



International Geoscience and Remote Sensing Symposium

**IGARSS 2022**

Kuala Lumpur, Malaysia



ISTITUTO NAZIONALE  
DI GEOFISICA E VULCANOLOGIA



SCUOLA DI INGEGNERIA AEROSPAZIALE  
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# Active landscape fire detection from space with ASI PRISMA: unlocking the complementary value of hyperspectral PRISMA data

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<sup>2</sup> SIA – La Sapienza University of Rome



# Overview

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- Survey

## Module 1 Wildfire from space

- Why wildfires matter
- PRISMA mission
- Methodology

## Module 2 Practicals

- Dive into PRISMA data
- Part 1 Registration
- Part 2 Catalogue
- Demo Pre-orbit software





# Survey

<https://forms.gle/g7bgMwGPtxcHphWL9>



# Module 1: Wildfire from space

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- Why wildfires matter
- PRISMA mission
- Methodology



# Module 1: Wildfire from space



## Framework

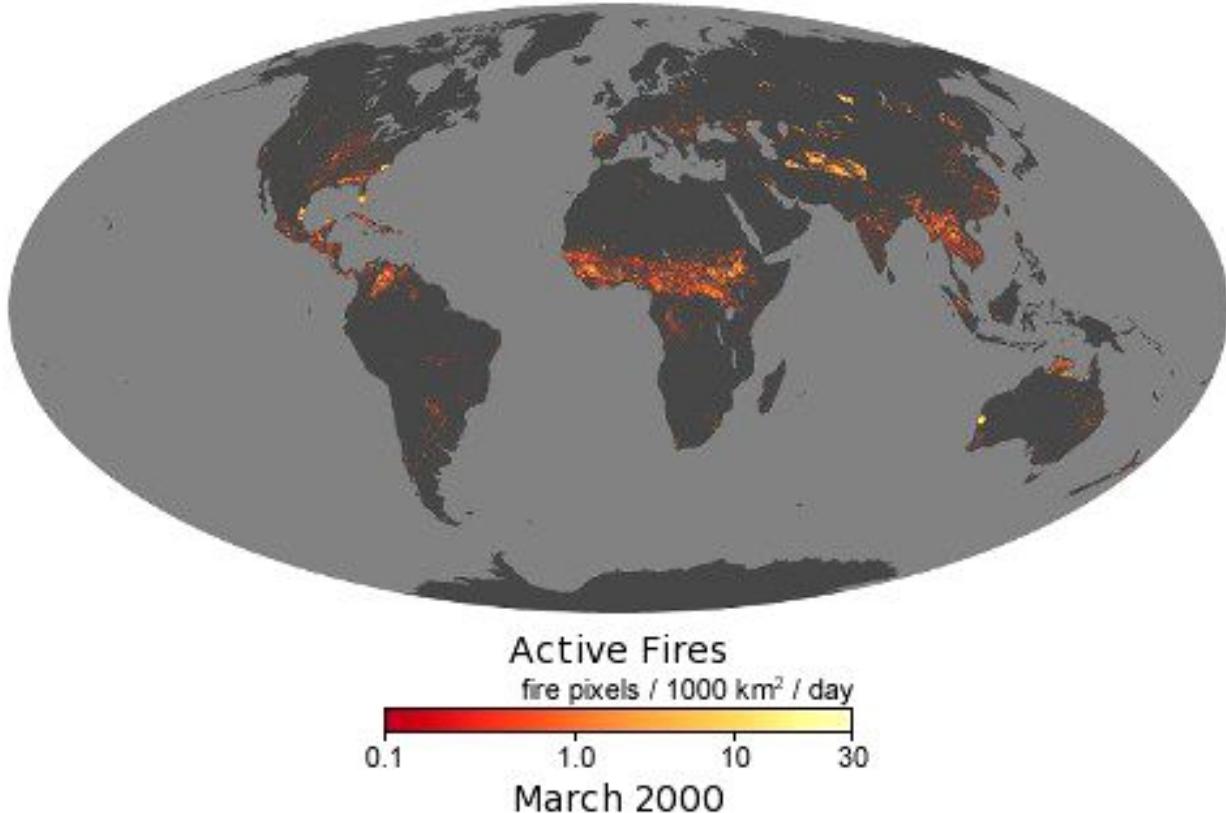
~3.4 %

of the Earth's  
vegetated area burns annually,  
with resulting  
large scale effects

*Giglio et.al. 2010*

Earth's atmospheric composition

Global climate through processes  
such as trace gas and aerosol  
production



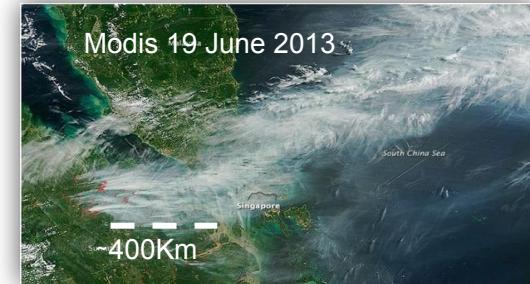
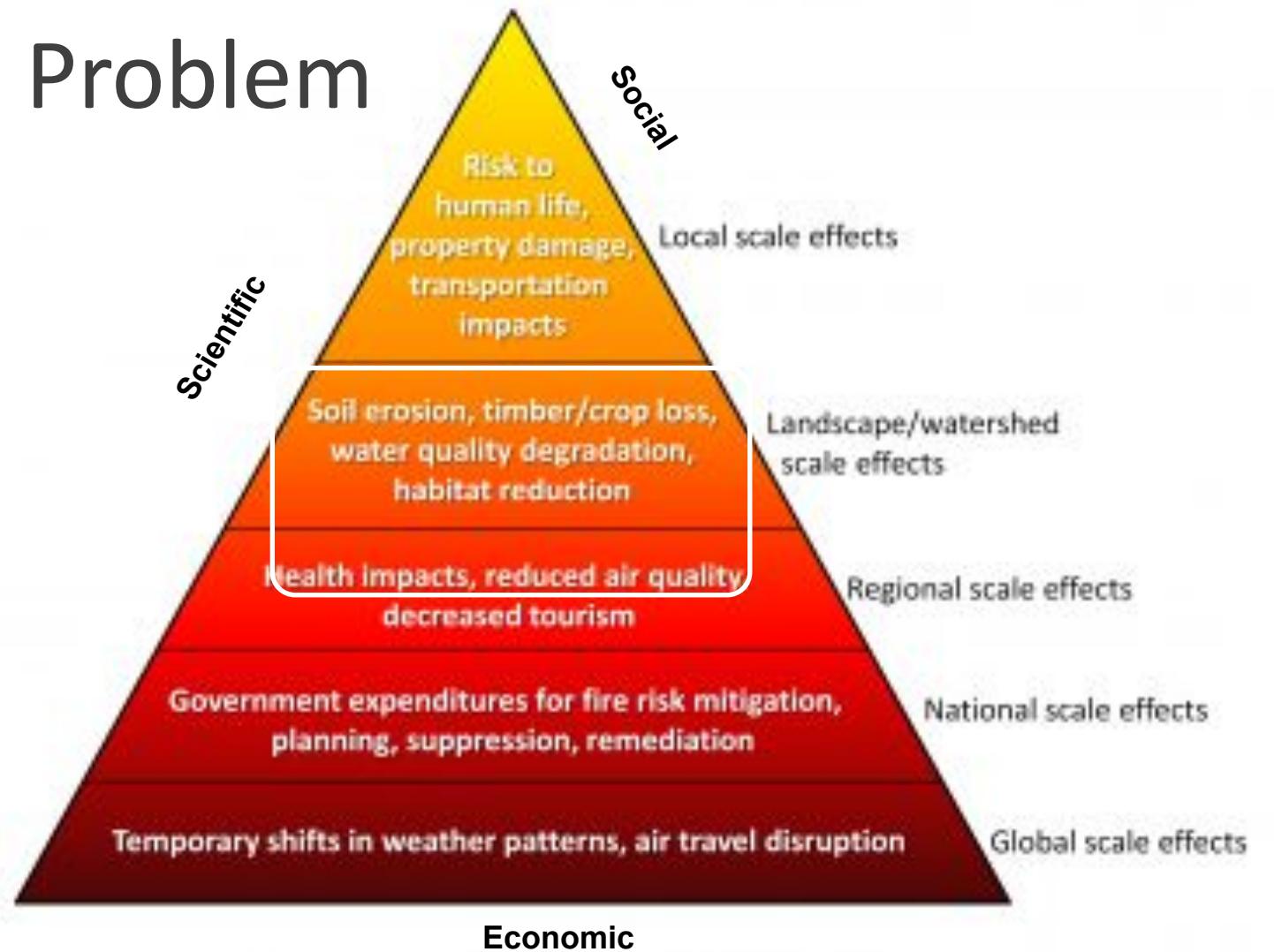
August 2021 active fire map based on MODIS observations. White pixels show as many as 30 fires in a 1,000-square-kilometer area per day. Orange pixels show as many as 10 fires, while red areas show as few as 1 fire per day.

Credits FIRE Earth Observatory NASA [https://earthobservatory.nasa.gov/global-maps/MOD14A1\\_M\\_FIRE](https://earthobservatory.nasa.gov/global-maps/MOD14A1_M_FIRE)

# Module 1: Wildfire from space



## Problem





# Need for research

- **Pre-fire** Measurements that can be correlated to fire behavior, fire regime, fire risk
- **Active fire** Localization, flame/ smouldering, evaluation of Parameters for modelling, Linking Energy to Emissions and Air Quality
- **Post- fire** burn scar delineation, Vegetation Mortality, Ecosystem Recovery, Land use change

# Benefits and limitation



	<b>PRISMA</b>	<b>EnMap</b>	<b>VIIRS</b>	<b>MODIS</b>	<b>SENTINEL3</b>	<b>MSG-SEVIRI</b>	<b>LANDSAT 8 -9</b>	<b>Sentinel 2A-B</b>	<b>ECOSTRESS</b>	
Spatial resolution	30m	30m	375m- 750m	250m- 500m- 1000m	500m- 1000m	1000m	15m- 30m- 100m	10-20m	50-60m	
Spectral coverage	VNIR-SWIR	VNIR-SWIR	VNIR-SWIR-MIR- TIR	VNIR-SWIR--MIR TIR	VNIR-SWIR-MIR- TIR	VNIR-SWIR-MIR- TIR	VNIR-SWIR-TIR	VNIR-SWIR	SWIR –TIR	
Number of bands	240	225	21	36	21 +2	12	9 +2	13	1 + 5	
Repetition time	5 Days	27days 5 days	Daily	Daily	Daily	15min	8 days	5 days	Variable*	
Swath width	30 km (2.77°)	30Km	3060 km	2330-km	1400km (nadir)	Main full Earth imagery (EU-Africa)	185 kilometers	290 km	384 Km	
PAN channel	Yes	No	No		No	No	Yes	No	No	
Benefits										
Limitations										

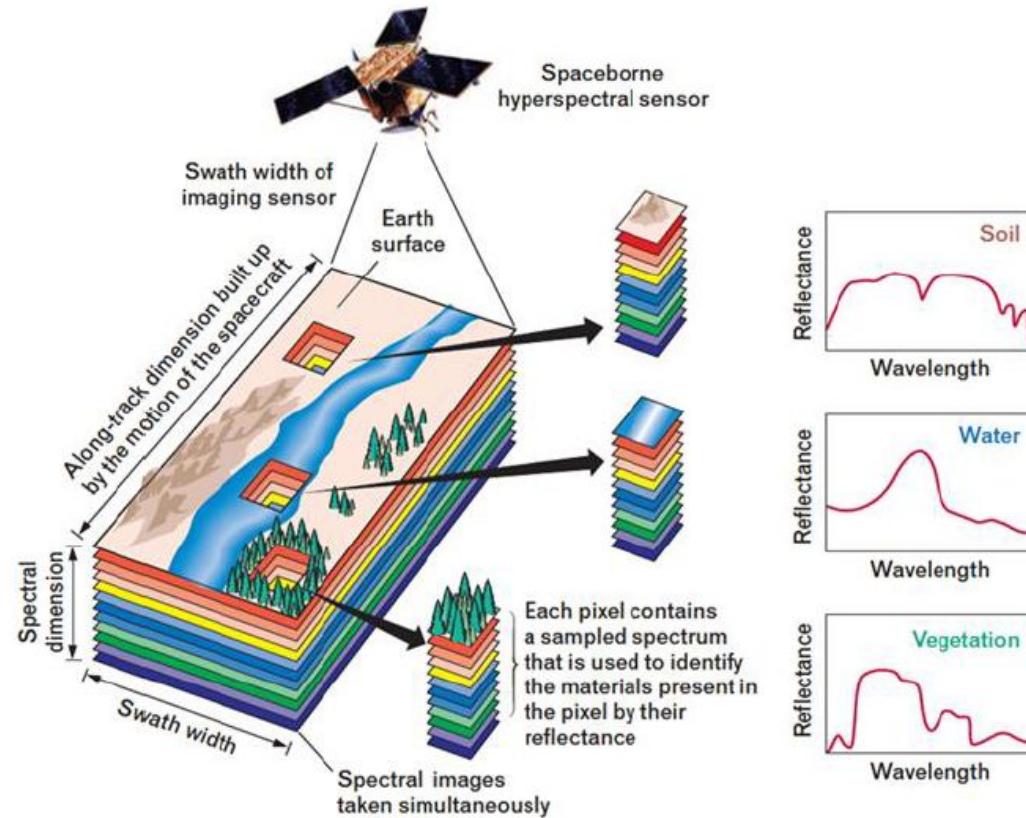
# PRISMA MISSION

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- Italian hyperspectral mission
- Free access to PRISMA data for research purposes
- TOA/BOA Radiance and BOA reflectance products available
- Acquisition requests available for users



