

FIREURISK - DEVELOPING A HOLISTIC, RISK-WISE STRATEGY FOR EUROPEAN WILDFIRE MANAGEMENT

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Executive Summary

The deliverable D4.7 “Implementation of prototype datasets and services with existing system” is a deliverable of the WP4 “Integrating FirEURisk resources with other EU platforms and legacy systems” of the FirEURisk project.

The task aims at presenting the general approach considered for the future integration of prototype datasets and services with existing services and fire risk data portals. This activity results in a roadmap illustrating where, when and how the project results will be integrated with legacy systems.

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List of Acronyms

Table 1: List of Acronyms

List of Acronyms	
CAMS	Copernicus Atmosphere Monitoring Service
CLMS	Copernicus Land Monitoring Service
C3S	Copernicus Climate Change Service
DRMKC	Disaster Risk Management Knowledge Centre
EC	European Commission
EFFIS	European Forest Fire Information System
EU	European Union
GWIS	Global Wildfire Information System
NWP	Numerical Weather Prediction
WP	Work Package

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1 Introduction

1.1 Purpose of the document

The present document (Deliverable 4.7 “Implementation of prototype datasets and services with existing systems”) is part of the Task 4.3.1 “Integrating FirEURisk resources with other EU platforms and legacy systems” and presents the general approach considered for the future implementation of prototype datasets and services with existing services (planned for Q3 2024).

This document provides, in a synthetic way, an overview of the existing systems and fire risk data portals available at national, subnational and European level including EFFIS, DRMKC and the Copernicus services and the review of FirEURisk products. The review identifies the most appropriate formats and contents for integration within these portals and services and to guide the development of the public cooperative platform, including the data, services and research knowledge to be made publicly available. This activity results in a roadmap illustrating where, when and how the project results will be integrated with legacy systems such as EFFIS, DRMKC and Copernicus.

1.2 Structure of the Document

This document is organised in four Sections. In Section 2, the integration approach is described including the key objectives of this activity and the data exchange architecture approach. In Section 3, the review of the existing fire risk data portals at national, sub-national and European level is detailed as well as the review of the FirEURisk products portfolio. To facilitate the reading of the document, most of the tables that make up the review are presented in the annexes. In Section 4, the roadmap for integration of project datasets in existing European platforms is described including a selection of relevant datasets and the timeline for integration.

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2 Integration approach

2.1 Key questions and objectives

This document is part of the Work Package 4 "Multi-level integration", whose objectives and activities are related to the legacy of the FirEURisk project and, in the framework of this specific activity, the transfer of FirEURisk products/ outputs to existing external platforms and services.

This activity led us to consider the following key questions:

- What are the fire risk data portals available at national/subnational and European level? Which portals should be prioritised for integration?
- What would be the product prototypes? When will the prototypes products be available?
- What is the added value of the most relevant FirEURisk products?
- What are the minimum requirements/ technical specifications for data integration?
- How to display outputs from the Public Cooperative Platform and from existing platforms in a unified user interface?

The objectives of this work were therefore the following:

- Identify the fire risk management platforms to be approached
- Develop a tool to display outputs from the internal platform and from existing platforms in a unified user interface, on the web and also on most mobile devices
- Define a list of relevant datasets for integration into the selected platforms
- Define the integration roadmap for these products until the end of the project, including the integration timeline.

The following sections describe the way we met those objectives.

2.2 Architecture approach

Integration of FirEURisk products with existing and legacy sytems should enable the common display of data from various sources and their overlapping. From architectural point of view, the user interface level integration is selected as the most appropriate approach. In order to achieve this, the Public Cooperative Platform hosting the products must provide interface for data retrieval, preferabley following standard protocols. To ensure the interoperability capability, an unified user interface is developed, with purpose of demonstrating the interoperability between products and data from selected traditional platforms and Public Coopertive Platform of FirEURisk project. A unified user interface has been developed to display outputs from the Public Cooperative Platform and from selected existing platforms (Figure 1). In the process of development many challenges have been faced, such as the time standards and settings of a WMS server, the styling of the layers that cannot be remotely adjusted (tailoring needed at the host's end), many products are not ready yet and map layers will be continued to be uploaded to the interface. By overcoming obstacles and solving these problems, we have ensured the interoperability of data products with existing ones.

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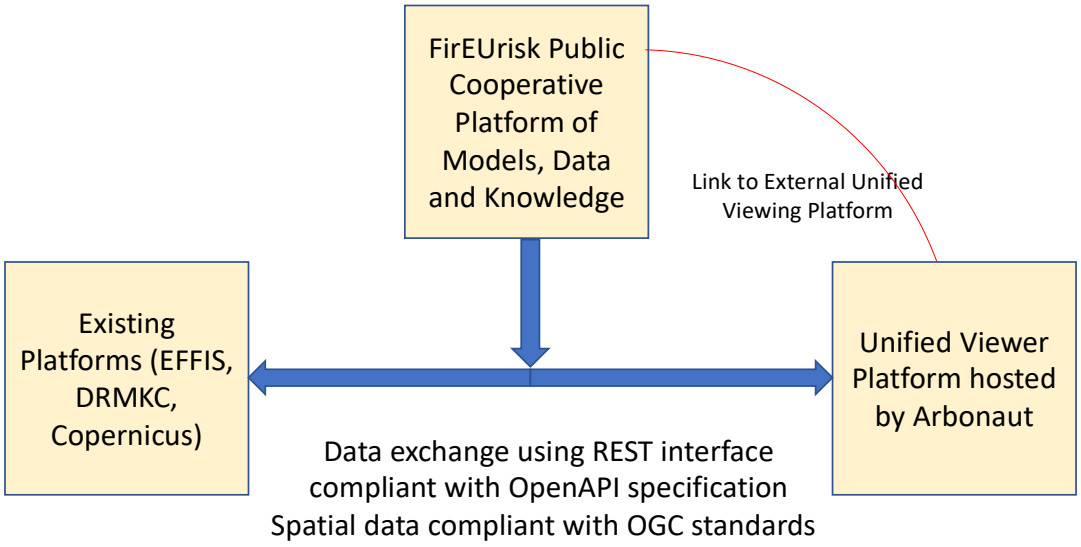


Figure 1 : Proposed architecture of the unified user interface.

Figure 2 displays the Unified Viewer Platform, which is linked to the Public Cooperative Platform. Ones the user requirements for data e.g. from EFFIS are know the agreements and functionalities of the exchange of data between the Unified Viewer Platform and the Existing Platforms are set. It is foreseen that not all end users are interested in all the data available at the FirEURisk Public Cooperative Platform nor at the Unified Viewer Platform.

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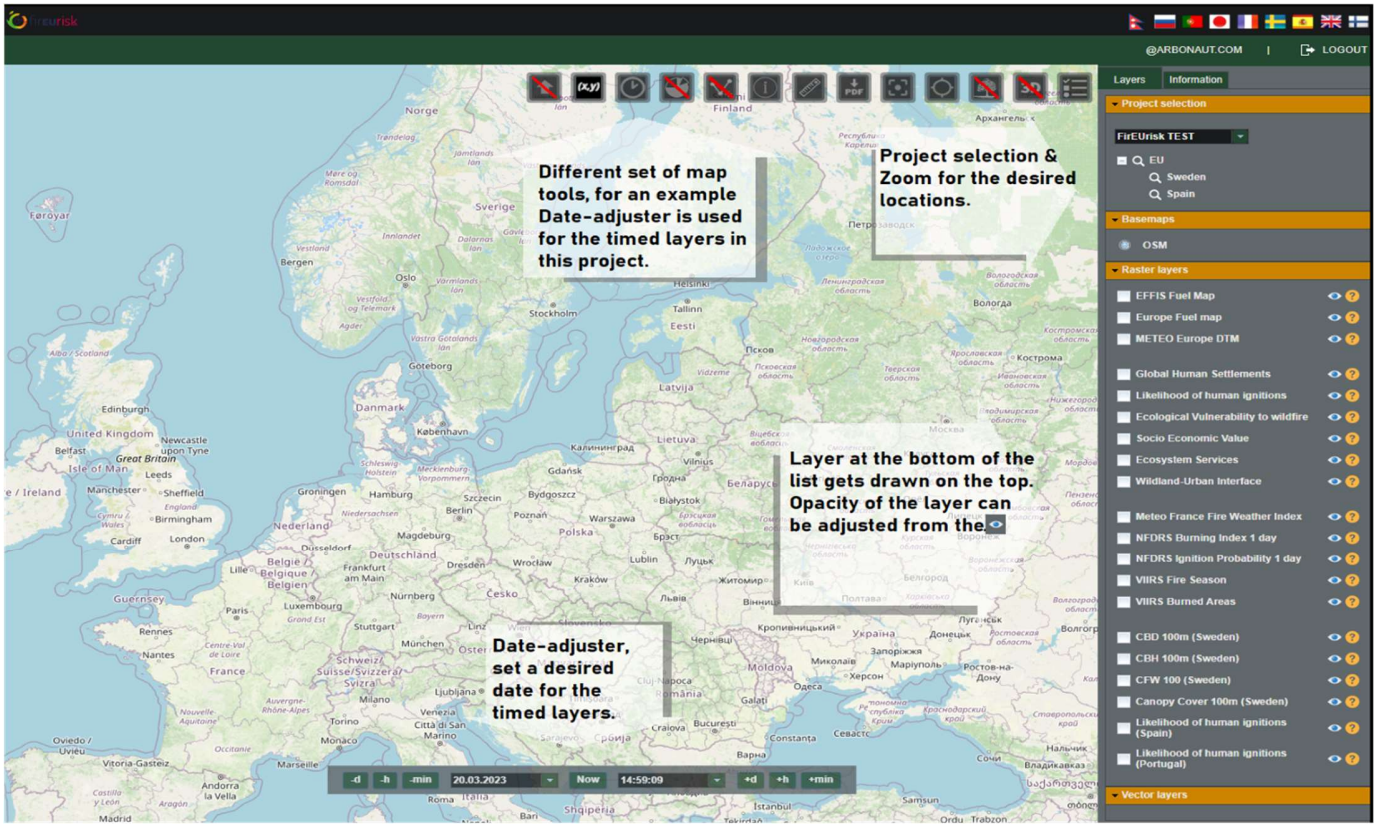


