

Enhancing EO Data Accessibility: Policy Recommendations and insights from **EO4EU Platform**



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Policy Brief



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Summary

Europe boasts a robust Earth Observation (EO) ecosystem. Yet persistent challenges, including data fragmentation, limited interoperability, and technical barriers, continue to hinder its full potential. The EO4EU project directly addresses these issues by developing an integrated platform that enhances EO data accessibility, usability, and real-time processing. By leveraging AI, machine learning, and cloud computing, EO4EU streamlines data retrieval and analysis, making it more accessible for policymakers, industry, researchers, and a larger public.

The EO4EU Platform serves as a model for how unified data access and advanced digital technologies can unlock the value of EO data and drive solutions to major environmental and societal challenges. Through seven targeted use cases on healthcare, ocean monitoring, soil erosion, forest ecosystems, civil protection, environmental pest control, and food security, the EO4EU project demonstrates EO data's transformative potential. These use cases not only highlight EO applications across diverse sectors but also provide valuable insights into the technical and operational requirements needed to optimize EO data utilisation.

This policy brief outlines key challenges in EO data exploitation and presents the solutions integrated into the EO4EU Platform to overcome them. It also showcases the implemented use cases to illustrate the features and capabilities essential for specific sectors. Finally, the policy brief provides policy recommendations based on the EO4EU project's consortia experience and expertise, aimed at addressing persistent barriers and maximizing the impact of EO data across Europe.





The European Union's policies are designed to facilitate open and unrestricted access to Earth Observation (EO) data, fostering innovation, economic growth, and scientific advancement. By promoting data accessibility, the EU aims to maximize the impact of EO technologies in critical domains such as environmental protection, disaster and crisis management, land and maritime monitoring, climate change mitigation, and atmospheric analysis.¹

Through these initiatives, the EU strengthens its global leadership in EO and aims to ensure data-driven decision-making.

Source	Accessibility	Access to the data
Copernicus	Data is open and freely accessible. It can be explored, visualized and downloaded through the Copernicus portal.	https://www.copernicus.eu/en/access-data .
GEOSS	GEOSS provides access to a wide range of earth observation data, and much of it is open access. The GEOSS Portal allows users to search and access data from various sources globally.	https://www.geoportal.org/?m:activeLayerTileId=os-m&f:dataSource=dab .
INSPIRE	The majority of the INSPIRE spatial data sets and services are available free of charge to the public and the public authorities, due to different national access regulations, there are some exceptions. ²	Example: https://agraratlas.inspire.gv.at/?x=14.03307&y=47.89621&z=10.32465&r=0#/00000000000000000000.0000.000000 .

2 Data.gv.at, Geodaten – INSPIRE, <https://www.data.gv.at/daten/inspire/>, state: 20.09.2024



Source	Accessibility	Access to the data
DestineE	DestinE Datasets contain data which can be accessed or downloaded for further processing for free. ³	https://platform.destine.eu/
Galileo/EGNOS	The data can be accessed through the EGNOS Data Access Service (EDAS). The use is limited to non-safety purposes for users within surveying, mapping, construction, agriculture and more. ⁴	https://edas-maritime.gsc-europa.eu/resources-tools/downloads (only for registered users)

Maximizing the potential of Earth Observation (EO) datasets requires a strong legislative framework. Several measures have been put in place by the EU to support the development of a comprehensive regulatory framework in the EU facilitating the efficient access, sharing, and use of geospatial and EO data across different sectors.

INSPIRE- Directive

The **INSPIRE Directive** aims to standardize geospatial data across EU member states, ensuring interoperability and seamless integration of datasets from various sources. It defines common standards for variables such as coordinate systems, metadata, and data formats, enabling efficient cross-border data sharing. Additionally, INSPIRE mandates that geospatial information critical for governance should be easily accessible, transparent, and discoverable, including clear terms of use.