# Hyperspectral technology



**PRISMA primary mission:**

- Costal zone
- Water quality
- Vegetation

# Launch



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- **Launch date**

March, 22<sup>nd</sup> 2019 02:50 CET  
First telemetry: March, 24<sup>th</sup> 2019

- **Operative date**

Fully operative in orbit from end January of 2020

- The Payload has been designed and manufactured by Leonardo, as part of a consortium including OHB-I, mission Prime, and operating under the authority of the Agenzia Spaziale Italiana.



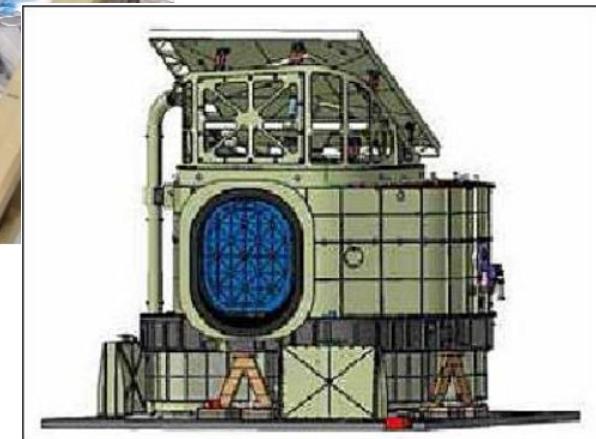
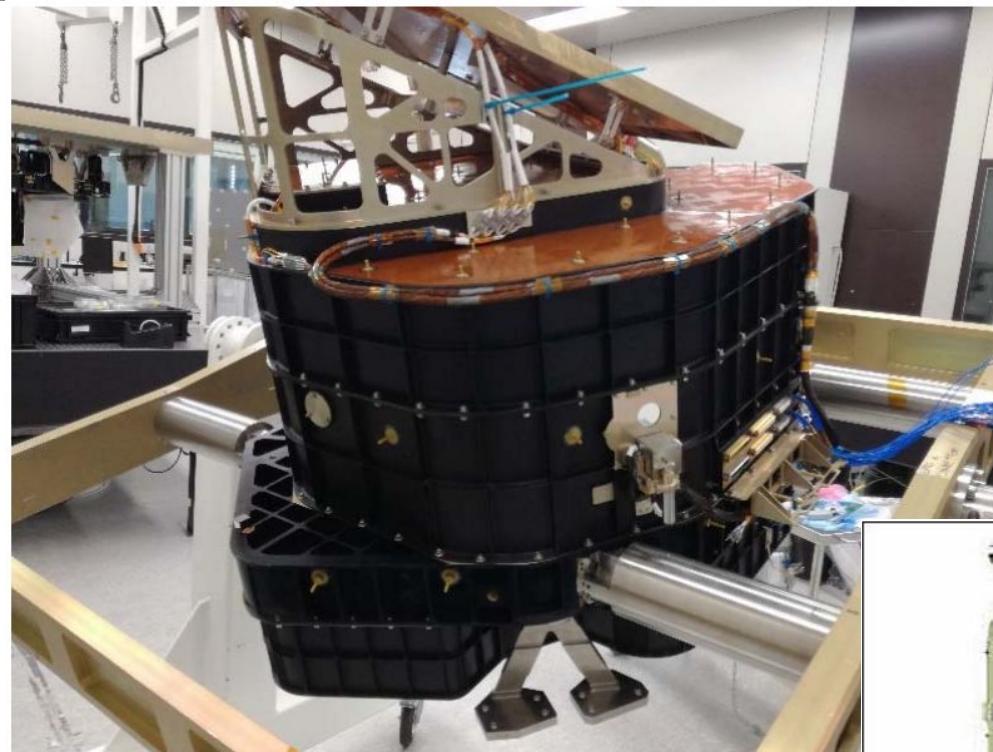
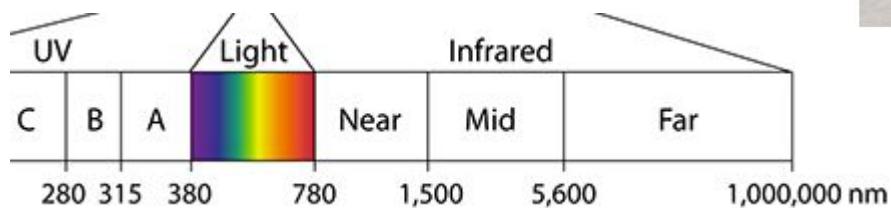
Agenzia Spaziale Italiana



# Prisma payload 1

The PRISMA Payload is a hyperspectral/panchromatic camera with VNIR (Visible and Near-InfraRed) and SWIR (ShortWave InfraRed) detectors.

- Imaging Spectrometer: able to acquire in a continuum of spectral bands ranging from 400 to 2500 nm
- medium resolution Panchromatic Camera (PAN)



Swath / FOV	30 km / 2.77°
Ground Sampling Distance (GSD)	HYP: 30 m PAN: 5 m
Spatial Pixels	HYP: 1000 PAN: 6000
Pixel Size	HYP: 30 x 30 µm PAN: 6,5 x 6,5 µm
Spectral Range	VNIR: 400 – 1010 nm SWIR: 920 – 2505 nm PAN : 400 – 700 nm
Spectral Sampling Interval (SSI)	≤ 10 nm
Spectral Width (FWHM)	≤ 10 nm
Radiometric Quantization	12 bit
VNIR SNR	> 200
SWIR SNR	> 100
PAN SNR	> 240
Absolute Radiometric Accuracy	> 5%
Spectral Bands	66 VNIR 173 SWIR
Data processing	Lossless compression with compression factor 1.6 Near lossless compression
Cooling system	Passive Radiator

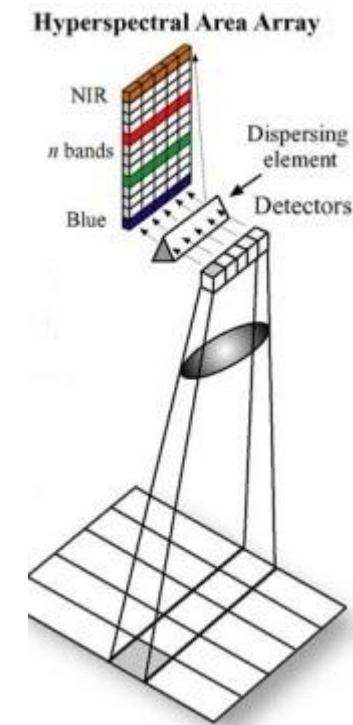
# PRISMA

## payload 2



The payload operates with a **Pushbroom** scanning concept.

The “instantaneous” spectral and spatial dimension (across track) of the spectral cube are given directly by the 2-D detectors, while the “temporal” dimension (along track) is given by the satellite motion.



# Products

- **Level 0 (Hyperspectral / PAN)**
- formatted data product with appended metadata, including ancillary data and file formatting information (Archived data) in proprietary format (non disseminated)
- **Level 1 (Hyperspectral / PAN)** radiometrically corrected and calibrated radiance data in physical units, including:
  - Cloud mask, Sun-glint Mask, Classification Mask, Calibration and characterization data
- **Level 2B Geolocated at Ground Spectral Radiance Product (Hyperspectral / PAN)**
- **Level 2C Geolocated At-surface Reflectance Product (Hyperspectral / PAN)**, including:
  - Aerosol Characterization Product (VNIR), Water Vapour Map Product (Hyperspectral), Cloud Characterization
- **Level 2D Geocoded version of the level 2C products (Hyperspectral / PAN)**
- **L1 and L2 product are disseminated in HD5 EOS format**

# Methodology: detection methods



- Vegetation fires involve **high temperatures**, so thermal remote sensing is suitable to its identification and study
- Actively burning **fires emit IR** so strongly, especially at MIR (3–5  $\mu\text{m}$ ) wavelengths that can be identify by Earth orbit
- ***Fixed –threshold approach*** algorithms which provide ‘hotspot’ counts and fire location maps (e.g. MODIS products Justice et al., 2002, Giglio et al., 2003, Denissen et al., 2006.)

# Hyperspectral features of Wildfires

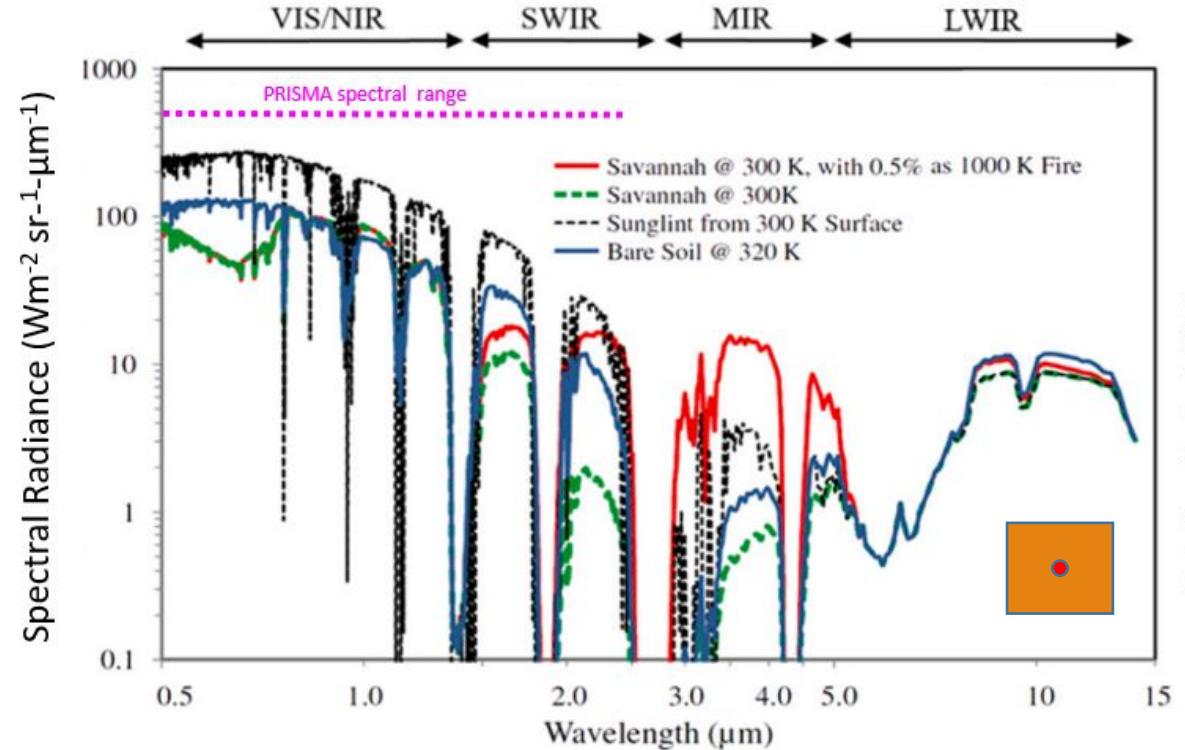
## Different approaches for wildfire characterization



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Adapted from Wooster et al 2013

