



## Hellenic National Meteorological Service



25 -27 May 2021

**Existing and next generation earth observation products  
for wildfires monitoring: Workshop and Data Discovery**



***User Solution from Services:  
Operational Forecasting and Remote  
Sensing support on wildfire monitoring and  
mitigation process***

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HNMS Remote Sensing Department

# Natural hazard “Fire” - Topics

Fire is the most frequent natural hazard during the warm season over Greece



## Legend

### Fires 2020 (stremma)

- 100 - 280
- 281 - 700
- 701 - 2000
- 2001 - 5800
- 5801 - 18790
- 18791 - 32712

GRC\_admin



Spatial distribution of fires during May - September 2020  
(forest and agricultural areas)

- **Operational Services**
  - NWP products and data
  - Remote sensing data
  
- **Visualization Systems-Tools**
  - HNMS Network App
  - HNMS GeoServer WMS
  - HNMS network access
  
- **Case studies**
  - July 22<sup>nd</sup> , 2020
  - May 19<sup>th</sup>, 2021



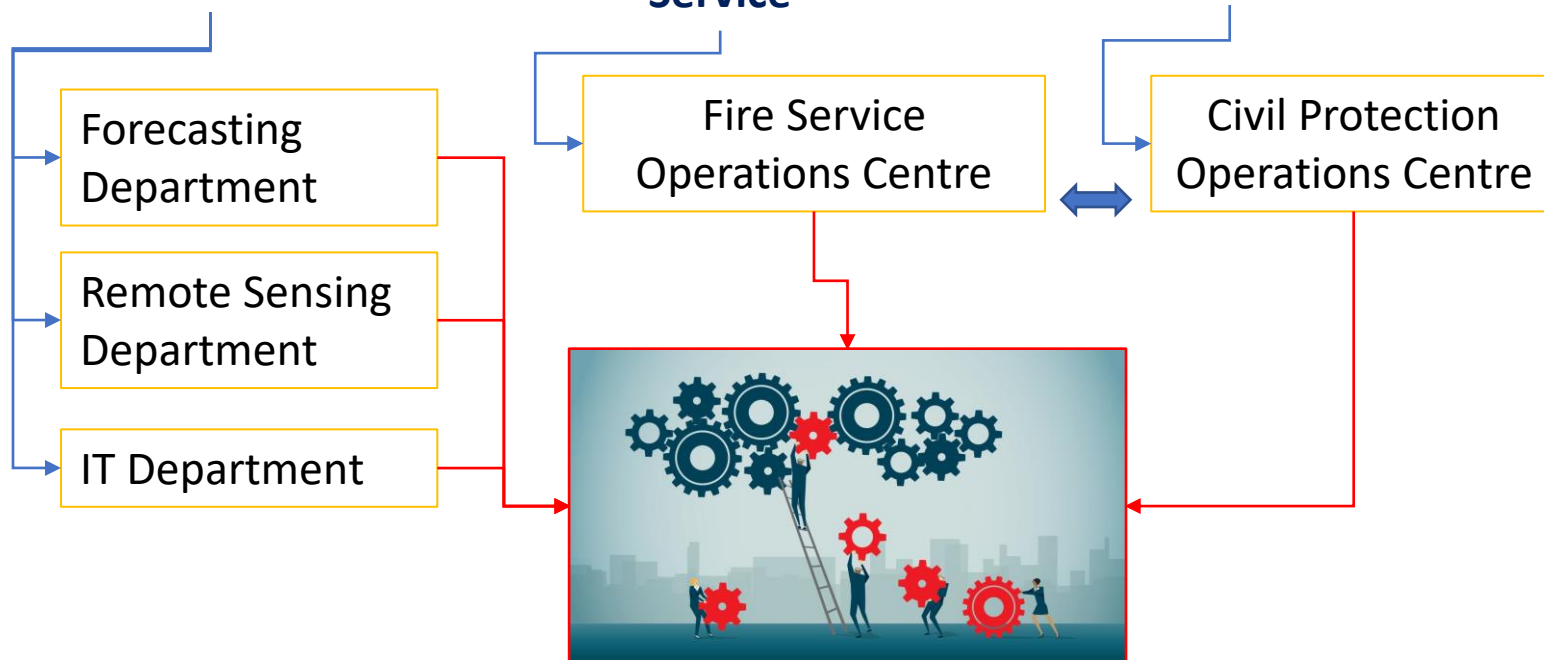
**Hellenic National  
Meteorological Service**



**Hellenic Fire  
Service**



**General Secretariat  
for Civil Protection**



**Close Collaboration to mitigate  
the impact of natural hazards**



## Meetings:

Define the meteorological parameters that will enhance the Strategic, Operational and Tactical Planning and Procedures of the Operations Centers



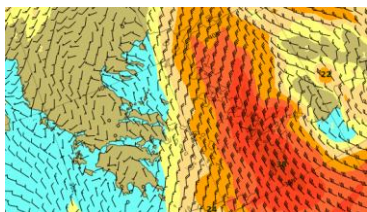
Push Services  
  
Operational Services

Fire Service  
Operations Centre

Civil Protection  
Operations Centre

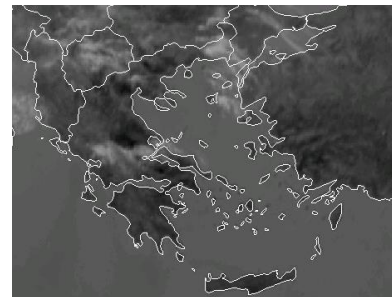
## NWP

- Total Cloud Cover (HCC, MCC, LCC)
- Relative Humidity
- Wind Direction
- Wind Speed (eg. Mean, gust)
- Precipitation (eg. Convective, stratiform)
- Meteogram
- etc



## RTW

- METARs
- Satellite data
- Radar data
- Lightning data

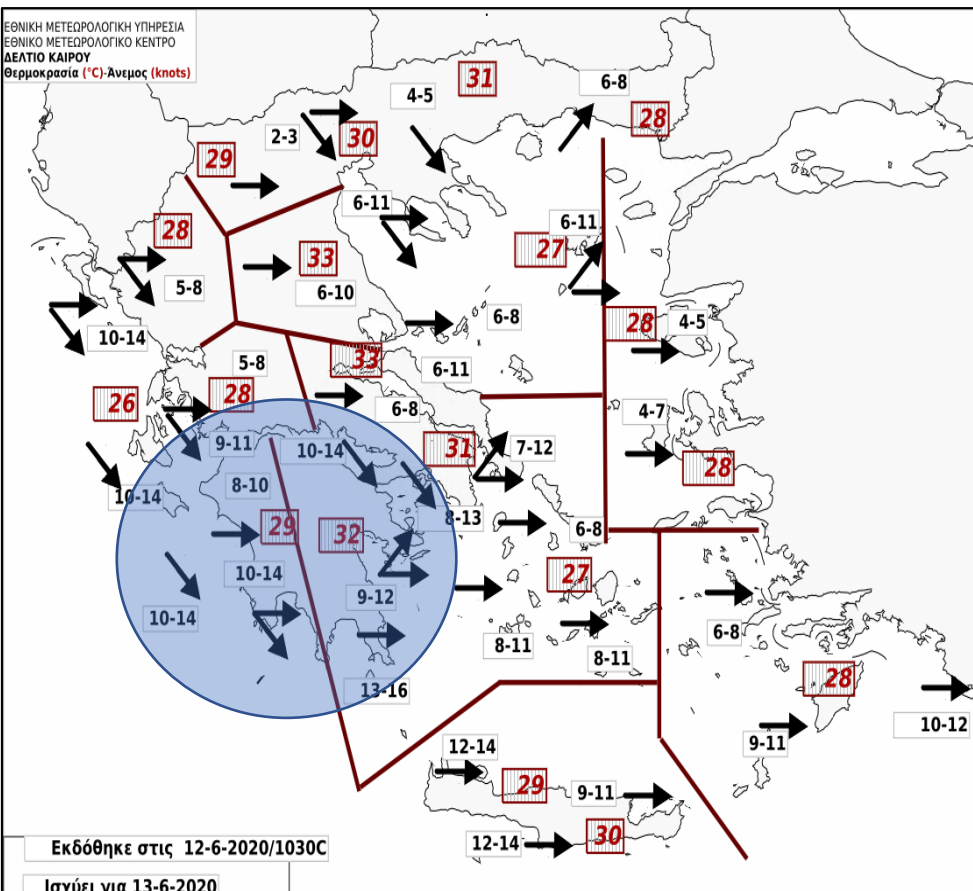


## Forecasts

- Regional Forecasts 24/7

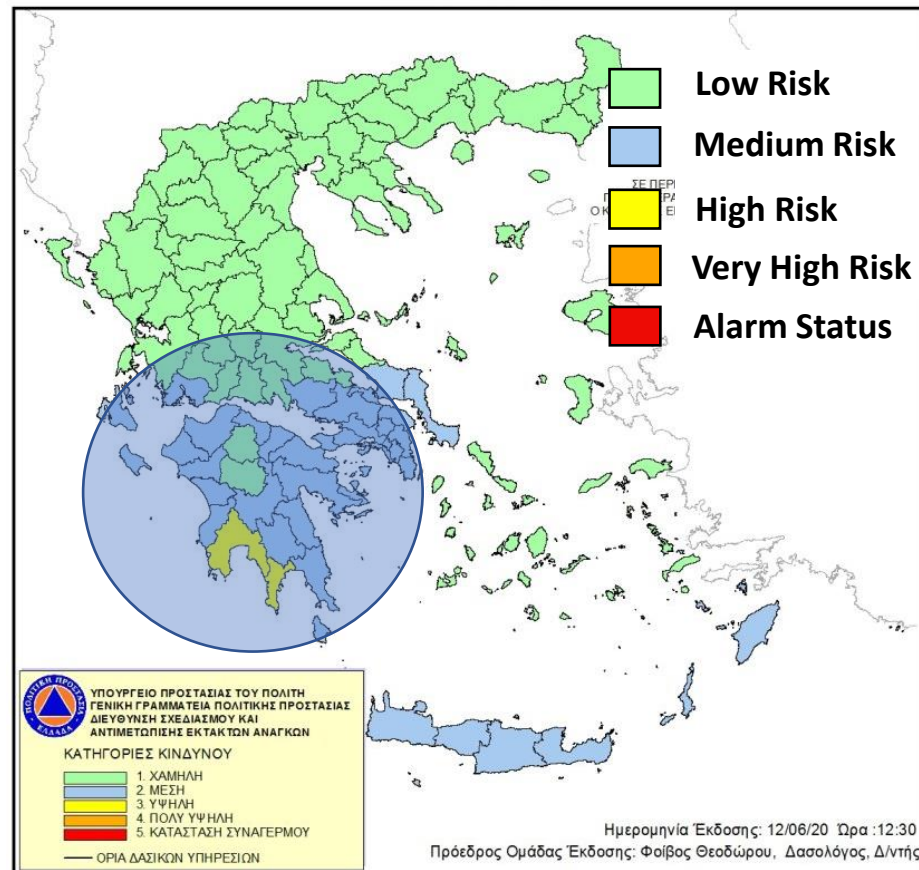


## Weather Bulletin for Fire Risk Map



**Input**  
(T2m, winds)

## GSCP Fire Risk

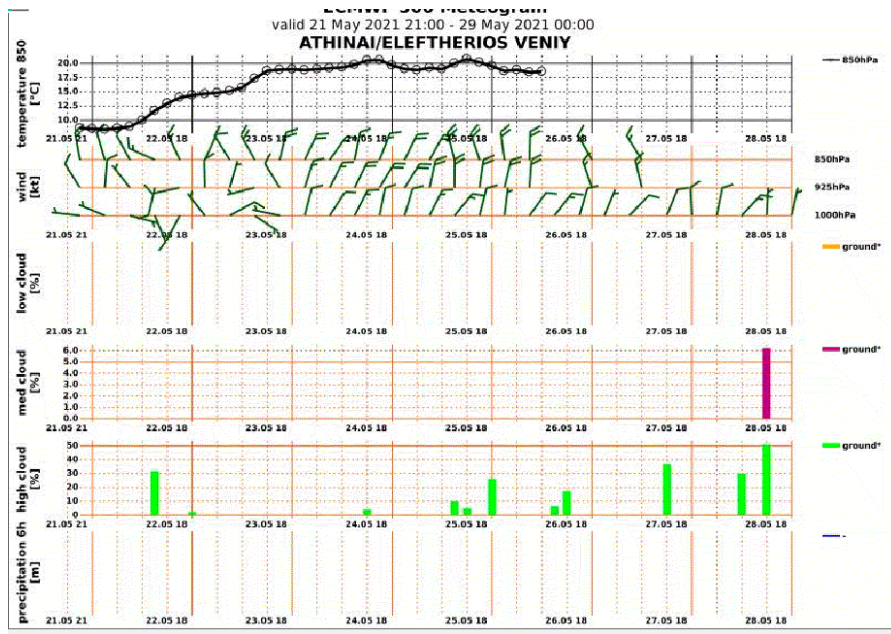


**Output**  
(by implementing and non-met factors)

## Weather Bulletin for Fire Air Assets

### Input

(T2m, winds, vertical wind profiles, cloud cover)



Operational limitation due to weather conditions

## Matrix - Fire Air Assets

### Output

(decision matrix for the next 72hrs)

