

living planet symposium | BONN 23–27 May 2022

TAKING THE PULSE
OF OUR PLANET FROM SPACE

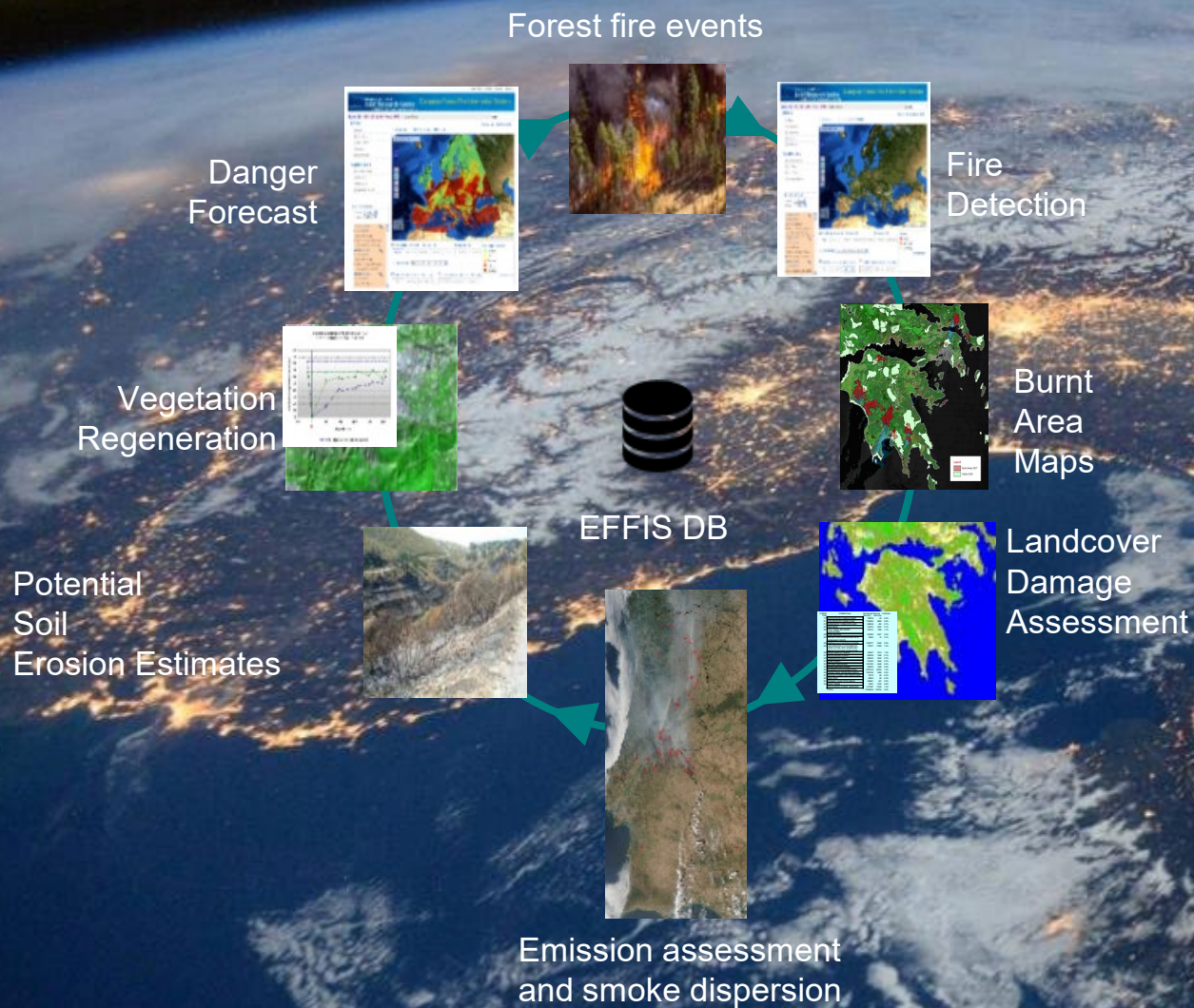


GlobFire as Knowledge Package in the GEO Knowledge Hub

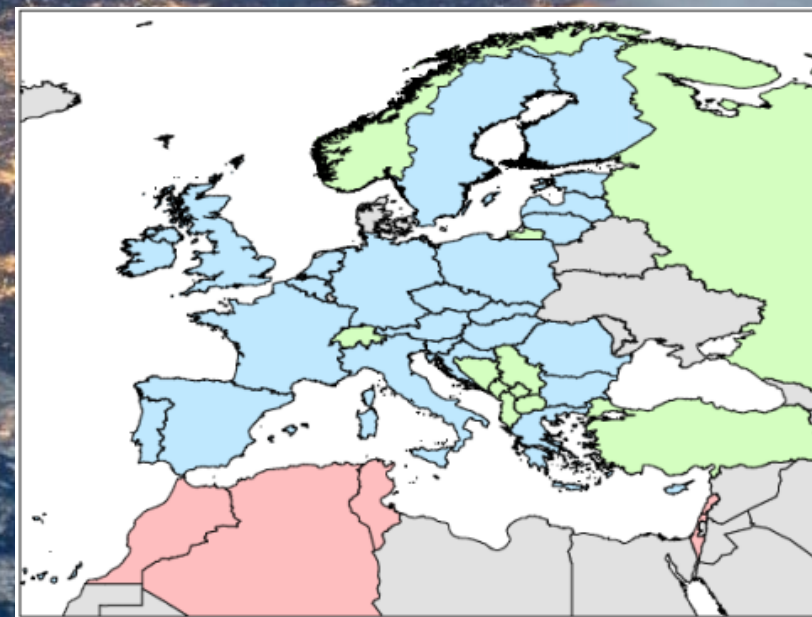
Tomas Artes Vivancos & GWIS/EFFIS Team

25/05/2022

European Forest Fire Information System



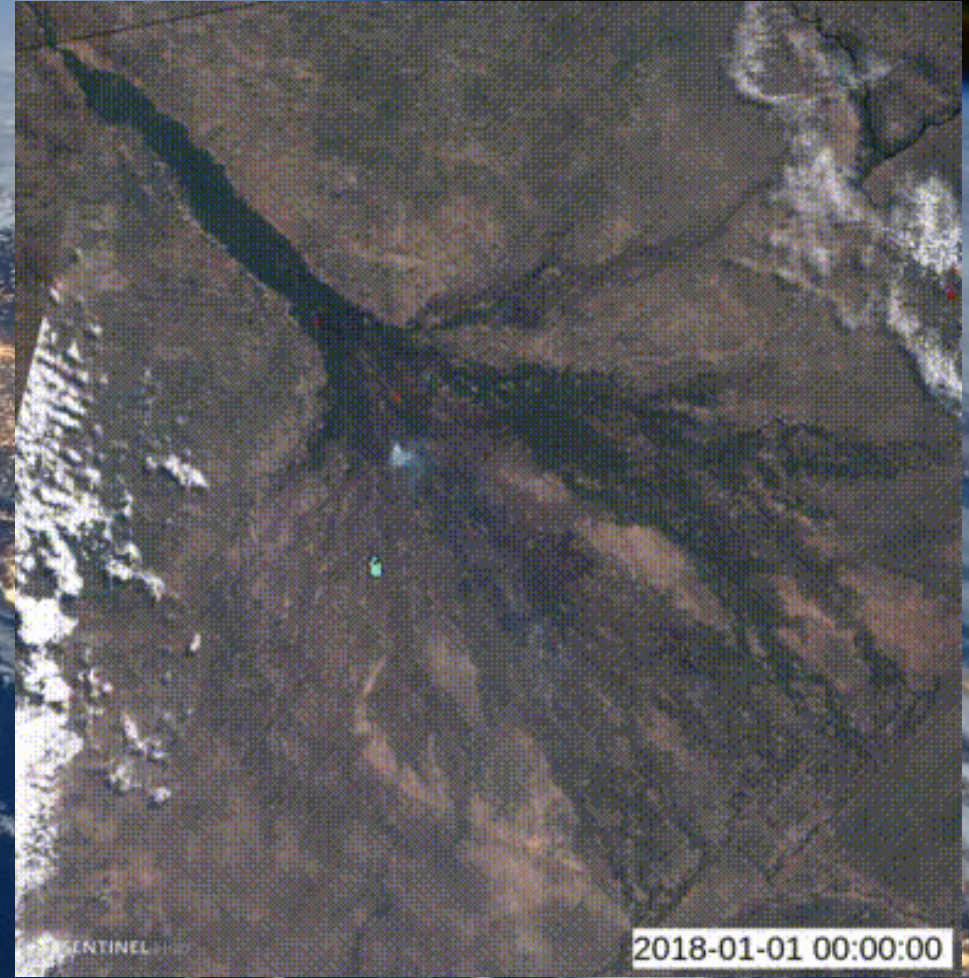
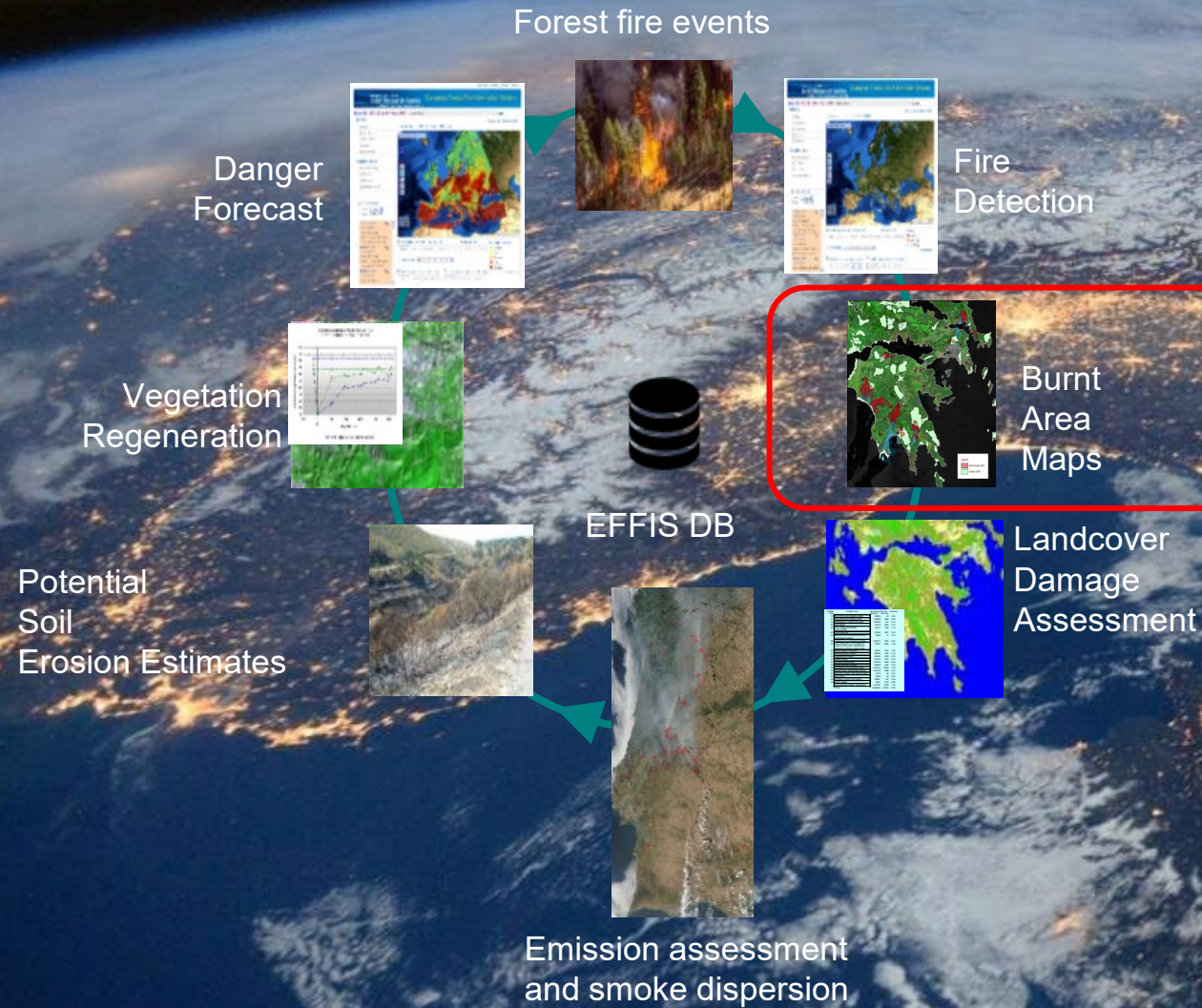
EFFIS is a system with users which uses:
Remote sensing
News
National reporting



