

COPERNICUS & ME

Preventing and managing forest fires in Castilla-La Mancha



THE GOVERNMENT OF CASTILLA LA-MANCHA NEEDS RELIABLE AND UP-TO-DATE INFORMATION ON THE VARIABLES THAT CAN FAVOUR FIRES AND ON THE AFFECTED FOREST AREAS.



COPERNICUS SATELLITES PROVIDE DATA TO BOTH PREVENT AND MANAGE FOREST FIRES.



THE DATA PROVIDED BY COPERNICUS HAVE HIGHLY CONTRIBUTED TO DECREASING UNCERTAINTY AND INCREASING PREPAREDNESS AGAINST FOREST FIRES IN THE REGION.



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SPAIN IS ONE OF THE MEDITERRANEAN COUNTRIES THAT ARE AFFECTED THE MOST BY SUMMER FIRES.

Forest fires develop in lands where combustible vegetation and sources of ignition are available due to human or natural activity.

The fire risk increases in summer periods, when conditions get more favourable for vegetation and soil to burn, triggered by increased drought caused by high temperatures and low humidity [1].

According to a report issued by Mediterranean Experts on Climate and Environmental Change (MedECC), in recent decades longer fire seasons alongside more frequent and severe fires occur in some Mediterranean countries, due to extreme climate events such as heatwaves [2].

Furthermore, climate change might cause even more severe forest fires in the future, as more extreme temperatures in summer are expected in the Mediterranean region [3].

In the summer of 2021, major forest fires led to both ecological and economic losses in Spain [4].

OF ALL SPAIN'S REGIONS, CASTILLA-LA MANCHA IS THE ONE WITH THE MOST MUNICIPALITIES IN HIGH FIRE-RISK AREAS, WITH A TOTAL OF 780 [5].





Castilla-La Mancha is a Spanish autonomous community located in the southern half of the Iberian Peninsula's Inner Plateau.

With a population of over two million people, the community occupies an area of 79,463 km², including over 3.5 million hectares of forests, which represent 13% of the whole Spanish forests [6].

In Castilla-La Mancha, the fire season typically starts in June and ends in September.

TO LIMIT THE DAMAGE OF FIRES ON FORESTS AND TAKE BETTER PREVENTIVE MEASURES TO AVOID THEM, THE GOVERNMENT NEEDS RELIABLE AND UP-TO-DATE INFORMATION ON THE VARIABLES THAT CAN FAVOUR FIRES AND ON THE AFFECTED FOREST AREAS.



INFOCAM - JUNTA DE COMUNIDADES DE CASTILLA-LA MANCHA

Type of organisation: Public regional organisation

Country: Spain

Annual budget in 2020: €50m - €100m

Previous experience with Earth Observation data: Yes

INFOCAM, INTEGRATED IN THE REGIONAL DEPARTMENT OF SUSTAINABLE DEVELOPMENT, LEADS THE INTEGRAL MANAGEMENT OF FOREST FIRES IN CASTILLA-LA MANCHA.

INFOCAM performs its tasks in coordination with all the departments of the Government of Castilla-La Mancha, with local and provincial entities, and with the companies and private owners that are involved in sustainable rural development.

INFOCAM takes action to preserve natural spaces and improve the quality of the environment, including activities related to the prevention and extinction of forest fires.

The Analysis and Planning Unit (UNAP) of INFOCAM issues periodical forest fire risk reports, that are used to enforce preparedness and response to forest fires.

UNAP is operated by a staff of twelve people who are mostly forest engineers, processing data from a wide range of sources, including remote sensing observations.



To prevent and monitor forest fire risks, INFOCAM needs to monitor the conditions of the vegetation.

Indeed, this is crucial information to perform a fire risk assessment: vegetation stress makes it prone to combustion, due to drought and high temperatures in summer or freeze in winter.

