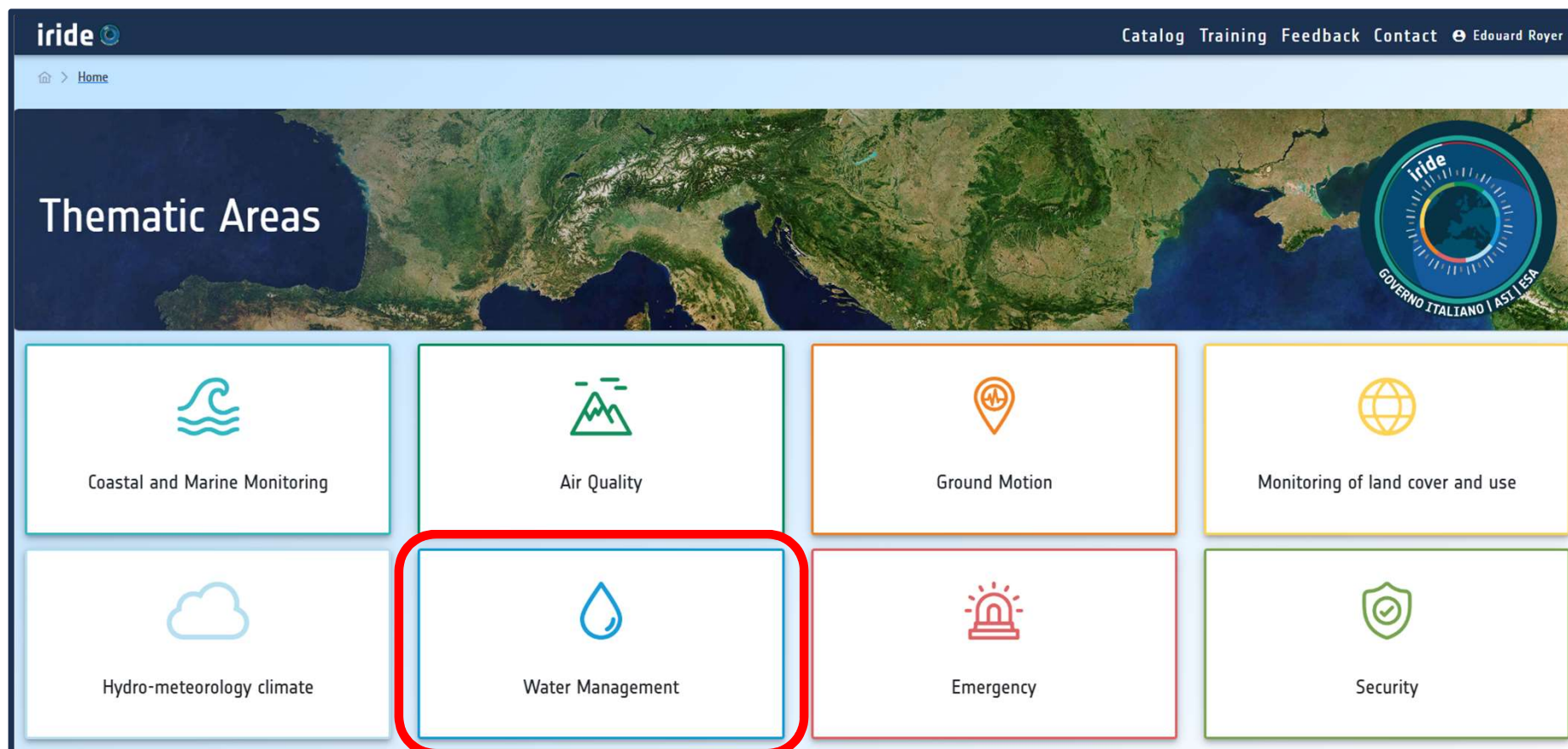


S6 – Water Management



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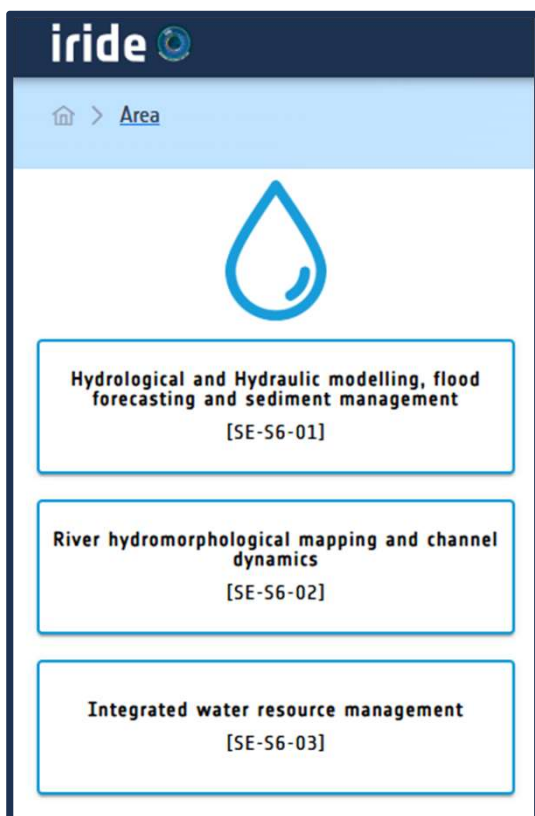


S6 – Water Management

L'obiettivo è avere una **comprensione più completa dei processi fluviali e del ciclo idrologico** in un clima che cambia, per avanzare verso una **gestione sostenibile dei fiumi e delle acque** e per supportare la **riduzione dei rischi**.

Perché i servizi IRIDE ?

- **Prodotti innovativi** attualmente non disponibili operativamente a livello nazionale
- Informazioni a supporto di tutti gli attori, le autorità competenti e i decisori coinvolti nell'attuazione della **Direttiva Quadro sulle Acque 2000/60/EC**, della **Direttiva sulle Alluvioni 2007/60/EC** e delle relative legislazioni italiane



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Hydrological and Hydraulic modelling, flood forecasting and sediment management



Water Management

Hydrological and Hydraulic modelling, flood forecasting and sediment management

[SE-S6-01]

River hydromorphological mapping and channel dynamics

[SE-S6-02]

Integrated water resource management

[SE-S6-03]

Il servizio mira a supportare un'ampia gamma di esigenze legate al ciclo idrologico: dalla valutazione delle risorse idriche alla classificazione della gravità degli eventi alluvionali.

Una serie di prodotti geospaziali vengono forniti a cadenza giornaliera su scala nazionale, attraverso l'integrazione di modellazione idrologica e idraulica con dati satellitari e misure a terra.

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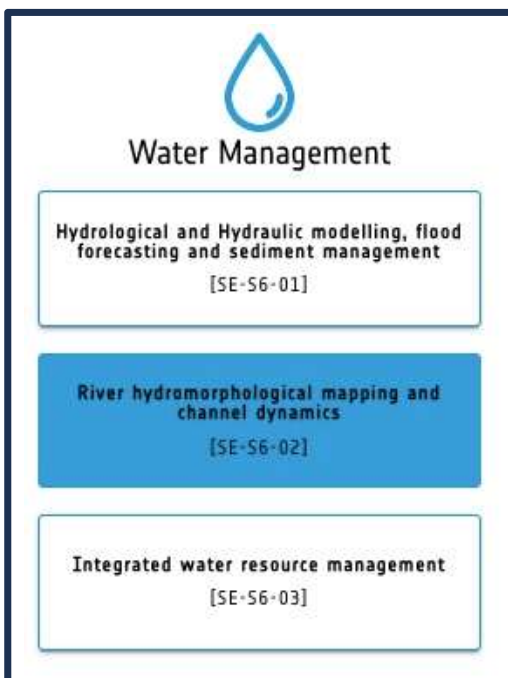
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River hydromorphological mapping and channel dynamics



Questo servizio mira a fornire un **osservatorio idro-morfologico fluviale su scala nazionale** per fiumi di dimensioni medio-grandi e piccole (larghezza alveo 15-50 m, utilizzando dati Copernicus e IRIDE), allo scopo di supportare la valutazione spazio-temporale delle **dinamiche degli alvei fluviali** in modo continuo e confrontabile su tutto il territorio nazionale.

Il servizio rappresenta un sistema di monitoraggio idro-morfologico basato sull'intelligenza artificiale, caratterizzato da una serie di indicatori idro-morfologici, calcolati automaticamente e sistematicamente a partire dai dati di Osservazione della Terra.

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Integrated water resource management



Water Management

Hydrological and Hydraulic modelling, flood forecasting and sediment management

[SE-S6-01]

River hydromorphological mapping and channel dynamics

[SE-S6-02]

Integrated water resource management

[SE-S6-03]

Il servizio consiste in una serie di indicatori a supporto della **gestione integrata delle risorse idriche**, relativamente a due ambiti tematici: **acqua e siccità**.

Utilizzando dati di Osservazione della Terra (Copernicus e IRIDE) e da modellazione numerica, il servizio fornisce indicatori specifici per i due ambiti, ad alta risoluzione spaziale ed elevata frequenza temporale, su tutto il territorio nazionale.

