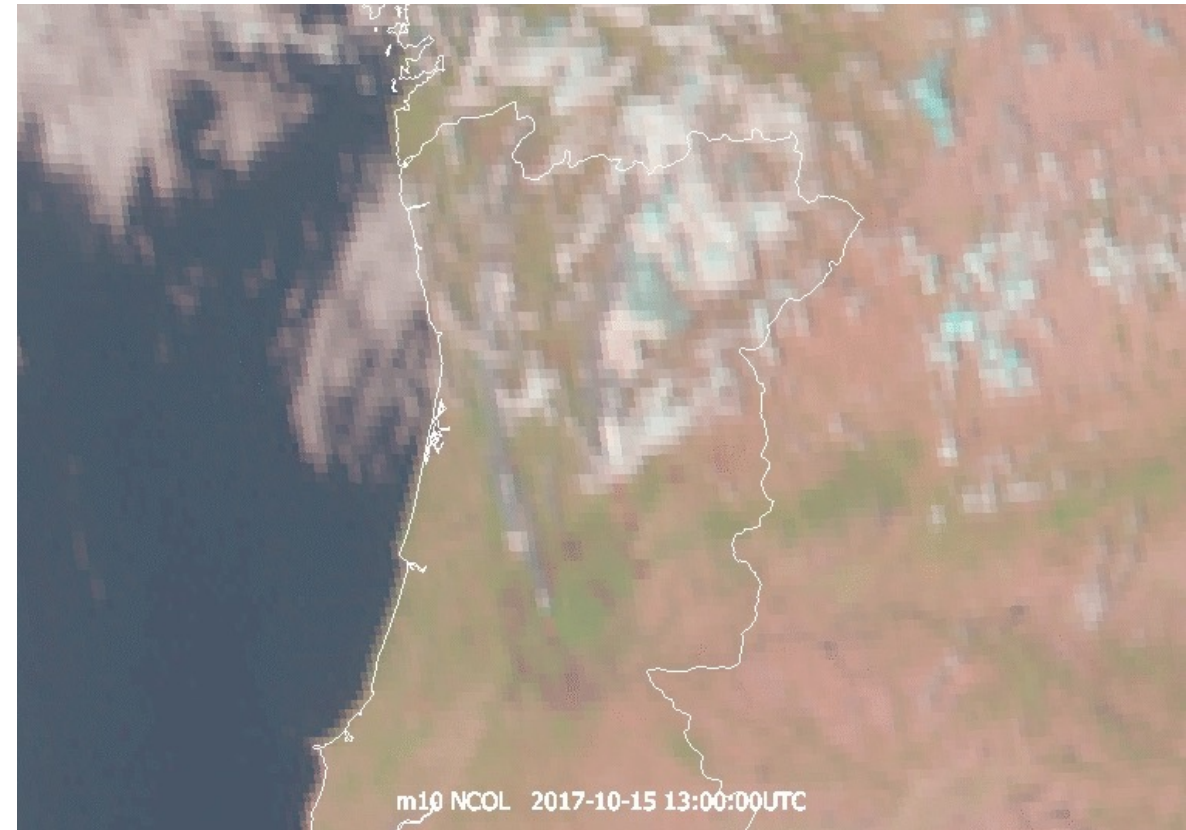
The **Satellite Application Facility on Land Surface Analysis (LSA SAF)** operationally disseminates a **Fire Risk Map product (FRM, LSA-504v2)** that provides daily forecasts of meteorological fire danger associated to probabilities of wildfires exceeding a specified threshold of released radiative energy, over the Mediterranean Basin.



