Live fuel moisture content approach using satellite data for Portugal mainland

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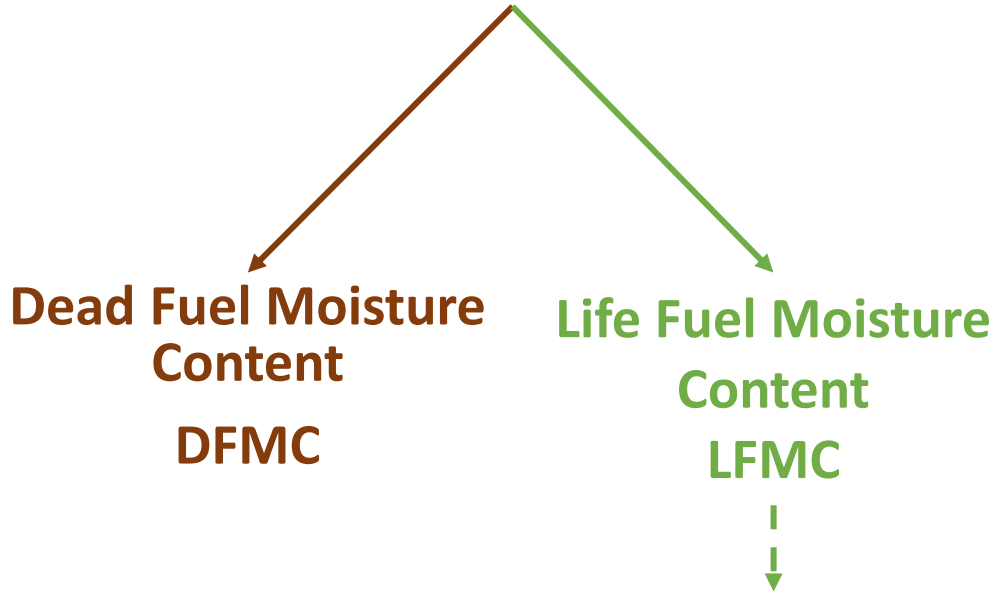
Rationale

The **fuel moisture content** (FMC) is an important property to assess fire danger, to control fuel ignition and fire propagation.



- Plants'adaptation to drought
- Capacity of extracting water from soils that vary among different vegetation species

The estimation **LFMC** plays an important role to improve fire danger assessment, bringing also advantages in the study of the dynamics of biodiversity and biomass understory recovery.

Data and Methods

LFMC in-situ measurements

Limited spatial coverage and temporal sampling

Solution:

Remote sensing data

Overcome space-time constraints and to develop methodological approaches to assess space-time LFMC variations

Leaf Area Index (LAI)

The amount of live green leaf material present in the canopy per unit of ground surface

Interdependent form LFMC with similar seasonal and interannual trends

Land Surface Temperature (LST)