Figure 2: The Unified Viewer Platform

To visit the Unified Viewer Platform go to: https://test-proms.arbonaut.com/proms/login.jsp
username:
fireurisk_demo
password:
hKC;qMz5fuqW

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3 Review of the existing systems and fire risk data portals (including EFFIS, DRMKC and the Copernicus services) and FirEURisk products

3.1 Review of existing platforms

3.1.1 Scope of the review

The first step of this work was an exhaustive review of existing risk platforms at European level, national (partner countries of the project), and sub-national (including platforms in Pilot Sites) levels. This work has also benefited / echoed the work of WP5 – Pilot Sites and Demonstrations Areas for the identification of existing risk platforms at PS levels.

To do so, a list of Fire Risk Information specialists was set up and is available in *Annex A: List of fire risk country's specialist.*

Specialists were contacted to provide details about national/subnational platforms in their country that integrate fire risk information.
The scope of the review includes the following criteria:

Table 2: Analysis criteria for the review of fire risk data portals and systems

Portals and Platforms Table Heading	Description
Platform Name	Short Name for Platform
URL	Web Address (Uniform Resource Locator)
Description	Description of the Platform
General Themes	A list of the Fire Risk themes /topics the platform provides information on. (e.g. burnt areas, risk assessment, fire danger forecast, etc.)
Target Audience	The user groups the platform targets (e.g. general public, policy makers; Emergency responders; Foresters)
FirEURisk theme	Adaptation / Reduction / Response
Fire Circle Phase	Prevention and preparedness/ Response phase/ Recovery phase
Scale	Global/ Continental/ National/ Regional

Results of this work are presented in *Annex B: Repository of existing systems and fire risk data portals at global, European, national and* subnational levels.

The following conclusions emerged from the review:

- The type of platform, the target audience (general public, policy makers or emergency responders) and the type of data available differ widely from one country/region to another. Many platforms developed at national / subnational level are not adequate for an integration of FirEURisk either because the resolution of the subnational

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level data is too high or country specific or because they integrate only fire danger forecasts or indices tailored for local area.

- The integration work appears relevant for continental platforms (European) such as The European Forest Fire Information System (EFFIS), Copernicus C3S, the Disaster Risk Management Knowledge Centre (DRMKC) and platforms at the Pilot Site level. As initially approved in the Grant agreement, focus for integration will be done on the European platforms in the framework of this activity.

3.1.2 Prioritization and focus on EFFIS, Copernicus and DRMKC

3.1.2.1 EFFIS

EFFIS (European Forest Fire Information System) currently provides a European assessment of forest fires (from pre-fire to post-fire phase) using three moderate resolution products: burnt areas, Hot Spots, and hazard indices. The information is web-based.
EFFIS was established in order to support the responsible national authorities in charge of preventing forest fires in the European Union and neighbouring countries, as well as to provide the European Commission (EC) and the European Parliament with reliable information on the trends associated with these incidents. EFFIS became operational in 2000. Wildfire monitoring in EFFIS comprises the full fire cycle, providing information on the pre-fire conditions and assessing post-fire damages.
EFFIS includes, starting from the pre-fire state, the following modules:

1. Fire Danger Assessment
2. Rapid Damage Assessment, which includes
   2.1. Active Fire Detection and Burnt Area Mapping
   2.2. Land Cover type affected
3. Fire News module
4. Statistics portal

Additionally, at the core of EFFIS lies the so-called Fire Database, which includes detailed information of individual fire records provided by the EFFIS network countries. Annual reports on forest fires are based on contributions provided by 34 countries out of the 40 countries in the EFFIS partner network.

Within the first module of EFFIS, meteorological and numerical weather prediction data are processed daily at the global scale to produce fire danger forecasts, while the second module processes optical satellite image data on a daily basis to provide information on active fires and the perimeters of burnt areas in the European, Middle Eastern and North African regions.
The activities under the current Copernicus program cover operational forest fire monitoring activities for Europe including, at least, the first two modules and the sequential implementation of wildfire monitoring modules at the European and global scale.

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Overall, the activities in EMS EFFIS/Global Wildfire Information System (GWIS) include:

1. Fire Danger Prediction. The methods are based on the processing of meteorological Numerical Weather Prediction datasets (NWP) for the computation of fire danger forecasts and fire danger anomalies using in-situ data from national meteorological services and other relevant data providers for calibration and validation of fire danger predictions. Results of the above include the computation, with a resolution of 8 to 10 km, of: (1) daily fire danger forecasts 1 to 9 days ahead, (2) the computation of fire danger anomalies and historical ranking (percentiles) and (3) the provision of seasonal and monthly fire weather forecasts, i.e. temperature and rainfall anomalies that are expected to prevail over European and Mediterranean areas during the 4 weeks and the next 6 months. The former anomalies are updated every week while the latter anomalies are updated monthly.

2. EFFIS - Active fire mapping and near real-time monitoring of burnt areas. Location of active fires, as detected by satellite imagery and the accurate mapping of fires of approximately 30 ha or larger and updated information on their perimeters is provided twice daily based on medium (approx. 250-300 m ground spatial resolution) imagery. Additionally, a bi-weekly high-resolution burnt area map is produced using high spatial resolution imagery (approx. 20-30 m ground spatial resolution) for the European, Middle East and North-Africa region, i.e. the area covered by the EFFIS Active Fire and Burnt Area Mapping.

The main characteristics and sources of the products made available from the EFFIS portal are given in Table 3.

Table 3: Main products available from the EFFIS portal and characteristics.

Phase/Product name	Spatial resolution	Frequency	Data sources
Prevention/Preparedness			
Fuel map	100 m	European scale, not updated	
Daily Fire Danger Index (FWI, KBDI, MARK-5, NFDRS)	8 - 10 km, European scale	Daily ECMWF (8km), 1 to 9 days forecasts METEOFRANCE (10km), 3 days forecasts	ECMWF and METEOFRANCE meteorological data
Tactical			
Hot Spots distribution	375 – 1000 m	Europe – North Africa scale, 6 times per day	Satellite (MODIS, VIIRS), news from RSS feeds.
Recovery			
Burn Scar Map HR	min. 20 ha	Daily, Europe – North Africa scale	MODIS, VIIRS, Sentinel-2 (on demand)
Damage Severity Map	20 ha	Daily	MODIS, VIIRS (dNBR)

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3.1.2.2 Copernicus

Copernicus is the European Union's Earth observation program, looking at our planet and its environment to benefit all European citizens. It offers information services that draw from satellite Earth Observation and in-situ (non-space) data.
The Earth observation satellites which provide the data exploited by the Copernicus services are split into two groups of missions:

- **The Sentinels**, which are developed for the specific needs of the Copernicus program. Sentinel-1, -2, -3 and -6 are dedicated satellites, while Sentinel-4 and -5 are instruments onboard EUMETSAT's weather satellites. Note that Sentinel-5P, which is a precursor to Sentinel-5, is also a dedicated satellite;
- **The Contributing Missions**, which are operated by National, European or International organizations and already provide a wealth of data for Copernicus services.