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Idrologia e dinamiche fluviali

Giulio Ceriola, Planetek Italia
ceriola@planetek.it

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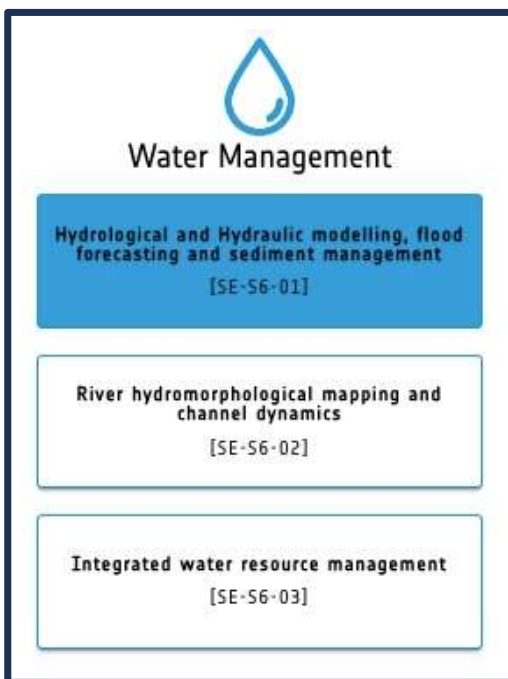
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Hydrological and Hydraulic modelling, flood forecasting and sediment management



○ Support to Hydrology (500m):

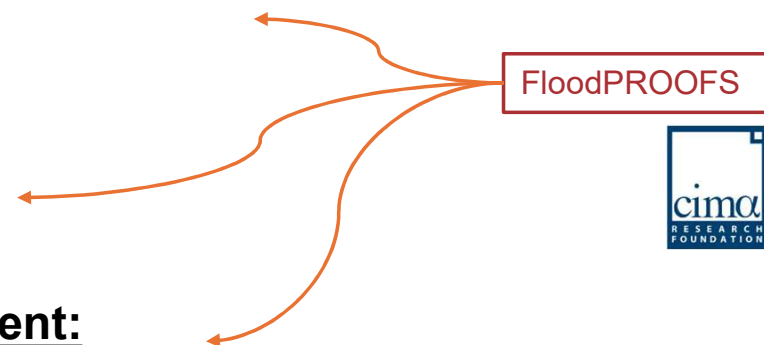
- Streamflow
- Root zone Soil Moisture from Triple collocation (1km)
- Snow Water Equivalent-SWE
- SWE Anomaly maps
- Flood Severity maps

○ Support to Flooding (10m):

- Flood depth mapping

○ Support to Sediment Management:

- Sediment budget (per reach segment)



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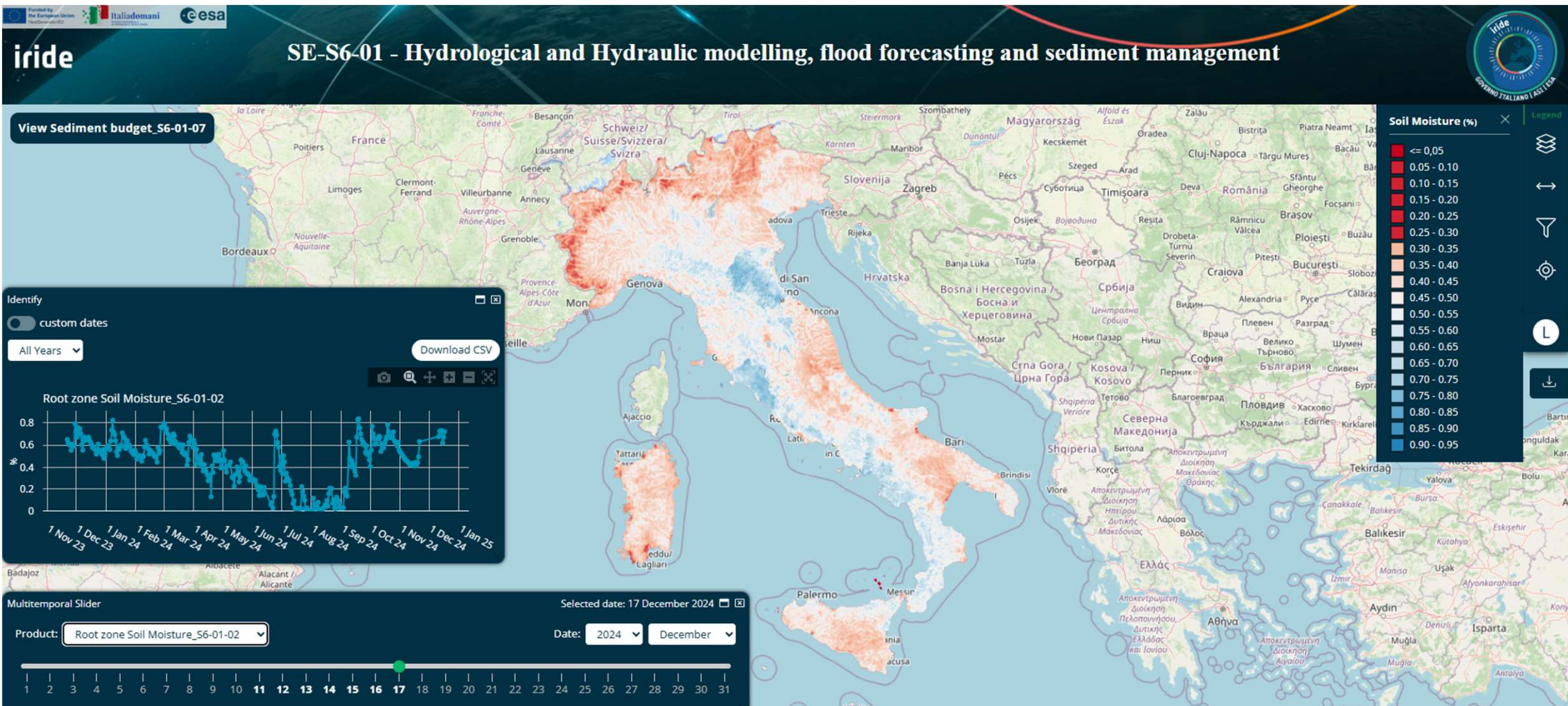


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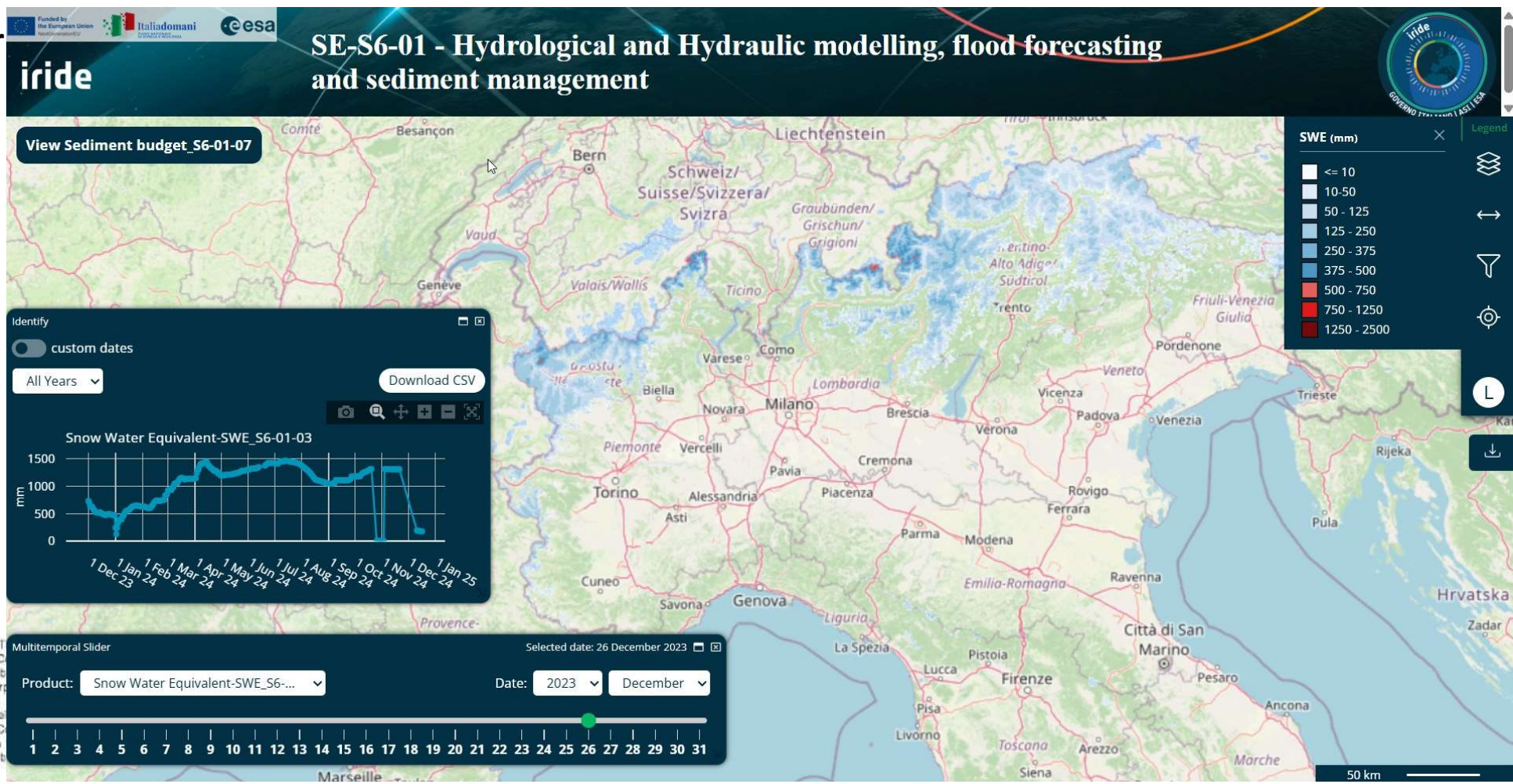
Hydrological and Hydraulic modelling, flood forecasting and sediment management