Project leader: Jesus San-Miguel Ayanz

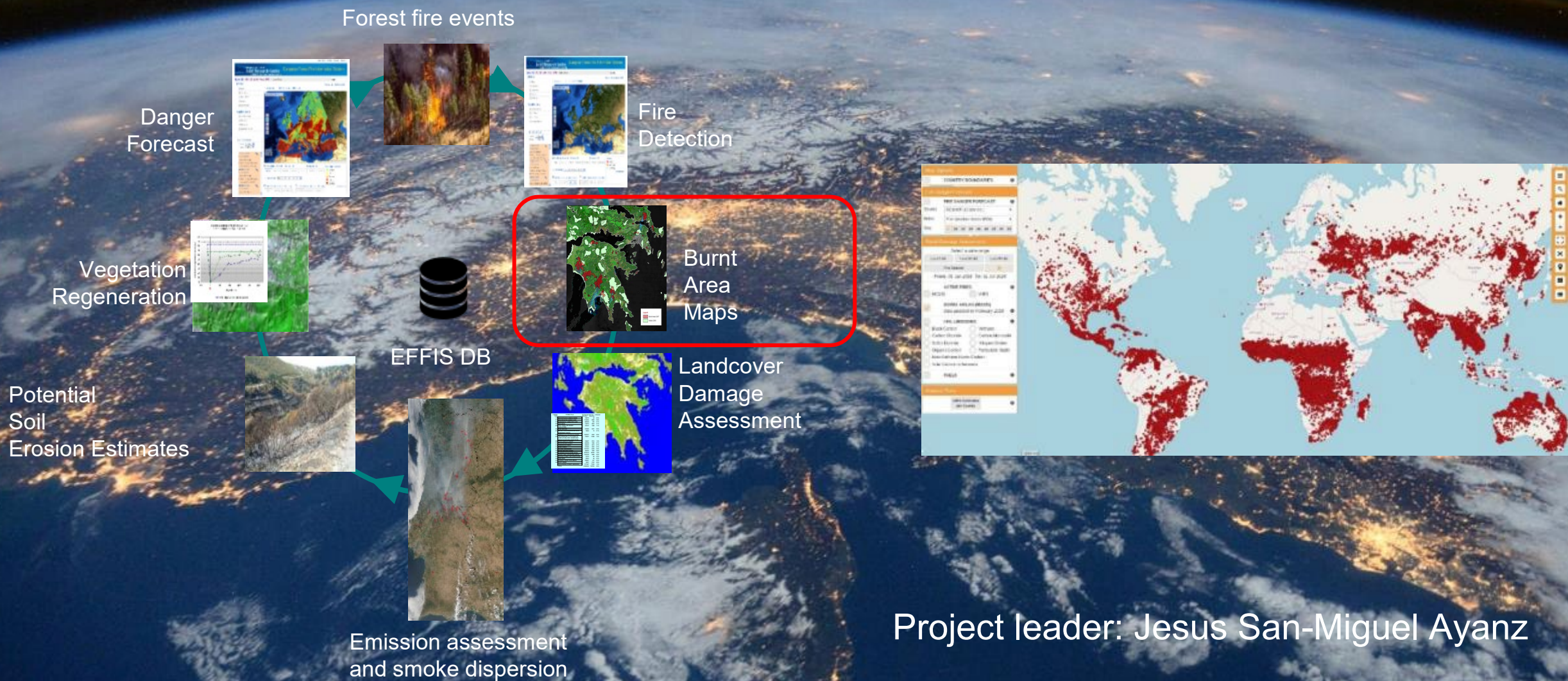


Global Forest Fire Information System



Project leader: Jesus San-Miguel Ayanz

Global Forest Fire Information System



Project leader: Jesus San-Miguel Ayanz

Global Forest Fire Information System




Archive

2017-01-12

SCIENTIFIC DATA

Data Descriptor | [Open Access](#) | Published: 29 November 2019

A global wildfire dataset for the analysis of fire regimes and fire behaviour

Tomàs Artés , Duarte Oom, Daniele de Rigo, Tracy Houston Durrant, Pieralberto Maianti, Giorgio Libertà & Jesús San-Miguel-Ayanz

Scientific Data 6, Article number: 296 (2019) | [Cite this article](#)

2140 Accesses | 10 Altmetric | [Metrics](#)

Abstract

Global fire monitoring systems are crucial to study fire behaviour, fire



GlobFire in the GKH

GlobFire Knowledge Package

October 22, 2021 | Version v1

knowledge Metadata-only

A global wildfire dataset for the analysis of fire regimes and fire behaviour

Tomas, Artes Vivancos ¹; Jesús, San-Miguel Ayanz ¹ [show affiliations](#)

DOI [10.5072/j7p48-6be70](https://doi.org/10.5072/j7p48-6be70)

Global fire monitoring systems are crucial to study fire behaviour, fire regimes and their impact at the global scale. Although global fire products based on the use of Earth Observation satellites exist, most remote sensing products only partially cover the requirements for these analyses. These data do not provide information like fire size, fire spread speed, how fires may evolve and joint into single event, or the number of fire events for a given area. This high level of abstraction is very valuable; it makes it possible to characterize fires by types (either size, spread, behaviour, etc.). Here, we present and test a data mining work flow to create a global database of single fires that allows for the characterization of fire types and fire regimes worldwide. This work describes the data produced by a data mining process using MODIS burnt area product Collection 6 (MCD64A1). The entire product has been computed until the present and is available under the umbrella of the Global Wildfire Information System (GWIS).

GlobFire can be used to create statistics which are not commonly found in burnt area products. For instance, the average monthly fire size for country. It can be useful to see the behaviour of the fire season, spatial differences of fire frequency or trends of the maximum daily fire spread. It is interesting to see how there are some regions where the number of fires increased but the total burnt area correlation trend is strongly negative. That fact count point out to successful fuel management techniques or prescribed fires. But the opposite can happen too, an increasing linear trend of burnt area and number of fires as in many regions of the Artic or southeastern-western Australia. Fire causes and fire spread behaviour are defined by a large set of different factors like socio-economic factors, weather conditions, fire fighting means, policies, etc. Then, it is hard to point out the reasons of the results obtained from this dataset. However, the datasets like GlobFire could help to detect those areas where fires statistics are worsening potentially by climate change and/or direct anthropogenic factors. Finally, it could help, combined with other datasets, to see in which regions fuel management is working or do research to improve fire danger and risk indexes. See more in Applications section of the manual (*GlobFire Manual Method Replication*).

- Share GlobFire publication.
- Share GlobFire dataset.
- Share the method to build/replicate GlobFire.
- Share the software used for GlobFire.
- Share how to use it and what can be done.
- GKH is Knowledge meeting point and a platform to share!

GlobFire in the GKH

GEO Knowledge Hub

October 22, 2021 | Version v1

A global wildfire dataset for the analysis of fire regimes and fire behaviour

Tomas, Artes Vivancos ¹; Jesús, San-Miguel Ayanz ¹ [show affiliations](#)

DOI: [10.5072/j7p48-6be70](https://doi.org/10.5072/j7p48-6be70)

Global fire monitoring systems are crucial to study fire behaviour, fire regimes and their impact at the global scale. Although global fire products based on the use of Earth Observation satellites exist, most remote sensing products only partially cover the requirements for these analyses. These data do not provide information like fire size, fire spread speed, how fires may evolve and joint into single event, or the number of fire events for a given area. This high level of abstraction is very valuable; it makes it possible to characterize fires by types (either size, spread, behaviour, etc.). Here, we present and test a data mining work flow to create a global database of single fires that allows for the characterization of fire types and fire regimes worldwide. This work describes the data produced by a data mining process using MODIS burnt area product Collection 6 (MCD64A1). The entire product has been computed until the present and is available under the umbrella of

- Share GlobFire publication.
- Share GlobFire dataset.
- Share the method to build/replicate GlobFire.
- Share the software used for GlobFire.
- Share how to use it and what can be done.

edge meeting point!

Nov 29, 2019

A global wildfire dataset for the analysis of fire regimes and fire behaviour.

Artés Vivancos, Tomás; San-Miguel, Jesús;

A global wildfire dataset for the analysis of fire regimes and fire behaviourGlobal fire monitoring systems are crucial to study fire behaviour, fire regimes and their impact at the global scale. Although global fire products based on the use of Earth Observation satellites exist, most remote sensing products only partially...

GlobFire in the GKH

GEO Knowledge Hub

October 22, 2021 | Version v1

knowledge Metadata-only

A global wildfire dataset for the analysis of fire regimes and fire behaviour

Tomas, Artes Vivancos ¹; Jesús, San-Miguel Ayanz ¹ [show affiliations](#)

DOI: [10.5072/j7p48-6be70](https://doi.org/10.5072/j7p48-6be70)

Global fire monitoring systems are crucial to study fire behaviour, fire regimes and their impact at the global scale. Although global fire products based on the use of Earth Observation satellites exist, most remote sensing products only partially cover the requirements for these analyses. These data do not provide information like fire size, fire spread speed, how fires may evolve and joint into single event, or the number of fire events for a given area. This high level of abstraction is very valuable; it makes it possible to characterize fires by types (either size, spread, behaviour, etc.). Here, we present and test a data mining work flow to create a global database of single fires that allows for the characterization of fire types and fire regimes worldwide. This work describes the data produced by a data mining process using MODIS burnt area product Collection 6 (MCD64A1). The entire product has been computed until the present and is available under the umbrella of the Global Wildfire Information System (GWIS).

