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Extreme Wildfire Events Data Hub for Improved Decision Making

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EWED

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List of Acronyms

ABL	Atmospheric Boundary Layer
AGL	Above Ground Level
BR	Burn Ratio
CFRS	Catalan Fire and Rescue Service
EWE	Extreme Wildfire Events
EWED	Extreme Wildfire Events Data Hub for Improved Decision Making
FL	Flame Length
FLI	Fire Line Intensity
GRAF	Grup d'Actuacions Forestals; Bombers de la Generalitat de Catalunya
LCL	Lifting Condensation Level
MSL	Mean Sea Level
PCF	Pau Costa Foundation
ROS	Rate Of Spread

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Executive Summary

D3.2 Case Studies is a data repository that collates meteorological and fire data gathered from wildfires and prescribed burns in a systematic and uniform format for integration into the Wildfire Data Portal. This deliverable presents two distinct outputs: firstly, the report document, and secondly, the dataset comprising data from ten forest fires and two prescribed burns.

This document outlines the structure and principal formats of the collected data, detailing how they are organized within the dataset. Additionally, it presents a concise analysis of the data, to highlight its potential applications.

The dataset comprises data collected in 2024 as part of the EWED Project, as well as data collected prior to this. The methodology of data collection on wildfires and prescribed burns was initiated in 2021 by the CFRS, and its archive contains a variety and quantity of data that are of interest for input to the Wildfire Data Portal. Consequently, it has been determined to incorporate them, even though they were not collected during the project timeframe.

The data collected processes and methodologies are defined and detailed in **D3.1 Protocols for Data Collection on Extreme Wildfire Events.**

1. Introduction

Case studies is a document and a dataset that compiles the data collected in wildfires throughout the project, in order to feed the Wildfire Data Portal and to run and enhance simulation and conceptual models. The data that is useful for the analysis, simulations and wildfire science and the collection methodology are described in detail in **D3.1 Protocols for data collection on Extreme Wildfire Events** [2]. The main objective of this deliverable is to set the basis of the Wildfire Data Portal (D3.3), gathering the data of the firsts wildfires that will feed this data portal. This document and the available dataset will be updated in the month 22 of the project, with the data gathered during 2025 and other relevant data (D3.4). All details and data will be available on the project's website.

As outlined in the D3.1 Protocols for data collection, this data gathering methodology was initially implemented by the Catalan Fire and Rescue Service (CFRS) during the 2021 fire season, and used by the following years in Catalunya, other regions of Spain and during the 2023 fire season in Chile. By the commencement of the EWED project in 2024, the use of this methodology expands to Greece, the Netherlands and Norway. Consequently, in this deliverable there is data available from wildfires and prescribed burns collected prior to the beginning of the project that has useful and clear information about pyroconvection phenomena and valuable radiosonde launches, as well as pictures, films and related information resulting from this data. The incorporation of this archive will contribute to the enhancement of the Wildfire Data Portal.

The present deliverable is comprised of two separate outputs. Firstly, this document provides detailed accounts of the data collected, explains the structure of the dataset and a brief analysis of the data gathered in some wildfires. The document is divided into two different sections:

- **Section 2:** provides an overview of the data format and the structure of the dataset, as well as a detailed account of the data gathered from each case study.
- **Section 3:** presents a brief analysis of the data collected from the wildfires and prescribed burns introduced at the dataset.

The second output of this deliverable is the set of data that has been collected and presented properly structured. This archive will constitute the initial dataset introduced into the Wildfire Data Portal.

2. Dataset

This section of the deliverable outlines the fundamental characteristics of the dataset structure, and the data collected during wildfires that are part of it. This process provides clarity regarding the manner in which data should be input once the Wildfire Data Portal becomes operational, thereby ensuring the consistency and utility of the data entered.

Moreover, the uniform structure of the data collected will facilitate navigation through the dataset, regardless of the country or fire service in which it has been collected or the type of wildfire occurred. In the Wildfire Data Portal, the data that is in the present dataset will be structured in a user friendly and simple way to facilitate the navigation through the data portal.

2.1. Case studies included

Some of the data included in this deliverable were collected during the 2024 fire season in countries where EWED Project partners operated. These regions experienced wildfires with optimal conditions for intense fire behaviour, especially in Greece and Catalunya.