Soil Moisture



Hydrological and Hydraulic modelling, flood forecasting and sediment management

Snow Water
Equivalent
(SWE)

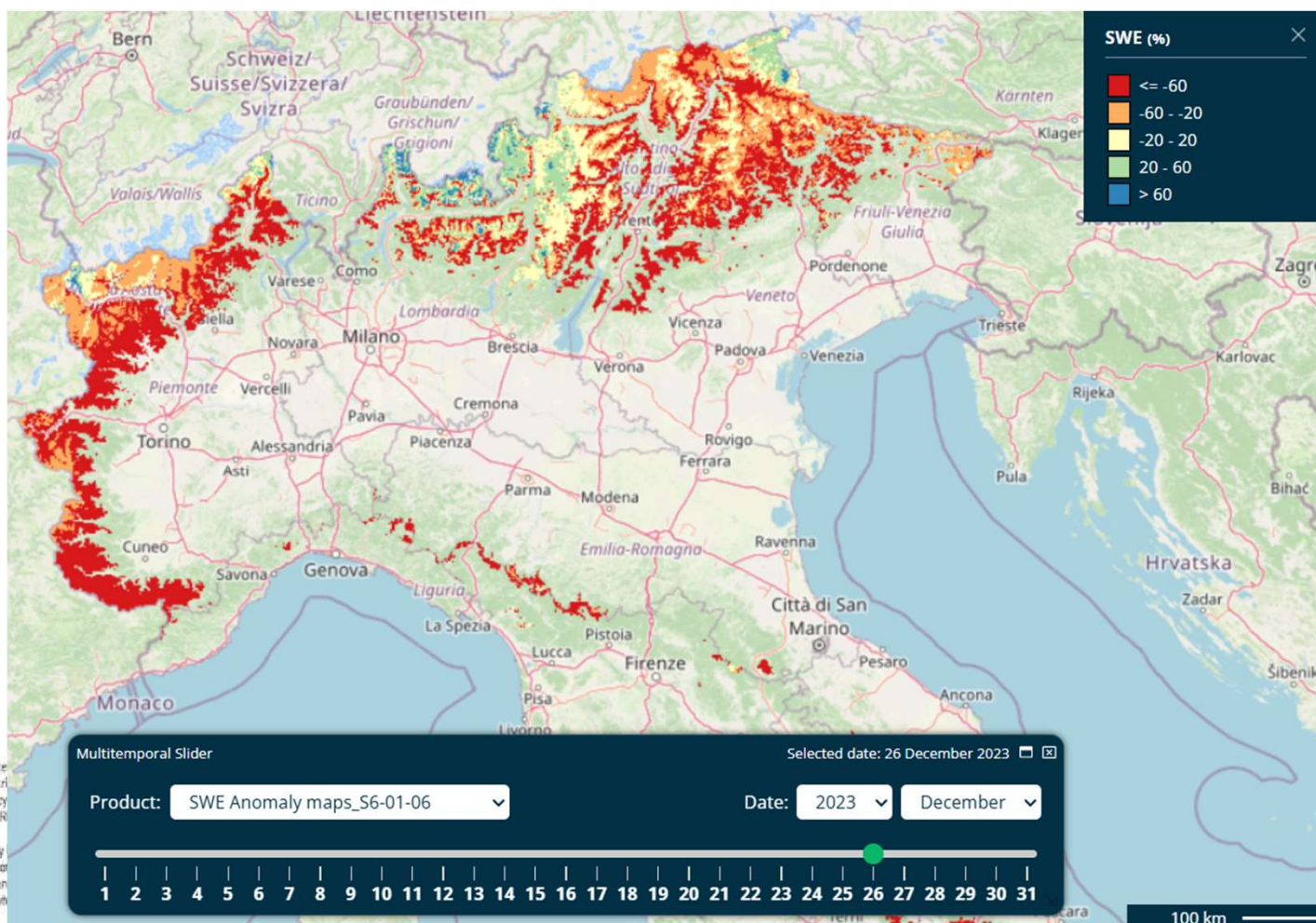


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Hydrological and Hydraulic modelling, flood forecasting and sediment management

SWE
anomaly



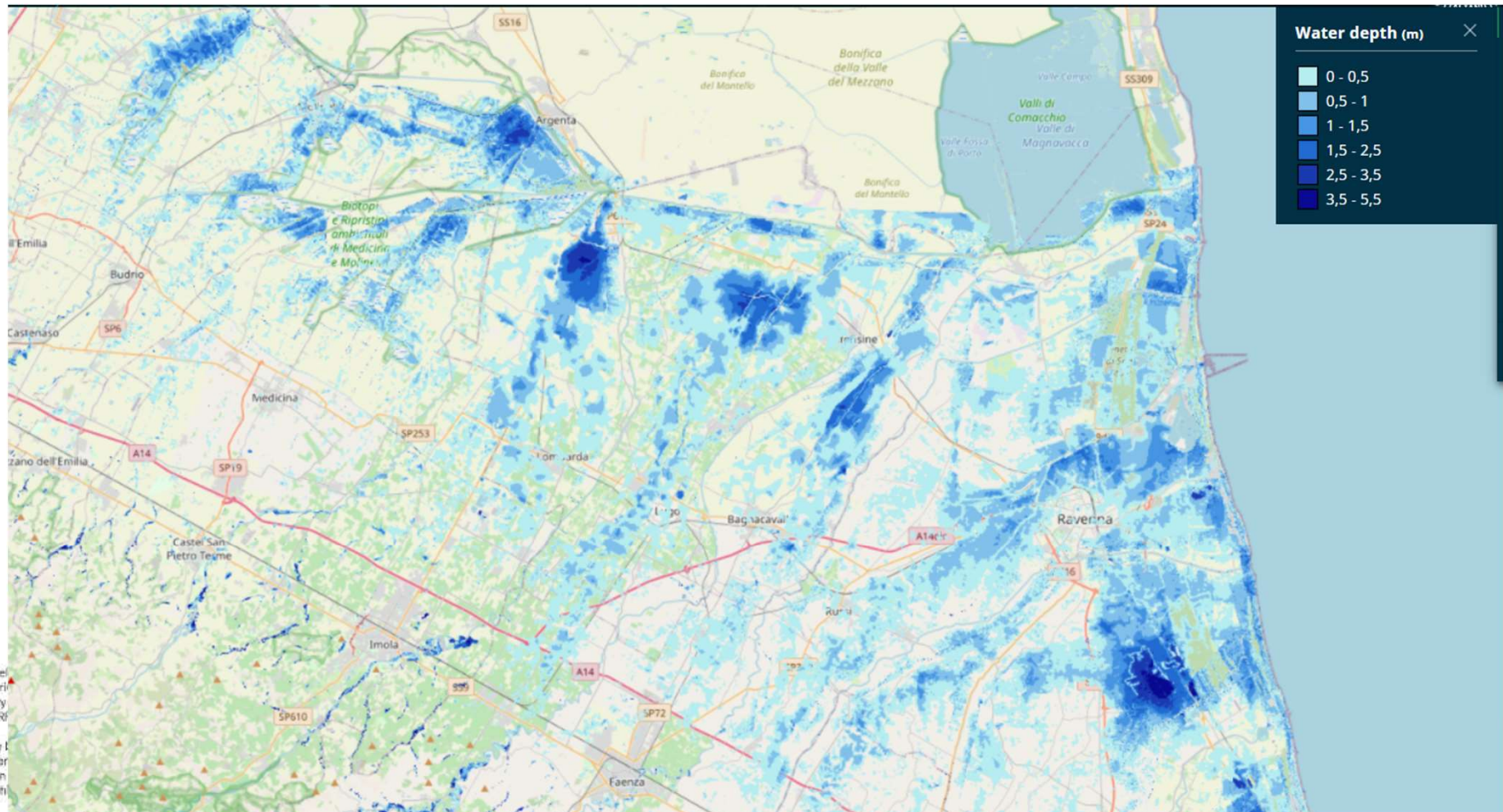
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Hydrological and Hydraulic modelling, flood forecasting and sediment management

Flood depth mapping (on demand)

