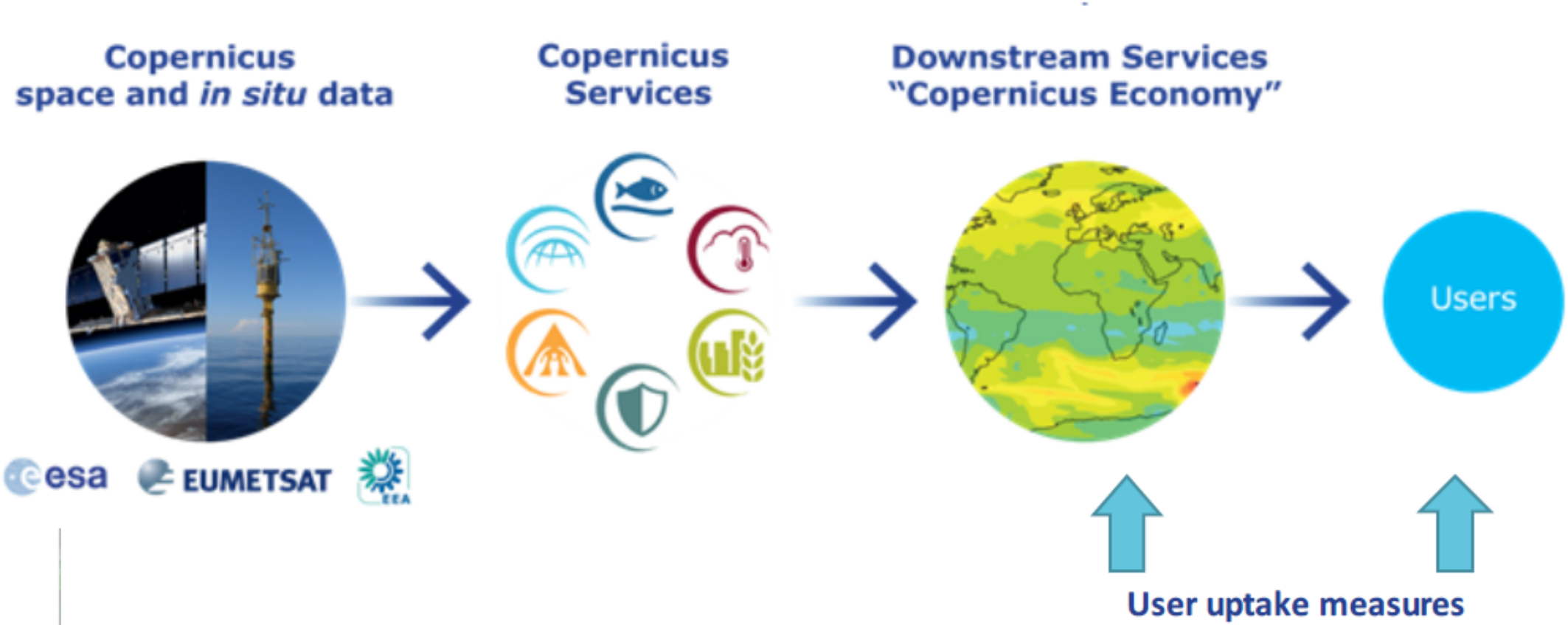
Copernicus – La governance Nazionale

Raccolta e valutazione dei requisiti utenti per lo sviluppo di Servizi operativi in ambito Copernicus

Contenuti

1. Il sistema nazionale ed europeo di utenti Copernicus
2. Cos’è lo user engagement e uptake
3. Attuali limiti nella penetrazione di mercato
4. La raccolta dei requisiti
5. Misurazione degli impatti

La catena di valore Copernicus



Forum Europeo degli utenti Copernicus

Procedura di comitato –REGOLAMENTO (EU) N.377/2014.

Articolo 3

9) «utenti Copernicus»:
a) gli utenti Copernicus di base: le **istituzioni e gli organi dell'Unione** e le **autorità europee**, **nazionali, regionali o locali** competenti ai fini della **definizione, dell'attuazione, dell'esecuzione o del monitoraggio del servizio pubblico** o della politica nei settori di cui all'articolo 2, paragrafo 2, lettera a);
b) gli utenti del **settore della ricerca**: università o ogni altra organizzazione dedita alla ricerca e all'istruzione;
c) gli utenti **commerciali e privati**;
d) gli enti di **beneficenza, organizzazioni non governative e internazionali**.

Articolo 30

La Commissione è assistita da un comitato (il **comitato Copernicus**). Tale comitato è un comitato ai sensi del regolamento (UE) n. 182/2011.
Il comitato Copernicus istituisce il «**forum degli utenti**» quale gruppo di lavoro incaricato di **fornirgli consulenza sugli aspetti legati alle esigenze degli utenti**, in conformità del suo regolamento interno.

Forum Europeo degli utenti Copernicus

Commissione Europea
DG DEFIS

European Commission

Stati Membri

"the User Forum is composed of ***experts nominated by the Member States****"*

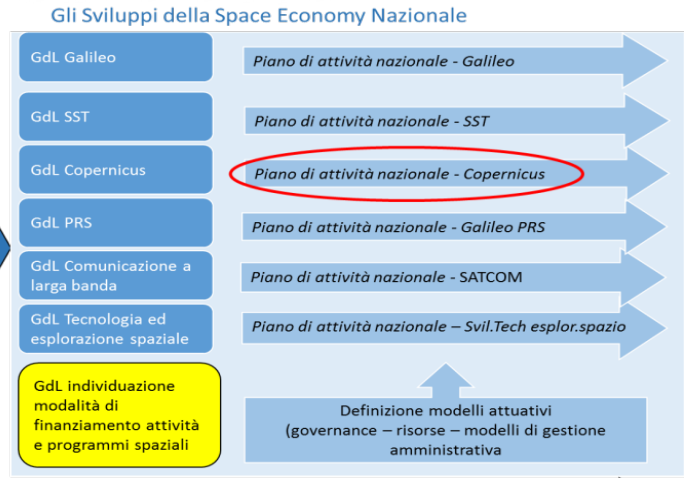
Il sistema nazionale ed europeo di utenti Copernicus

Governance nazionale

PCM (Coord. Premier), Partecipata da Ministri o Sottosegretari di Stato

L. n.7 11/1/18 Comitato interministeriale per le politiche relative allo spazio e alla ricerca aerospaziale

Piano strategico Space Economy di posizionamento nazionale



Documento dei fabbisogni dell'utenza nazionale

Supporto al Forum Nazionale degli Utenti Copernicus

Attività Preparatoria

Capo UCM, Segretario COMINT, ASI Rappresentanza Ministeri (D.leg. 128/2003)

DPCM 20/12/18 Struttura di Coordinamento per le politiche relative allo spazio, aerospazio e ai correlati servizi applicativi

Partecipano per garantire la massima condivisione interagenziale (senza diritto di voto):

- Dip. ProCiv
- Dip. Per le Politiche di coesione (PCM)
- Dip. Affari Regionali (PCM)
- ISPRA
- Organismi di informazione per la sicurezza (L. 124/2007)

Forum Nazionale degli Utenti del Programma Copernicus

Al Presidente del Consiglio dei ministri sono attribuiti l'alta direzione, la responsabilità politica generale e il coordinamento delle politiche dei Ministeri relative ai programmi spaziali e aerospaziali, nell'interesse dello Stato. Per il perseguimento di tali fini la legge istituisce il *Comitato interministeriale per le politiche relative allo spazio e alla ricerca aerospaziale COMINT* (a cui partecipano i ministeri tra cui il MATTM, il MISE e il MIT, etc…).

Per garantire l'attuazione delle decisioni del Comitato è istituita con DPCM del 19 dicembre 2018 presso la Presidenza del Consiglio – Ufficio del Consigliere militare (PCM-UCM) la *Struttura di coordinamento per le politiche relative allo spazio, all'aerospazio e ai correlati servizi applicativi*. Tale Struttura si avvale del supporto, del Dipartimento di Protezione civile, del Dipartimento delle politiche di Coesione (PCM), del Dipartimento degli Affari regionali e le autonomie (PCM), gli Organi di informazione e sicurezza e dell'**ISPRA**, quale raccordo fra le comunità di utenti nazionali nel settore dell'osservazione della terra, già organizzate nel Forum Nazionale degli Utenti Copernicus.

Forum Nazionale degli Utenti del Programma Copernicus

Rappresentanti Istituzioni Pubbliche

Rappresentanti Nazionali dei board internazionali

PCM Ufficio consigliere militare

Forum Nazionale degli utenti

(ISPRA - segreteria di supporto)

Rappresententi Industriali e commerciali

Rappresentanti della ricerca

Gli obbiettivi dello user forum nazionale

1. Consentire alla comunità nazionali degli Utenti di **condividere informazioni e decisioni** circa le attività in atto e future presso il Comitati e User Forum Copernicus;
2. **Identificare e definire** presso le diverse Comunità **fabbisogni e requisiti degli utenti finali** per nuove ed innovative **tecnologie, prodotti e servizi operativi**.
3. **Valutare complessivamente** lo stato di fatto, la consistenza, la coerenza e l'efficacia anche operativa del **Programma** nel suo insieme, con particolare riguardo per i fabbisogni e requisiti espressi dagli utenti nazionali per la promozione e la realizzazione di **qualificate, autorevoli e coordinate politiche, piani e programmi di sviluppo e di attività** come quelle per i Core Services da offrire a livello europeo per tutti gli SM e quelle per i Downstream Services, che dai primi possono originarsi a livello nazionale.

Forum Nazionale degli Utenti del Programma Copernicus

Tavoli di consultazione

- Sicurezza
- Interno
- Emergenze
- SNPA
- Trasporti
- Agricoltura
- Beni Culturali (TF – EU a guida ITA)
- fascia costiera
- valorizzazione

Tavoli di consultazione esterni al Forum Nazionale

- Tav. Naz. Geol. Operativa
- Tav. Naz. Climatologia Op.
- Tav. Naz. Idrologia Operativa

Altre comunità

Copernicus Academy collega università, istituti di ricerca, scuole di business, organizzazioni private e senza fini di lucro, nei Paesi partecipanti a Copernicus (EU28 + Norvegia e Islanda) e oltre.

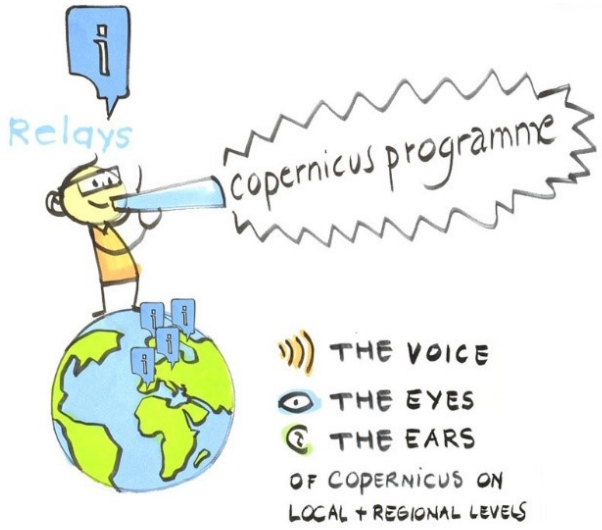
L'obiettivo della rete è quello di collegare le istituzioni accademiche e di ricerca con autorità e fornitori di servizi

Gli attuali 85 membri di questa comunità globale, sono i rappresentanti di Copernicus sul campo e promuoveranno i benefici del programma di osservazione della Terra dell'UE

Agiscono come attori locali, coordinando e promuovendo le attività intorno al programma Copernicus, i suoi benefici e le opportunità per i residenti e le imprese locali.