GlobFire can be used to create statistics which are not commonly found in burnt area products. For instance, the average

- Share GlobFire publication.
- Share GlobFire dataset.
- Share the method to build/replicate GlobFire.
- Share the software used for GlobFire.
- Share how to use it and what can be done.
- GKH Knowledge meeting point!

Nov 29, 2019 Dataset Metadata-only

A global wildfire dataset for the analysis of fire regimes and fire behaviour

Tomas, Artes Vivancos;

Set of ESRI Shapefiles containing the fire events from GlobFire based on MCD64A1....



GlobFire in the GKH

GEO Knowledge Hub Search

October 22, 2021 | Version v1 knowledge Metadata-only

A global wildfire dataset for the analysis of fire regimes and fire behaviour

Tomas, Artes Vivancos ¹; Jesús, San-Miguel Ayanz ¹ show affiliations

DOI [10.5072/j7p48-6be70](https://doi.org/10.5072/j7p48-6be70)

Global fire monitoring systems are crucial to study fire behaviour, fire regimes and their impact at the global scale. Although global fire products based on the use of Earth Observation satellites exist, most remote sensing products only partially cover the requirements for these analyses. These data do not provide information like fire size, fire spread speed, how fires may evolve and joint into single event, or the number of fire events for a given area. This high level of abstraction is very valuable; it makes it possible to characterize fires by types (either size, spread, behaviour, etc.). Here, we present and test a data mining work flow to create a global database of single fires that allows for the characterization of fire types and fire regimes worldwide. This work describes the data produced by a data mining process using MODIS burnt area product Collection 6 (MCD64A1). The entire product has been computed until the present and is available under the umbrella of the Global Wildfire Information System (GWIS).

- Share GlobFire publication.
- Share GlobFire dataset.
- **Share the method to build/replicate GlobFire.**
- Share the software used for GlobFire.
- **Share how to use it and what can be done.**
- **GKH Knowledge meeting point!**

Oct 22, 2021 Other Open

GlobFire Manual Method Replication

Tomas, Artes Vivancos;

Describes the procedure and how to use the code used for GlobFire dataset....

GlobFire in the GKH

GEO Knowledge Hub Search

October 22, 2021 | Version v1 knowledge Metadata-only

A global wildfire dataset for the analysis of fire regimes and fire behaviour

Tomas, Artes Vivancos ¹; Jesús, San-Miguel Ayanz ¹ show affiliations

DOI [10.5072/j7p48-6be70](https://doi.org/10.5072/j7p48-6be70)

Global fire monitoring systems are crucial to study fire behaviour, fire regimes and their impact at the global scale. Although global fire products based on the use of Earth Observation satellites exist, most remote sensing products only partially cover the requirements for these analyses. These data do not provide information like fire size, fire spread speed, how fires may evolve and joint into single event, or the number of fire events for a given area. This high level of abstraction is very valuable; it makes it possible to characterize fires by types (either size, spread, behaviour, etc.). Here, we present and test a data mining work flow to create a global database of single fires that allows for the characterization of fire types and fire regimes worldwide. This work describes the data produced by a data mining process using MODIS burnt area product Collection 6 (MCD64A1). The entire product has been computed until the present and is available under the umbrella of the Global Wildfire Information System (GWIS).

GlobFire can be used to create statistics which are not commonly found in burnt area products. For instance, the average

- Share GlobFire publication.
- Share GlobFire dataset.
- Share the method to build/replicate GlobFire.
- **Share the software used for GlobFire.**
- Share how to use it and what can be done.
- GKH Knowledge meeting point!

Nov 29, 2019 Software Metadata-only

GlobFire Procedure Code and Environment

Vivancos, Tomas;

GlobFire procedure source codePython virtual environmentVirtual machine ready to run the codeSource code and Python environmentVirtual Machine ...

Uses of GlobFire

GWIS – Country Profiles:

- Burnt area extent
- Fire frequency
- Seasonality
- Landcover damage
- Damage to protected areas
- Etcetera...

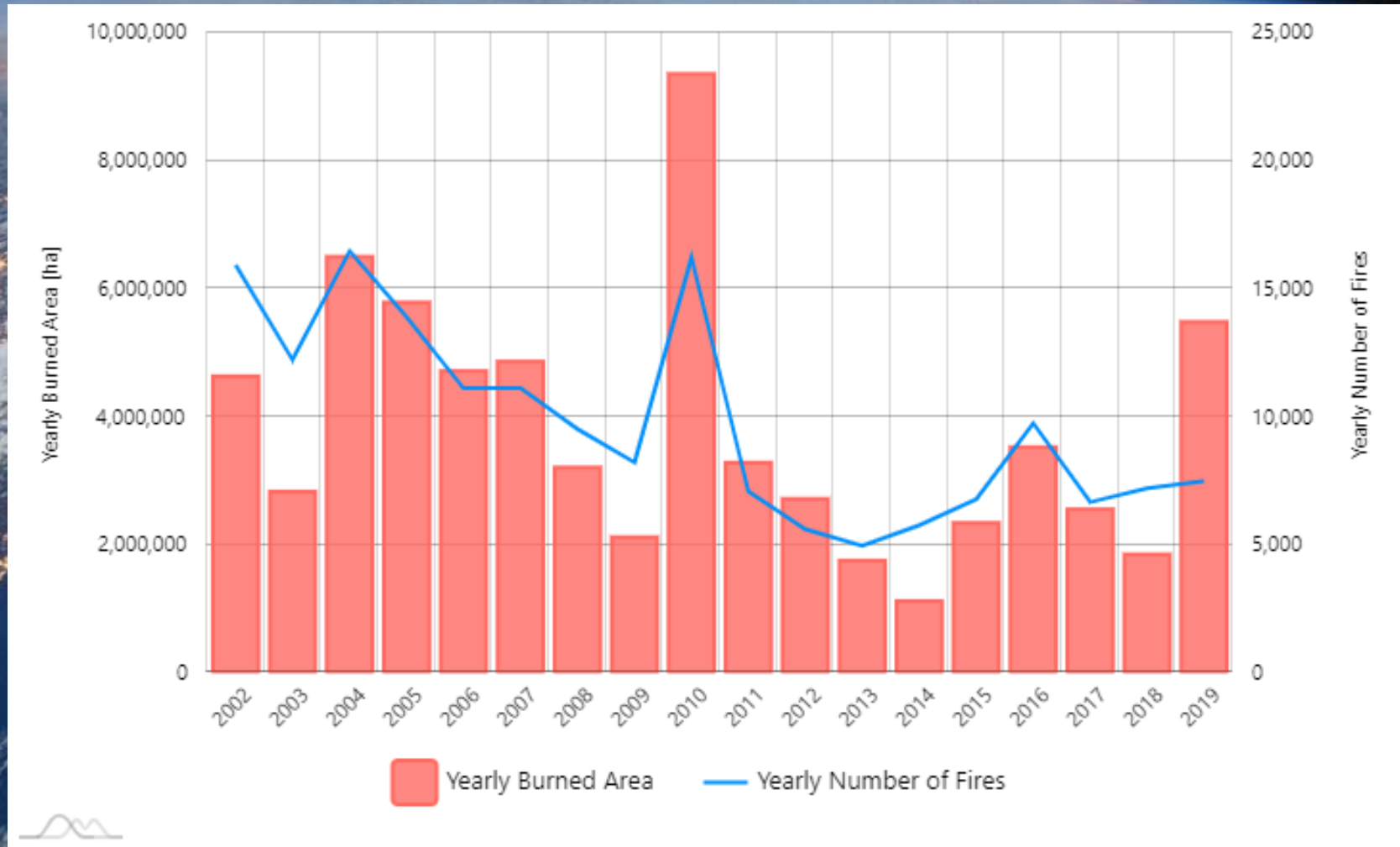
<https://gwis.jrc.ec.europa.eu/apps/country.profile/>



Uses of GlobFire

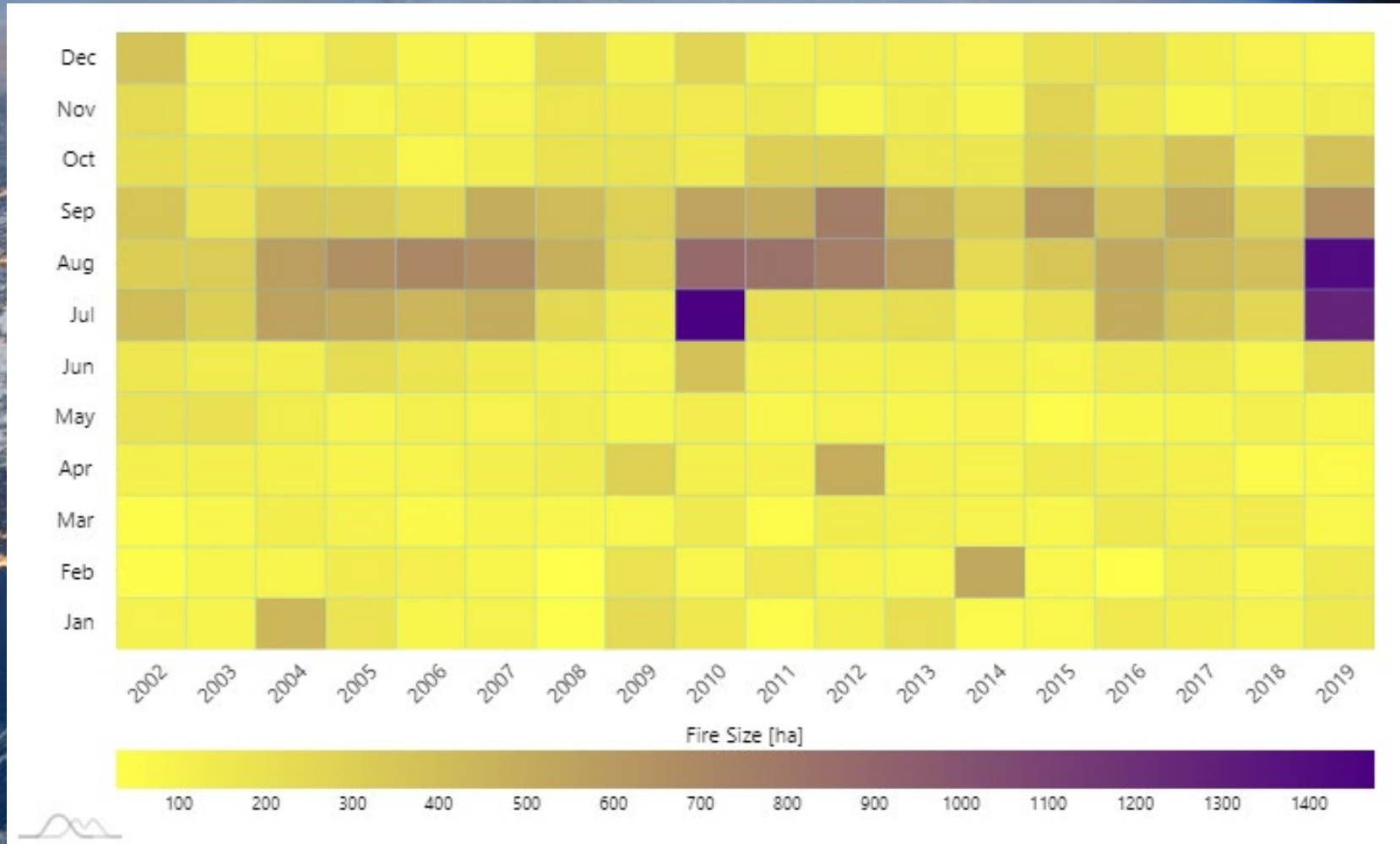
GWIS – Country Profiles:

Bolivia:
Number of fires
Burnt area



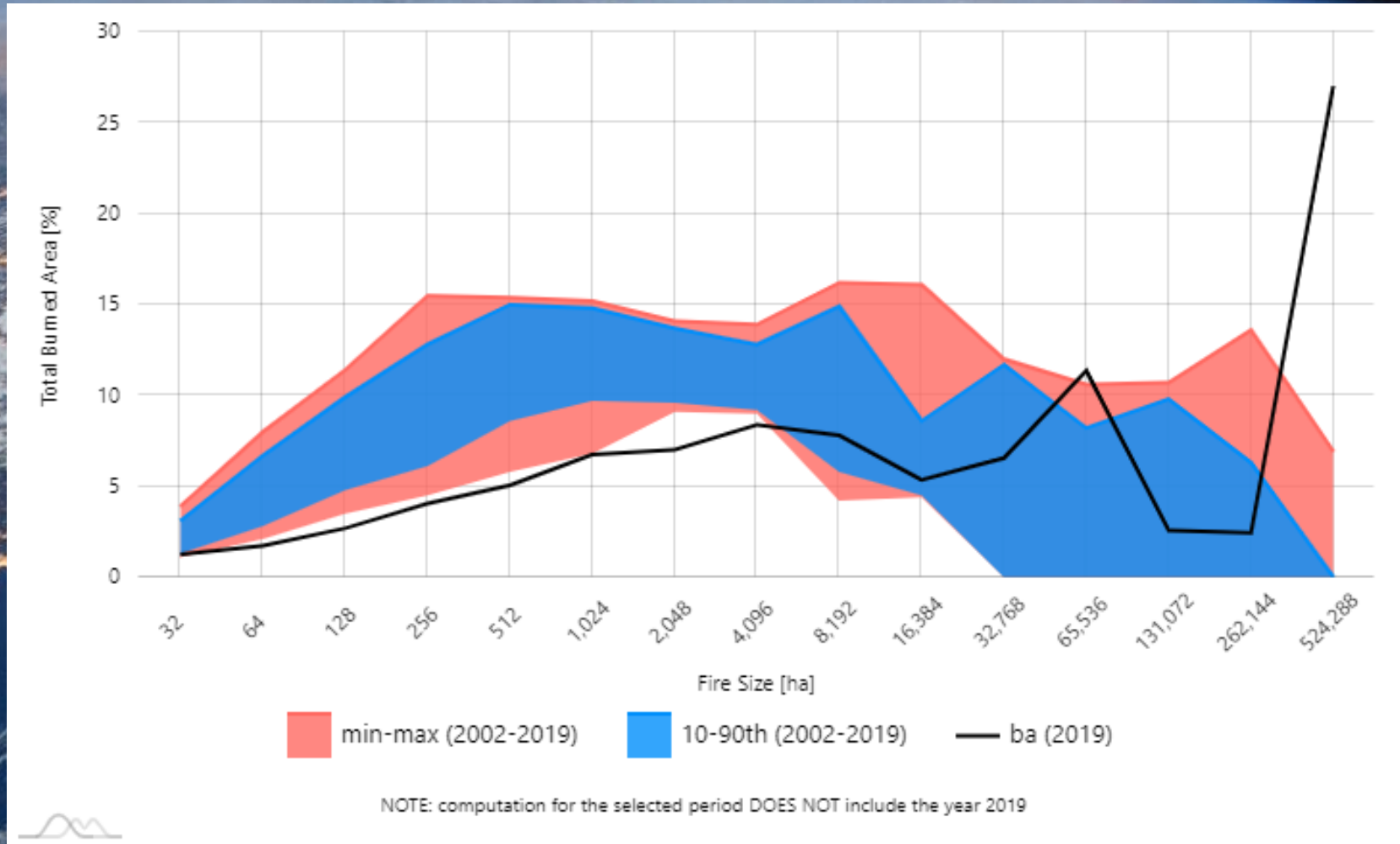
Uses of GlobFire

GWIS – Country Profiles:
Average monthly fire size

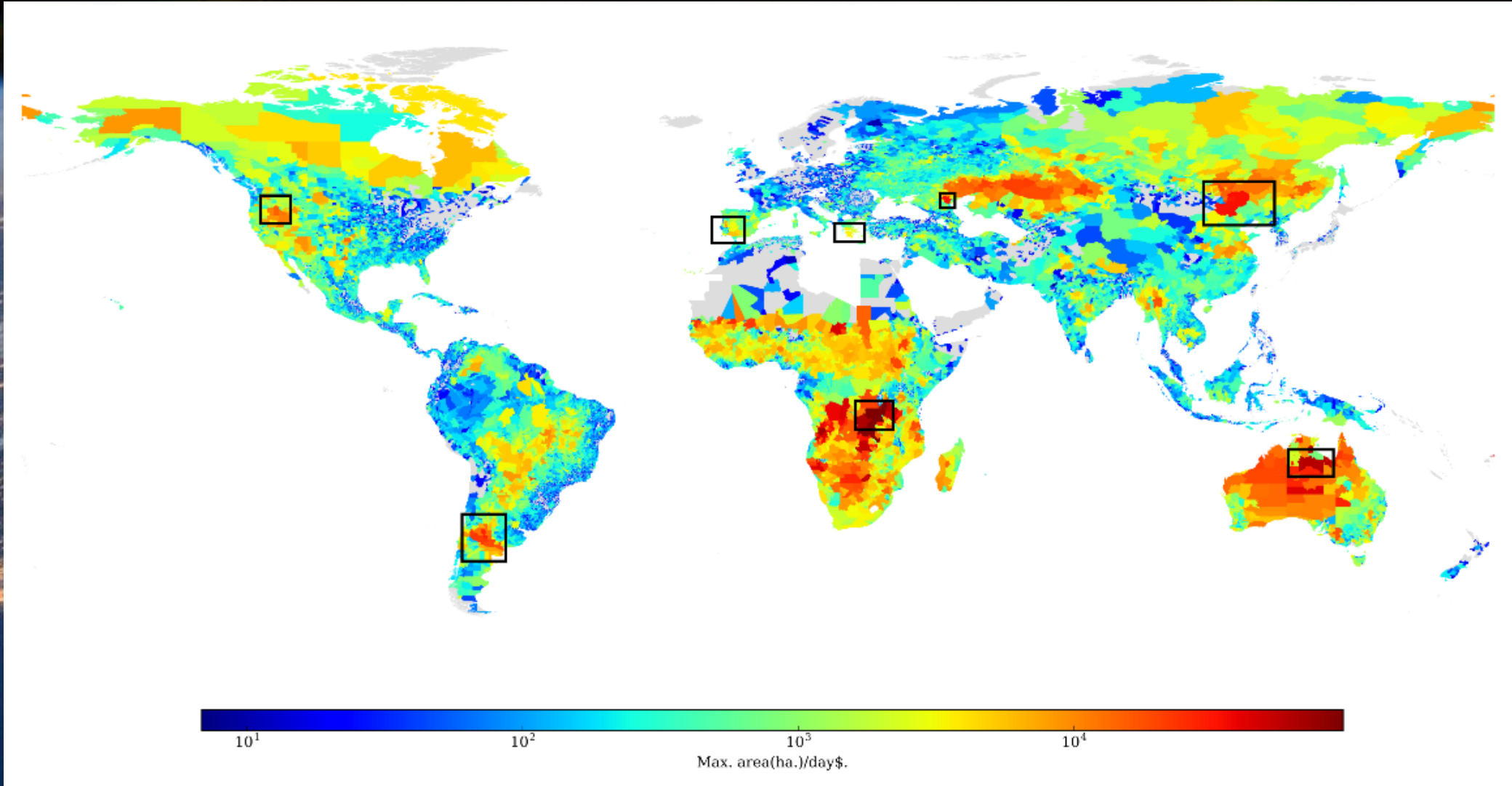


Uses of GlobFire

GWIS – Country Profiles:
Yearly fire size distribution.

