



## Milestones and KPI of flagship 2.6.3

### MS10 (to be completed by August 2025)

- TAR6.10 [MS report for UC2.6.3: Implementation of the selected technology(ies); test and validation on selected dataset(s). Proof-of-Concept deployment]. **KPI:** [Final report provided; release of the developed code on public repository];

#### KPIs

KPI ID	Description	Acceptance threshold	Status
KPI2.6.1.1	Publications	2	3+2+1*
KPI2.6.1.2	Presentations at conferences	2	4+1
KPI2.6.1.3	Publicly available Code repositories	1	0**
KPI2.6.1.4	Use case Test Datasets	1	6

3 published, 2 accepted, one under review.

1 to do next week

1 private now and to made public before the end of the project

+5! (but maybe is better to group some ds depending on analyses strategy and timeline)



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DI RIPRESA E RESILIENZA



Centro Nazionale di Ricerca in HPC,  
Big Data and Quantum Computing

## KPI 2.6.1.1: Publications

### ➤ **Already published: 3**

- D. Marletta, A. Midolo, E. Tramontana, Detecting Photovoltaic Panels in Aerial Images by Means of Characterising Colours, Technologies 2023, 11(6), 174 (**PAPER**)
- N. Lopane et. al., Geoelectric Joint Inversion for 3D Imaging of Vineyard Ground, Agronomy, 14 (11) (**PAPER**)
- D. Marletta, A. Midolo, E. Tramontana, Automatic Land Use and Land Cover Classification by Means of Characterising Colours, Proceedings of IEEE WETICE, June 26-28, 2024, Reggio Emilia, Italy (**PROCEEDINGS**)

### ➤ **Accepted: 2**

- G. A. Anastasi et. al., The Spoke 2 of the ICSC National Centre, with a focus on deep learning applications in astroparticle physics and satellite imagery, Proceedings of 13th CRIS-MAC 2024, June 17-21, 2024, Trapani, Italy (**PROCEEDINGS**)
- G. Piparo et. al., AI algorithms for satellite and airborne imaging reconstruction, Nuovo Cimento C (**PROCEEDINGS**)

### ➤ **Under review: 1**

- Virginia group's paper on last year acquisition campaign and analysis (**PAPER**)



## KPI 2.6.1.2: Presentations at conferences

### ➤ **Already performed: 4**

- G. A. Anastasi et. al., The Spoke 2 of the ICSC National Centre, with a focus on deep learning applications in astroparticle physics and satellite imagery, 13th CRIS-MAC 2024, June 17-21, 2024, Trapani, Italy (**TALK**)
- D. Marletta, A. Midolo, E. Tramontana, Automatic Land Use and Land Cover Classification by Means of Characterising Colours, IEEE WETICE, June 26-28, 2024, Reggio Emilia, Italy (**TALK**)
- G. Piparo et. al., AI algorithms for satellite and airborne imaging reconstruction, 110<sup>th</sup> SIF congress, September 9-13, 2024, Bologna, Italy (**INVITED TALK**)
- G. A. Anastasi et. al., Advancing environmental monitoring through deep learning: wildfire segmentation using time-series of images from the Sentinel constellation, European Geosciences Union (EGU) General Assembly 2025, 27 April to 2 May 2025, Vienna, Austria (**TALK**)

### ➤ **TO DO: 1**

- G. Piparo et. al., Enhancing Decision-Making With EO Data and High-Performance Computing: Applications in Renewable Energy, Agriculture, and Disaster Response, ESA Living Planet symposium 2025, 23-27 June 2025, Vienna, Austria. (**TALK**)