SUPPORTO AGLI UTENTI

Copernicus Relays



84 MEMBRI IN 33 PAESI

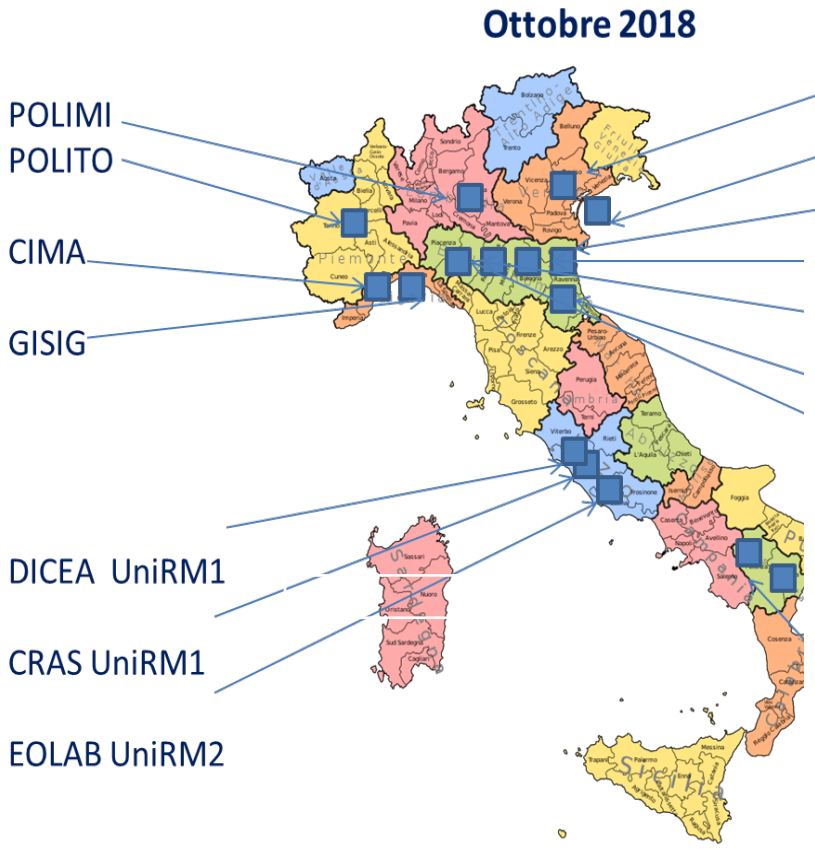
Copernicus Academy

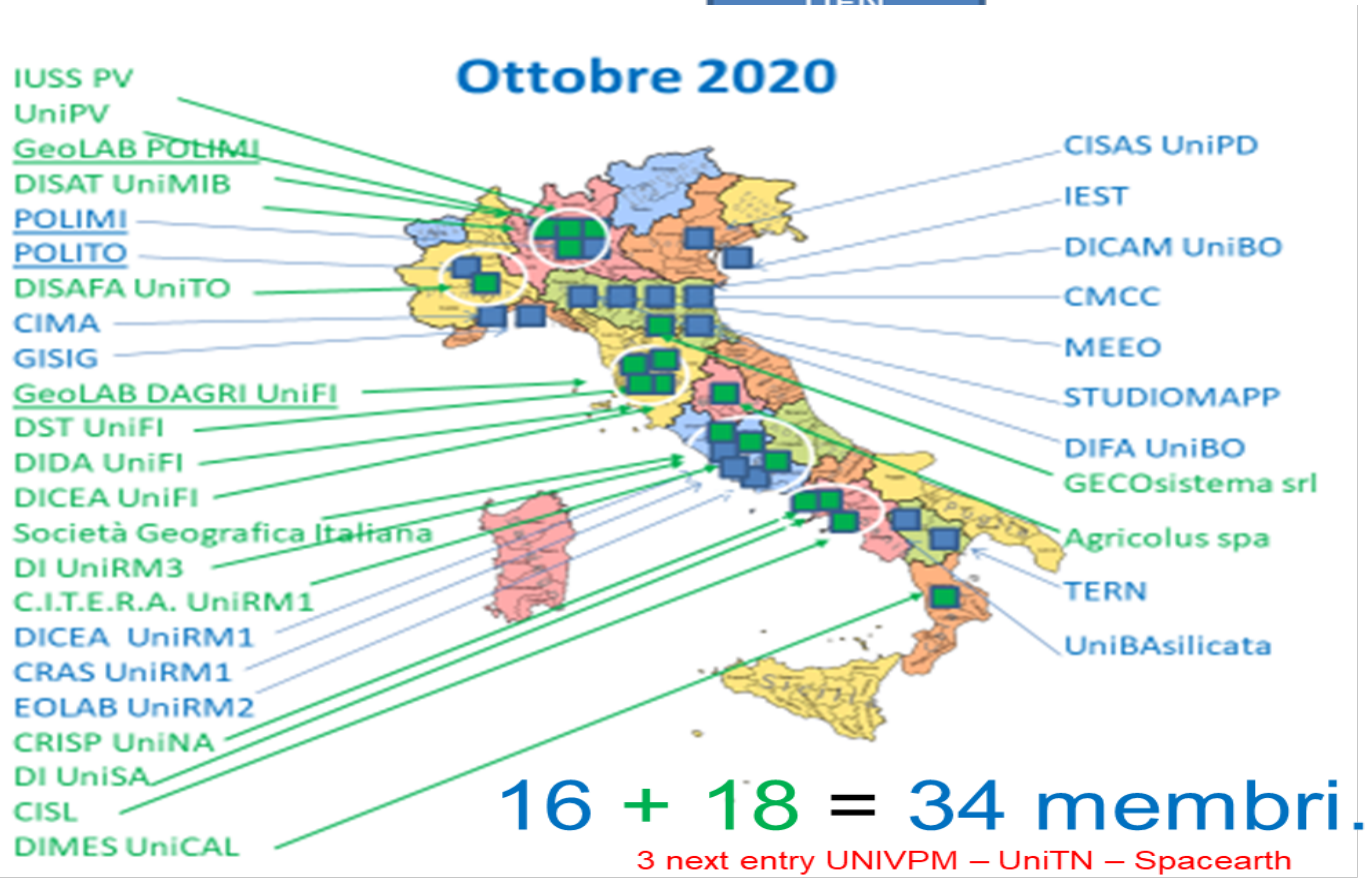
144 MEMBRI IN 42 PAESI

EUMETSAT
ECMWF
esa
EEA
FRONTEX
MERCATOR OCEAN
EUSC
JRC
EUROPEAN COMMISSION
EMSA

9 AGENZIE E ORGANIZZAZIONI

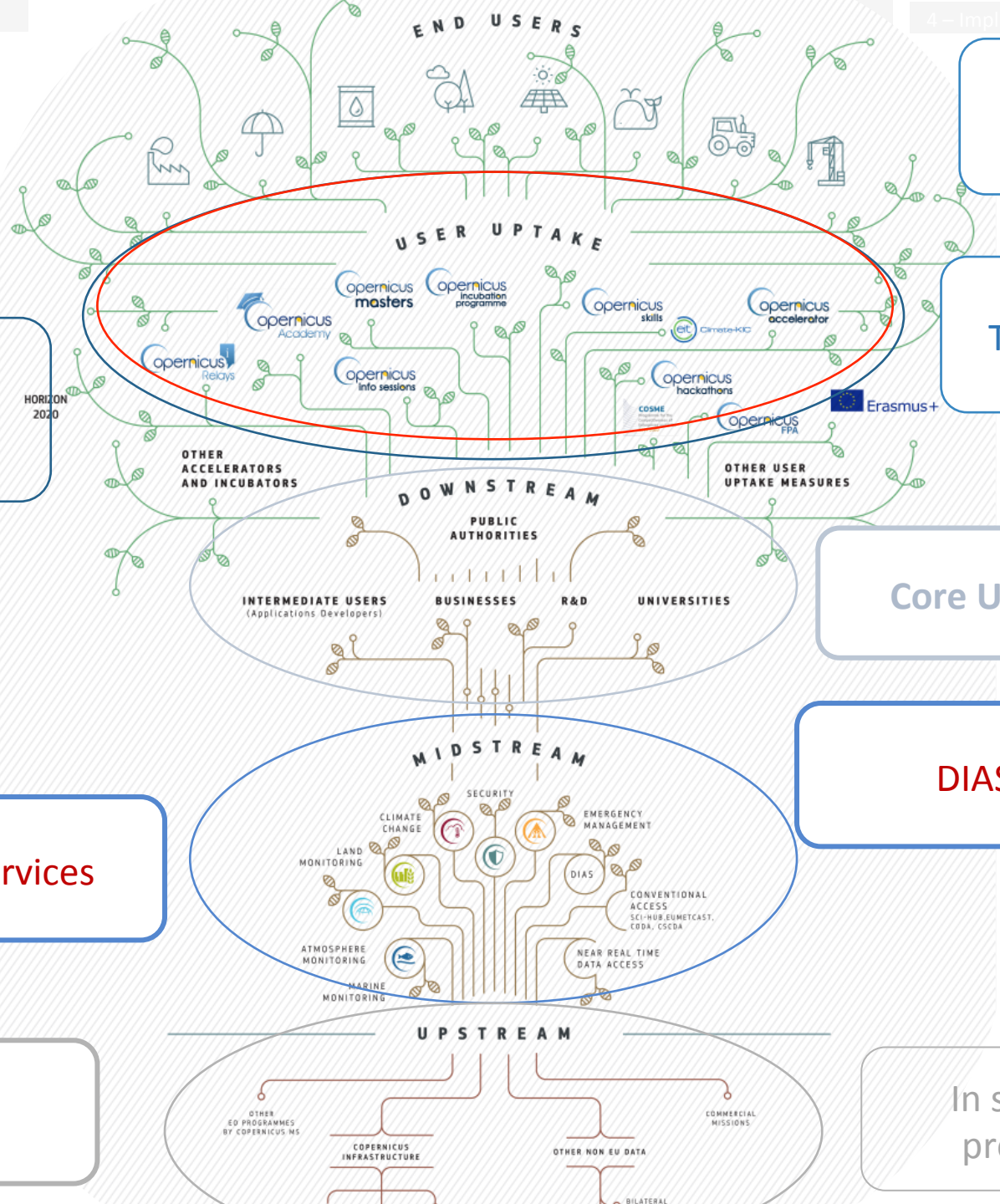
Il Coordinamento e la Rete Nazionale dei Copernicus Academy





- centrata su alcuni dei principali Atenei e/o Politecnici disponibili e cap
  quelli relativi al proprio bacino di attrazione studentesca, promuovenc
  accademicamente collegati e collaboranti, e/o interessati a proporsi p
- partecipata anche da altri soggetti, sia pubblici (Enti Pubblici di Ricerc
  formazione e/o la formazione professionale);
- disponibile a definire, sostenere e realizzare un Piano d'azione nazion
  tutti i soggetti partecipanti alla Rete nazionale e mirato a realizzare un

n. 5 focal point



User Uptake (Academy, FPA, Relays…)