Top-of-atmosphere spectral radiance simulated at four different target pixels (note logarithmic x and y axes) using the MODTRAN 5 radiative transfer code. In Fig. are shown the simulations for a savannah surface at 300 K; the same surface but with a 1000 K fire covering 0.5 % of the ground field-of-view (FOV), specularly reflected sunglint from a 300 K surface; and solar-heated (320 K) bare soil. The pixel containing the sub-pixel fire shows a signal highly elevated in the MIR (3–5  $\mu\text{m}$ ) spectral region compared to all other targets, equivalent to a brightness temperature of around 400 K (Wooster M.J. et al. (2013). [https://doi.org/10.1007/978-94-007-6639-6\\_18](https://doi.org/10.1007/978-94-007-6639-6_18))

# Detection of hotspots with hyperspectral imagery

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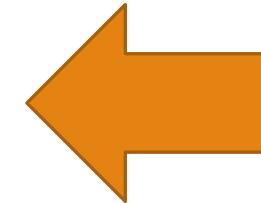
- Hyperspectral imagery presents nonpareil features in support to remote sensing applications
- Hotspots detection can benefit from the continue spectral signature of hyperspectral remote sensing, eventually helping in *counteracting dangerous events and managing rescue operations.*
- This work reports a preliminary investigation on how the new Italian hyperspectral satellite **PRISMA** can be used to *support ground operations for hotspot detection.*

# Hyperspectral active fire characterization techniques



Hyperspectral active fire detection techniques from satellite based on:

1. VNIR-SWIR bands
2. Temperature



# Fire detection: hyperspectral based indexes



'Advanced'K Band Difference (AKBD)= Max|Band K<sub>i</sub>|-Bkg

Vodacek, 2002  
Amici et al 2011

$$CIBR = \frac{L_{\lambda_m}}{(w2 * L_{\lambda_2} + w3 * L_{\lambda_3})}$$

Dennison et al. 2006, 2009

$$HFDI = \frac{(L_{\lambda_1} - L_{\lambda_2})}{(L_{\lambda_1} + L_{\lambda_2})}$$

Dennison 2009,

# Active fire: PRISMA Case study



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## Bush fire - NSW 2019 (Australia)

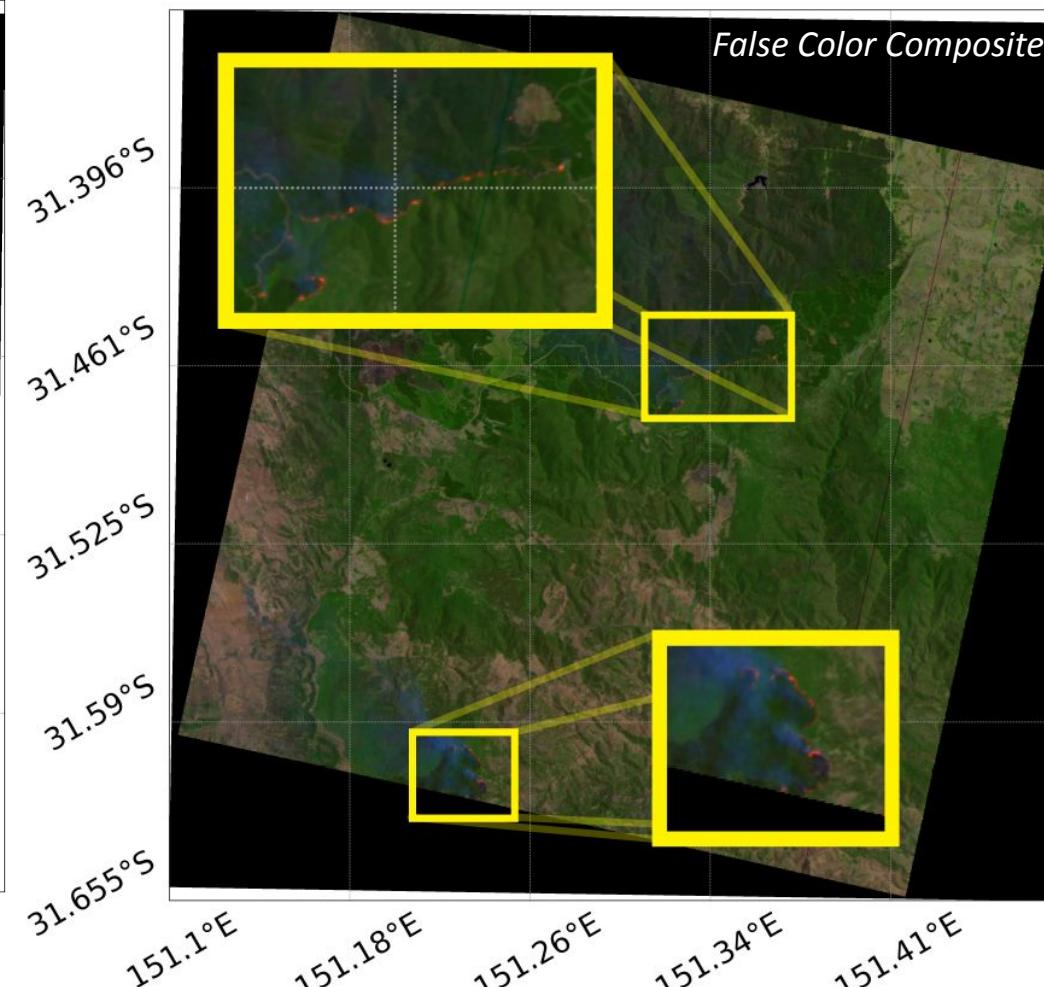
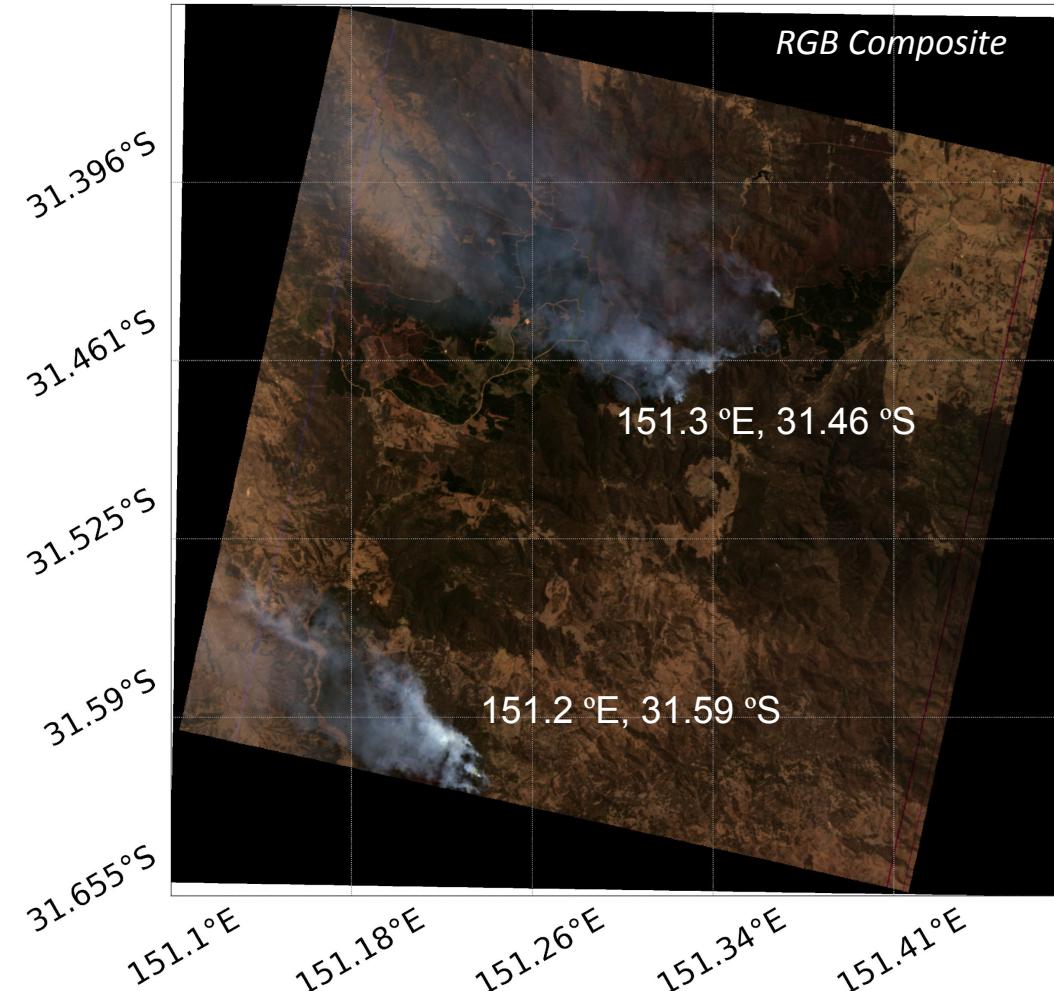
- 2019–20 bushfire season was the most widespread, extreme and catastrophic that Australia has ever experienced since European



# Bush fire - PRISMA - December 27, 2019



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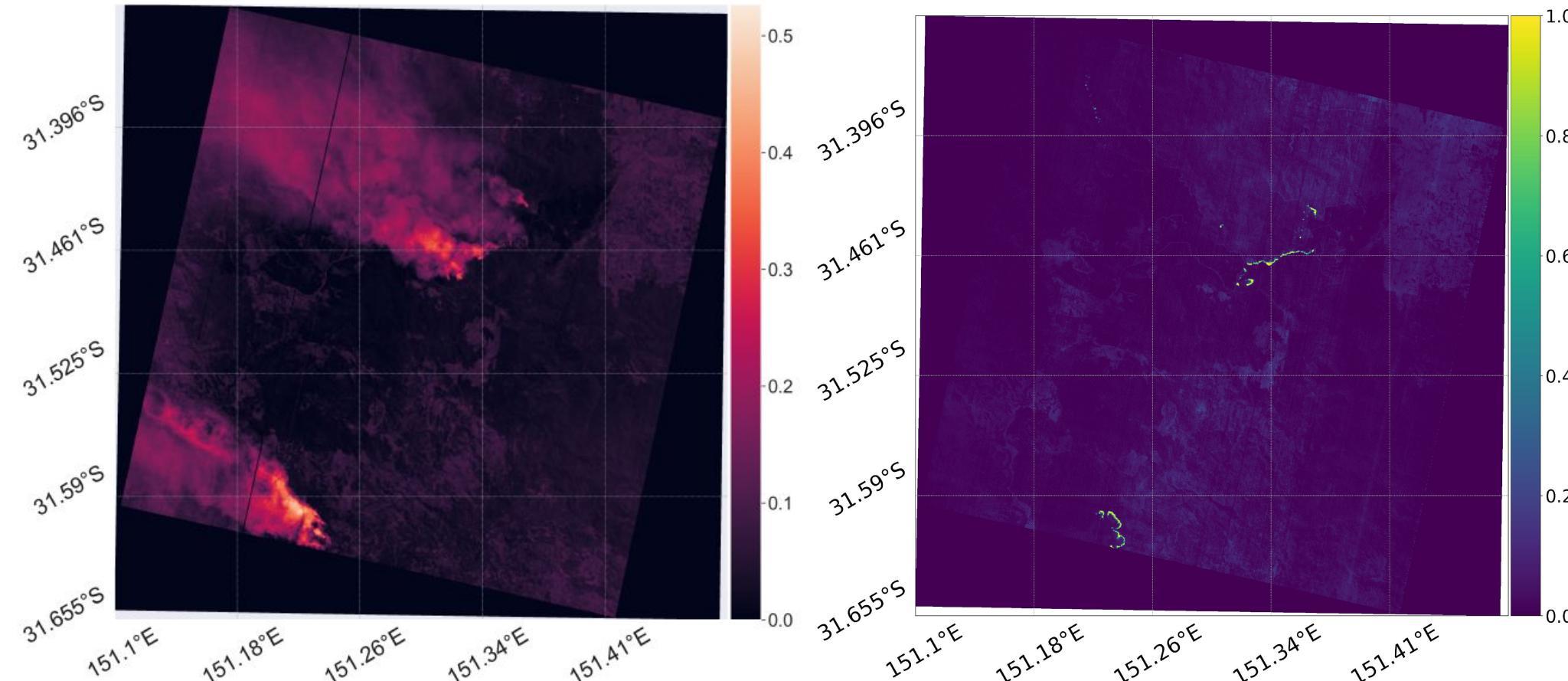
*Image from:*  
Spiller, D., Ansalone,  
L., Amici, S., Piscini,  
A., Mathieu, P. P.,  
“Analysis and  
Detection of Wildfires  
by Using Prisma  
Hyperspectral  
Imagery”, ISPRS 2021,  
July 4-10 2021