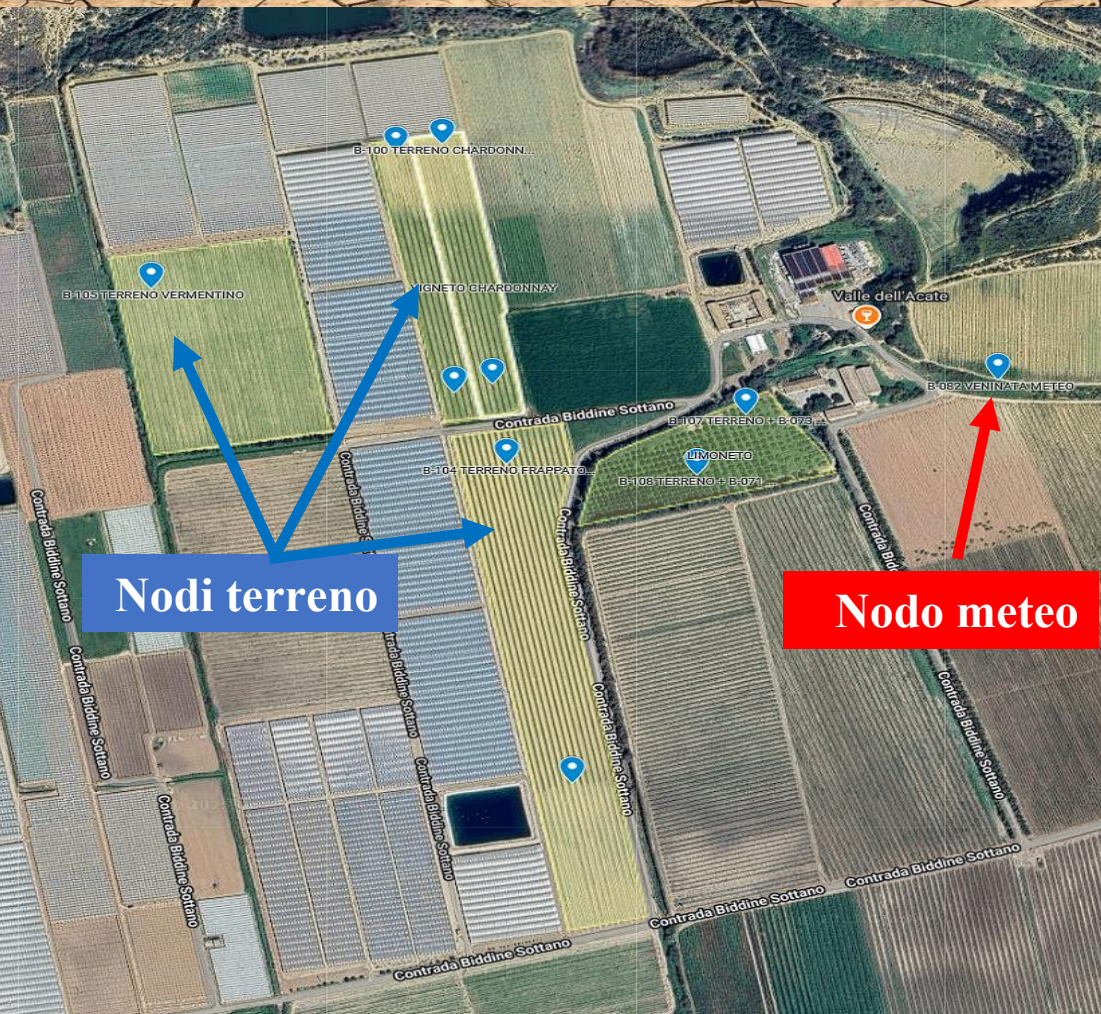


## KPI 2.6.1.4: Use case Test Datasets

- **Deterministic Learning Algorithm for Object Identification: 2**
  - High-resolution satellite/aerial imagery for photovoltaic panel identification (**PUBLIC**)
  - High-resolution satellite/aerial imagery for land use segmentation (**PUBLIC**)
- **High-Resolution Image Processing Based on Spectral Indexes for Disease Detection in Vineyards: 2+1**
  - First acquisition campaign: 17 ha vineyard of Sangiovese grapes in Emilia-Romagna (Italy), August 8, 2023 (**PRIVATE**)
  - Second acquisition campaign: 2000 ha of vineyards in the provinces of Ravenna, Forlì-Cesena, Rimini and Bologna (Italy), July 8-19, 2024 (**PRIVATE**)
  - Third acquisition campaign: IN PROGRESS (**PRIVATE**) **NEW!**
- **Deep Learning for Satellite Imagery Analysis: 2+4**
  - Sentinel multi-modal data based on Copernicus Emergency Management Service (CEMS) post-wildfire segmentation labels (**PUBLIC**)
  - Sentinel multi-modal data based on Ferrara group segmentation/identification of Flavescence doree labels (**PRIVATE**)
  - Sentinel multi-modal data based on SEMAFORO activities (For the moment, based on GS estimated evapotranspiration value labels and **processed with a TerraMind-based model**) (**PRIVATE**) **NEW!**
  - Pleiades & Pleiades Neo optical imagery (50 cm & 30 cm resolution) covering SEMAFORO sites, with 2–5 additional acquisitions scheduled over the next few months (**PRIVATE**) **NEW!**
  - Pleiades & Pleiades Neo optical imagery (50 cm & 30 cm resolution) covering PERBACCO vineyards (**PRIVATE**) **NEW!**
  - PlanetScope imagery (min 3 m resolution) for SEMAFORO, providing a wide temporal revisit of ~1 day (**PRIVATE**) **NEW!**