LINK: [INSPIRE Knowledge Base](#)

Open Data Directive

To provide common rules for a European market for government data based on transparency and fair competition. The Directive specifies that High Value Datasets (HVDs) should be made available free of charge, in machine-readable format, via APIs and, where relevant, as bulk downloads. HVDs are datasets that are associated with important benefits for society and the economy, which datasets are HVDs and how they may be published and further processed is defined in the HVDs Implementing Act. This directive complements the **INSPIRE Directive**, as both promote accessibility and standardisation of spatial data within the EU.

Data Governance Act

The **Data Governance Act** is designed to facilitate data sharing and reuse across sectors by addressing technical and legal barriers. It strengthens mechanisms for secure and standardized data exchange, particularly for sensitive or commercially valuable data. The act, along with the Open Data Directive, is implemented under Directive 2019/1024 on Open Data and the Re-use of Public Sector Information.

³ destination-earth.eu, DestinE Data Policy for DestinE Digital Twin Outputs, <https://destine-data-lake-docs.data.destination-earth.eu/en/latest/dedl-discovery-and-data-access/DestinE-Data-Policy-for-DestinE-Digital-Twin-Outputs/DestinE-Data-Policy-for-DestinE-Digital-Twin-Outputs.html>, state: 20.09.2024

⁴ europa.eu, EGNOS | Satellite Navigation, https://defence-industry-space.ec.europa.eu/eu-space/egnos-satellite-navigation_en, state: 20.09.2024



Copernicus data policy

The **Copernicus Data Policy** ensures that data and information from the EU's Copernicus program are made available on a full, open, and free-of-charge basis, subject to specific conditions such as registration, dissemination formats, and access restrictions where necessary. This open-access model enhances innovation and maximizes the socioeconomic benefits of Copernicus EO data.

Future Prospects: Evolving Data Policies

Several new legislative and policy initiatives are under development to further refine data governance and support environmental sustainability:

- ☑ The **Data Act** (will become applicable in September 2025) aims to regulate data access and usage by defining who can access specific datasets and under what conditions, ensuring fair distribution of data-driven value.
- ☑ **GreenData4All** is an initiative aimed at modernizing EU regulations on environmental geospatial data and improving public access to environmental information.
- ☑ **Green Deal Data Space** is a developing framework to establish a common European data space for collecting, sharing, processing, and analyzing large-scale datasets in support of the European Green Deal's priority actions.

These upcoming initiatives will further enhance Europe's position as a leader in Earth Observation data accessibility, environmental monitoring, and digital innovation.





Enhancing EO Data Accessibility: Insights from the EO4EU project

Europe is globally recognized for its strong EO and research capabilities, supported by a diverse range of EO data sources. In addition to the key data sources (see Table 1), numerous EU-funded projects and initiatives aim to streamline the retrieval and processing of geospatial information.

However, the EO data landscape remains complex and fragmented. Major EO data sources often do not provide ready-to-use datasets tailored to a broad spectrum of users, making data accessibility and usability a challenge. Moreover, a lack of coordination among different initiatives results in a limited scope of applications, restricting the full potential of EO data in addressing critical challenges across various sectors. These barriers hinder efficient data exploitation and slow down adoption by policymakers, industry, and academia.

To enhance EO data uptake and usability, the **EO4EU project** seeks to establish a unified platform for seamless access and processing of EO data. By leveraging artificial intelligence and machine learning, the project aims to offer advanced tools for data integration, interpolation, extrapolation, and visualisation. Additionally, it introduces immersive VR features, enabling users to interact with EO datasets in an intuitive and dynamic way, ultimately bridging the gap between data providers and end-users.

EO4EU Survey: Features Expanding EO Data Usability

The **EO4EU project** conducted a **public survey** to assess user needs and challenges related to **EO data retrieval, processing, and usability**. The findings reveal a **strong demand** for European EO data sources and highlight **critical requirements** for improving accessibility, interoperability, and ease of use.

By identifying key user priorities, the survey results contribute to the development of more **efficient, user-friendly, and scalable EO data platforms**.

The following findings, presented in this policy brief, offer actionable insights that can **inform future strategies** for EO data governance, innovation, and adoption across multiple sectors.