COPERNICUS PROVIDES DATA ON VEGETATION RELATED TO PHENOLOGY, PHOTOSYNTHESIS ACTIVITY, AND VEGETATION STRESS.

INFOCAM uses Copernicus data from Sentinel-2 and Sentinel-3 satellites to estimate the Normalised Difference Vegetation Index (NDVI) and the Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) Index.

The NDVI describes the difference between visible and near-infrared reflectance of vegetation cover and can be used to estimate the density of green on an area of land.

This information is important to know the amount of vegetation that could be available for potential fires.

The FAPAR is the fraction of the solar radiation absorbed by live leaves for the photosynthesis activity.

The index indicates the green and alive elements of the vegetation.

The UNAP obtains these data as already filtered information for the purposes of the INFOCAM.



Map indicating the status of combustible materials. Source: INFOCAM's web GIS platform

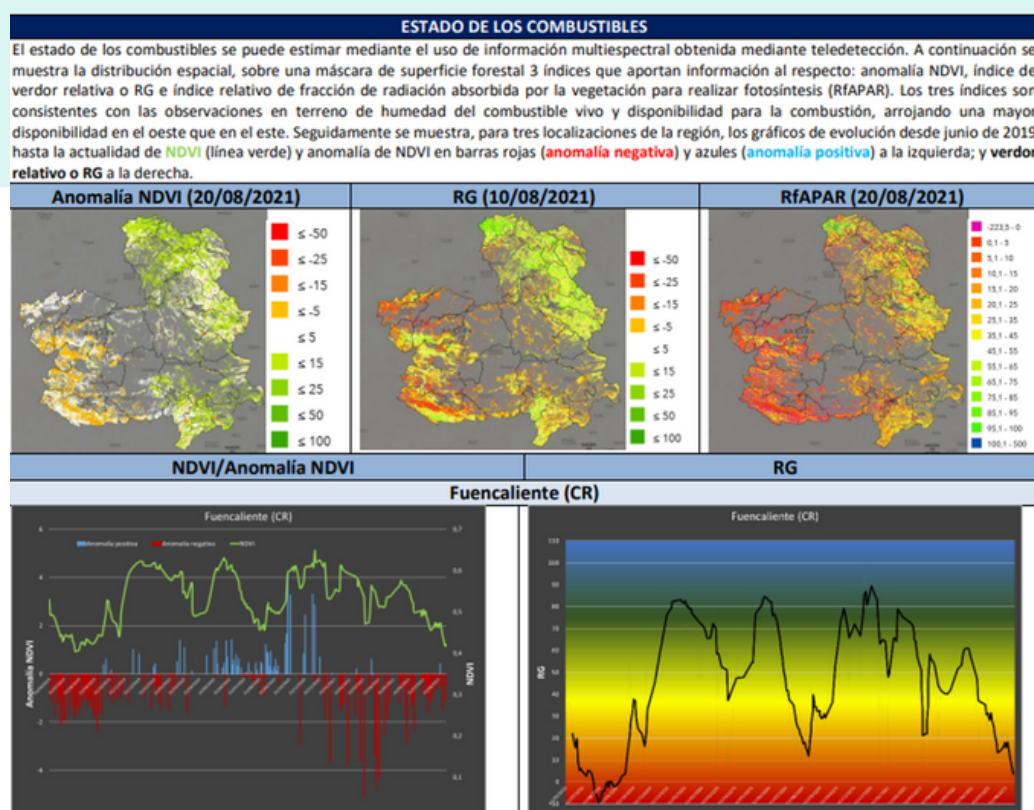
INFOCAM USES NDVI AND FAPAR INDICES PROVIDED BY COPERNICUS TO EVALUATE THE FIRE RISK.

These data are crucial to reduce uncertainty, especially with regard to emergency preparedness.

The maps and the data concerning the forest fire risks are provided to the stakeholders through a web-GIS (Geographic Information System) and daily reports that are distributed to the entities in charge of managing forests and fire risks.