# IRRIGAZIONE DI PRECISIONE: DECISIONI GUIDATE DAI SENSORI





# IRRIGAZIONE DI PRECISIONE: DECISIONI GUIDATE DAI SENSORI

Burned Area
Vineyard Disease
EV-Sensor
EV-Satellite

Sensor Data Folder:
semaforo\_info/Veninata/Chardonnay\_alto

Overall Start Date:
08/04/2025
Overall End Date:
12/05/2025

Plot Individual Series

Compare Series:
N
P
K
Conductivity
Precipitation

Plot Comparative S...

Scatter X:
Temperature
Scatter Y:
N
P
K
Conductivity
Precipitation

Plot Scatter(s)

KC (Jan-Apr):
0.4
KC (May-Sep):
0.5
KC (Oct-Dec):
0.3
Area (ha):
Days per period:
7

KC File Path:
semaforo\_info/Veninata/Chardonnay\_alto/Crop\_coefficient.xlsx
GeoJSON File Path:
semaforo\_info/Veninata/Chardonnay...

Note: Either manually enter KC values for the three periods above, or provide a file path to an Excel file containing three values (order: Jan-Apr, May-Sep, Oct-Dec). If a file is provided, it takes precedence.

Run Iterative ET+ A...

Dashboard per  
l'analisi dei  
dati



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Burned Area
Vineyard Disease
EV-Sensor
EV-Satellite

Sensor Data Folder: semaforo\_info/Veninata/Chardonnay\_alto

Overall Start Date: 08/04/2025 Overall End Date: 12/05/2025

Plot Individual Series

Compare Series: N P K Conductivity Precipitation

Plot Comparative S...

Scatter X: Temperature Scatter Y: N P K Conductivity Precipitation

Plot Scatter(s)

KC (Jan-Apr): 0.4 KC (May-Sep): 0.5 KC (Oct-Dec): 0.3 Area (ha): Days per period: 7

KC File Path: semaforo\_info/Veninata/Chardonnay\_alto/Crop\_coefficient.xlsx GeoJSON File Path: semaforo\_info/Veninata/Chardonnay...

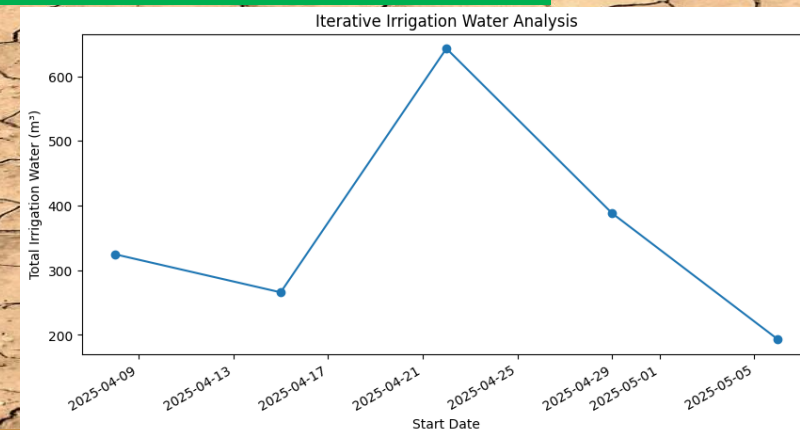
Note: Either manually enter KC values for the three periods above, or provide a file path to an Excel file containing three values (order: Jan-Apr, May-Sep, Oct-Dec). If a GeoJSON file path is provided, its computed area (ha) will override the manual input.

Run Iterative ET<sub>a</sub>...