Key findings from the EO4EU Survey

1. Most In-Demand Datasets

Copernicus Sentinel-2 (70%), Sentinel-1 (63.3%), and the Digital Elevation Model (60%) were identified as the top three datasets required by users.

- ☑ **Long-term historical datasets** are essential for studying changes in Earth's surface over time.
- ☑ **Broad geographical coverage** is necessary to enable analyses from local to global scales.

2. Search & Metadata Requirements

- ☑ The most preferred search method is based on **standard criteria (93.3%)**, such as time range, sensor type, processing level, coverage, and cloud cover.
- ☑ Users also expressed interest in **natural language search (36.7%)** and **image-based search (30%)**.
- ☑ To improve data discoverability, a **two-level metadata system (96.7%)** is recommended:
 - ☑ Collection-level metadata (dataset-level)
 - ☑ Granule-level metadata (file-level)
- ☑ Essential metadata attributes include **geographical and temporal extent, processing level, and relevant keywords**.
- ☑ Interfacing services like an **API (73.3%), processing algorithms, and computing resources** were highlighted as crucial.

3. Processing Capabilities

- ☑ Users prioritize **near-real-time processing (63.3%)** to obtain rapid results.
- ☑ **Customizable processing pipelines (56.7%)** are needed to tailor workflows to specific user requirements.
- ☑ The ability to integrate **local processing chains (82.6%)** with **platform-based processing (70%)** is a key requirement.
- ☑ Users emphasized the need to access data through **various methods (API/CLI - 30%)** and to **retrieve intermediate processing results (70%)** for debugging and validation.

4. Algorithm & Analysis Needs

- ☑ The most sought-after algorithm is **Data Fusion (70%)**, which enables the integration of multiple data sources such as **Sentinel-1 (100%), Sentinel-2 (100%), ERA-5, and MODIS (100%)**.
- ☑ Users also expressed strong interest in **Feature Extraction Algorithms (53.3%)**, including vegetation indices (NDVI, NDI) and Machine Learning (ML)-based tools.
- ☑ Interfacing services should allow users to implement custom code and visualize processing results alongside EO datasets.



The EO4EU Platform Differentiating Factors

The EO4EU Platform is a major outcome of the EO4EU Project, funded under the Horizon Europe programme. Designed to enhance access to and utilisation of EO data, the platform aims to support better forecasting, decision-making, and policy implementation across various sectors. To achieve this, EO4EU integrates disruptive technologies that streamline data retrieval, processing, and analysis.

The EO4EU Platform leverages cutting-edge innovations, including:

- ☑ **Machine Learning & AI** – Automating data processing, enhancing pattern recognition, and improving predictive analytics.
- ☑ **Cloud Computing** – Enabling scalable, high-performance data storage and processing for large EO datasets.
- ☑ **Semantic-Enhanced Knowledge Graph** – Structuring and linking EO data to improve discoverability, interoperability, and usability.

These technologies allow EO4EU to tackle key challenges, such as data fragmentation, accessibility barriers, and the need for real-time insights, while ensuring a more seamless and effective use of EO data for a better forecast and decision-making.

1. Overcoming Data Fragmentation

One of the primary challenges in EO data accessibility is the fragmentation across multiple sources, making it difficult for users to find, access, and utilize comprehensive datasets efficiently. EO4EU tackles this issue by integrating diverse EO datasets into a unified platform, streamlining access and enhancing interoperability.

By consolidating data from sources such as Copernicus, GEOSS, ECMWF, and Galileo, EO4EU reduces complexity and ensures users can easily search, retrieve, and process information from different providers in a seamless manner. Additionally, the EO4EU platform leverages AI-powered tools, machine learning capabilities, and advanced visualisation techniques to enhance usability, making EO data more accessible.

2. Reducing Technical Barriers

Many potential users encounter technical challenges when accessing EO data, often due to complex interfaces, overwhelming data formats, or a lack of technical expertise. These barriers limit the widespread adoption of EO data, preventing non-expert users from fully leveraging its potential.