Copernicus provides six services:

1. **Atmosphere**: The Copernicus Atmosphere Monitoring Service (CAMS) provides continuous data and information on atmospheric composition.
2. **Climate Change:** The Copernicus Climate Change Service (C3S) supports society by providing authoritative information about the past, present and future climate in Europe and the rest of the World.
3. **Emergency**: The Copernicus Emergency Management Service (Copernicus EMS) provides all actors involved in the management of natural disasters, man-made emergency situations, and humanitarian crises with timely and accurate geo-spatial information derived from satellite remote sensing and completed by available in situ or open data sources.
4. **Land**: The Copernicus Land Monitoring Service (CLMS) provides geospatial information on land cover and its changes, land use, vegetation state, water cycle and Earth's surface energy variables to a broad range of users in Europe and across the World in the field of environmental terrestrial applications.
5. **Marine**: The Copernicus Marine Service (or Copernicus Marine Environment Monitoring Service) is the marine component of the Copernicus Program of the European Union. It provides free, regular and systematic authoritative information on the state of the Blue (physical), White (sea ice) and Green (biogeochemical) ocean, on a global and regional scale.
6. **Security**: The Copernicus service for Security applications aims to support European Union policies by providing information in response to Europe's security challenges. It improves crisis prevention, preparedness and response in three key areas: Border surveillance, Maritime surveillance, and Support to EU External Action.

Among these services, the following are potentially capable to provide products of interest for FirEURisk or, in some way, benefit from FirEURisk products (deeply developed in the next section):

- **<u>Copernicus EMS service:</u>**

The Copernicus EMS consists of two components:

- a mapping component;

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- an early warning component.

The mapping component of the service (Copernicus EMS - Mapping) has a worldwide coverage and provides maps based on images from commercial and free satellites.

High resolution maps could be, in principle, used to validate FirEUrisk products (e.g. the quality of the burnt areas database used to develop vulnerability maps).

The early warning component, concerning fire, of the Copernicus EMS consists of:

The European Forest Fire Information System (EFFIS), which provides near real-time and historical information on forest fires and forest fire regimes in the European, Middle Eastern and North African regions.

The European Drought Observatory (EDO), which provides drought-relevant information and early-warnings for Europe.

Global Wildfire Information System (GWIS) and Global Drought Observatory (GDO) complete the previous two above systems at global level.

Table 4: Main components and products available from the Copernicus EMS service

Phase/Product name	Spatial resolution	Frequency	Data sources
CEMS			
Global Human Settlement	10 - 100 m	Global, updated every 5 years	Landsat, night-time lights
Rapid mapping			
Burn Scar Map HR	2m	On demand	VHR satellite sensors
Damage severity map HR	2m	On demand	VHR satellite sensors

➢ **Copernicus Land Monitoring Service (CLMS).**

The Copernicus Land Monitoring Service (CLMS) provides geospatial information on land cover and its changes, land use, vegetation state, water cycle and Earth's surface energy variables to a broad range of users in Europe and across the World in the field of environmental terrestrial applications.

CLMS consists of **five main components**:

- The systematic monitoring of biophysical parameters produces mainly a series of qualified bio-geophysical products on the status and evolution of the land surface.
- Land cover and land use mapping produces land cover classifications at various levels of detail, both within a pan-European and global context.
- Thematic hot-spot mapping aims to provide tailored and more detailed information on specific areas of interest, known as hotspots. Hotspots in the context of CLMS are prone to specific environmental challenges.
- Imagery and reference data which provide satellite image mosaic in high and very high resolutions and reference datasets.
- Ground motion. In addition to the above-mentioned components, a new European Ground Motion activity has been launched.

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Table 5 lists the products from CLMS, and their characteristics, of potential interest for FirEUrisk.

Table 5. List of products available from CLMS.

Phase/Product name	Spatial resolution	Frequency	Data sources
CLMS			
CORINE Land cover land use map	100 m (25 ha MMU)	European scale, updated every 6 years	
Imperviousness **Forests** **Grassland** **Water & Wetness** **Small Woody Features** **Settlement map**	10m (5m for Small Woody Features) 2 – 10m (Settlement map)	European scale, updated every 3 years Unknown (Settlement map, last 2016)	Sentinel-2 Settlement map (Pleiades, Deimos-02, WorldView-2, WorldView-3, GeoEye-01 and Spot 6/7)
Urban Atlas **Street Tree layer** **Building Height 2012** **Riparian Zone land cover** **Natura 2000**	10m (1 ha MMU) (0.05 ha MMU for STL) (0.5 ha MMU for RZ and N2K)	2018	Pléiades, KOMPSAT, Planet, SPOT6, SuperView, etc. - resolution 2 or 4 meters Building Height based on IRS-P5 stereo images and VHR false stereo pairs from the MAXAR catalogue (WV-01, WV-02, GE-01 and IK) supplemented by LiDAR data.
Dry Matter Productivity **FAPAR** **FCOVER** **LAI** **NDVI**	300m	Decadal	Sentinel-3
Soil Water Index	1km	Daily	Sentinel-1, Metop
Land Surface Temperature	5km	Hourly	MSG
Water bodies	60m	Monthly	Sentinel-2
Recovery			
Burn Scar Map	300 m	Decadal	Sentinel-3

3.1.2.3 Disaster Risk Management Knowledge Centre (DRMKC)

The European Commission Disaster Risk Management Knowledge Centre (EC DRKMC) integrates existing scientific multi-disciplinary knowledge and co-develops innovative solutions for existing needs. Activities of the EC DRMKC support the translation of complex scientific data and analyses into usable information and provides science-based advice for DRM policies.

The DRMKC Risk Data Hub is a multi-hazard Geo-portal aiming at providing a common tool for scientists, practitioners and policy-makers to support bridging science and policy, past and future, local/National/European and Global scales in the frame of DRM. It is conceived to be co-developed by **scientists and end-users** seeking to crystallize the science-policy interface.

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So far the Risk Data Hub provides maps in which, mainly at country level, the level of risk is provided selecting the asset (population, building, forests, etc.) and the hazard (geophysical, hydrological, meteorological, climatological, technological, biological, transportation, malicious).
The Risk Data Hub **takes care of data integration** required to host data on the online platform, but it does not change anything of what is received from the source.
DRMKC **provides a restricted area** dedicated to authorized users for managing their own data.

3.1.2.4 Review of the available data and functionalities on these European platforms

Annex C: Review of fire risk data products available in EFFIS and Copernicus Services presents the exhaustive review of data included in EFFIS and Copernicus platforms (time horizons, spatial scale…) and their functionalities (download/display, API, etc.).

3.2 Review of FirEUrisk products and platform for data selection

We conducted a review of the FirEUrisk Product portfolio (source of information on the upcoming products) and the SATWAYS platform (https://fireurisk.satways.net). The comparison of existing platforms and FirEUrisk products was performed in order to:

- ➔ Evaluate the added value of FirEUrisk products and their benefits for the existing platforms
- ➔ Select relevant prototype datasets to integrate (prototypes should covered European Territory level): fuel map, wildland urban interface, vulnerability maps…

The table below (Table 6) presents the definition of the selected datasets.

Table 6 : Definition of the selected datasets.

Product name	Description	Scale	Characteristics
Human ignition probability map	This product shows the likelihood of ignitions in Europe	European territory	**Spatial resolution**: 1km² **Static layer** **Output format**: .tiff ; .csv **Temporal coverage**: 2001-2019
Fuel type and model map	This product will include the fuel type and parameters following the standard classification of fuels agreed for the project. https://essd.copernicus.org/preprints/essd-2022-184/	European territory	**Spatial resolution**: 1km² **Static layer** **Output format**: .tiff **Temporal coverage**: 2018-2020

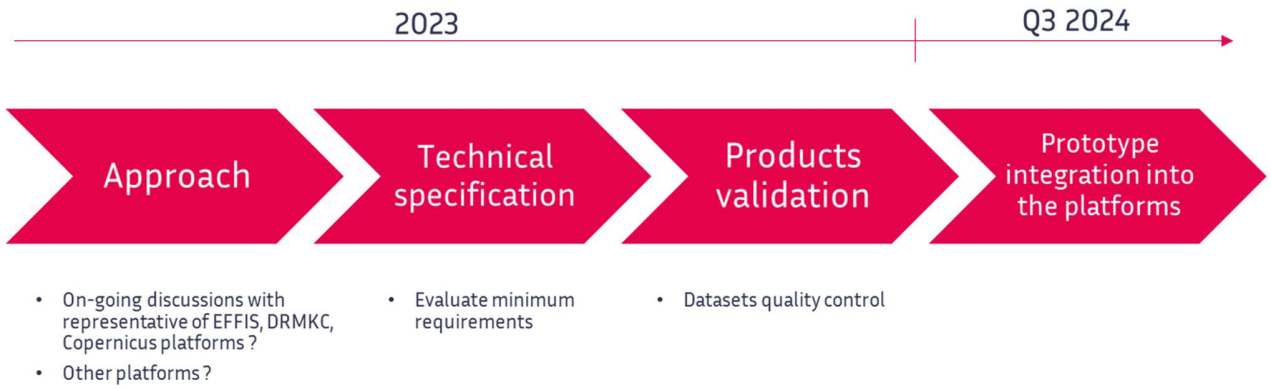
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Wildland – Urban Interface map	This product identifies the locations of wildland - urban interfaces (WUI) of two types, interface (where human settlements adjoin flammable vegetation) and intermix (where human settlements are interspersed with a matrix of flammable vegetation).	European territory	**Spatial resolution**: 10m **Static layer** **Output format**: .GeoTiff **Temporal coverage**: 2020
Fire effects on biodiversity database (FireonBio)	This database compiles information of wildfire effects on biodiversity (fauna and flora). All records will be referenced and, when possible, include geographic coordinates.	European territory	**Spatial resolution**: 1km² **Static layer** **Output format**: .csv **Temporal coverage**: 2001-2019
Vulnerability map	The calculation of the integrated propagation risk and vulnerability map will be based on a multi-criteria analysis of input data that take into account: meteorology, geomorphology, vegetation and sociological factors.	It could be applied to any region if appropriate meteorological service could be realized.	**Spatial resolution**: 100m **12 months minimum production update** **Output format**: .tiff, .pdf **Temporal coverage**: calculation performed 2 times a day for next 12 hours

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4 Roadmap for integration of project datasets in existing platforms

4.1 Timeline



The following steps of the roadmap will be followed for the selected products to integrate.