# Fire Radiative Power

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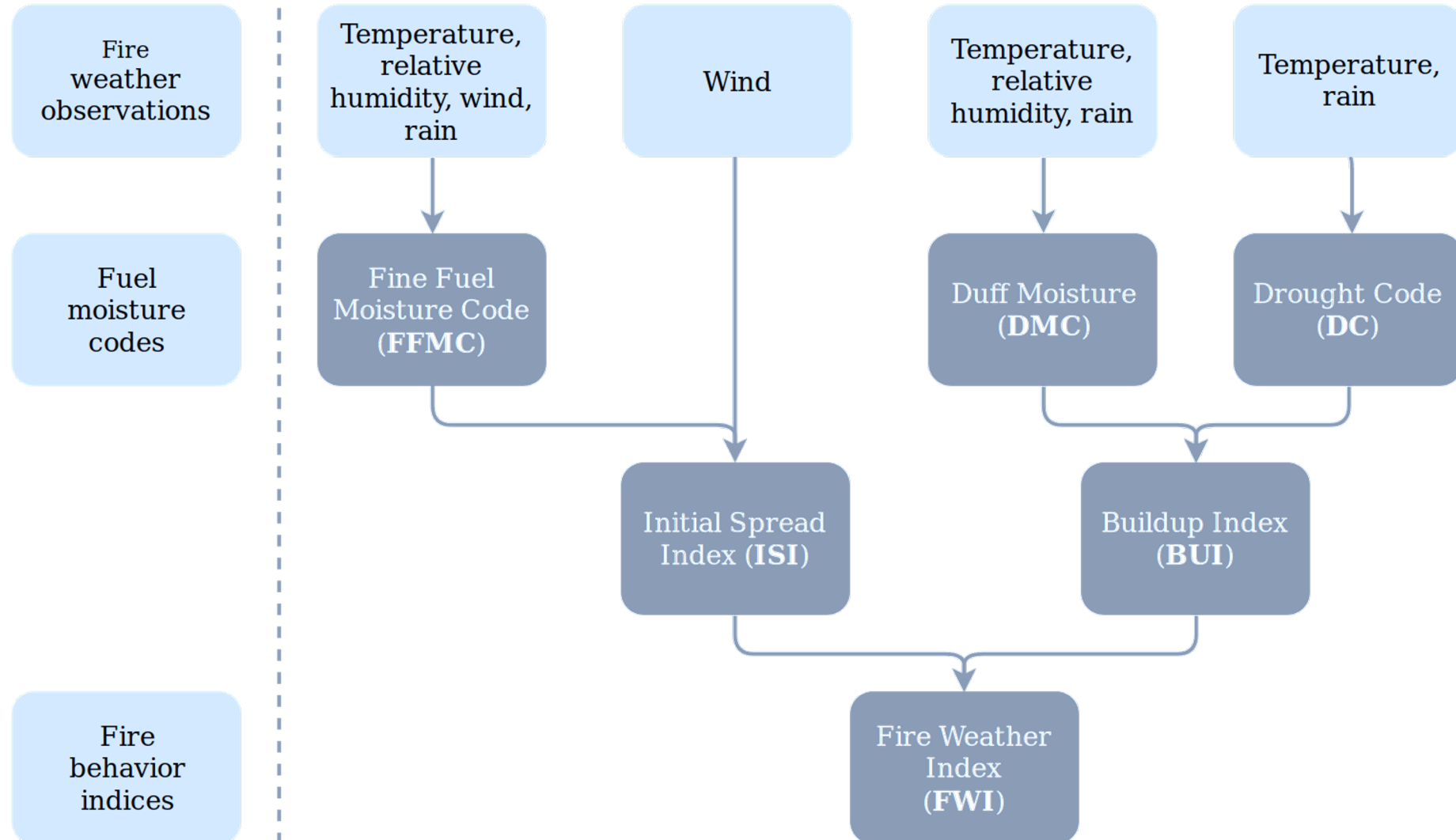
The Fire Risk Map product is calibrated using values of **Fire Radiative Power (FRP)** as derived from observations by the **SEVIRI instrument** on-board **MSG satellites** and values of the **Fire Weather Index (FWI)**, the major component of the **Canadian Fire Weather Index System (CFWIS)**, as derived from **ERA-5 reanalyzes**.



**Meteosat-10, 15/10/2017 13:00-17:30 UTC**

# The Canadian FWI System

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# Calibration of the Canadian FWI System

## Calibration of the Fire Weather Index over Mediterranean Europe based on fire activity retrieved from MSG satellite imagery

Carlos C. DaCamara<sup>A E</sup>, Teresa J. Calado<sup>A</sup>, Sofia L. Ermida<sup>A</sup>, Isabel F. Trigo<sup>A C</sup>, Malik Amraoui<sup>A B</sup> and Kamil F. Turkman<sup>D</sup>

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*International Journal of Wildland Fire* 23(7) 945-958 <https://doi.org/10.1071/WF13157>

Submitted: 10 June 2012 Accepted: 23 April 2014 Published: 8 August 2014



Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2017-346>  
Manuscript under review for journal Nat. Hazards Earth Syst. Sci.  
Discussion started: 13 October 2017  
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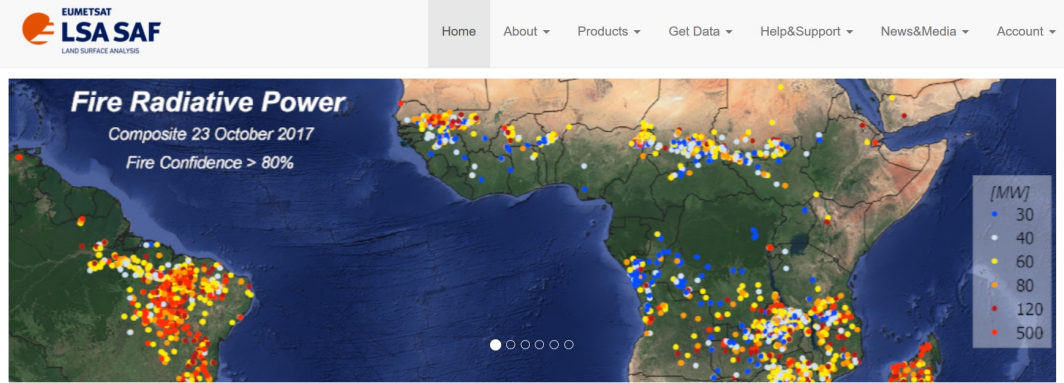
Natural Hazards  
and Earth System  
Sciences  
Discussions