## Dashboard per l'analisi dei dati

## Calcolo del quantitativo di acqua irrigata

Period: 2025-05-06 to 2025-05-12  
 Mean Temperature : 20.12 °C  
 Mean Wind Speed : 8.94 m/s  
 Mean Air Humidity : 60.84 %  
 Mean Solar Radiation : 20.82 MJ/m²/day  
 Atmospheric Pressure : 101.30 kPa  
 Delta : 0.15 kPa/°C  
 Gamma : 0.07 kPa/°C  
 Net Radiation : 16.66 MJ/m²/day  
 Reference ET (ET<sub>o</sub>) : 4.10 mm/day  
 Crop-Adjusted ET (ET<sub>c</sub>) : 2.87 mm/day (using KC = 0.70)  
 Total ET (over 7 days): 20.11 mm  
 Soil Moisture - Min : 15.149999999999999  
 Soil Moisture - Max : 16.15  
 Irrigation Water Volume: 11.65 m³  
 Precipitation Sum : 3.26 m³  
 ET<sub>met</sub> : 0.33  
 ET<sub>irr</sub> : 16.40  
 Total Irrigation Water: 193.08 m³





# IRRIGAZIONE DI PRECISIONE: DECISIONI GUIDATE DAI SENSORI, DAI DRONI



Burned Area

Vineyard Disease

EV-Sensor

EV-Satellite

Sensor Data Folder:

semaforo\_info/Veninata/Chardonnay\_alto

Overall Start Date:

08/04/2025

Overall End Date:

12/05/2025

Plot Individual Series

Compare Series:

N

P

K

Conductivity

Precipitation

Plot Comparative S...

Scatter X:

Temperature

Scatter Y:

N

P

K

Conductivity

Precipitation

Plot Scatter(s)

KC (Jan-Apr):

0.4

KC (May-Sep):

0.5

KC (Oct-Dec):

0.3

Area (ha):

Days per period:

7

KC File Path:

semaforo\_info/Veninata/Chardonnay\_alto/Crop\_coefficient.xlsx

GeoJSON File Path:

semaforo\_info/Veninata/Chardonnay...

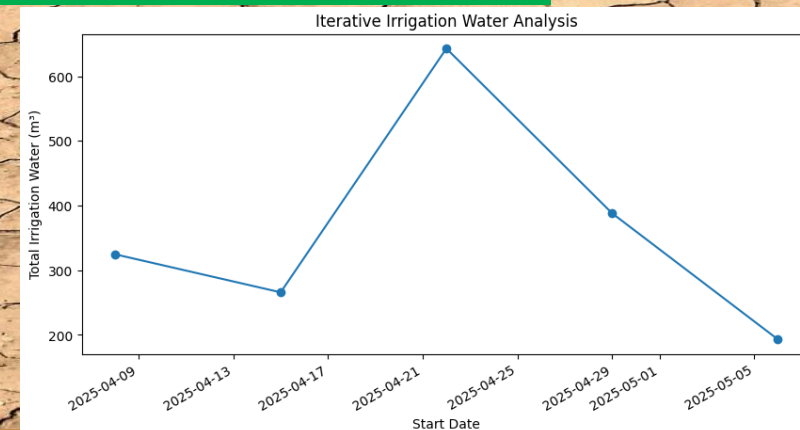
Note: Either manually enter KC values for the three periods above, or provide a file path to an Excel file containing three values (order: Jan-Apr, May-Sep, Oct-Dec). If a GeoJSON file path is provided, its computed area (ha) will override the manual input.

Run Iterative ET<sub>a</sub>...