The EO4EU Platform is designed to eliminate these obstacles by offering a more user-friendly interface that simplifies data discovery, retrieval, and processing thanks to AI-driven tools, automated workflows, and interactive visualisation features.

3. Addressing Real-Time Data Need

In many applications, timely access to updated information is crucial for effective decision-making. Delays in data retrieval and processing can hinder rapid response efforts, particularly in time-sensitive fields such as disaster management, environmental monitoring, and crisis response.

The EO4EU Platform addresses this need by offering real-time processing capabilities, enabling users to access, analyze and interpret EO data quickly and efficiently.



EO4EU Platform: Unifying and Streamlining Access to EO Data Sources

Centralized Data Aggregation: The EO4EU Platform aggregates data from multiple EO providers, including satellite imagery and geospatial information. This means users can access a wide range of datasets without needing to navigate through different databases or platforms, streamlining the data retrieval process.

Variety of Data Types: EO4EU integrates various types of data, such as historical records, real-time updates, and predictive models. This comprehensive approach allows users to analyze and process information efficiently across different temporal and spatial dimensions.

Interoperability: The platform adheres to standard protocols, facilitating seamless integration with other data systems. This interoperability ensures that EO data can be effectively combined with other datasets for comprehensive analyses.

API Accessibility: ADAM provides an API that allows for easy access to its functionalities. This API enables other components of the EO4EU ecosystem to interact with the platform, further enhancing the integration of diverse data sources.

Knowledge Graph Integration: The data access component works alongside a Knowledge Graph component, which enhances semantic search capabilities. This integration allows users to perform simplified searches for datasets based on metadata, improving the overall usability of EO data.

Expected Impact

Democratisation of Data: By integrating diverse EO data sources into a single platform, EO4EU democratizes access to environmental information. This empowers a broad range of stakeholders, including researchers, policymakers, and industry, to utilize EO data for informed decision-making.

Enhanced Collaboration: The centralized nature of EO4EU encourages collaboration among different users and organisations by providing a common platform for accessing and analyzing EO data. This collaborative environment fosters innovation and knowledge sharing.



EO4EU Platform: Insights from Industry Applications

The growing demand for EO data is particularly evident in industry applications. From tech-driven sectors to traditional industries, EO data provides significant economic and innovation value.

Within EO4EU, seven use cases have been developed to test the EO4EU platform and evaluate its potential impact across multiple sectors. These efforts aim to enhance EO data usability, streamline data access, and facilitate broader adoption in various industries.

EO4EU Use Cases: Unlocking the Potential of EO Data Across Industries

Earth Observation data has the potential to revolutionize multiple sectors and industries, offering valuable insights for decision-making. By providing accurate, real-time, and historical geospatial information, EO data supports climate monitoring, disaster management, agriculture, urban planning, environmental protection, and more fields.

Cities can use EO insights to monitor land use, assess air quality, and plan infrastructure development, ensuring sustainable urban growth. In the agricultural sector, EO data helps to optimize crop monitoring, assess soil health, and predict yields, enabling precision farming and more sustainable agricultural practices. When it comes to crisis management, real-time satellite imagery assists in disaster preparedness, response, and recovery, providing crucial data for managing wildfires, floods, earthquakes, and hurricanes.

By addressing these challenges, EO data not only enhances industry operations but also plays a crucial role in advancing sustainability, economic growth, and climate resilience. However, to maximize its impact, it is essential to showcase practical examples and expand applications across sectors to encourage wider adoption.

To showcase the benefits of leveraging EO data and the capabilities offered by the EO4EU Platform, **the EO4EU project has developed seven Use Cases** demonstrating the impact EO data might have and the features required to address the identified challenges.

Use case 1: Personal Allergy Symptoms Forecast



▣ **Sector:** Healthcare and Public Health

▣ **Impact:** Improves the management of pollen allergies using location-specific forecasts and personal symptom predictions. Enhances public health responses to growing allergy prevalence, improving the quality of life.