Data from various indices can be also comparably used by INFOCAM to analyse variations between selected periods and estimate when and where the fire season is expected to start and what the risk areas are in Castilla-La Mancha.

Thanks to Copernicus data and services, the Analysis and Planning Unit can issue regular reports indicating the forest fire risks in Castilla-La Mancha and produce maps of the risks that are made available to all the entities involved in the implementation of the INFOCAM Plan.



Part of the Forest Fire Risk Report issued by the UNAP in August 2021. Status of combustible materials. © INFOCAM

Índice de Propagación Potencial de Incendios Forestales
 IPP previsto para la semana del 29 de noviembre al 6 de diciembre de 2021



Part of the Forest Fire Risk Report issued by the UNAP for the period 29 November - 6 December 2021. Index of potential spread of forest fires. © INFOCAM

**THE MAPS HAVE
HIGHLY
CONTRIBUTED TO
DECREASING
UNCERTAINTY AND
INCREASING
PREPAREDNESS
AGAINST FOREST
FIRES IN THE
REGION.**

The INFOCAM'S Web-based GIS platform contributes to enforcing preventive measures and preparedness in order to better protect forests from fires.

The fire season does not start every year at a same time. Instead, its start varies according to the weather of previous seasons.

Knowing the level of vegetation stress allows fire managers to determine when vegetation is more prone to combustion.

Remote sensing data provided by Copernicus represent a crucial tool to support fire services before the fire season starts and enable them to activate resources and procedures.

During emergencies, when fires are being managed, the vegetation condition indices provide fire managers with information about the spatial distribution of the fire risk that is useful to design operational plans for fire extinction.

Finally, the web-based GIS allows stakeholders to access information even from remote locations.

Based on the information on the fire risks contained in the maps, the region can increase or move resources (e.g., helicopters, fire engines and fire brigades) from prevention tasks to firefighting tasks in time.

Moreover, combined with wind and meteorological data, the maps allow for the forecasting of fire spreads into nearby areas.

LINKS

Castilla-La Mancha Website:

www.castillalamancha.es/

GEACAM Website: www.geacam.es/

INFOCAM Plan:

www.castillalamancha.es/sites/default/files/documentos/pdf/20180108/plan_infocam_2017.pdf

INFOCAM en la lucha contra incendios.

¿Qué es y cómo funciona?, Castilla-La Mancha Media:

www.cmmedia.es/noticias/castilla-la-mancha/que-es-infocam-y-como-lucha-contra-incendios/

Copernicus Emergency Management Service Mapping:

<https://emergency.copernicus.eu/mapping/#zoom=2&lat=22.06508&lon=66.41537&layers=OBT00>

Copernicus Global Land Service Website:

<https://land.copernicus.eu/global/>

Global Forest Watch Website:

<https://www.globalforestwatch.org/>

European Commission, Joint Research Centre, CEMS Rapid Mapping:

<https://data.jrc.ec.europa.eu/collection/id-0072>

REFERENCES

[1] Wildfires, Climate Change Services, Copernicus, 2020. Consulted on 3 December 2021.

[2] Risks Associated to Climate and Environmental Changes in the Mediterranean Region, A preliminary assessment by the MedECC Network, 2019. Consulted on 3 December 2021.

[3] Climate change impacts on wildfires in a Mediterranean environment, Climatic Change, August 2014. Consulted on 3 December 2021.

[4] La violencia de los incendios forestales convierte a 2021 en uno de los años más destructivos de la década, elDiario, 28 October 2021. Consulted on 4 December 2021.

[5] Half of Spain's towns at high risk of forest fires, ELPAIS, 13 October 2021. Consulted on 4 December 2021.

[6] Plan Especial de Emergencias por Incendios Forestales De Castilla-La Mancha (INFOCAM), Castilla La-Marcha 2017. Consulted on 10 December 2021.

CREDITS AND CONTACTS

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