Data and Methods

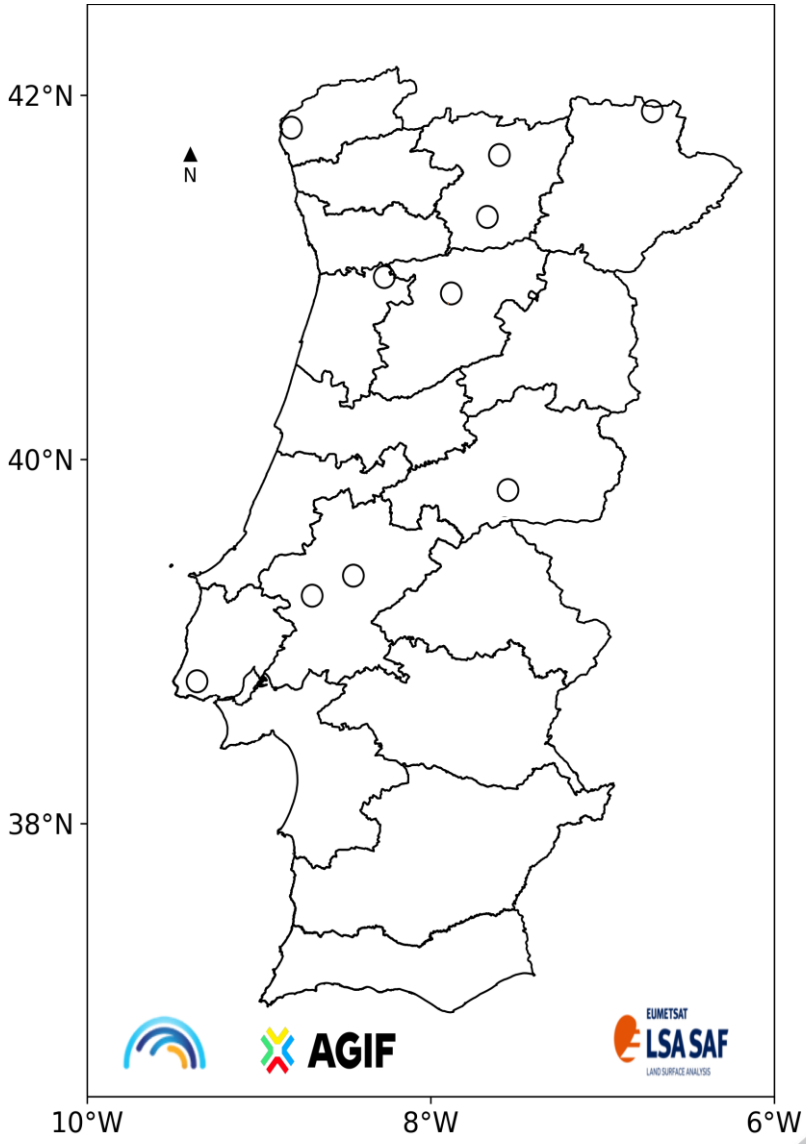
Statistical model to pixel by pixel for Portuguese national scale

- **LAI** and **LST** products, delivered by the EUMETSAT LandSurface Analysis Satellite Applications Facility (LSA SAF).