4.1.1 Approach

Currently there is an active line of communication with EFFIS to interact between their platform and FirEURisk. This collaboration is two-way:

- ➔ Data from EFFIS (the Fire Weather Index and Burned Area) have been integrated into the FirEURisk mobile application.
- ➔ EFFIS has expressed their interest in adding some of the products developed by FirEURisk to their system: in case of static products, such as the fuel map or the vulnerability map, they could integrate the final products directly into their system. In case of dynamic products, such as fuel moisture content, they are more interested in the methods and algorithms, to be able to compute the products in an operational way, even after the FirEURisk project ends. In any case, before adding products to the EFFIS platform, the FirEURisk product developers need to evaluate and validate their products, to assure that they comply with the quality standards of EFFIS. For this reason, the specific steps to incorporate FirEURisk data into EFFIS will start after the end of the WP1 activities once the products have been finished and evaluated. What is more, it would be beneficial if the products have been tested in some Pilot Sites to confirm they're fit to purpose.

4.1.2 Technical specifications

Annex A contains some details on the characteristics of the products made available by the existing platforms analysed in this document.

EFFIS does not allow the automatic download of dynamic products, which limits the use of its products in an operational way. Another limitation is the relatively coarse spatial resolution of the products offered on the platform, which, while adequate to provide a synoptic view of the wildfire situation at the European scale, oftentimes proves insufficient at the smaller national, regional and local scales.

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The Copernicus platform does allow automatic download of dynamic products, but only a handful of them (concerning vegetation status) are useful in the framework of fire management.
In general, we have to consider a two-way flux of the products or information concerning the FirEUrisk field of interest:

- Static and/or dynamic products produced in FirEUrisk can be delivered through the FirEUrisk platform and at the same time can be distributed to other existing platforms to be integrated in their own information system;
- Products made available from other initiatives can be integrated into the FirEUrisk platform.

In both cases, in order to facilitate the integration, it is necessary to provide additional information, namely:
FirEUrisk ➔ others

- Data format, spatial resolution, extent of the area to be covered by the product, requested data update frequency. For instance, in order for a product to be integrated into the EFFIS platform, it should have a certain spatial resolution and cover the whole European territory as well as the countries of Turkey and Cyprus.
- FirEUrisk Public Coopertive Platform complies with INSPIRE and Open Geospatial Consortium (OGC) and provides WMS REST based API for integration of selected products into maping interface. To ensure this, an unified user interface has been developed. During development extensive testing of WMS interoperability capability has been carried out. All identified obstacles and problems have been communicated with Platform developers and corrected.

Others ➔ FirEUrisk

- In this case, we have less uncertainty since we already know the characteristics of the products available from already established initiatives (e.g. EFFIS, Copernicus) and then we are tasked to assess whether or not the available products are suitable for the FirEUrisk objectives. Issues arise concerning the availability of tools to download these products with the objective to integrate them into the FirEUrisk platform, and/or to exploit them to compute advanced products of interest [Danger + Exposure + Vulnerability == Risk] (see Annex C).

To conclude these brief considerations of the requirements for an effective data exchange with other platforms, a third possibility in which no data are transferred between platforms should be considered. In this case, other platforms would decide to adopt the FirEUrisk research findings in terms of methodologies and would independently retrieve the information of interest. Therefore, project partners should only ensure that the methodology is well described and documented in the associated deliverables or scientific papers in order to ensure the replicability of the results.
In Figure 3, with reference to the FirEUrisk integration scheme, we see where the information provided by the main platforms considered in this document could provide useful input to the FirEUrisk project.

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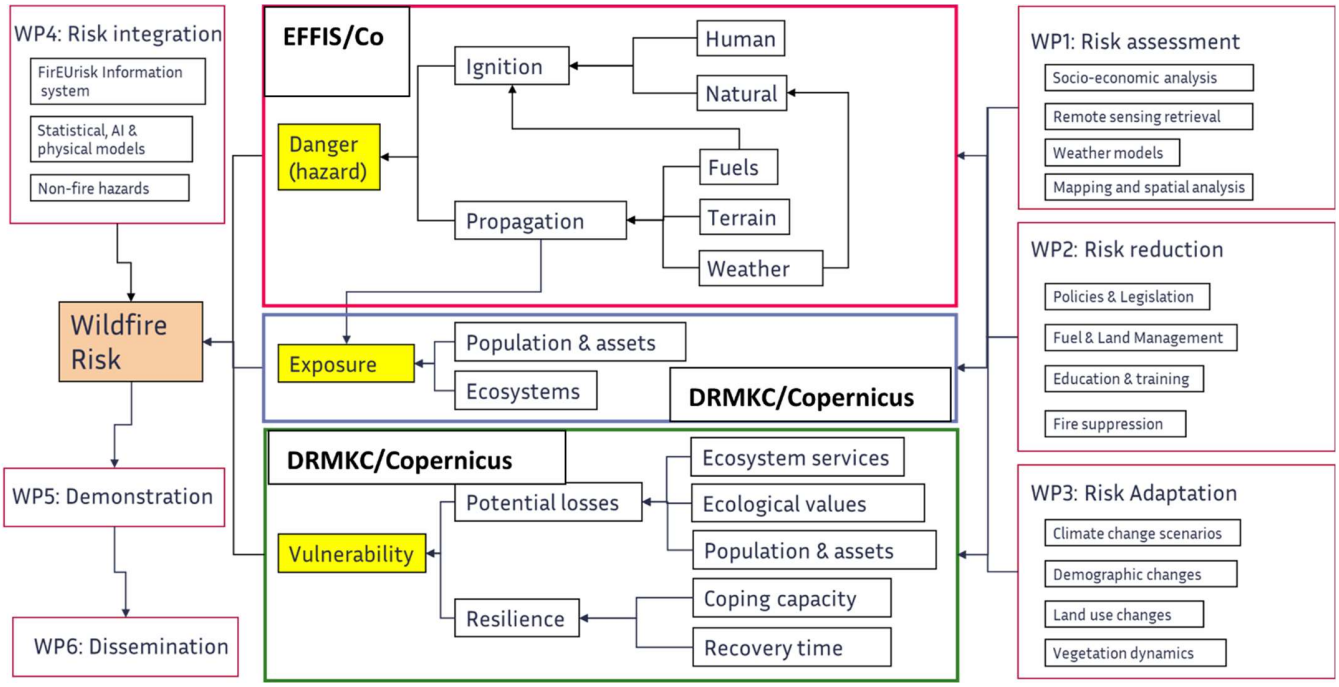


Figure 3: Position of existing platforms in the conceptual diagram of fire risk components for FirEURisk.

It is worth noting that only the Copernicus Land Cover Service provides medium to high resolution maps suitable for national/regional/local scale assessment of risk.

DRMKC does not contain relevant data concerning wildfire risk. Furthermore, it covers different types of risks (geophysical, hydrological, meteorological, climatological, technological, biological, transportation, malicious). Since not all European countries are prone to the same risks, in principle, even FirEURisk products available at national or regional scale might be integrated in this system. Therefore, the possibility to provide to this platform information computed in FirEURisk should be explored.

4.1.3 Products validation

The outcomes of FirEURisk will be validated through the ongoing WP1 activities.

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5 Conclusions

The Deliverable 4.7 – *Implementation of prototype datasets and services with existing systems*, presents the roadmap for the future integration of FirEURisk prototype products with existing fire risk platforms such as EFFIS, DRMKC and Copernicus. At this stage of the project, active communication is ongoing with EFFIS that has expressed their interest to add some of the products developed by FirEURisk to their system, either static products (i.e., fuel map, vulnerability maps) or the methods and algorithms of dynamic products (i.e., fuel moisture contents). This incorporation is planned at the end of WP1 activities once the products have been completed and validated. Interactions with other existing platforms will be continuous throughout the project's duration depending on their data requirements and interest in using the information produced by the project.