Data information generated by SIA under ASI licence to use. Original PRISMA product copyright ASI- ( 2019)

# Bush fire - PRISMA - December 27, 2019

## Band VNIR

## SWIR



*Image from:*  
Spiller, D., Ansalone,  
L., Amici, S., Piscini,  
A., Mathieu, P. P.,  
“Analysis and  
Detection of Wildfires  
by Using Prisma  
Hyperspectral  
Imagery”, ISPRS 2021,  
July 4-10 2021

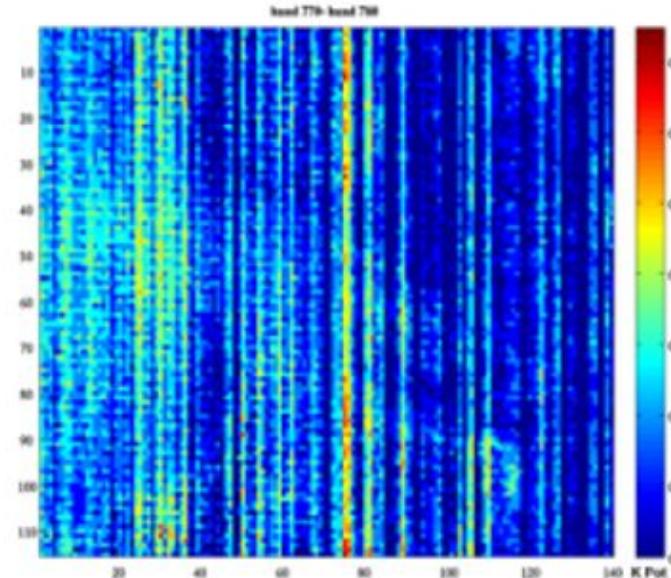
# Bush fire - PRISMA

## December 27, 2019



Ben Halls Gap National Park

AKBD



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# Bush fire - PRISMA

## December 27, 2019



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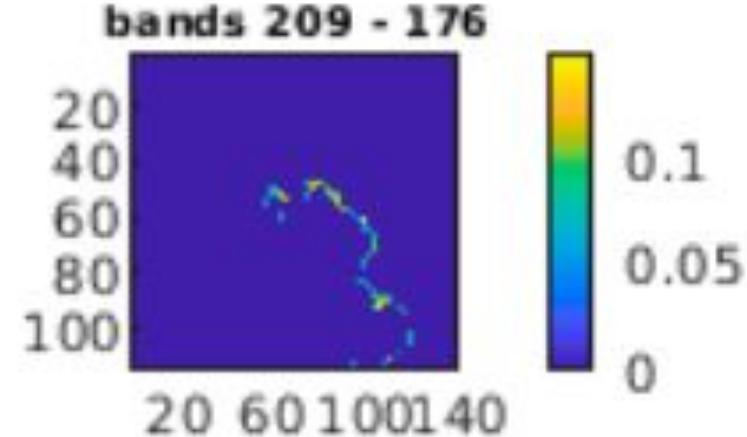
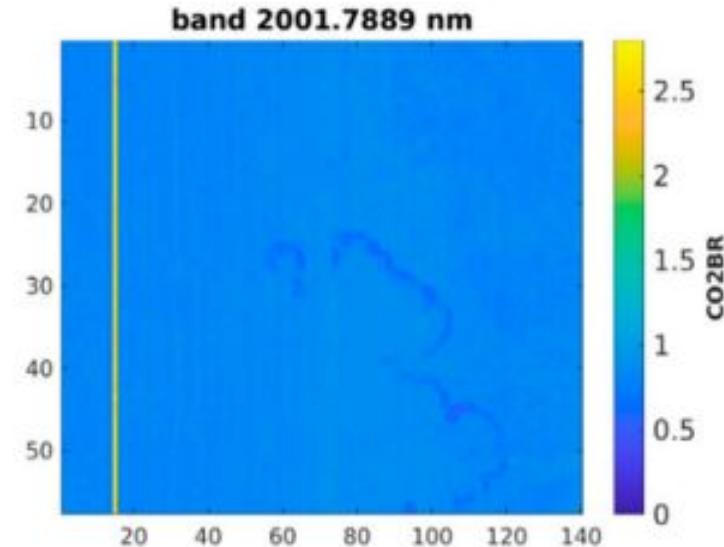
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Ben Halls Gap National Park

CDI

HFDI



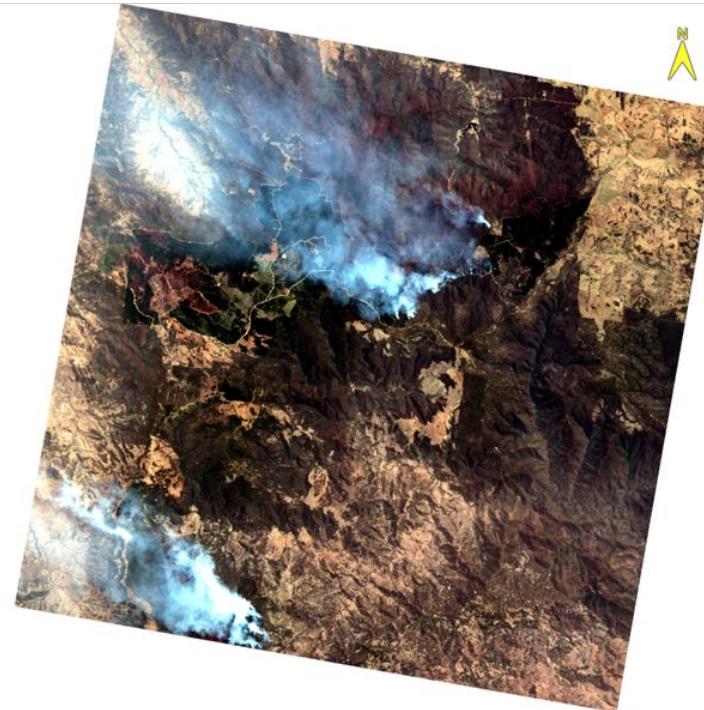
a 2001.79nm and 2010.36nm were used.

Data information generated by SIA under ASI licence to use. Original PRISMA product copyright ASI- ( 2019) - Amici S. and Piscini A. 2021

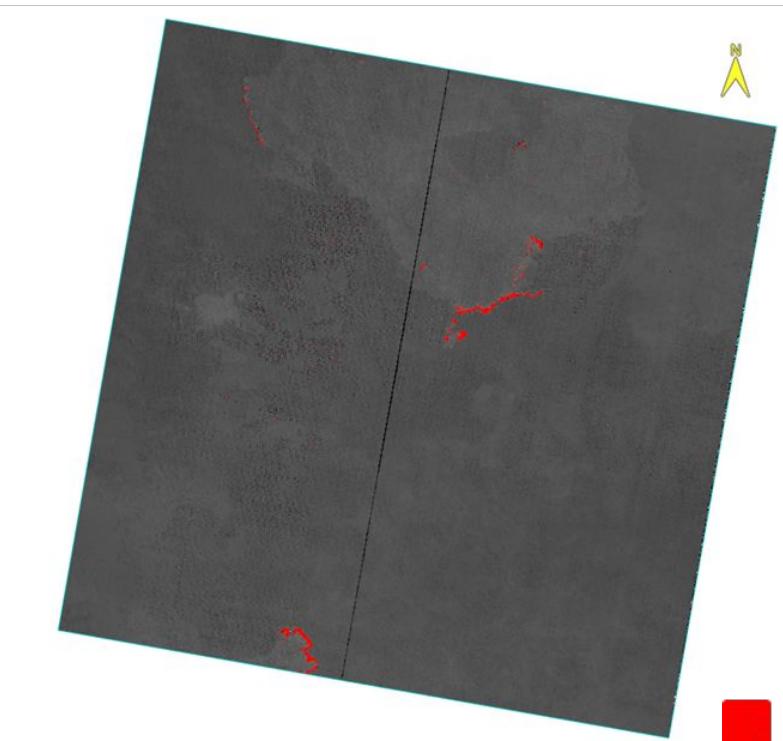
# Bush fire - PRISMA - December 27, 2019



RGB true color



Hyperspectral Fire index



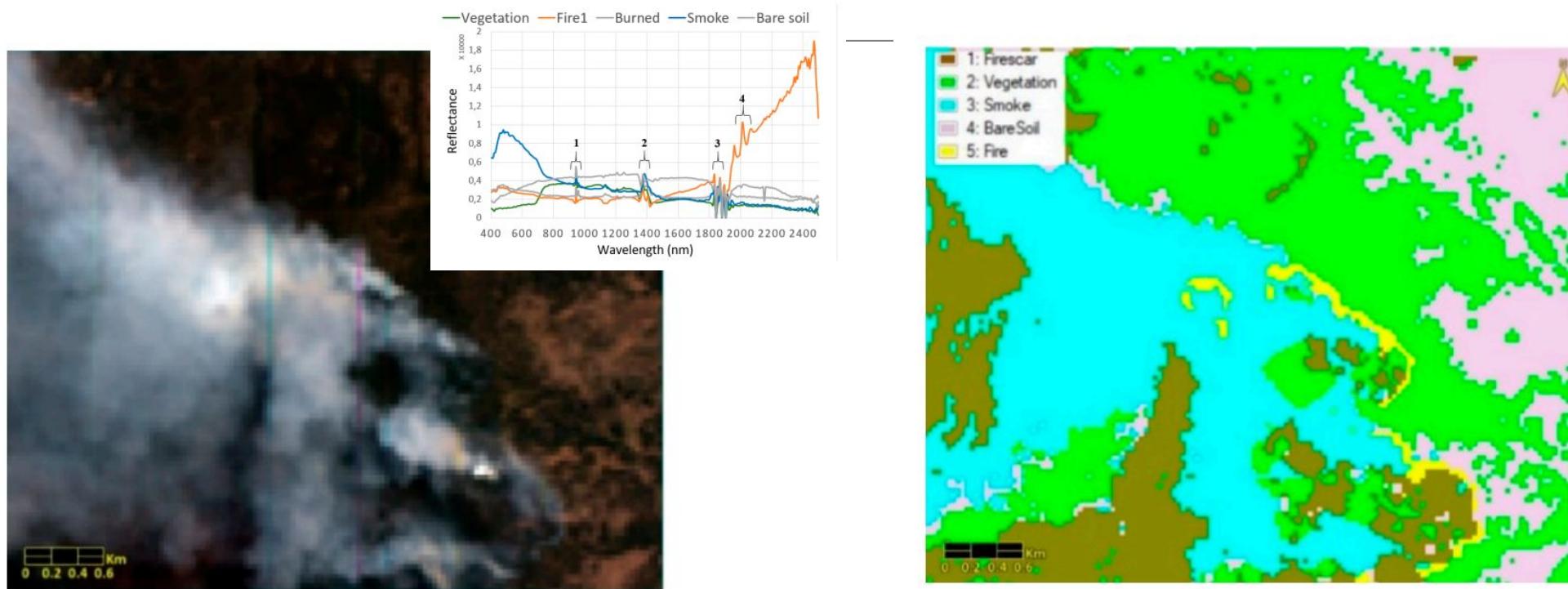
Forest Fire Front

Data information generated by INGV under ASI licence to use. Original PRISMA product copyright ASI- (2019) Amici S. et. al Living Planet Symposium 2022