▣ **Use Case requirements for the platform stimulating further uptake:**

- ▣ Data Handling, due to integration of air quality modelling and local weather forecasts;
- ▣ Forecasting Capability, to support for up to 96-hour predictions;
- ▣ Personalisation, due to the ability to handle individual symptom data for tailored predictions;
- ▣ Scalability, for the expansion from regional (Latvia and Lithuania) to European and global scope.



Use case 2: Ocean Monitoring



- ☑ **Sector:** Maritime and Environmental Sustainability
- ☑ **Impact:** Optimizing trans-oceanic shipping routes, reducing fuel consumption and environmental footprints. Enhancing safety and compliance with international maritime regulations through real-time data integration.
- ☑ **Use Case requirements for the platform stimulating further uptake:**
 - ☑ High-Volume Data Processing, to elaborate large meteorological datasets in real-time;
 - ☑ Optimisation Algorithms, to integrate weather data into route optimisation models;
 - ☑ Use of AI, e.g. Convolutional Neural Networks, for weather state forecasting;
 - ☑ Real-Time Analytics, to process and analyze spatio-temporal data for dynamic route optimisation.

Use case 3: Food Security



- ☑ **Sector:** Agriculture and Food Systems
- ☑ **Impact:** Assessing climate change impacts on agricultural productivity, enabling sustainable crop management and adaptation strategies. Mitigating food insecurity by identifying viable crop suitability under changing environmental conditions.
- ☑ **Use Case requirements for the platform stimulating further uptake:**
 - ☑ Data Fusion, to integrate production, climate, soil, and altitude data with EO datasets;
 - ☑ Machine Learning, to train algorithms for predicting crop yield under varying climate conditions;
 - ☑ Scalable EO processing, for using continuous satellite imagery and vegetation indices for large-scale agricultural monitoring.

Use case 4: Forest Ecosystems



- ☑ **Sector:** Environmental Monitoring and Carbon Management
- ☑ **Impact:** Providing consistent, high-resolution forest cover maps for, among others, accurate greenhouse gas (GHG) reporting and land-use monitoring. Supporting climate change mitigation strategies and EU compliance in the LULUCF sector. Fostering standardized, repeatable datasets for GHG inventory.
- ☑ **Use Case requirements for the platform stimulating further uptake:**
 - ☑ High-Resolution Mapping (e.g. 10m) of forest cover and related change;
 - ☑ Use of AI models trained with Sentinel-1 and other geospatial (e.g., LUCAS) datasets for land classification;
 - ☑ Dynamic User-tailored applications to select specific geographic regions and periods.



Use case 5: Soil Erosion



- ☑ **Sector:** Land Management and Infrastructure Planning/Protection
- ☑ **Impact:** Enhancing predictions of rainfall-induced soil erosion, to inform decisions to protect ecosystems, infrastructure, and agriculture. Facilitating timely interventions with improved erosion forecasts based on EO and AI integration.
- ☑ **Use Case requirements for the platform stimulating further uptake:**
 - ☑ Integration of terrain, soil properties, and land cover-based algorithms;
 - ☑ Support for frequent (e.g. sub-annual) soil erosion assessment to respond to dynamic conditions;
 - ☑ Use of artificial neural networks trained on multispectral EO images;
 - ☑ Incorporation of transport infrastructure data into soil erosion risk models.

Use case 6: Environmental Pest



- ☑ **Sector:** Agriculture and Crisis Management
- ☑ **Impact:** Providing early warning and real-time monitoring of locust swarms to minimize agricultural damage. Supporting global food security by preempting pest-related crises with EO-driven predictive models.
- ☑ **Use Case requirements for the platform stimulating further uptake:**
 - ☑ Ability to fuse and analyze extensive EO datasets,
 - ☑ Integration of algorithms (e.g. Maxent and Recurrent Neural Network) for early warnings;
 - ☑ Support for time-series climatic data and spatial aggregation for ecosystem suitability forecasts;
 - ☑ Capability to track near real-time swarm movements using stochastic modeling.