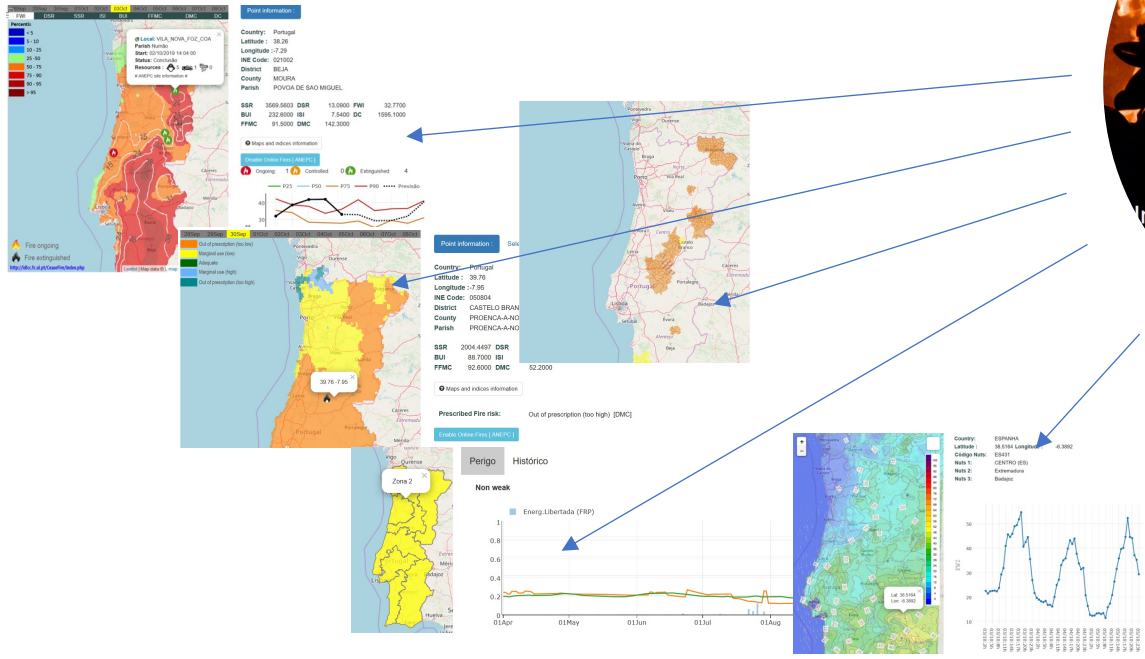
## Fire danger rating over Mediterranean Europe based on fire radiative power derived from Meteosat

Miguel M. Pinto<sup>1</sup>, Carlos C. DaCamara<sup>1</sup>, Isabel F. Trigo<sup>2</sup>, Ricardo M. Trigo<sup>1</sup>, K. Feridun Turkman<sup>3</sup>

# CeaseFire: a user-oriented interface



Using high-quality information from the LSA SAF to generate interactive maps with reliable information for fire managers and fire fighters.