# Support Vector Machine for classification



Bush fire - PRISMA - December 27, 2019



Classification accuracy 96.87%, with a K coefficient of 0.96

Amici S. and Piscini 2021

# 1- D Convolutional Neural Network (CNN) for classification

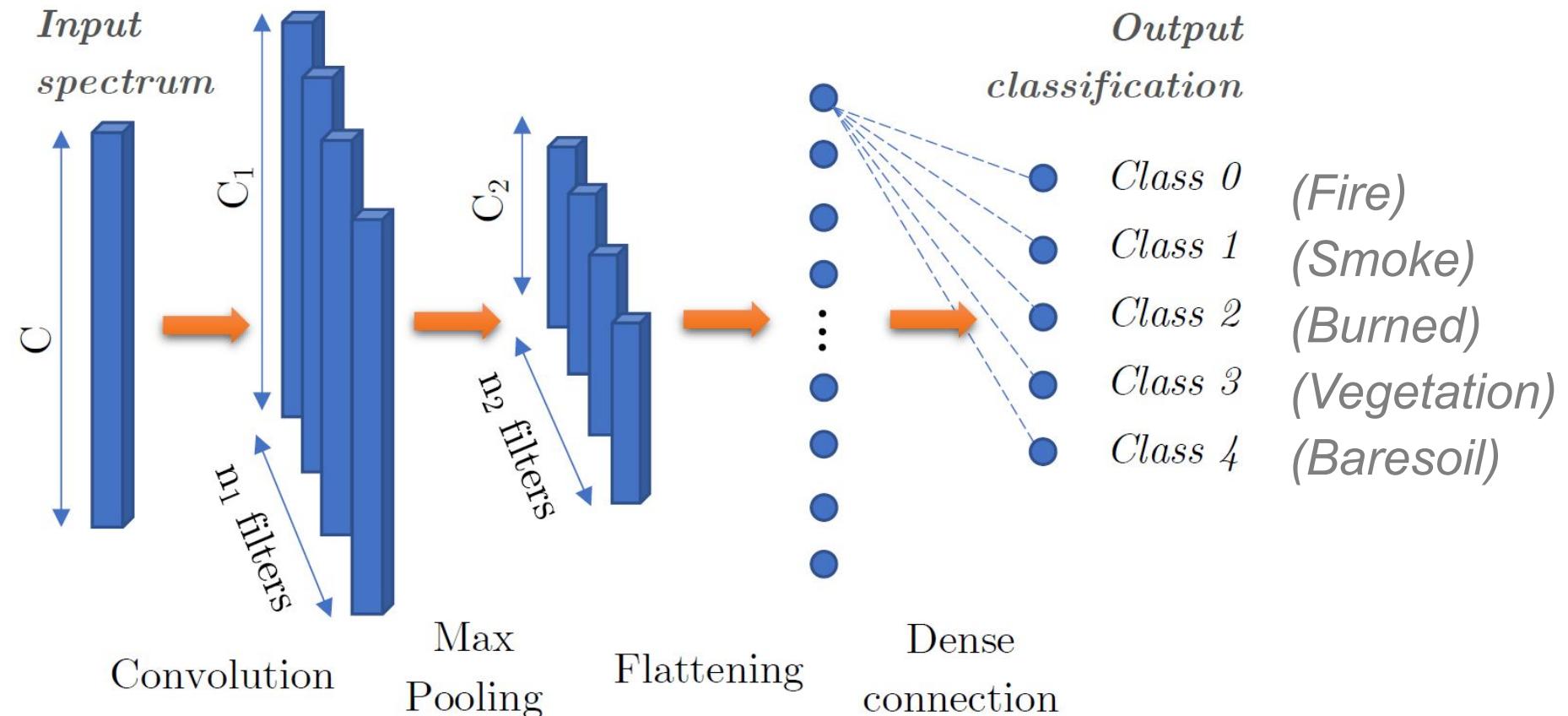


Image from:  
Spiller, D., Ansalone, L., Amici, S., Piscini, A., Mathieu, P. P., "Analysis and Detection of Wildfires by Using Prisma Hyperspectral Imagery", ISPRS 2021, July 4-10 2021

```
<None> <None>
1 import tensorflow as tf
2 from tensorflow.keras.layers import Conv1D, MaxPooling1D, Flatten, Dense
3 from tensorflow.keras import Model
4 from tensorflow.keras.optimizers import Adam
5 from tensorflow.keras.regularizers import l2
6
7 def model_1D(dim, learn_rate, lmbda, drop, FL, n_filters, init):
8     """Parameters:
9         dim : image dimension (256)
10        learn_rate : learning rate for the optimizer (1e-4)
11        lmbda : regularization parameter (1e-5)
12        drop : dropout percentage (0.15)
13        FL : kernel size (3)
14        n_filters: number of filters (112)
15        init: kernel initializer (he_normal)
16
17    Output:
18    model : unet model"""
19
20    img_input = tf.keras.Input(shape=(dim,1))
21
22    C1 = Conv1D(n_filters,FL,padding='same',
23                activation='relu',
24                kernel_initializer=init,
25                kernel_regularizer=l2(lmbda))(img_input)
26
27    MP1 = MaxPooling1D(pool_size=(2), strides=(2))(C1)
28
29    F = Flatten()(MP1)
30    D1 = Dense(units = 128, activation = 'relu')(F)
31    D2 = Dense(units = 5, activation = 'softmax')(D1)
32
33    model = Model(inputs=img_input,outputs=D2)
34
35    opt = Adam(learning_rate=learn_rate)
36    model.compile(loss='categorical_crossentropy',
37                  optimizer=opt,
38                  metrics=['accuracy'])
39
40    return model
41
```

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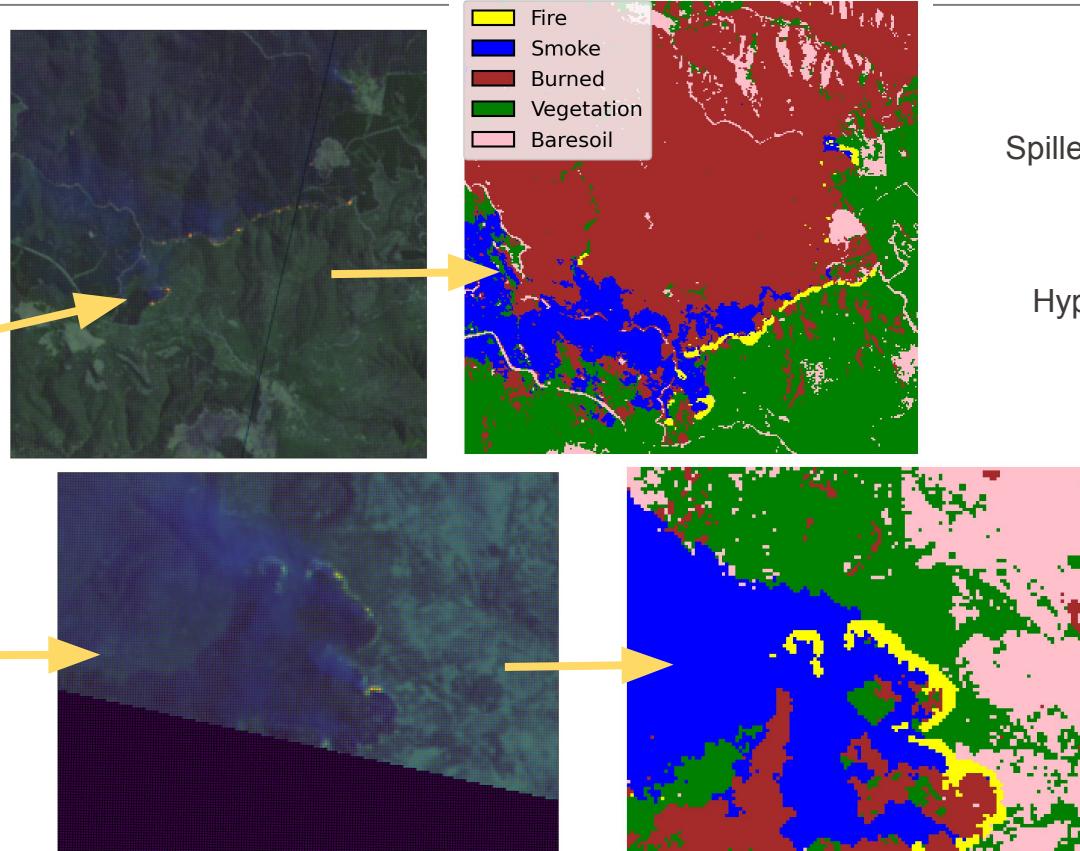
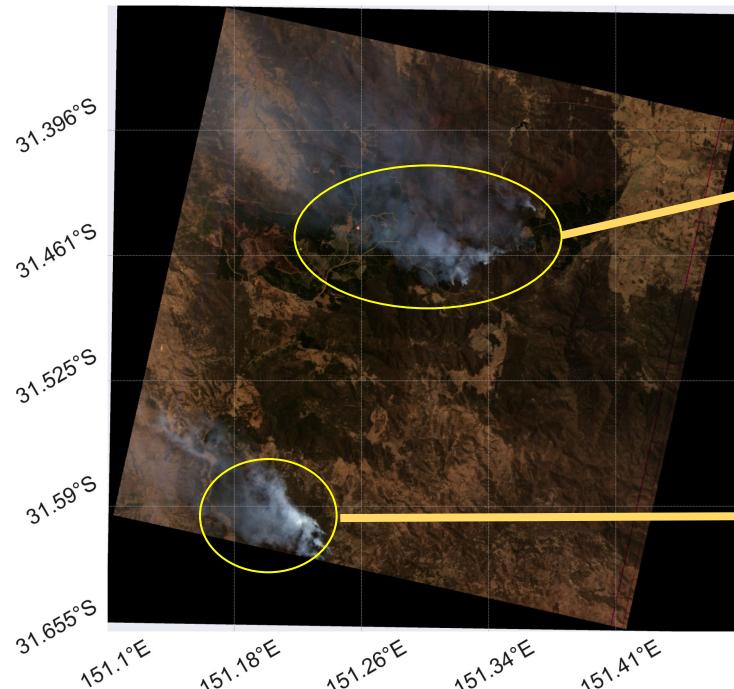


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# 1- D Convolutional Neural Network (CNN) for classification

Segmentation map



*Image from:*  
Spiller, D., Ansalone, L., Amici, S.,  
Piscini, A., Mathieu, P. P.,  
“Analysis and Detection of  
Wildfires by Using Prisma  
Hyperspectral Imagery”, ISPRS  
2021, July 4-10 2021

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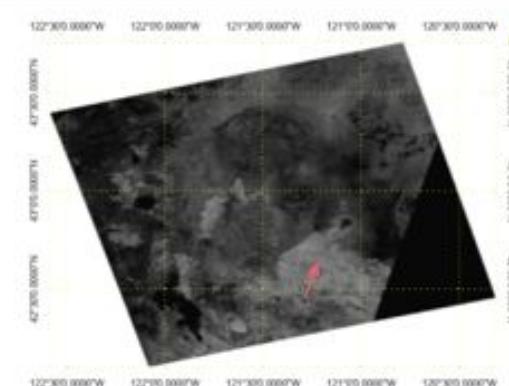
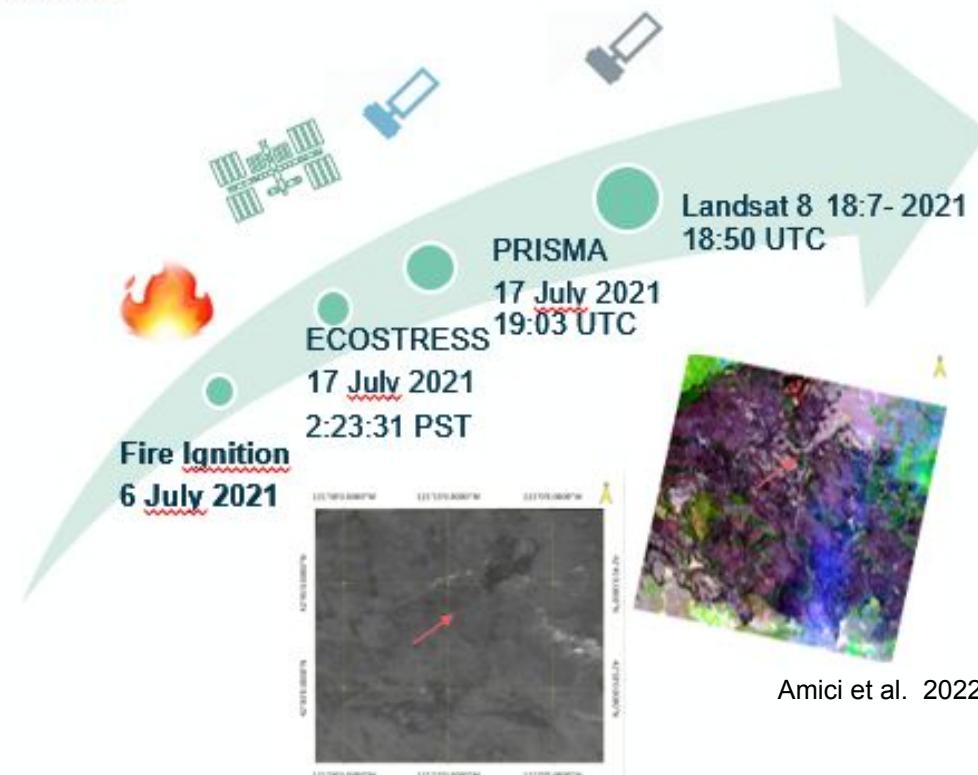
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eesa