Emilia Romagna 2023



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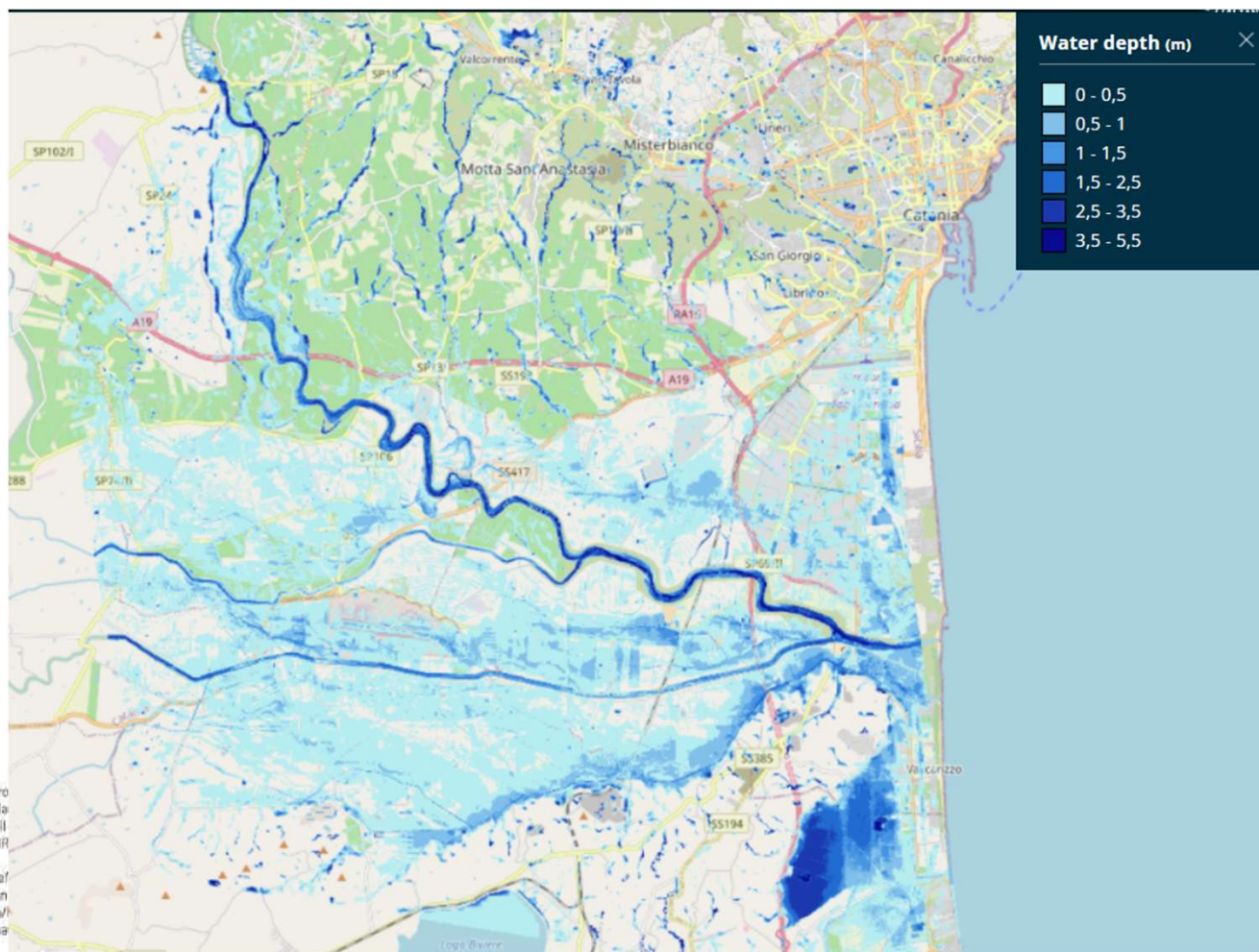
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S6-01

Hydrological and Hydraulic modelling, flood forecasting and sediment management

**Flood depth mapping
(on demand)**

Catania 2021



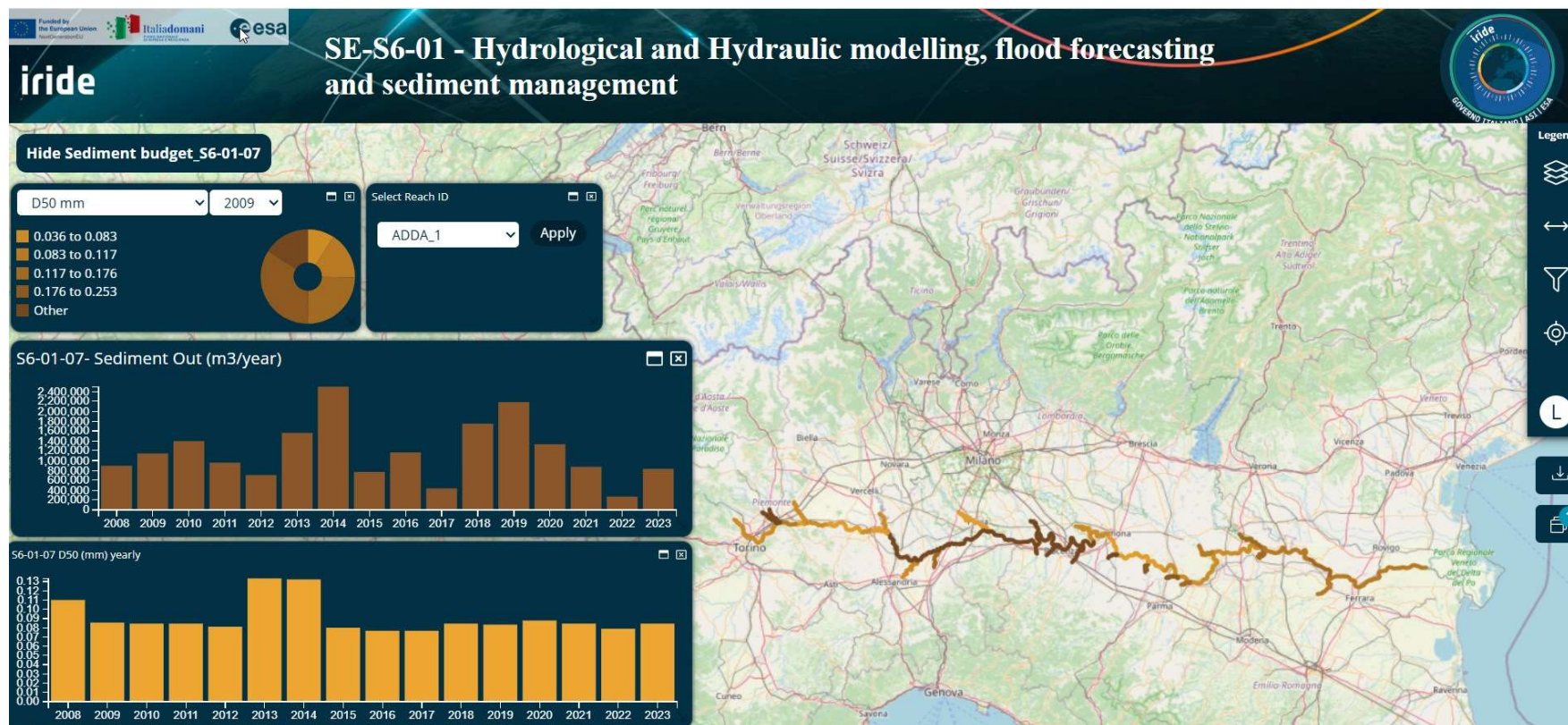
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Hydrological and Hydraulic modelling, flood forecasting and sediment management

Sediment budget (per reach segment)

Po river basin



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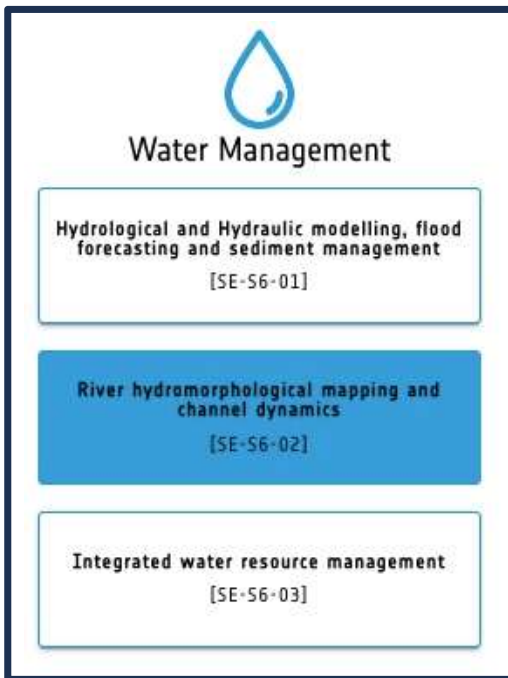
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River hydromorphological mapping and channel dynamics



This service aims to provide a national-scale **fluvial hydro-morphological observatory** for medium-large to small rivers (riverbed width 15-50 m).

- Operational implementation at the national scale of an **AI-based hydro-morphological monitoring system**

A number of **hydro-morphological indicators**, automatically and systematically computed from EO data across space and time (macro-geomorphic units)

- Enabling the spatio-temporal **assessment of riverbeds dynamics** in a continuous and comparable way across the national territory.