As mentioned in the document's introduction, the dataset also contains the CFRS archive of wildfires and prescribed burns that occurred prior to the project's commencement. This is because the methodology employed for the collection of these data was initiated by the CFRS in 2021. It has been determined that, due to the quality and quantity of the data collected over three years, this archive can contribute to the Wildfire Data Portal, even if the wildfires or prescribed burns did not occur within the project period (2024-2025).

This methodology is innovative as it goes beyond to the collection of data on surface fire behaviour. It also gathers atmospheric data, both from outside and inside the smoke plumes of the wildfires and prescribed burns. This data allows for an in-depth analysis of these phenomena and can be used to run simulations and support the development of fire behaviour models. The data from prescribed burns, despite there are not actual wildfire, is useful for calibrating simulations and models for the first few tens of meters above the surface.

2.2. Dataset structure

The case studies in the database have been labelled in the following way, so that all data and information are arranged and structured for ease of use and uploading to the portal:

YYYYMMDD_FireName_W/PB_CountryCode

In the case of W/PB, the letter W indicates that the data was collected in a wildfire, while PB indicates that the data was collected in a prescribed burn. The CountryCode is the first three letters of the country where the data has been collected. In the case of Greece, the country code is GRE. For example, the folder for the Varnavas wildfire in Greece in 2024 is named as follows: *20240811_Varnavas_W_GRE*

The information pertaining to each case study is entered into a folder structured according to sub-folders, which contain all the data that are collected during the wildfire or prescribed burn:

- **Hourly perimeters:** This folder contains the file with geographical information on the spread (position of the perimeter) of the wildfire throughout the episode.

- **Radiosonde files:** contain the data from the various radiosonde launches made during the event. In this instance, the aforementioned items will also be clearly identified as follows: *YYYYYYMMDD_SondeCode_Plume/Env*. In this deliverable, the data are primarily sourced from radiosondes deployed within the smoke plume, but also from environmental ones. In the case of the in-plume radiosondes, the designation "Plume" is employed, whereas "Env" is used for environmental data. For example, the Varnavas sonde would be designated *20240811_2144_Plume*

- **Videos:** contain the pictures collected during the wildfire or prescribed burn from the fire behaviour in surface, from the smoke plume or pyroconvection phenomena. If possible, with the time of shooting in local time and their location.

- **Photos:** contain the pictures collected during the wildfire or prescribed burn from the fire behaviour in surface, from the plume plume or pyroconvection phenomena. If possible, with the time of shooting in local time and their location.

Furthermore, each case study incorporates a variety of additional documents.

- **General_*FireNameYear*:** this document contains the essential information regarding the fire, which will allow classifying the various case studies within the Wildfire Data Portal. This information will be used as filters, to help both search and download the data.

- **Fire behaviour_*FireNameYear***: this document collates the observed values of fire behaviour at the surface level, as well as general values pertaining to the fire itself (surface area affected, point of ignition, etc.)

In the case of reports pertaining to the wildfire or prescribed burning, these will also be included, accompanied by the name, the authors and the link to the document. The file name is structured as follows: **Publication*X_FireNameYear***.

2.3. Data collected format

The information detailed in section 2.2 is collated in a variety of files, each with a distinct format contingent on the nature of the data. This section provides a detailed explanation of the file formats and structure where the data is stored.

- **Hourly perimeters**. In *Keyhole Markup Language* (.kml). Datetime field is in local time.

- **Radiosonde files. Vertical profile data**. Data obtained from the radiosonde launches.

    - *Flight track*. In *Keyhole Markup Language* (.kml)

    - *Flight data history*. Data collected by each radiosonde**.** In *comma separated values* file (.csv)

        - *UTC time*
        - *Altitude above mean sea level*
        - *Altitude above ground level*
        - *Atmospheric pressure*
        - *Wind speed*
        - *Wind heading*
        - *Temperature*
        - *Relative humidity*
        - *Internal temperature*
        - *Latitude*
        - *Longitude*
        - *Rise speed*

Disclaimer: The value of the Sonde Code field represents the unique identifier assigned by the Windsond software to each launch. This value indicates the time in local time of the connection *established between the radiosonde and the receiver. In the data file containing the collected flight data, the time field contains values in UTC.*

- **Videos:** In .mp4
- **Photos:** In .jpg
- **General information data.** In *comma separated values* file (.csv). Contains the following information.
    - *Category*: if the data is from a wildfire or a prescribed burn
    - *Fire classification*: based on the classification of *Castellnou et al 2021* [1]