MS and EU policies

Technology transfer

Core User Group

DIAS

Copernicus Services

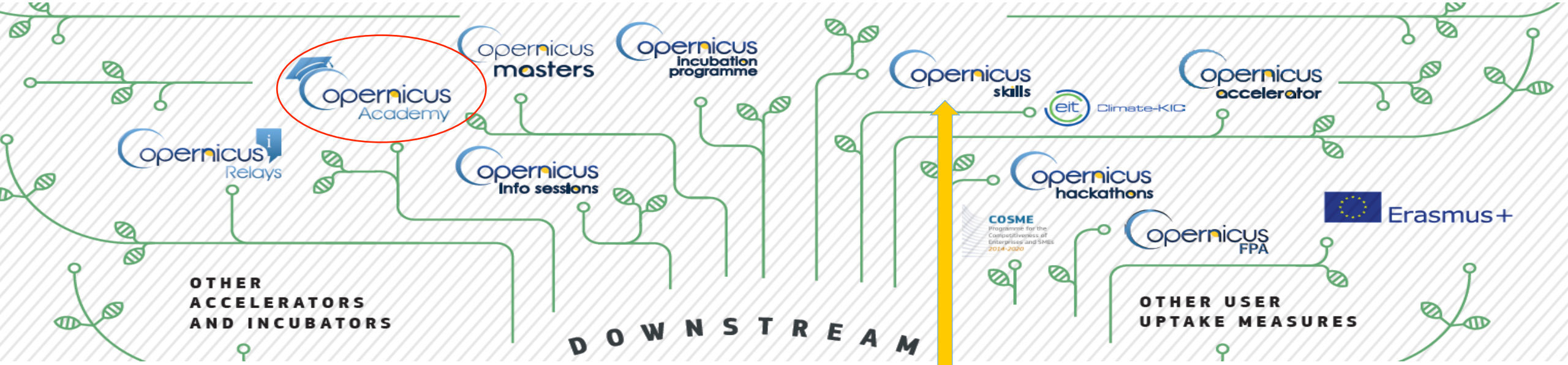
Sentinels

In situ obs. providers

Research projects

Higher education

Skills in the Copernicus Ecosystem: Università



Strategic axes for enhancing education and skills development through Copernicus

Awareness/ Outreach

Communication

- Outreach material
- Events
- Branding
- Promotion support actions (**COSME**)

Information/ Networking

Users uptake

- National training & info sessions
- **CEST** (Copernicus Ecosystem)
- Industry workshops

Skills training

Users uptake

- Copernicus **Accellerator/ Incubation** programme
- Professionals training (**KICs**)

- **RUS** (Researchers support)
- Students training (KICs)
- **PhD**s & **post-PhD**s scholarships (KICs)

Skills enhancing

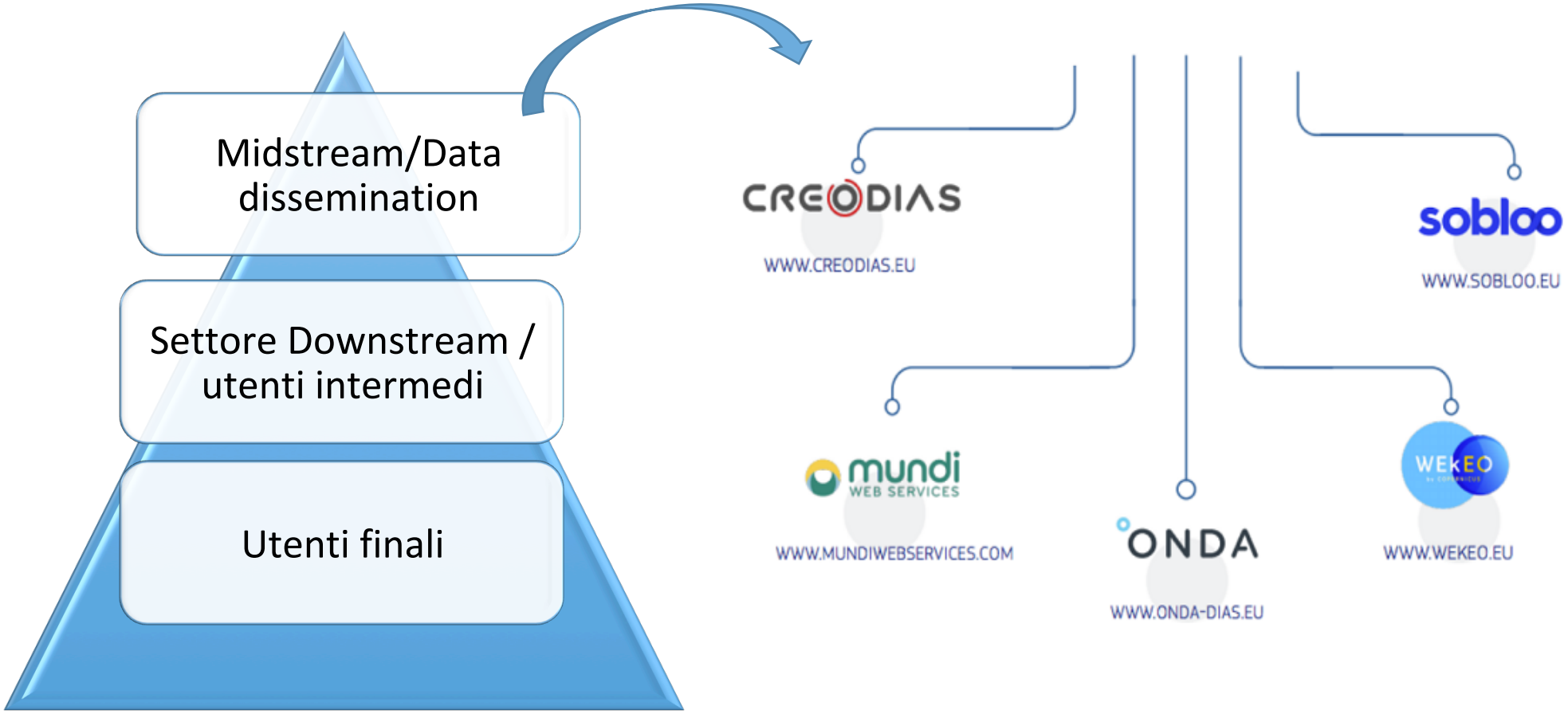
Users strategy

- **DIAS** (Digital infrastructure)
- **Copernicus Academy** and **Relays** networks
- **FPA** and **COP FWC**
- **H2020**
- **E4GEO** partnership (Erasmus+)

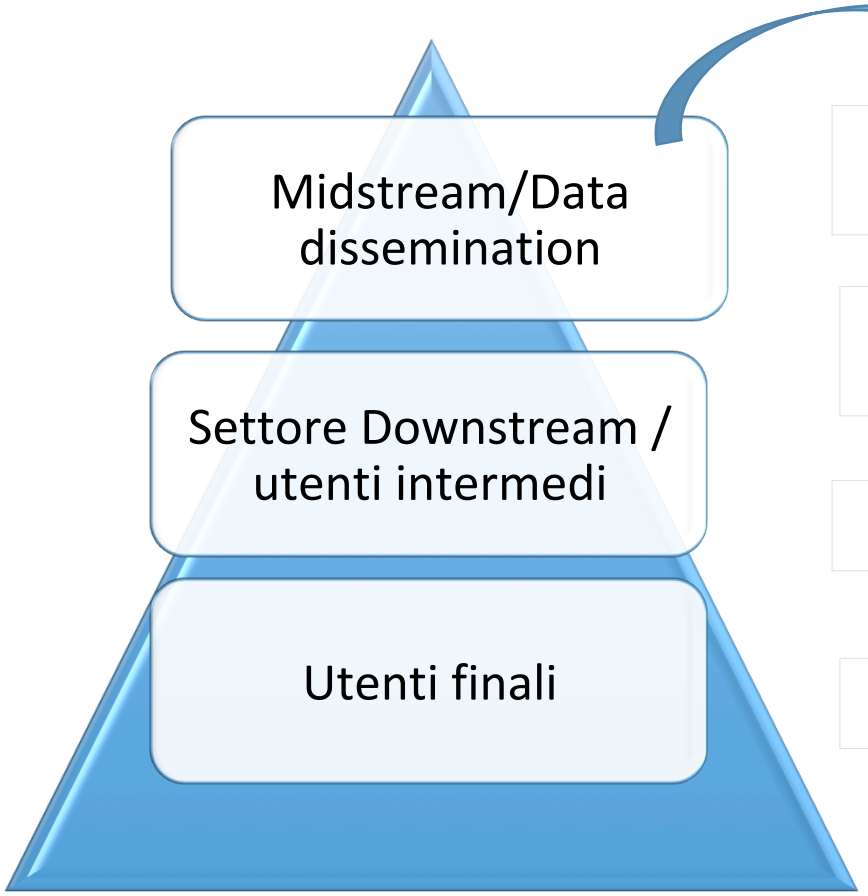
ERASMUS PLUS
SECTOR SKILLS ALLIANCE

TO DEVELOP A STRATEGIC APPROACH (BRLUEPRINT)