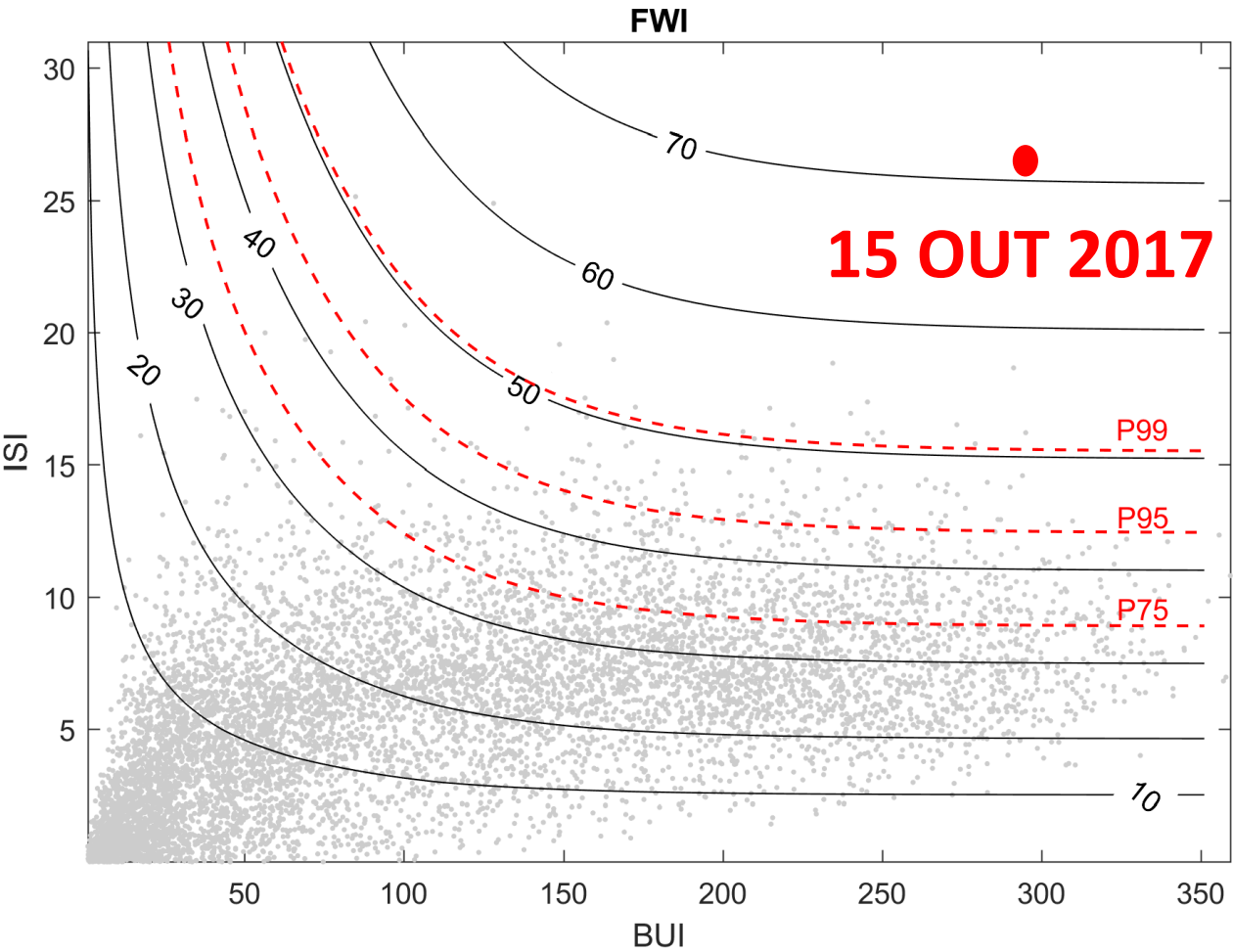
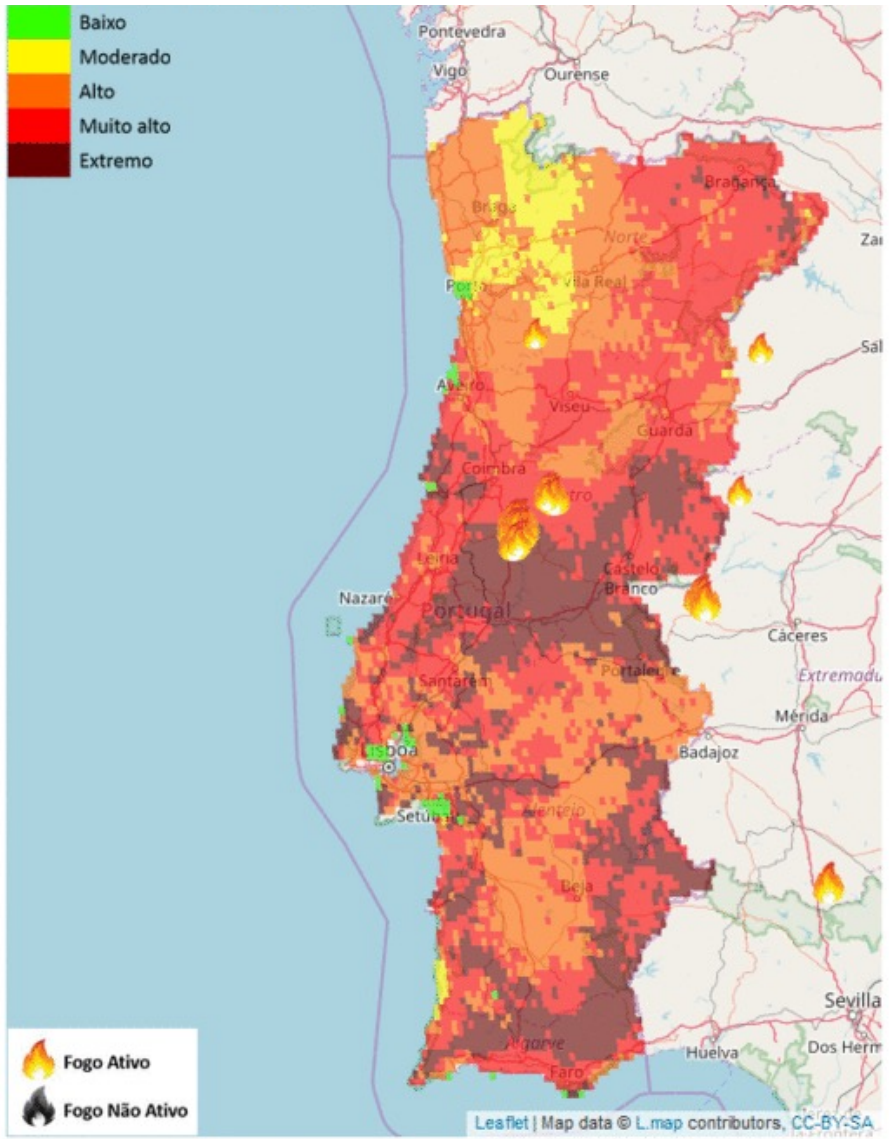


