Active landscape fire detection from space with ASI PRISMA: unlocking the complementary value of hyperspectral PRISMA data

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Overview

- 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 Demo Pre-orbit software

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Survey

https://forms.gle/g7bgMwGPtxcHphWL9

Module 1: Wildfire from space

- Why wildfires matter
- PRISMA mission
- Methodology

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Module 1: Wildfire from space

Framework

~3.4 %

of the Earth's

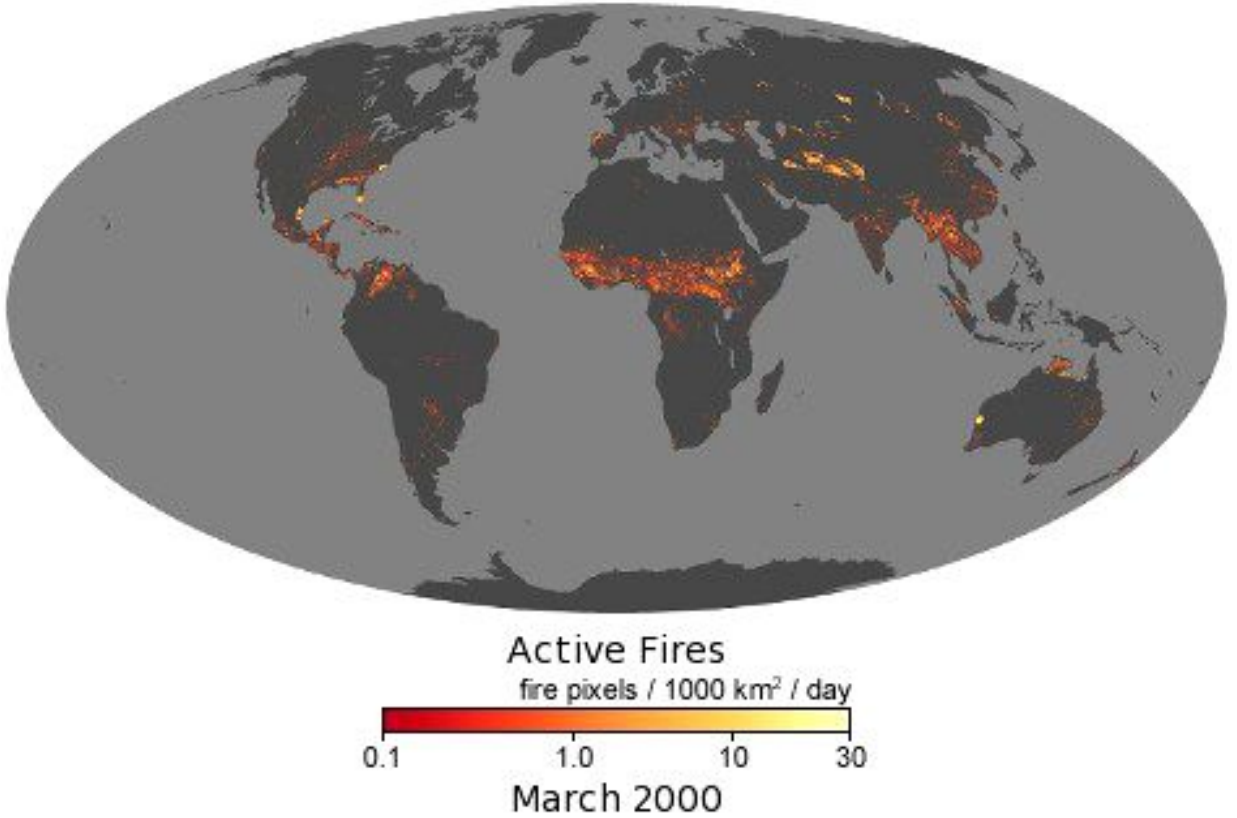
vegetated area burns annually, with resulting

large scale effects

Giglio et.al. 2010

Earth's atmospheric composition

Global climate through processes such as trace gas and aerosol production

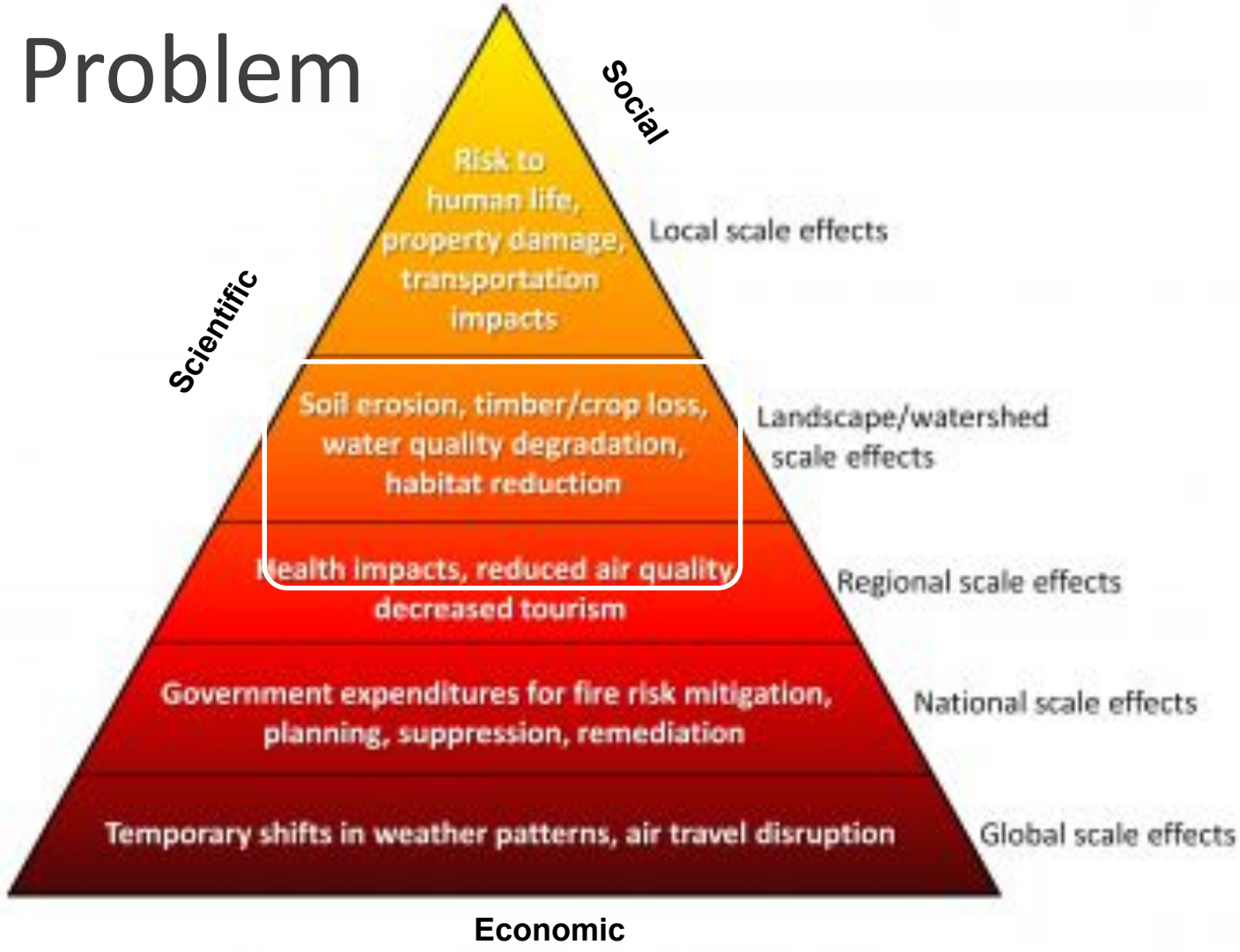


August 2021 active fire map based on MODIS observations White pixels show as many as 30 fires in a 1,000-square-kilometer area per day. Orange pixels show as many as 10 fires, while red areas show as few as 1 fire per day.
Credits FIRE Earth Observatory NASA https://earthobservatory.nasa.gov/global-maps/MOD14A1_M_FIRE

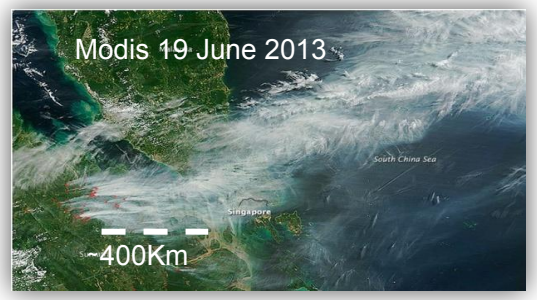
Sorgente: https://earthobservatory.nasa.gov/global-maps/MOD14A1_M_FIRE

Module 1: Wildfire from space

Problem



Source http://www.earthzine.org/wp-content/uploads/2013/08/figure2.jpg



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1 http://www.sardiniapost.it/cronaca/incendio-vicino-olbia-spento-subito-grazie-un-continuo-bombardamento-dacqua/
2 http://earthobservatory.nasa.gov/IOTD/view.php?id=81431
3 http://www.wri.org/blog/2014/03/fires-indonesia-spike-highest-levels-june-2013-haz

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

	PRISMA	EnMap	VIIRS	MODIS	SENTINEL3	MSG-SEVIRI	LANDSAT 8 -9	Sentinel 2A-B	ECOSTRESS
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

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

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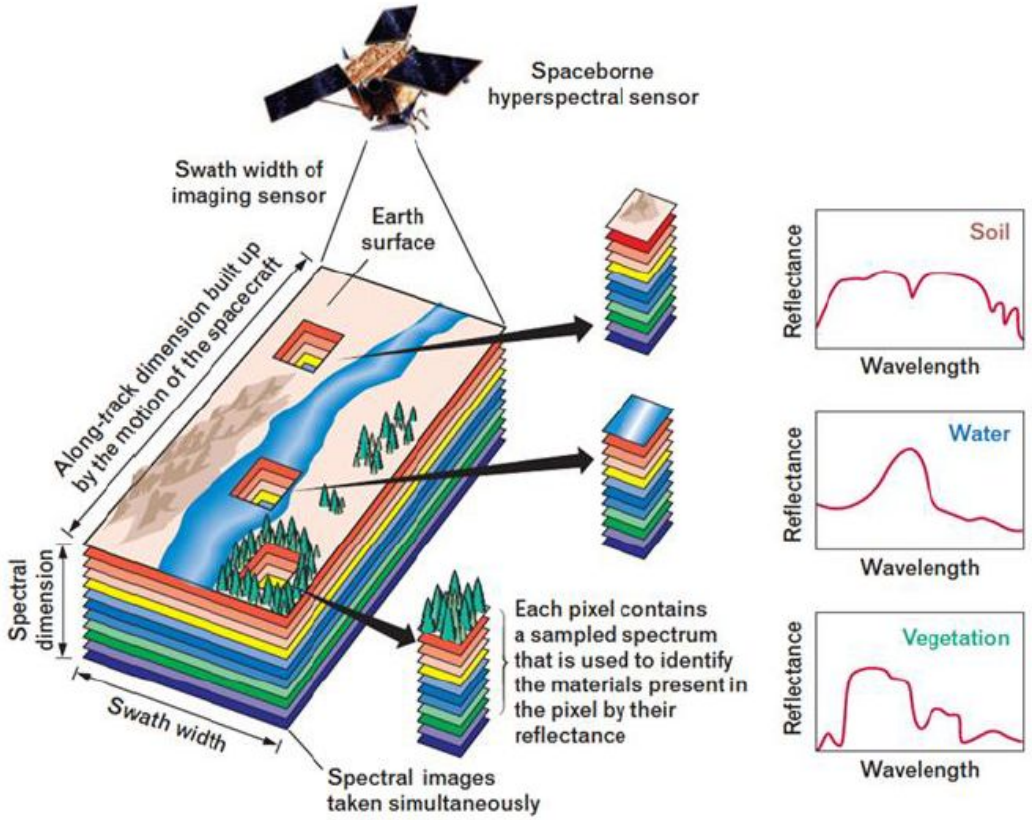
Hyperspectral technology



PRISMA primary mission:

- Costal zone
- Water quality
- Vegetation

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Launch

- **Launch date**
  March, 22nd 2019 02:50 CET
  First telemetry: March, 24th 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.