I tre componenti dello user uptake Copernicus



I tre componenti dello user uptake Copernicus



Facilitate access to Copernicus data & information

Facilitate discovery & view of Copernicus data & information

Access to cloud storage

Access to computing power

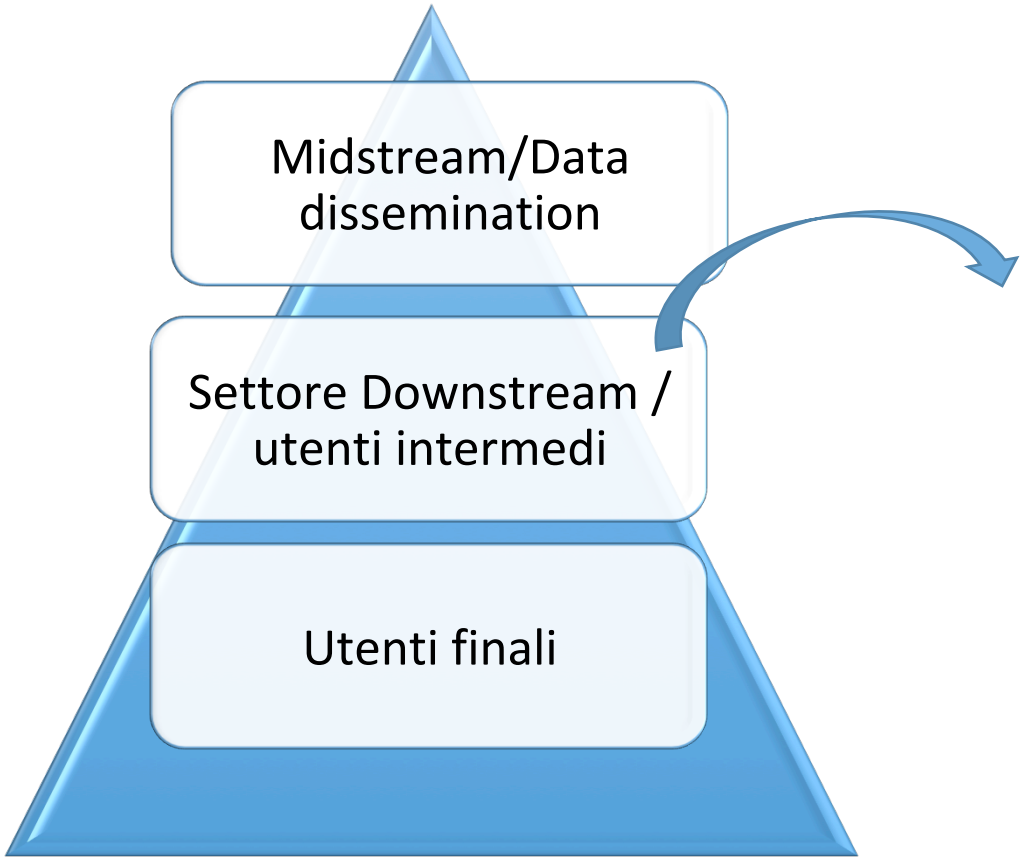
Support Copernicus data dissemination

Support user uptake related to geospatial products & services

Strengthen the European geospatial & cloud computing industry

Ensure non-dependency on third countries technologies

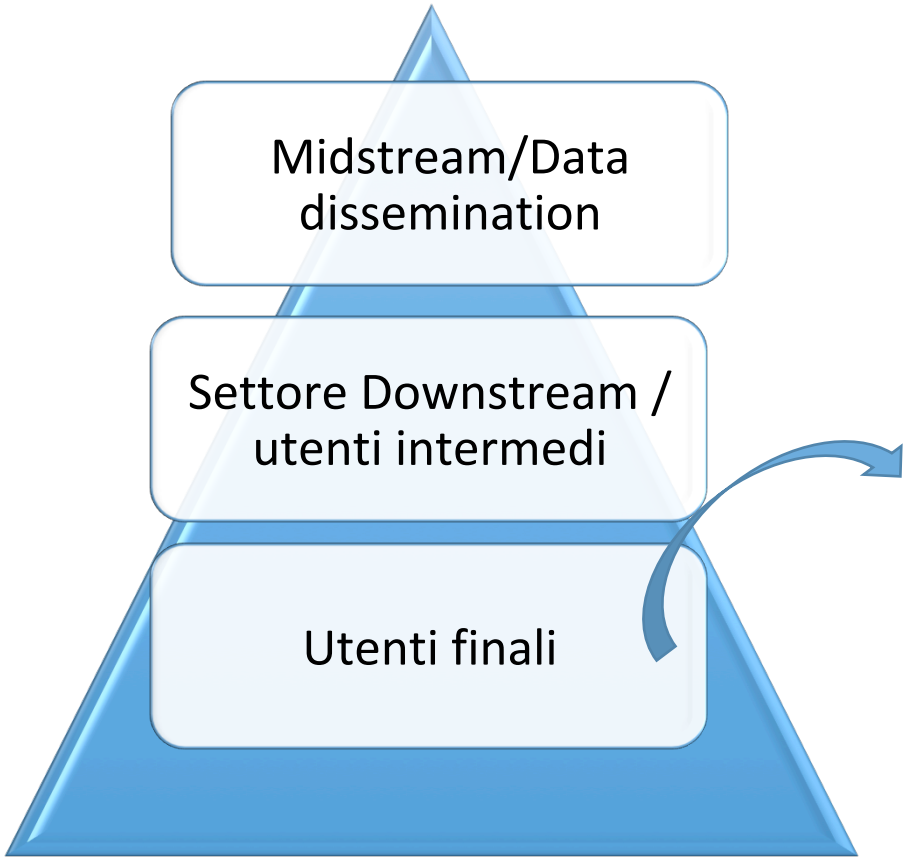
I tre componenti dello user uptake Copernicus



- Pre-processing
- Analysis
- Access to high and very high resolution imagery
- Value Added Services
- Fusion of EO imagery with other sources of data
- Display

"EO experts"

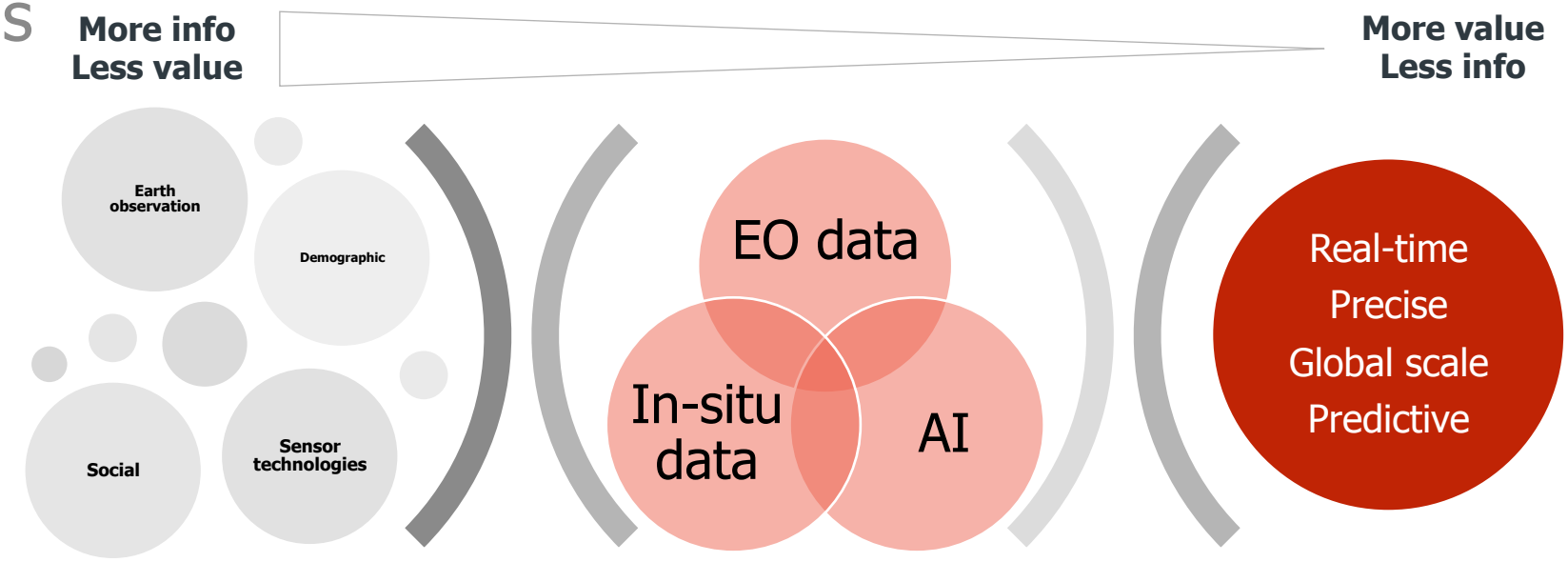
I tre componenti dello user uptake Copernicus



- Input EO-based products in their activities
- Very specific operational needs

Cloud and Platform era: from "Big Data" to "Big Indicators"

Remote-sensing technologies and ICT technologies (i.e. artificial intelligence) together will enable new insights into our toughest global problems



Disparate Data → Big Data → Big Indicators

- ❑ Unprecedented streams of data available
- ❑ Increasing real-time info about our world…
- ❑ … but limited value if used in isolation of each other

- ❑ Employ multiple data sets together
- ❑ Using cloud processing and AI to make insight from high volumes of information

- ❑ Turning information and insight into prediction
- ❑ Be able to track change in health of Earth's many systems
- ❑ Intervene in more targeted ways across bigger areas

La Rete Nazionale e le altre azioni di User Uptake

National Copernicus Academy Network

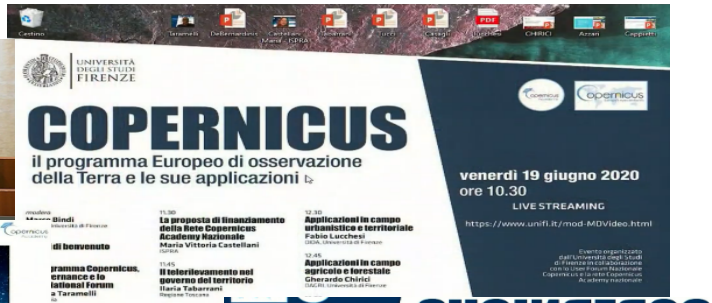
FAB SPACE 2.0

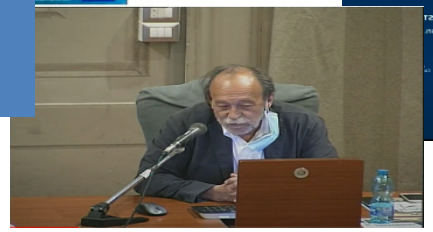
Geospatial Data and Satellite Facilities Open School
Viticoltura 4.0 e Paesaggio delle Colline Piemontesi
Istituto "Giovanni Penna", Asti 23 – 25 settembre 2019
Copernicus User Forum Nazionale
Copernicus Academy
Stati Generali dell'Innovazione

Il ***MIUR***, il ***Processo di Bologna*** e le ***European univeristies,*** iniziativa innovativa concepita nell'ambito del programma Erasmus plus per la creazione di curricula universitari condivisi tra università europee, garantendo la completa circolarità degli studenti nonché la reciprocità dei servizi di diritto allo studio.

Format condivisi a livello nazionale

Seminari di Ateneo
sul Programma Copernicus
mezza giornata in vdc





PROSSIMAMENTE

Università di Napoli Federico II
Politecnico Marche
Università di Trento

Copernicus Academy National Workshop
su uno specifico tema - 1 giorno

Perchè al PoliTO sul Climate Change Service (C3S)?

è un **centro di eccellenza** per le attività accademiche sul cambiamento climatico

è un membro della Rete dei "**Copernicus Academy**"

sessione mattutina presentazioni
sessione pomeridiana dimostrativa/addestrativa

170 partecipanti

Format condivisi a livello locale o settoriale

GeoData and Satellite Facilities Open Schools

Organizzato dal Coord.to CA con SGI con il supporto dell'Università locale

Si rivolge ad una generalità di soggetti

È Incentrata su uno **specifico tema**

Agricoltura 4.0 e

ATTESTATO DI PARTECIPAZIONE

Si attesta che

la xxxxxxxxxxxxx

ha partecipato in qualità di docente all'esercitazione organizzata presso l'ARPA Liguria sul *Copernicus Land Monitoring Service*

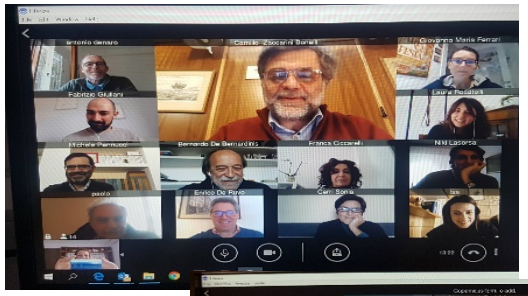
11 febbraio 2020

Il Delegato Nazionale
User Forum Europeo
Prof. Andrea Taramelli

Il Coordinatore della
Copernicus Academy
Prof. Bernardo De Bernardinis

Ref. Coordinamento Copernicus Academy: Dssa Maria Castellani, ISPRA

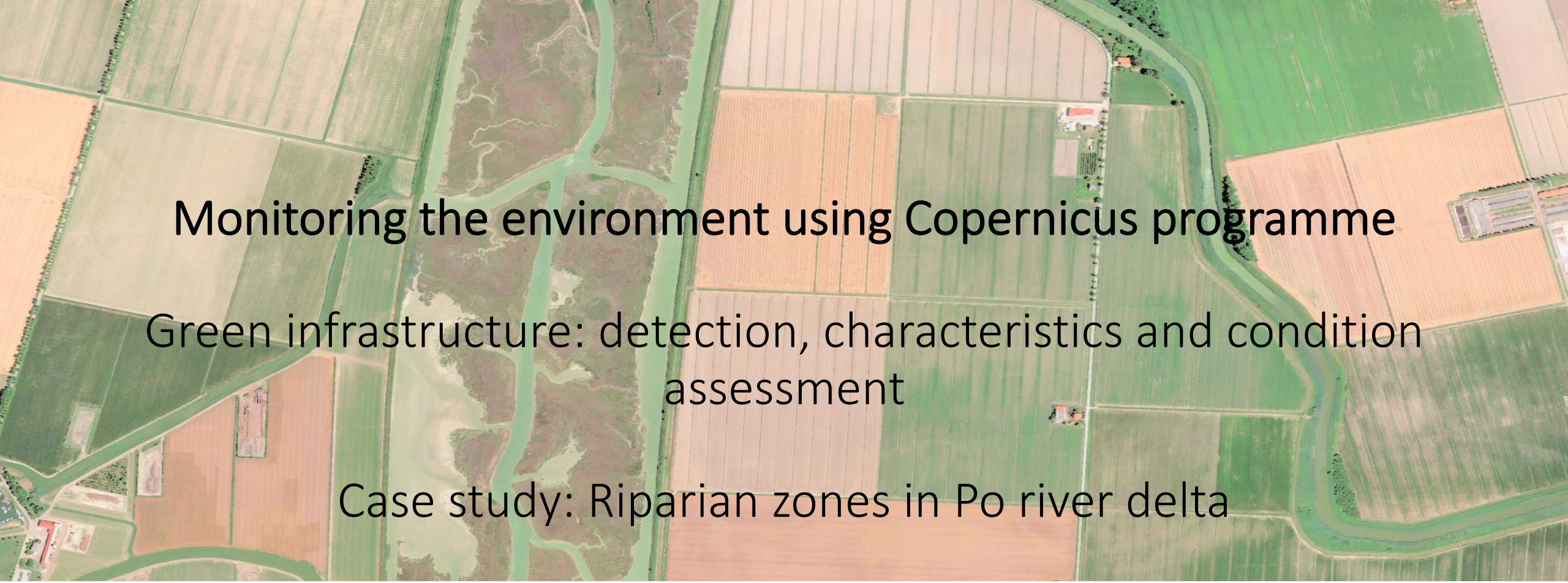
Certificato CA n. 01/2020



Seminari formativi/addestrativi rivolti alle Agenzie Regionali/Provinciali Ambientali (SNPA)

c/o ARPA Liguria

Con sessione addestrativa/esercitativa



Monitoring the environment using Copernicus programme

Green infrastructure: detection, characteristics and condition assessment

Case study: Riparian zones in Po river delta

Dr. Andrea Taramelli	IUSS Pavia, EUCENTRE, ISPRA	andrea.taramelli@iusspavia.it
Dr. Emiliana Valentini	CNR	emiliana.valentini@cnr.it
Dr. Laura Piedelobo	IUSS Pavia	laura.piedelobomartin@iusspavia.it