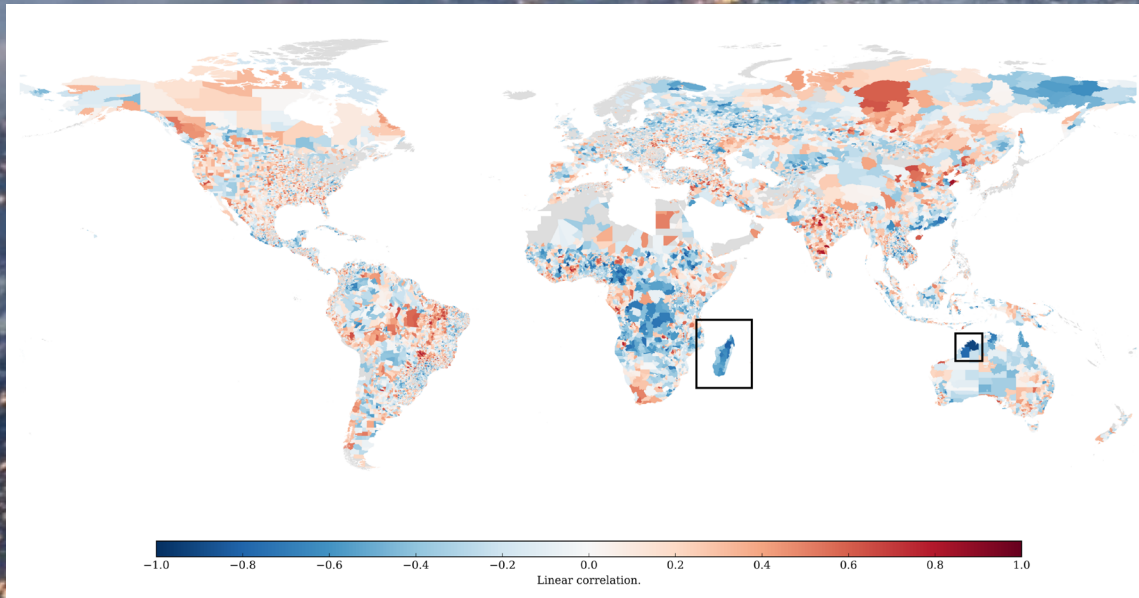


Uses of GlobFire

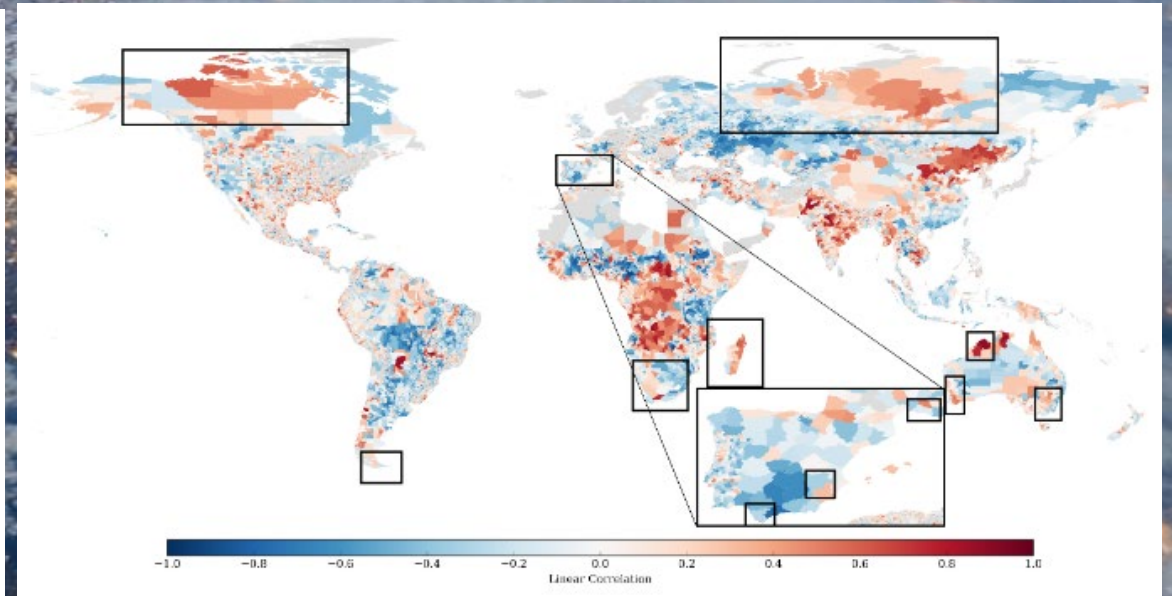


Max. fire spread speed 2001-2017

Uses of GlobFire

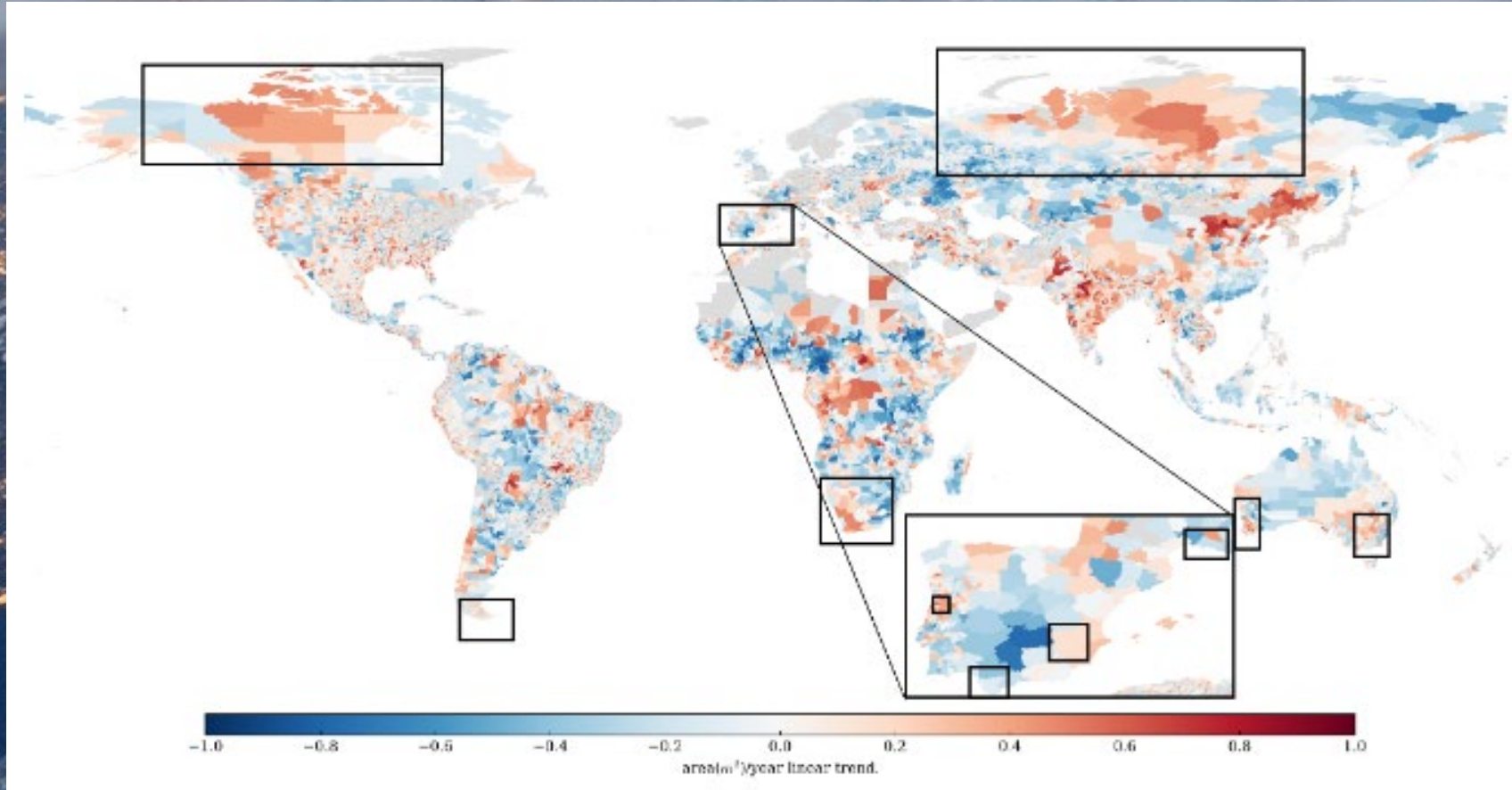


Yearly linear correlation of **fire size** (2001-2017).



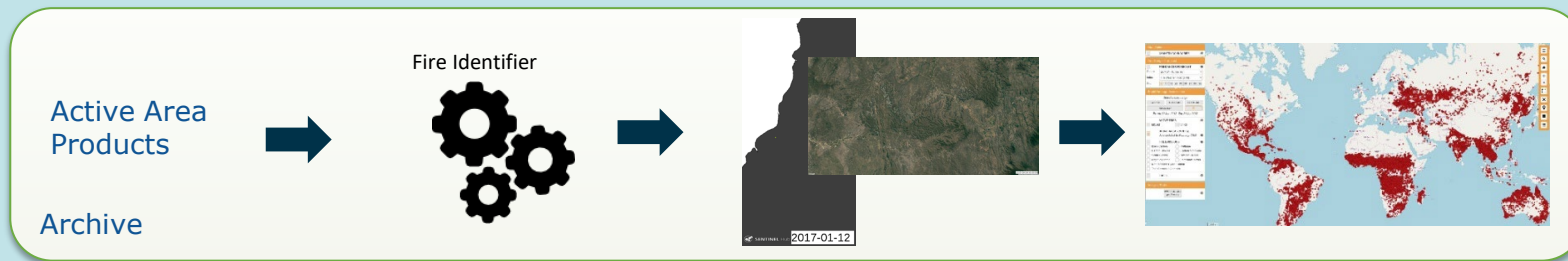
Yearly correlation of the **number of fires** (2001-2017).

Uses of GlobFire

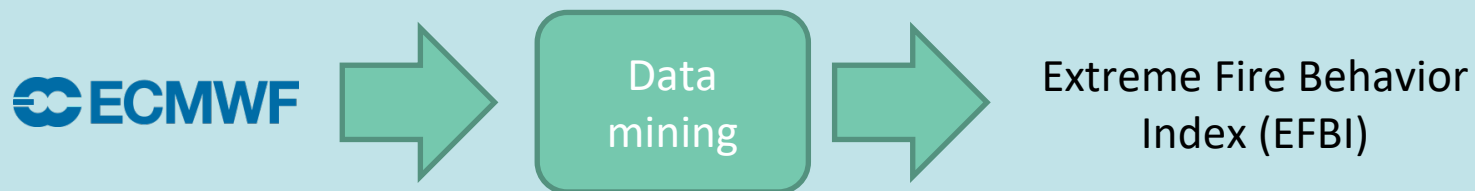


Total burnt area yearly linear correlation (2001-2017).

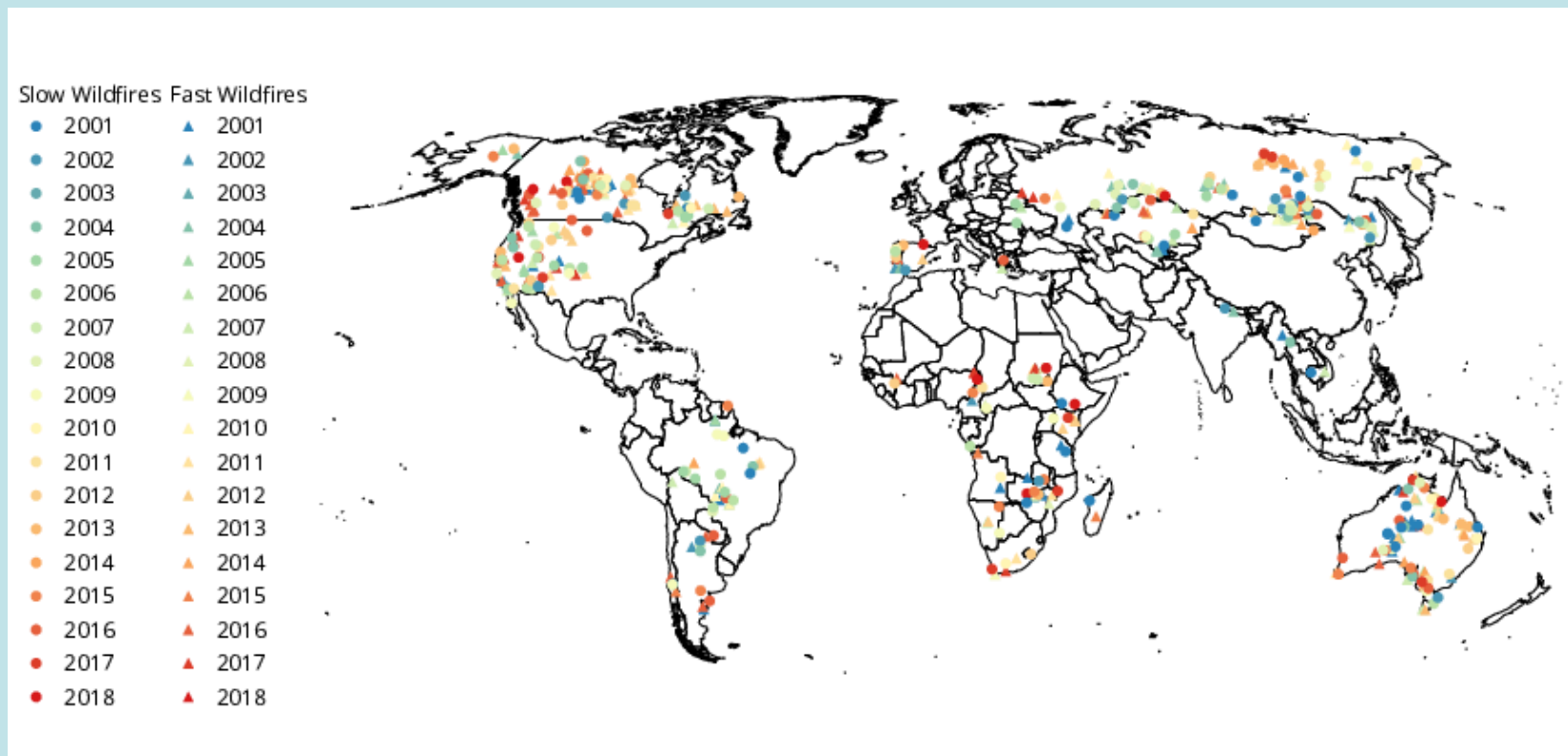
GWIS Use example: Extreme Fire Behaviour