■ Favourable  
■ Marginal  
■ Unfavourable

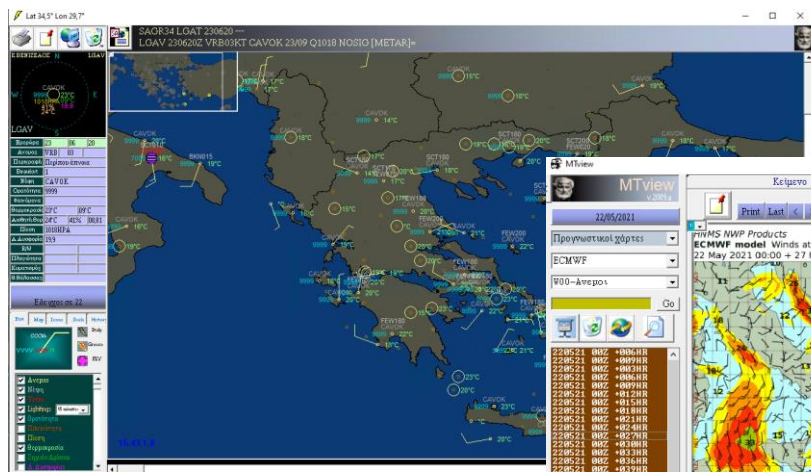
Airport	03Z	06Z	09Z	12Z	15Z	18Z
Airport No1	Favourable	Favourable	Marginal	Unfavourable	Marginal	Favourable
Airport No2	Favourable	Favourable	Favourable	Favourable	Favourable	Marginal
Airport No3	Favourable	Marginal	Marginal	Marginal	Marginal	Marginal

Deploy the air-assets to another airport to increase operational availability

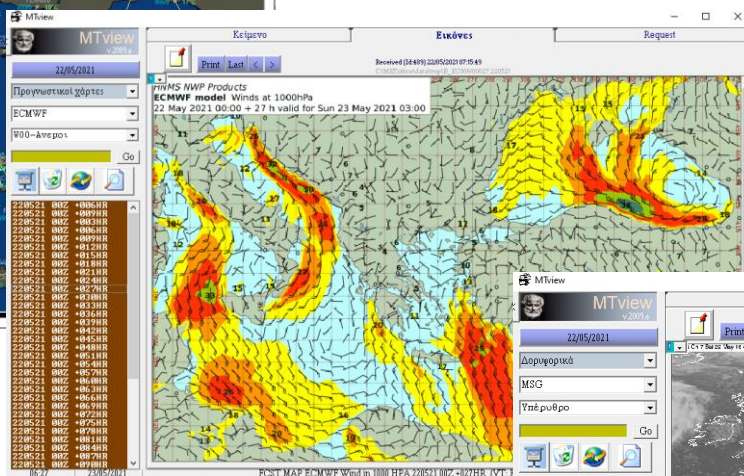


## HNMS Network App

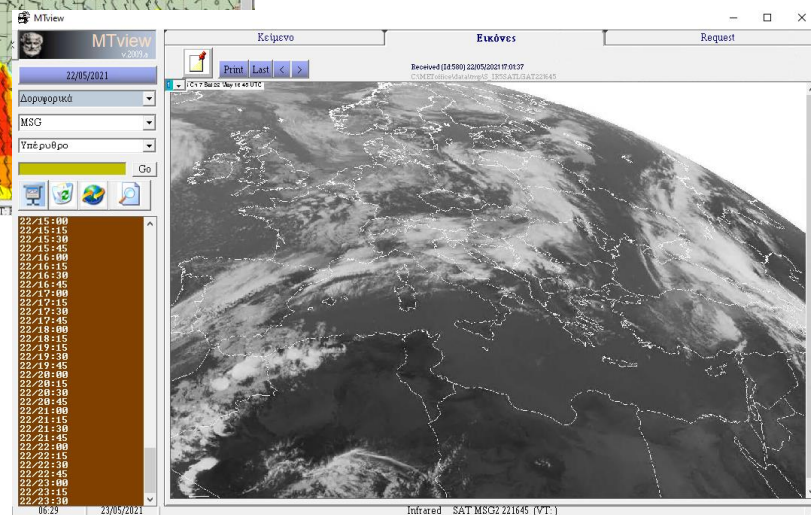
Current weather conditions



NWP products

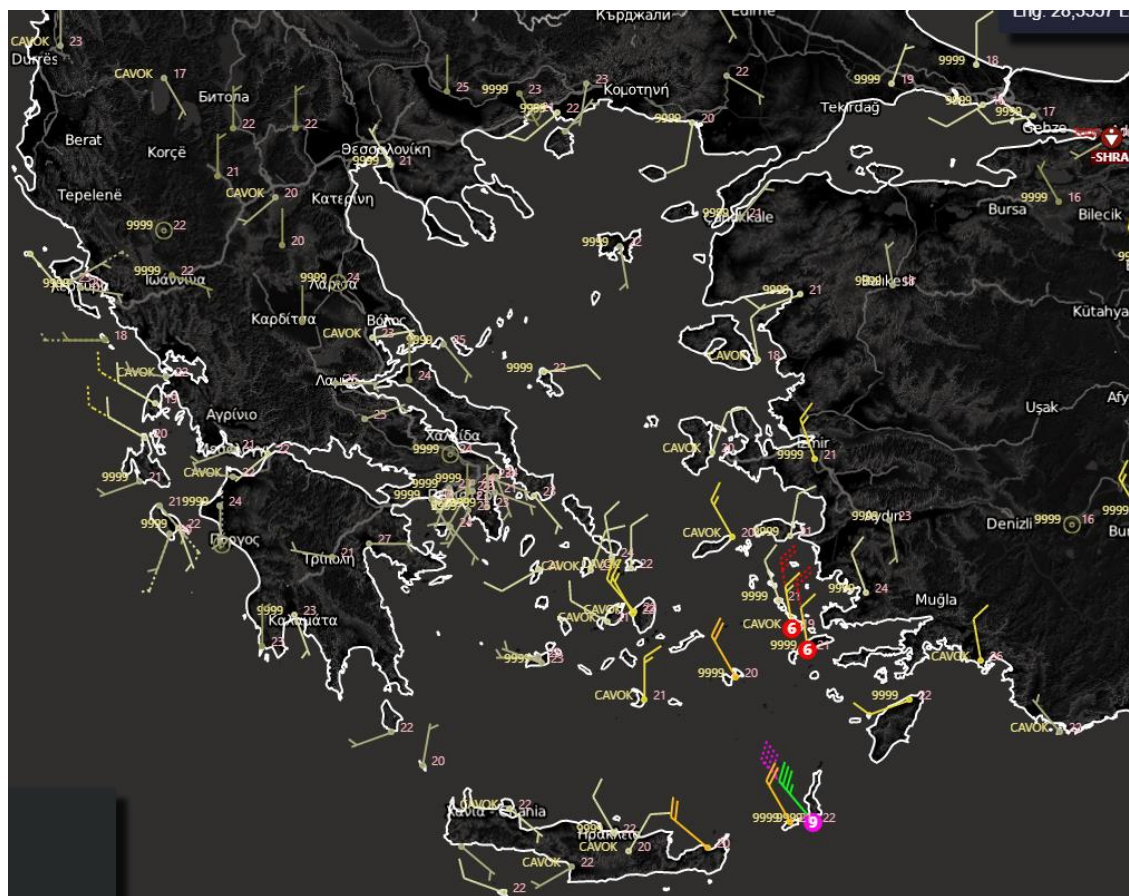


Satellite images

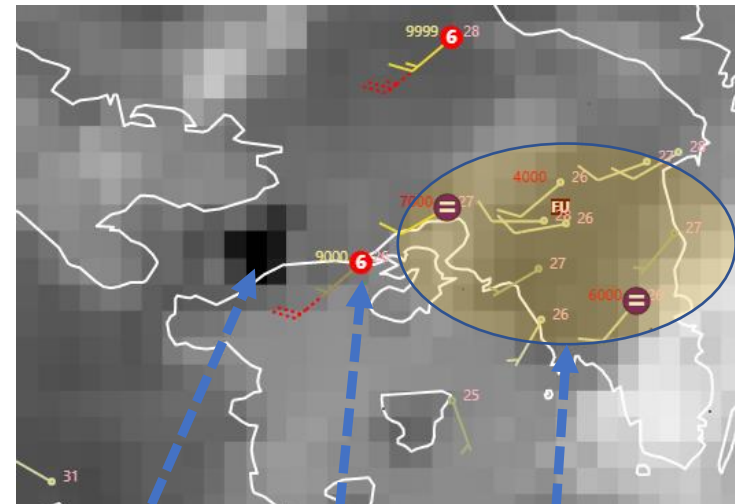




## HNMS GeoServer WMS



MET11 IR 3,9 20-05-2021

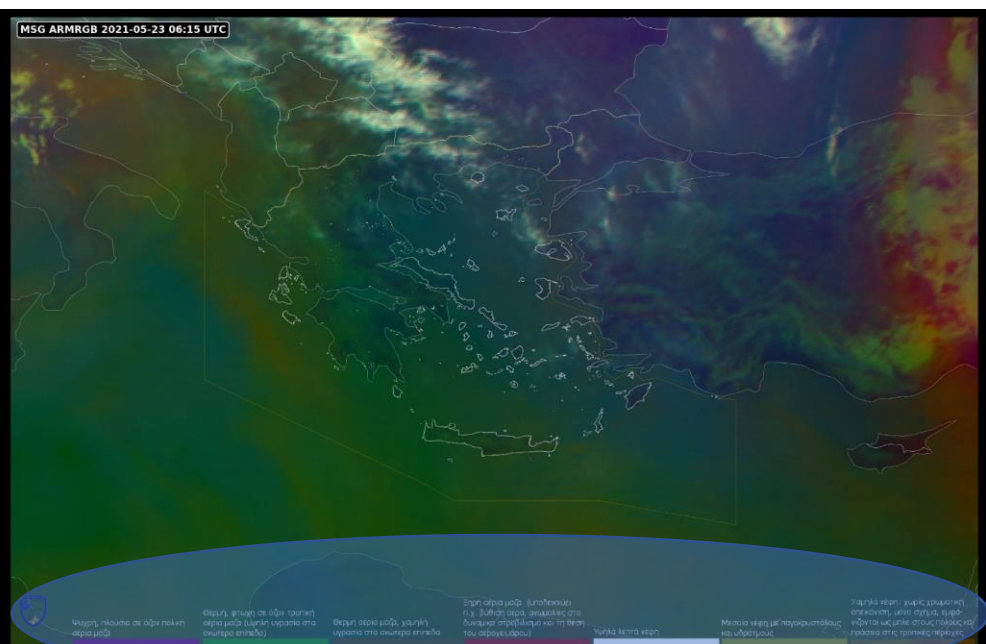
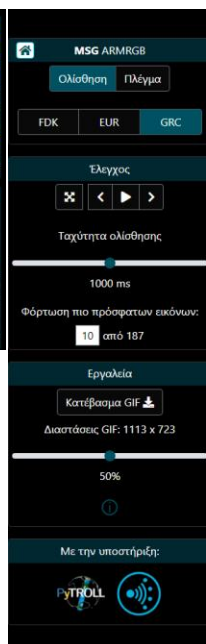
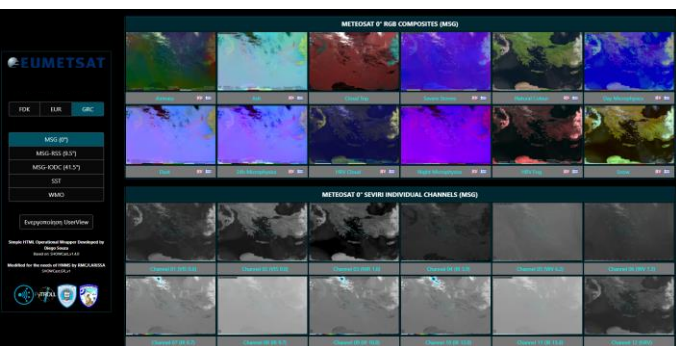


Fire detection

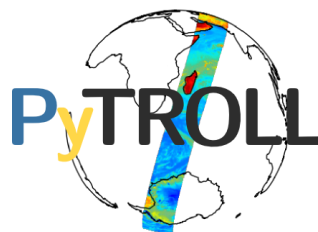
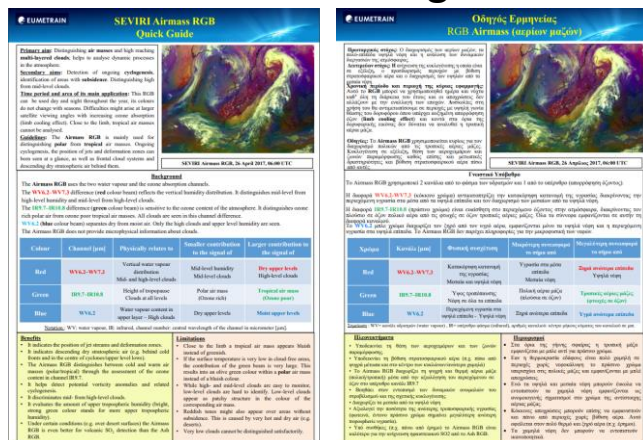
W-SW gusty winds