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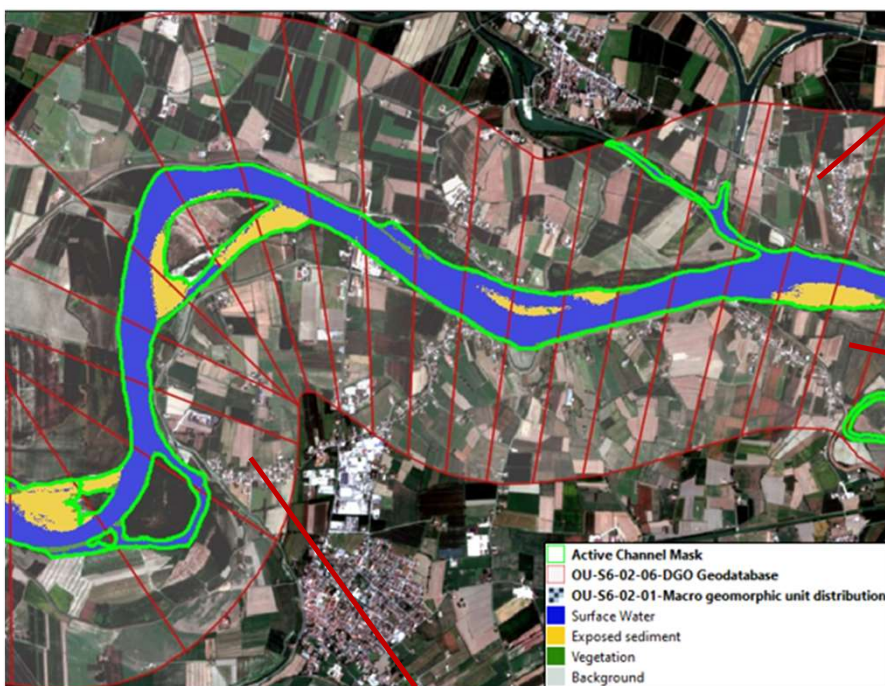
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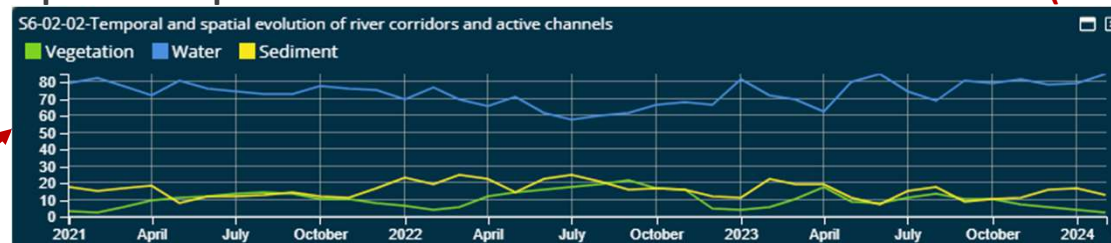
River hydro-morphological mapping and channel dynamics

Key products

S6-02-01 - Macro-geomorphic unit distribution (Monthly)

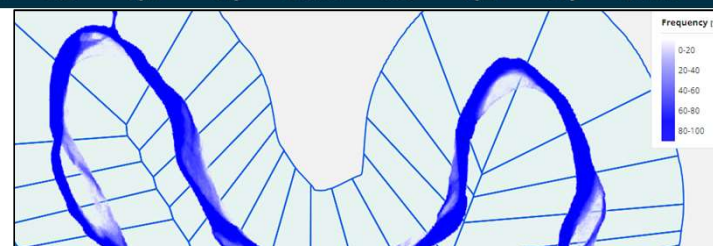


S6-02-02 - Temporal and spatial evolution of river corridors and active channels (Monthly)



Spatial and temporal aggregation

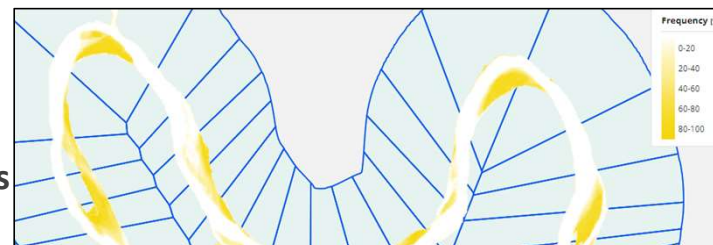
S6-02-03 - Water frequency maps



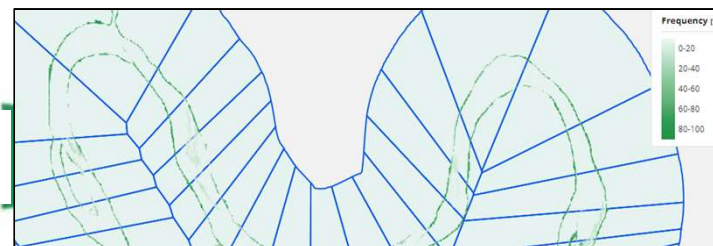
Yearly

Temporal aggregation

S6-02-04 - Exposed Sediment frequency maps



S6-02-05 - Vegetation frequency maps



S6-02-06 - Disaggregated Geographical Object (DGO) geodatabase

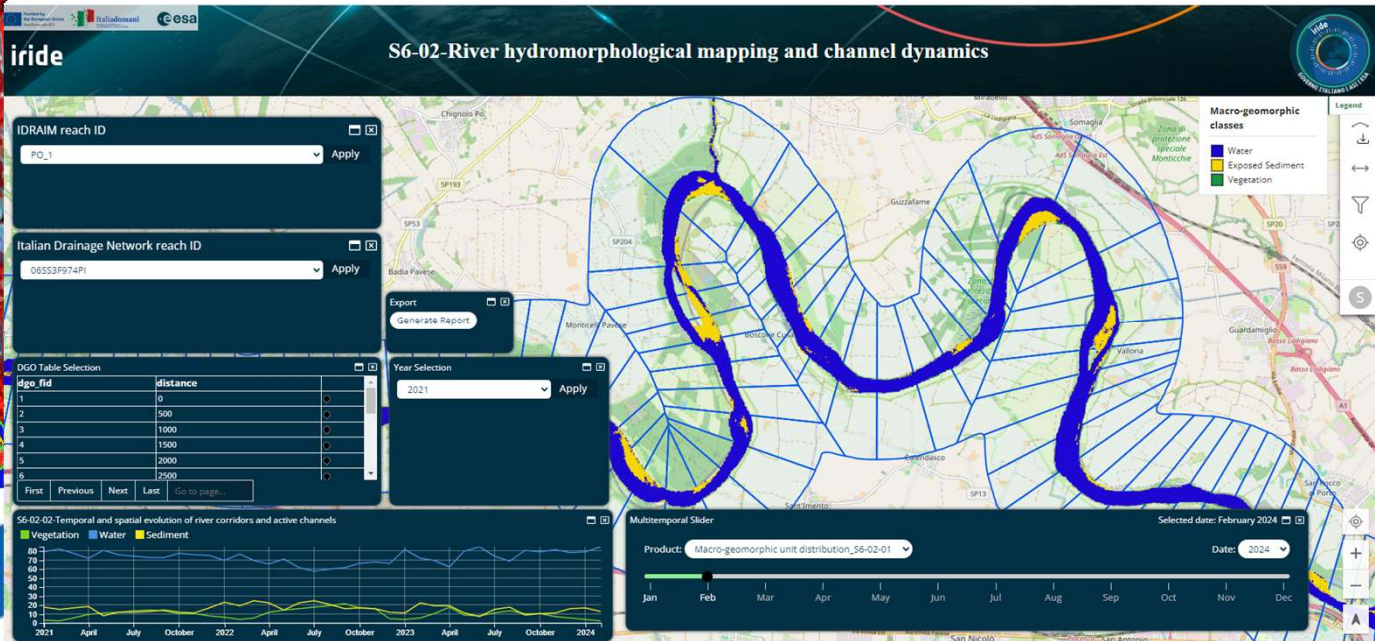
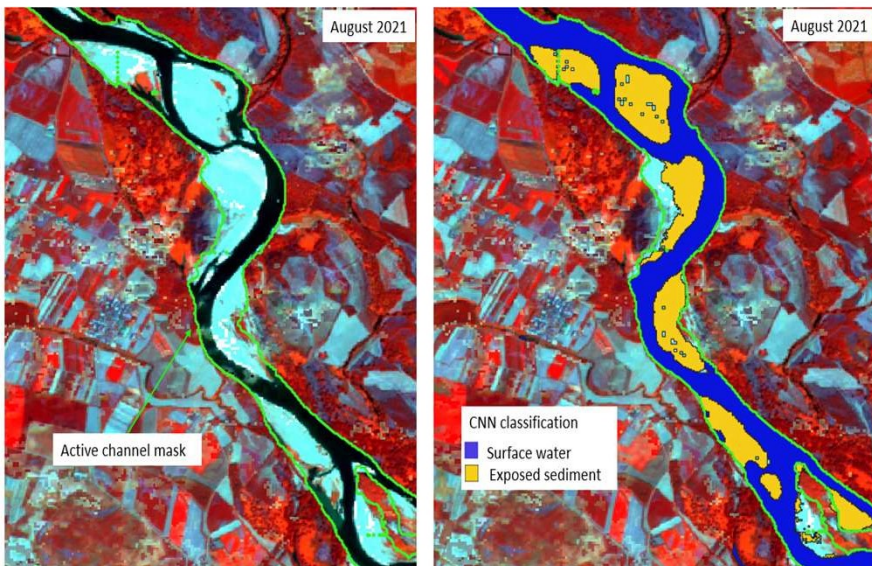
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River hydromorphological mapping and channel dynamics