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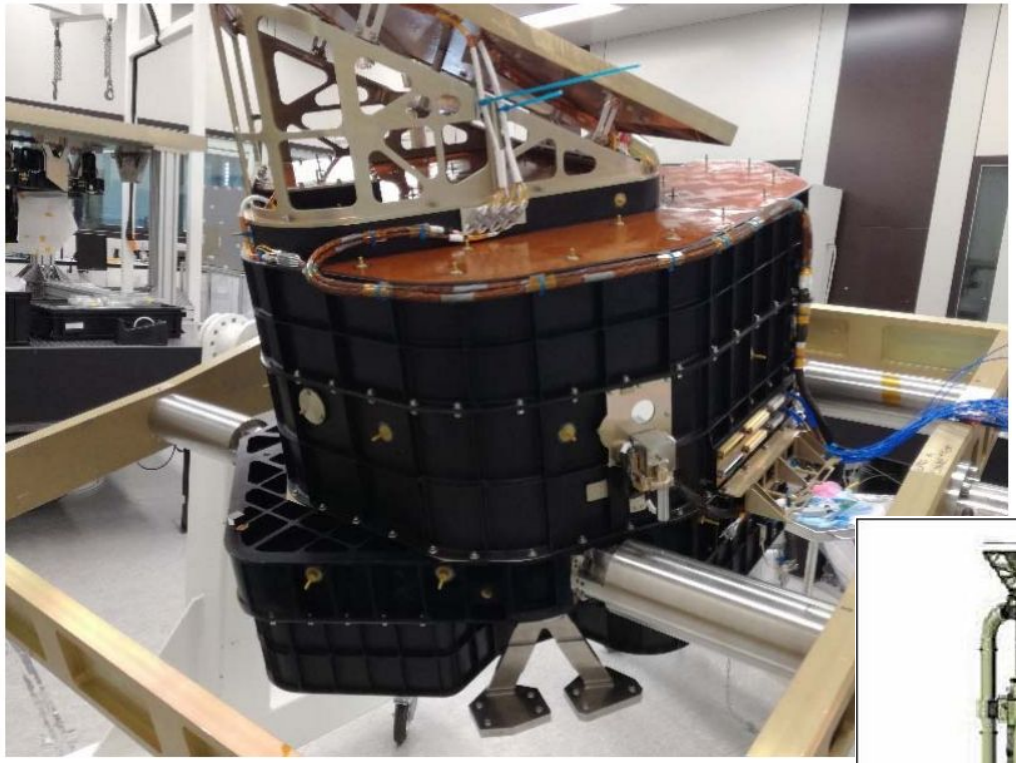
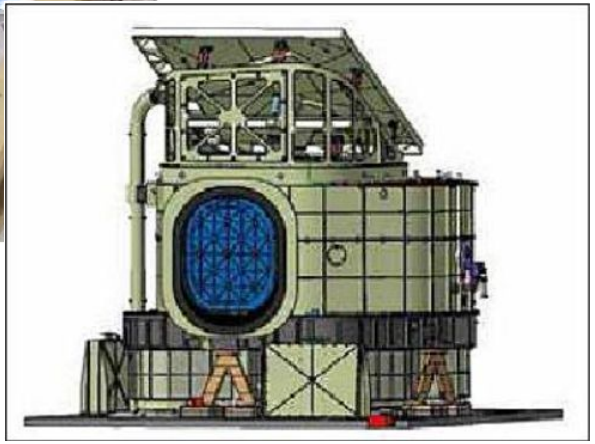
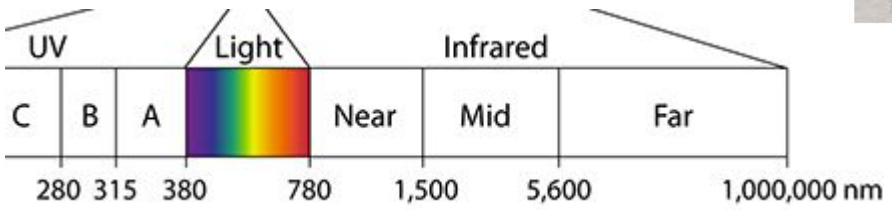
Prisma payload 1

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)







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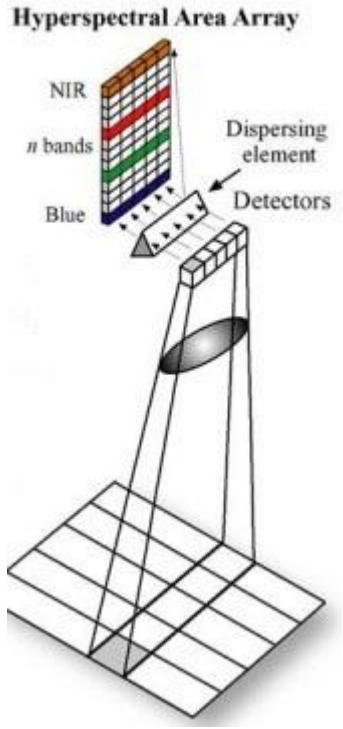
PRISMA payload 2

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

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.



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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**

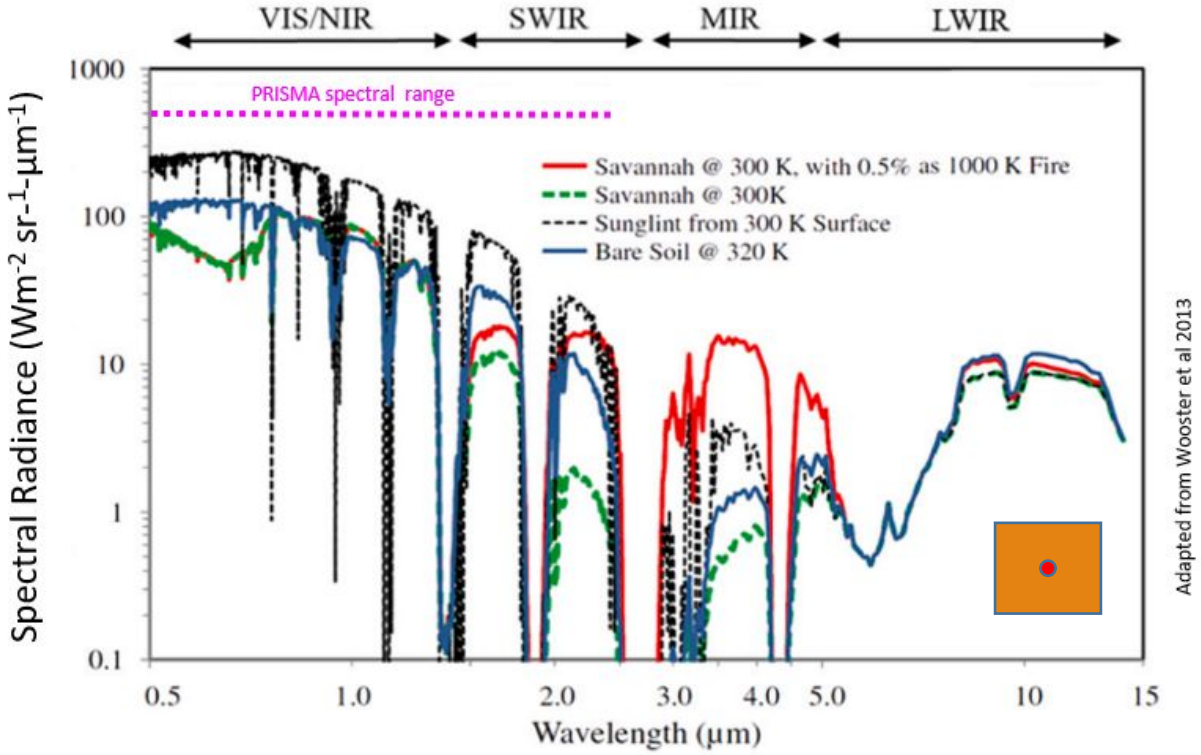
Methodology: detection methods

- 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 µm)** 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, Denisson et al., 2006.)

Hyperspectral features of Wildfires Different approaches for wildfire characterization



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 µm) 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)

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Detection of hotspots with hyperspectral imagery

- **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*.

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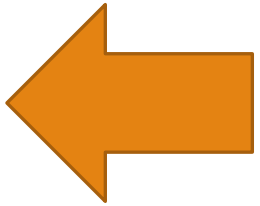
Hyperspectral active fire characterization techniques

Hyperspectral active fire detection techniques from satellite based on:

1. VNIR-SWIR bands
2. Temperature



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Fire detection: hyperspectral based indexes

$$\text{'Advanced'K Band Difference (AKBD)} = \text{Max}|\text{Band K}_i| - \text{Bkg}$$

VodaceK, 2002
Amici et al 2011

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

Dennison et al. 2006, 2009

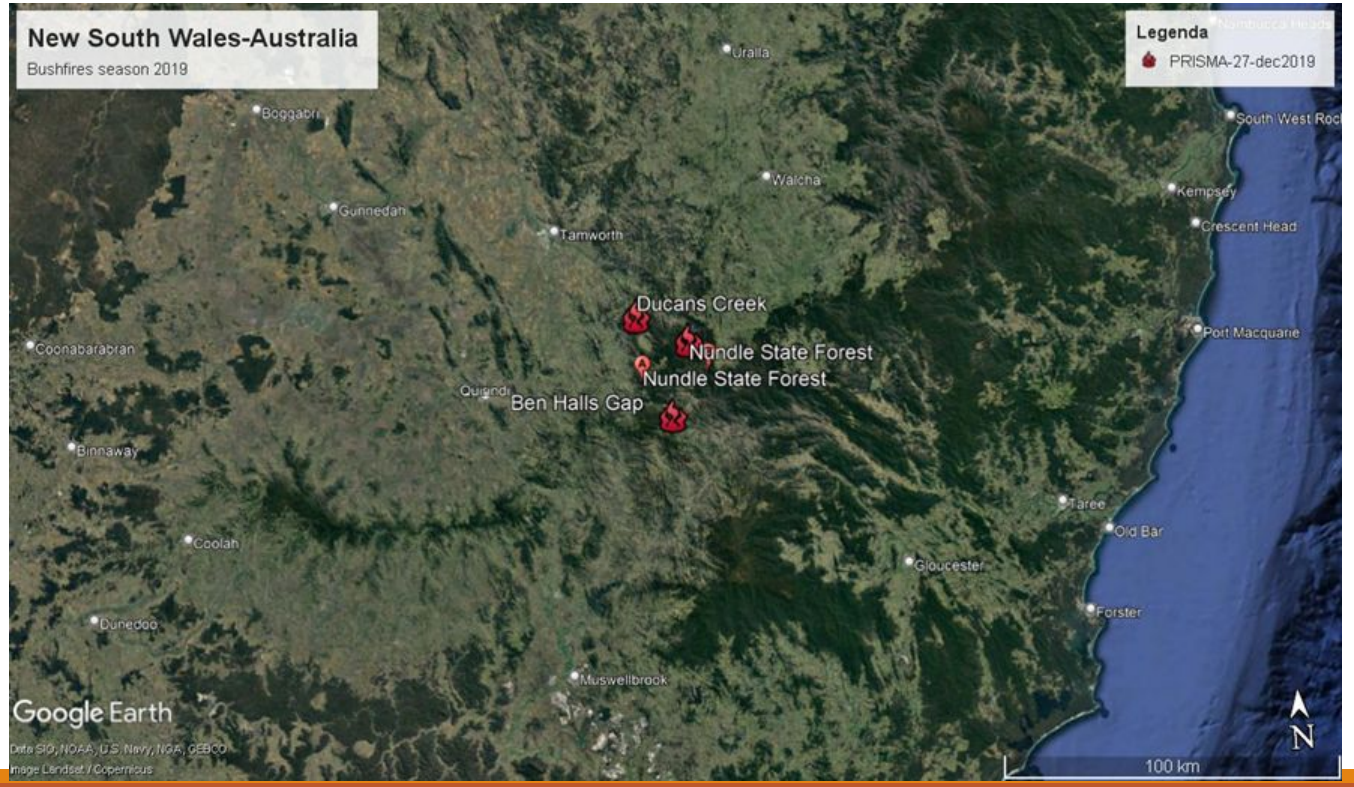
$$\text{HFDI} = \frac{(L_{\lambda_1} - L_{\lambda_2})}{(L_{\lambda_1} + L_{\lambda_2})}$$