Poor visibility due to smoke

## HNMS network access



## Translated RGB guides



Friendly user interface  
Zoom in/out, animation, legend  
support, etc

# Fire event: 22 July 2020

Impact: 23000 and 10000 stemma of forests and agriculture areas, respectively

Date: 22 July 2020

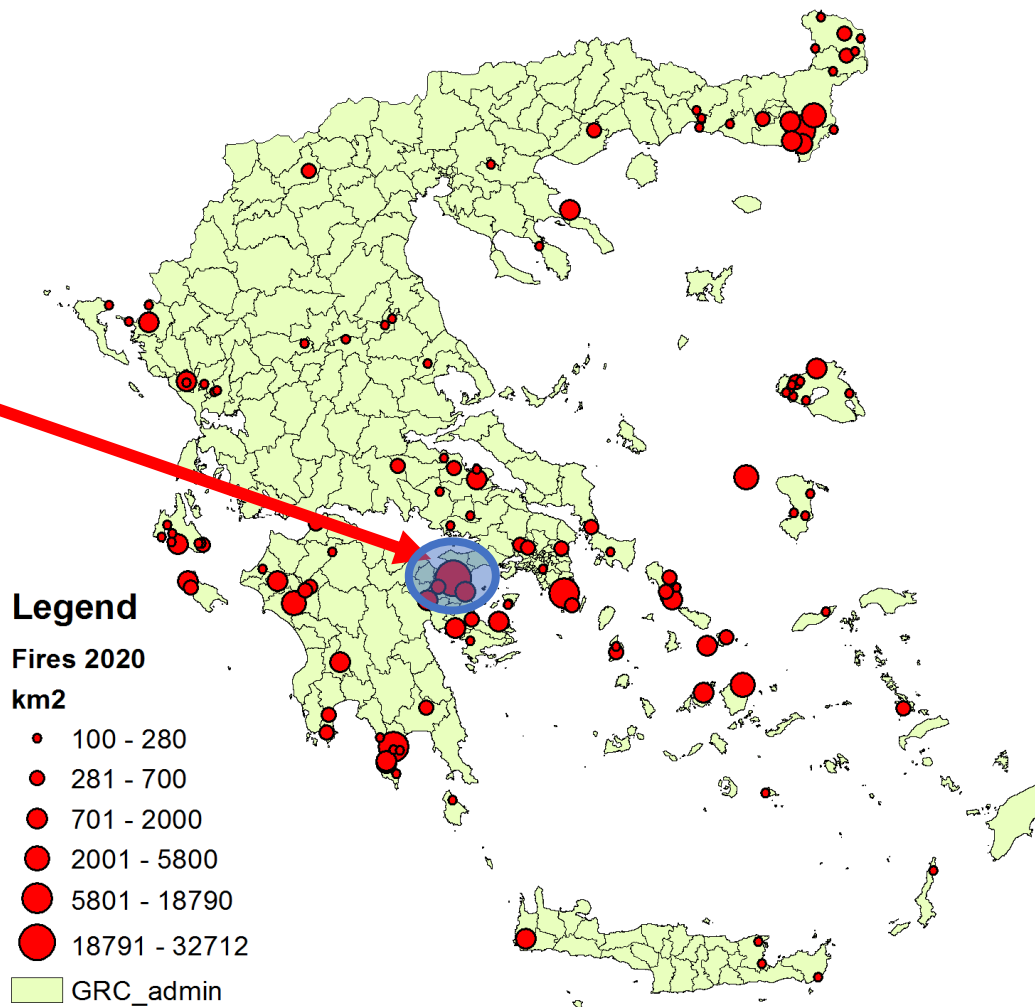
Time: 08:58 UTC

Lon: 22,98

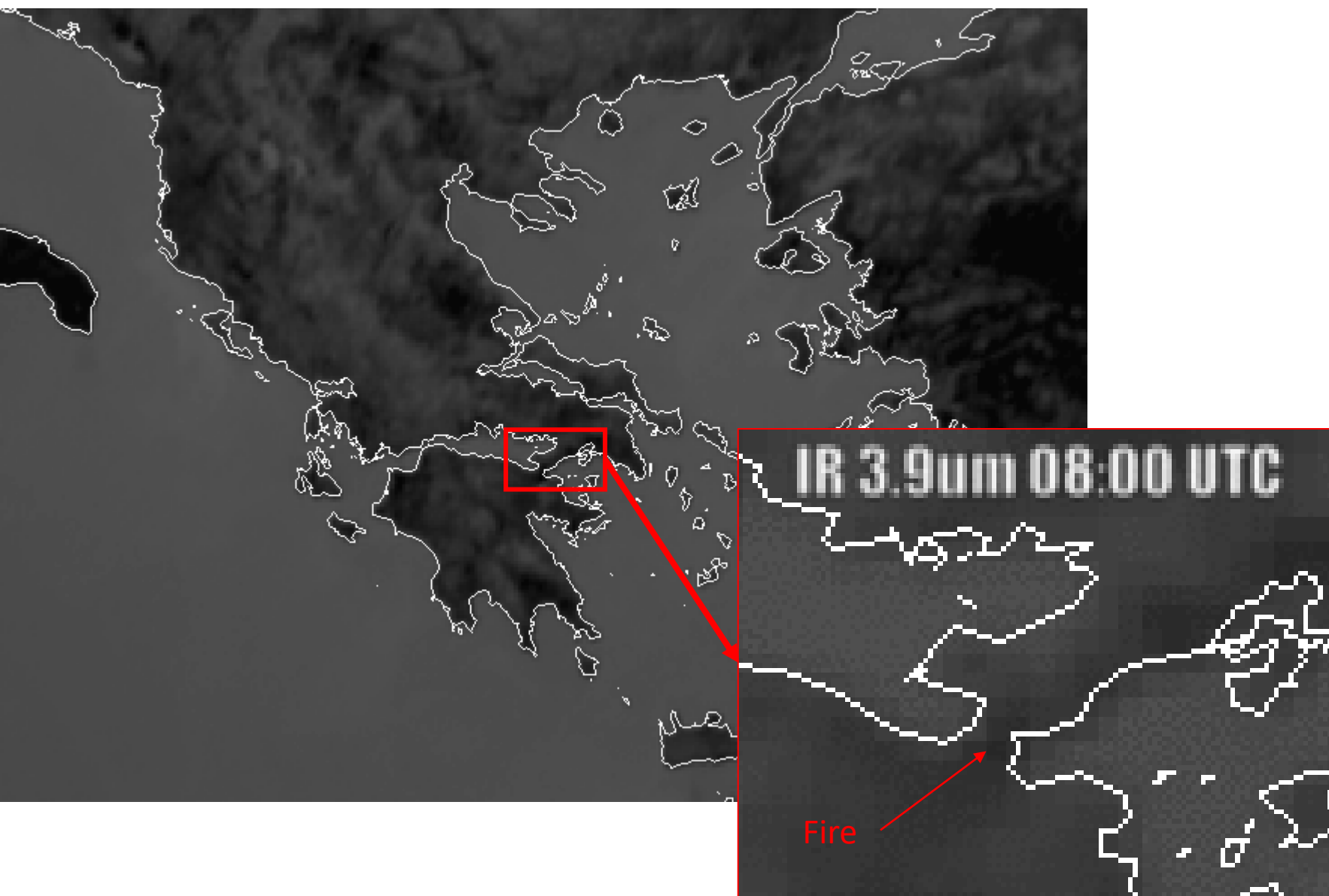
Lat: 37,88



@Source: APE

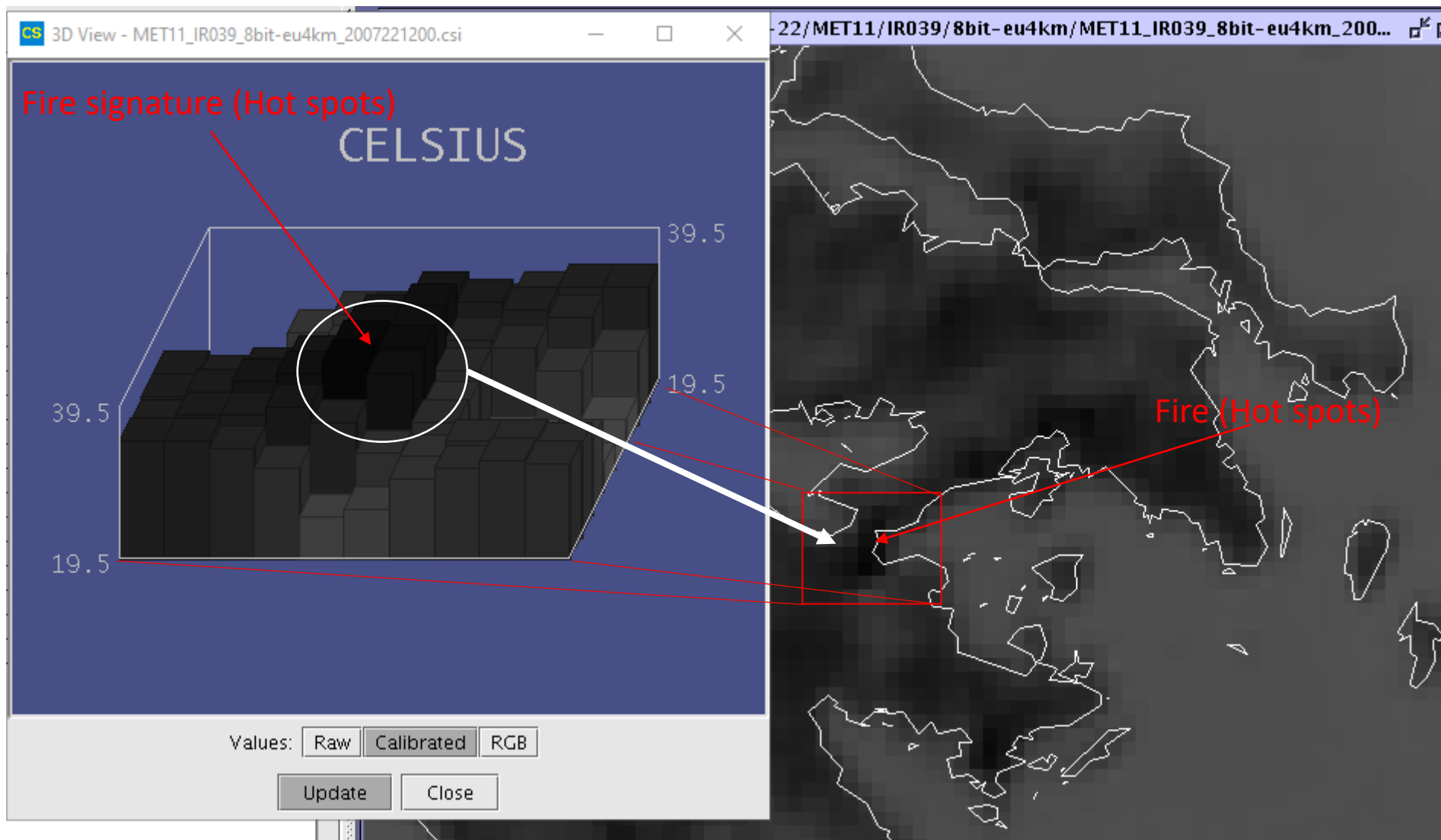


# Fire event: 22 July 2020



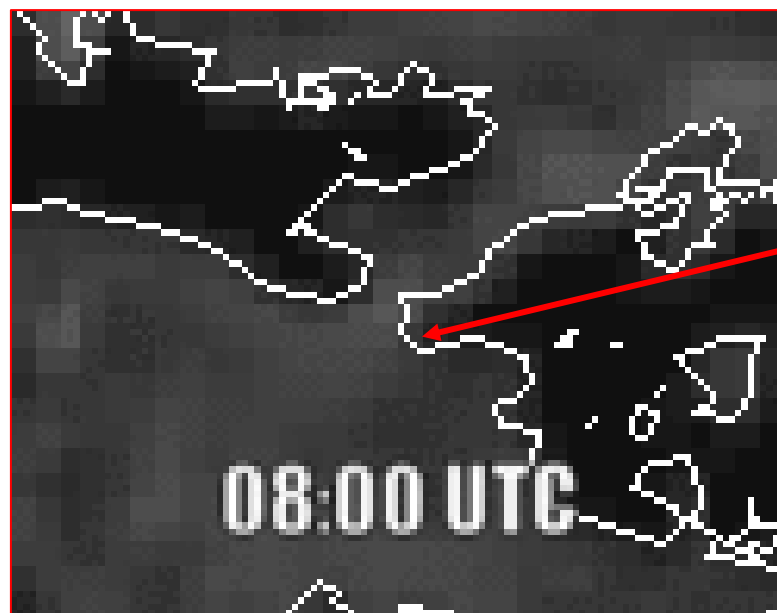


## 3D visualization of T



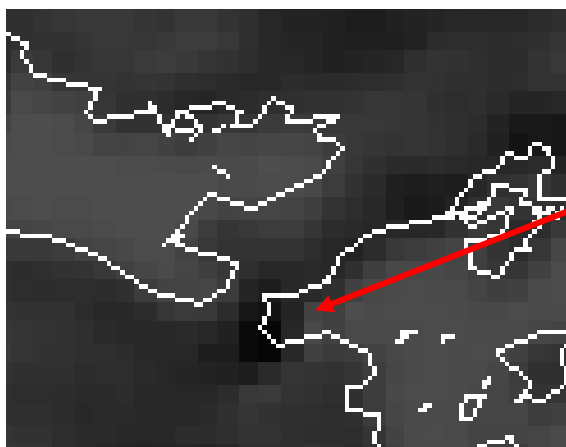
# Fire event: 22 July 2020

Extract the solar component of the infra-red 3.9  $\mu\text{m}$

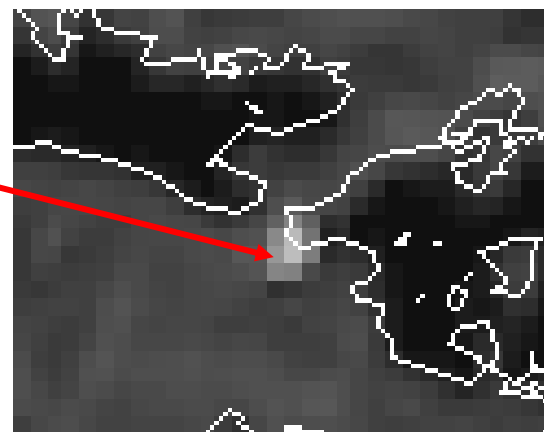


**Fire**

White pixels



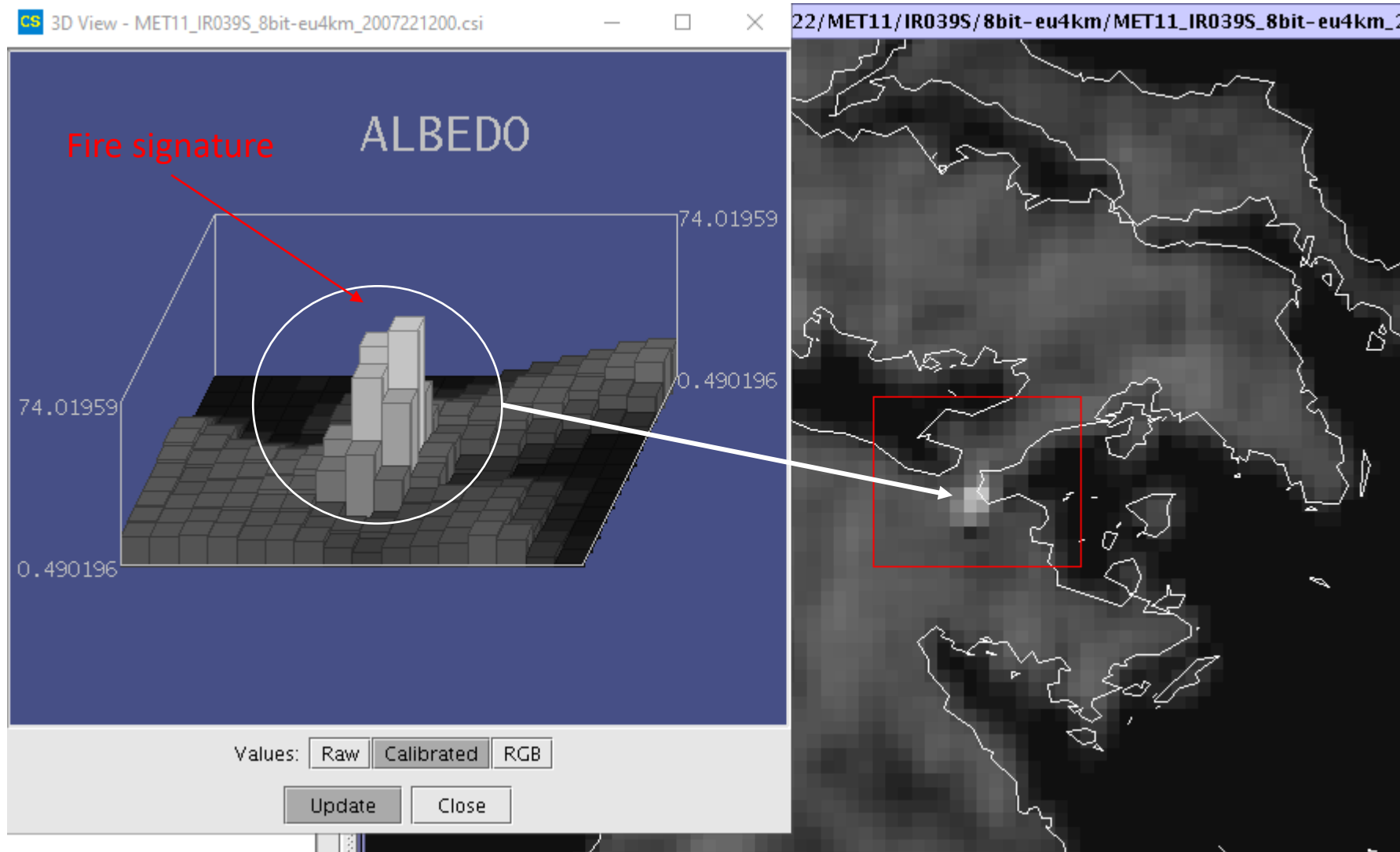
IR 3.9  $\mu\text{m}$  09:30 UTC

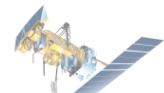
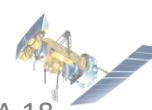
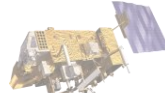
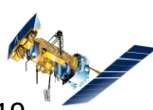


IR S-3.9  $\mu\text{m}$  09:30 UTC