Dashboard per  
l'analisi dei  
dati

## Calcolo del quantitativo di acqua irrigata

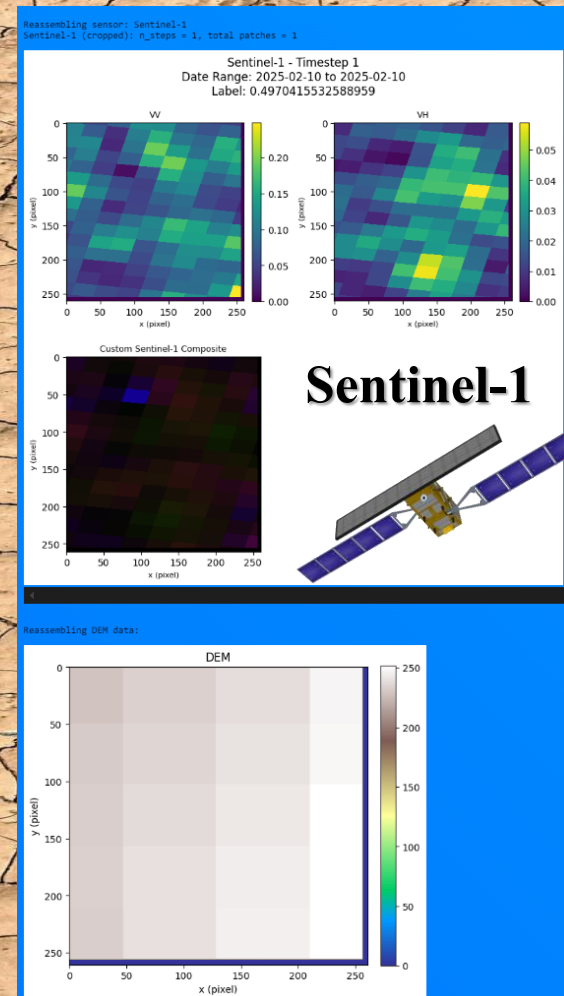
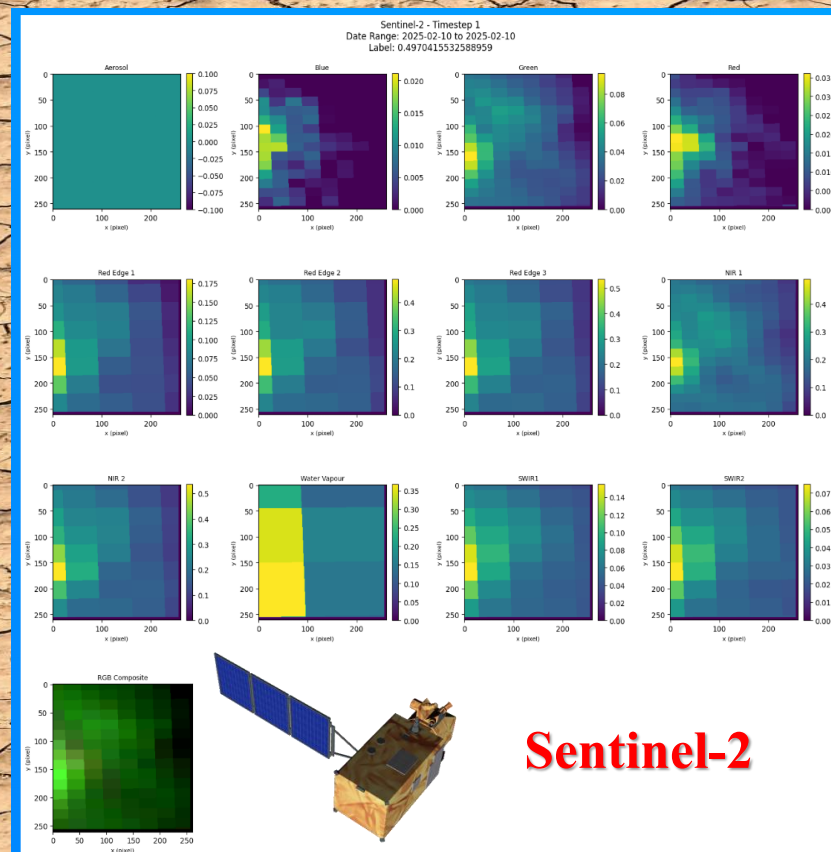
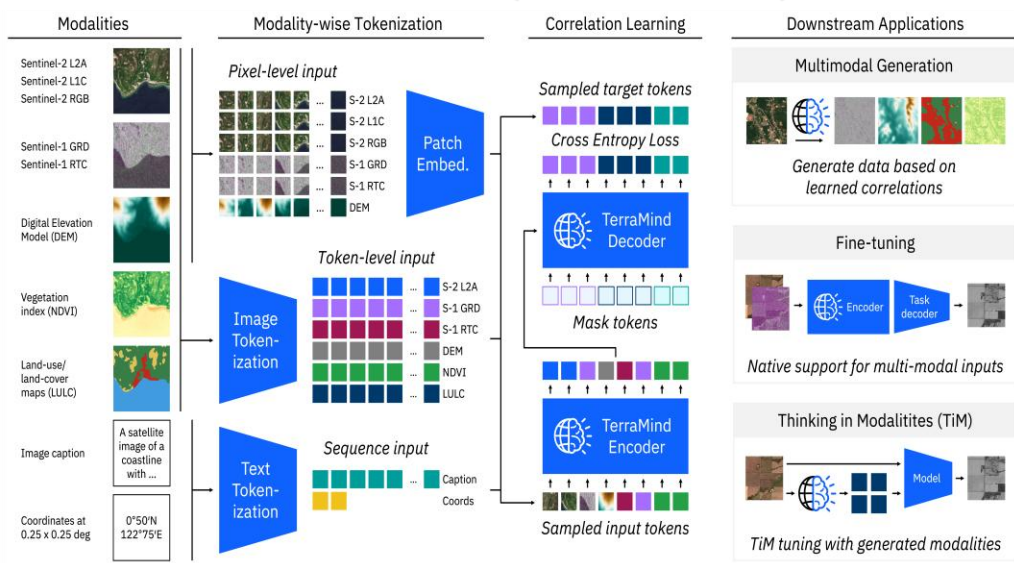
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# IRRIGAZIONE DI PRECISIONE: DECISIONI GUIDATE DAI SENSORI, DAI DRONI, DAI SATELLITI E DALL'IA