Dennison2009,

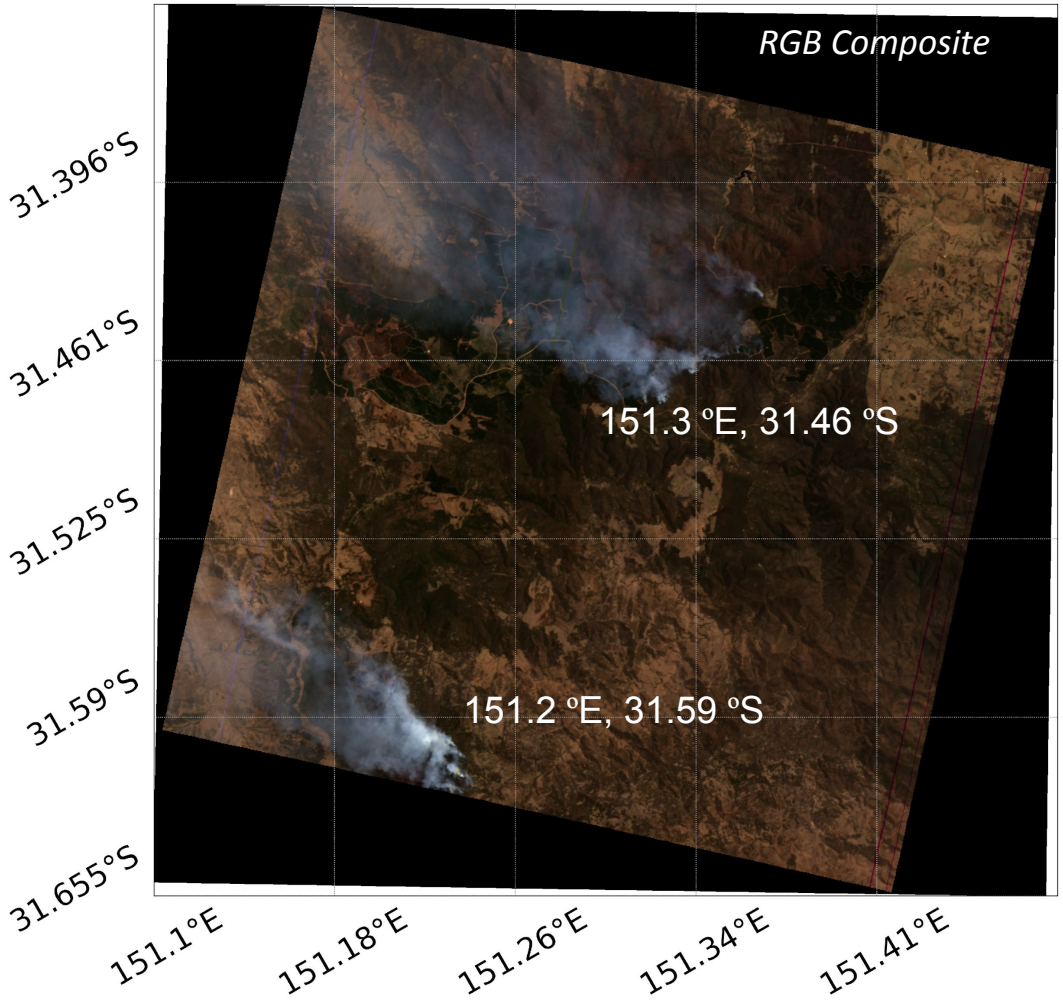
Active fire: PRISMA Case study

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



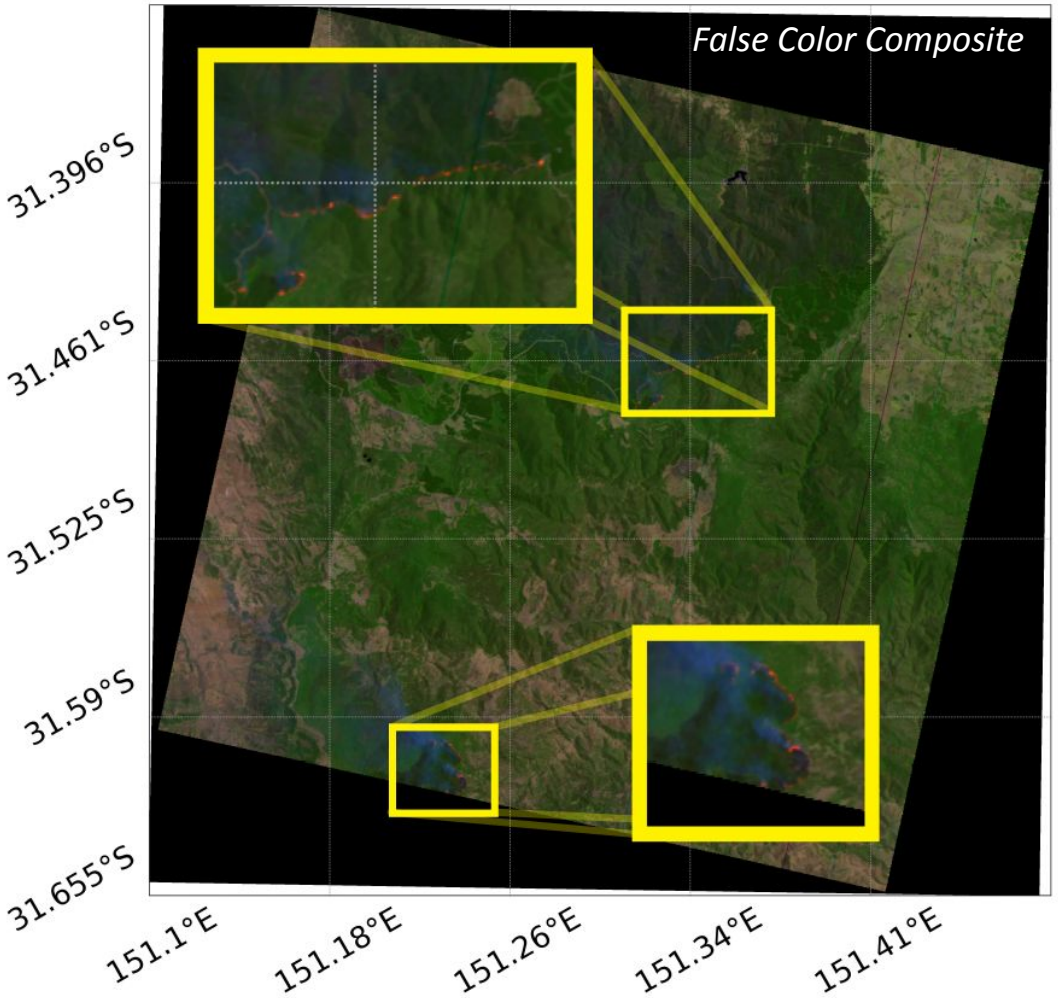


Image from: Spiller, D., Ansalone, L., Amici, S., Piscini, A., Mathieu, P. P., "Analysis and Detection of Wildfires by Using Prisma Hyperspectral Imagery", ISPRS 2021, July 4-10 2021

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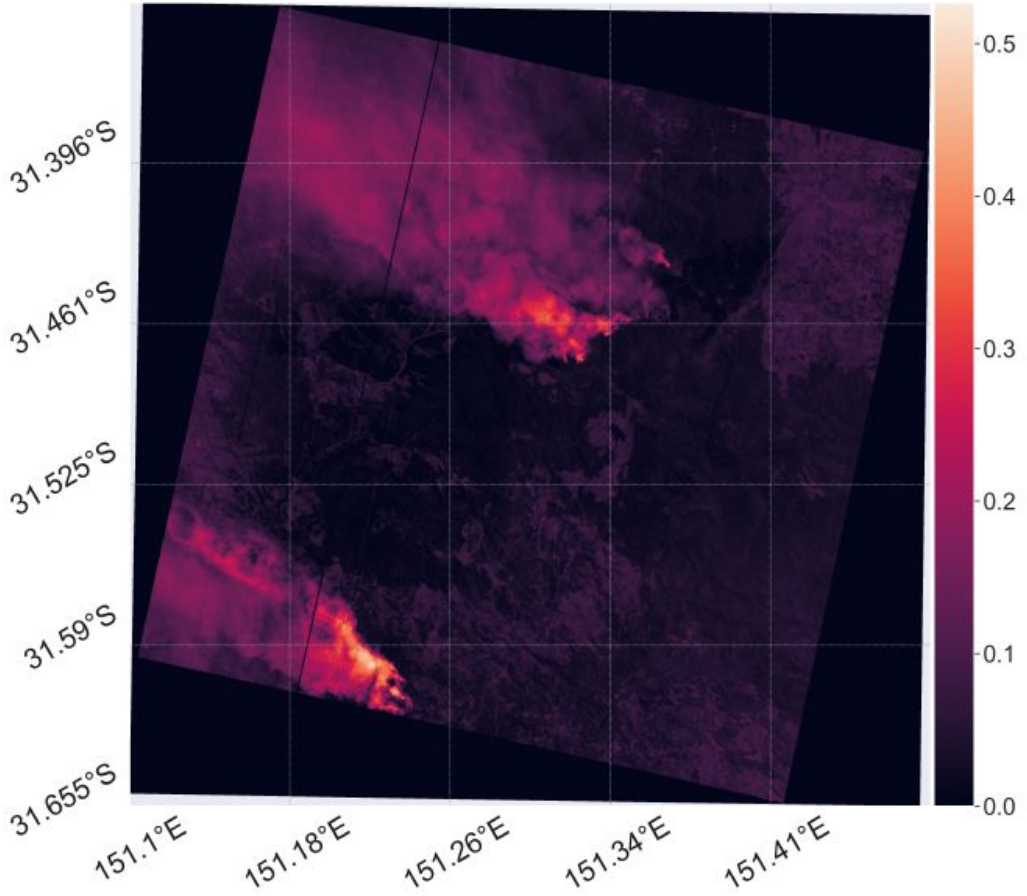
Bush fire - PRISMA - December 27, 2019

Band VNIR

SWIR



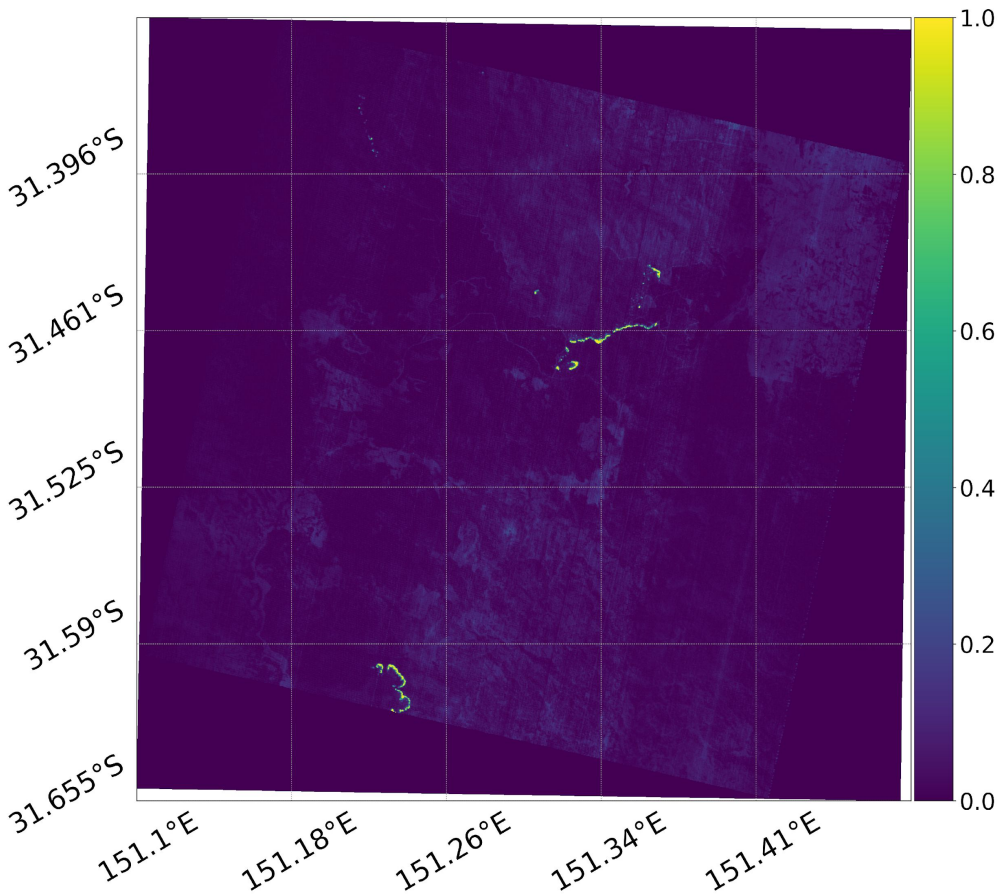
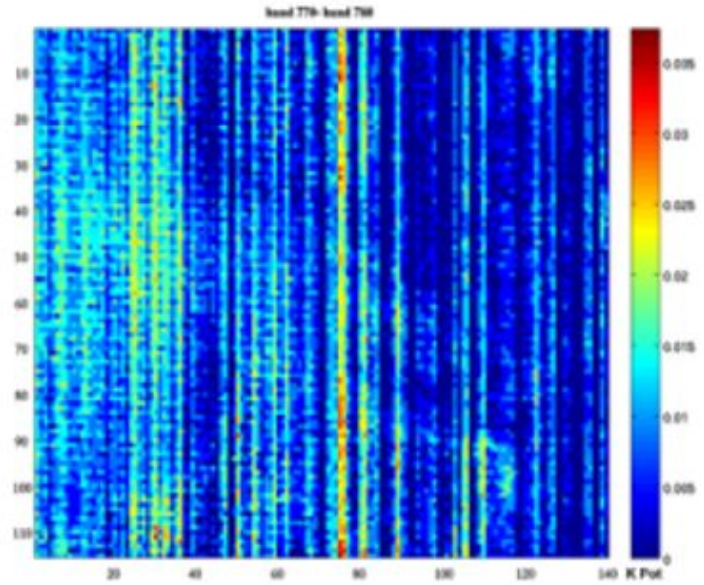


Image from: Spiller, D., Ansalone, L., Amici, S., Piscini, A., Mathieu, P. P., "Analysis and Detection of Wildfires by Using Prisma Hyperspectral Imagery", ISPRS 2021, July 4-10 2021

Bush fire - PRISMA
December 27, 2019

Ben Halls Gap National Park

AKBD



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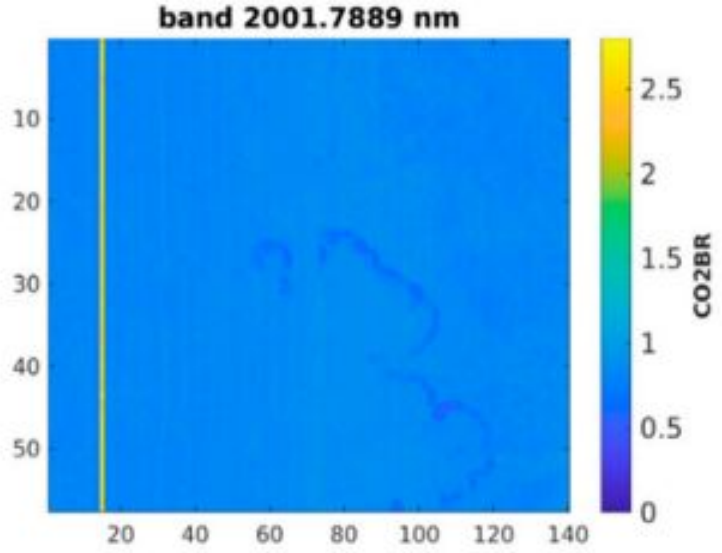
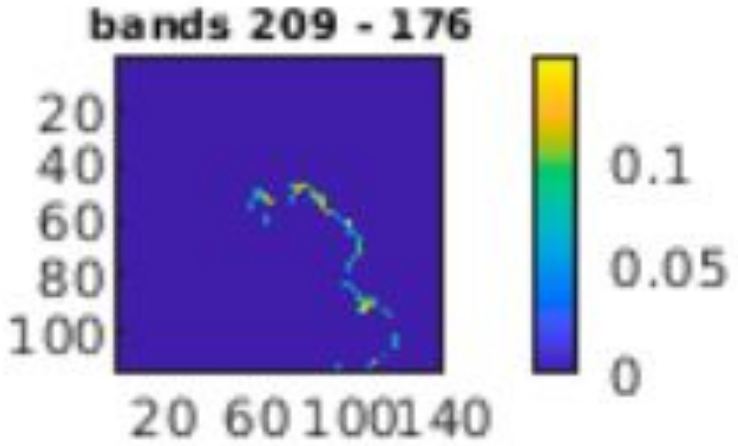
Bush fire - PRISMA
December 27, 2019