- An **objective and continuous and rigorous monitoring of geomorphological dynamics at the national scale**
- **AI-based technology: CNN Algorithm for Active Channel delineation.**
- **A flexible geo-database enabling easy consultation and interrogation**



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Water Resource Management

Roberta Bruno, eGeos
roberta.bruno@e-geos.it

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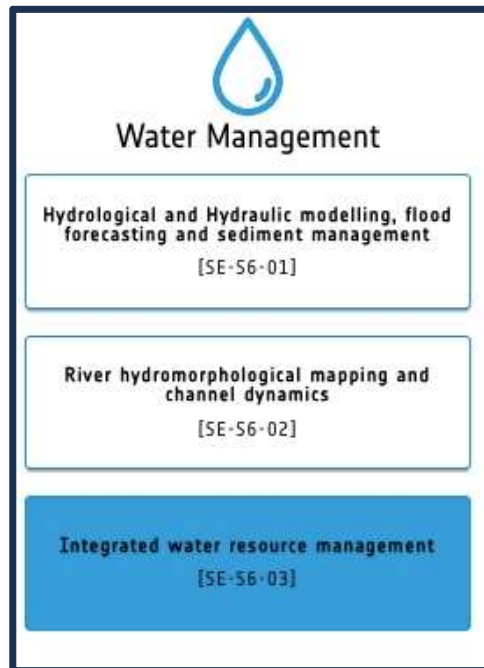
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Integrated water resource management



- SE-S6-03 provides indices to support the integrated management of water resources (water quality, water quantity, water availability, drought, and water scarcity), including models and satellite-derived indices, and in-situ data.

This SVC also provides:

- **Indicators** useful for the evaluation of the frequency, evolution, spatial variation, and trajectory of the "**water**" macro geomorphic units;
- **drought indicators** derived from satellite and in situ data, including water stress indicators and vegetation indicators;

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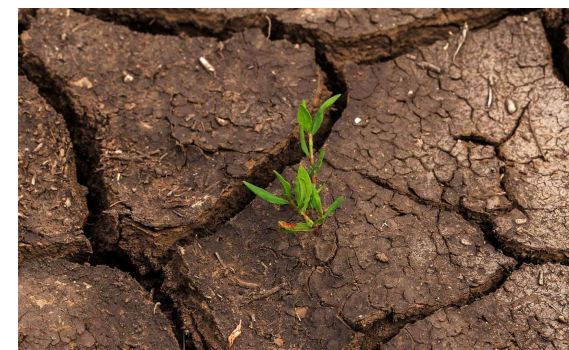
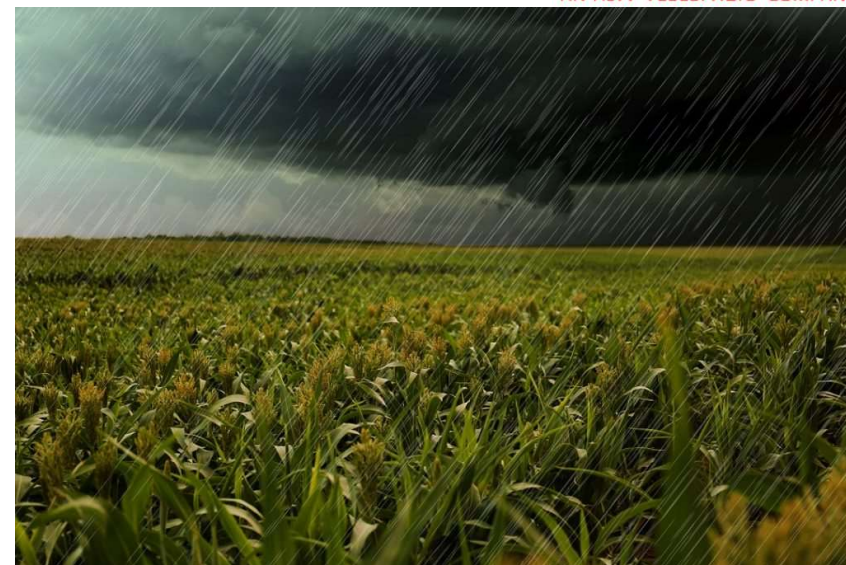


Standardized Precipitation Index (SPI) gives information about the deviation of precipitation from its long-term average over a specific period.

are valuable tools for monitoring and quantifying drought and precipitation variability over different time scales (1,3,6,12 months).

These maps can help to:

- Optimize crop planning and water resource management.
- Enable insurance companies to evaluate drought risk more accurately
- Compare conditions across different climate regions because it standardizes precipitation anomalies relative to local historical conditions.



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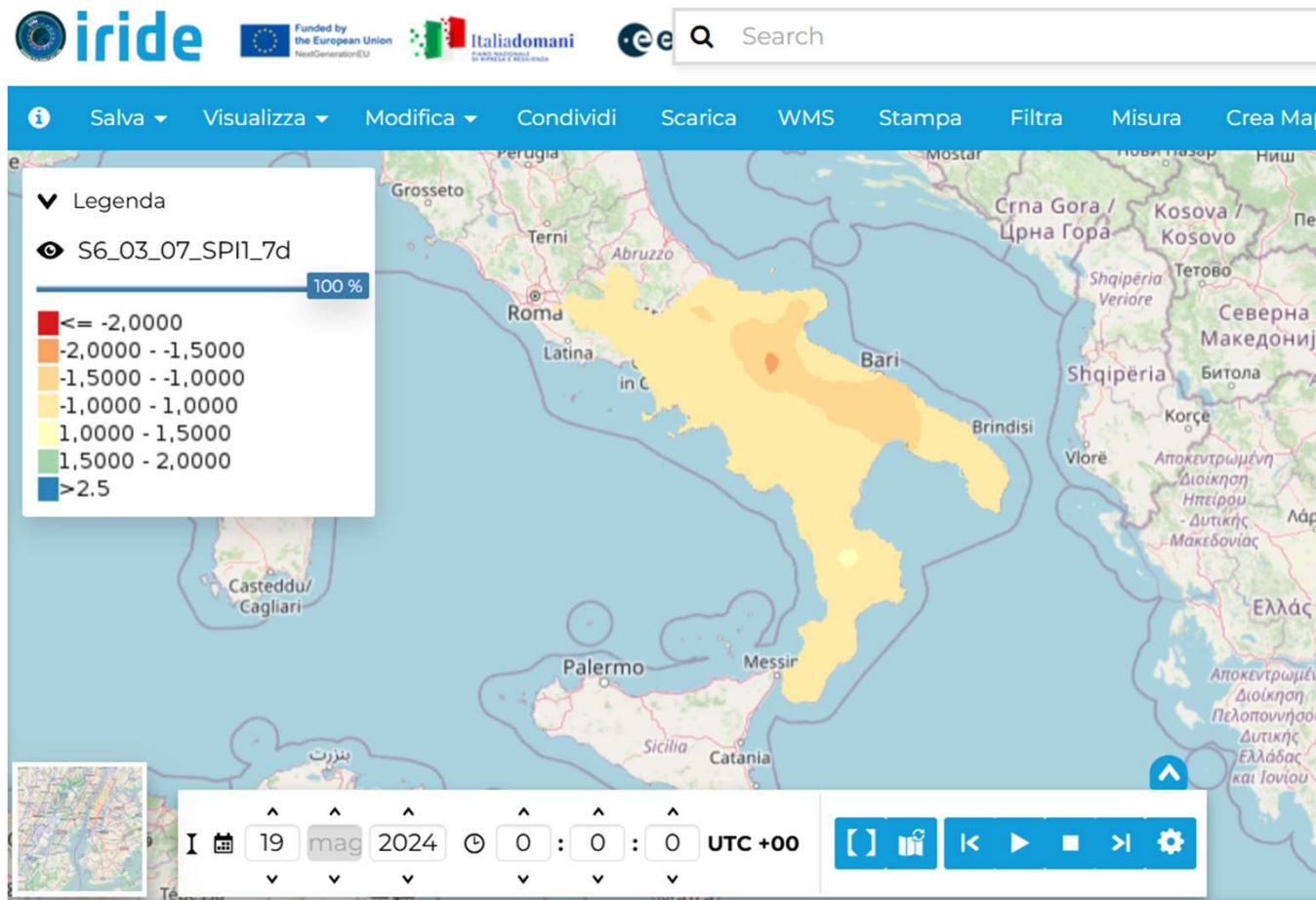


Integrated water resource management

Frequency:
Monthly
3 different model
time steps: 7d,
10d, 1m

Resolution:
1000 m

Aoi: National
Territory



Standardized Precipitation Index (SPI1)

- It allows for comparisons across different climate regions because it standardizes precipitation anomalies relative to local historical conditions.