Table 1. Definition of pyroconvection prototypes

Pyroconvection types	*Description*
Surface plume	Fire-atmosphere interaction is limited to surface layer
Convective plume	Fire-atmosphere interaction within the ABL but without cloud formation
Overshooting PyroCu	Short-lived PyroCu formed in slightly stable ABL
Resilient PyroCu	Persistent PyroCu, formed in unstable ABL, but with vertical growth limited by shear or stability in upper layers
Deep PyroCu / PyroCb	PyroCu development that breaches the atmospheric cap and attains a free convective state

    - *Country*: where the data was taken
    - *Year*: when the data was taken
    - *Fire name*: to identify the wildfire or prescribed burn
- **Fire behaviour data**. In *comma separated values* file (.csv). Contains the following information, if all is gathered:
    - *Start location latitude*
    - *Start location longitude*
    - *Start data-time of the fire*
    - *Total burned area*
    - *Mean fire behaviour*
    - *Torching percentage in head*
    - *Torching percentage in flanks*
    - *Mean flame length (FL) in head*
    - *Max flame length (FL) in head*
    - *Mean flame length (FL) in flanks*
    - *Max flame length (FL) in flanks*
    - *Mean spotting distance*
    - *Max spotting distance*
    - *Mean rate of spread (ROS)*
    - *Max rate of spread (ROS)*
    - *Mean burn ratio (BR)*
    - *Max burn ratio (BR)*
- **Reports and publications**. Linked to the original source.

2.4. Dataset inputs

In accordance with the data structure and formats previously outlined, the data available for each case study is presented below. The data outlined in D3.1 Protocols for data collection has been collected to date; however, the dataset remains open to accommodate the inclusion of additional data sources, if necessary, for specific case studies.

Although the Wildfire Data Portal will feature a section dedicated to simulation and modelling, these are not included in the present dataset. The current dataset exclusively encompasses data gathered in the field during the course of wildfires and prescribed burns.

Table 2. Control table of all the data available in the dataset

Id	Martorell21 _W_CAT	StaColomaQ21 _W_CAT	PontVilomara 22 _W_CAT	Batea24 _W_CAT	Tortosa24 _W_CAT	Katsimidi24 _W_GRE	Mequinensa24 _W_CAT	Figuera24 _W_CAT	VilanovadeMeià24 _W_CAT	Varnavas24 _W_GRE	Orista23 _PB_CAT	Rojals24 _PB_CAT
GENERAL												
name	X	X	X	X	X	X	X	X	X	X	X	X
year	X	X	X	X	X	X	X	X	X	X	X	X
country	X	X	X	X	X	X	X	X	X	X	X	X
category	X	X	X	X	X	X	X	X	X	X	X	X
fire classification	X	X	X	X	X	X	X	X	X	X	X	X
description	X	X	X	X	X	X	X	X	X	X	X	X
publications	X	X	X									
GEGRAFICAL DATA												
hourly perimeters	X	X	X	X	X	X	X	X	X	X	*	*
PHOTOS/VIDEOS												
photos	X	X	X	X	X	X	X	X	X	X	X	X
videos	X	X	X	X	X	X	X	X	X	X	X	
FIRE BEHAVIOR												
start latitude	X	X	X	X	X	X	X	X	X	X	X	X
start longitude	X	X	X	X	X	X	X	X	X	X	X	X
start date-time	X	X	X	X	X	X	X	X	X	X	X	X
burned area	X	X	X	X	X	X	X	X	X	X	X	X
mean fire behaviour	X	X	X	X	X	X	X	X	X	X	X	X
torch head (%)	X	X	X	X	X				X			X
torch flanks (%)	X	X		X	X				X			
mean FL head	X	X	X	X	X		X	X	X		X	X
max FL head	X	X	X	X	X		X	X	X		X	X
mean FL flanks	X	X	X	X	X		X	X	X			
max FL flanks	X	X	X	X	X		X	X	X			
mean spotting	X	X	X	X	X		X		X		X	X
max spotting	X	X	X	X	X		X	X	X		X	X
mean ROS	X	X	X	X	X					X		
max ROS	X	X	X	X	X	X	X	X	X	X		
mean BR	X	X	X	X	X		X			X		
max BR	X	X	X	X	X	X	X			X	X	X
SOUNDING												
flight history data	X	X	X	X	X	X	X	X	X	X	X	X
flight track	X	X	X	X	X	X	X	X	X	X	X	X

* In prescribed burns it is only included the final perimeter

3. Detailed data from case studies

The following section presents a comprehensive analysis of the data gathered in case studies that will be included in the larger dataset that constitutes this deliverable 3.2. The principal aim is to showcase the full range of capabilities inherent in the data gathered, which will be systematically stored and organised within the Wildfire Data Portal.