Ben Halls Gap National Park

CDI



HFDI

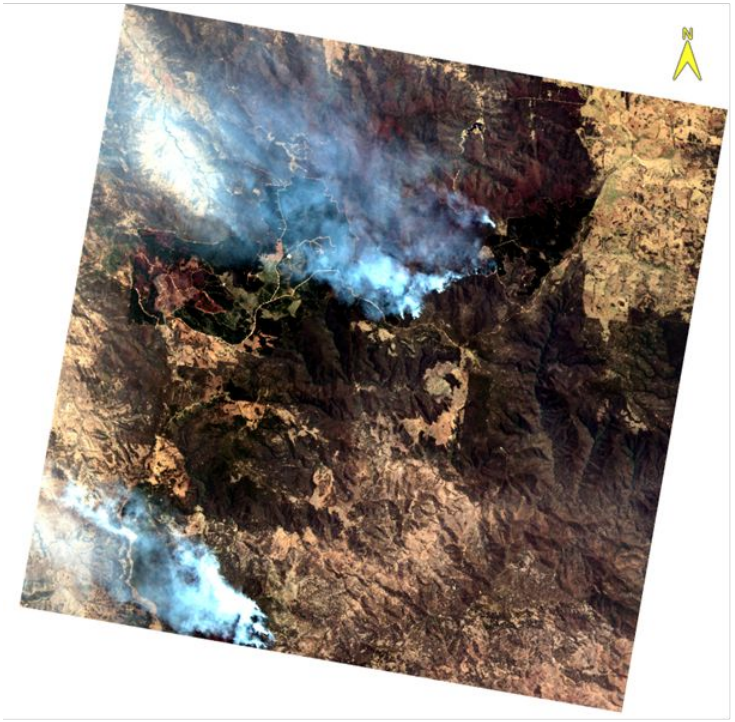


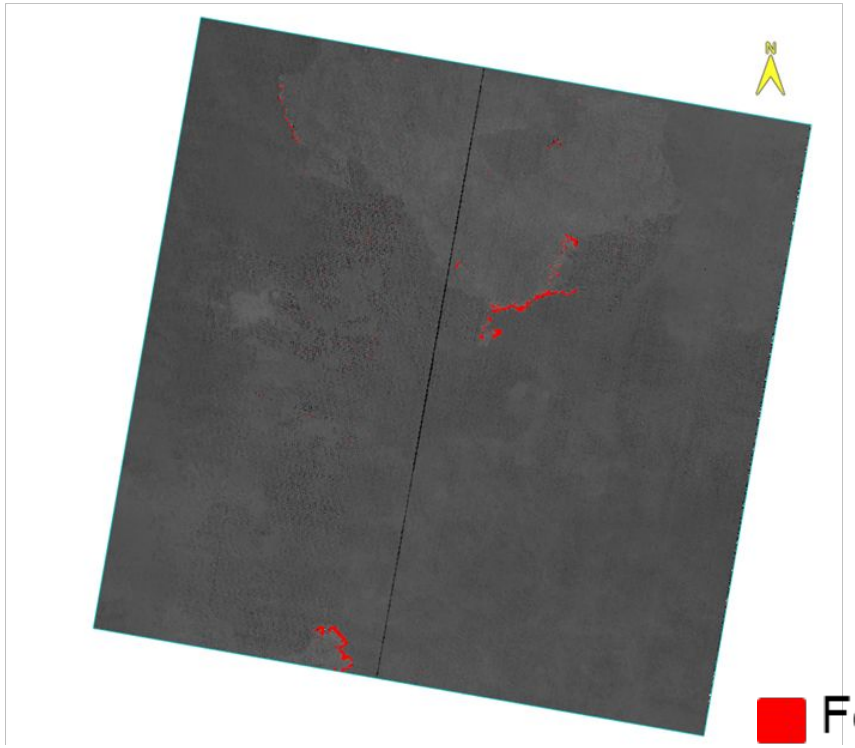
a 2001.79nm and 2010.36nm were used.

Bush fire - PRISMA - December 27, 2019

RGB true color

Hyperspectral Fire index





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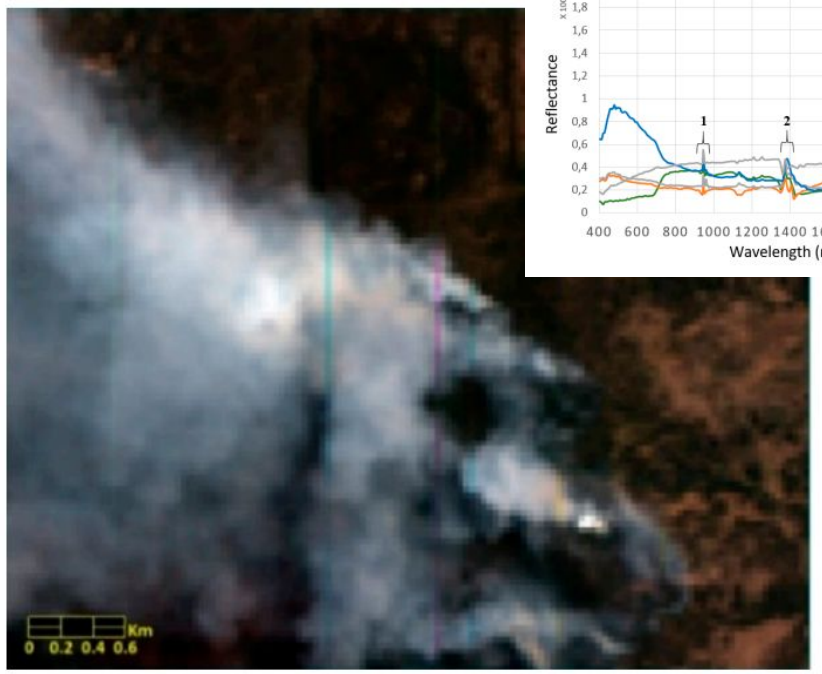
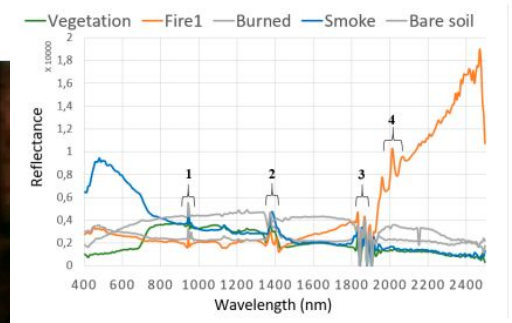
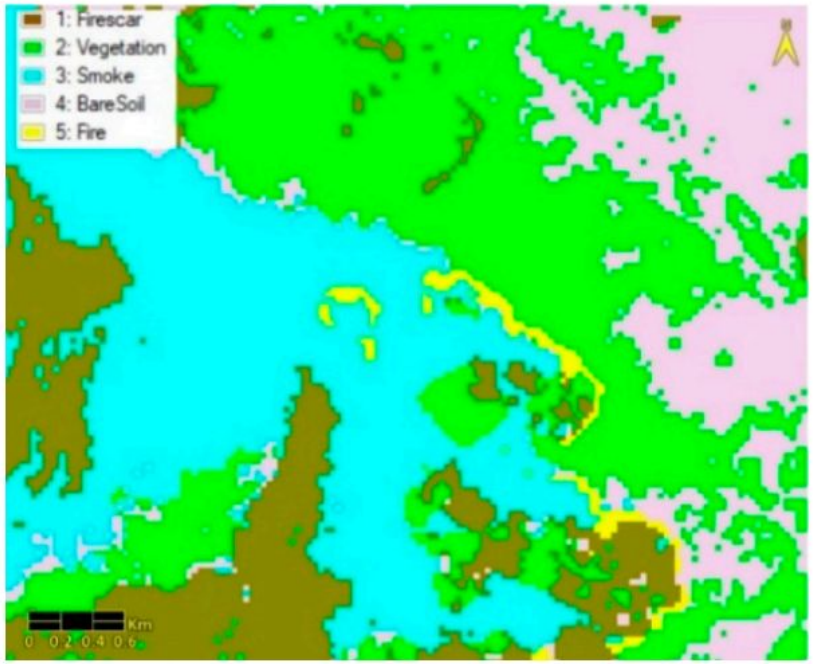
Support Vector Machine for classification

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

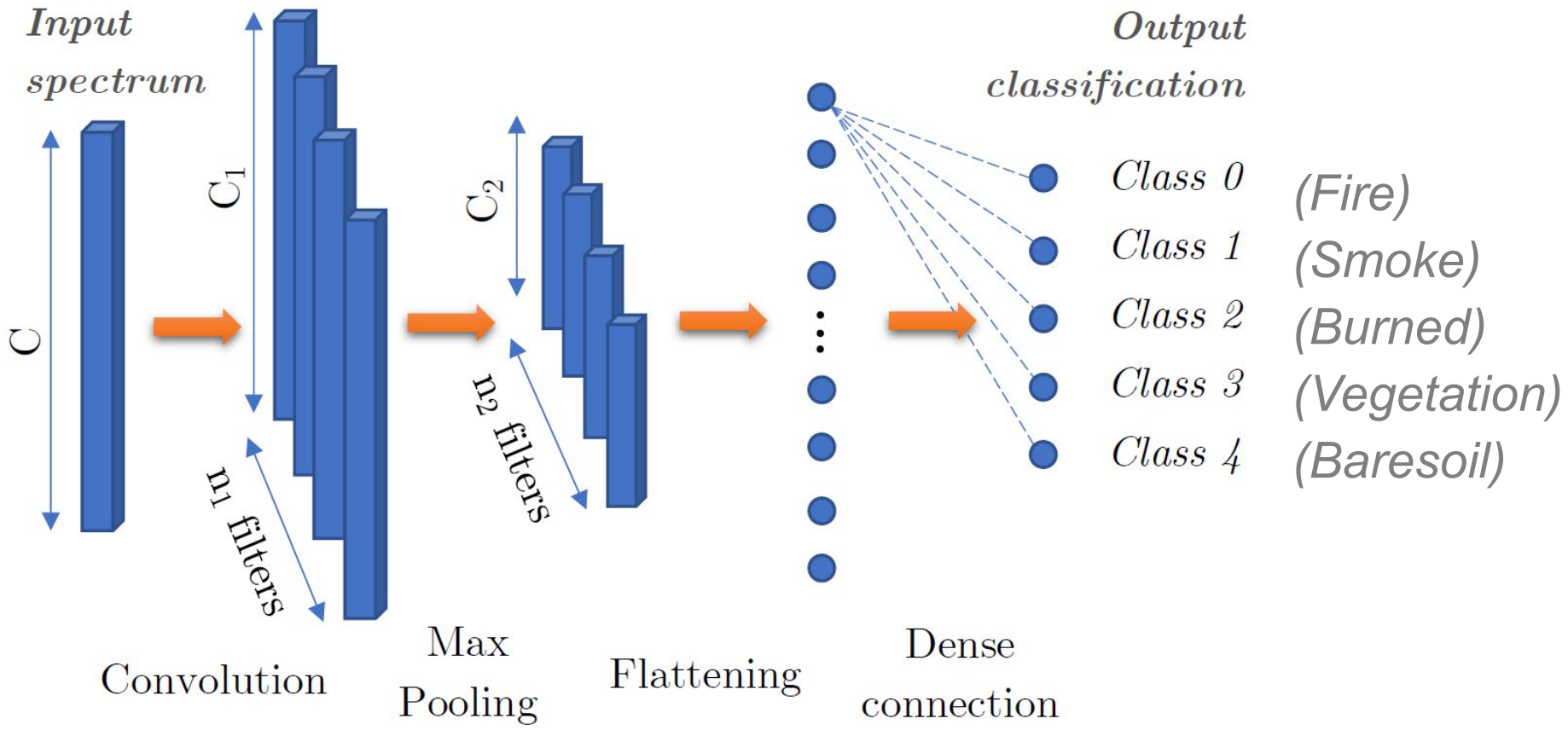


Image from:
Spiller, D., Ansalone, L., Amici, S., Piscini, A., Mathieu, P. P., "Analysis and Detection of Wildfires by Using Prisma Hyperspectral Imagery", ISPRS 2021, July 4-10 2021