In addition, a unified tool interface has been developed to display outputs from the internal platform and from existing platforms. The unified user interface tools rely on WMS API provided by FirEURisk Public Cooperative Platform and demonstrates interoperability capability on user interface level. The selected producs are easily integrated into unified user interface and enable overlaying of EFFIS and FirEURisk map products.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003890.

6 Annex A: List of fire risk country's specialist

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Country	Partners	Fire Risk Information specialist
Bulgaria	IICT-BAS	Wildfire Task group Chair leading a group in Bulgarian Academy of Sciences which is 152 years old research organization working for the national stakeholders on national, regional or municipal levels. https://riskmap.bg/
Croatia	FESB SPLIT	Associate professor at Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture – University of Split
Cyprus	EUC	Scientific Collaborator on Fire Safety Engineering in the European University in Cyprus. Research associate at CERIDES
Finland	OY Arbonaut ltd, FMI	CTO of Arbonaut
France	SAFE CLUSTER, UVSQ, IRD	Point of contact for forest fire risk management in the General Directorate for civil security.
Germany	SNG, TUD, PIK	Research scientist and project manager at the TU Dresden
Greece	KEMEA, NCSR, AUTH, SATWAYS	Professor at the Faculty of Forestry and Natural Environment – Researcher in Geoinformatics, Remote Sensing and Cartography Aristotle University of Thessaloniki
Israel	HU	Head of the Fire Research Branch Operations Division at The Israeli National Fire and Rescue
Italy	SIA, CNR, ISIG	Point of contact for fire risk management in the technical Scientific Activities Office of the Civil Protection Department
Netherlands	STICHTING VU	PhD Research working on comparing land management strategies across the EU to reduce the risk of wildfire.
Portugal	ADAI, IPMA, UAVR	Research scientist at the Center of Studies on Forest Fires (ADAI)
Romania	INCDS	Senior Researcher at National Research and Development Institute in Forestry ”Marin Dracea”
Spain	UAH, UCO, Meteogrid sl, UdL, SCIENSEED, GMV, CSIC	Associate Director at Meteogrid
Sweden	RISE	Research scientist at RISE on wildfires, their ignition, behaviour and consequences to society
UK	HUTTON, KCL, SU	Forestry Commission's advisor for central government on wildfire

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Ukraine	Regional Eastern Europe Fire Monitoring Center	Head of the Regional Eastern Europe Fire Monitoring Center (REEFMC) Professor at the National University of Life and Environmental Sciences of Ukraine
PA - 1 (Kalmar Ian)	Research Institutes of Sweden (RISE)	Research scientist at RISE on wildfires, their ignition, behaviour and consequences to society
PA – 2 (Central Europe)	TUD	Project scientist at Technische Universität Dresden (TUD).
PA – 3 (Central Portugal)	ADAI	Research scientist at ADAI
PA – 4 (Barcelona Province)	UdL	Professor at UdL
PA – 5 (East Attika Region)	KEMEA	Senior researcher at KEMEA

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7 Annex B: Repository of existing systems and fire risk data portals at global, European, national and subnational levels

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003890.

Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
The European Forest Fire Information System (EFFIS)	https://effis.jrc.ec.europa.eu/	Several platforms combined. Current Situation Viewer: meteorological fire danger maps and forecast up to 6 days, daily updated maps of hot spots and fire perimeters. Firenews: collects, geo-locates and stores in a database fire news published on the internet in all the EU and other languages. Long-term fire weather forecasts: Monthly and seasonal forecasts of temperature and rainfall anomalies.	Fire Danger Forecasts; Active Fires; Burnt Areas; Fuels; Human Settlement; Protected Areas, Landcover; Fire News;	Policy Makers; Emergency Responders; Foresters; General Public	All	All	Continental	
Global Wildfire Information System (GWIS)	https://gwis.jrc.ec.europa.eu/apps/gwis_current_situation/index.html	The same as EFFIS, developed by the same team, but at global scale.	Fire Danger Forecasts; Active Fires; Burnt Areas; Fuels; Human Settlement; Protected Areas, Landcover; Fire News;	Policy Makers; Emergency Responders; Foresters; General Public	All	All	Global	
Copernicus C3S	https://cds.climate.copernicus.eu	Fire weather indicators for Europe from 1970 to 2098 derived from reanalysis and climate projections (Application) Fire danger indicators for Europe from 1970 to 2098 derived from reanalysis and climate projections (Dataset) Fire-burnt area from satellite observations (provided by UAH).	Future danger; burnt areas	Policy makers; Researchers	Adaptation	Prevention and preparedness	Global	
Copernicus Land services	https://land.copernicus.eu/	Satellite based land cover products provided at 3 years frequency plus specific products like burnt areas which are provided at 10 days frequency.	Burnt areas; Human settlement; Land cover; Forest type and three density cover; fire danger; fuel map	Foresters; Prevention/Preparedness	All	Prevention and preparedness	Continental	
Emergency Management System	https://emergency.copernicus.eu/emsdata.html	Mapping post event	Burnt areas; population density ; damage assessment	Responders	Response	Recovery phase	Global	

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
Disaster Risk Management Knowledge Centre	https://drmkc.jrc.ec.europa.eu/risk-data-hub#/risk	Integrates existing scientific multi-disciplinary knowledge and co-develops innovative solutions for existing needs. Activities of the EC DRMKC support the translation of complex scientific data and analyses into usable information and provides science-based advice for Disaster Risk Management policies.	Risk Assessment? No data are available on the DRMKC data hub	Policy Makers	Reduction	Prevention and preparedness	Continental	
ESA Biomass Climate Change Initiative (Biomass_cci)	https://climate.esa.int/en/odp/#/project/biomass	The primary science objective ESA's Climate Change Initiative Biomass project is to provide global maps of above-ground biomass (Mg ha-1). Although this resolution is finer than required for current climate modelling, it will allow more refined information to be inferred (e.g. forest age structure and the disturbance regime) that is relevant for climate and has the potential to be exploited by carbon cycle and climate models as they develop.	Land cover, fuel map	Policy Makers; Emergency Responders; Foresters.	All	Prevention and preparedness	Global	
FIRMS (Fire Information for Resource Management System)	https://firms.modaps.eosdis.nasa.gov/	The Fire Information for Resource Management System (FIRMS) distributes Near Real-Time (NRT) active fire data within 3 hours of satellite observation from the Moderate Resolution Imaging Spectroradiometer (MODIS) aboard the Aqua and Terra satellites, and the Visible Infrared Imaging Radiometer Suite (VIIRS) aboard S-NPP and NOAA 20 (formally known as JPSS-1).	Active fires, burned areas	Emergency Responders; Foresters	Response	Response phase	Global	
Spanish Meteorological Agency (AEMET)	http://www.aemet.es/es/eltiempo/prediccion/incendios	Daily maps of fire danger (called risk in the system)	Fire Danger Forecasts		Response	Prevention and preparedness	National	Spain
Emergencies Comunitat Valenciana	https://www.112cv.gva.es/va/incendios-forestales	Different Spanish Communities have maps of fire risk in their websites.	Fire Danger Forecasts		Response	Prevention and preparedness	Sub-national	Spain

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
Xunta de Galicia	https://mediorural.xunta.gal/es/temas/defensa-monte/irdi	Different Spanish Communities have maps of fire risk in their websites.	Fire Danger Forecasts		Response	Prevention and preparedness	Sub-national	Spain
Comunidad de Asturias	http://www.112asturias.es/v_portal/apartados/apartado.asp?te=223	Different Spanish Communities have maps of fire risk in their websites.	Fire Danger Forecasts		Response	Prevention and preparedness	Sub-national	Spain
AdriaFireRisk	http://propagator.fesb.hr/AdriaFireRisk/	AdriaFireRisk calculates site-specific wildfire risk index based on experimental system for micro location wildfire risk index calculation developed for Split – Dalmatia County. AdriaFireRisk is also a support system for additional HOLISTIC project result – AdriaFireRiskPanels designed to raise the awareness about the wildfire risk in order to increase caution and reduce the number of accidental wildfires.	Risk assessment (takes meteorological, vegetation, terrain, and anthropological parameters into account)	Broad population. Displayed on panel	All	Prevention and preparedness	Sub-national	Croatia
Fire Detect AI	https://oiv.hr/en/services-and-platforms/oiv-fire-detect-ai/	Information system for forest fire video surveillance and monitoring. Network of 96 cameras mounted in forests in Croatia with automatic smoke detection and alarming. Information system integrated with GIS and coupled with AdriaFireRisk , AdriaFirePropagator and EFFIS hotspots and burnt area products in one user interface.	Early fire detection, alarming, Fire surveillance	Emergency Responders; Foresters	All	Prevention and preparedness	Sub-national	Croatia
AdriaFirePropagator	http://propagator.fesb.hr/login.php	AdriaFirePropagator is a Web based system for wildfire behaviour modelling and wildfire spread simulation. Web based means that all the data are stored on the server, and all the applications in the fire simulation software are server-based programs that run when requested by the users and the only user interface is a standard web browser.	Risk assessment	Emergency Responders	Response	Response phase	National	Croatia
Mapa de perill	http://agricultura.gencat.cat/ca/ambits/medi-	Catalunian fire risk map	Risk assessment			Prevention and	Sub-national	Catalonia

