

Primo meeting nazionale del National Collaboration Programme per il CLMS – Fase 2

Caso studio 2: sinergia prodotti satellitari e droni

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Il gruppo di lavoro DRONI SNPA

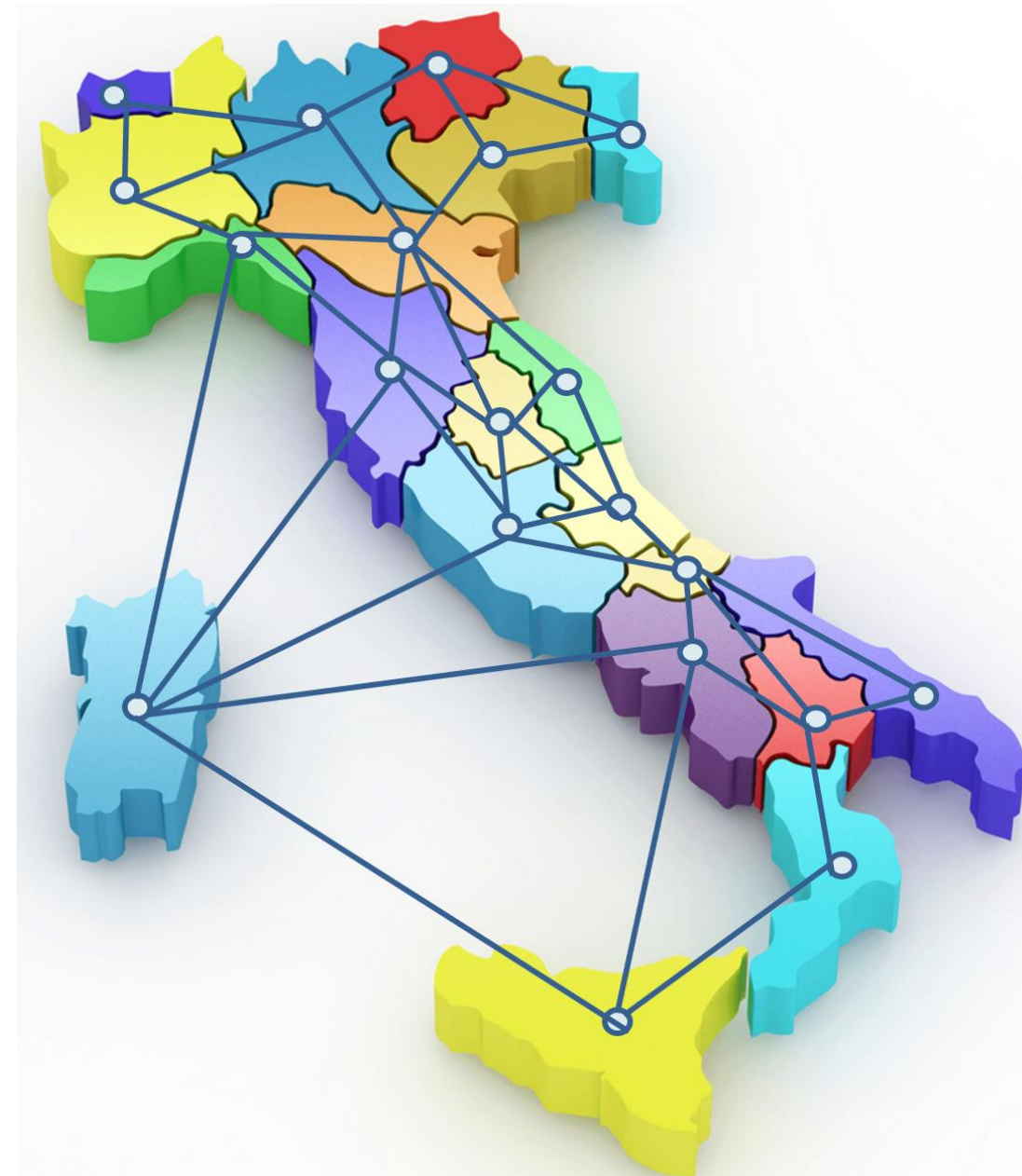
SNPA = 21 Agenzie Regionali (**ARPA**) e Provinciali (**APPA**) + **ISPRA**

OBIETTIVO:

Migliorare l'efficienza e l'efficacia del monitoraggio e del controllo ambientale attraverso tecniche di osservazione della Terra e utilizzo integrato di **strumenti innovativi**.