# Satellite complementarity

## ACQUISITION TIMELINE



Amici et al. 2022 Living Planet Symposium 2022

10



\* THE EUROPEAN SPACE AGENCY



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# Q & A 15 min

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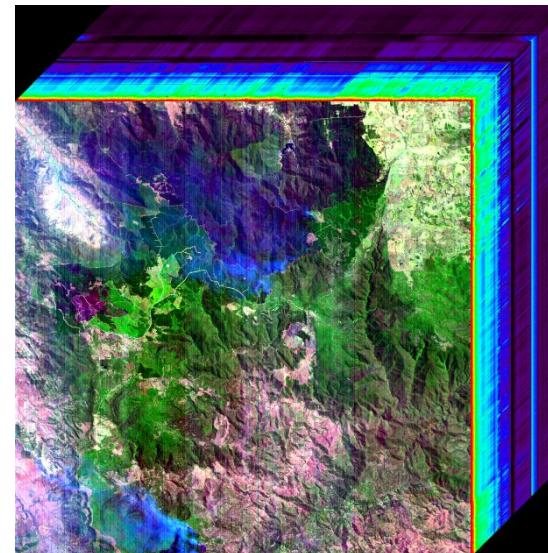


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# Module 2 Practicals

## Dive into PRISMA data



# Overview



- 
- Part 1 PRISMA portal registration
  - Part 2 DEMO PRISMA Catalogue
  - PRISMA new data acquisition
  - PRISMA- PRE ORBIT open source software
  - Classification software
  - Resources

# Create an account: step 1

## Registration page



- 1) Go to  
<https://prisma.asi.it/>  
and click on Register now

The image shows the WSO2 Identity Server sign-in page. At the top, it says "WSO2 IDENTITY SERVER". Below that is a blue header bar with the word "SIGN IN" in white. The main form has two input fields: "Username" containing "ITA\_ScN1\_0011\_6\$" and "Password" with several dots. There is a checkbox labeled "Remember me on this computer". A note below the fields states: "After a successful sign in, we use a cookie in your browser to track your session. You can refer our [Cookie Policy](#) for more details." At the bottom is a large black "SIGN IN" button. An orange arrow points from the text "Don't have an account? [Register Now](#)" at the bottom left towards the "SIGN IN" button.

# Create an account: step 2 User request form

## 2) User request form

- Right click on “**Terms and conditions**” and
- save locally  
LICENCE\_TO\_USE\_PRISMA\_DATA.pdf
- Use Adobe reader to open the file

The screenshot shows a web browser window with the URL https://prismauserregistration.asi.it. The page features the ASI logo and a background image of Earth and a satellite. The main title is "User Request Form". A red circle highlights the link "Download the Terms, Conditions and User Data". Below it, a note states: "PRISMA is a small mission and the management of the registration requests will be available only during normal working hours of the Italian time zone. We will do our best to minimize delays." At the bottom, there's a section titled "We recommend to be careful about the following elements:" with three numbered points.

Download the [Terms, Conditions and User Data](#)  
Complete the required fields in the last pages of the downloaded Terms and Conditions (license) file, saving it in a pure digital format (no scan of the pages), then Upload it. Please read carefully the compiling instructions at page 12-13 of the license and rename the file as requested in the naming convention before uploading

△ PRISMA is a small mission and the management of the registration requests will be available only during normal working hours of the Italian time zone.  
We will do our best to minimize delays.

We recommend to be careful about the following elements:

1. any question about the registration phase and any difficulties you could encounter when moving the first steps into the system can be addressed using the Help Desk Button on top of page
2. the license and user data file must be downloaded on local storage, compiled (using any version of Acrobat Reader capable to fully edit the pdf forms) and only after uploaded into the system. It should not be scanned nor reprinted in pdf, not compiled inside the internet browser
3. the upload of the license and user data file into the system is done by selecting it and pressing the "SEND REQUEST" button. This in turn requires the mandatory acceptance of the Terms & Conditions in the license (done by flagging the related box) and optionally the authorization to ASI to send promotional communications about PRISMA



# Create an account: step 3 the Term and Cond.

---

- The document is structured in different chapter. Attention need to be made at the “Article 4” permitted uses” and “Article 5 “ what you are not allowed to do.
- It is possible to do everything with the products

**BUT:**

- **ridistribution to third parties**
  - **commercial use**
  - **altering thecopyright notice**
- are NOT PERMITTED.**

# Registration



- You can register as single user or group (up to 16 people)
- Identify the category (using table 6-1 on page 12)
- For Example: University in Malesia is “**No National Science user**” category
- Try to avoid generic user “which has lower privileges”
- On page 14 Enter the project title, duration of the project in digits (i.e. 6), area of interest and project description (minimum 150 words)
- And select the category fill the information related to people involved
- SAVE as **SURNAME\_Name.pdf** go back in the registration and **upload the file**
- Tick the boxes to receive information
- click on **SEND REQUEST**
- After a couple of days **you will receive your credentials**

We recommend to be careful about the following elements:

1. any question about the registration phase and any difficulties you could encounter when moving the first steps into the system can be addressed using the Help Desk Button on top of page
2. the license and user data file must be downloaded on local storage, compiled (using any version of Acrobat Reader capable to fully edit the pdf forms) and only after uploaded into the system. It should not be scanned nor reprinted in pdf, not compiled inside the internet browser
3. the upload of the license and user data file into the system is done by selecting it and pressing the "SEND REQUEST" button. This in turn requires the mandatory acceptance of the Terms & Conditions in the license (done by flagging the related box) and optionally the authorization to ASI to send promotional communications about PRISMA
4. the description of the project must contain at least 150 words (this does not mean 150 characters)
5. after pressing the "SEND REQUEST" button, wait that your registration request is taken in charge by the system. This happens when on top of the page appears "Your Request has successfully submitted. We will verify your data and apply the membership as soon as possible" on a green background
6. please be patient and refrain from pressing the "SEND REQUEST" button twice or submitting multiple identical registration requests

Flagging the acceptance, the User takes all the penal and administrative consequences deriving from the falsification in documents and from incomplete and / or mendacious declarations relating to the information entered in the License. The User also declares to have read, to have understood and to accept all the terms and articles contained in the General Conditions for the Provision of Prisma Products and in the related License To Use.

Download the [PRISMA Privacy Policy](#) provided pursuant to art. 13 of the European General Data Protection Regulation 2016/679 (GDPR)



# Demo: PRISMA catalogue

- How to access it
- The catalogue is available from PRISMA browser <http://prisma.asi.it>

WSO<sub>2</sub> IDENTITY SERVER

## SIGN IN

Username  
ITA\_ScN1\_0011\_6\$

Password  
.....

Remember me on this computer

After a successful sign in, we use a cookie in your browser to track your session. You can refer our [Cookie Policy](#) for more details.

**SIGN IN**

Don't have an account? [Register Now](#)



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# PRISMA catalogue

- Access the catalogue by selecting catalogue

→ C https://prisma.asi.it/missionselect/

Home Logout (ITA\_ScN1\_0011\_6\$)

ASI

Mission Selection Form

Mission \*

PRISMA

Systems \*

Select one of available Systems.

OPEN

Other links

- Documentation Area
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- [Latest News](#)

# Catalogue



← → C https://prisma.asi.it/js-cat-client-prisma-src/ Aggiorna

Home Logout (ITA\_ScN1\_0011\_6\$)

Layers

- EO Products
- Placemarks
- External WMS Layers

Product search

Place Search

Placemarks

Selection Info

No item selected



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# PRISMA Latest News

## Processors change log (update)

March 10, 2022

Starting from May 2021, a deviation from the nominal values was detected in the ITF (Instrument Transfer Function) and CW (Central Wavelength) parameters of the VNIR channel. This led to a recalibration activity, which is still in progress and will likely end in May 2022.

At the conclusion of the above recalibration activity, a new version of the processors will be issued and made available and, for those who wish, it will be possible to request reprocessing of out-of-specification products.

## Processors change log (update)

February 4, 2022

Component & version	Installation Date	Description
LOACORNERS v4.1.0 L0 processor v2.3.2	28/02/2020	Solves the incorrect evaluation of the image corners geographic position on level 0 products
PRS_L1_SOI_A 3.6.1	11/05/2020	Changing the default parameters of the set-points of the temperature control loops of the two FPAs in the hyperspectral sensor, from 3341DN (186.04K) to 3321DN (188.2K) for the VNIR channel and from 3304DN (186.07K) to 3274DN (189.4K) for the SWIR channel, to solve the error of the temperature increase of the two radiators from April 2019 due to the terrestrial seasonal effect and the operational load of the Satellite. The fix adapts the L1 processor to this new set point.
PRS_L0 v2.4.0 PRS_L1_SOI_A v3.7.0, v3.7.0.1	06/07/2020	Correction of the generation part of the cloud coverage layer which in the case of high cloud cover, wrongly

## Introduction

Very recently, ASI has developed a pre-feasibility tool which users can exploit **to predict feasible future dates of acquisition over their targets**.

*The tool is available online at the url: <http://prisma-prefeasibility.asi.it/>*

By using this tool, users can query the system to:

1. Get an estimation of the data-take opportunities over a **single target** and filling the fields shown in the page.
2. Get an estimation of the data-take opportunities over a **multiple targets** by uploading a csv file with the required information.

Users can set the same requirements used for the images request made on the PRISMA portal, so that they can have a list of the possible acquisition windows.

The only uncontrolled variables are the weather, which can stop the system from acquiring when too many clouds are expected, and the presence of other higher-priority requests.

# PRISMA – Pre-feasibility tool



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## Single request mode

### PRISMA Pre-Feasibility Tool

Version: Update Trajectory R\_5.4 - Prefeasibility R\_6.3 - For any problems please contact: [prisma\\_missionmanagement@asi.it](mailto:prisma_missionmanagement@asi.it)

Through this page it is possible to check PRISMA feasibility by manually insert Lat and Lon and Params  
If you what to check feasibility for a set of points by using CSV file with a set of POI click the following button:

Insert Username:

Start epoch:  \*  
[yyyy-mm-ddThh:mm:ss.ssssss] It shall be in the future

Strip length:  [Spot image: 30 x 30 Km] \*

Lat:  \*

[deg] Shall be in the range [-82, 82]

LookAngle Min:  -21

[deg] Shall be in the range [-21, 21]

MinSunZenithAngle:  0.0

[deg] Shall be in the range [0, 70]

Description:

[text]

Stop epoch:  \*  
[yyyy-mm-ddThh:mm:ss.ssssss] It shall be in the future and greater than Start epoch

Lon:  \*

[deg] Shall be in the range [-180, 180]

LookAngle Max:  21

[deg] Shall be in the range [-21, 21] and greater than LookAngle Min

MaxSunZenithangle:  70.0

[deg] Shall be in the range [0, 70] and greater than MinSunZenithAngle

the fields marked with \* are mandatory

The content of fields with red dashed line borders are invalid or missing

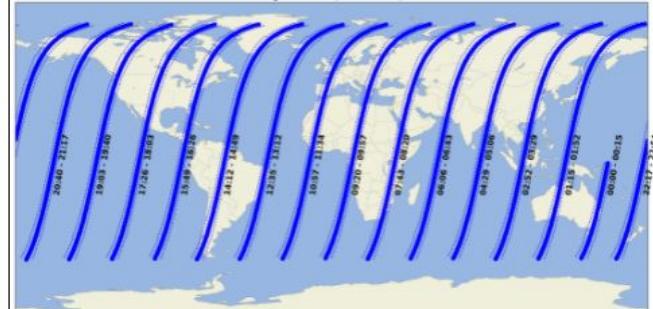
Please wait until the calculation is finished without reloading the page; the completion of the computation could last even many minutes depending by the extent of the time interval on which you require the feasibility

Updated on September 02 2021 04:00:12 UTC with the following TLE:

2 44072 97.8824 318.6433 0001477 85.1439 274.9944 14.83660737132655
1 44072U 19015A 21244.83158489 .00000107 00000-0 19403-4 0 9991

hover the mouse on the graphs to zoom-in

Sep 02 2021 (UTC Times)



# PRISMA – Pre-feasibility tool



## Multiple requests mode

Version: Update Trajectory R\_5.4 - Prefeasibility R\_6.3 - For any problems please contact: [prisma\\_missionmanagement@asi.it](mailto:prisma_missionmanagement@asi.it)

Through this page  
If you want to check feasibility

### PRISMA Pre-Feasibility Tool

user\_input.csv - Blocco note

File Modifica Formatta Visualizza ?