**Fire**

## 3D visualization of S3.9





NOAA-19  
Channel 5,4,3  
2020-07-22 1558 UTC  
EARS Athens

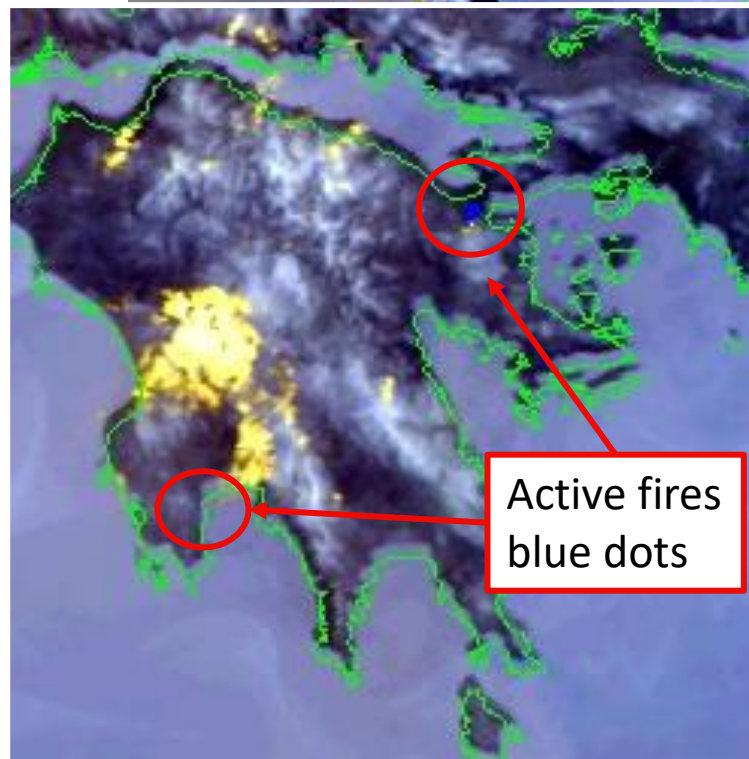
## Fire event: 22 July 2020

NOAA 19

Channels 5,4,3

22 Jul 2020, 1550Z

and day active fire



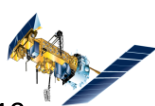




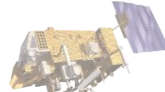
HNMS

25 -27 May 2021

NOAA 19



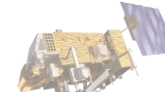
METOP A



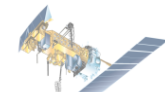
NOAA 18



METOP B



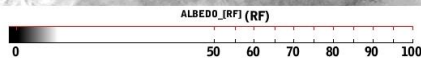
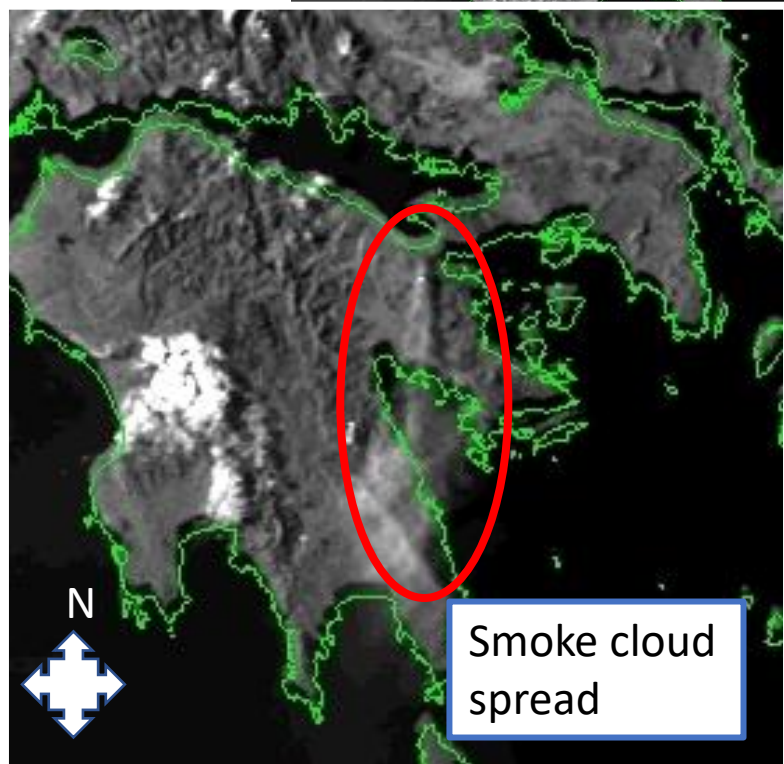
NOAA 18



## Fire event: 22 July 2020

NOAA 19  
Channel 2  
22 Jul 2020, 1550Z

NOAA-19  
Channel 2  
2020-07-22 1550 UTC  
EARS Athens



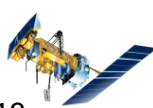




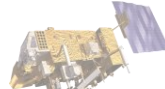
HNMS

25 -27 May 2021

NOAA 19



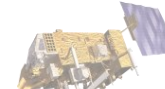
METOP A



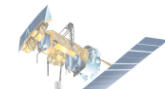
NOAA 18



METOP B



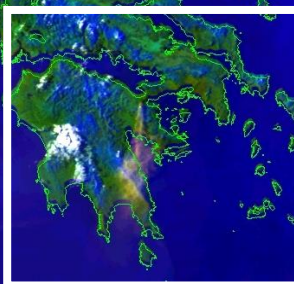
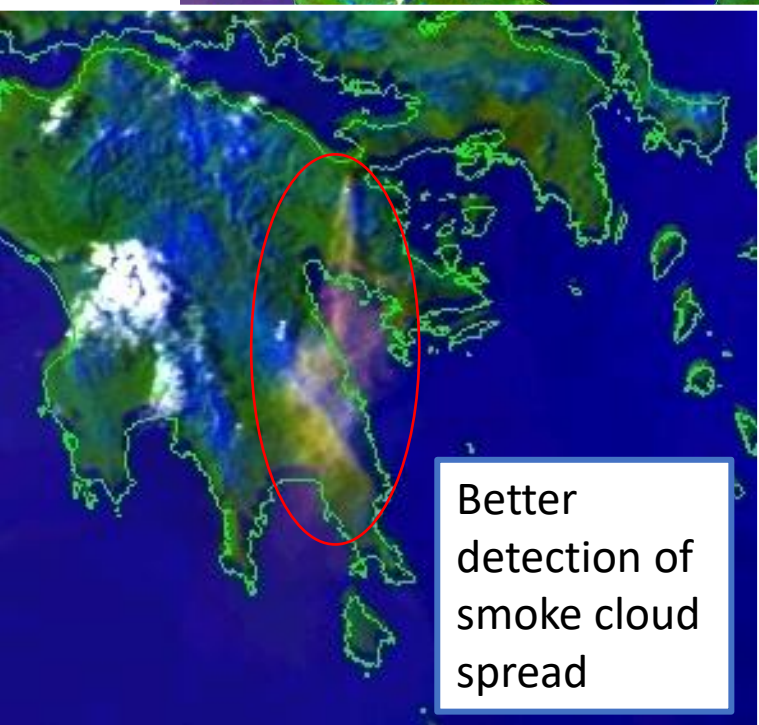
NOAA 18