<None> <None>

```python
import tensorflow as tf
from tensorflow.keras.layers import Conv1D, MaxPooling1D, Flatten, Dense
from tensorflow.keras import Model
from tensorflow.keras.optimizers import Adam
from tensorflow.keras.regularizers import l2

def model_1D(dim, learn_rate, lmbda, drop, FL, n_filters, init):
    """Parameters:
    dim : image dimension (256)
    learn_rate : learning rate for the optimizer (1e-4)
    lmbda : regularization parameter (1e-5)
    drop : dropout percentage (0.15)
    FL : kernel size (3)
    n_filters: number of filters (112)
    init: kernel initializer (he_normal)

    Output:
    model : unet model"""

    img_input = tf.keras.Input(shape=(dim,1))

    C1 = Conv1D(n_filters,FL,padding='same',
                activation='relu',
                kernel_initializer=init,
                kernel_regularizer=l2(lmbda))(img_input)

    MP1 = MaxPooling1D(pool_size=(2), strides=(2))(C1)

    F = Flatten()(MP1)
    D1 = Dense(units = 128, activation = 'relu')(F)
    D2 = Dense(units = 5, activation = 'softmax')(D1)

    model = Model(inputs=img_input,outputs=D2)

    opt = Adam(learning_rate=learn_rate)
    model.compile(loss='categorical_crossentropy',
                  optimizer=opt,
                  metrics=['accuracy'])

    return model

```

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1- D Convolutional Neural Network (CNN) for classification

Segmentation map

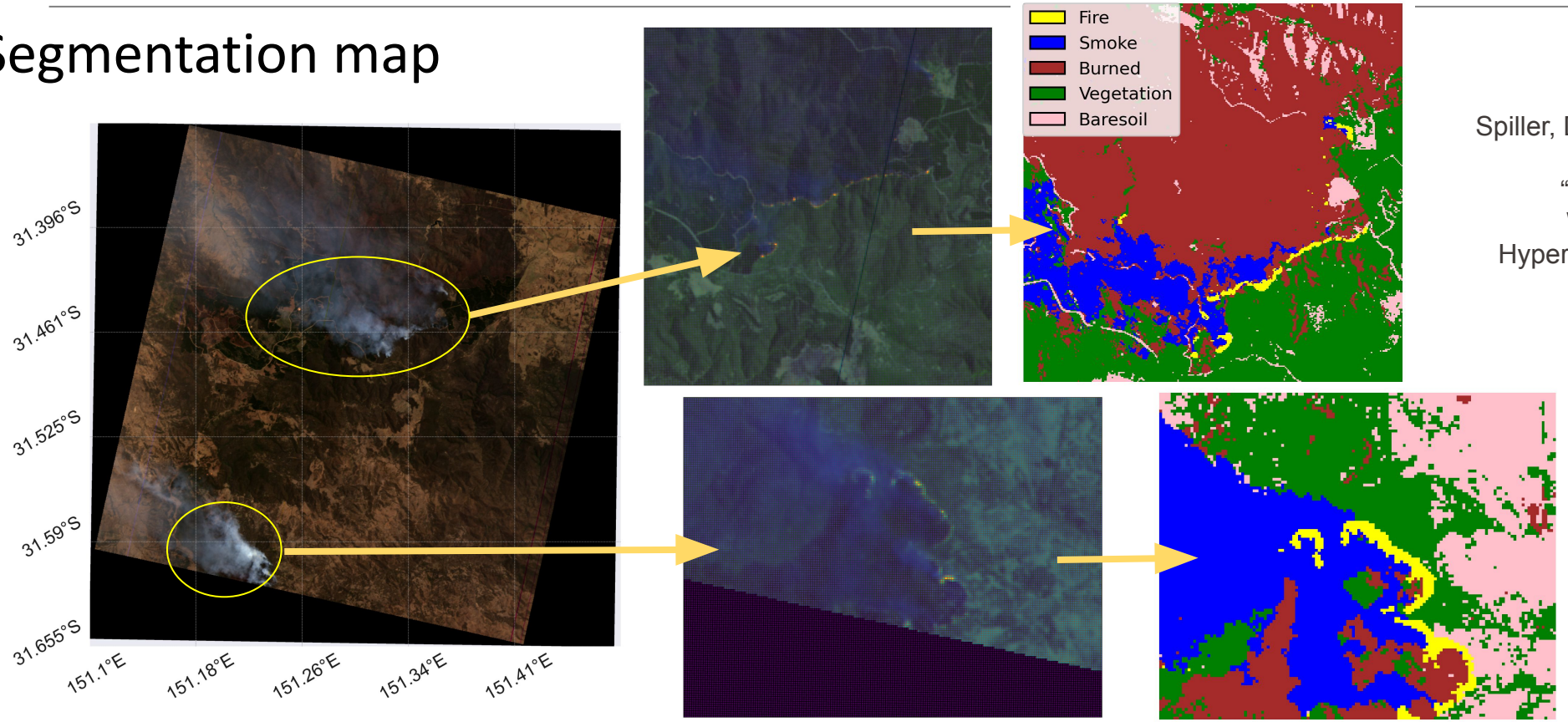
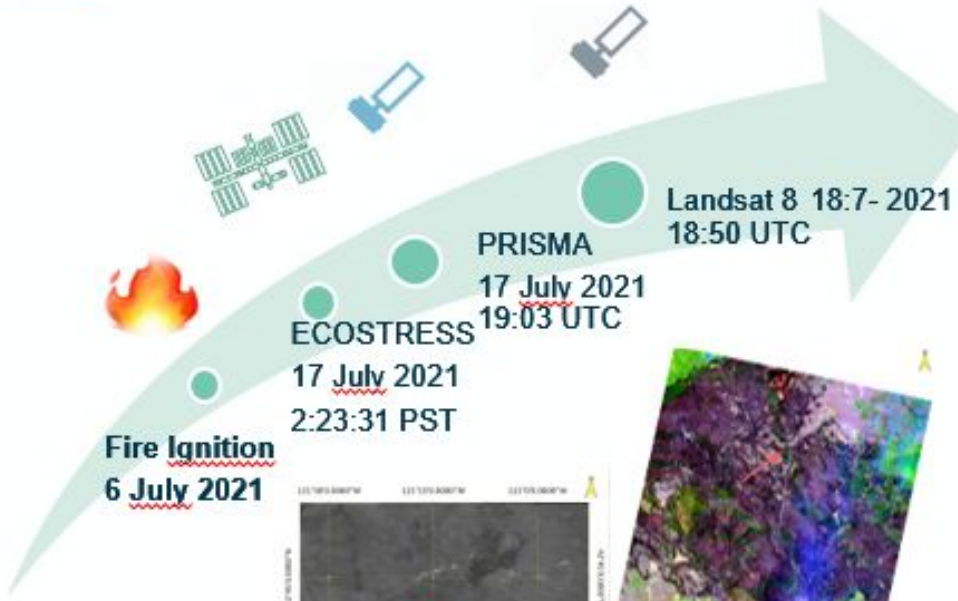
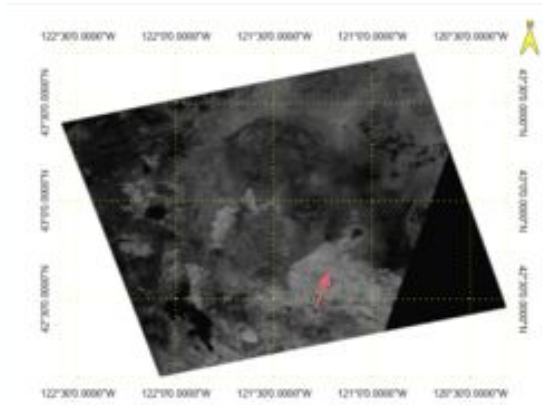


Image from:
Spiller, D., Ansalone, L., Amici, S., Piscini, A., Mathieu, P. P., "Analysis and Detection of Wildfires by Using Prisma Hyperspectral Imagery", ISPRS 2021, July 4-10 2021

Satellite complementarity

ACQUISITION TIMELINE





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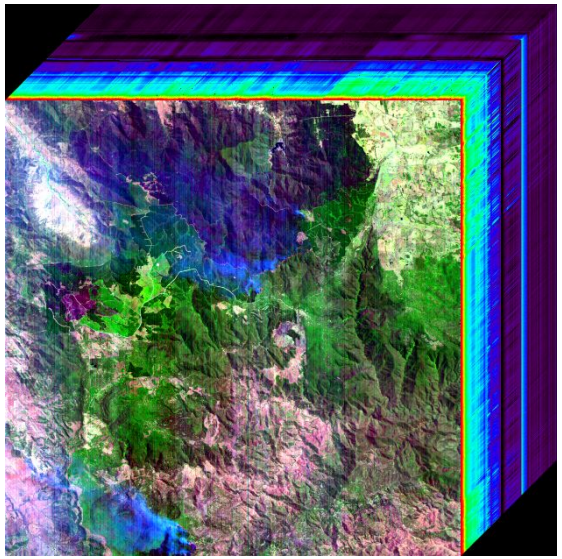
Q &A 15 min

Module 2 Practicals

Dive into PRISMA data

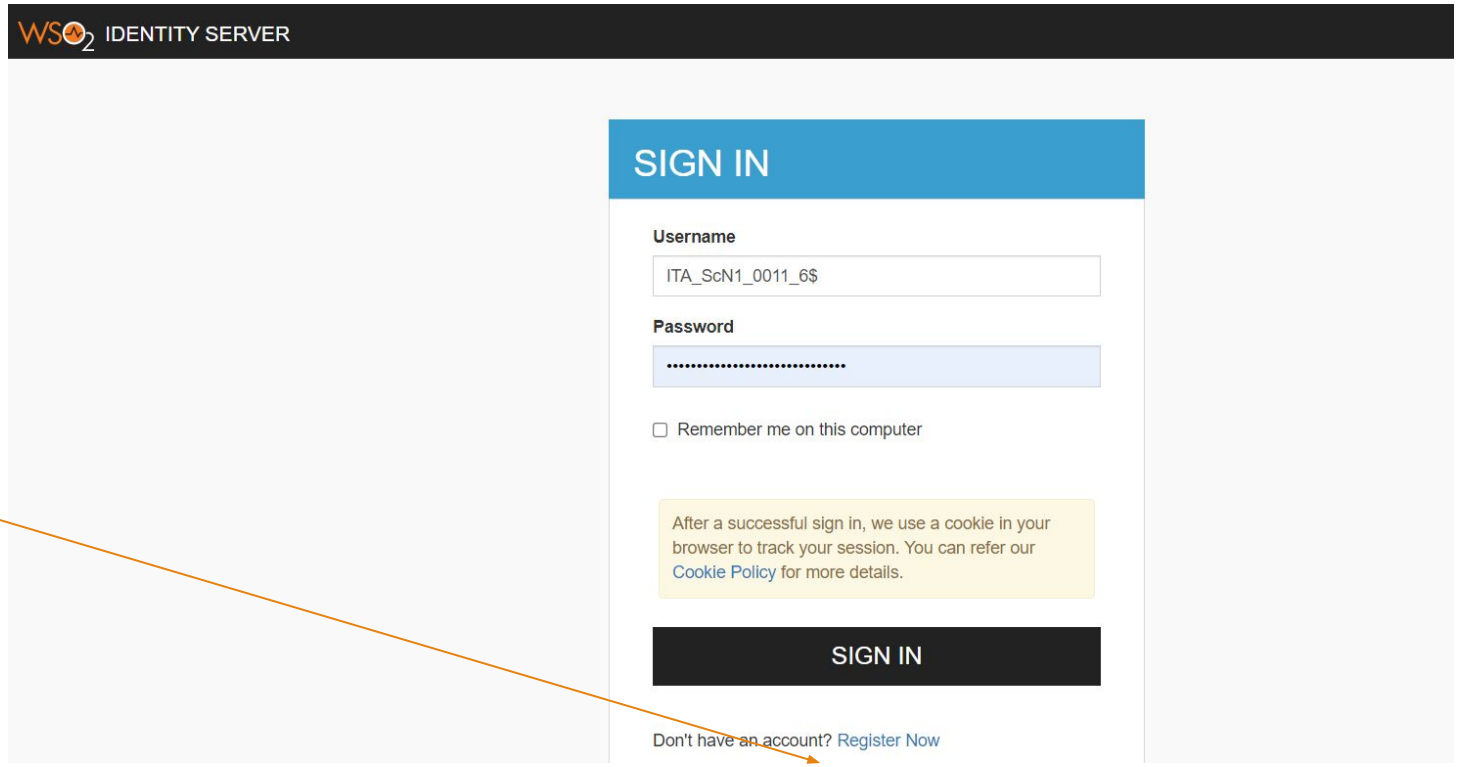


Overview

- 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

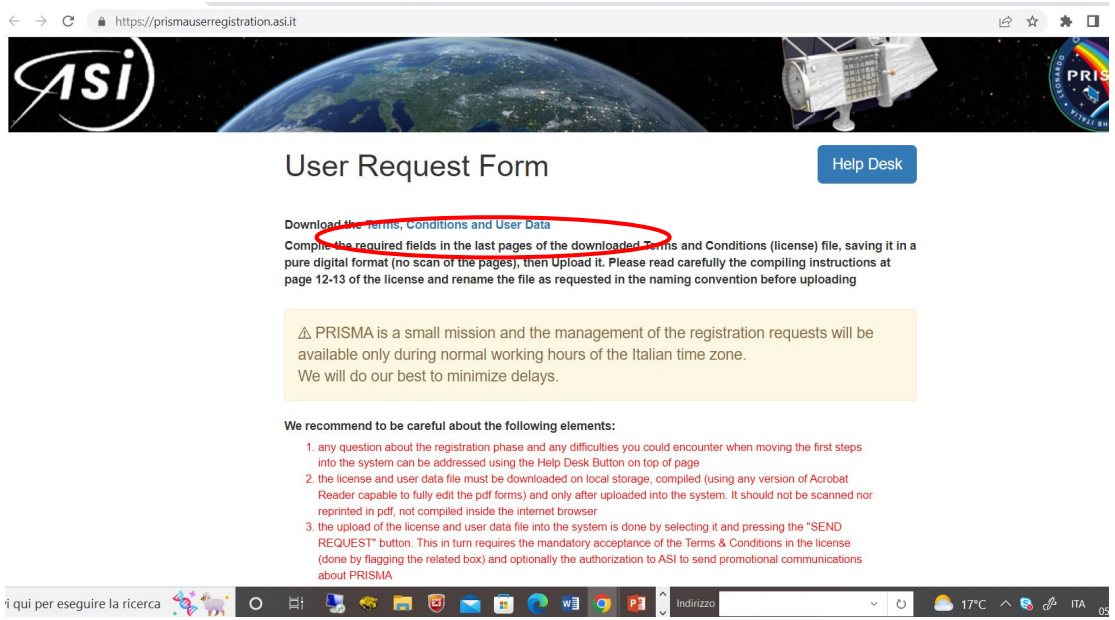
- 1) Go to https://prisma.asi.it/ and click on Register now



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



Create an account: step 3 the Term and Cond.