For the analysis of wildfires, the data collected detailed in the previous section can be grouped into three different categories: how the fire affected and behaved on the surface, how it spread through the area, and how the fire interacted with the atmosphere. In addition, photographs and videos illustrate these data and facilitate reading. Thus, for each of these categories, different examples of some of the case studies present in the dataset are presented. Also, is needed to understand what is considered as an Extreme Wildfire Event and their impacts in landscape and firefighting capacity.

3.1.1. Brief description of an Extreme Wildfire Event (EWE)

In order to properly analyse the data collected on wildfires it is essential to first define what is meant by an 'Extreme Wildfire Event' and to determine the characteristics that are valued in each of them, in order to justify their designation as such. In the D1.1 Transfer of Lessons Learned on EWE of the FIRE-RES Project [3], the term is defined as fires with large-scale fire-atmosphere interactions that generate pyroconvective behaviour, coupling processes, that result in fast, intense, uncertain, and fast-paced changing fire behaviour.

In this document, the numerical values of fire behaviour characteristics are defined in accordance with the definitions set forth by Tedim et al. (2018) [4]. These values include:

- FLI above 10.000 kW/m
- ROS higher than 3.000 m/h
- Spotting distance longer than 1.000 m or observed prolific to massive spotting
- Extreme values of burn ratio
- FL higher than 10 meters
- Chaotic and unpredictable fire spread

Now that the term 'EWE' has been defined, it is appropriate to proceed with an example of the data analysis of various case studies included in the dataset. This analysis will be conducted from the perspective of wildfire management, with the objective of demonstrating the potential of this type of data for decision-making during emergency responses. The analysis is supported by recent findings in the field of atmospheric physics concerning wildfires, that have contributed to a reduction in uncertainty regarding pyroconvective phenomena. The purpose of this dataset is also to facilitate future advancements in this field.

The mentioned data categories constitute the basis for an in-depth analysis of wildfires in terms of fire behaviour and pyroconvection. To provide a comprehensive overview, it would be beneficial to include the operational decisions (strategies, tactics and manoeuvres) taken during the extinguishing operations. However, this is beyond the scope of this document.

3.1.2. Surface fire behaviour

The following table presents a series of fire behaviour data collected from some wildfires that are in the dataset. This data can be employed to determine whether the wildfires included in the dataset can be classified as EWE or whether some of the values can be considered extreme.

Table 3. Fire behaviour comparison between wildfires from the dataset

Id	SantaColoma Q21_W_CAT	Martorell21_W_CAT	Varnavas24_W_GRE	Batea24_W_CAT	Tortosa24_W_CAT	VilanovaMeià 24_W_CAT
Fire classification	**PyroCb**	**Resilient PyroCu**	**Convective plume**, short-live Ov. PyroCu	**Convective plume**	**Resilient PyroCu**	**Convective plume**, incipient short-lived Ov. PyroCu
Burned area	1.789 ha	197 ha	10 414 ha	445 ha	90 ha	70 ha
Mean fire behaviour	Passive crown fire, high intensity	Surface, high intensity	Surface, high intensity	Surface, high intensity	Surface, high intensity	Passive crown fire, high intensity
Mean flame length	20 m	10 m	-	3 m	5 m	8 m
Max flame length	40 m	15 m	-	10 m	3 m	20 m
Spotting distance	500 m (massive 50 m)	500 m (massive 25 m)	-	800m (massive 35 m)	-	400 m (massive 20 m)
Mean rate of spread	2.500 m/h	700 m/h	1 500 m/h	800 m/h	-	-
Max rate of spread	3.300 m/h	1350 m/h	4 500 m/h	2.900 m/h	1000 m/h	1000 m/h
Mean burn ratio	90 ha/h	20 ha/h	450 ha/h	40 ha/h	-	-
Max burn ratio	450 ha/h	90 ha/h	2.750 ha/h	100 ha/h	-	-

One of the most notable characteristics is the extent of the burned area and the fire classification. Except for the wildfire in Vanavas, Greece (Varnavas24_W_GRE) and Santa Coloma de Queralt, Catalonia (SantaColomaQ21_W_CAT), the burned area is relatively small. However, moist pyroconvective phenomena were observed. This is indicative of a high intensity fire behaviour and the fuel availability in the landscape.