2021-10-10T12:00:00.000000,2021-11-15T00:00:00.000000,1,41.9028, 12.4964, -21,21,0.0,70.0,Rome  
2022-04-01T12:00:00.000000,2022-10-31T00:00:00.000000,1,-33.9249, 18.4241,-21,21,0.0,70.0,Cape Town  
2021-09-01T12:00:00.000000,2022-01-01T00:00:00.000000,1,40.7128, -74.0060,-21,21,0.0,70.0,New York

The csv file must contains the one entries like the following example for each row:

format: 'Start epoch' \* [yyyy-mm-ddThh:mm:ss.ssssss], 'Stop epoch' \* [yyyy-mm-ddThh:mm:ss.ssssss], 'Strip length' \* (in case of spot image)' [n], 'Lat' \* [deg], 'Lon' \* [deg], 'LookAngle Min' [deg], 'LookAngle Max' [deg], 'MinSunZenithAngle' [deg], 'MaxSunZenithangle' [deg], 'Description' [text]

example: "2022-03-13T00:00:00.100000, 2022-06-06T00:00:00.300000, 1, 45.84, 7.5667, -21, 20, 0, 70, Torgnon"

the fields marked with \* are mandatory

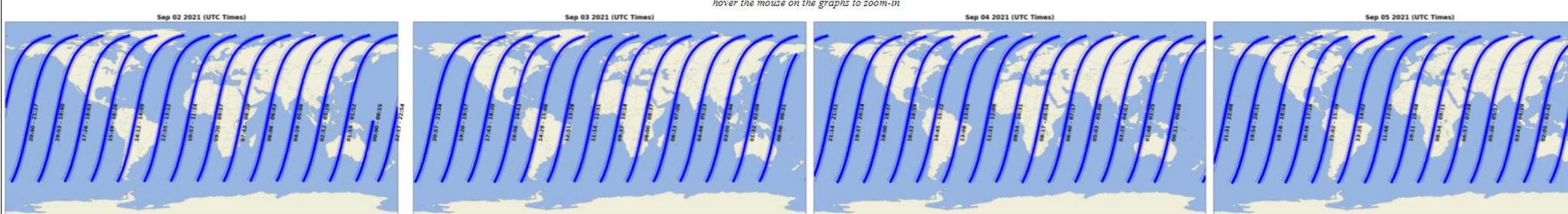
The content of fields with red dashed line borders are invalid or missing

Select CSV file to upload:  Nessun file selezionato

Please wait until the calculation is finished without reloading the page; the completion of the computation could last even many minutes depending by the extent of the time interval and the number of points on which you require the feasibility

Updated on September 02 2021 04:00:12 UTC with the following TLE:

2 44072 97.8824 318.6433 0001477 85.1439 274.9944 14.83660737132655
1 44072U 19015A 21244.83158489 .00000107 00000-0 19403-4 0 9991



# PRISMA – Pre-feasibility tool



## Output example

Start Time	Stop Time	Latitude (deg)	Longitude (deg)	Roll (deg)	SZA (deg)	Site	
2021-10-15 10:10:50.348317953	2021-10-15 10:10:54.458317953	41.9028	12.4964	6.2	51.6	Rome	
2021-10-20 09:57:34.468837731	2021-10-20 09:57:38.578837731	41.9028	12.4964	-18.0	54.0	Rome	Acquisition can be discarded due to roll uncertainties
2021-10-21 10:14:07.527234303	2021-10-21 10:14:11.637234303	41.9028	12.4964	12.2	53.6	Rome	
2021-10-26 10:00:51.448682597	2021-10-26 10:00:55.558682597	41.9028	12.4964	-12.2	55.8	Rome	
2021-10-27 10:17:23.953121956	2021-10-27 10:17:28.063121956	41.9028	12.4964	17.9	55.5	Rome	Acquisition can be discarded due to roll uncertainties
2021-11-01 10:04:07.322710470	2021-11-01 10:04:11.432710470	41.9028	12.4964	-6.2	57.6	Rome	
2021-11-07 10:07:22.980145371	2021-11-07 10:07:27.090145371	41.9028	12.4964	-0.2	59.3	Rome	
2021-11-13 10:10:38.934031244	2021-11-13 10:10:43.044031244	41.9028	12.4964	6.2	60.8	Rome	
2022-04-07 08:53:12.046855277	2022-04-07 08:53:16.156855277	-33.9249	18.4241	-0.2	49.1	Cape Town	
2022-04-13 08:56:29.253817283	2022-04-13 08:56:33.363817283	-33.9249	18.4241	6.7	50.4	Cape Town	
2022-04-18 08:43:14.040256383	2022-04-18 08:43:18.150256383	-33.9249	18.4241	-19.7	53.4	Cape Town	Acquisition can be discarded due to roll uncertainties
2022-04-19 08:59:45.925461479	2022-04-19 08:59:50.035461479	-33.9249	18.4241	13.4	51.7	Cape Town	
2022-04-24 08:46:29.442084892	2022-04-24 08:46:33.552084892	-33.9249	18.4241	-13.5	54.6	Cape Town	
2022-04-25 09:03:01.597287038	2022-04-25 09:03:05.707287038	-33.9249	18.4241	19.5	53.0	Cape Town	Acquisition can be discarded due to roll uncertainties
...	...	...	...	...	...	...	...

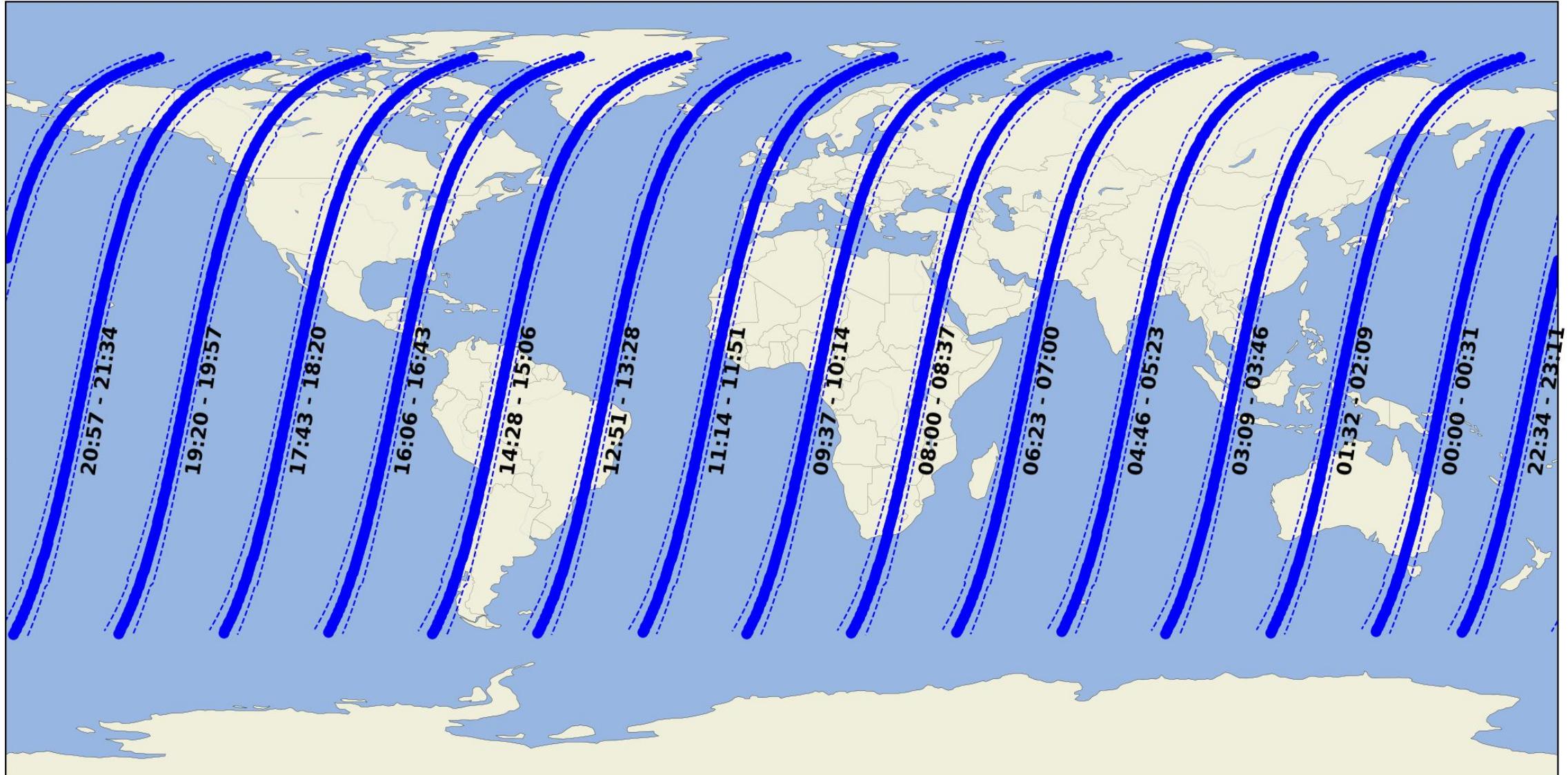
# PRISMA – Pre-feasibility tool



Sep 03 2021 (UTC Times)

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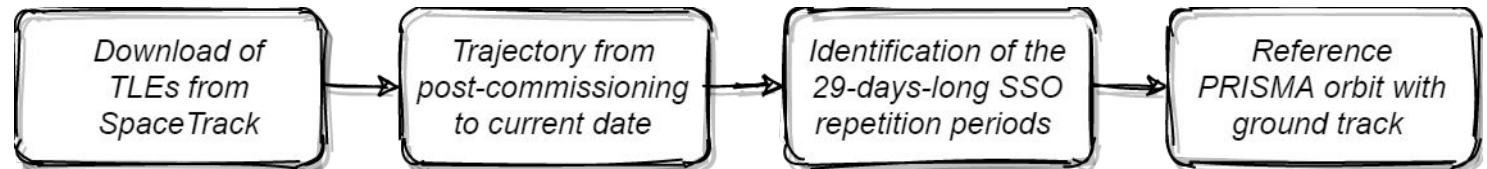
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since 1926



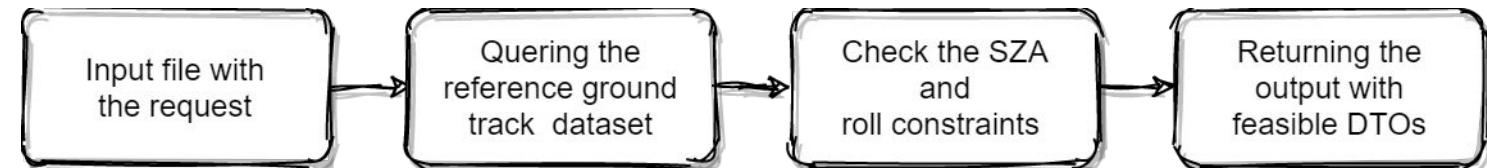
## Architecture of the Pre-Feasibility Tool

The tool is split into two separate software:

1. The first one is related to the creation of the reference ideal orbit of PRISMA needed to make future DTOs estimations. This software is planned to run every day to always have an updated reference orbit with related ground track, and it does not interface with users.



2. The second part of the pre-feasibility tool is the one that interfaces with the users' requests uploaded in the ASI website. The input is passed to the software which queries the reference PRISMA ground track trajectory generated with the first algorithm. Considering all the constraint, and specifically the solar zenith angle (SZA) and the roll angle, the feasible DTOs are generated.



# New PRISMA acquisition



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## Mission Selection Form

Mission \*

PRISMA

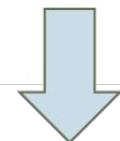
Systems \*

New Acquisition

OPEN

### Other links

- [Documentation Area](#)
- [Click here for Help Desk support \(use the button on top of the registration page\)](#)
- [Latest News](#)



Programming Request Status Filter:

ANY

PR id



Clear Filters

Include past

+ New Order

Due Date

Summary

Order Stat...

