EGU22-10035
https://doi.org/10.5194/egusphere-egu22-10035
EGU General Assembly 2022

Live fuel moisture content approach using satellite data for Portugal mainland

Catarina Alonso[1], Rita Durão[1,2], and Célia Gouveia[1,3]
[1]Instituto Português do Mar e Atmosfera (IPMA), Portugal
[2]Centro de Recursos Naturais e Ambiente, Instituto Superior Técnico, Universidade de Lisboa
[3]Instituto Dom Luiz, Faculdade de Ciências da Universidade de Lisboa

The fuel moisture content (FMC) is an important property to assess fire danger, to control fuel ignition and fire propagation. The wetting and drying rates of the fuels are driven by the fuel characteristics and weather conditions, being FMC strongly driven by solar radiation influencing fuel temperature in the highly exposed fuels. Usually, FMC is divided into Dead Fuel Moisture Content (DFMC) and Life Fuel Moisture Content (LFMC). LFMC is not easily estimated due to plants' adaptation to drought and capacity of extracting water from soils that significantly vary among different vegetation species. Extreme climate events (such as droughts and heatwaves) are important factors addressed to fire danger assessment and related activities, due to their significant impacts on fuel conditions and in the vegetation status. High-impact mega-fires have been reported over areas where biomass and fuel accumulation present significant amounts. Therefore, the estimation LFMC is a useful approach to improve fire danger assessment, bringing also advantages in the study of the dynamics of biodiversity and biomass understory recovery.

Although LFMC in-situ measurements have limited spatial coverage and temporal sampling, the use of remote sensing data is essential to overcome space-time constraints and to develop methodological approaches to assess space-time LFMC variations over Portugal. Accordingly, to previous studies, LFMC estimation results improve when using a vegetation index together with the minimum temperature. The Leaf Area Index (LAI) is a quantitative measure of the amount of live green leaf material present in the canopy per unit ground surface. Since LAI and LFMC are interdependent variables with similar seasonal and interannual trends, it is possible to estimate LFMC based on LAI data.

The present work aims to obtain LFMC statistical model to pixel by pixel for Portuguese national scale, using LAI and Land Surface Temperature (LST) products, delivered by the EUMETSAT Land Surface Analysis Satellite Applications Facility (LSA SAF) and LFMC in-situ data for Atlantic Scrub that are routinely collected over 10 monitoring sites by AGIF (Agência para a Gestão Integrada de Fogos Rurais, IP).

Results revealed very good correlation values between LFMC in-situ data and LFMC estimated, ranging between 0.68 and 0.92, decreasing to values ranging from 0.30 and 0.90, highlighting the robustness of the model in the majority of the locations. 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 however being less important LST in the northeast of Portugal. Further work will focus on the assessment of the remote sensing-based LFMC estimations uncertainty and the linking of LFMC to fire danger and behavior.

Acknowledgments: This study was performed within the framework of the LSA-SAF, co-funded by EUMETSAT and was partially supported by national funds through FCT (Fundação para a Ciência e a Tecnologia, Portugal) under project FIRECAST (PCIF/GRF/0204/2017) and by the 2021 FirEUrisk project funded by European Union's Horizon 2020 research and innovation programme under the Grant Agreement no. 101003890).