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- It is possible to do everything with the products

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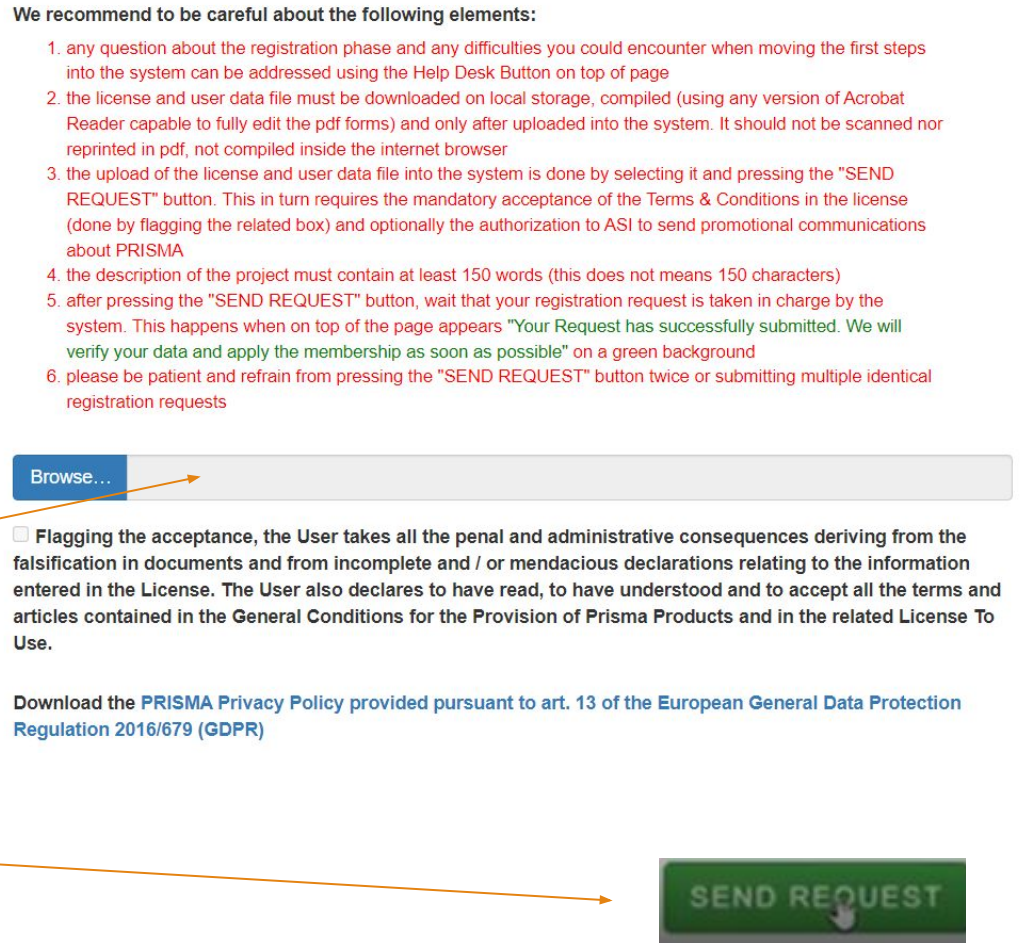
- **commercial use**
- **altering thecopyright notice**

are NOT PERMITTED.

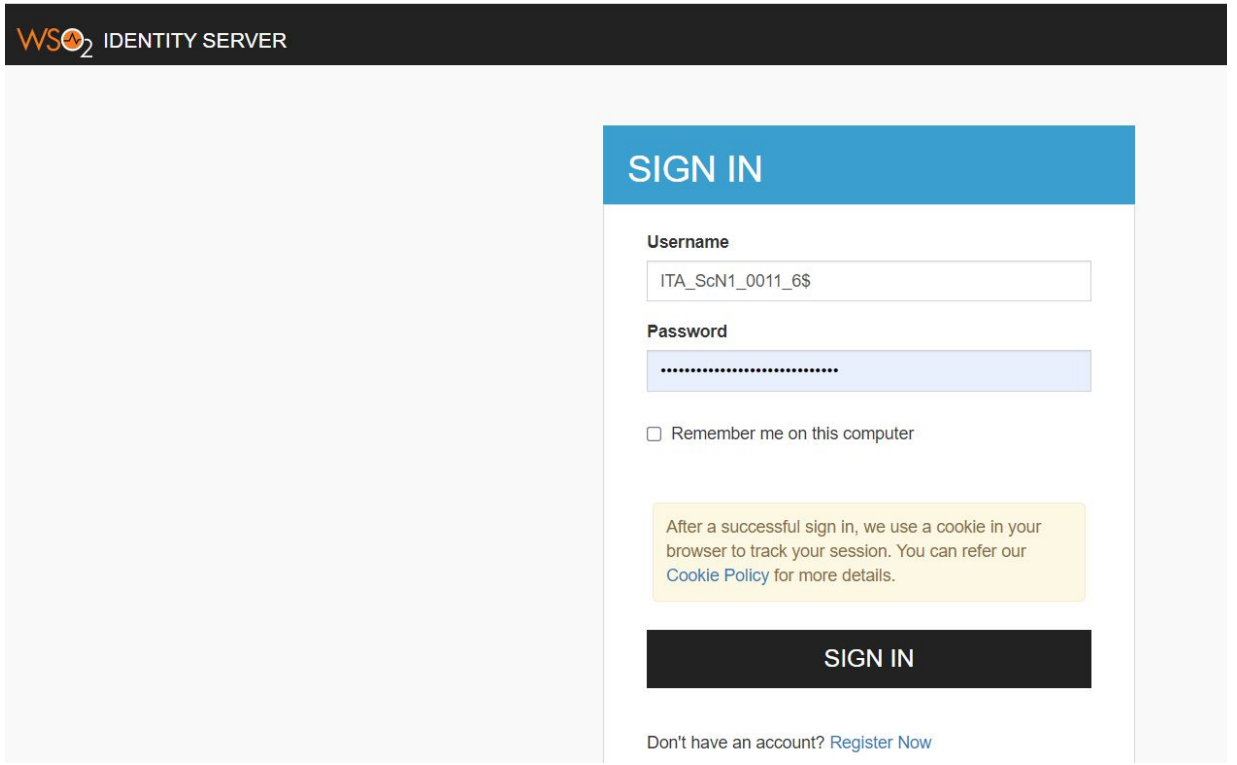
Registration

- You can register as single user or group (up 16 people)
- Identify the category (using table 6-1 on page12
- For Example: University in Malesia is “**No National Science user “** category
- Try to avoid generic user “which has lower privileges”
- Im page 14 Enter the project title, duration of the project in digits (i.e. 6), area of interest and project descrption (minmum 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**



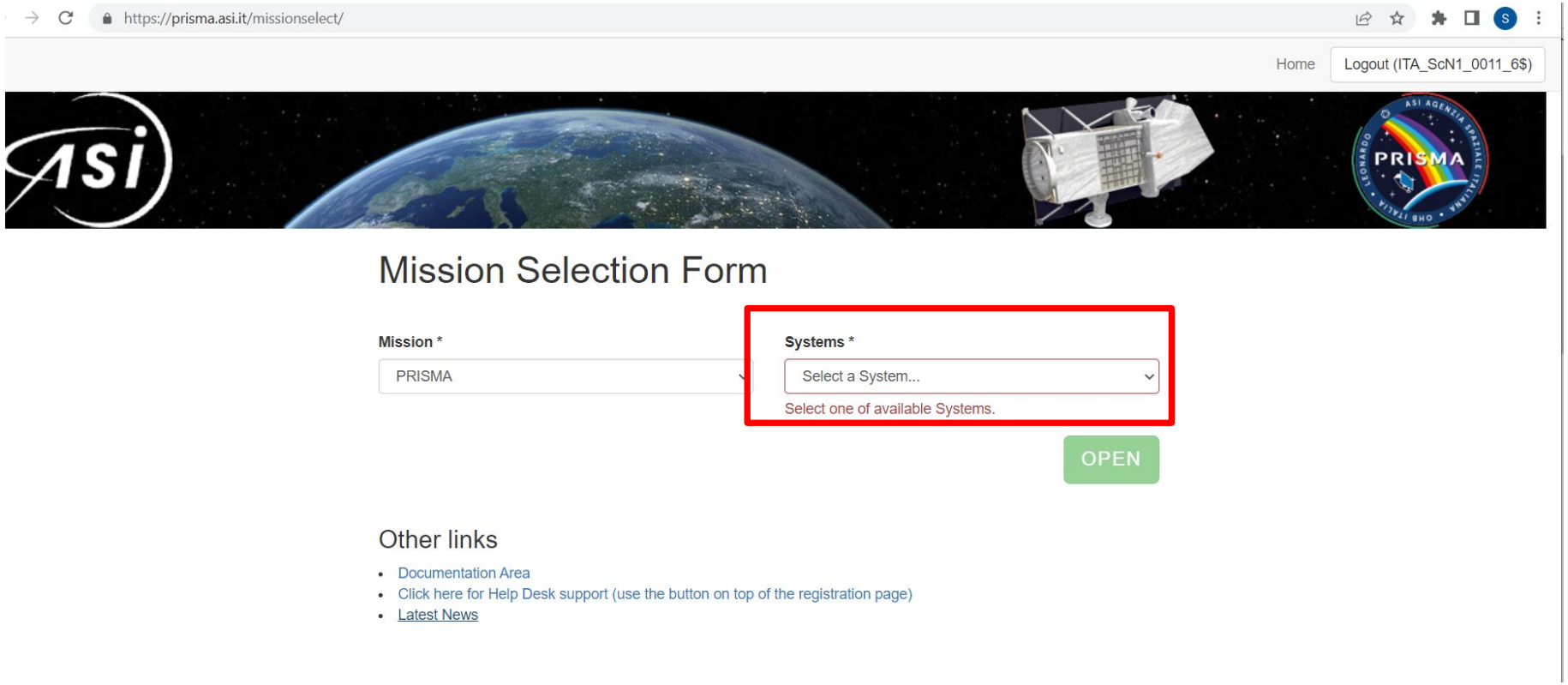
Demo: PRISMA catalogue

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

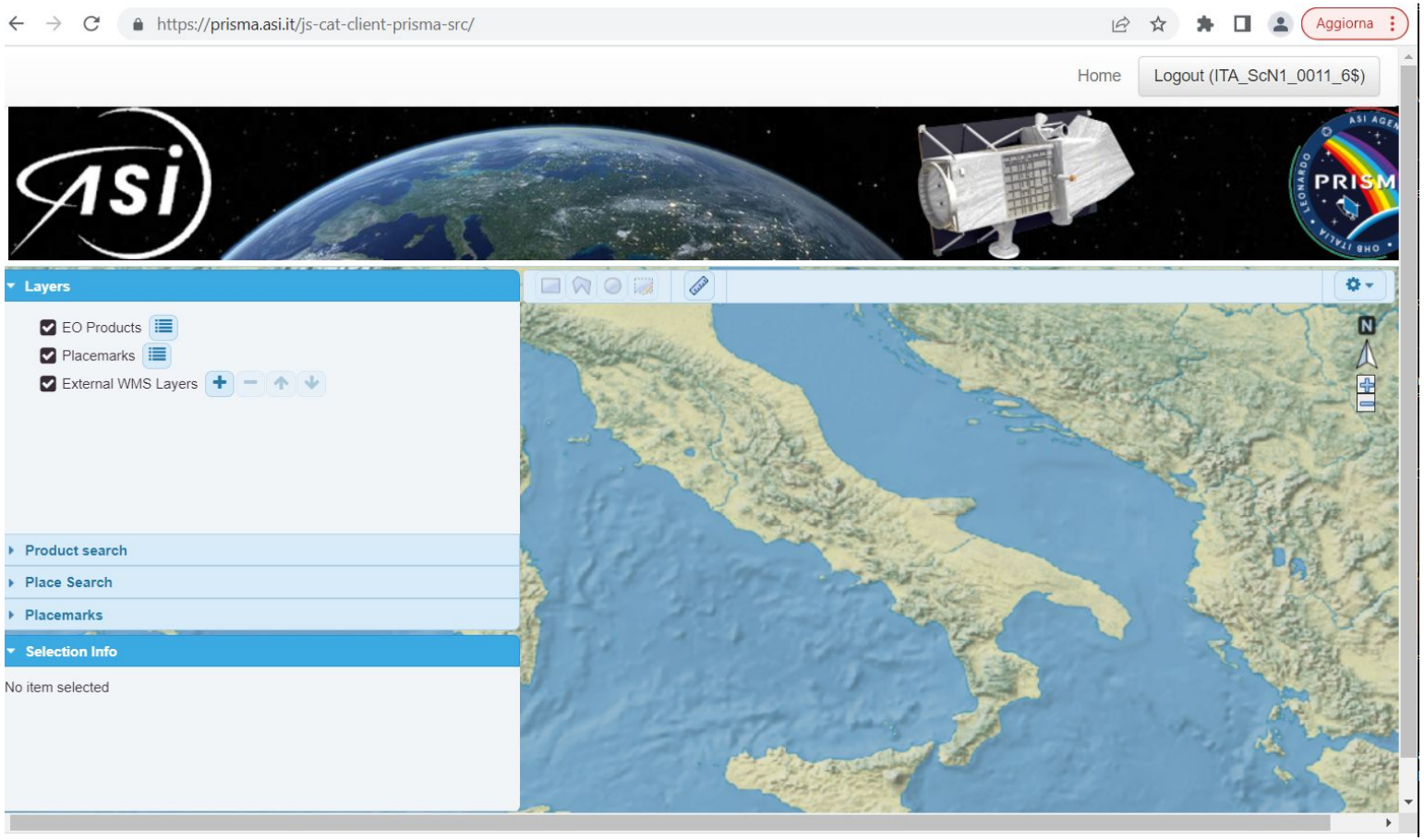


PRISMA catalogue

- Access the catalogue by selecting catalogue



Catalogue


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

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 Wavelenght) 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
L0ACORNERS 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 hyperspetral 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