Interactive maps of Indices and Fire Hazard





# CeaseFire: a user-oriented interface



Daily values for 1 April – 31 August 1980-2020 (8774 pontos)



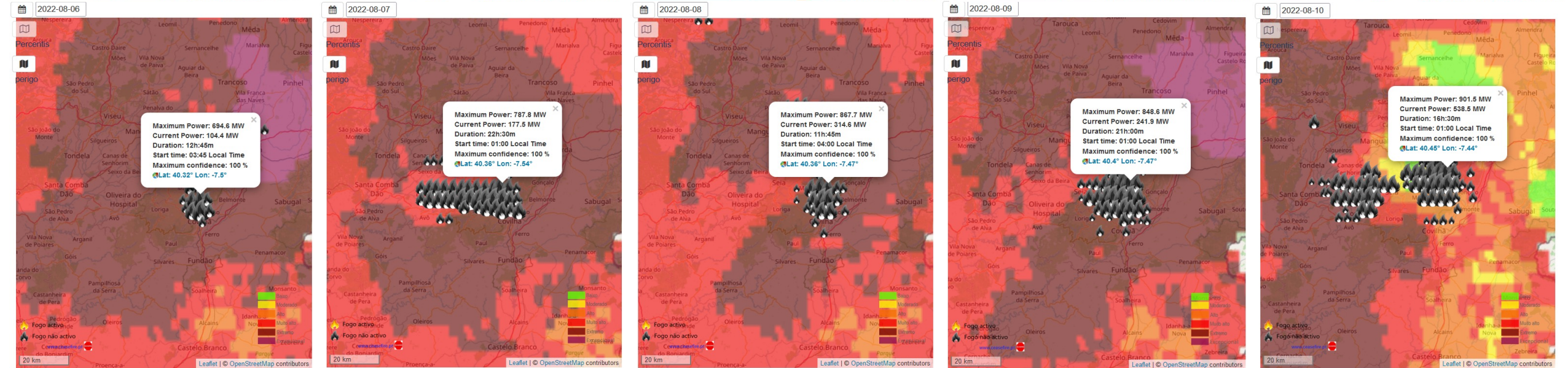
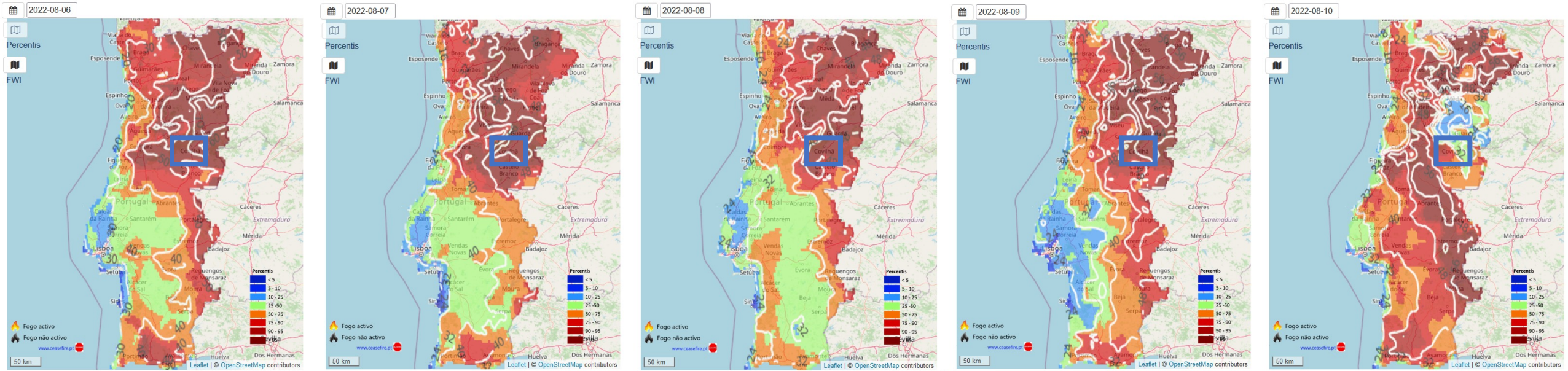
Vieira de Leiria