ATTIVITA':

- **mappatura dello stato dell'arte** dell'impiego di droni all'interno del SNPA;
- **confronto tecnico-operativo e condivisione delle esperienze**;
- **messa a sistema** delle procedure metodologiche - operative, e **definizione di uno standard SNPA**, per la realizzazione di rilievi, l'elaborazione dei dati e l'analisi delle informazioni di interesse ambientale. Redazione di **linee guida SNPA**.



L'uso dei DRONI nel SNPA

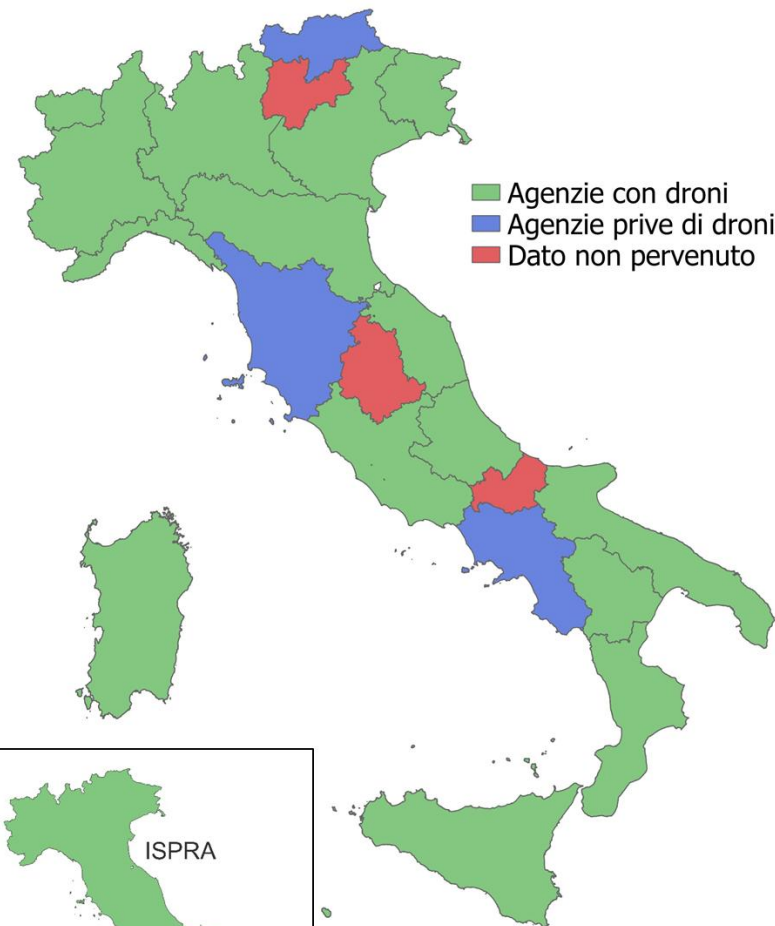
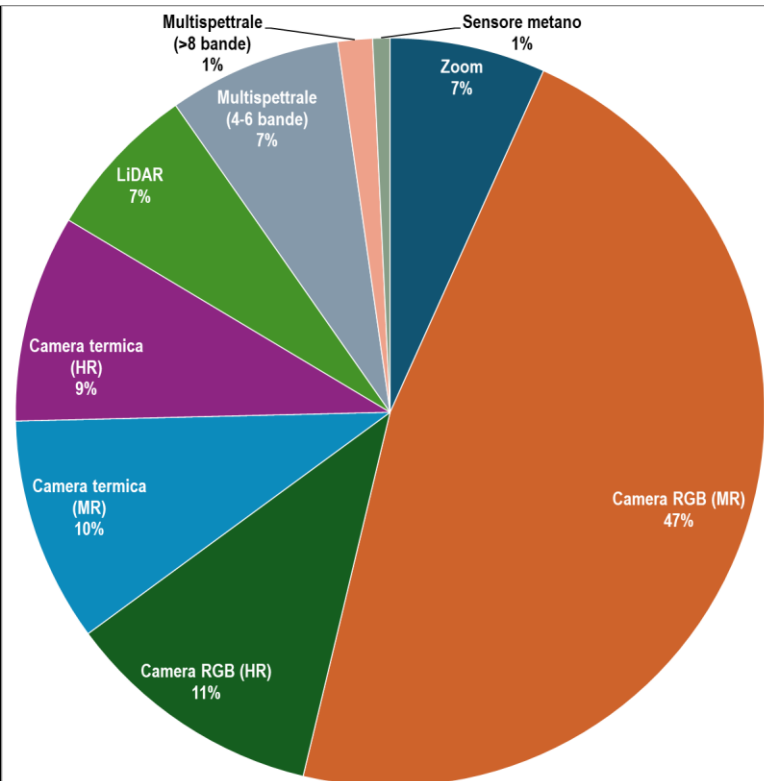
https://www.snpambiente.it/wp-content/uploads/2025/06/Impiego-e-gestione-dei-droni-nel-SNPA_2025.pdf