PRISMA – Pre-feasibility tool

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

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***

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:

Multiple Points

Insert Username: *

Start epoch: * *[yyyy-mm-ddThh:mm:ss.ssssss] It shall be in the future*	**Stop epoch:** * *[yyyy-mm-ddThh:mm:ss.ssssss] It shall be in the future and greater than Start epoch*
Strip length: Spot image: 30 x 30 Km *	
Lat: * *[deg] Shall be in the range [-82 , 82]*	**Lon:** * *[deg] Shall be in the range [-180 , 180]*
LookAngle Min: -21 *[deg] Shall be in the range [-21 , 21]*	**LookAngle Max:** 21 *[deg] Shall be in the range [-21 , 21] and greater than LookAngle Min*
MinSunZenithAngle: 0,0 *[deg] Shall be in the range [0 , 70]*	**MaxSunZenithangle:** 70,0 *[deg] Shall be in the range [0 , 70] and greater than MinSunZenithAngle*
Description: *[text]*	*the fields marked with * are mandatory* *The content of fields with red dashed line borsers are invalid or missing*

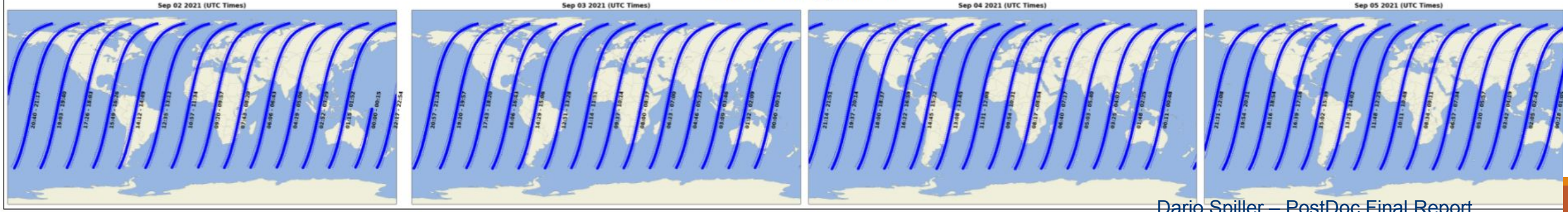
Submit

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



PRISMA – Pre-feasibility tool

Multiple requests mode

PRISMA Pre-Feasibility Tool

Version: Update Trajectory R_5.4 - Prefeasibility R_6.3 - For any problems please contact: ***prisma_missionmanagement@asi.it***

Through this pag
If you what to check feasibi

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'*** ** (1 in case of spot image)' [n],* ***'Lat'*** ** [deg],* ***'Lon'*** ** [deg],* ***'LookAngle Min'*** *[deg],* ***'LookAngle Max'*** *[deg],* ***'MinSunZenithAngle'*** *[deg],* ***'MaxSunZenithangle'*** *[deg],* ***'Description'*** *[text]*

example: "2022-05-13T00:00:00.100000, 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

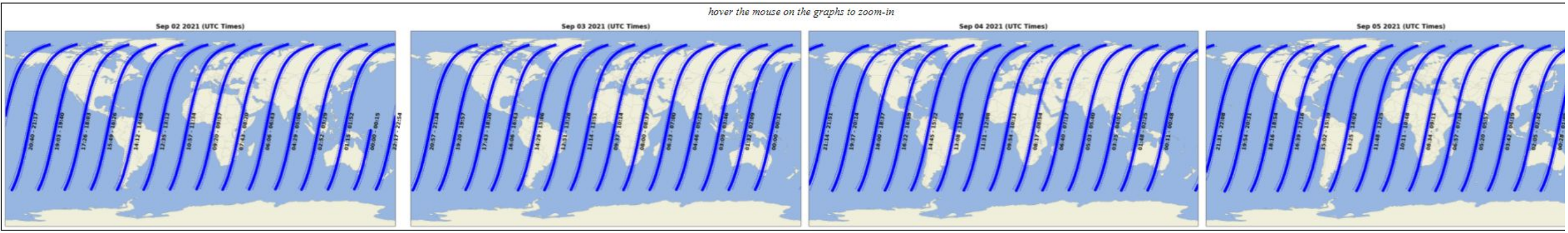
Select CSV file to upload: Scegli file | Nessun file selezionato | Upload CSV

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

hover the mouse on the graphs to zoom-in

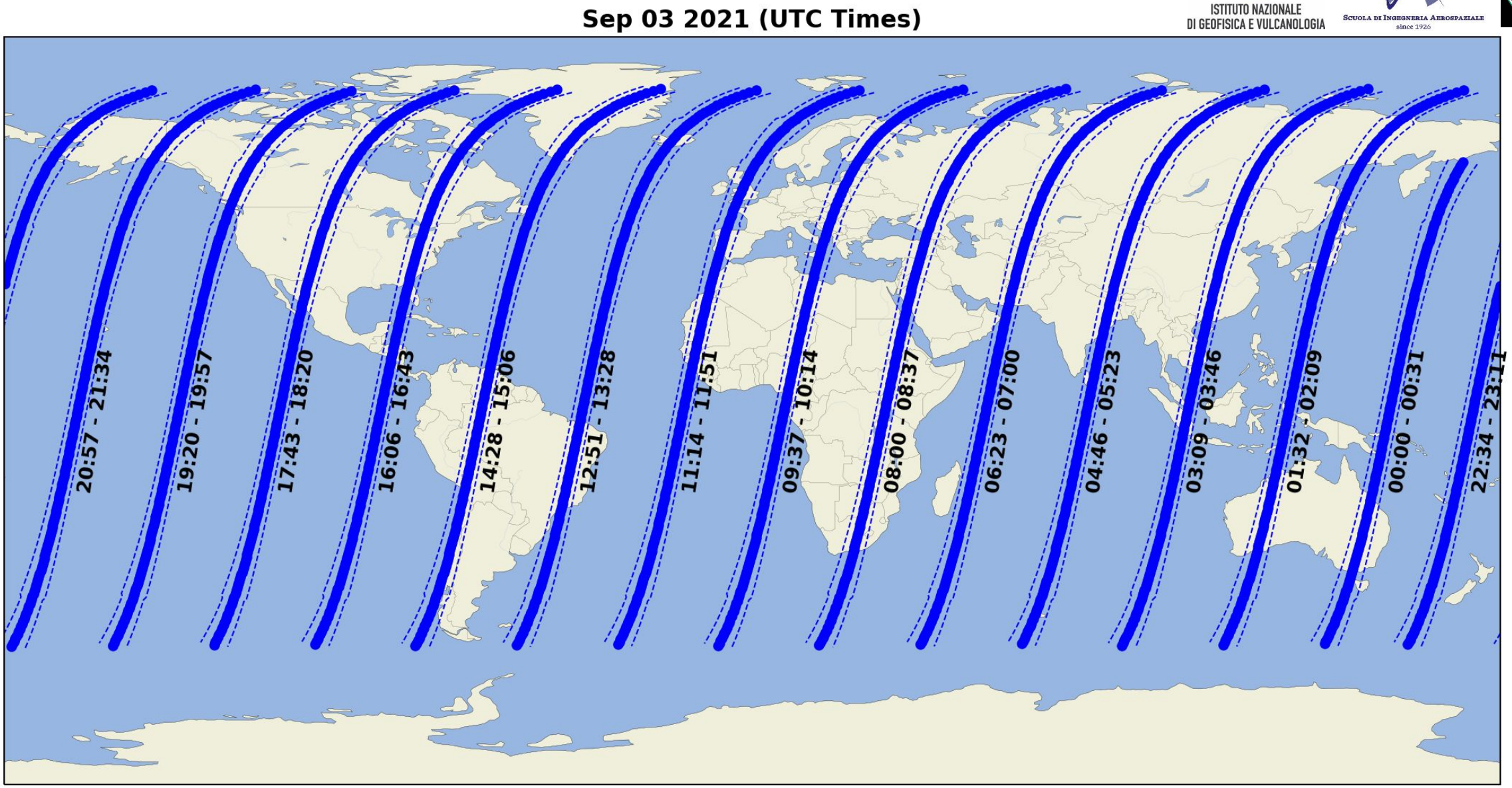


PRISMA – Pre-feasibility tool

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
…	…	…	…	…	…	…	…

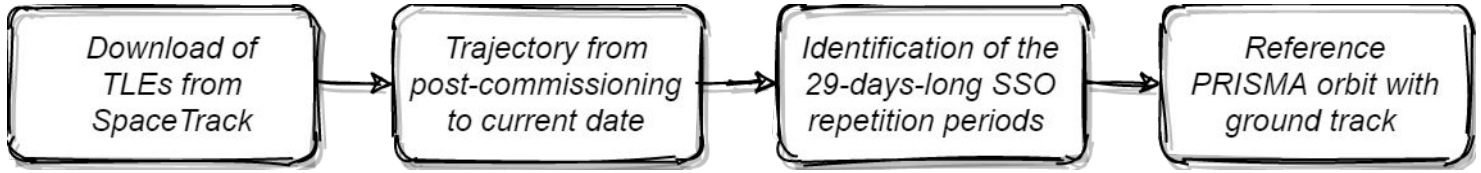
PRISMA – Pre-feasibility tool



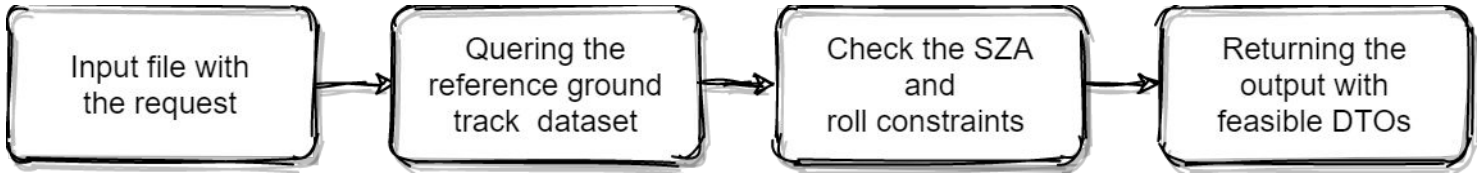
Architecture of the Pre-Feasibility Tool

The tool is split into two separate software:

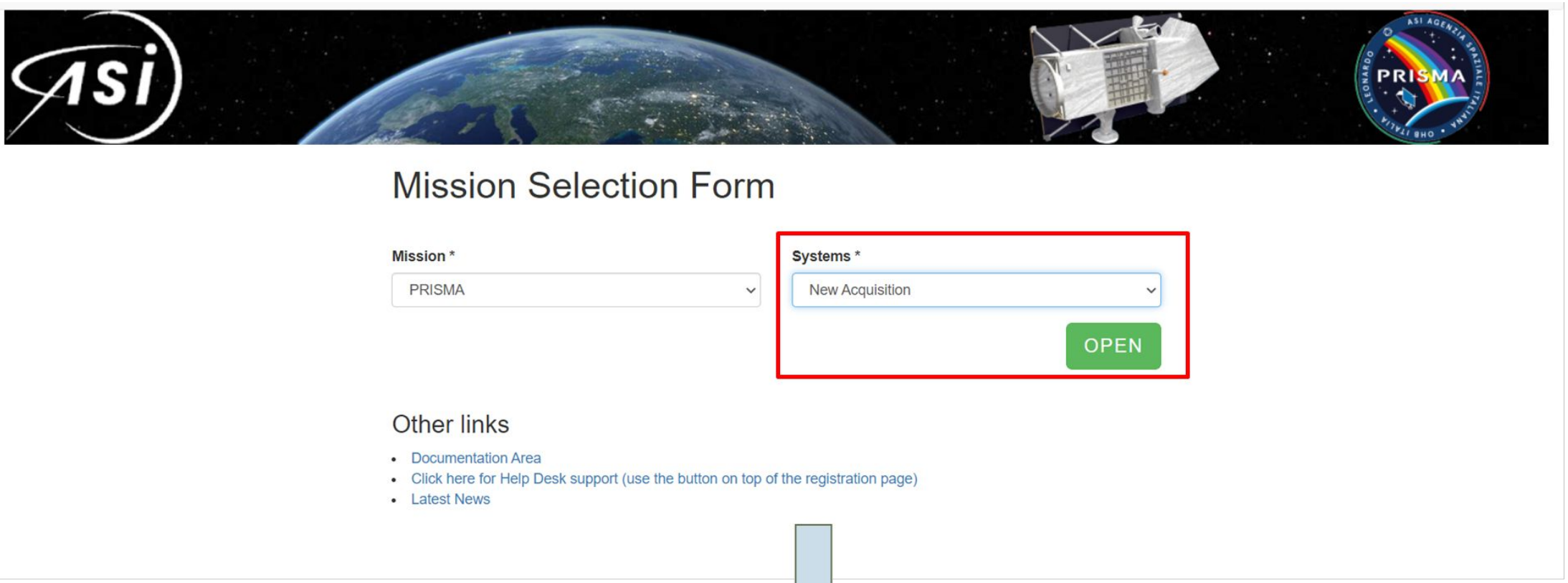
1. The first one is related to the creation of the reference ideal orbit of PRISMA needed to make future DTOs estimations. This software is planned to run every day to always have an updated reference orbit with related ground track, and it does not interface with users.