# Portugal

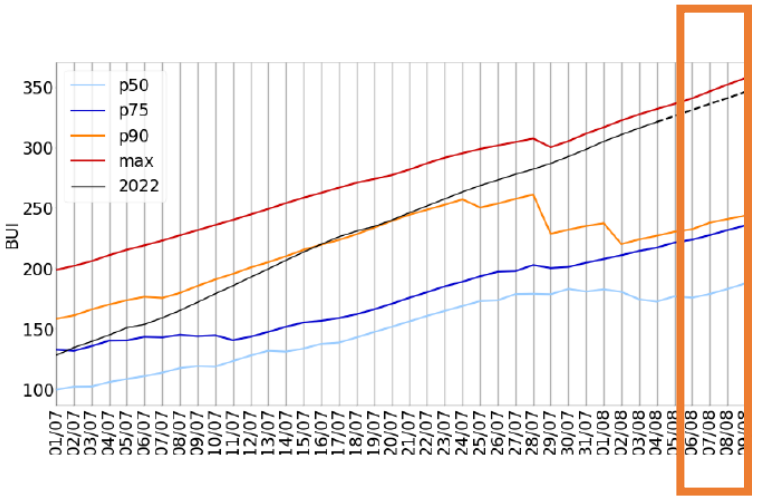
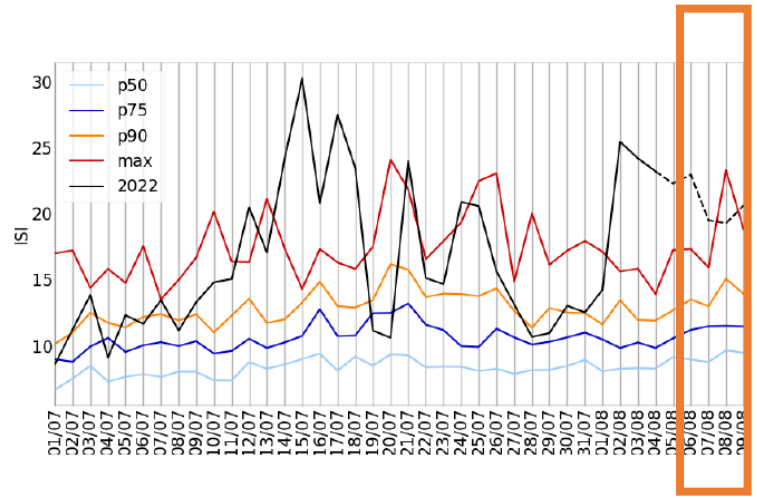
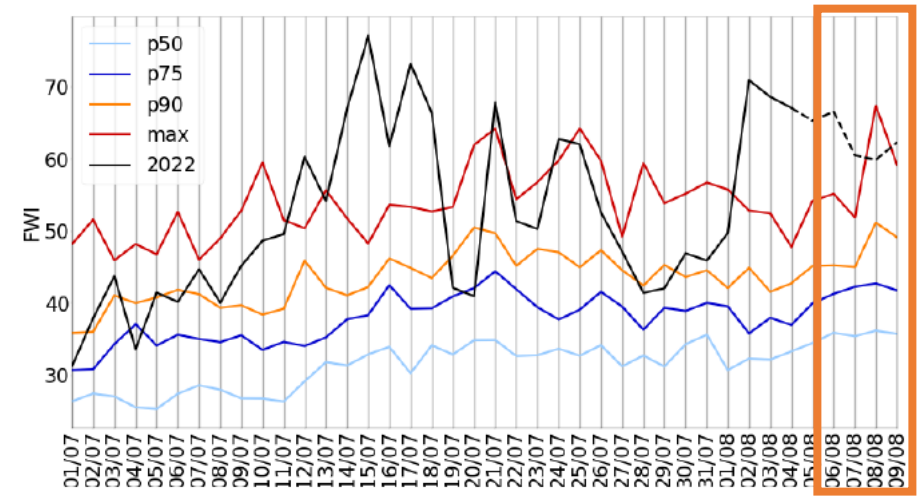
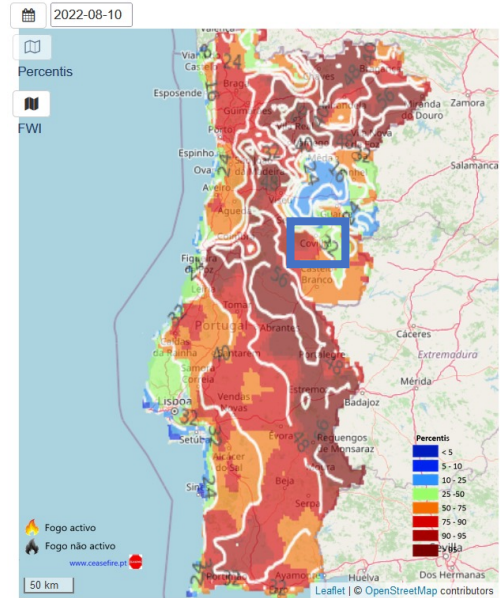