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
d'incendi forestal	natural/incendis-forestals/mapes/mapa-perill-incendi/					preparedness		
Multisites	http://multisites.ipma.pt/anpc/	It provides information and data for the EXCLUSIVE use of the SNPC and is based on pre-established agreements between the various entities that participate in the SNPC. The information made available through this channel, IPMA maintains operational other forms of communication, pre-established, with the National Civil Protection Authority.	Data, forecasts, warning and fire risk related information	National Civil Protection Authority			Regional	
MF2 - Meteorological Hazard of Rural Fires	http://mf2.ipma.pt	The project, "MF2 - Meteorological Hazard of Rural Fires", was developed within the scope of the "data services" initiative based on the strategic objective of modernizing data exploration tools to support decision-making. The web platform developed aims to serve as an interface for users to access data, resulting from numerical processing of atmospheric models and remote detection. The way to access the data is through a computer system for viewing and downloading geo-referenced data.	Fire related data visualization and dissemination	fire end-user and public			Regional	
FEB Monitorização	https://arcg.is/1CXqDK0	Decision support platform	Operational information; meteo; burned areas; risk maps; etc…	Civil Protection Agents	Response	All	National	Portugal PA-3
Análise Estratégica	https://arcg.is/0Pqzyi	Fire Risk analysis and expected fire behaviour for all the national territory (3 days basis)	Meteo analysis; fire Risk per region; etc.	Civil Protection Agents	Response	Prevention and preparedness	National	Portugal PA-3
SADO	http://sado.prociv.local/sado/	Data repository of all civil protection operations	Operational information; timeline of operations; available assets, etc.	Civil Protection Operational Structure	Response	Response phase	National	Portugal PA-3

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
Dashboard Incêndios Rurais	https://arcg.is/4bXXn	Data about ongoing operations	Public information on the ongoing occurrences	All	Response	Response phase	National	Portugal PA-3
Site ANEPC - Ocorrências ativas	http://www.prociv.pt/pt-pt/SITUACAOOPERACIONAL/	Official site	Public information on the ongoing occurrences	All	Response	Response phase	National	Portugal PA-3
SGIF	https://fogos.icnf.pt/sgif2010/login.asp	"Platform with different levels of access and permissions, which enables the collection, analysis, dissemination and consultation of information related to rural fires. - Data connection to the SADO platform and to IPMA's daily meteorological data. - Handling of diverse information at the level of each occurrence by the GNR and forestry technical offices - Upload of DFCI activity by DFCI Technicians (ICNF and GTF) - Repository of documental information for access to all registered users - Public area with relevant information in terms of awareness-raising content; web services."	Management Fires data Infrastructure Planning Statistics Maps	Restricted: for entities that produce, edit and consult information Public: consultation of general results in maps, charts and tables	All	All	Continental	
SISF	https://fogos.icnf.pt/sapadores/login.asp	Platform with different levels of access and permissions, which enables the collection, analysis, dissemination and consultation of information related to the Forest Sapper Program	Management Planning Statistics Professional qualification	Restricted: for entities that produce, edit and consult information	All	All	Continental	
PSF - Citizen support in fuel management	https://sig.icnf.pt/portal/apps/View/index.html?appid=e6a63345a0c64eed927a875c8c44feab	In the PSF application - Citizen support in fuel management (Dashboard and WebSIg) the citizen can search which teams operate in a certain area of interest for fuel management. It allows consulting the managing entities, contacts of these teams, and getting in touch with those responsible. You can also take terrain measurements, print the map or share it via email, Facebook or Twitter.	Planning Forest fire reduction	General public	Reduction	Prevention and preparedness	Continental	

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
QueimasQueimadas	https://fogos.icnf.pt:8443/queimasqueimadas/	Platform with an interface for recording citizen requests for extensive burnings or burning in heaps that aims to : - Carry out a centralised management of applications for authorisation of extensive burning and burning in heaps - Simplify and facilitate access to authorisation and evaluation requests and their responses - Increase knowledge of risk conditions for those who practice and for those who authorise burning actions	Vegetation management Forest fire reduction Statist	Public area to register burning requests Restricted area for entities that evaluate the requests and make decisions on the requests.	Reduction	Prevention and preparedness	Continental	
Aplicação PMDFCI	https://fogos.icnf.pt/infoPMDFCI/PMDFCI_PUBLICOlist.asp	The PMDFCI application is a forest fire management plans consulting platform	Planning	Public: Access to the public content of the Municipal Fire Protection Plan (PMDFCI) Restricted: Restrictive access to Forestry Technical Offices (GTF). for loading alphanumeric information.	All	Prevention and preparedness	Continental	
Aplicação de apoio GIFR	https://sig.icnf.pt/portal/apps/webappviewer/index.html?id=37d5532c334a4e8b98ed93e5b8bea7f4	WebSIG platform with different levels of access and permissions, which enables the collection, consultation and monitoring of DFCI execution. This application aims to make it possible to consult public geographic data in an easy-to-access support for those involved in the management of rural fires – from specialist technicians to the common citizen, in order to reduce the pressure of requests for information sharing. It intends to support action in forest fire risk management by making available in one place information residing	Maps Statistics	Restricted: visualization of classified maps and edition of geographical information	None	None	Continental	

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
		in several systems, especially SGIF platform data and SISF platform data: Available tools: • Layers list (turn layers on/off, manipulate transparency some more) • Location search • Survey of Fire Start Points (Code SGIF) • Area/distance measurement tool • Selection tool • Map printing tool • Proximity Analysis Tool						
INSPIRE geoportal (Bulgaria)	https://inspire.egov.bg/en	Ministry of electronic services host all available electronic data in BG that can be used in any kind of situation	Data sets for Bulgarian territory. No specific functionalities	All	Adaptation	Prevention and preparedness	National	Bulgaria
Riskmap platform (south Bulgaria)	https://riskmap.bg/	Hosted and developed by IICT-BAS led by Assoc. Prof. Nina Dobrinkova for 5 vulnerable zones in south Bulgaria. Users of the platform are local fire brigades, forestry departments, municipal representatives and volunteer groups. Data repository for meteorological forecasts, critical infrastructure, forestry inventory, flood potential zones calculated with time steps of 50, 100, 500, 1,000 years waves. Only registered users can access the data. Bulgarian language only is available.	Risk assessment and operational information on the field	Local fire brigade units, municipal units, forestry units, volunteer groups.	Response	Response phase	Sub-national	Bulgaria
Previncat	http://previncat.ctfc.cat/en/index.html	Web server aiming at providing the required information to plan fuel and forest management actions to reduce the risk of large forest fires in Catalonia	Risk assessment	All	Reduction	Prevention and preparedness	Sub-national	PA-4
Severicat	http://severicat.ctfc.cat/?lang=en	SEVERICAT is a burn severity map server offering data from Catalonia from 1986 and beyond. Burn severity refers specifically to fire effects on above-ground biomass.	Public information on the ongoing occurrences	All	Response	Recovery phase	Sub-national	PA-4

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
Incendis forestals	http://interior.gencat.cat/ca/arees_dactuacio/proteccio_civil/consells_autoproteccio_emergencia/riscos_naturals/incendi_del_bosc/	Portal of the Catalan government with outreach information for the general public	Recommendations in case of wildfire; self-defence	Broad population. Displayed on panel	Adaptation	Prevention and preparedness	Sub-national	PA-4
Cartographic bases on forests of the Generalitat.	http://agricultura.gencat.cat/es/serveis/cartografia-sig/bases-cartografiques/boscos/	Cartographic information related to wildfires and forest attributes	Burned areas, risk maps, fuel flammability, fire defence infrastructures, etc	All	All	Prevention and preparedness	Sub-national	PA-4
Natuurbrand Risico	https://www.natuurbrandrisico.nl/	Daily risk updates from the government of the Netherlands. The country is broken up into 25 safety regions for which fire risk is assessed regularly. Risk is described in two phases. Website is fairly basic.	Fire danger monitoring/ forecasting.	General public	Reduction	Prevention and preparedness	National	The Netherlands
Deutscher Wetterdienst Waldbrandgefahrenindex	https://www.dwd.de/DE/leistungen/waldbrandgef/waldbrandgef.html	German National Weather Service Forest Fires Danger Website (operates from March - October) The WBI is used by the state authorities responsible for forest fire prevention to assess the risk of forest fires and to issue warnings. The forest fire danger levels of the DWD thus form the basis for a forest fire danger presentation harmonized at state level. The local assessment of the risk of forest fires may differ from the DWD product. Updated Daily	National Map showing fire risk index (scale 1-5)	All	Reduction	Prevention and preparedness	National	Germany
Sachsenforst Waldbrandgefahrenstufen	https://www.mais.de/php/sachsenforst.php	Uses national fire risk level, adapted to local regional specifics such as forest type. (https://www.wald.sachsen.de/Karte_Waldbrandgefahrenklassen_Sachsen_2021.pdf\) The demarcation and presentation of the individual forest fire hazard classes is carried out administratively on the basis of the municipalities. The designation of the forest fire hazard classes is	Regional (Saxony) Map showing fire risk index (scale 1-5)	All	Reduction	Prevention and preparedness	Sub-national	Germany