IMPIEGO E GESTIONE DI DRONI NEL SNPA PER IL MONITORAGGIO E IL CONTROLLO AMBIENTALE

Delibera del Consiglio SNPA n.283/25 del 21.05.2025

PUBBLICAZIONI TECNICHE
SNPA 2025



Le applicazioni tematiche

Ambienti terrestri

Mappatura e monitoraggio di habitat terrestri

Monitoraggio di fattori perturbanti

Monitoraggio della morfologia fluviale

Monitoraggio frane

Colate detritiche

Impatti di fenomeni alluvionali

Monitoraggio glaciale

Monitoraggio nivologico

Monitoraggio ambienti soggetti a permafrost



Ambienti marini, marino-costieri e lagunari

Mappatura e monitoraggio di habitat marini

Acquacoltura

Morfologia e linea di costa

Dinamica ambienti dunali

Monitoraggio e ricerca di sversamento idrocarburi

Identificazione rifiuti plastici

Monitoraggio e censimento avifauna acquatica



Ambienti antropizzati

Monitoraggio processi produttivi e impianti

Ispezione siti industriali a seguito di incidente

Controllo e gestione dei rifiuti

Monitoraggio discariche/cave

Monitoraggio sversamenti

Monitoraggio operazioni di sfangamento di invasi

Valutazione della luminanza (ambiente notturno)



Caso studio 2: integrazione di dati UAS e prodotti CLMS

- a)** Monitoraggio dei **copri idrici superficiali** e delle dinamiche per lo studio della disponibilità idrica (estensione e livelli) e dei potenziali impatti sugli ecosistemi.
- **Laghi** (montani in morfologia incassata, con vegetazione perilacuale e versanti ombreggiati oppure grandi laghi con ampi settori a battente ridotto)
 - **Fiumi**

Parametro da monitorare: variazione della superficie bagnata, stato della vegetazione

Prodotti CLMS: water bodies (water extent, water cover duration), vegetation; NDWI (S2)

Dati UAS ad altissima risoluzione: per confronto/validazione dei prodotti CLMS e miglioramento della classificazione, specialmente nelle condizioni tecnicamente più complesse (ombre topografiche, vegetazione incombente).

Lago Trasimeno

Integrazione di dati UAS, CLMS e LiDAR per il monitoraggio multiscala della dinamica costiera

Caso studio



Monitoraggio della dinamica della linea di costa e delle variazioni delle aree emerse/livelli d'acqua.



Area pilota: settori costieri del Lago Trasimeno e stazioni/transects di monitoraggio.