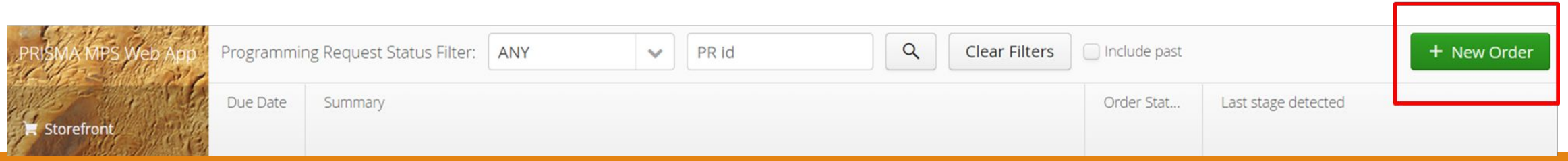


2. The second part of the pre-feasibility tool is the one that interfaces with the users' requests uploaded in the ASI website. The input is passed to the software which queries the reference PRISMA ground track trajectory generated with the first algorithm. Considering all the constraint, and specifically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



New PRISMA acquisition





VALIDITY TIME RANGE

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

AREA OF INTEREST

Spot image: 30 x 30 km Quota: 1

Longitude [deg]	Latitude [deg]	Cloud Coverage [%]
12.4923730	41.8902510	20.00

LookAngle Min	LookAngle Max	MinSunZenithAngle	MaxSunZenithAngle
-21.0000000	21.0000000	.0000000	70.0000000

Description

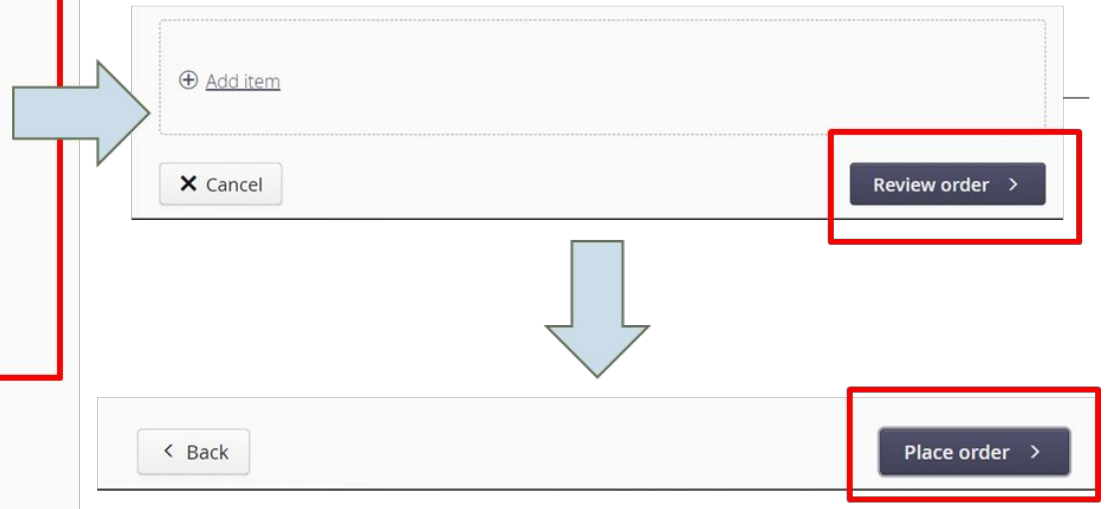
Rome, Italy

Contextual Processing Order

None

Use GCP

MAP VIEWER



ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

SCUOLA DI INGEGNERIA AEROSPAZIALE since 1926

STEFANIA.AMICI@INGV.IT - DARIO.SPILLER@UNIROMA1.IT

Q &A 15 min

Open source Software

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

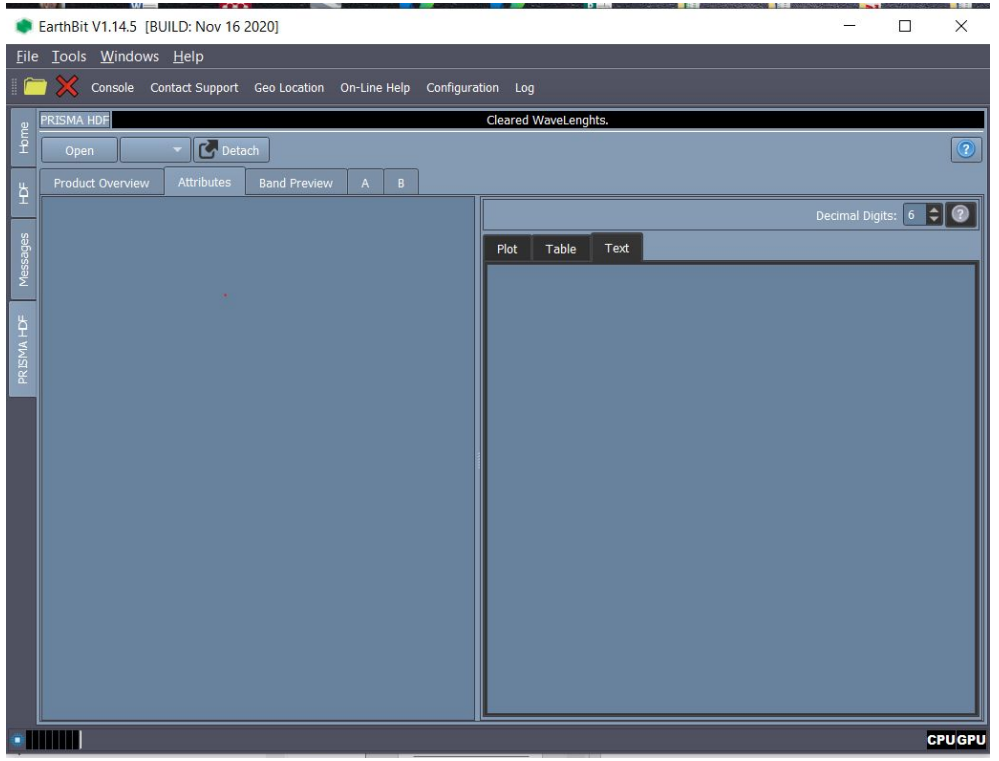
https://github.com/DarioSpiller/Tutorial_PRISMA_IGARSS_wildfires.git

Other software for PRISMA Stefy

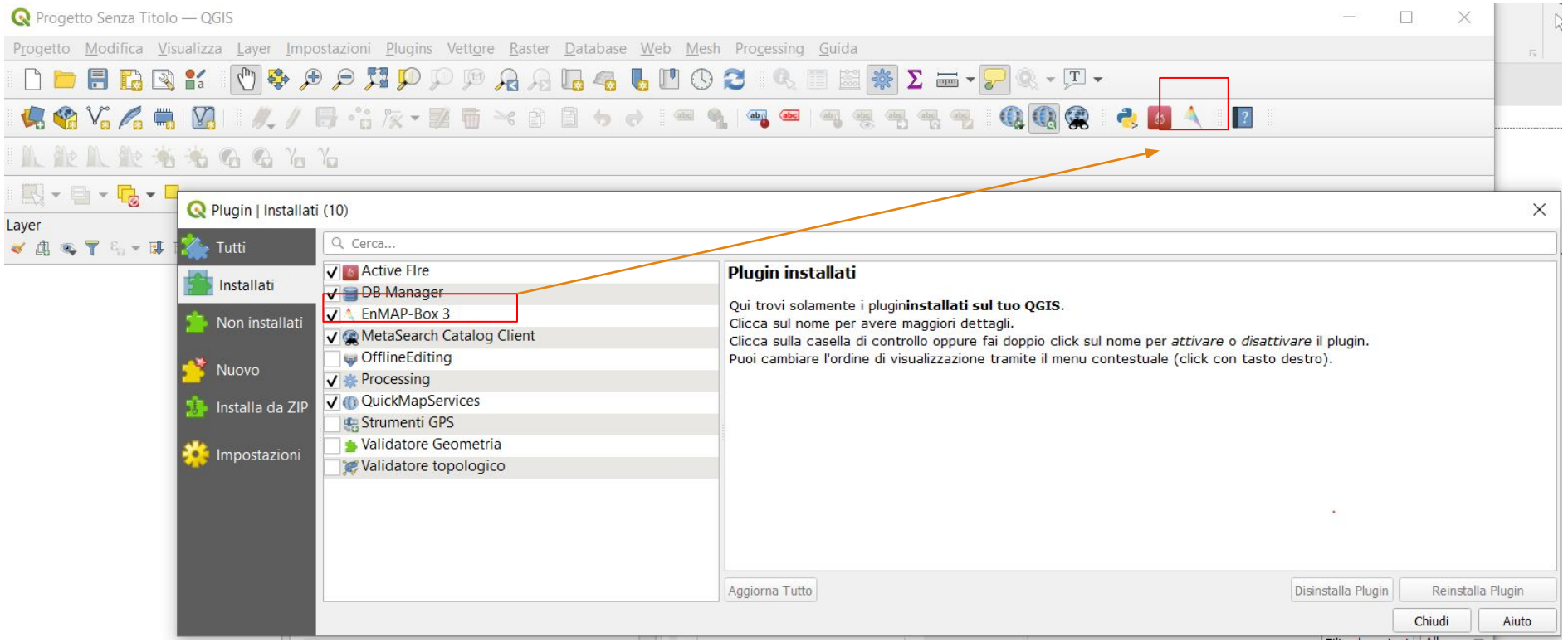
- [EarthBIT | Planetek Italia](https://www.planetek.it/prodotti/tutti_i_prodotti/earthbit)

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)



ENVI DEMO

Resources

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

Thanks for attending!

Evaluation Feedback
https://forms.gle/GqcF6fAxcaWYsSxv9

Interested in co-hosting opportunity?

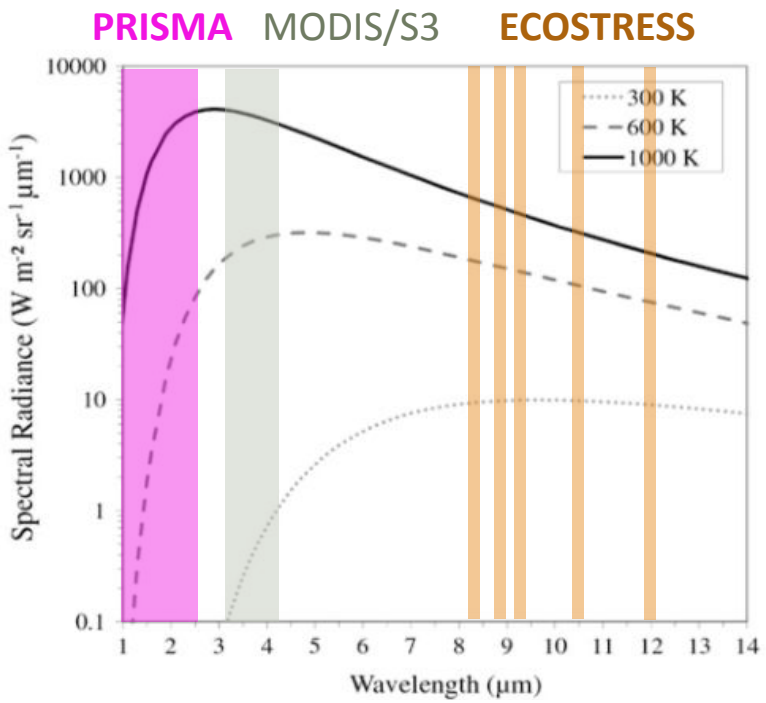
Stefania.amici@ingv.it
Dario.Spiller@uniroma1.it

Want to know more about wildfire research?

https://sites.google.com/ingv.it/rl-project-fires

Module 1 Theory Wildfire from space

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