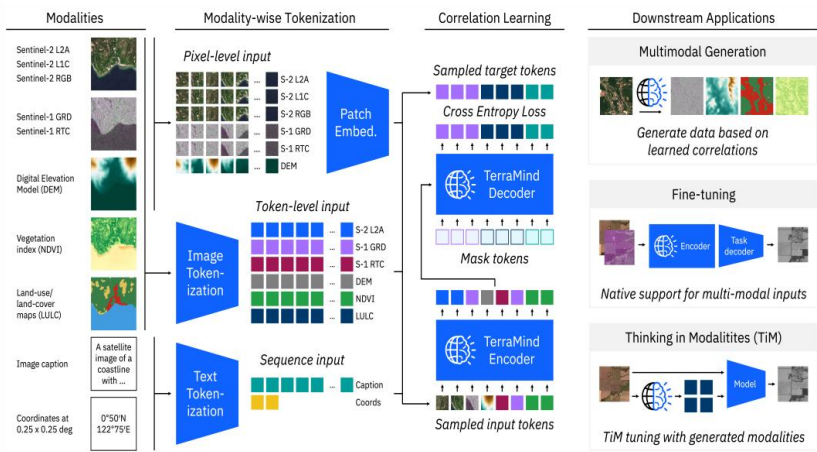
## TerraMind (Esa & IBM)





# IRRIGAZIONE DI PRECISIONE: DECISIONI GUIDATE DAI SENSORI, DAI DRONI, DAI SATELLITI E DALL'IA

## TerraMind (Esa & IBM)



	Name	Type	Params	Mode
0	backbone	TerraMindTim	1.0 B	train
1	refine	TransformerEncoder	285 M	train
2	mlp_head	Sequential	526 K	train
3	doy_proj	Linear	2.0 K	train