Approccio multiscala per supportare analisi ambientali e gestione del lago.

Dati integrati



Ortofoto e modelli 3D da UAS.



Water Cover Duration – 10 m (CLMS).



Dati LiDAR / modelli altimetrici.



Linee di costa derivate da satellite.



CLMS Water Cover Duration – 10 m

Prodotto annuale europeo dal 2016

Sentinel-1 + Sentinel-2

Che cosa rappresenta

Durata della copertura d'acqua espressa in giorni/anno, utile per distinguere aree temporanee e permanenti.



Linee di costa da satellite

Isola Maggiore

Isola Polvese

TRANS241

TRANS212

TRANS167

TRANS134

TRANS113

TRANS296

TRANS319

TRANS068

TRANS043

TRANS025

TRANS388

TRANS450

TRANS450

TRANS467

0 2,5 5 10 km

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Portfolio overview

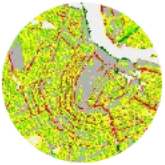
Wondering which data to use for your application? Ask [Copernicus Observia](#).

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Cover & Use](#)[Land Cover & Use
in Priority Areas](#)[Bio-geophysical
Variables](#)[Ground Motion
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Mosaics](#)[Reference &
Validation Data](#)**Bio-geophysical Variables**[Summary](#) [Detailed](#) 

Qualified products on the status and evolution of the land surface globally and in Europe.

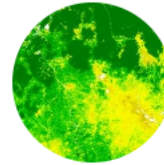


Qualified products on the status and evolution of the land surface globally and in Europe.



Temperature and Reflectance

The Temperature and Reflectance product group at global scale provides data about the energy budget at the land and inland water surfaces.



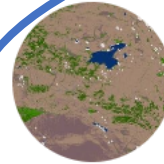
Vegetation

The Vegetation product group provides products describing the state, the dynamism and the disturbances of the terrestrial vegetation globally and in Europe.



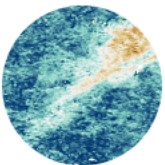
Snow

The Snow product group provides data about snow properties on land globally and in Europe.



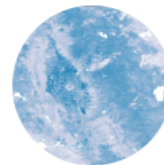
Water Bodies

The Water product group provides information about the surface extent covered by water on a permanent basis, lake water quality, water level of lakes and rivers and ice occurrences in the hydrographic network worldwide and in Europe.



Soil Moisture

The Soil Moisture product group provides data about the relative water content in the soil and the moisture condition at various depths in the soil globally and in Europe.



Evapotranspiration

The Evapotranspiration product group provides data about actual evapotranspiration, soil evaporation, canopy transpiration, sensible heat flux and latent heat flux with global coverage.

Water Bodies



[View in the data viewer](#)

[Overview](#)

[Technical summary](#)

Water is fundamental to life on Earth. To understand its role in ecosystems and human societies, we must examine key characteristics that influence its quality and availability. For example, understanding the water's surface temperature is key for monitoring climate change and modelling weather patterns. Tracking water levels in lakes and rivers helps in flood prediction, irrigation planning, and hydroelectric power generation. The presence and extent of ice on lakes and rivers can have significant implications for regional climates, ecosystems, and human activities. Moreover, the surface extent of water bodies, whether permanent or ephemeral, informs land management across various sectors. In an era marked by environmental change, these metrics offer insights into sustainable water resource management.

The Water Bodies product group offers users a variety of tailored datasets that deliver accurate, near-real time information on European and global water resources. The data enable researchers, policymakers and industries to make informed decisions that balance resource use with environmental sustainability. Whether by helping to monitor fragile ecosystems or supporting long term community planning, these products bridge the gap between observation and action, ensuring that water—one of Earth's most vital resources—is managed wisely in a changing world.

Water Extent >

Detects at global scale the areas covered by inland water.

River and Lake Ice Extent >

Classifies ice for freshwater bodies in Europe and at global scale.

River and Lake Water Level >

Provides at global scale the height, in meters above the geoid, of the reflecting surface of continental water bodies.