Last stage detected

 Storefront Mis out

## VALIDITY TIME RANGE

Start epoch:  16/07/22 12:00Stop epoch:  30/07/22 12:00

## AREA OF INTEREST

 Spot image: 30 x 30 km

Quota: 1

Longitude [deg]

12.4923730

Latitude [deg]

41.8902510

Cloud Coverage [%]

20.00

LookAngle Min

-21.0000000

LookAngle Max

21.0000000

MinSunZenithAngle

.0000000

MaxSunZenithAngle

70.0000000

## Description

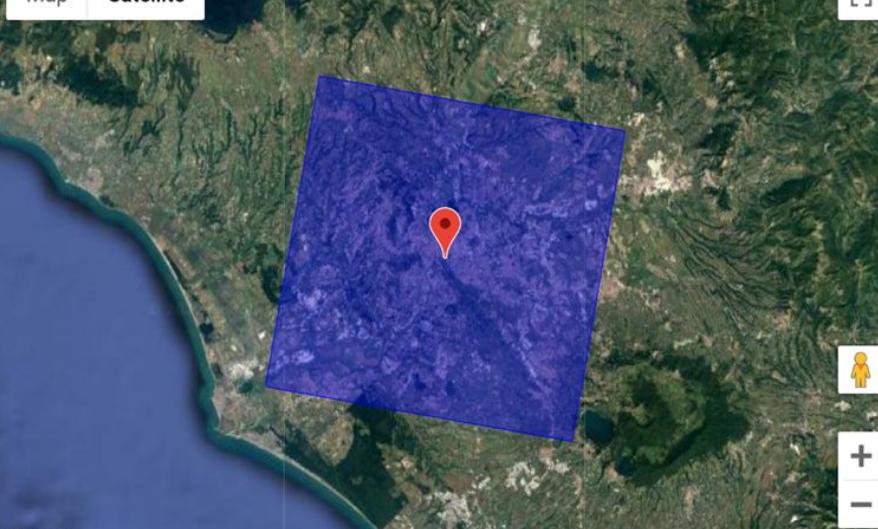
Rome, Italy

## Contextual Processing Order

None

 Use GCP

## MAP VIEWER

 Map  Satellite

Keyboard shortcuts | Imagery ©2022 TerraMetrics | 5 km | Terms of Use | Report a map error

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# Q & A 15 min

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# Open source Software

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- Learn how to use open source software for AI classification
- The code is freely available on github!

[https://github.com/DarioSpiller/Tutorial\\_PRISMA\\_IGARSS\\_wildfires.git](https://github.com/DarioSpiller/Tutorial_PRISMA_IGARSS_wildfires.git)

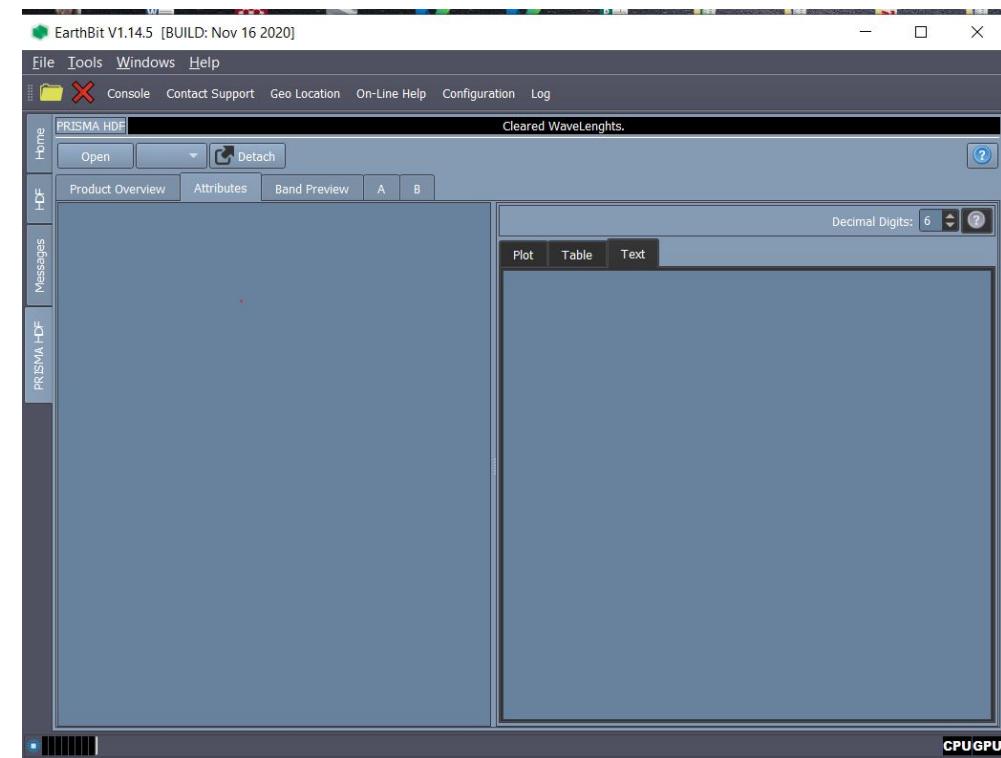
# Other software for PRISMA Stefy

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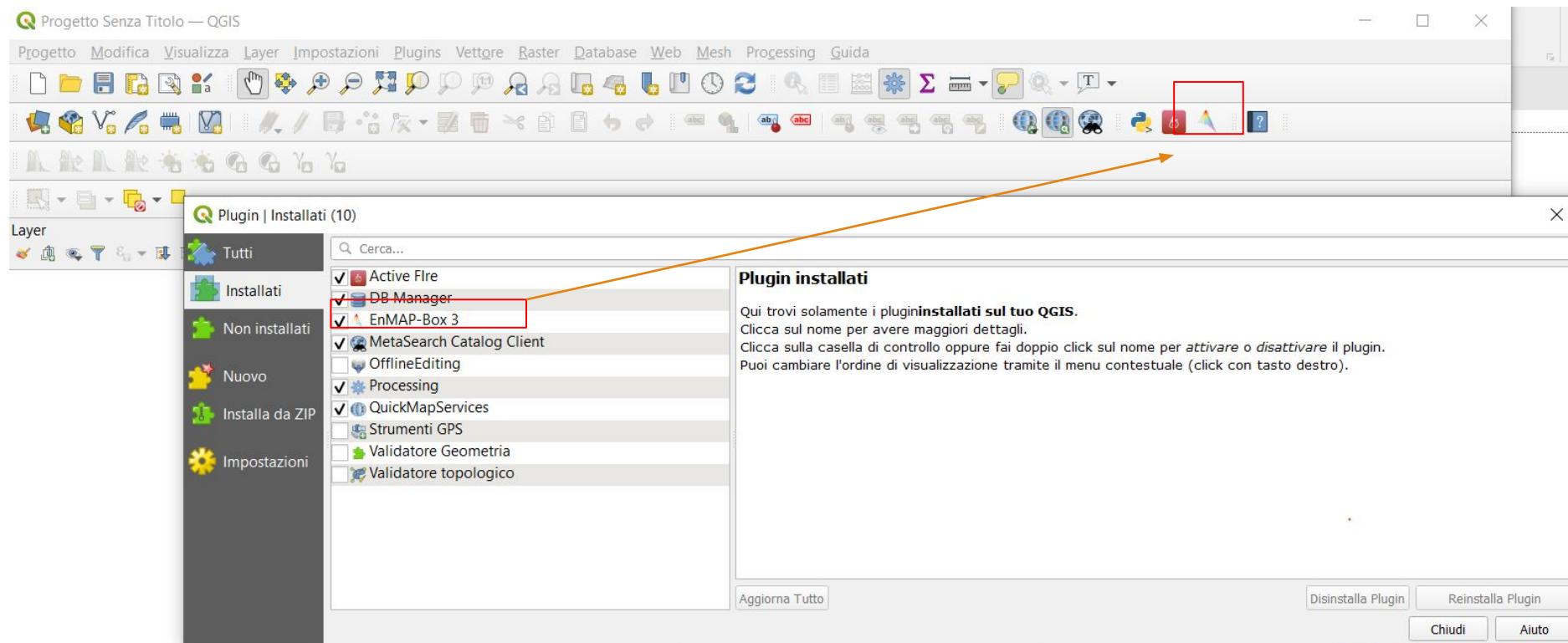
- [EarthBIT | Planetek Italia](https://www.planetek.it/prodotti/tutti_i_prodotti/earthbit)

[https://www.planetek.it/prodotti/tutti\\_i\\_prodotti/earthbit](https://www.planetek.it/prodotti/tutti_i_prodotti/earthbit)

Open source read PRISMA L1 and L2



# Enmap toolbox a QGIS plugin (only for PRISMA L2)



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## ENVI DEMO

# Resources

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## VIDEO

- [Beyond the Visible - Hands-on training: PRISMA User Registration – YouTube](#)
- [Beyond the Visible - Hands-on training: PRISMA Archive - YouTube](#)
- [Beyond the Visible - Hands-on training: PRISMA Image Acquisition – YouTube](#)

## Software

GIRHUB...

Earth bit: [https://www.planetek.it/prodotti/tutti\\_i\\_prodotti/earthbit](https://www.planetek.it/prodotti/tutti_i_prodotti/earthbit)

# Thanks for attending!

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Evaluation Feedback  
<https://forms.gle/GqcF6fAxcaWYsSxv9>

Interested in co-hosting opportunity?

[Stefania.amici@ingv.it](mailto:Stefania.amici@ingv.it)  
[Dario.Spiller@uniroma1.it](mailto:Dario.Spiller@uniroma1.it)

Want to know more about wildfire research?  
<https://sites.google.com/ingv.it/rl-project-fires>



The image shows the cover of a journal issue titled "fire". The cover is orange and features a small icon of flames. To the right, it says "an Open Access Journal by MDPI". On the far right, there are two circular badges: one yellow with "IMPACT FACTOR 2.726" and one dark blue with "CITESCORE 4.9". The main title of the issue is "Contribution of New Spaceborne Instruments to the Understanding, Monitoring and Responses to Active Fires". Below that, it lists "Guest Editors" as Dr. Stefania Amici, Dr. Dario Spiller, Prof. Dr. Ioannis Gitas. It also mentions the "Deadline" as 31 August 2023. At the bottom, it provides the URL "mdpi.com/si/130527" and the text "Special Issue Invitation to submit".

# Module 1 Theory Wildfire from space



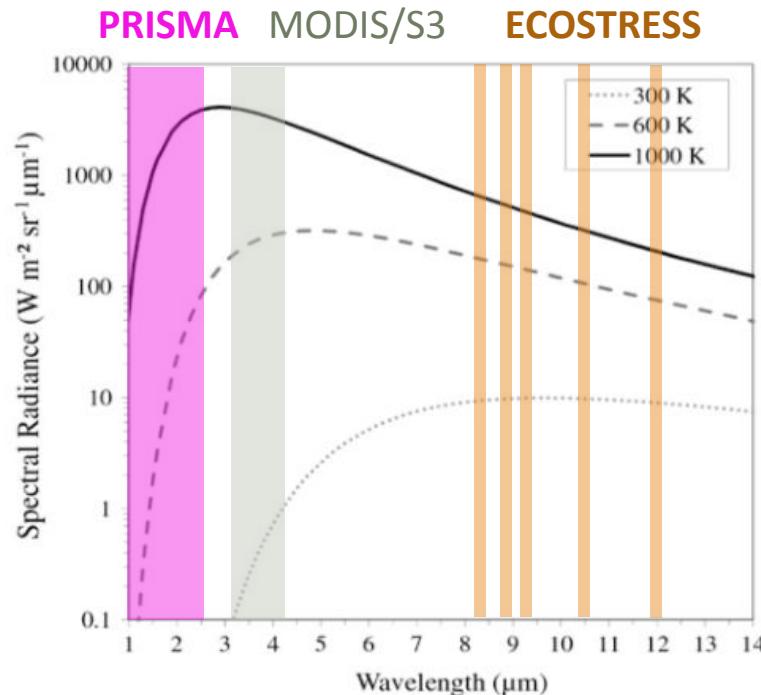
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How Remote Sensing helps to characterize wildfires



Emitted spectral radiance for Blackbodies at typical flaming (1000K) and smouldering 600K temperature  
Atmospheric window are shaded in grey