NOAA-19  
Channel 1,2,4  
2020-07-22 1950 UTC  
EARS Athens

## Fire event: 22 July 2020

NOAA 19  
Channels 1, 2 ,4  
22 Jul 2020, 15:50Z

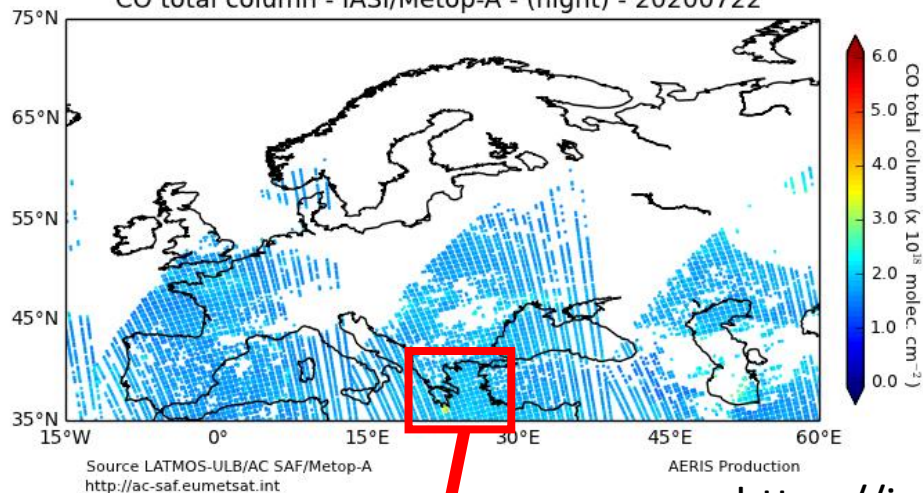




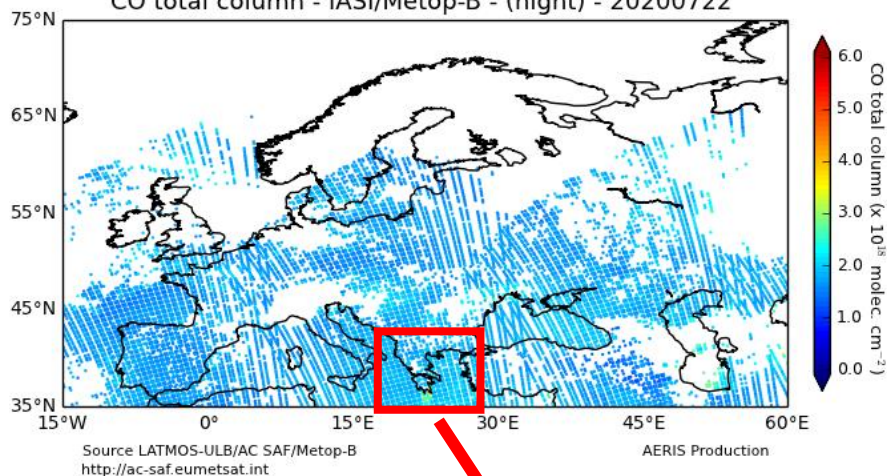
# Fire event: 22 July 2020

## CO Transport due to North winds

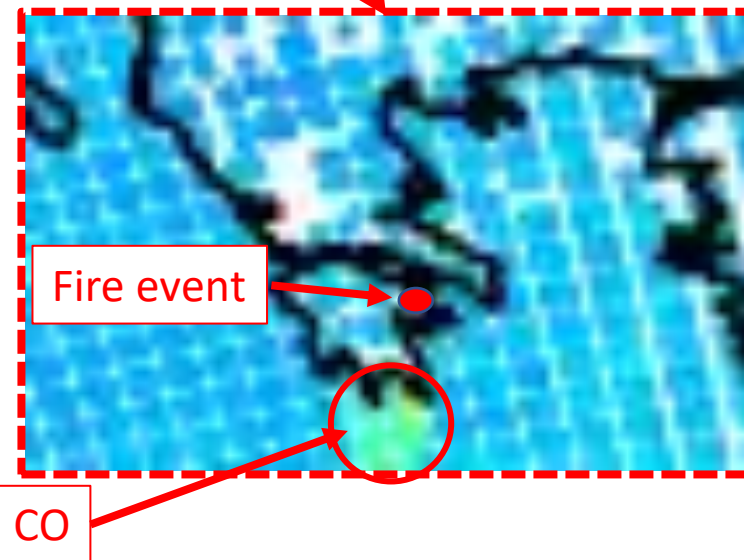
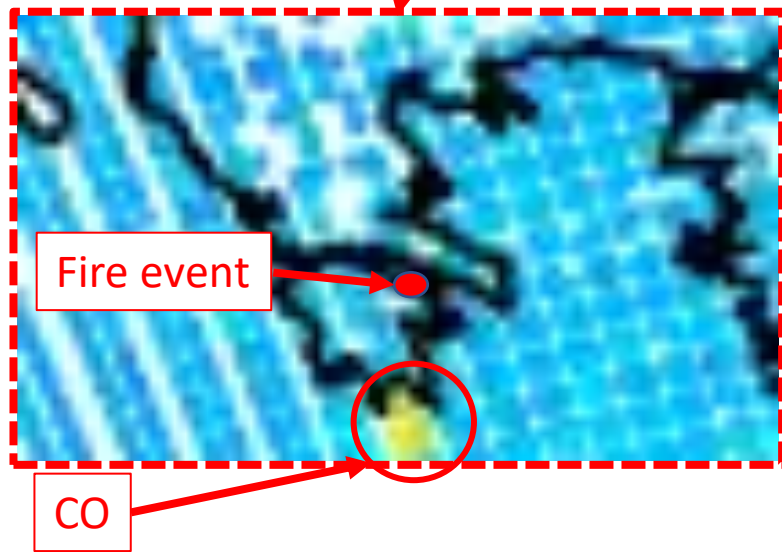
CO total column - IASI/Metop-A - (night) - 20200722



CO total column - IASI/Metop-B - (night) - 20200722



<https://iasi.aeris-data.fr>

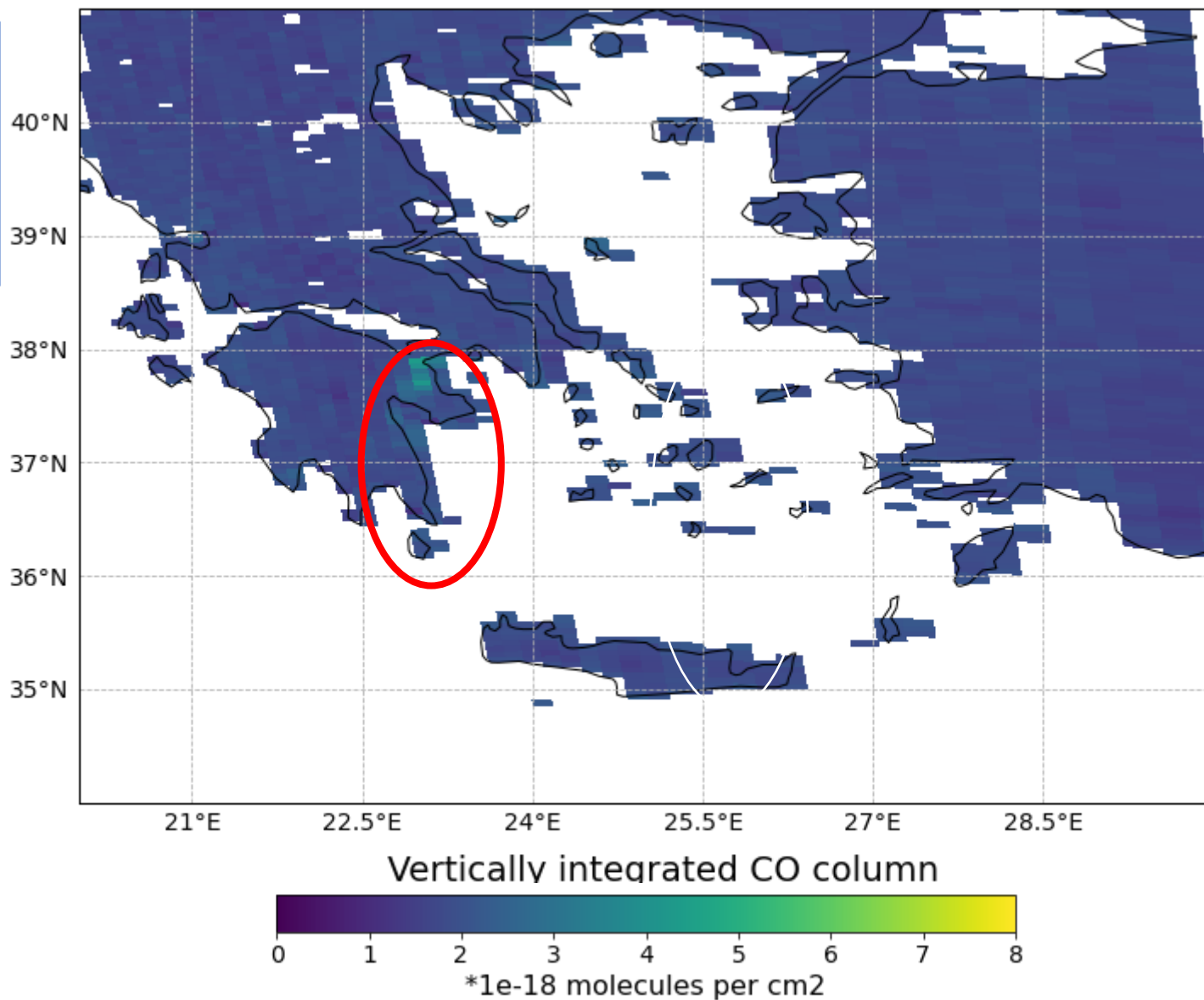




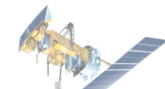
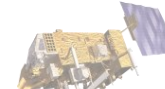
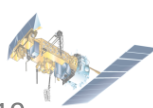
HNMS

# Fire event: 22 July 2020

Sentinel 5,  
TROPOMI,  
CO L2  
*Date: 22-7-20*  
*Time:11:29Z*







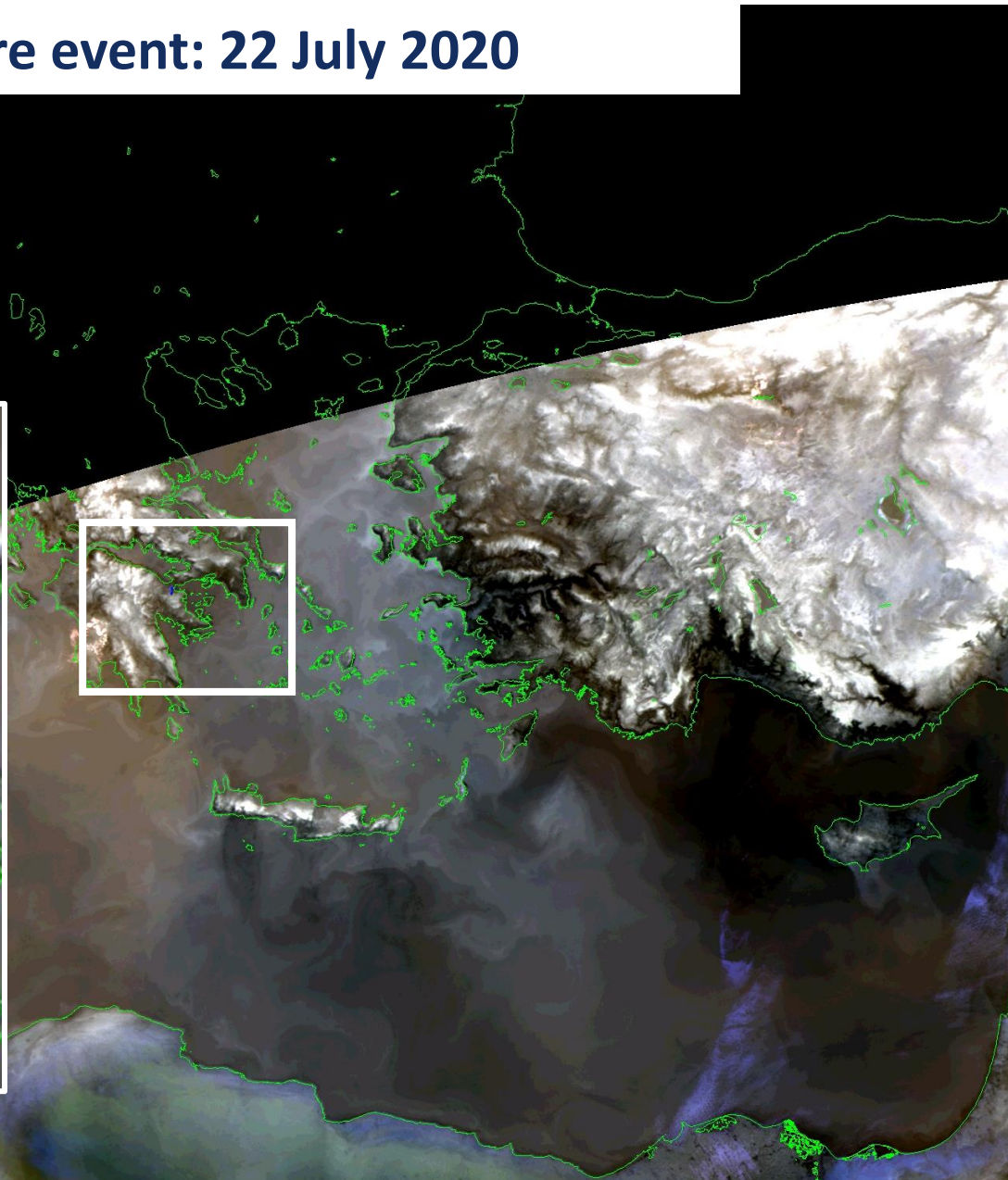
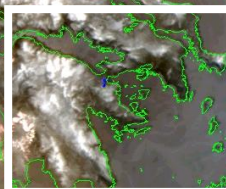
## Fire event: 22 July 2020

METOP A

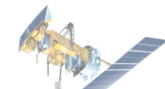
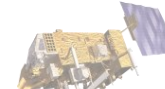
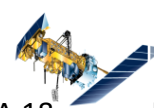
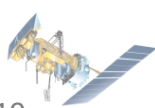
Channels 5, 4, 3

22 Jul 2020, 18:16Z

METOP-A  
Channel 5,4,3  
2020-07-22 1816 UTC  
EARS Athens







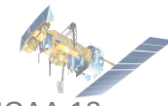
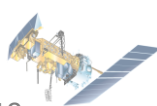
## Fire event: 22 July 2020