Retrieve when&where extreme fire events took place



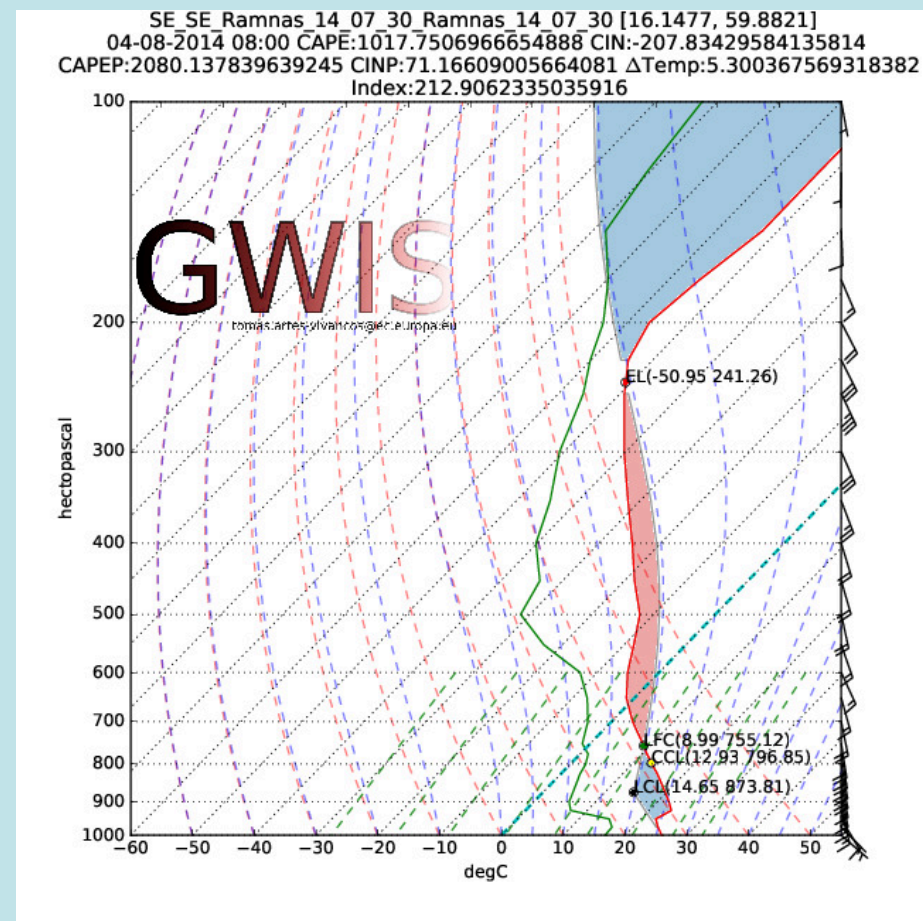
GWIS Use example: Extreme Fire Behaviour



GWIS Use example: Extreme Fire Behaviour

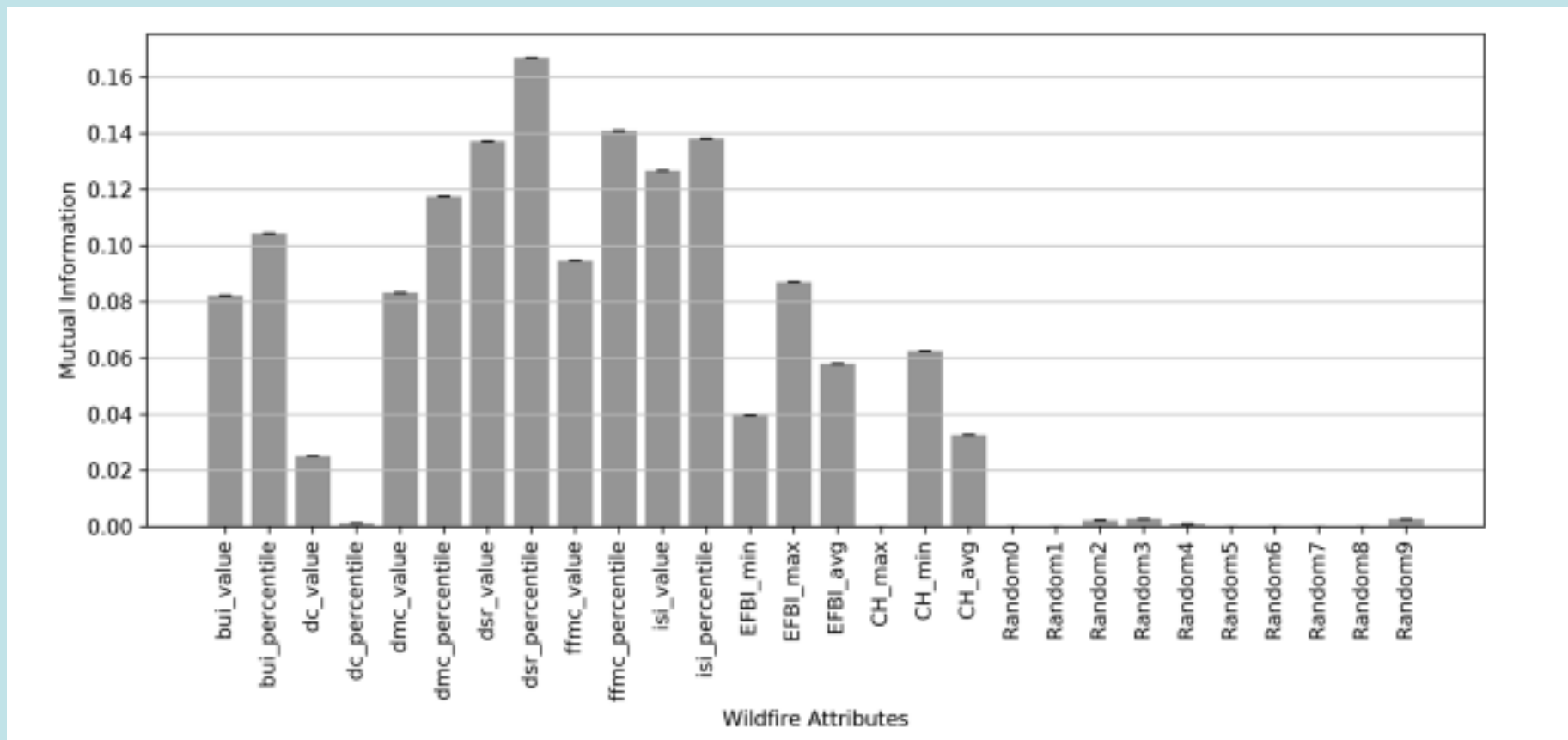
For each fire several fields are collected:

- FWI
- Components of FWI
- Computed in percentiles for that fires since 1980
- Landcover
- Vertical profile:
 - Temperature
 - Dew point temperature
 - Wind speed
 - Wind direction
- We compute a new index of deep convection with conditioned stability.



GWIS Use example: Extreme Fire Behaviour

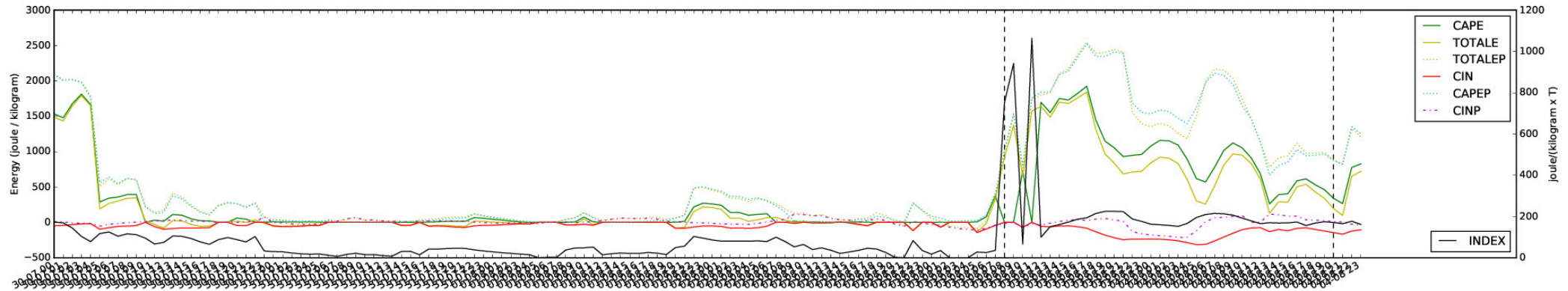
Mutual information between the fire class and each parameter.