Another value recorded during the fires is the flame length, which depends on both the fire intensity and the type of fuel involved. Nevertheless, very high values were observed in the case of Santa Coloma de Queralt and Vilanova de Meià (VilanovaMeià24_W_CAT), corresponding to very high-intensity crown fires with a great impact on the ecosystems. In Santa Coloma de Queralt, the behaviour was sustained over time, while in Vilanova de Meià it occurred within a more limited temporal and spatial scope.

The ROS is highly dependent on the pyroconvective phenomena that may occur, as these can multiply the expected ROS with the actual fuel and meteorological conditions. The distance of the spotting fire also plays a crucial role, as it allows the fire to spread by jumping, thus increasing its speed.

3.1.3. Fire spread monitoring

The progression of the fire across the landscape is clearly shown by the isochrones, or **hourly perimeters**, which illustrate the location of the fire perimeter at different times. This approach is highly effective for analysing the movements of the fire and determining the impact of pyroconvective phenomena. Additionally, they are also used to calculate the ROS and burn ratio, as well as to evaluate the impact of suppression tasks.

For instance, the isochrones for the Santa Coloma de Queralt fire illustrate the different patterns of fire movement and the influence of pyroconvection on its spread, as showed in Figure 1.

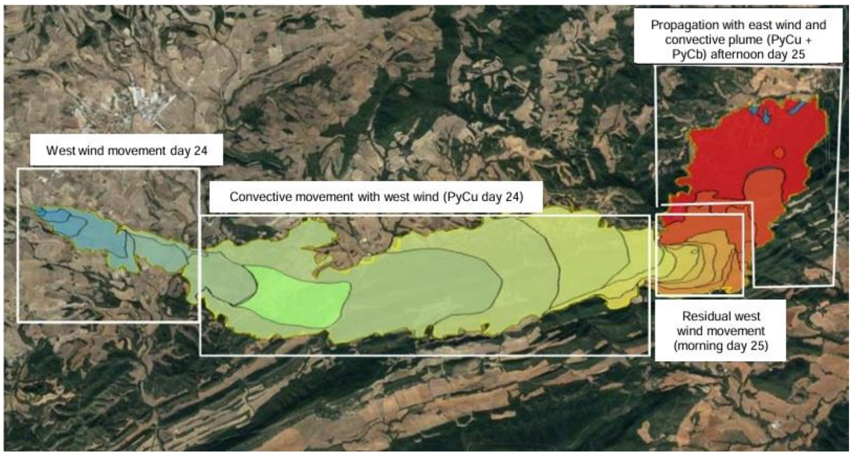

Figure 1. Hourly perimeters of Santa Coloma de Queralt fire, 2021. Source: CFRS

This observation is also evident in the hourly perimeters from the Varnavas fire, where a high ROS was observed during the initial hours of the fire due to the meteorological conditions, and a high BR sustained until late at night, with high-intensity fire behaviour, which was not expected. This had an impact on the extinguishing capacity of the firefighting operation.

In the Tortosa fire in Catalonia (Tortosa24_W_CAT), the phenomenon of pyroconvection caused a four times increase of the ROS compared to that expected for the fuel and meteorological conditions. (from 250 m/h at the start to 1.000 m/h once the pyroconvection phenomena occurred). The effect of this phenomenon is reflected in the hourly perimeters of the fire.