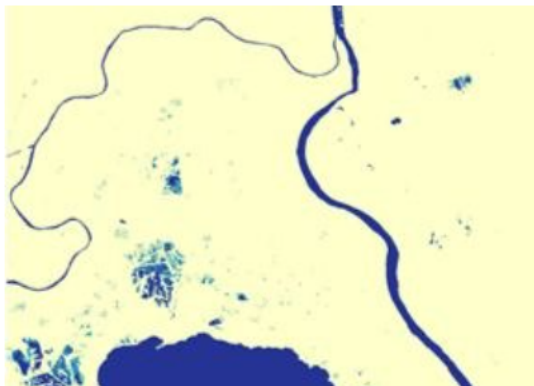
Lake Water Quality >

Provides a semi-continuous water quality observation record for medium and large-sized lakes around the globe.

Water Cover Duration 2016-present (raster 10 m and 100 m), Europe, yearly

General info

Download



Production updates

02.10.2026

Provides at European level and on an annual basis the duration of surface water occurrence as the number of days per hydrological year, allowing to separate temporary and permanent water. Additionally, this information is essential to differentiate snow on ice and land since it provides a probability that a particular pixel is frozen or liquid water. Water Cover Duration is based on Sentinel-1 and Sentinel-2 imagery at 10 and 100 m resolution with the temporal extent from 2016 to present.

Validation status

Not validated

Dataset citation

- DOI (raster 10 m): <https://doi.org/10.2909/39e1ff33-01d9-45c2-9edc-00924383f34f>
- DOI (raster 100 m): <https://doi.org/10.2909/f2dab19c-57d5-4b26-9c1b-9dababff1f2a>

NDWI, Normalized Difference Water Index

The NDWI is used to monitor changes related to water content in water bodies. As water bodies strongly absorb light in visible to infrared electromagnetic spectrum, NDWI uses green and near infrared bands to highlight water bodies.

The index was proposed by McFeeters, 1996.

$$\text{NDWI} = \text{Green} - \text{NIR} / \text{Green} + \text{NIR}$$

- Sentinel-2 **NDWI = (B03 - B08) / (B03 + B08)**

Caso studio 2: integrazione di dati UAS e prodotti CLMS

b) Monitoraggio della **copertura di alberi nelle zone del limite superiore della vegetazione** (caratterizzate da un gradiente di copertura forestale variabile in funzione delle condizioni ambientali e di uso antropico della risorsa): migliorarne la conoscenza fornisce indicazioni interessanti sui processi di abbandono delle pratiche pastorali in quota a vantaggio di formazioni più naturali (rinaturalizzazione).

Parametro da monitorare: copertura forestale

Prodotti CLMS: Tree Cover Density 2018-present (raster 10 m), Europe, yearly

Dati UAS ad altissima risoluzione: per confronto/validazione dei prodotti CLMS

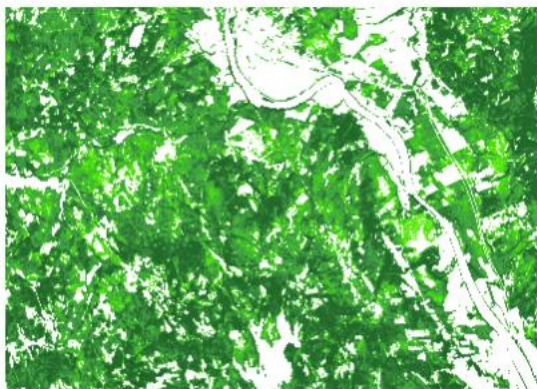


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Tree Cover Density 2018-present (raster 10 m), Europe, yearly

General info

Download



Provides an annual pan-European tree cover density map at 10m resolution for the period from the 2018 reference year onwards expressed as a percentage (1–100%) per pixel and representing the vertical projection of tree crowns onto the ground.

Validation status

Validated

Dataset citation

- DOI: <https://doi.org/10.2909/e677441e-fb94-431c-b4f9-304f10e4dfd8>