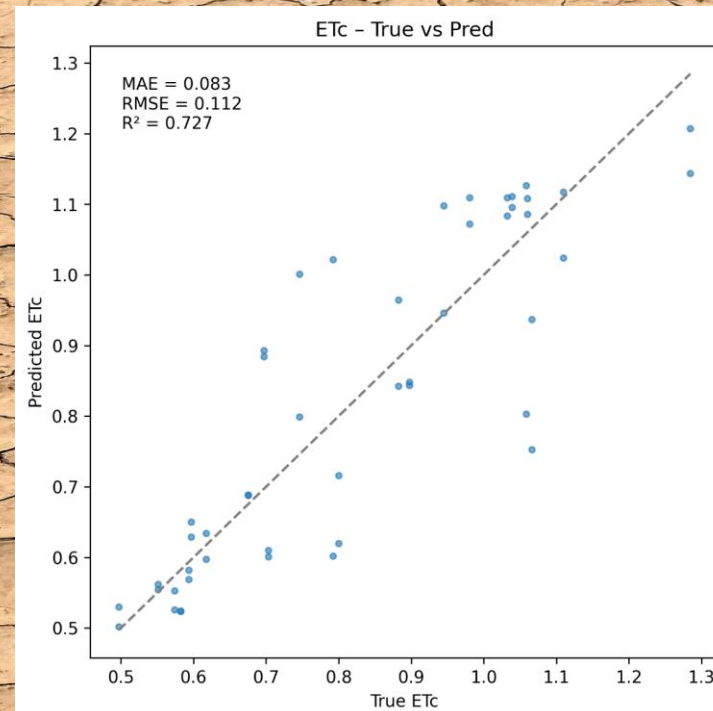
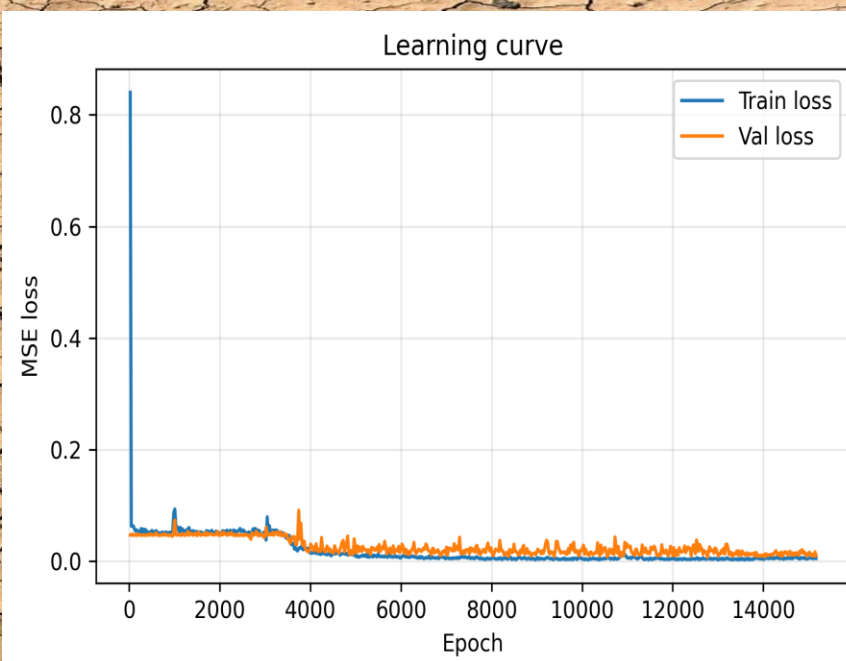
  

285 M	Trainable params
1.0 B	Non-trainable params
1.3 B	Total params
5,259.831	Total estimated model params size (MB)

14 fields (8 train- 2 val -2 test)

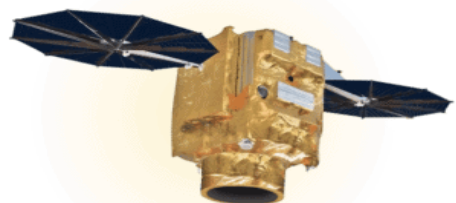
05/02/25-08/05/2025 (12weeks)

1. Train = 96 examples 248x248 px
2. Val = 24 examples 248x248 px
3. Test = 48 examples 248x248 px

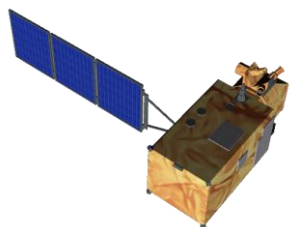




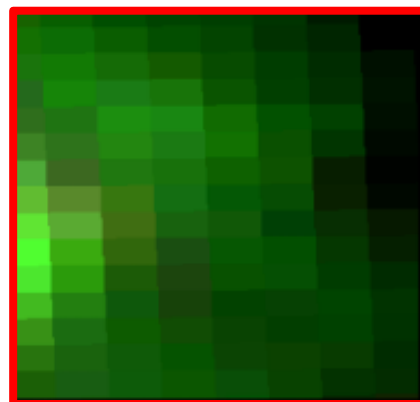
# IRRIGAZIONE DI PRECISIONE: DECISIONI GUIDATE DAI SENSORI, DAI DRONI, DAI SATELLITI E DALL'IA: PUNTANDO SEMPRE AL FUTURO