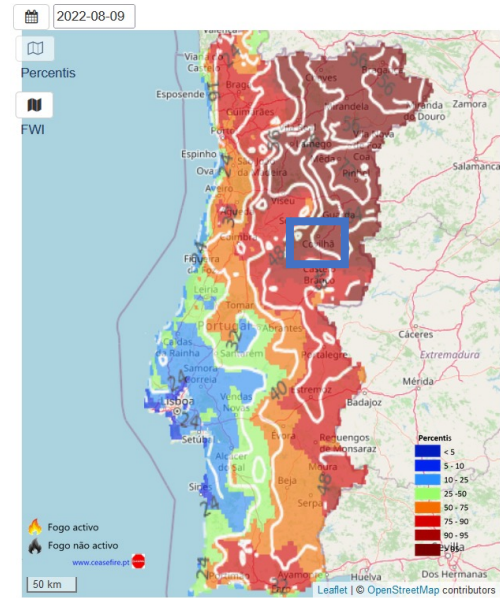
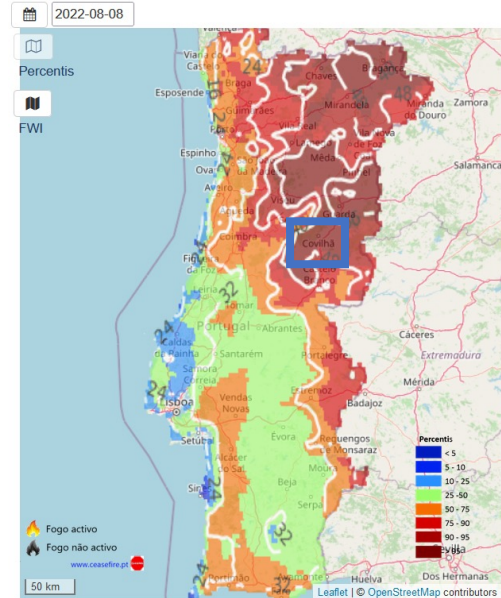
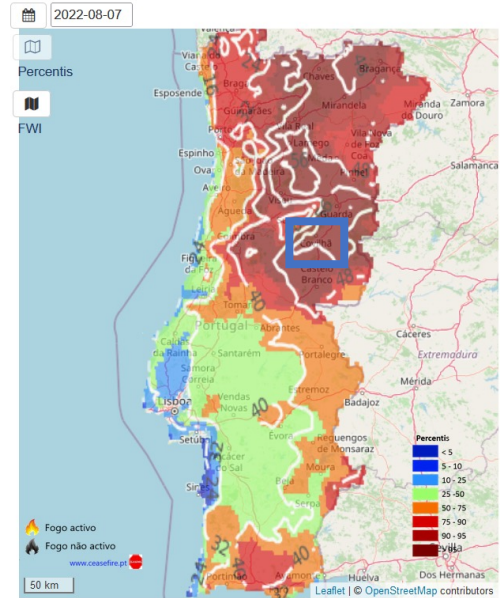
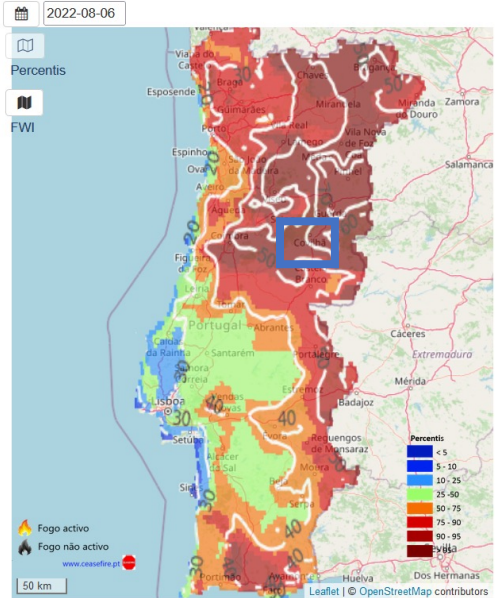
## 15/10/2017