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
		based on the forest fires that have been statistically recorded over many years, their burnt area and frequency, taking into account the ignition and burning readiness of existing forest structures (tree species composition and age) as well as regional site and climatic conditions. Updated daily and available as an App for mobile devices, showing fire risk at sub-state level.						
Land Brandenburg Aktuelle Waldbrandgefahrenstufen	https://mluk.brandenburg.de/mluk/de/landwirtschaft/forst/waldschutz/waldbrandgefahr-in-brandenburg/waldbrandgefahrenstufen/	Provides information on daily fire risk across Brandenburg (Based on German National Weather Service information) Updated daily	Regional (Brandenburg) Map showing fire risk index (scale 1-5)	All	Reduction	Prevention and preparedness	Sub-national	Germany
FireRisk.cz	https://www.firerisk.cz/	Provides detailed map illustrating fire risk in the Czech Republic, includes forecast at local authority level, includes drought, wind, temperature and atmospheric stability	National Map showing fire risk index (scale 1-5)	All	Reduction	Prevention and preparedness	National	PA-2
Inspectoratul General pentru Situatii de Urgenta - IGSU (National Inspectorate for Emergency Situations)	https://gis.ro-risk.ro/arcgis/sharing/portals/self?f=pjson https://www.ro-risk.ro/SitePages/Pornire.aspx	Portal to assess the disaster risk for 10 types of hazards, including forest fires at Local Administrative Unit level. The risk and hazard are assessed in three different national scenarios (probability of occurrence at 10, 100 and 1,000 years).	Risk assessment	All	All	Prevention and preparedness	National	PA-2
Fire Ukrforest	https://fire.ukrforest.com/map/index	Managed by State Forestry Committee and reflects occurrence of fires (MODIS + forestry statistics), fuel type and ignition probability	Fire danger	All		Prevention and preparedness	National	Ucrania

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Platform Name	URL	Description	Themes/Topics	Target Audience	FirEUrisk theme	Fire Circle Phase	Scale	Country
Inspectoratul General pentru Situatii de Urgenta - IGSU (National Inspectorate for Emergency Situations)	https://gis.ro-risk.ro/arcgis/sharing/portals/self?f=pjson https://www.ro-risk.ro/SitePages/Pornire.aspx	Portal to assess the disaster risk for 10 types of hazards, including forest fires at Local Administrative Unit level. The risk and hazard are assessed in three different national scenarios (probability of occurrence at 10, 100 and 1,000 years).	Risk assessment	All	All	Prevention and preparedness	National	Romania
Extranet Feux de forêt Météo France	http://www.pro.meteofrance.com	Daily maps of meteorological fire danger (J-5 -> J+4)	Fire Danger Forecasts	Only operational centres at national and local levels	Reduction	Prevention and preparedness	National	France

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8 Annex C: Review of fire risk data products available in EFFIS and Copernicus Services

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003890.

Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of outputs
The European Forest Fire Information System (EFFIS)	Human Settlement Layer	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png				Png	data are in standard format. Automated collection of maps is not allowed	160 kB
The European Forest Fire Information System (EFFIS)	Protected Areas Layer	EFFIS - Data and services (europa.eu)							data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	CCI Landcover	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png				Png	data are in standard format. Automated collection of maps is not allowed	250 kB
The European Forest Fire Information System (EFFIS)	ECMWF FWI - Fire Weather Index (FWI) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	FWI is computed from the ECMWF model (8 km), which provides 1 to 9 days forecasts. The Fire Weather Index is mapped in 6 classes (very low, low, medium, high, very high and extreme). The fire danger classes are the same for all countries and maps show an harmonized picture of the spatial distribution of fire danger level throughout Europe, Middle East and North Africa.	Displayed on the viewer and png	8 km	1 to 9 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	ECMWF FWI - Initial Spread Index (ISI) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	8 km	1 to 9 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	ECMWF FWI - Build Up Index (BUI) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	8 km	1 to 9 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of outputs
The European Forest Fire Information System (EFFIS)	ECMWF FWI - Fine Fuel Moisture Code (FFMC) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	8 km	1 to 9 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	ECMWF FWI - Duff Moisture Code (DMC) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	8 km	1 to 9 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	ECMWF FWI - Drought Code (DC) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	8 km	1 to 9 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	ECMWF FWI - Anomaly Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	8 km	1 to 9 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	ECMWF FWI - Ranking Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png		1 to 9 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of outputs
The European Forest Fire Information System (EFFIS)	Meteo France FWI - Fire Weather Index (FWI) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	FWI is computed from the MeteoFrance model (10 km), which provides up to 3 days forecasts. The Fire Weather Index is mapped in 6 classes (very low, low, medium, high, very high and extreme). The fire danger classes are the same for all countries and maps show an harmonized picture of the spatial distribution of fire danger level throughout Europe, Middle East and North Africa.	Displayed on the viewer and png	10 km	1 to 3 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	Meteo France FWI - Initial Spread Index (ISI) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	10 km	1 to 3 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	Meteo France FWI - Build Up Index (BUI) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	10 km	1 to 3 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	Meteo France FWI - Fine Fuel Moisture Code (FFMC) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	10 km	1 to 3 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of outputs
The European Forest Fire Information System (EFFIS)	Meteo France FWI - Duff Moisture Code (DMC) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	10 km	1 to 3 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	Meteo France FWI - Drought Code (DC) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	10 km	1 to 3 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	Meteo France FWI - Anomaly Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	10 km	1 to 3 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	Meteo France FWI - Ranking Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)		Displayed on the viewer and png	10 km	1 to 3 days forecast	Daily	Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	KBDI - Keetch-Byron Drought Index Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	Keetch Byron Drought index forecast	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs
The European Forest Fire Information System (EFFIS)	MARK-5 - Drought Factor (MARK-5 DF) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	Drought factor forecast	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs
The European Forest Fire Information System (EFFIS)	MARK-5 - Rate of Spread (MARK-5 ROS) Fire Danger	EFFIS - Data and services (europa.eu)	Rate of spread forecast	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of outputs
	Forecast (1 day forecast)									
The European Forest Fire Information System (EFFIS)	MARK-5 - Fire Danger Index (MARK-5 FDI) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	Fire danger index forecast	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs
The European Forest Fire Information System (EFFIS)	NFDRS - Rate of Spread (NFDRS ROS) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	NFDRS - Rate of spread forecast	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs
The European Forest Fire Information System (EFFIS)	NFDRS - Spread Component (NFDRS SC) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	NFDRS - Spread component forecast	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs
The European Forest Fire Information System (EFFIS)	NFDRS - Energy Release Component (NFDRS ERC) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	NFDRS - Energy release component forecast	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs
The European Forest Fire Information System (EFFIS)	NFDRS - Burning Index (NFDRS BI) Fire Danger Forecast (1 day forecast)	EFFIS - Data and services (europa.eu)	NFDRS - Burning index forecats	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs
The European Forest Fire Information System (EFFIS)	NFDRS - Ignition Probability (NFDRS IC) Fire Danger	EFFIS - Data and services (europa.eu)	NFDRS - Ignition probability forecast	Displayed on the viewer and can be downloaded	8 km	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	kbs