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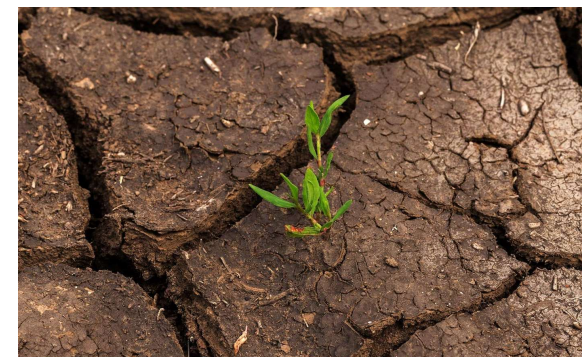
SPEI (Standardized Precipitation Evapotranspiration Index) extends SPI by integrating both precipitation and evaporative demand, making SPEI more suited to represent drought severity in a changing climate.

Soil moisture anomaly (SMA) maps provide detailed information about the water content in the soil, which is crucial for:

- Help farmers to monitor soil water status in real time.
- Optimize irrigation scheduling to prevent water stress.

The **Standardized Precipitation Evapotranspiration Index (SPEI)**, **Combined Drought Indicator (CDI)**, and **Soil Moisture Anomaly (SMA)** are essential tools:

- for monitoring and managing drought, with specific applications in agriculture, hydrology, and climate studies



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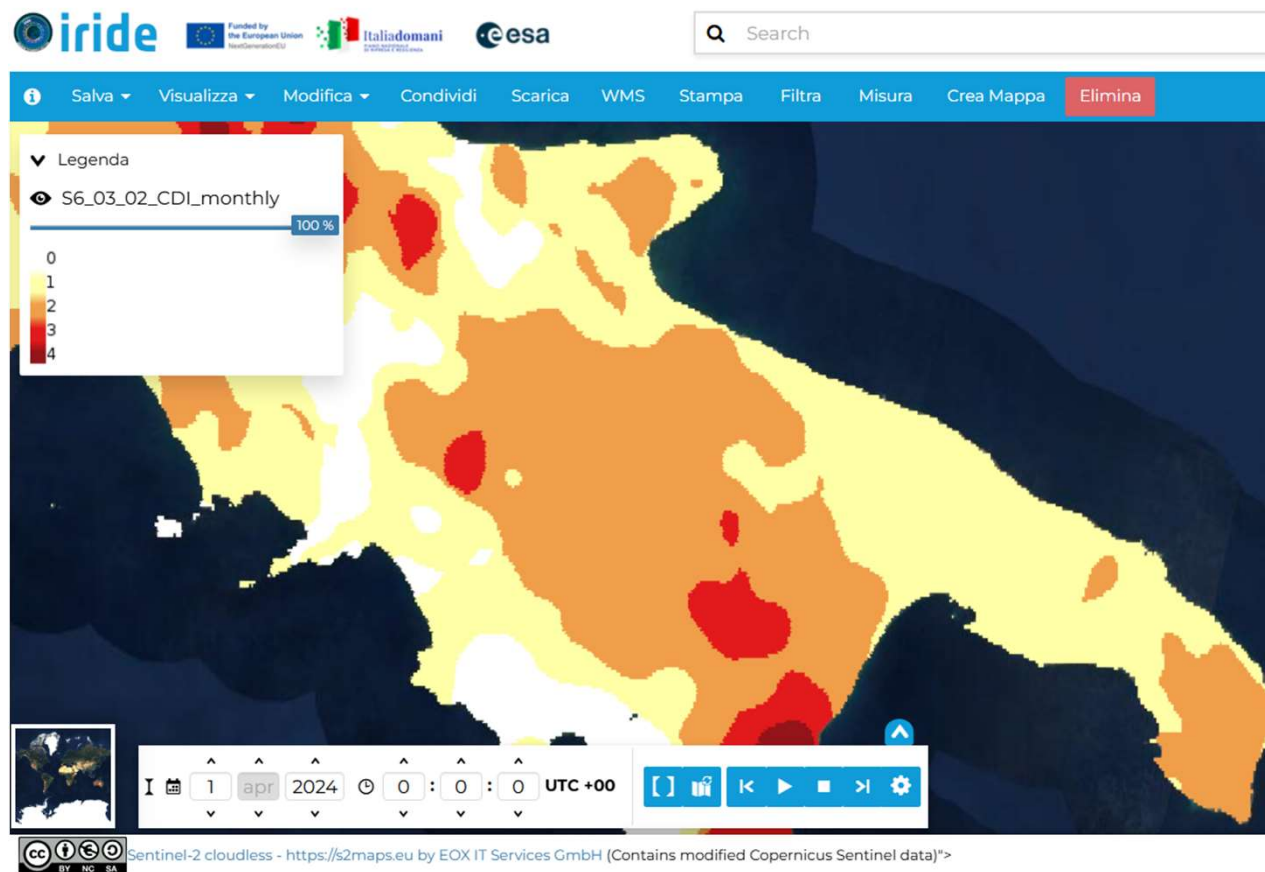


Integrated water resource management

Frequency:
Monthly

Resolution:
1000 m

Aoi: National
Territory



Combined Drought Indicator (CDI)

- It combines effect of soil moisture anomaly (SMA) and drought severity (SPI)

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Potential application:

- water availability for plants and animals helping land managers assess site-specific vulnerabilities to climate change
(Hydroclimatic water balance)
- Identifying arid, semi-arid, and dry sub-humid regions prone to desertification, supporting agricultural planning by classifying climatic zones based on water stress levels **(Aridity Index)**
- large-scale assessment of surface water flows enabling monitoring in regions with limited ground observation networks
(Runoff Index)



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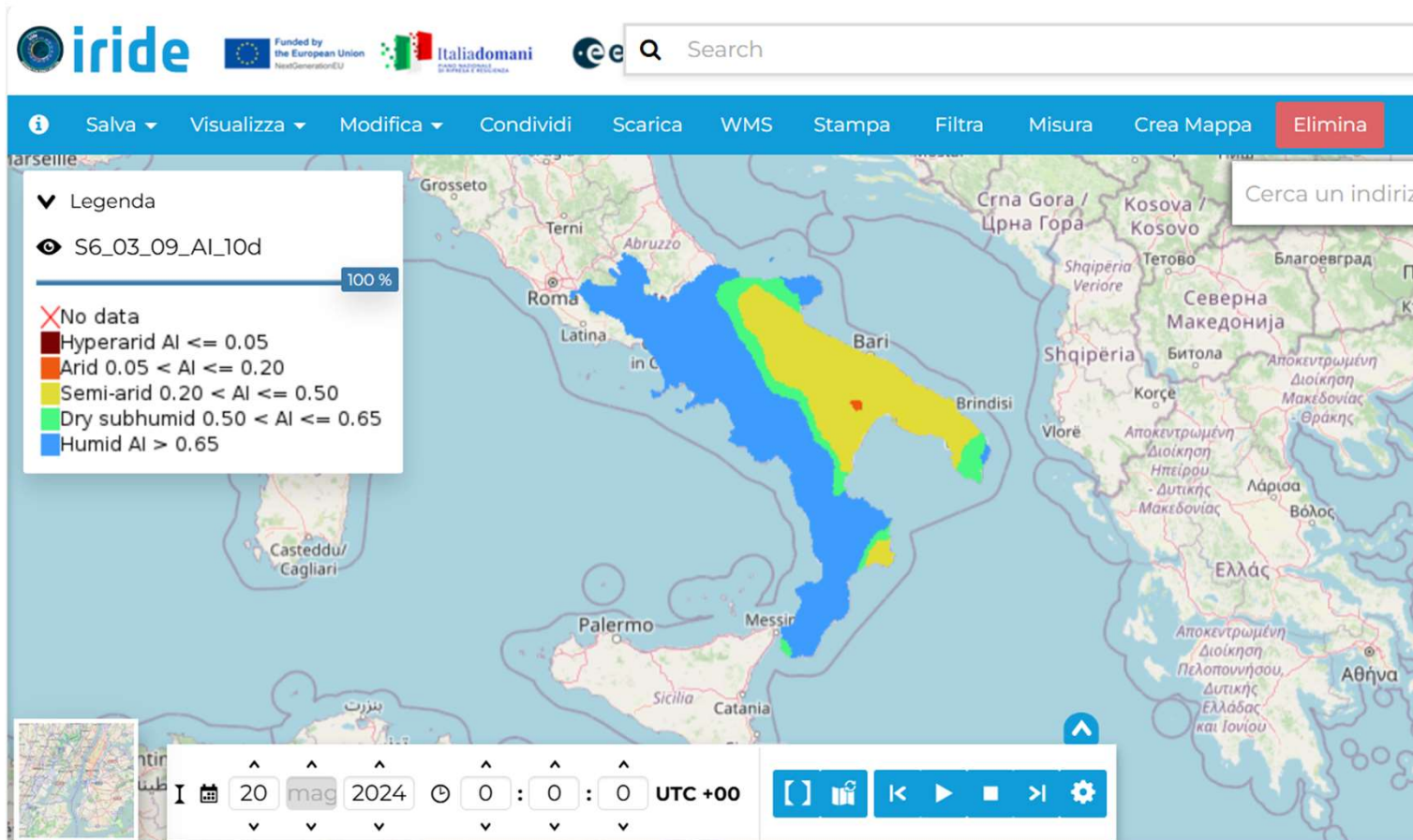