NOAA 18  
Channels 5, 4, 3  
2020-07-22 19:05 UTC  
EARS Athens

NOAA 18  
Channels 5, 4, 3  
22 Jul 2020, 19:05Z



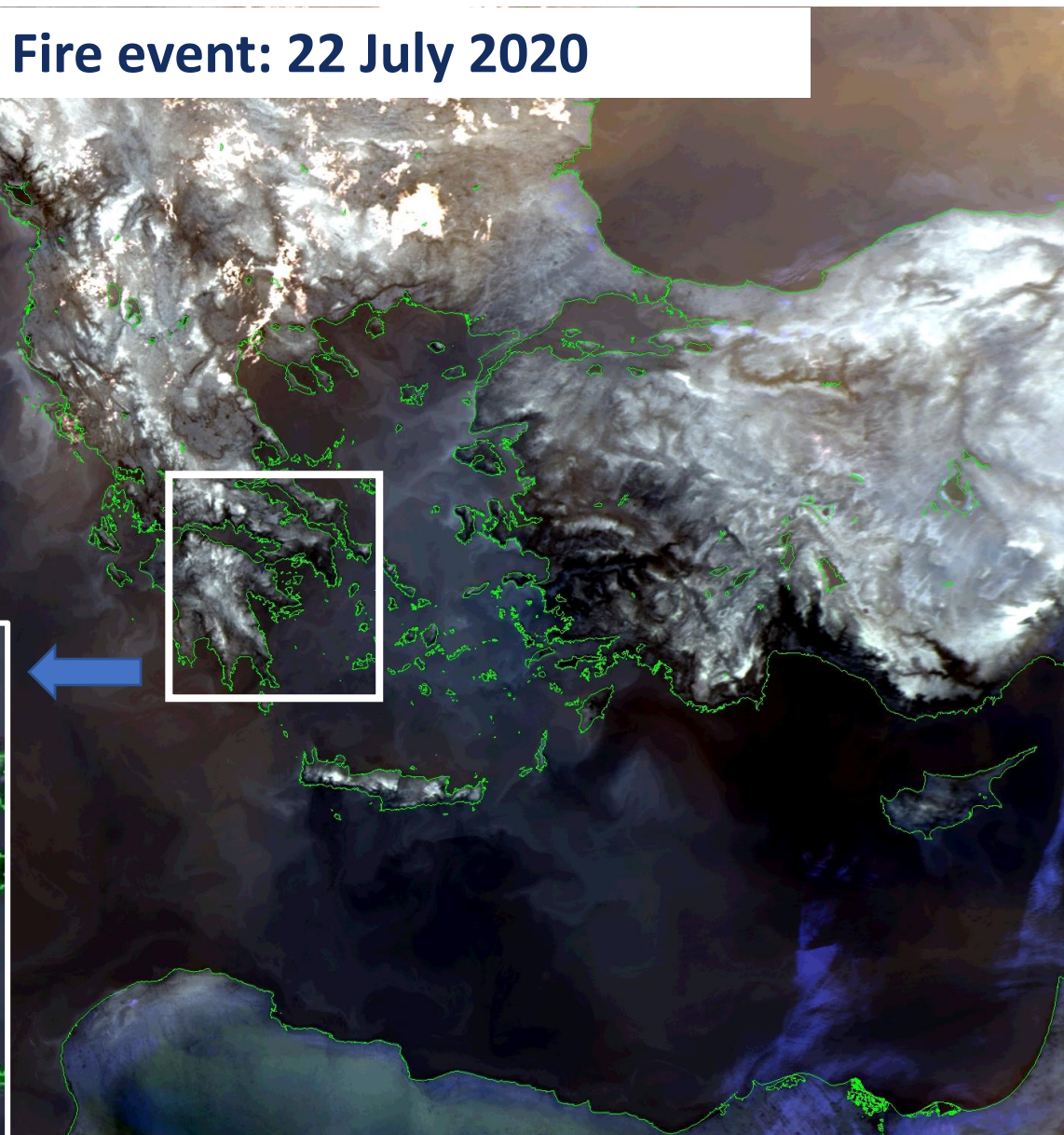




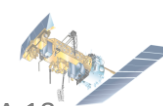
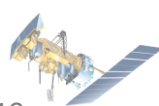
## Fire event: 22 July 2020

METOP B  
Channels 5, 4, 3  
22 Jul 2020, 19:31Z

METOP B  
Channels 5, 4, 3  
2020-07-22 19:31:00Z  
EARS Athens



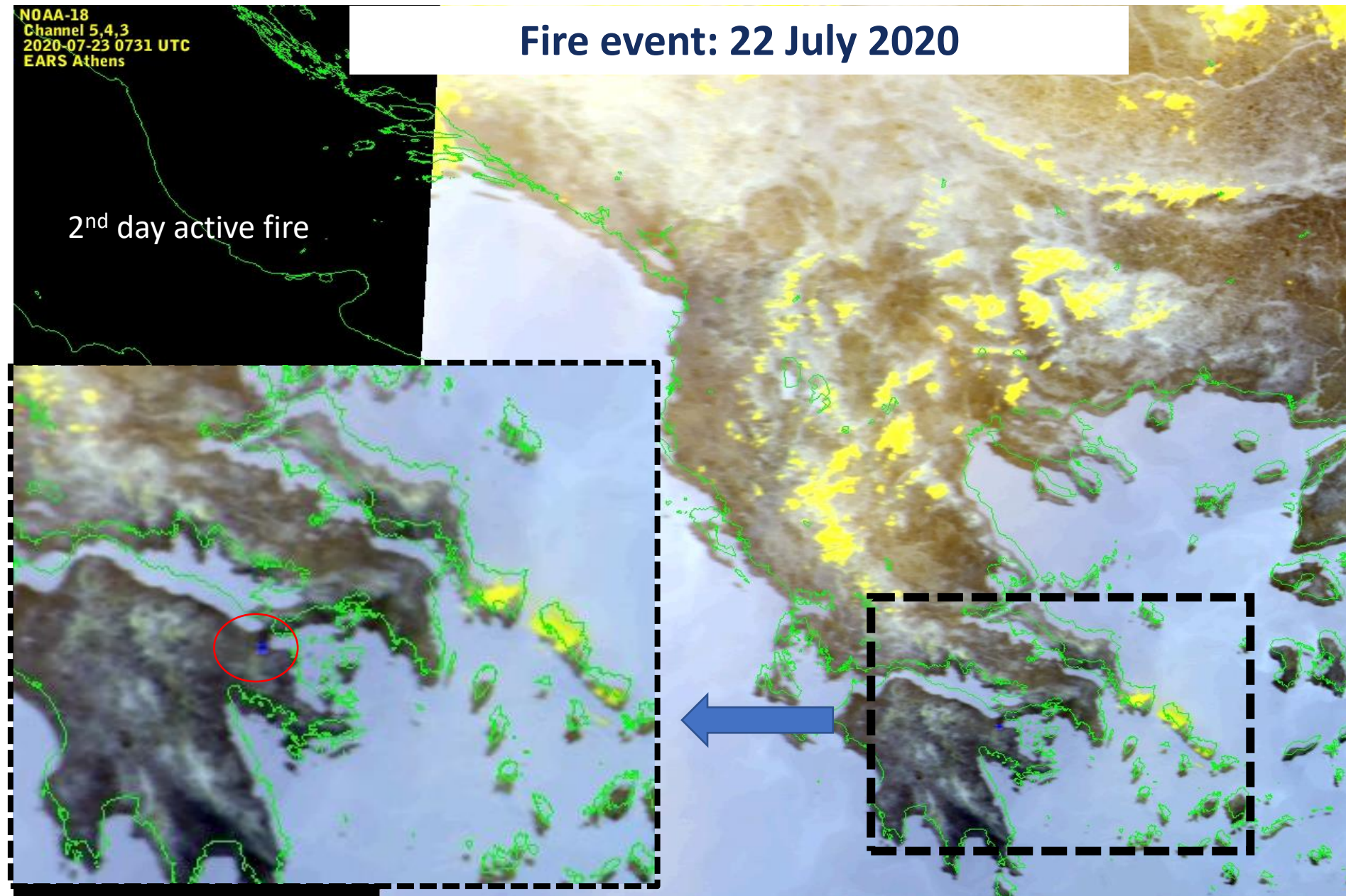




NOAA-18  
Channel 5,4,3  
2020-07-23 0731 UTC  
EARS Athens

## Fire event: 22 July 2020

2<sup>nd</sup> day active fire





**Fire Event:** early evening 19 May 2021

**Where:** western of Athens

Day 1 (May 19<sup>th</sup>)

Day 2 (May 20<sup>th</sup>)

**WORLDVIEW**

Layers
Events
Data

OVERLAYS

☒
Fires and Thermal Anomalies (Day and Night)  
Terra and Aqua / MODIS

☒
Place Labels  
© OpenStreetMap contributors, Natural Earth

☒
Coastlines / Borders / Roads  
© OpenStreetMap contributors

☒
Coastlines  
© OpenStreetMap contributors

BASE LAYERS

☒
Corrected Reflectance (True Color)  
NOAA-20 / VIIRS

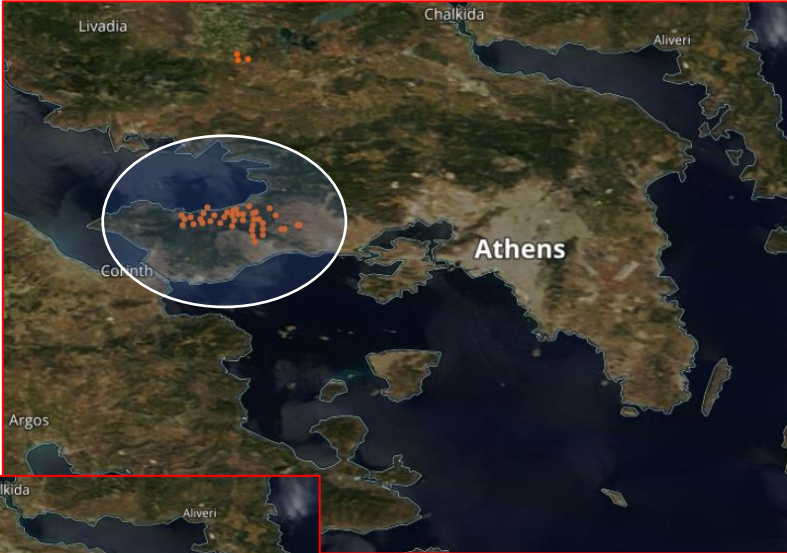
☒
Corrected Reflectance (True Color)  
Suomi NPP / VIIRS

☒
Corrected Reflectance (True Color)  
Aqua / MODIS

☒
Corrected Reflectance (True Color)  
Terra / MODIS

☐ Group Similar Layers

+ Add Layers
Start Comparison



Day 3 (May 21<sup>st</sup>)