GWIS Use example: Extreme Fire Behaviour

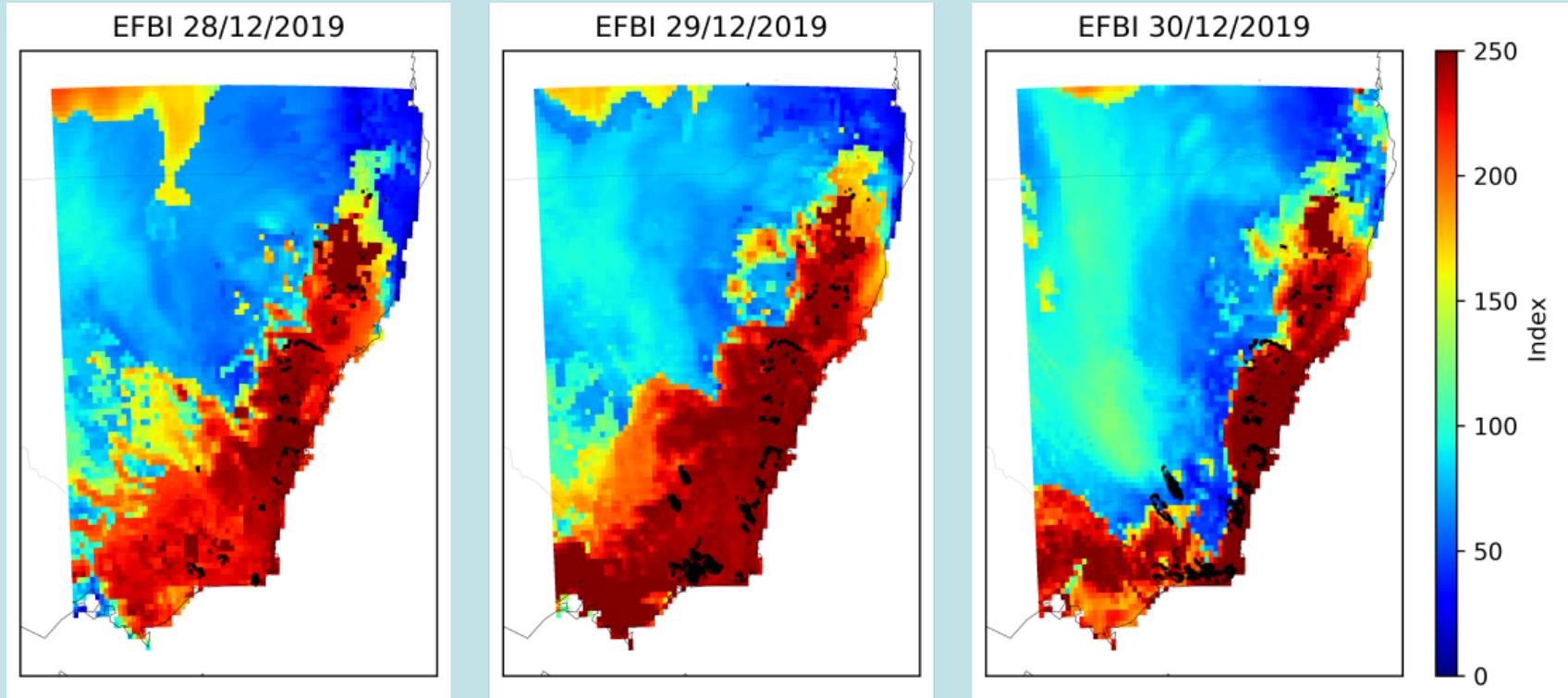
GWIS

tomas.artet-vivanco@ec.europa.eu



Wildfire in Sala (2014, Sweden) that burnt close to 10 000 ha from 3 to 4 August 2014 (time period marked with vertical dashed lines).

GWIS Use example: Extreme Fire Behaviour



GWIS Use example: Extreme Fire Behaviour

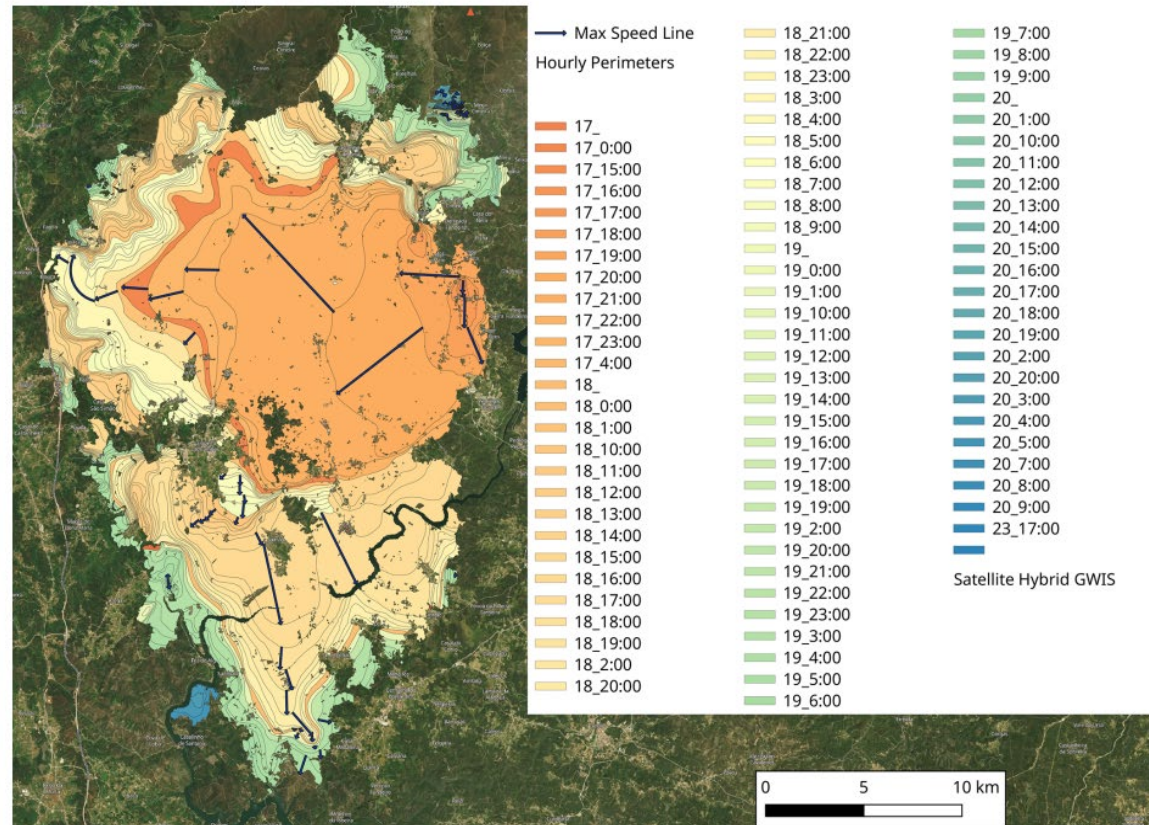
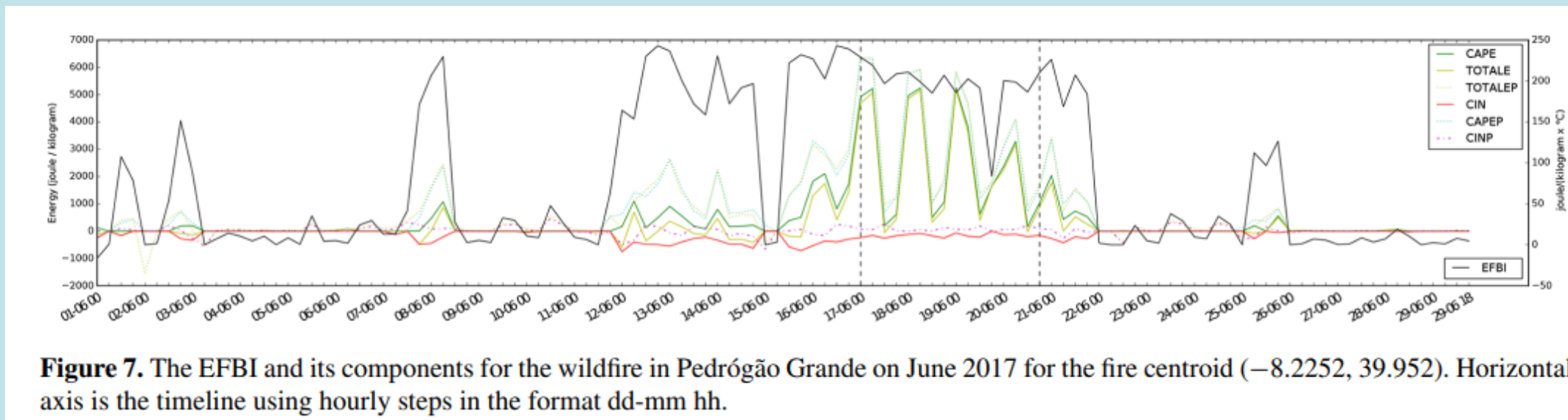


Figure 6. Time sequence of the wildfire which took place in Pedrógão Grande (Comissão Técnica Independente, 2017), Portugal, on 17 June 2017. The maximum speed line between time steps is shown with a black arrow. Background image © MapTiler (<https://maptiler.com/copyright>, last access: 15 March 2021). GWIS: Global Wildfire Information System.

GWIS Use example: Extreme Fire Behaviour



GWIS Use example: Extreme Fire Behaviour

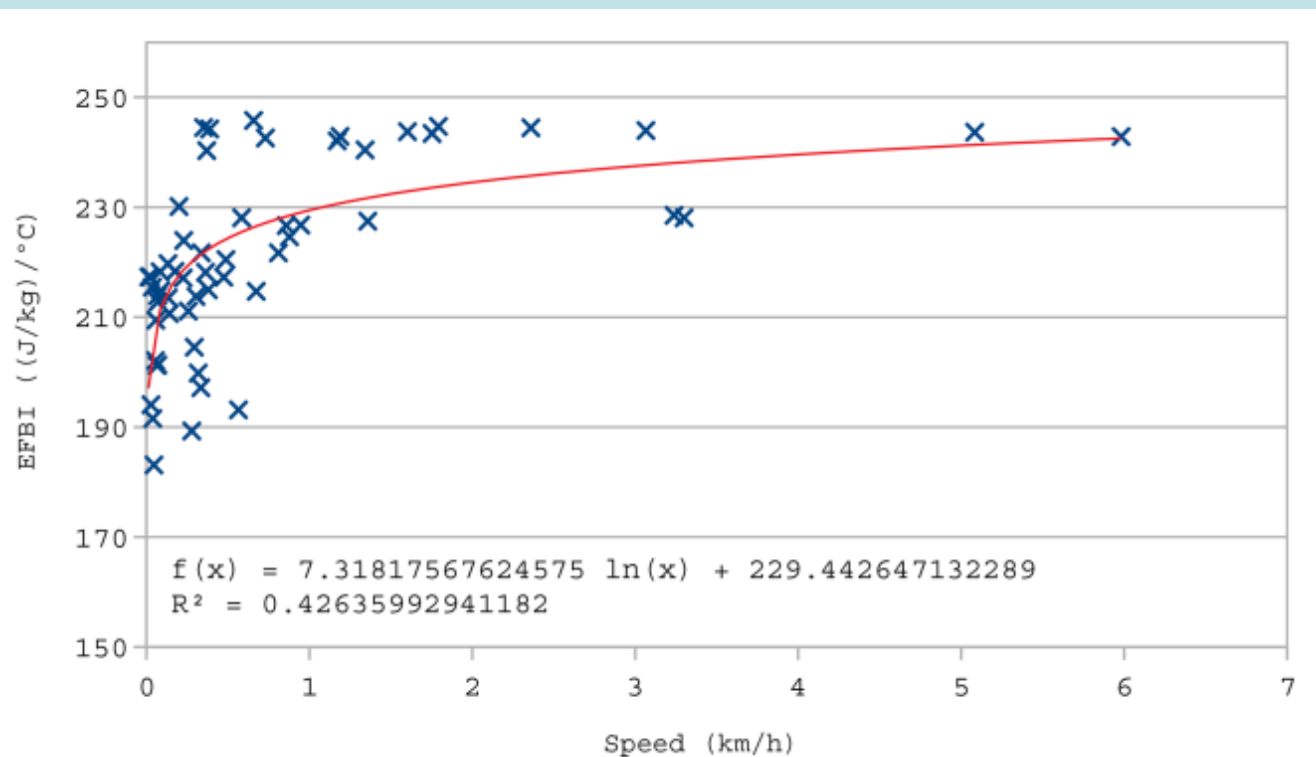


Figure 8. Scatter plot showing the maximum fire front speed and the values of the EFBI for each time step with a logarithmic trend line.