<b>Place:</b>	<b>Mainly district of Coimbra, Portugal</b>
<b>Date:</b>	<b>15 October 2017</b>
<b>Burnt area:</b>	<b>152 060 ha</b>
<b>Land use:</b>	<b>Forest and urban areas</b>
<b>Dead:</b>	<b>36</b>
<b>Wounded:</b>	<b>63 (16 serious condition)</b>
<b>Coordinates:</b>	<b>40° 12' N, 8° 25' W (Coimbra)</b>

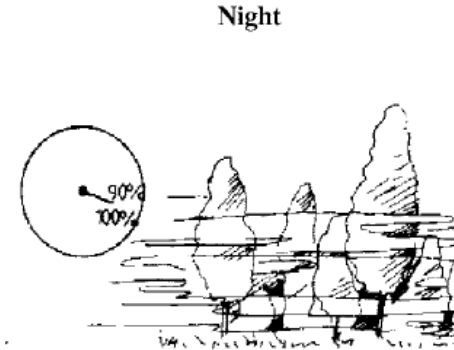
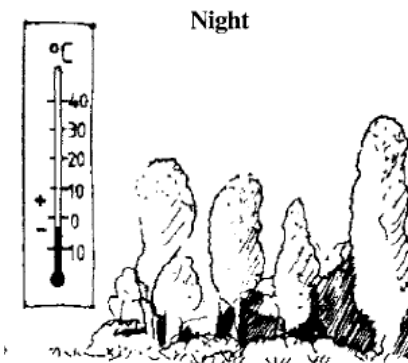
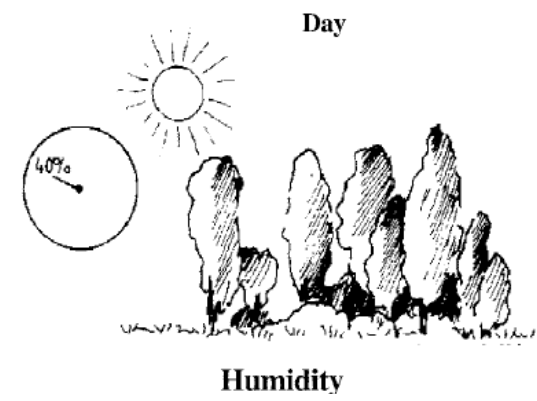
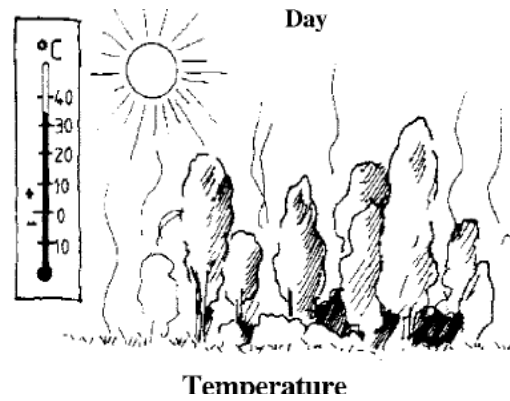
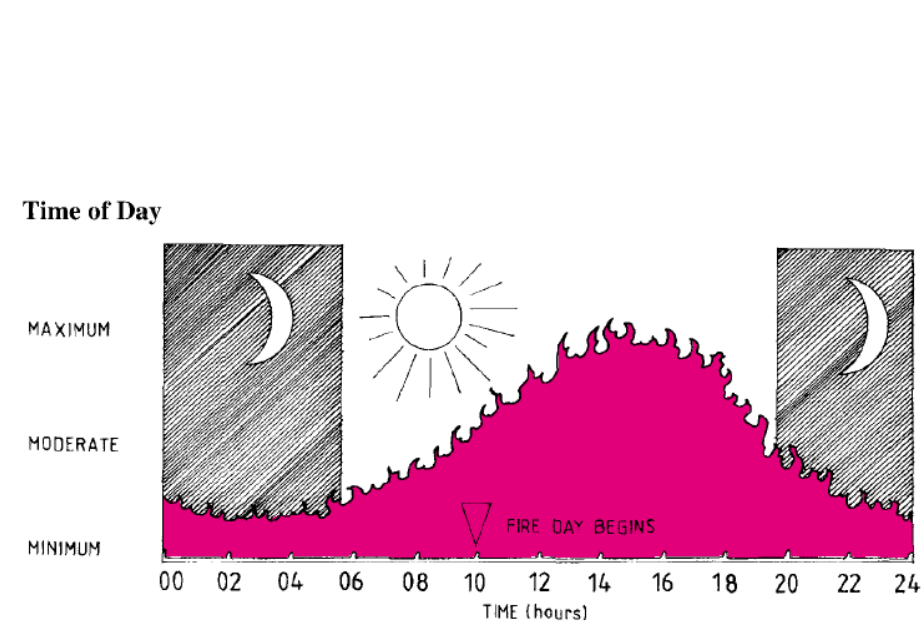
# Covilhã – 6-11 August 2022



# Covilhã – 6-11 August 2022



# The daily cycle of fire activity



# An hourly index of meteorological fire danger

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The strong **sub-daily variability** exhibited by active fires raises the need for an **hourly assessment of meteorological fire danger** that would allow defining **windows of opportunity** to successfully fight a given fire.

For this purpose, we have **extended the definition of the FWI System** that was originally designed to be computed at **12h local time** to an hourly index.

The procedure consists in computing FWI using the meteorological conditions of each hour for the CFWIS components and using a linear combination of the conditions from the two previous days (for estimates of the hourly index at am local times) or previous and current day (for pm local times) for the components with memory in the moisture codes of CFWIS.

The result is an **hourly FWI** that presents a **smooth transition** between days and **keeps the hourly FWI at 12h identical to the standard daily FWI**.

# Covilhã – 6-11 August 2022