HNMS

# Fire event: 19 May 2021

## Fire Event:

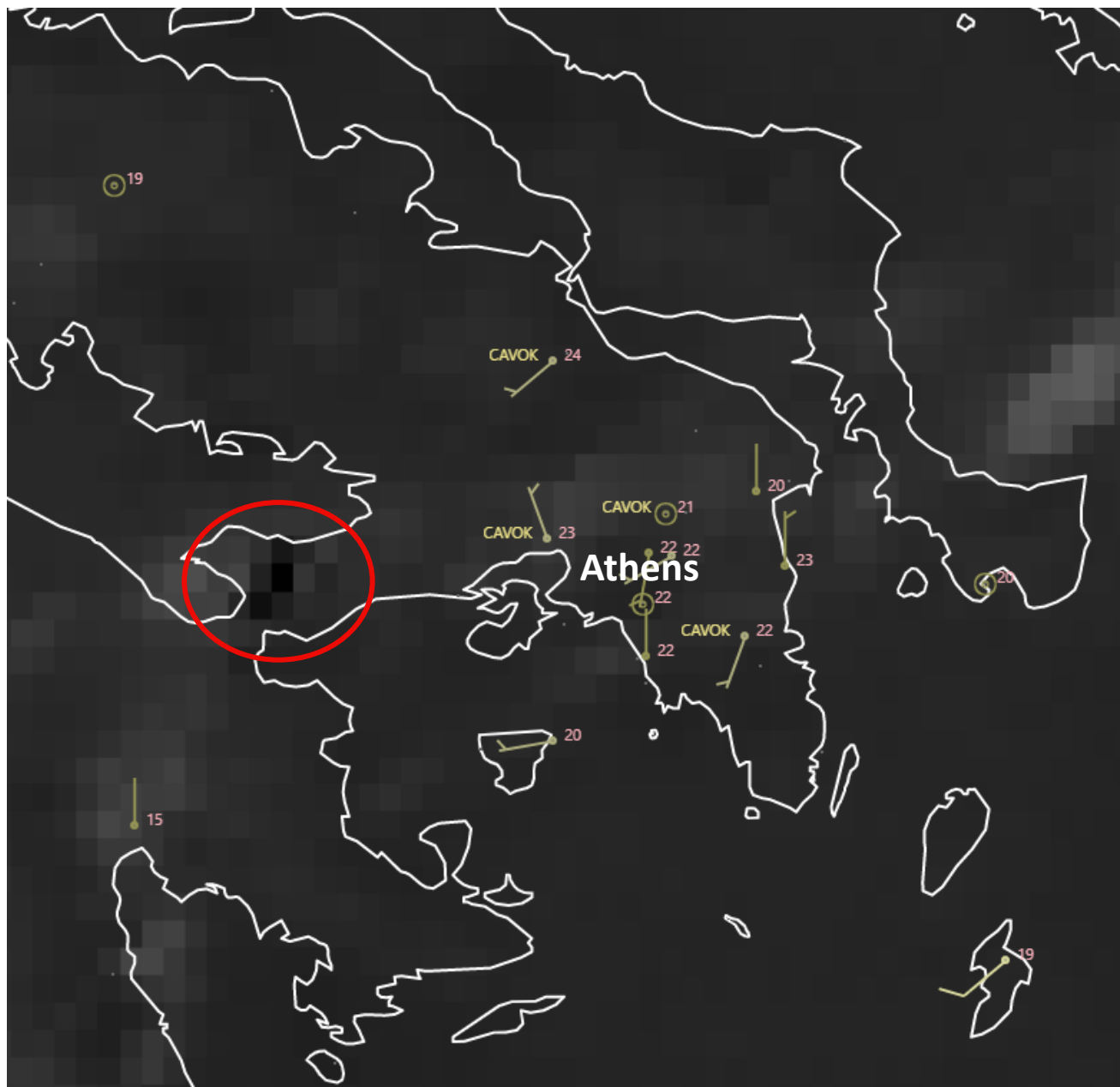
early evening 19 May 2021

Where: western of Athens

## IR 3,9

19 May 2021

20:00 UTC





# Fire event: 19 May 2021

## Fire Event:

early evening 19 May 2021

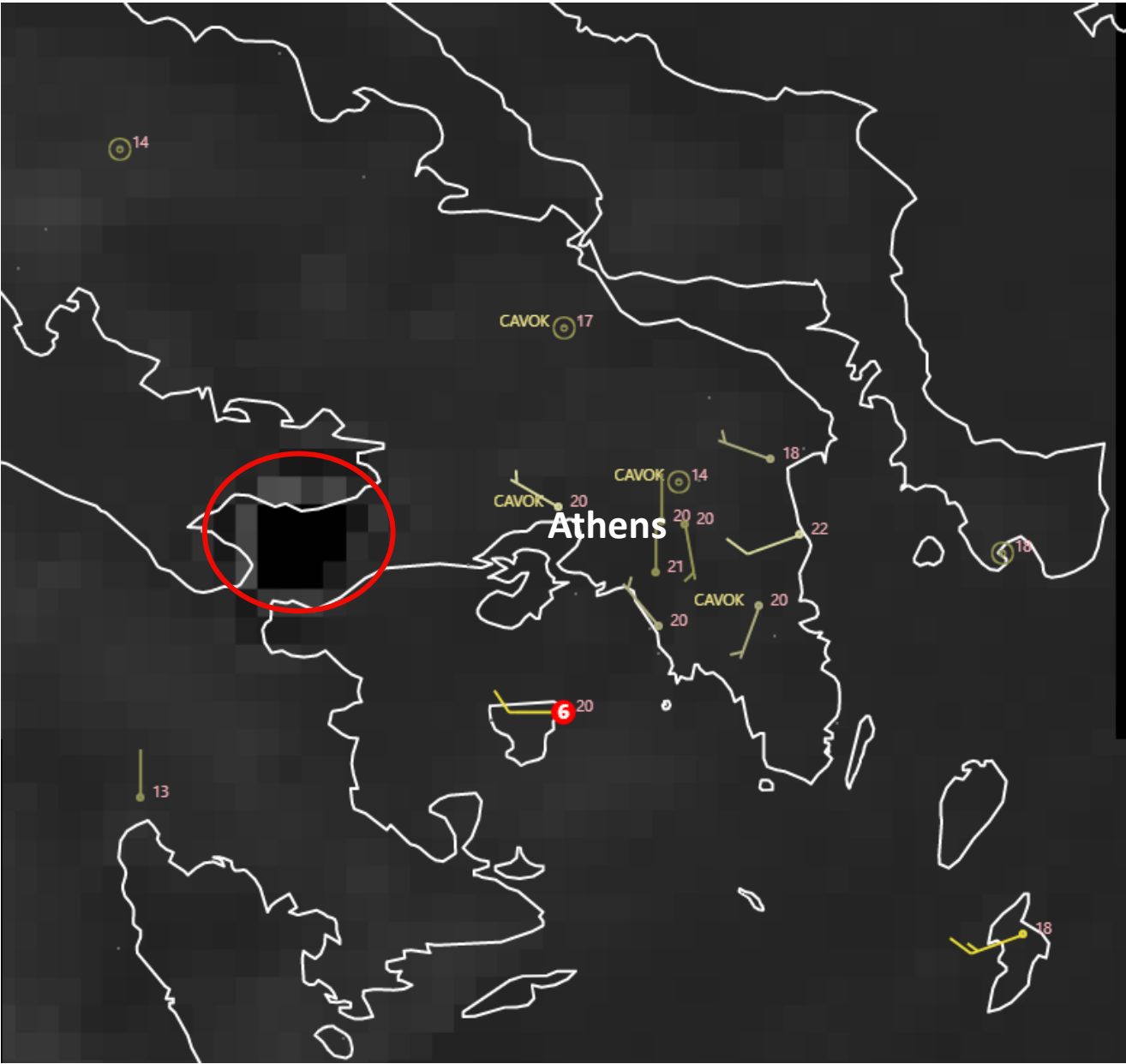
Where: western of Athens

**4 hrs later**

IR 3,9

20 May 2021

00:00 UTC





HNMS

# Fire event: 19 May 2021

## Fire Event:

early evening 19 May 2021

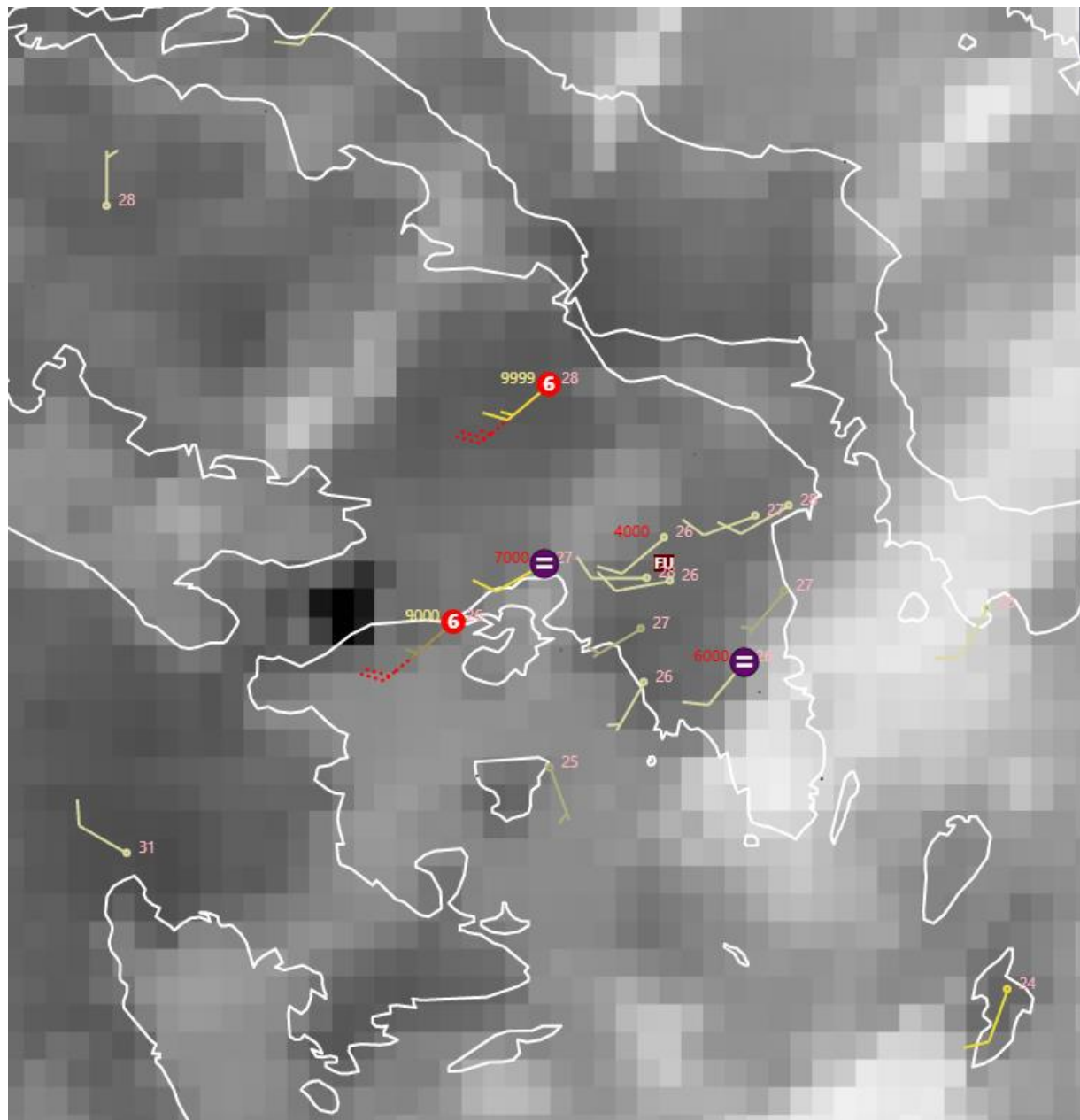
Where: western of Athens

**12 hrs later**

**IR 3,9**

20 May 2021

12:00 UTC





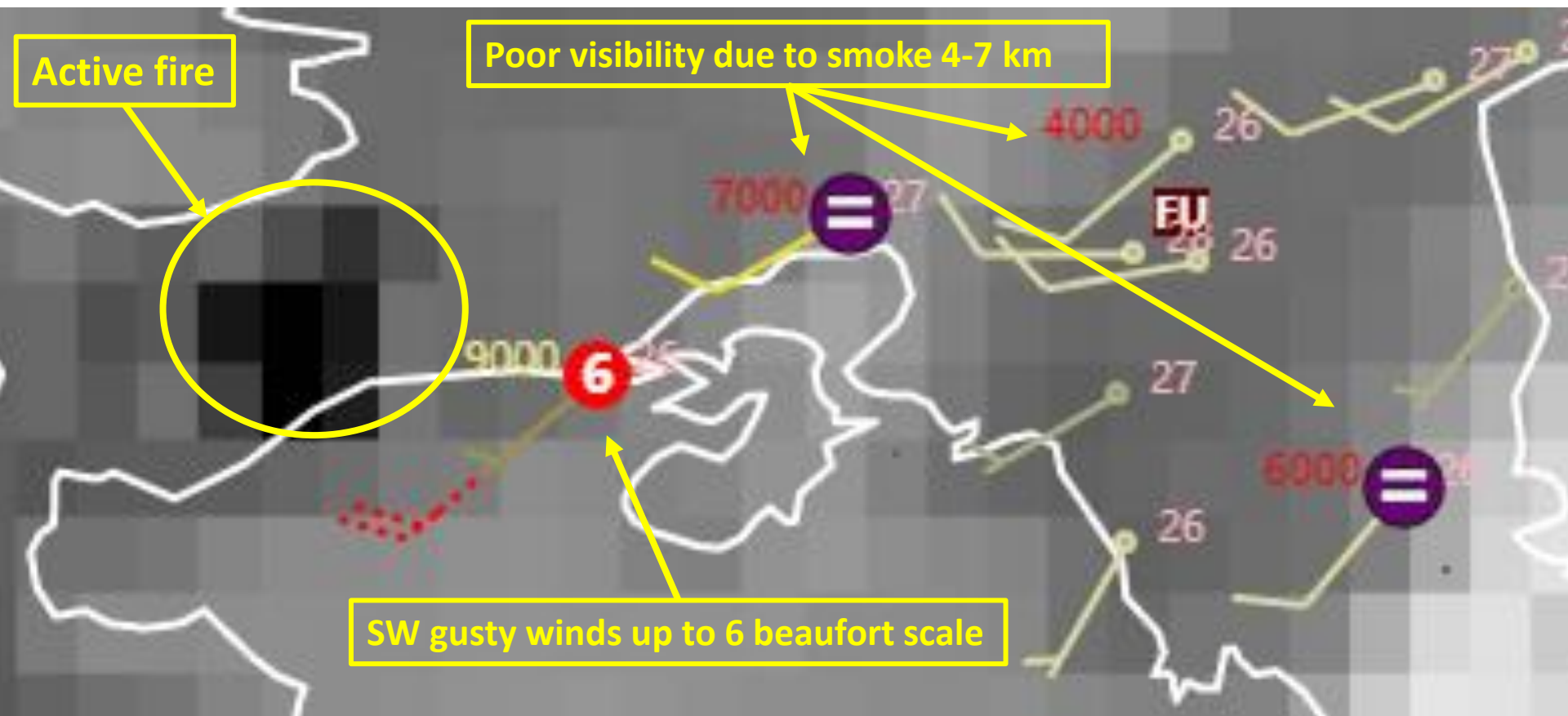
# Fire event: 19 May 2021

## Fire Event:

early evening 19 May 2021

Where: western of Athens

**12 hrs later** IR 3,9 20 May 2021 12:00 UTC





HNMS

# Fire event: 19 May 2021

## Fire Event:

early evening 19 May 2021

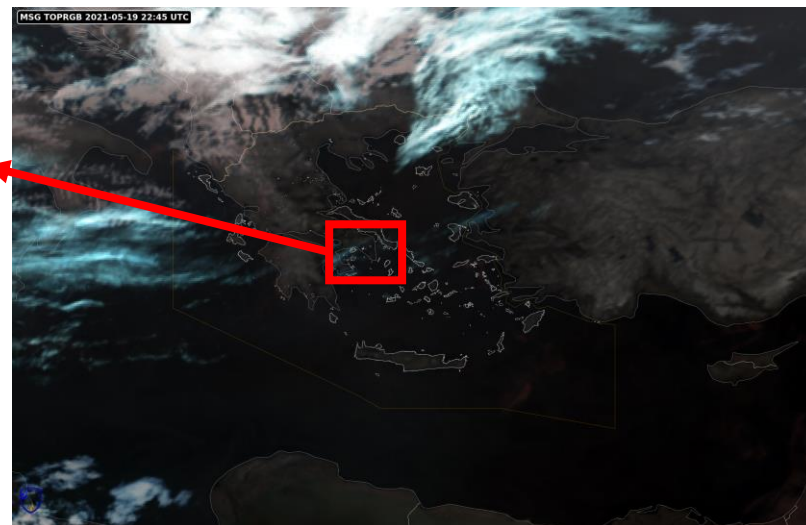
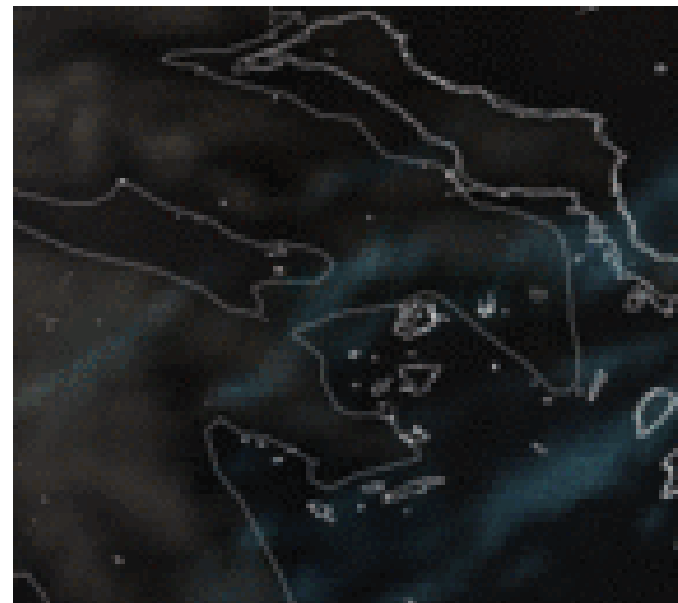
Where: western of Athens