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Aridity Index

Integration of high-resolution data from other IRIDE SVCs (Land Cover from S4-01 and Precipitation Amount from S5-02)



Spatial Resolution:
From 500 to 1000 m

Temporal resolution:
3 different model time steps: 7d, 10d, 1m

Aoi: National Territory

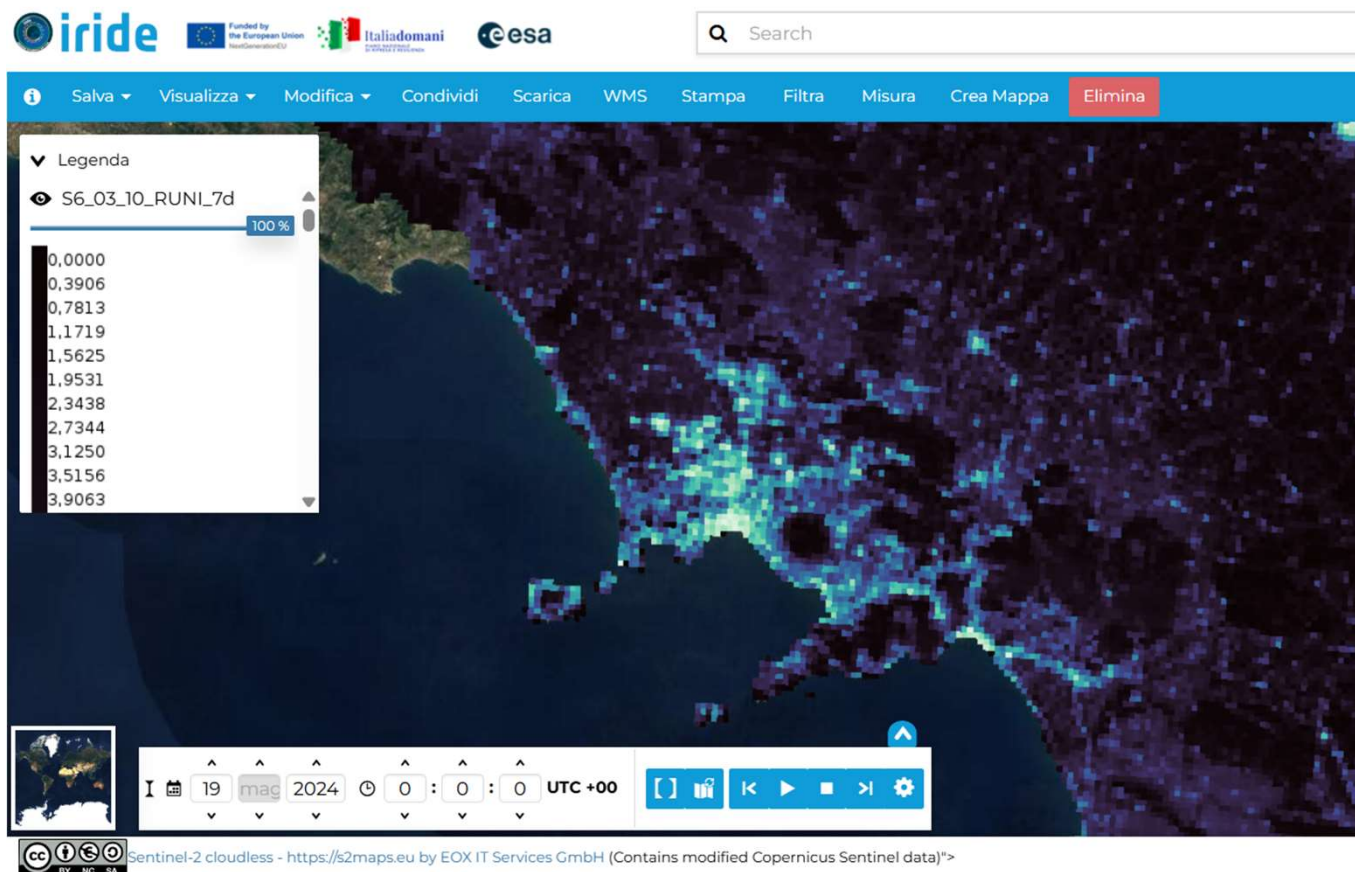
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S6-03 Integrated water resource management

Runoff Index

Integration of high-resolution data from other IRIDE SVCs (Land Cover from S4-01 and Precipitation Amount from S5-02)



Spatial Resolution:
From 500 to 1000 m

Temporal resolution:
3 different model time steps: 7d, 10d, 1m

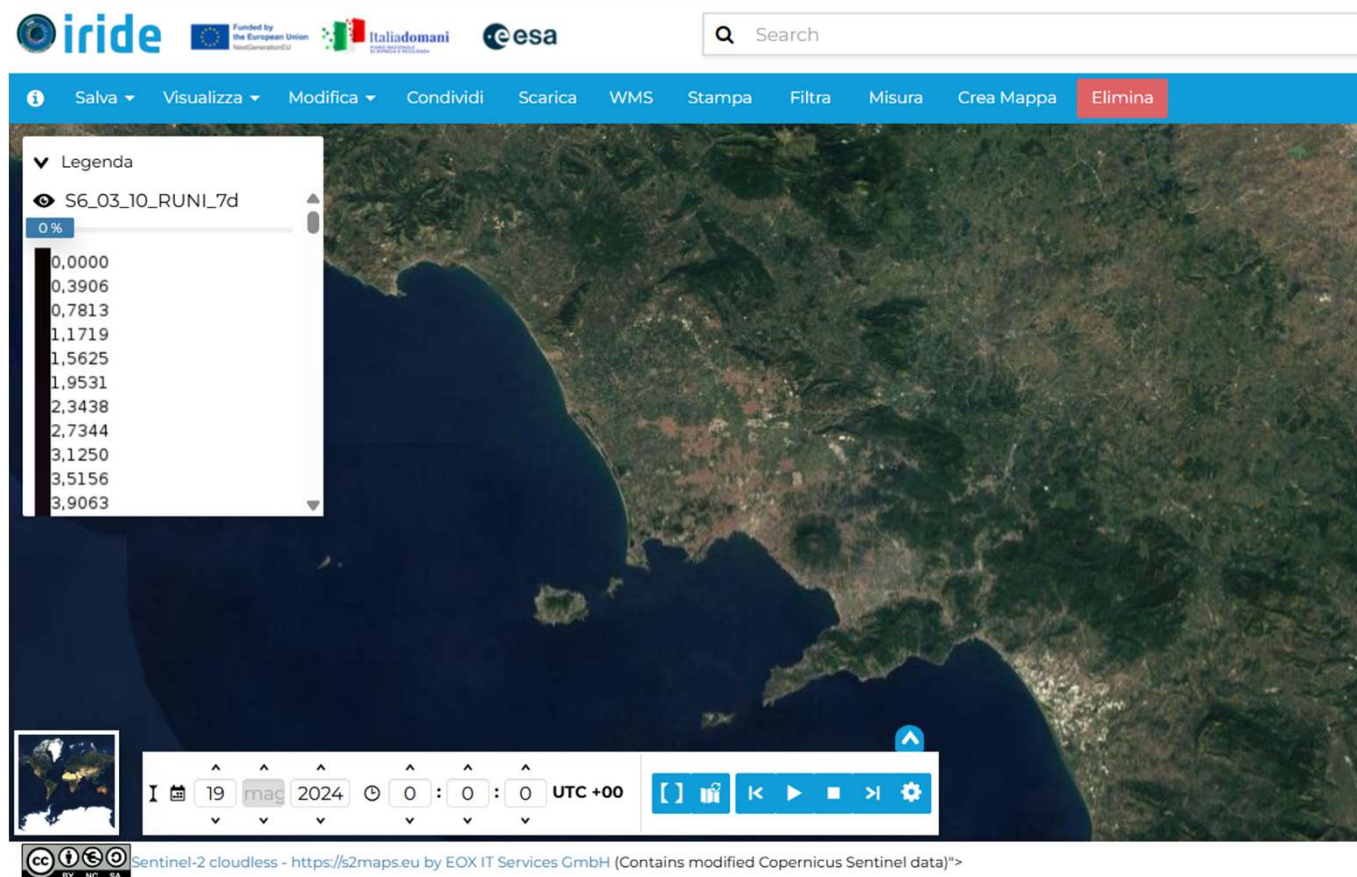
Aoi: National Territory



S6-03 Integrated water resource management

Runoff Index

Integration of
high-resolution
data from other
IRIDE SVCs (Land
Cover from S4-01
and Precipitation
Amount from S5-
02)



**Spatial
Resolution:**
From 500 to
1000 m

**Temporal
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3 different
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