For <u>every week</u>:
LAI mean between Tuesday and Thursday

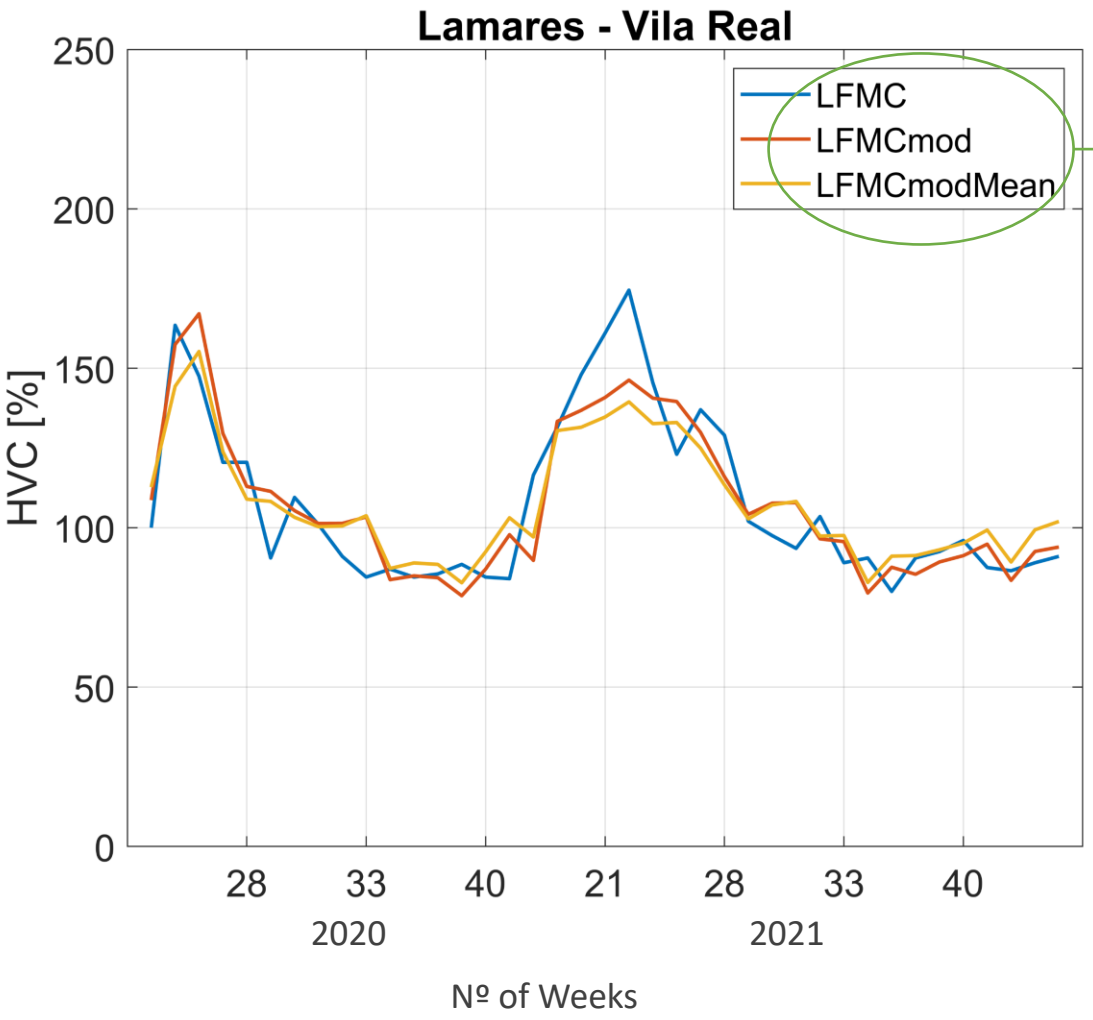
LST mínimum (hourly) between Monday and Friday

- **LFMC** in-situ data for **Atlantic Scrub** are routinely collected and provided over 10 monitoring sites by AGIF/ICNF national authorities and disseminated by IPMA, between 2020 and 2021.



Results

Best Model



LFMC – LFMC measure in-situ for the site.

LFMCmod – LFMC modulated with b coefficients for the site.

LFMCmodMean –LFMC modulated with b coefficients mean from all 10 sites.