R IR 3,9 CO<sub>2</sub> COR

G IR 10,8

B IR 12,0

19 May 22:45 UTC



# Fire event: 19 May 2021

## Fire Event:

early evening 19 May 2021

Where: western of Athens

R IR 3,9 CO<sub>2</sub> COR

G IR 10,8

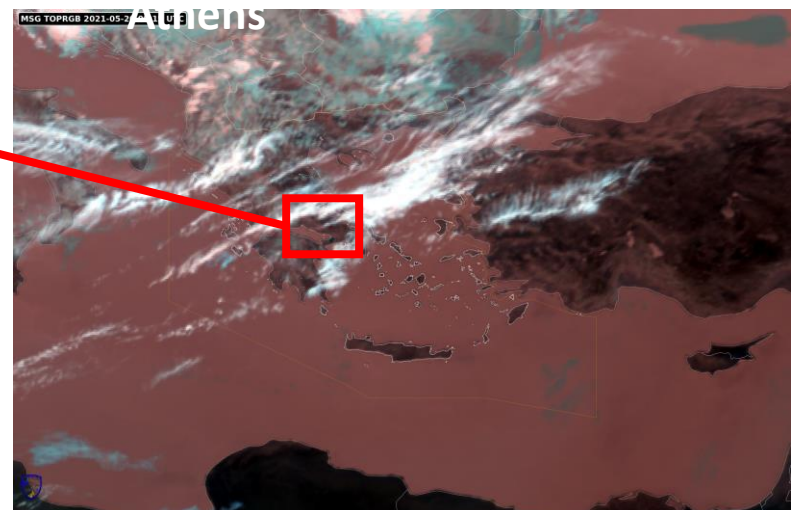
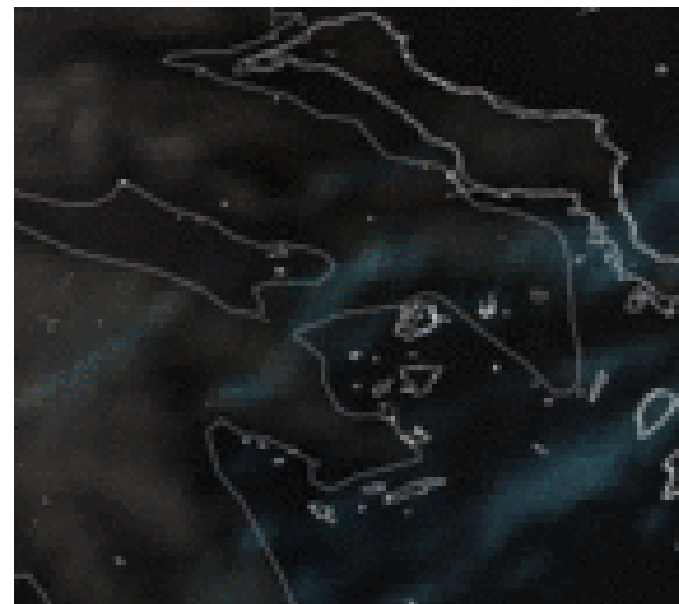
B IR 12,0

20 May 09:15 UTC



Black= burnt area

Red dots= active fires

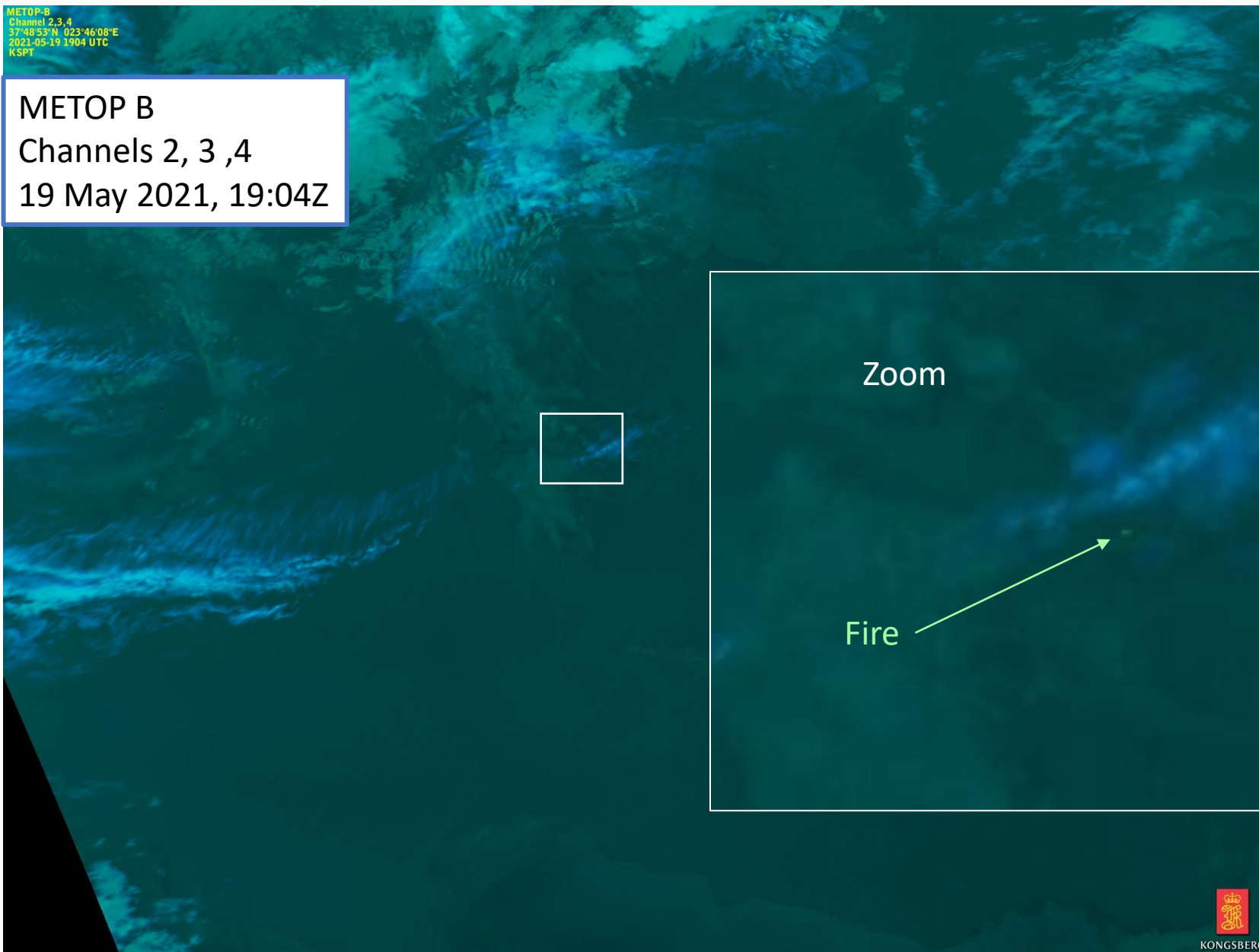




# Fire event: 19-21 May 2021

METOP-B  
Channel 2,3,4  
37°48'53"N 023°46'08"E  
2021-05-19 1904 UTC  
KSPT

METOP B  
Channels 2, 3 ,4  
19 May 2021, 19:04Z



Zoom

Fire



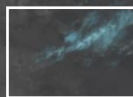




# Fire event: 19-21 May 2021

METOP-B  
Channel 3, 4, 5  
37°48'53"N 023°46'08"E  
2021-05-19 1904 UTC  
KSPT

METOP B  
Channels 3, 4, 5  
19 May 2021, 19:04Z



Zoom

Fire



# Fire event: 19-21 May 2021

METOP-B  
Channel 3,2,1  
37°48'53"N 023°46'08"E  
2021-05-20 0905 UTC  
KSPT

METOP B

Channels 3, 2, 1

20 May 2021, 09:05Z

Fire

Grey  
colors=  
smoke over  
eastern  
parts of  
Greece



HNMS

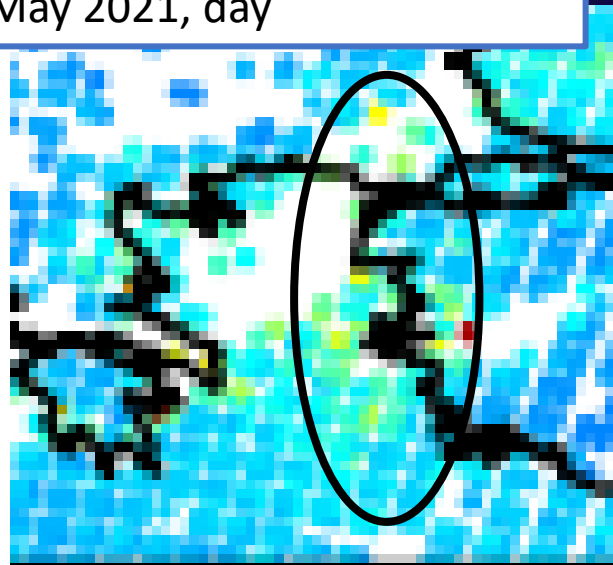
25 -27 May 2021

# Fire event: 19-21 May 2021

METOP-B  
Channel 1,2,4  
37°48'53"N 023°46'08"E  
2021-05-20 0905 UTC  
KSPT

METOP B  
Channels 1, 2 ,4  
20 May 2021, 09:05Z

METOP B  
CO total column from IASI 20  
May 2021, day



Fire

Purple colors=  
smoke over  
easter parts of  
Greece



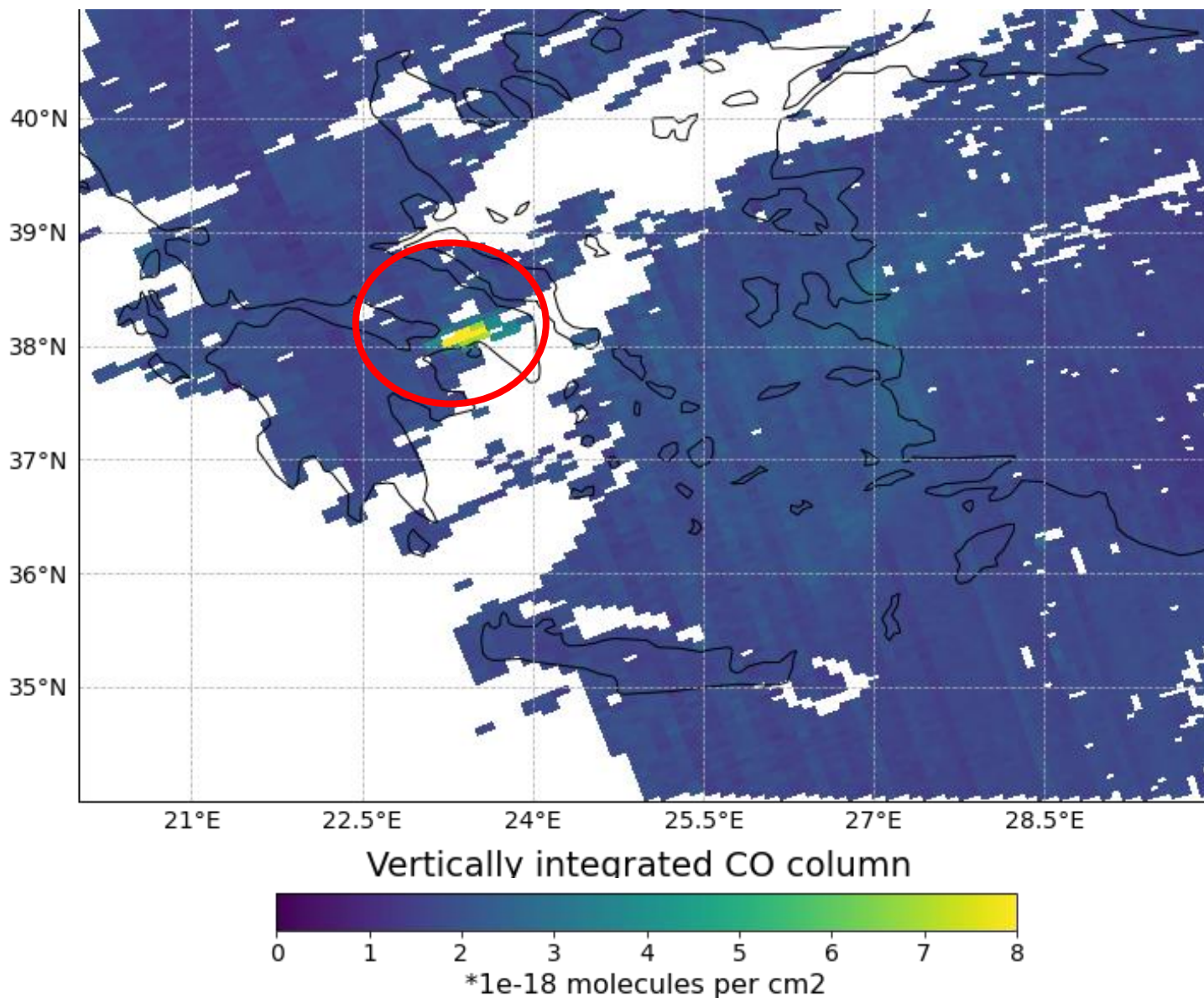
KONGSBERG





HNMS

Sentinel 5,  
TROPOMI,  
CO L2  
*Date: 20-5-21*  
*Time:10:56Z*





## Hellenic National Meteorological Service



25 -27 May 2021

**Existing and next generation earth observation products  
for wildfires monitoring: Workshop and Data Discovery**

**Thank you for your attention!**



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