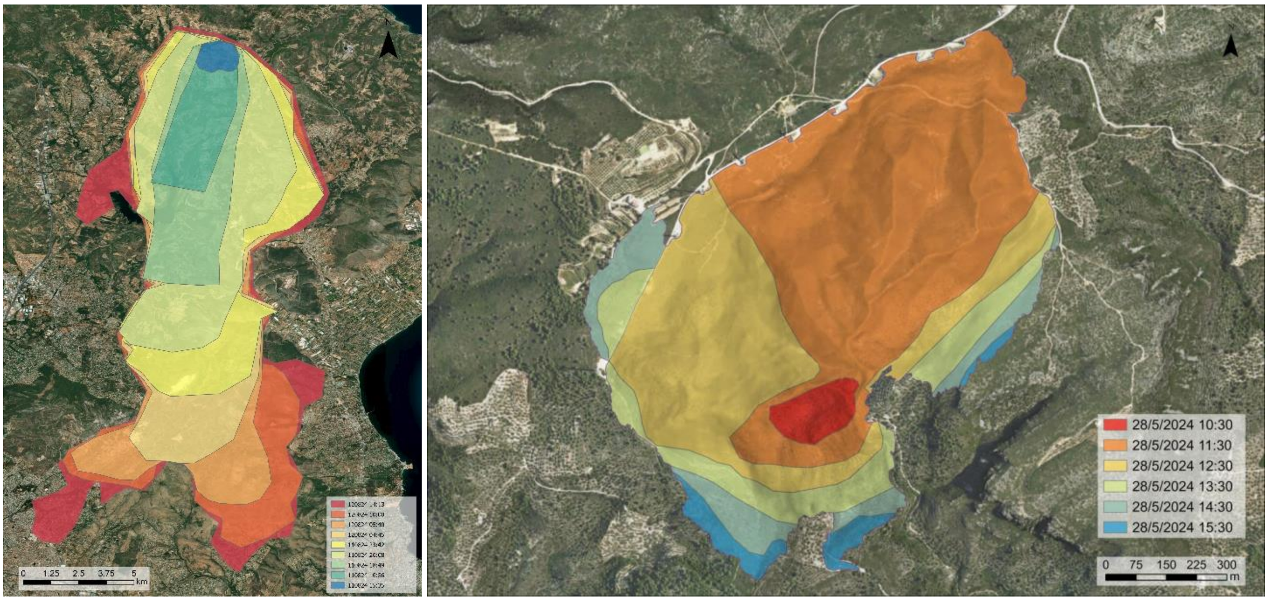

*Figure 2. **Left:** Hourly perimeters of Varnavas wildfire, 2024. Source: HFS. **Right:** Hourly perimeters of Tortosa wildfire, 2024. Source: CFRS*

3.1.4. Data of atmospheric vertical profile

The data gathered launching radiosondes is of interest in terms of understanding the structure of the vertical profile of the atmosphere and observing any modifications that may occur as a result of interaction with the fire. In addition, it permits the identification of factors such as the height of the plume, the presence or absence of wet pyroconvection, and the amount of vertical air displacement, which affects the surface rate of spread. The pyroconvection prototypes set by Castellnou et al. (2022) [1], are described in table 1.

The moist pyroconvection observed in Tortosa was recorded during the launch of the sonde 20240528_1226, as illustrated in Figure 3 (right). As can be observed in the graph, which depicts the relative humidity (RH) data in relation to flight time and altitude, above 1500 metres the RH exceeds 80%, indicating condensation of the smoke plume. The graph on the left shows the rising speed of the radiosonde within the plume in relation to time and height. This data can be extrapolated to represent the vertical movement of the air parcel.

20240528_1226 – launched from the head

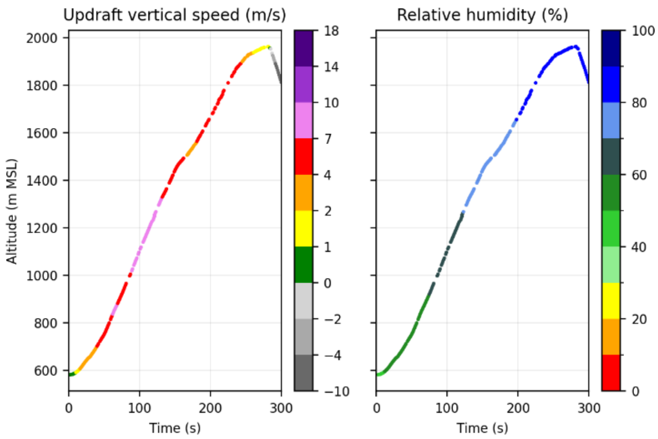

Figure 3. Radiosonde data profile from Tortosa wildfire, 2024

The increase in the ROS can also be explained by this graph (figure 3, left). Ascent velocities exceeding 7 m/s, indicates an increase in the surface propagation velocity. This positive correlation between ascent velocity and ROS velocity is supported by the findings of Castellnou et al. (2022).

The launch of radiosondes has also proved invaluable in providing insights into observed phenomena, as evidenced in, for example, the case of Santa Coloma de Queralt. Figure 4 presents the vertical profile obtained through two radiosondes launches on the second day of the fire, with one launched at midday and the other in the late afternoon, during the pyrocumulonimbus (PyroCb) phenomenon. In these profiles, significant alterations are evident, including changes in plume height, ascent speed, and in-plume relative humidity.