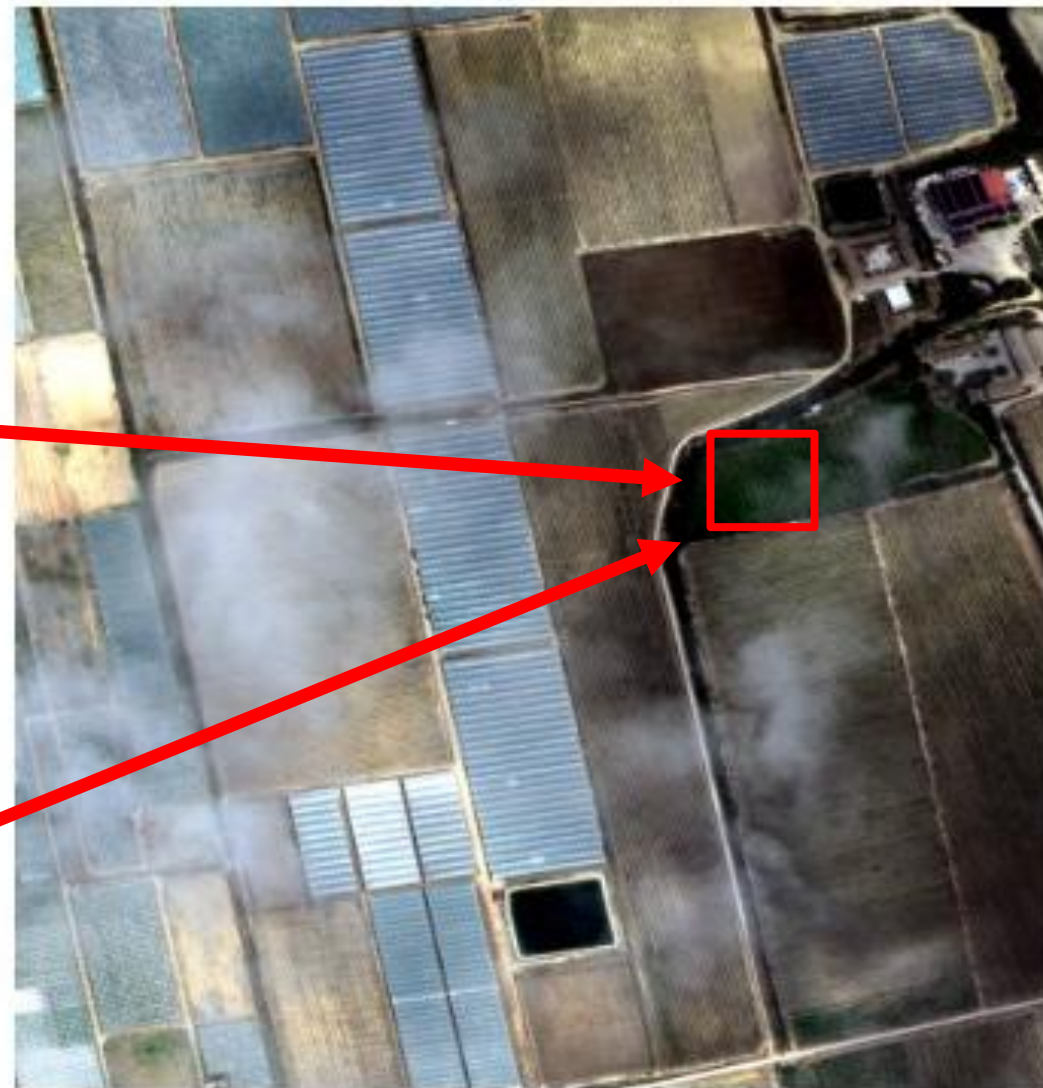
**Plesiadess-Neo (AirBus)**  
**30 cm di risoluzione**



**Sentinel-2 (ESA)**  
**10 m di risoluzione**



**RGB (30 cm)**



## Extra activities

Within Flagship 2.6.3, several outreach activities were carried out:

- Presentation of the Flagship activities during the **public session of the annual Spoke 2 meeting** in December 2024, both in person and live on YouTube
- **Partecipazione in the webinar dedicated to Space Economy**, organized by the ICSC Supercomputing Trends Observatory and publications on the dedicated report
- **Filling out the questionnaire** "COMMUNICATION - Enhancing the impact of NRPP-funded project results"
- **Contribution to the Pint of Science Festival 2025** with a presentation on flagship activities and their relationship with the public sector **NEW!**

News on computational resources **NEW!**

Cloud resources will arrive soon. They will consist in **3 Vms with jupyter notebooks**:

- one with 96 vCores and 288 Gb vRam and two with 48 vCores and 144 Gb vRam, each
- 3 TB storage and 2 GPUs are shared between the Vms