Use case 7: Civil Protection Activities



- ☑ **Sector:** Disaster Risk Management and Emergency Response
- ☑ **Impact:** Improving real-time decision-making for managing natural disasters such as wildfires and floods. Enhancing preparedness and response capabilities using high-frequency EO updates and AI-driven risk assessments.
- ☑ **Use Case requirements for the platform stimulating further uptake:**
 - ☑ Support for timely and high-frequency EO data with unsupervised processing capabilities;
 - ☑ Generation of high-resolution risk assessments for hazards like wildfire and floods;
 - ☑ Integrating decision support capabilities, e.g. through compatibility with platforms like Jixel for real-time emergency response;
 - ☑ Enhancing visualisation tools including virtual reality environments for risk mapping.



Overall, the development of the above-mentioned Use Cases helped to identify a set of common requirements that have to be fulfilled to serve a wide range of applications:

1. **Scalability** handling data at regional to global scales
2. **Real-Time Processing** for dynamic and predictive use cases
3. **AI and ML Capabilities** for forecasting, optimisation, and classification tasks
4. **Interoperability** enabling seamless compatibility with existing models, datasets, and user-driven configurations
5. **User Interface** including accessible tools for data visualisation and decision support





Policy Recommendations for Enhancing EO Data Accessibility and Usability

To maximize the impact of EO data and ensure its effective integration across sectors, the following policy recommendations are proposed:

➤ Reduce Data Fragmentation & Foster Cross-Sector Knowledge Sharing

- ☑ Establish a unified approach to integrating EO data sources, reducing redundancies and improving data discoverability.
- ☑ Facilitate collaboration between EO initiatives, research institutions, and industry stakeholders to streamline geospatial information access and use.

➤ Raise Awareness & Incentivize Widespread Adoption

- ☑ Develop targeted outreach campaigns to highlight the economic, environmental, and societal benefits of EO data.
- ☑ Provide incentives for businesses, local governments, and civil society to adopt EO data solutions, showcasing clear return-on-investment case studies.

➤ Simplify Access & Enhance Usability for Decision-Makers

- ☑ Lower the technical barriers to EO data utilisation by developing **intuitive platforms, automated workflows, and AI-driven analysis tools**.
- ☑ Ensure decision-makers can **access actionable insights** by integrating EO data into policy dashboards and user-friendly visualisation tools.

➤ Promote Interoperability & Standardisation for Sustainable Data Governance

- ☑ Align EO data governance with **FAIR (Findable, Accessible, Interoperable, Reusable) and CARE (Collective Benefit, Authority to Control, Responsibility, Ethics) principles** to enhance usability and accessibility.
- ☑ Develop common standards and protocols that ensure compatibility across different platforms, datasets, and analytical tools for both **public and private sector** users.



➤ Strengthen Policy Integration & Community Engagement

- ☑ Conduct extensive consultations with **the EuroGeo community, industry stakeholders, and policymakers** to identify EO data applications in key sectors such as:
 - ☑ Climate change and environmental protection
 - ☑ Energy and transportation
 - ☑ Agriculture and food security
 - ☑ Civil protection and disaster management
 - ☑ Healthcare and public health
- ☑ Encourage cross-sector dialogue to align EO data capabilities with specific policy needs, ensuring its seamless integration into decision-making frameworks.

By implementing these recommendations, EO data can become more accessible, impactful, and actionable, empowering stakeholders to make informed, data-driven decisions while fostering innovation and sustainable development.