On this day, a succession of pyrocumulus (PyroCu) were observed, reaching a maximum height of approximately 2000 metres, as illustrated in the graph on the left. However, with the advent of the sea breeze, the smoke plume exhibited vertical growth, reaching up to 8000 metres and the formation of a pyrocumulonimbus (PyroCb). Considering the aforementioned data, the firefighters present at the fire were temporarily withdrawn, as the phenomenon led to erratic and unpredictable fire behaviour, posing a significant safety risk.

20210725_1233 – launched from the back-RF **20210725_2019 – launched from the back**

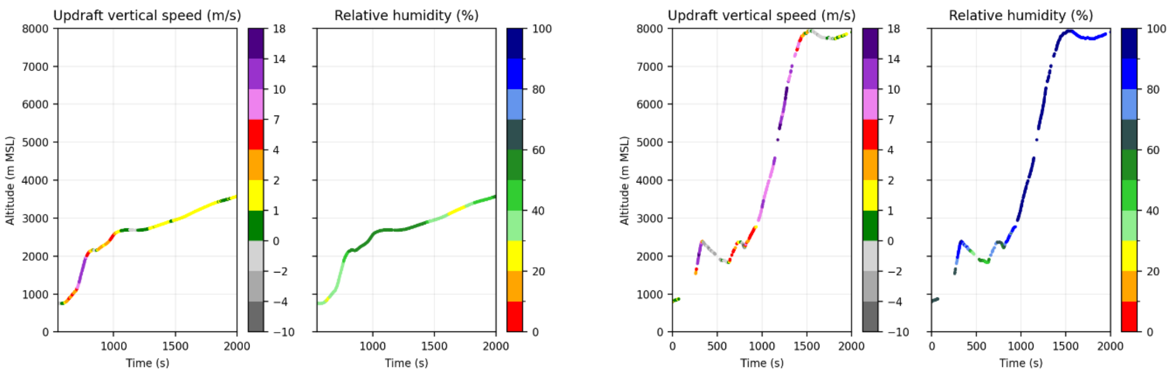

Figure 4. Atmospheric vertical profiles from two radiosondes launched in the Santa Coloma de Queralt wildfire 2021.

Another illustrative example is the Varnavas fire in Greece. Initially, the wildfire was driven by the wind with an appearance of convective plume that didn't last, but the interaction between the fire and the atmosphere during the early hours until the night favoured the rapid spread of the fire and hindered firefighting efforts. Figure 5 illustrates the data collected by the radiosonde launched by the Hellenic Fire Service, which depicts a smoke plume reaching approximately 1500 m in height, with a stable atmosphere above and a relatively humid layer in the upper part of the ABL. These conditions of the vertical atmospheric profile facilitate an understanding of the high intensity surface fire behaviour.

20240811_2144 – launched from the back **2145 – right flank**

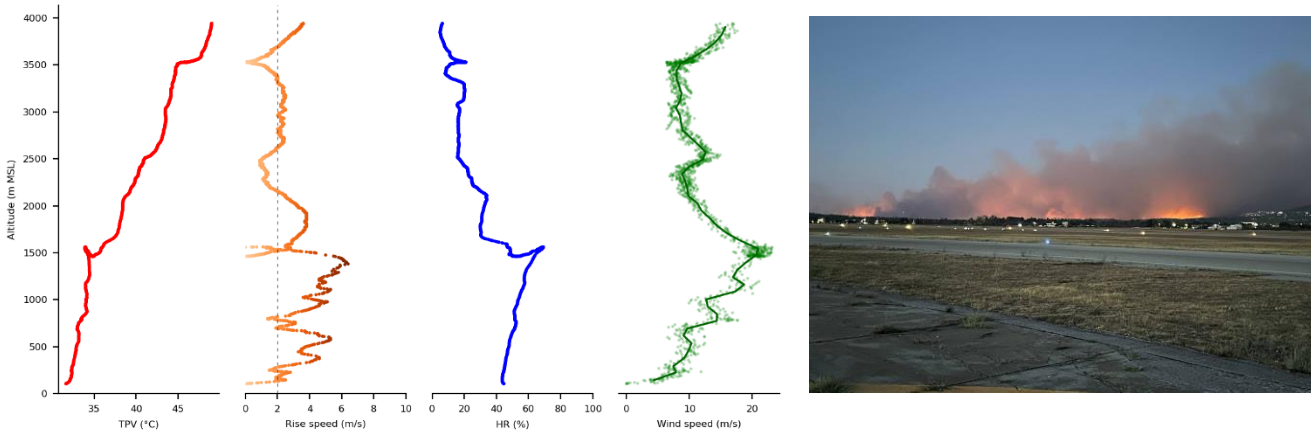

Figure 5. Atmospheric vertical profile from the radiosonde launched in the Varnavas wildfire, 2024, and photo of the fire behaviour at the moment of the launch