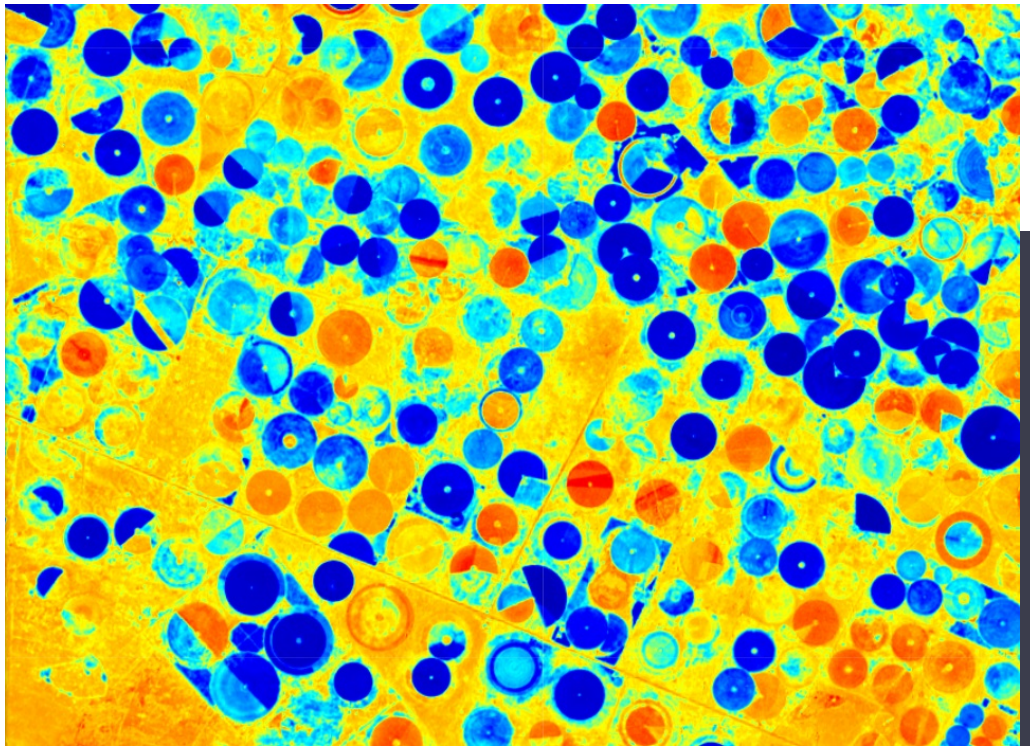
Remote sensing training

1. Satellite data
    1. Sentinel 2 and the multispectral instrument sensor (MSI)
    2. Biogeophysical indices: NDVI, EVI, NDWI
    3. Exercise: ENVI software. Downloading the Sentinel 2 image that captures Po river delta in July 2018, creating a layer stack, band combination visualization (true colour and false colour composites), calculating the NDVI and creating a region of interest (ROI).
    4. Spectral libraries
    5. Exercise: ENVI software. Visualizing a spectral library.
2. The Copernicus Land Monitoring Service, green infrastructure and Natural Water Retention Measures
    1. Exercise: Downloading the riparian zones LC/LU and delineation layers for Po river delta
    2. QGIS and the plugins
    3. Exercise: QGIS software. Condition assessment of GI in the riparian area of Po river basin in July 2018.

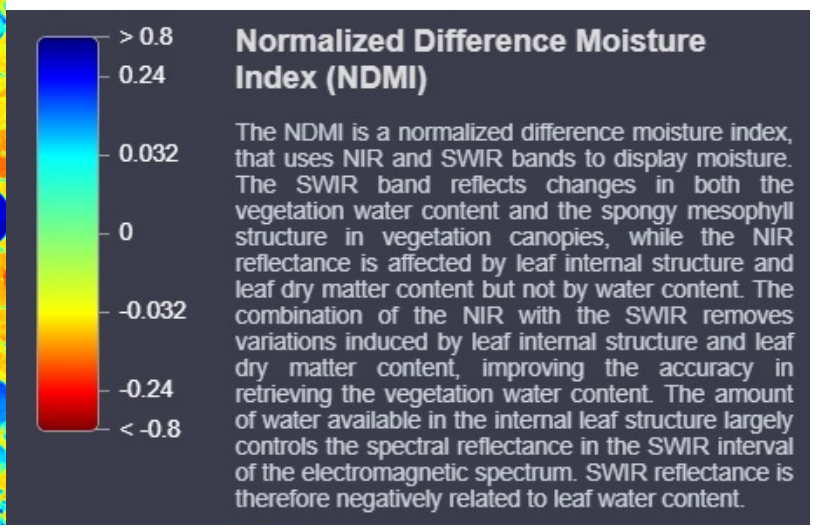
1. Satellite data

Biogeophysical indices: mathematical combination of 2 or more of the spectral bands which is more directly related to biophysical characteristics of interest, e.g., clhorophyl, leaf water content, vigorousness, health, phenological stages.

Water index



$$NDWI = \frac{NIR - SWIR_1}{NIR + SWIR_1},$$



Exercise: Download the Sentinel 2 image that captures Po river delta (Italy) the 18th of July 2018, creating a layer stack, band combination visualization (true colour and false colour composites), calculating the NDVI and creating a region of interest (ROI).

1. Satellite data

Copernicus DataHub: downloading Sentinel 2 data L2A (corrected from the atmospheric effect) with Sen2Cor algorithm. Under the European Space Agency (ESA)

You can download the images on this link

https://scihub.copernicus.eu/dhus/#/home

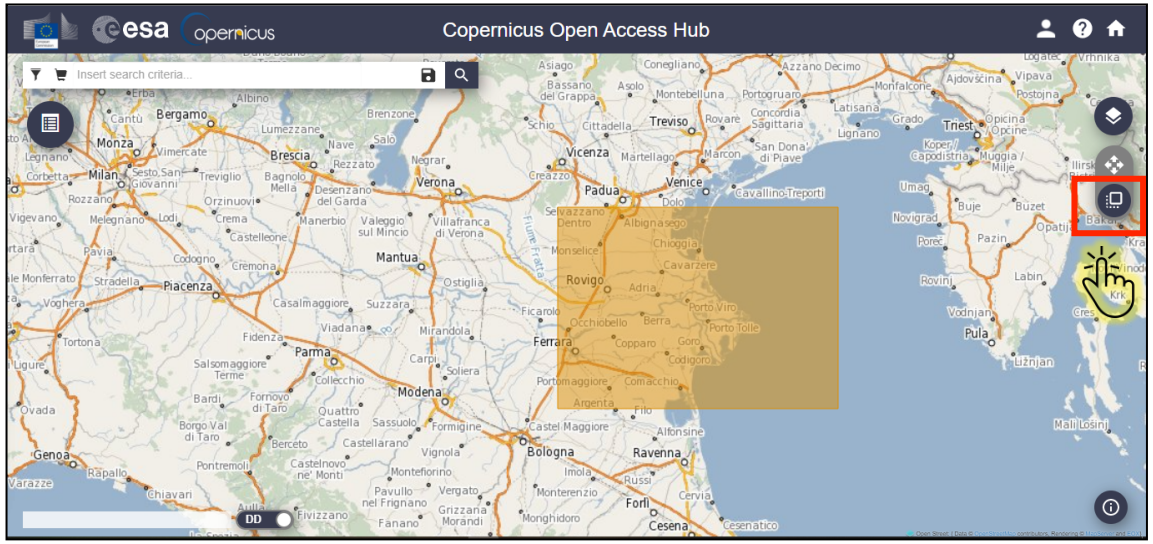
Create account:

First you need to create an account.
Just click on **“Sign in”** and enter your data

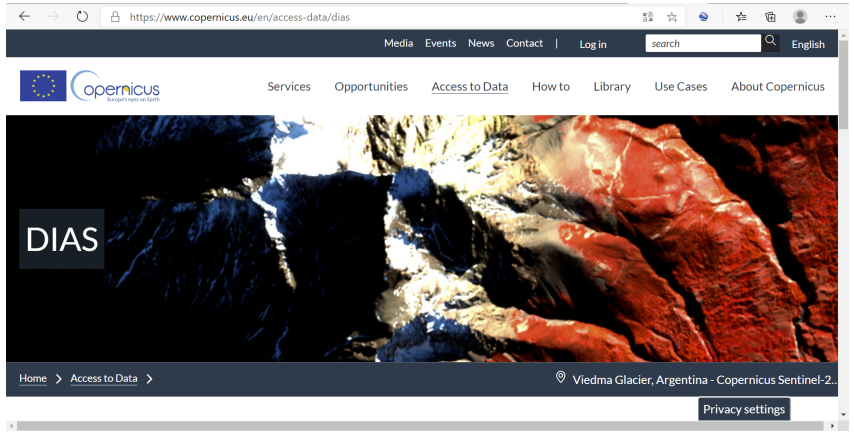
Select area:

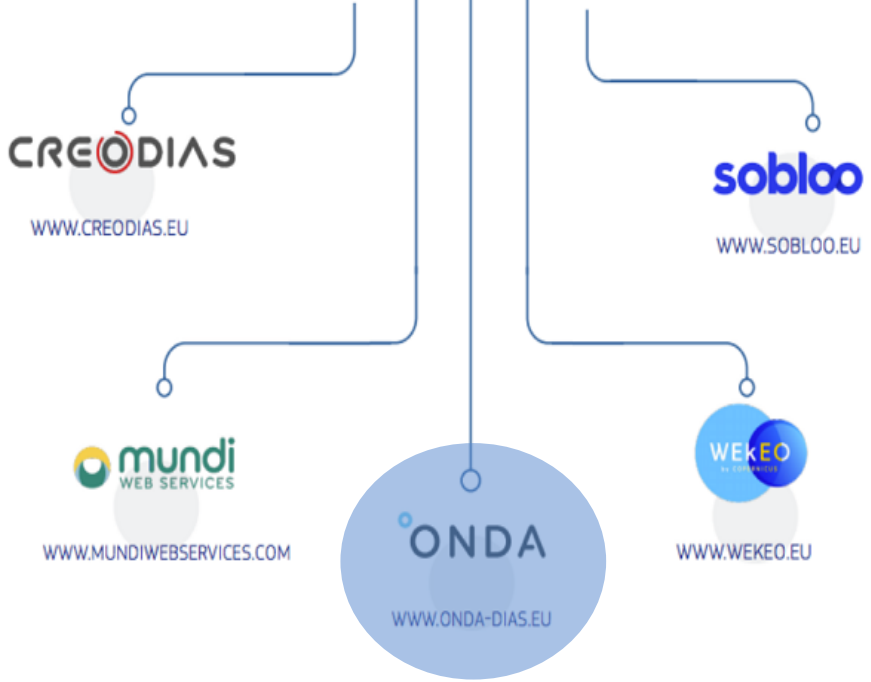
1. **Zoom in** on your area of interest

2. **Click** on “Switch to Area mode” 
and highlight the study area (Delta of the Po)