Conclusions

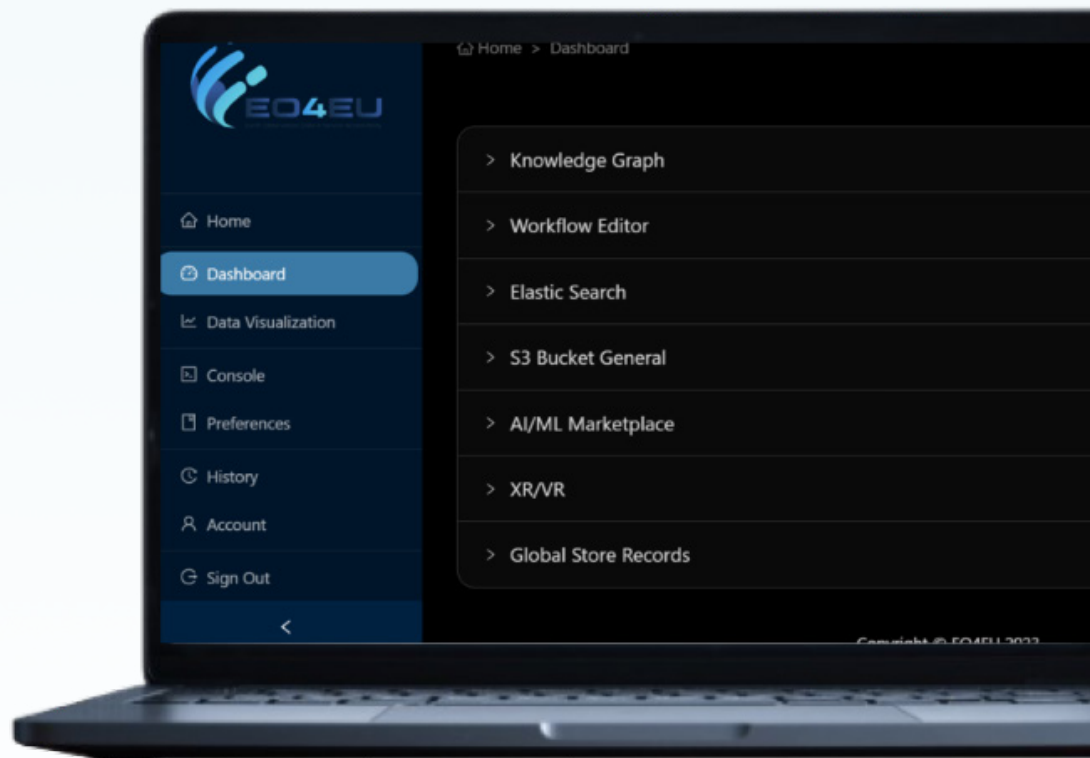
Despite the robust sources of EO data and research advancements, key barriers such as data fragmentation, limited coordination, and technical complexities hinder its widespread use in Europe. The EO4EU project provides a promising solution by offering a platform that streamlines access, enhances interoperability, and integrates cutting-edge technologies like AI, machine learning, and immersive tools to improve the usability of EO data for a broader range of users.

Through user surveys and a set of industry-specific use cases, the EO4EU platform has demonstrated its potential to benefit such sectors as agriculture, healthcare, environmental monitoring, and disaster management. These use cases have highlighted critical requirements such as scalability, real-time data processing, and seamless integration with existing systems, while underlining the need for a user-friendly, accessible platform solution that empowers diverse stakeholders.

To fully leverage the potential of EO data, Europe must prioritize removing existing barriers, particularly in terms of data fragmentation, accessibility, and usability. Ensuring that EO data is not only accessible but also actionable for various end-users is key to achieving impactful results.

Specific recommendations stemming from the EO4EU project include reducing EO data fragmentation by providing unified solutions, enhancing data sharing and the interoperability of existing systems, raising awareness about the available data sources and promote their use in relation to the most pressing challenges, simplifying access to EO data for non-technical users, leverage disruptive technologies for real-time data processing and wider customisation capabilities.

By leveraging these recommendations, Europe can fully unlock the transformative potential of EO data, strengthening informed decision-making in numerous industries and sectors.



Authors:

Stathes Hadjiefthymiades, Sarantis Paskalis (NKUA), Vasileios Baousis (ECMWF), Valeriya Fetisova, Rob Carillo (Trust-IT Services Srl), Monia Santini (CMCC), Ralf Hedel (Fraunhofer-Gesellschaft), Stefano Natali, Maximilien Houel (Sistema GMBH), Marco Folegani (MEE0 Srl)