Nº in-sito observations = 39

R = 0.89

$R_{CrossValidation}$ = 0.87

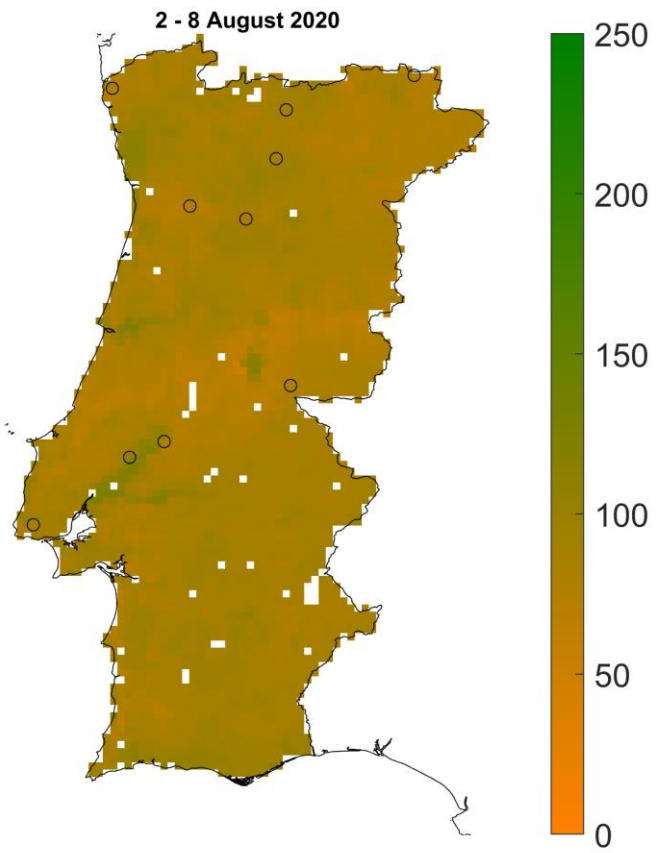
b_{LAI} = 0.90

b_{LAI_mean} = 0.70

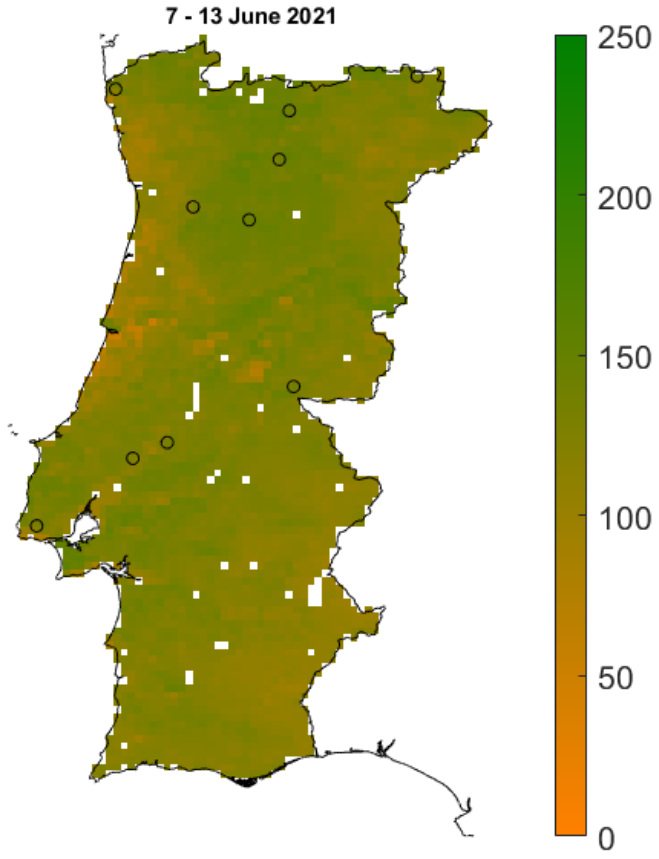
$b_{LSTmín}$ = -0.23

$b_{LSTmín\_min}$ = -0.26

Results



	LFMC	LFMC mod
Bragança	83	90
Caminha	87	90
Chamusca	87	86
Castro Daire	71	102
Chaves	84	103
Vila Real	86	104
Castelo Branco	70	93
Santarém	87	121
Sintra	---	102
Vale de Cambra	98	87



	LFMC	LFMC mod
Bragança	133	159
Caminha	---	135
Chamusca	104	151
Castro Daire	101	170
Chaves	105	165
Vila Real	146	166
Castelo Branco	87	163
Santarém	126	145
Sintra	122	154
Vale de Cambra	157	157

Discussion and Conclusions

- Results revealed good correlation values between **LFMC in-situ** data and **LFMC estimated**.
- These results vary spatially, being higher over the most sampled locations, as expected; and have the drawback of being site-specific.
- The influence of **LAI** is higher than the minimum of **LST,** being **LST** less important in the northeast Portugal.
- The study is at a preliminary stage, in order to improve the robustness of the model it was necessary:
  - Higher frequency of in situ measurements;
  - More in-situ measurement sites in the south of the country.
- Further work will focus on the assessment of the remote sensing-based **LFMC** estimations uncertainty, applying the analysis to other vegetation classes and the linking of **LFMC** to **fire danger and behavior**.

Thank you ☺

For any questions, please contact me by e-mail:
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