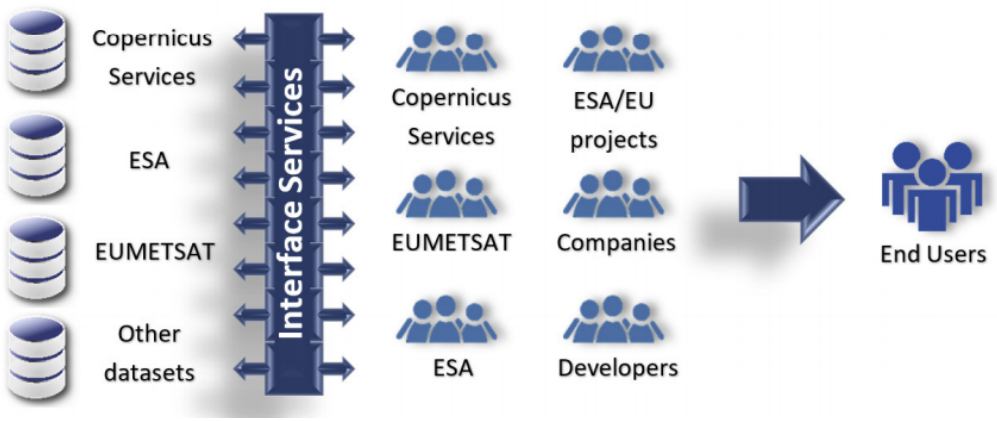
1. Satellite data





DIAS (Data and Information Access Services) are the five cloud platforms that provide centralized access to data and information from the Copernicus program and the tools for their electronic processing.

The five DIAS online platforms allow users to discover, use, process and download Copernicus data and information. They allow access to Sentinel satellite data and to all information products of Copernicus' six primary operational services (Core services) and cloud tools (open source and / or paid based on actual use).



Among the DIAS, **ONDA** is designed to support users of various levels of experience and ability to manage geospatial data for different purposes. Individual users, students and researchers interested in EO can access even if they do not have too many skills and knowledge of remote sensing systems.
https://www.onda-dias.eu/cms/
ONDA catalogue (https://catalogue.onda-dias.eu/catalogue/)

ONDA

HOME DATA SERVICES EDUCATION SHOWCASE ABOUT NEWS HELP

General Purpose

General purpose Virtual Servers
with balanced CPU
and memory resources.
Ideal for entry level or generic computing requirements.

Explore

Computing Intensive

High frequency CPU Virtual Servers
for powering your computational work.
Ideal for large data processing.

Explore

Memory Intensive

Memory optimised Virtual Servers
for fast processing.
Ideal for distributed parallel computing requirements.

Explore

GPU

Our most powerful public Cloud instances,
up to 1,000 times faster than the Computing
Intensive ones for parallel processing

Explore

Sandbox

Add storage to your instance

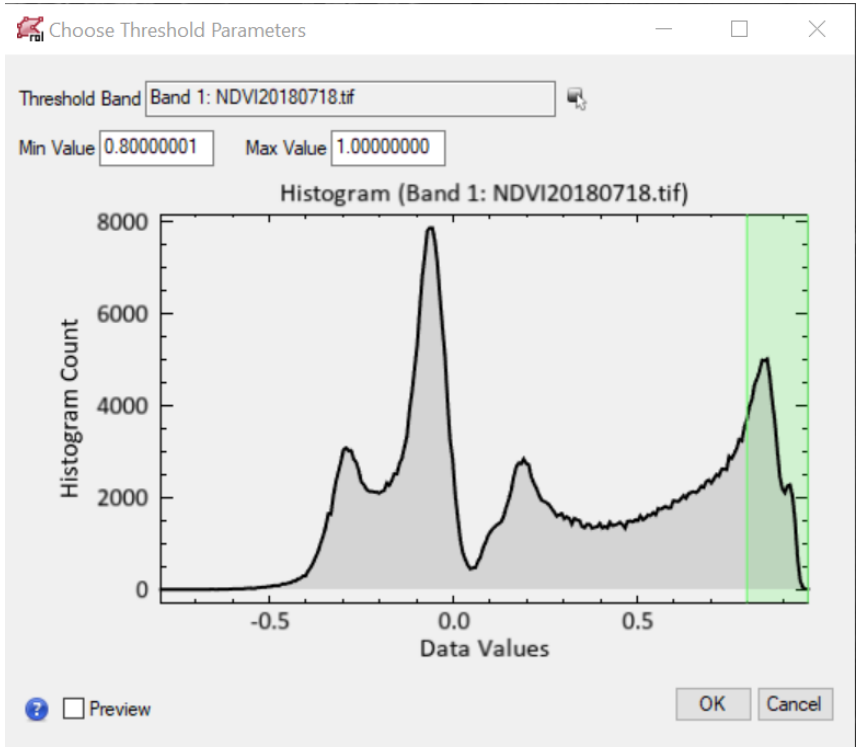
Solution	Model	RAM	Processor	Storage	Bandwidth	Price from
General Purpose	b2-120	120 GB	32 vCPUs	400 GB SSD	10.000 Mbps	325,00 € ex. VAT/month
General Purpose	b2-15	15 GB	4 vCPUs	100 GB SSD	250 Mbps	42,00 € ex. VAT/month
General Purpose	b2-30	30 GB	8 vCPUs	200 GB SSD	500 Mbps	85,00 € ex. VAT/month
General Purpose	b2-60	60 GB	16 vCPUs	400 GB SSD	1.000 Mbps	165,00 € ex. VAT/month
General Purpose	b2-7	7 GB	2 vCPUs	50 GB SSD	250 Mbps	22,00 € ex. VAT/month
Computing Intensive	c2-120	120 GB	32 vCPUs	400 GB SSD	10.000 Mbps	485,00 € ex. VAT/month
Computing Intensive	c2-15	15 GB	4 vCPUs	100 GB SSD	250 Mbps	62,00 € ex. VAT/month
Computing Intensive	c2-30	30 GB	8 vCPUs	200 GB SSD	500 Mbps	125,00 € ex. VAT/month
Computing Intensive	c2-60	60 GB	16 vCPUs	400 GB SSD	1.000 Mbps	245,00 € ex. VAT/month
Computing Intensive	c2-7	7 GB	2 vCPUs	50 GB SSD	250 Mbps	32,00 € ex. VAT/month
Memory intensive	r2-120	120 GB	8 vCPUs	200 GB SSD	1.000 Mbps	145,00 € ex. VAT/month
Memory intensive	r2-15	15 GB	2 vCPUs	50 GB SSD	250 Mbps	32,00 € ex. VAT/month
Memory intensive	r2-240	240 GB	16 vCPUs	400 GB SSD	10.000 Mbps	285,00 € ex. VAT/month
Memory intensive	r2-30	30 GB	2 vCPUs	50 GB SSD	250 Mbps	37,00 € ex. VAT/month
Memory intensive	r2-60	60 GB	4 vCPUs	100 GB SSD	250 Mbps	72,00 € ex. VAT/month
Sandbox	s1-2	2 GB	1 vCPUs	10 GB VPS-SSD	100 Mbps	2,99 € ex. VAT/month
Sandbox	s1-4	4 GB	1 vCPUs	20 GB VPS-SSD	100 Mbps	6,99 € ex. VAT/month
Sandbox	s1-8	8 GB	2 vCPUs	40 GB VPS-SSD	100 Mbps	12,99 € ex. VAT/month
GPU	t1-180	180 GB	32 vCPUs	50 GB RAID-NVME	10.000 Mbps	4.899,00 € ex. VAT/month
GPU	t1-45	45 GB	8 vCPUs	400 GB RAID-NVME	2.000 Mbps	1.199,99 € ex. VAT/month
GPU	t1-90	90 GB	16 vCPUs	800 GB RAID-NVME	4.000 Mbps	2.459,99 € ex. VAT/month

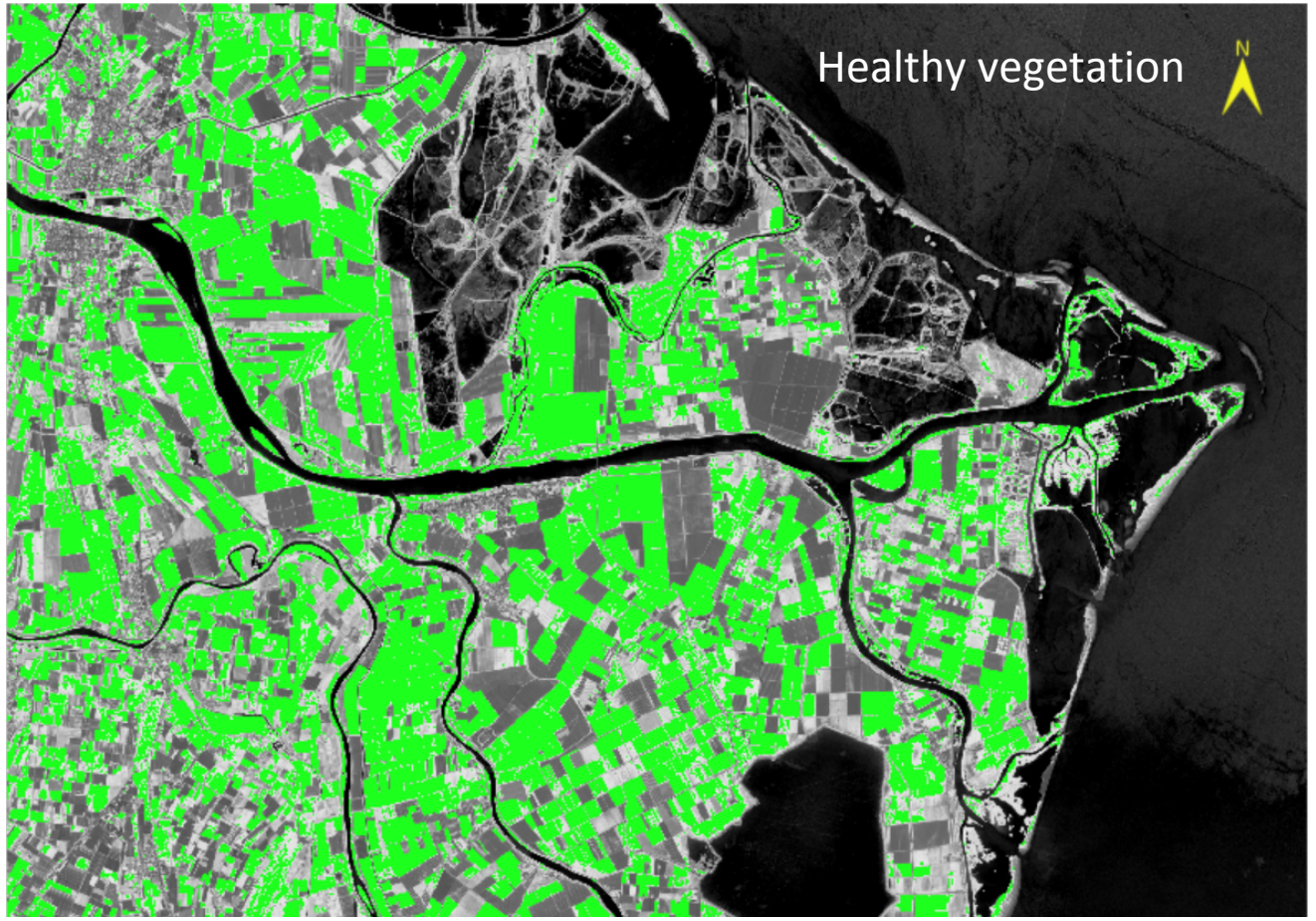
https://www.onda-dias.eu/cms/services/catalogues/virtual-servers/?wdt_column_filter%5B1%5D=#offer

1. Satellite data

Calculation of the NDVI and creation of a ROI defining a threshold.