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of outputs
	Forecast (1 day forecast)									
The European Forest Fire Information System (EFFIS)	Active Fires Last 1 day layer MODIS	EFFIS - Data and services (europa.eu)	Active fire last day	Displayed on the viewer and can be downloaded	Country scale	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Active Fires Last 7 days layer MODIS	EFFIS - Data and services (europa.eu)	Active fire last 7 days	Displayed on the viewer and can be downloaded	Country scale	7 days	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Active Fires Last 30 days layer MODIS	EFFIS - Data and services (europa.eu)	Active fire last 30 days	Displayed on the viewer and can be downloaded	Country scale	30 days	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Active Fires Fire Season layer MODIS	EFFIS - Data and services (europa.eu)	Active fire last season	Displayed on the viewer and can be downloaded	Country scale	Season	Yearly	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Active Fires Last 1 day layer VIIRS	EFFIS - Data and services (europa.eu)	Active fire last day	Displayed on the viewer and can be downloaded	Country scale	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Active Fires Last 7 days layer VIIRS	EFFIS - Data and services (europa.eu)	Active fire last 7 days	Displayed on the viewer and can be downloaded	Country scale	7 days	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Active Fires Last 30 days layer VIIRS	EFFIS - Data and services (europa.eu)	Active fire last 30 days	Displayed on the viewer and can be downloaded	Country scale	30 days	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of outputs
The European Forest Fire Information System (EFFIS)	Active Fires Fire Season layer VIIRS	EFFIS - Data and services (europa.eu)	Active fire last season	Displayed on the viewer and can be downloaded	Country scale	Season	Yearly	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Burnt Areas Last 1 day layer MODIS	EFFIS - Data and services (europa.eu)	Burnt areas over last day	Displayed on the viewer and can be downloaded	Country scale	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Burnt Areas Last 7 days layer MODIS	EFFIS - Data and services (europa.eu)	Burnt areas over last 7 days	Displayed on the viewer and can be downloaded	Country scale	7 days	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Burnt Areas Last 30 days layer MODIS	EFFIS - Data and services (europa.eu)	Burnt areas over last 30 days	Displayed on the viewer and can be downloaded	Country scale	30 days	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Burnt Areas Fire Season layer MODIS	EFFIS - Data and services (europa.eu)	Burnt area over the fire season	Displayed on the viewer and can be downloaded	Country scale	Season	Yearly	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Burnt Areas Last 1 day layer VIIRS	EFFIS - Data and services (europa.eu)	Burnt areas over last day	Displayed on the viewer and can be downloaded	Country scale	1 day	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Burnt Areas Last 7 days layer VIIRS	EFFIS - Data and services (europa.eu)	Burnt areas over last 7 days	Displayed on the viewer and can be downloaded	Country scale	7 days	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Burnt Areas Last 30 days layer VIIRS	EFFIS - Data and services (europa.eu)	Burnt areas over last 30 days	Displayed on the viewer and can be downloaded	Country scale	30 days	Daily	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of outputs
The European Forest Fire Information System (EFFIS)	Burnt Areas Fire Season layer VIIRS	EFFIS - Data and services (europa.eu)	Burnt area over the fire season	Displayed on the viewer and can be downloaded	Country sacle	Season	Yearly	Png	data are in standard format. Automated collection of maps is not allowed	<10 kb to 300 kb
The European Forest Fire Information System (EFFIS)	Fuels	EFFIS - Data and services (europa.eu)	Fuels	Download	European scale			Png	data are in standard format. Automated collection of maps is not allowed	
The European Forest Fire Information System (EFFIS)	EFFIS Fuel Map	EFFIS - Data and services (europa.eu)	The EFFIS fuel map was derived in the context of JRC Contract Number 384347 on the "Development of a European Fuel Map." Although the original map contained 42 vegetation complexes, these were assigned to the 13 categories of the NFFL or fire behavior models (Anderson, 1982). The last 3 categories of the NFFL models are not used in the European Fuel Map.	Displayed through the viewer and can be dowloaded	100 m	Present time	10 years old	Tif	data are in standard format. Automated collection of maps is not allowed	607 MB
The European Forest Fire Information System (EFFIS)	Total burnt areas EFFIS database	EFFIS - Data and services (europa.eu)	Country total burnt areas (from the EFFIS database)	Download	Country scale	yearly : 2000 to 2019		Csv	data are in standard format. Automated collection of maps is not allowed	data dependant , 3.1 kb
The European Forest Fire Information System (EFFIS)	Total number of fires EFFIS database	EFFIS - Data and services (europa.eu)	Country total number of fires (from the EFFIS database)	Download	Country scale	yearly: 2000 to 2019		Csv	data are in standard format. Automated collection of maps is not allowed	2.3 kb
The European Forest Fire Information System (EFFIS)	Total burnt areas European Fire Database	EFFIS - Data and services (europa.eu)	Country totals (burnt areas) per year, as published in the Forest Fires in Europe, North Africa and Middle East reports.	Download	Country scale	yearly: 1980 - 2016		Csv	data are in standard format. Automated collection of maps is not allowed	3.9 kb
The European Forest Fire Information System (EFFIS)	Total number of fires European Fire Database	EFFIS - Data and services (europa.eu)	Country totals (number of fires) per year, as published in the Forest Fires in Europe, North Africa and Middle East reports.	Download	Country scale	yearly : 1980 - 2016		Csv	data are in standard format. Automated collection of maps is not allowed	3.7 kb

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Copernicus Land services	Corine Land Cover	https://land.copernicus.eu/	The CORINE Land Cover (CLC) inventory was initiated in 1985 (reference year 1990). Updates have been produced in 2000, 2006, 2012, and 2018. It consists of an inventory of land cover in 44 classes. CLC uses a Minimum Mapping Unit (MMU) of 25 hectares (ha) for areal phenomena and a minimum width of 100 m for linear phenomena.	download	100m	from 1990	3 years	geotiff format	standard data format, API available for automated data collection	125 MB
Copernicus Land services	Forest type	https://land.copernicus.eu/	The high resolution forest product consists of three types of (status) products and additional change products. The status products are available for the 2012 and 2015 reference years: 1. Tree cover density providing level of tree cover density in a range from 0-100% 2. Dominant leaf type providing information on the dominant leaf type: broadleaved or coniferous 3. A Forest type product.	download	20m or 100m	from 2012	3 years	geotiff format	standard data format, API available for automated data collection	country dependent, all Europe 4 GB
Copernicus Land services	Tree cover density	https://land.copernicus.eu/	The high resolution forest product consists of three types of (status) products and additional change products. The status products are available for the 2012 and 2015 reference years: 1. Tree cover density providing level of tree cover density in a range from 0-100% 2. Dominant leaf type providing information on the dominant leaf type: broadleaved or coniferous 3. A Forest type product.	download	20m	from 2012	3 years	geotiff format	standard data format, API available for automated data collection	country dependent, all Europe 4 GB
Copernicus Land services	Imperviousness	https://land.copernicus.eu/	The high resolution imperviousness products capture the percentage and change of soil sealing. Built-up areas are characterized by the substitution of the original (semi-) natural land cover or water surface with an artificial, often impervious cover. These artificial surfaces	download	20m or 100m	from 2006	3 years	geotiff format	standard data format, API available for automated data collection	country dependent, all Europe 3.3 GB

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of output
			are usually maintained over long periods of time.							
Copernicus Land services	Water and Wetness	https://land.copernicus.eu/	The combined Water and Wetness product is a thematic product showing the occurrence of water and wet surfaces over the period from 2012 to 2018 for the EEA39 area.	download	20m or 100m	from 2015	3 years	geotiff format	standard data format, API available for automated data collection	country dependent, all Europe 2.0 GB
Copernicus Land services	Grassland	https://land.copernicus.eu/	The high resolution grassland product is a grassland/non-grassland mask for the EEA39 area. This grassy and non-woody vegetation baseline product includes all kinds of grasslands: managed grassland, semi-natural grassland and natural grassy vegetation.	download	20m or 100m	from 2015	3 years	geotiff format	standard data format, API available for automated data collection	country dependent, all Europe 3.9 GB
Copernicus Land services	Small woody features	https://land.copernicus.eu/	Small woody landscape features are important vectors of biodiversity and provide information on fragmentation of habitats with a direct potential for restoration while also providing a link to hazard protection and green infrastructure, amongst others.	download	5m or 100m	2015	3 years	geotiff and shapefile	standard data format, API available for automated data collection	country dependent,
Copernicus Land services	Burnt areas	https://land.copernicus.eu/global/themes/vegetation	The Burnt Area products map burn scars, surfaces which have been sufficiently affected by fire to display significant changes in the vegetation cover (destruction of dry material, reduction or loss of green material) and in the ground surface (temporarily darker because of ash).	download	300m	from 2014	10 days	netCDF4	standard data format, API available for automated data collection	65 MB
Copernicus Land services	surface soil moisture	https://land.copernicus.eu/glob	Surface Soil Moisture (SSM) is the relative water content of the top few centimetres soil, describing how wet or dry the soil is in its topmost layer, expressed in percent	download	100m	from 2015	daily	netCDF4	standard data format, API available for	5 MB

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Platform Name*	Data Product Name*	URL*	Dataset Description	Functionnalities (download, display)	Spatial resolution	Temporal coverage	Update Frequency	Format of outputs	Interoperability (APIs available, Standards)	Size of output
		al/themes/vegetation	saturation. It is measured by satellite radar sensors and allows insights in local precipitation impacts and soil conditions.						automated data collection	
Copernicus Land services	vegetation phenology and productivity	https://www.wekeo.eu/data?	Vegetation Phenology and Productivity (VPP) comprise 13 parameters up to 2 seasons that characterize the vegetation growth cycle. A set of 13 Vegetation Phenology and Productivity parameters are derived, for up to two growing seasons.	download	10m	from 2017	yearly	geotiff	standard data format, API available for automated data collection	Area dependent

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