GWIS Use example: Extreme Fire Behaviour

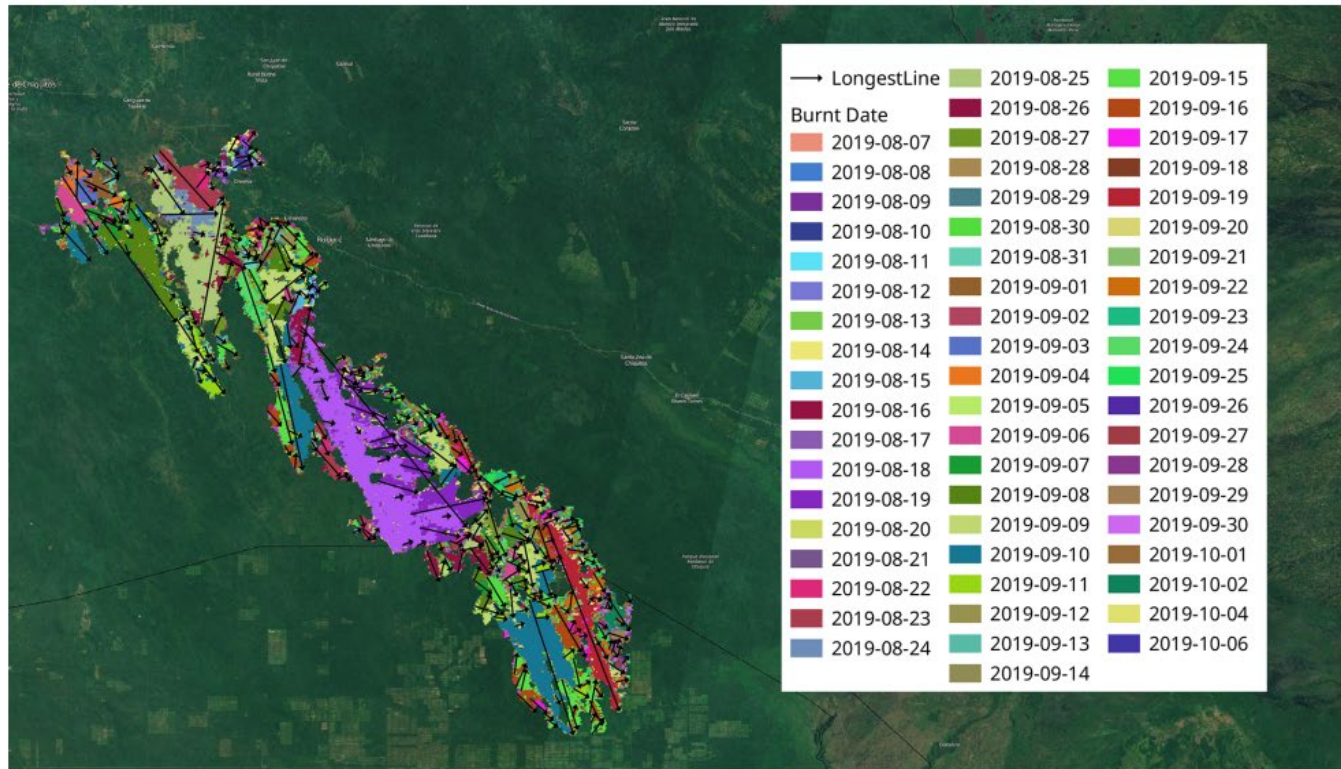


Figure 9. Daily burnt area for the duration of wildfire in Roboré, Bolivia, in 2019. The maximum speed line between time steps is shown with a black arrow. The missing days do not have any daily burnt area in GlobFire. Background image © MapTiler (<https://maptiler.com/copyright>, last access: 18 March 2021). Please note that the date format in this figure is yyyy-mm-dd.

GWIS Use example: Extreme Fire Behaviour

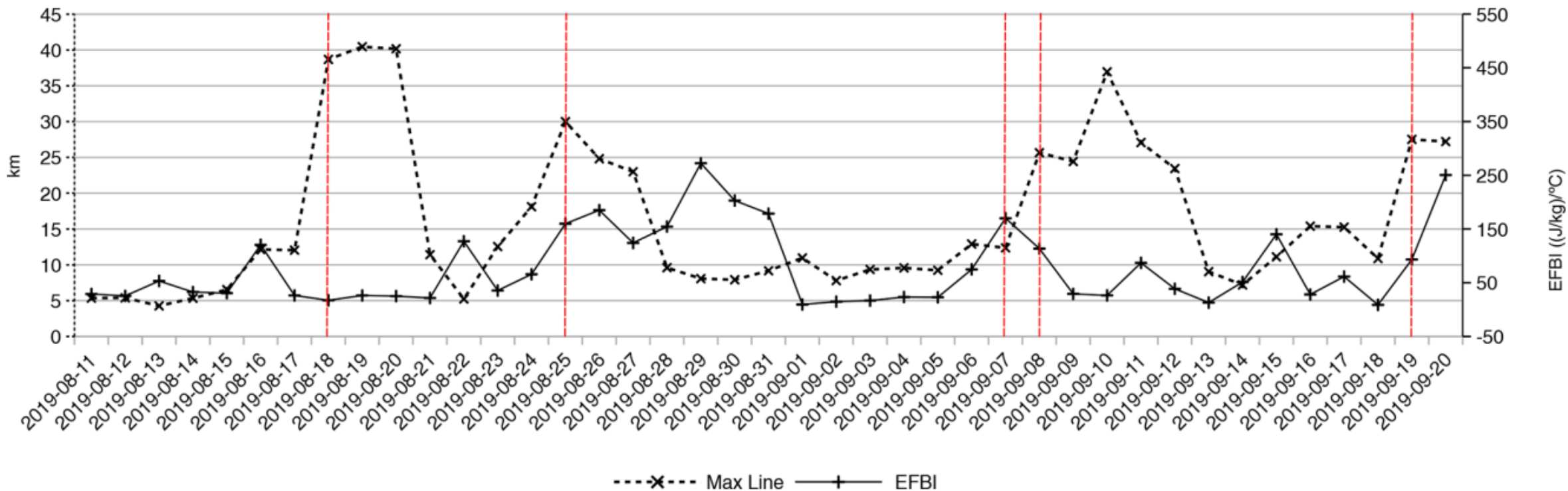
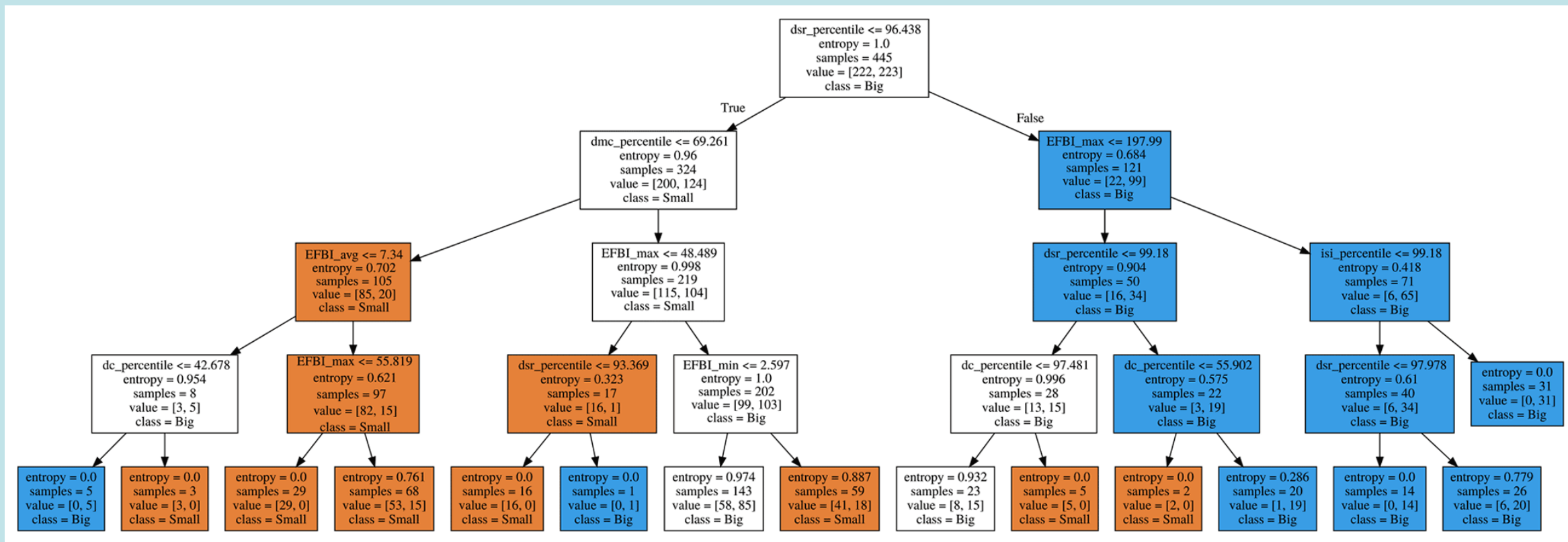


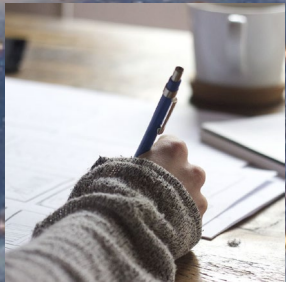
Figure 10. Maximum longitude of the daily burnt area and the EFBI and its components for the wildfire in Roboré, Bolivia, in 2019. Vertical dashed red lines show when a pyroCb took place. Please note that the date format in this figure is yyyy-mm-dd.

GWIS Use example: Extreme Fire Behaviour



Accuracy of 78.37 % (standard error of 1.85 %) using NN

Thanks



Questions?

You can find me at tomas.artes-vivancos@ec.europa.eu

Contact GWIS team at:

JRC-EFFIS@ec.europa.eu