7. Define the range between 0.8 and 1



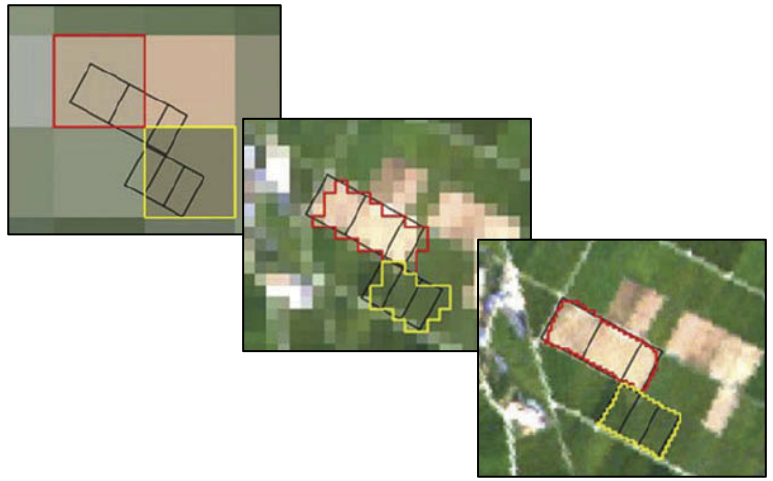


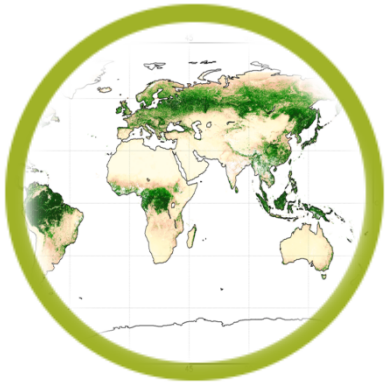
Remote sensing training

1. Satellite data
    1. Sentinel 2 and the multispectral instrument sensor (MSI)
    2. Biogeophysical indices: NDVI, EVI, NDWI
    3. Exercise: ENVI software. Downloading the Sentinel 2 image that captures Po river delta in July 2018, creating a layer stack, band combination visualization (true colour and false colour composites), calculating the NDVI and creating a region of interest (ROI).
    4. Spectral libraries
    5. Exercise: ENVI software. Visualizing a spectral library.
2. The Copernicus Land Monitoring Service, green infrastructure and Natural Water Retention Measures
    1. Exercise: Downloading the riparian zones LC/LU and delineation layers for Po river delta
    2. QGIS and the plugins
    3. Exercise: QGIS software. Condition assessment of GI in the riparian area of Po river basin in July 2018.

2. Copernicus Land Monitoring Service

Copernicus is a European system for monitoring the Earth. Data is collected by different sources, including Earth observation satellites and in-situ sensors. The data is processed and provides reliable and up-to-date information in six thematic areas: land, marine, atmosphere, climate change, emergency management and security. The land theme provides data in three levels of detail.





Global

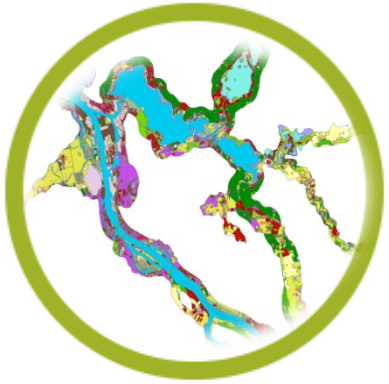
provides a series of bio-geophysical products on the status and evolution of the land surface at global scale at mid and low spatial resolution

e.g. Vegetation dynamics, biophysical parameters, energy balance

Pan-European

provides information about the land cover and land use (LC/LU), land cover and land use changes and land cover characteristics

e.g. Biodiversity, water bodies, land-use, land change



Local

focuses on different hotspots, i.e. areas that are prone to specific environmental challenges and problems

e.g. Riparian zones, Natura 2000, urban land-use

2. Copernicus Land Monitoring Service

Green infrastructure:

The EU Directorate General Environment (DG-ENV) promotes the use of nature-based green infrastructure solutions and this is progressively included in a range of policies of which for water.

Natural Water Retention Measures (NWRM) support Green Infrastructure by contributing to integrated goals dealing with nature and biodiversity conservation and restoration, landscaping, etc. NWRM are green infrastructures applied to the water sector, which permit to achieve and maintain healthy water ecosystems, and offer multiple benefits.

Natural water retention measures are catalogued according to 4 sectors: Agriculture, Forest, Hydromorphology and Urban in http://nwrm.eu/measures-catalogue

Piedelobo et al., 2019. Assessment of Green Infrastructure in Riparian Zones Using Copernicus Programme. Remote Sens. 11(24), 2967; https://doi.org/10.3390/rs11242967

Exercise: Download the Riparian Zones LC/LU and Delineation layers for Po river delta (Delineation Units DU005A and D018A)

2. Copernicus Land Monitoring Service

Riparian Zones:

Riparian zones represent transitional areas occurring between land and freshwater ecosystems, characterised by distinctive hydrology, soil and biotic conditions and strongly influenced by the stream water. They provide a wide range of riparian functions (e.g. chemical filtration, flood control, bank stabilization, aquatic life and riparian wildlife support, etc.) and ecosystem services.

The Riparian Zones products support the objectives of several European legal acts and policy initiatives, such as the EU Biodiversity Strategy to 2020, the Habitats and Birds Directives and the Water Framework Directive.

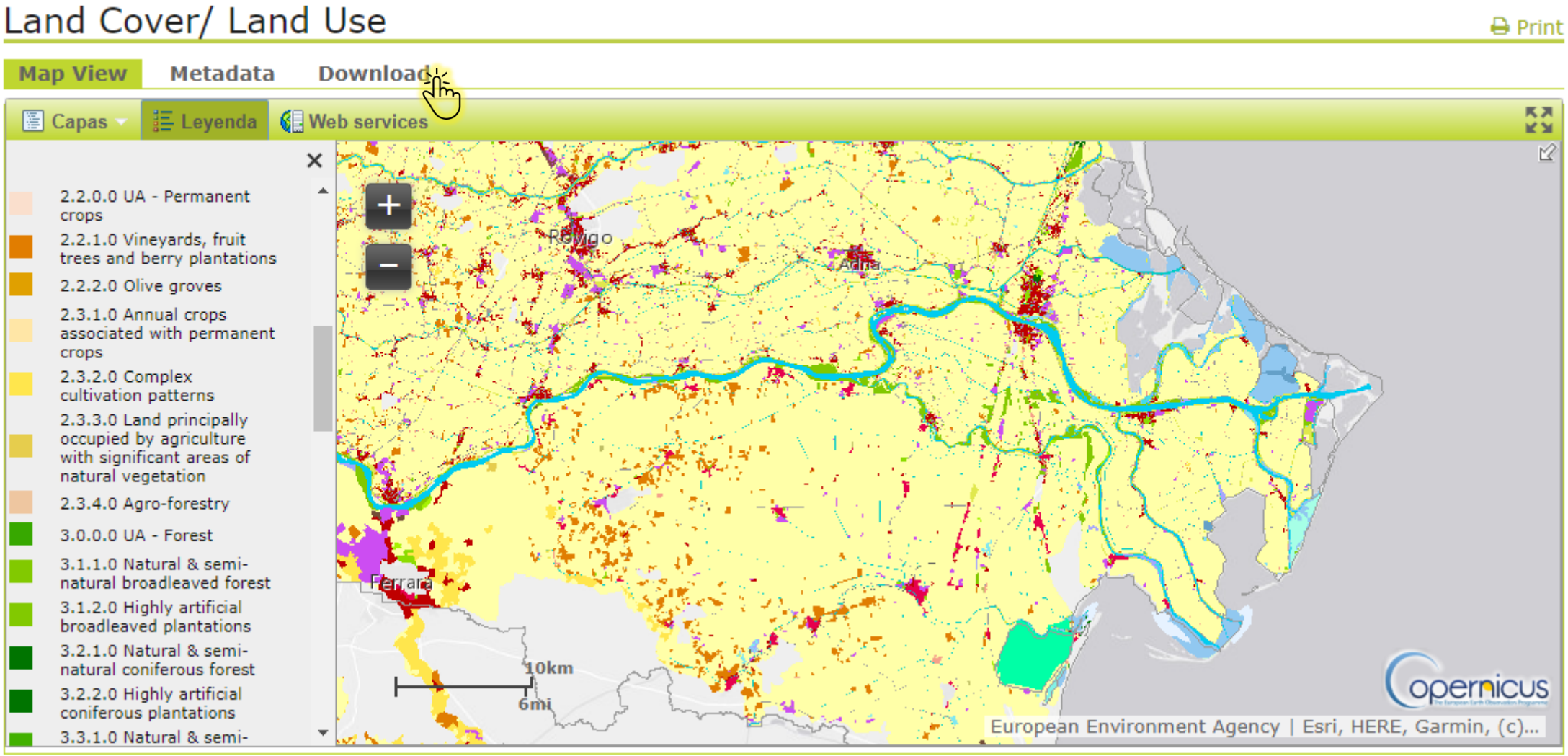
Three complementary product groups provide detailed information on the state and characteristics of riparian zones across the EEA member and cooperating countries.

Copernicus Land Monitoring Service: https://land.copernicus.eu/

2. Copernicus Land Monitoring Serv

Riparian Zones:

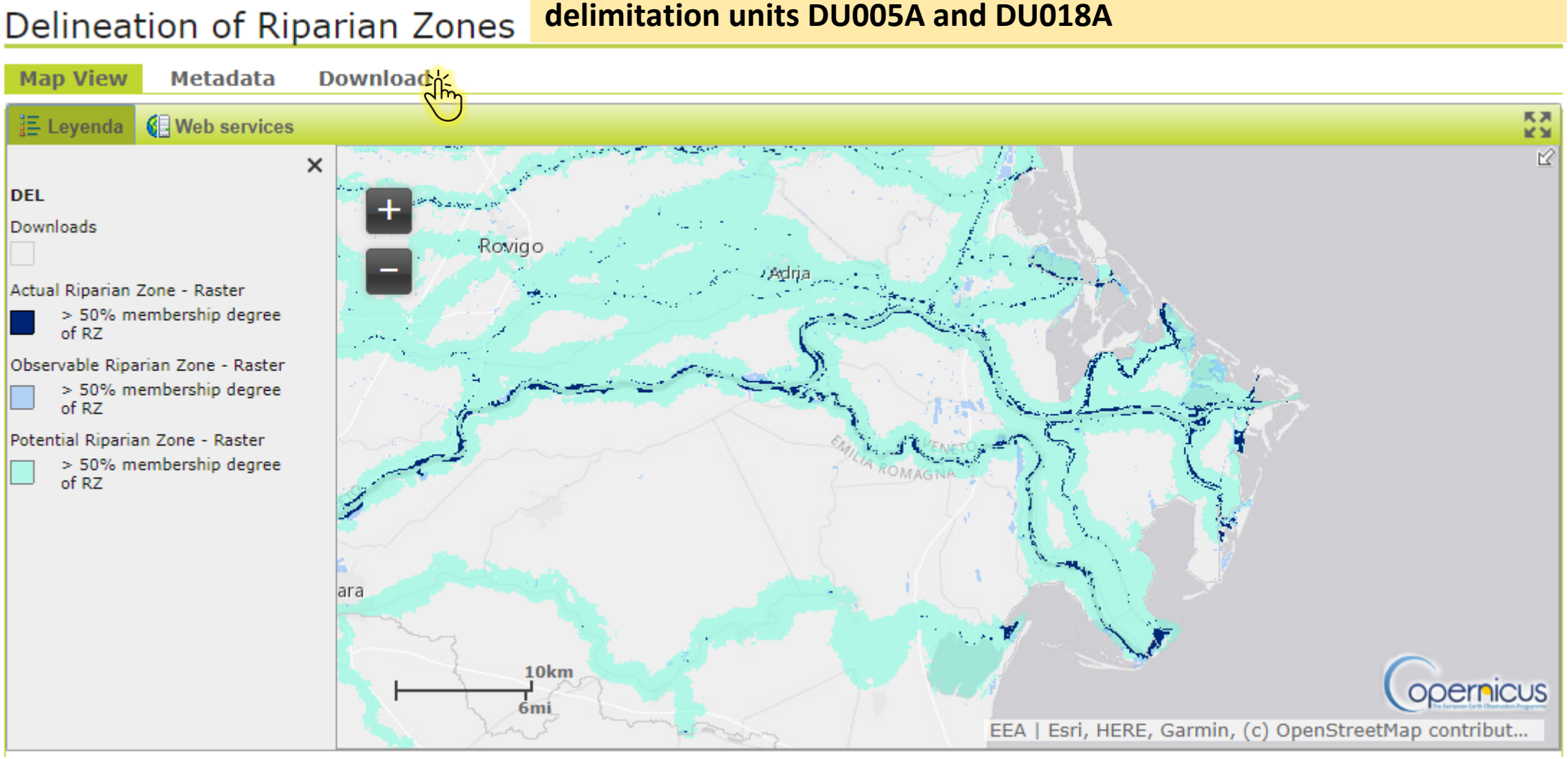
RZ LC/LU is a vector layer. Download delimitation units DU005A and DU018A



2. Copernicus Land Monitoring Serv

Riparian Zones:

RZ delineation is available as both vector and raster layer. Download delimitation units DU005A and DU018A



QGIS plugins add additional functionality to the QGIS application.

There is a collection of plugins ready to be used, available to download. These plugins can also be installed directly from the QGIS Plugin Manager within the QGIS application.

Plugins are developed by independent organizations and developers, the QGIS organization does not take any responsibility for them.

In QGIS, go to *Complements* > *Administrate and install complements*

Look for the plugin of interest and install it.

Some interesting plugins are:

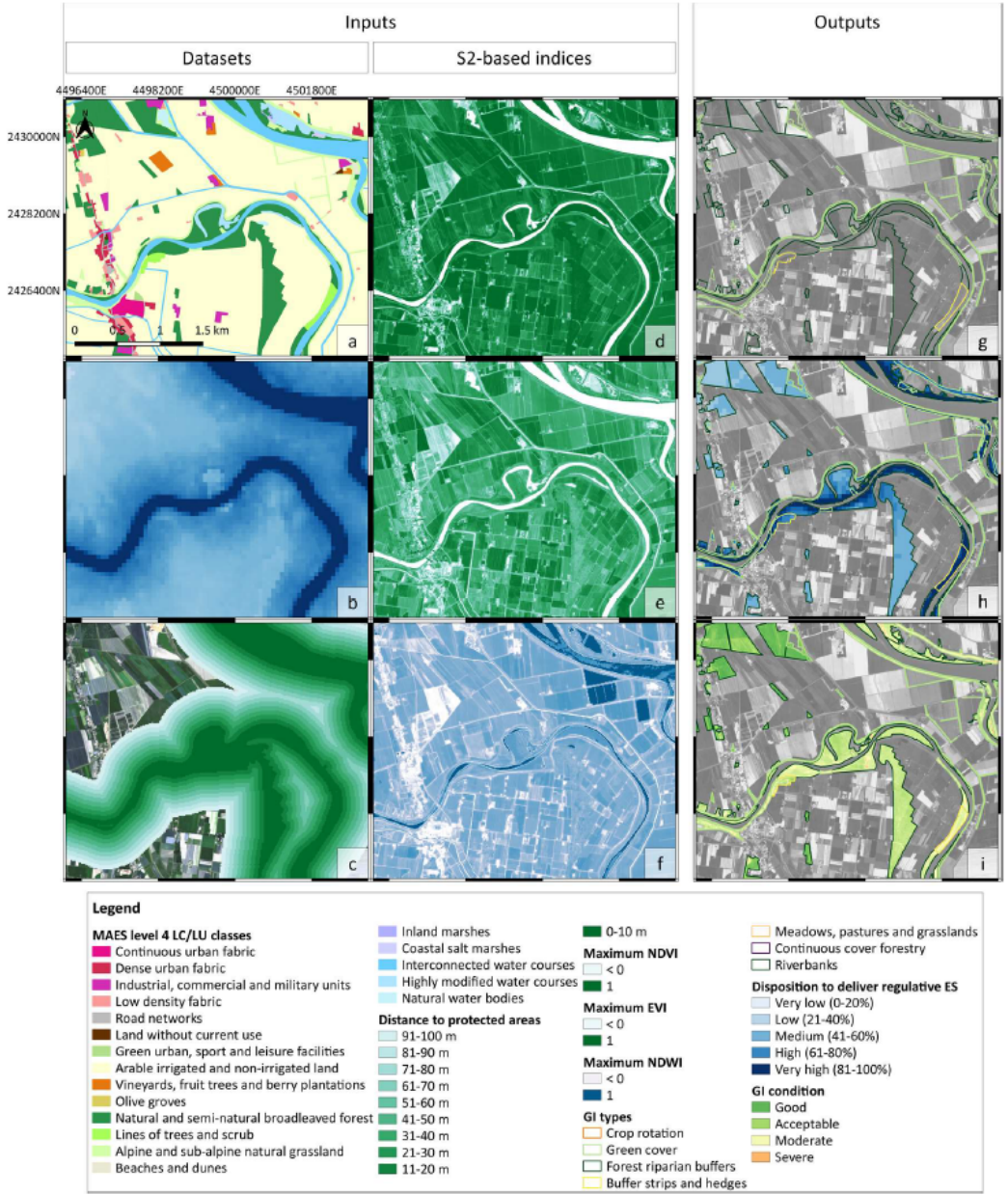
- ✓ Semi-Automatic Classification plugin
- ✓ QuickMapServices
- ✓ Temporal/Spectral Profile Tool

Attention! Your plugins must have the check in so you are able to visualize them in QGIS. ☑

Exercise: Condition assessment of GI in the riparian area of Po river basin in July 2018.

Input data:

- NDVI July 2018 (Vi)
- EVI July 2018 (Ei)
- NDWI July 2018 (Wi)
- Potential RZ membership (Di)
- Natura 2000 buffer (Ni)



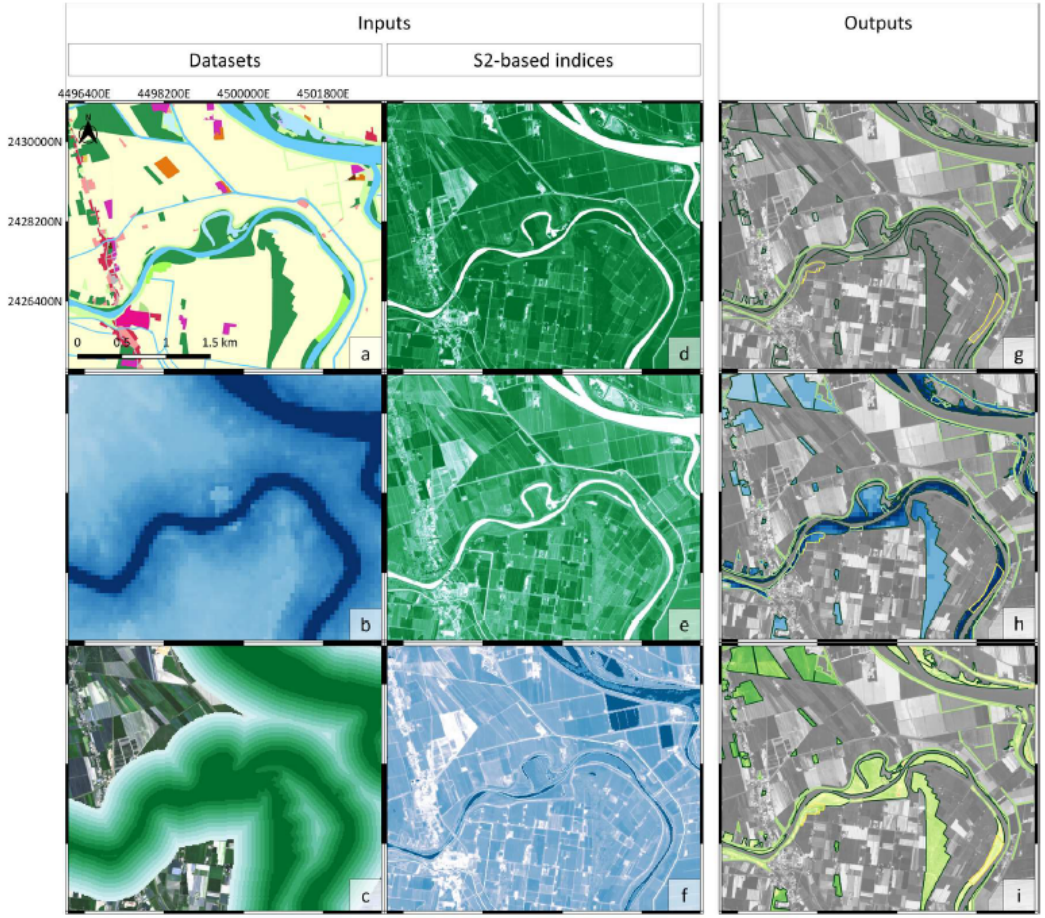
Riparian NWRM in an area of Po delta:
(a) MAES level 4 LC/LU classes (from RZ LC/LU).
(b) Disposition to deliver riparian ES (from DRZP).
(c) Distance to protected areas in Natura 2000.
(d) Maximum NDVI in 2018.
(e) Maximum EVI in 2018.
(f) Maximum NDWI in 2018.
(g) 1st output: Identification of agriculture and forest NWRM in riparian areas.
(h) 2nd output: Spatial model of GI disposition to deliver regulative ES.
(i) 3rd output: Pixel-based assessment of GI condition

Piedelobo et al., 2019. Assessment of Green Infrastructure in Riparian Zones Using Copernicus Programme. Remote Sens. 11(24), 2967; https://doi.org/10.3390/rs11242967

Exercise: Condition assessment of GI in the riparian area of Po river basin in July 2018.

Input data:

- NDVI July 2018 (Vi)
- EVI July 2018 (Ei)
- NDWI July 2018 (Wi)
- Potential RZ membership (Di)
- Natura 2000 buffer (Ni)



Capacity to provide ecosystem services — $D_i = D/10;\ [0,10]$,

Membership in Natura 2000 network — $N_i = N/10;\ [0, 10]$,

Greenness response and water stress

$V_i = NDVI(BOA)_{maxi} \cdot 10;\ [0, 10]$,

$E_i = EVI(BOA)_{maxi} \cdot 10;\ [0, 10]$,

$W_i = NDWI(BOA)_{maxi} \cdot 10;\ [0, 10]$,

$$\text{Conservation condition, } C_i = D_i + N_i + V_i + E_i + W_i;\ \forall j,\ [0,\ 50],$$