The photographic and video material captured during the fire, both by personnel involved in the fire suppression operations and by external sources, provides a valuable source of information that can be linked with the data collected in the field, as previously described. This allows for straightforward visualisation and comparison of different types of fires. To achieve this, it is essential to accurately identify the time each photograph or video was taken.

The Wildfire Data Portal will facilitate the automatic and efficient execution of this type of analysis, as well as enabling the comparison with previous cases. This will improve the understanding of extreme fire behaviour and enhance the capacity to respond effectively to these wildfires.

4. Conclusions

This deliverable presents the initial set of case studies to be introduced in the Wildfire Data Portal, which will serve to establish the fundamental structure of the data hub. This will be a continuously evolving portal, with new information being added and the number of available wildfires and prescribed burns increasing over time. The dataset contains observations prior and during the project EWED.

It should be noted that the dataset presented in this deliverable does not contain the same data for all fires and burns. The specific data included depends on the country in which the fire or prescribed burn occurred, the type of wildfire, its characteristics, and other factors. This is illustrated in Table 2, which contains the control of case studies entered. This offers a significant amount of information to the portal, but it is essential that the data collection process is standardised (see D3.1 Protocols for Data Collection on EWE) and that it is properly organised.

Also, it is important to consider that the database structure described in this document pertains specifically to the downloadable dataset of D3.2 Case studies. The data will be organised in a more user-friendly way in the Wildfire Data Portal, thus facilitating searching, reading and analysis. Section 3 of this document demonstrates the potential and capabilities of this archive to analyse the data gathered from an emergency management perspective. Additionally, the Wildfire Data Portal will serve as a good data repository for wildfire science.

At the 22nd month of the project (November 2025), an update to this document will be delivered in the framework of the D3.4 Case studies update. This update will include data collected throughout the year 2025 by the project partners and/or other external collaborators involved in the data collection. Additionally, it will feature other wildfires and prescribed burns of interest present in the CFRS archive.

5. References

[1] Castellnou, M., Bachfischer, M., Miralles, M., Ruiz, B., Stoof, C. R., & Vilà-Guerau de Arellano, J. (2022). Pyroconvection classification based on atmospheric vertical profiling correlation with extreme fire spread observations. *Journal of Geophysical Research: Atmospheres, 127, e2022JD036920.* https://doi.org/10.1029/2022JD036920

[2] Castellnou, M., Nebot, E., Arilla, E., Bachfisher, M., Castellarnau, X., Castellvi, J., Cespedes, J., Estivill, L., Ferragut, A., Larrañaga, A., Miralles, M., Pagès, J., Pallàs, P., Rosell, M., Ruiz, B., Guarque, P. (2024). *Protocols for data collection on Extreme Wildfire Events*. Extreme Wildfire Events Data Hub for Improved Decision Making (EWED). https://civil-protection-knowledge-network.europa.eu/system/files/2024-11/ewed_d3.1_protocols-for-data-collection-on-ewe_0.pdf

[3] Castellnou, M., Nebot, E., Estivill, L., Miralles, M., Rosell, M., Valor, T., Casals, P., Duane, A., Piqué, M., Górriz-Mifsud, E., Coll, L., Serra, M., Plana, E., Colaço, C., Sequeira, C., Skulska, I., Moran, P. (2022). FIRE-RES Transfer of Lessons Learned on Extreme wildfire Events to key stakeholders. Deliverable D1.1 FIRE-RES project. 119 pages. https://doi.org/10.5281/zenodo.10260790

[4] Tedim, F., Leone, V., Amraoui, M., Bouillon, C., Coughlan, M. R., Delogu, G. M., Fernandes, P. M., Ferreira, C., McCaffrey, S., McGee, T. K., Parente, J., Paton, D., Pereira, M. G., Ribeiro, L. M., Viegas, D. X., & Xanthopoulos, G. (2018). Defining extreme wildfire events: Difficulties, challenges, and impacts. *Fire*, *1*(1), 9. https://doi.org/10.3390/fire1010009