CDSE

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Copernicus Data Space Ecosystem

Annual report 2024

PROGRAMME OF THE EUROPEAN UNION

Copernicus Europe's eyes on Earth

esa

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FOREWORD

It is my pleasure to present the **Copernicus Data Space Ecosystem Annual Report 2024**.

The year **2024** was truly remarkable for the Copernicus Data Space Ecosystem (CDSE) – a year that not only demonstrated the platform's operational maturity but also revealed the transformative potential of Europe's Earth Observation infrastructure. With nearly 80 petabytes of online data, more than 34 million newly published Sentinel products, and over 200 PB of EO data delivered, the CDSE has become one of the world's most powerful and accessible data ecosystems. The CDSE user community continued to grow with unprecedented momentum. Registered users soared from **84,000 to almost 290,000**, complemented by 3.7 million anonymous visits to the Copernicus Browser. This global adoption affirms that simple, immediate, and powerful access to satellite data is unlocking new ideas and accelerating innovation at every scale.

What makes this achievement particularly inspiring is not only the scale of data, but the way users can now interact with it. **Streamlined data access has become one of CDSE's greatest strengths**, and I am constantly impressed by the live demonstrations our experts deliver during webinars, workshops, and public EO events. Watching them reveal insights from raw satellite data in just seconds, directly in the **Copernicus Browser**, reminds me each time of the transformative power we are putting into the hands of our users. Combined with Sentinel Hub, openEO, and cloud-native interfaces, this shift from **"download first" to "process where the data lives"** is redefining how Earth Observation data is used across research, public administration, commercial applications, education, and beyond.

These achievements would not have been possible without the exceptional collaboration and team spirit across the **CDSE consortium**, involving T-Systems, CloudFerro, Sinergise, VITO, ACRI, DLR, STARION and many more contributors. Together, we navigated significant operational challenges – from managing rapid user growth to expanding mission coverage – while continuously improving system stability, download performance, catalogue interfaces, and user support. The dedication of the teams and their shared commitment to service excellence have directly translated into a better and more seamless experience for all users.

The year 2024 also marked an important year of **innovation and evolution**. We introduced new data access mechanisms, broadened our offering with global mosaics and additional Copernicus Contributing Missions data, released new on-demand production capabilities, and deployed major updates across Sentinel Hub, openEO, the catalogue, and the Copernicus Browser. These enhancements laid the foundation for the next phase of CDSE growth.

As we look ahead, our vision is clear: **to further grow CDSE into an open, vibrant, and collaborative ecosystem of services**. In 2024, we completed critical groundwork – defining governance models, harmonizing onboarding processes, and preparing the infrastructure to welcome new service providers. These efforts now enable us to expand beyond data access alone. In the coming years, CDSE will increasingly host **Copernicus Services, national and thematic services, and third-party offerings**, forming an integrated environment where diverse solutions can thrive. This expansion will be further accelerated by the fast-moving frontier of **AI capabilities**, unlocking new possibilities for automated analysis, fusion of multimodal datasets, and scalable insight generation directly within the ecosystem.

I extend my heartfelt thanks to the entire CDSE team, ESA, and the European Commission for their continued partnership and dedication. Together, we are building more than an infrastructure – we are shaping Europe's future capability to observe, understand, and protect our planet.

I wish you an inspiring read and look forward to an exciting chapter ahead for the Copernicus Data Space Ecosystem.

Uwe Marquard
CDSE Service Manager

T-Systems International GmbH

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Title image: source: *copernicus.eu, Image of the Day, 2024/03/16 Camargue*

DOCUMENT OBJECTIVES

This document summarizes the functioning of the Copernicus Data Space Ecosystem (CDSE) in 2024 in providing the Data Access Services for the Copernicus Sentinel Missions operated by ESA, providing an in-depth analysis of the publication and usage trends for the satellite data managed within the CDSE. It also presents the status of services currently in production and an outlook for the future.

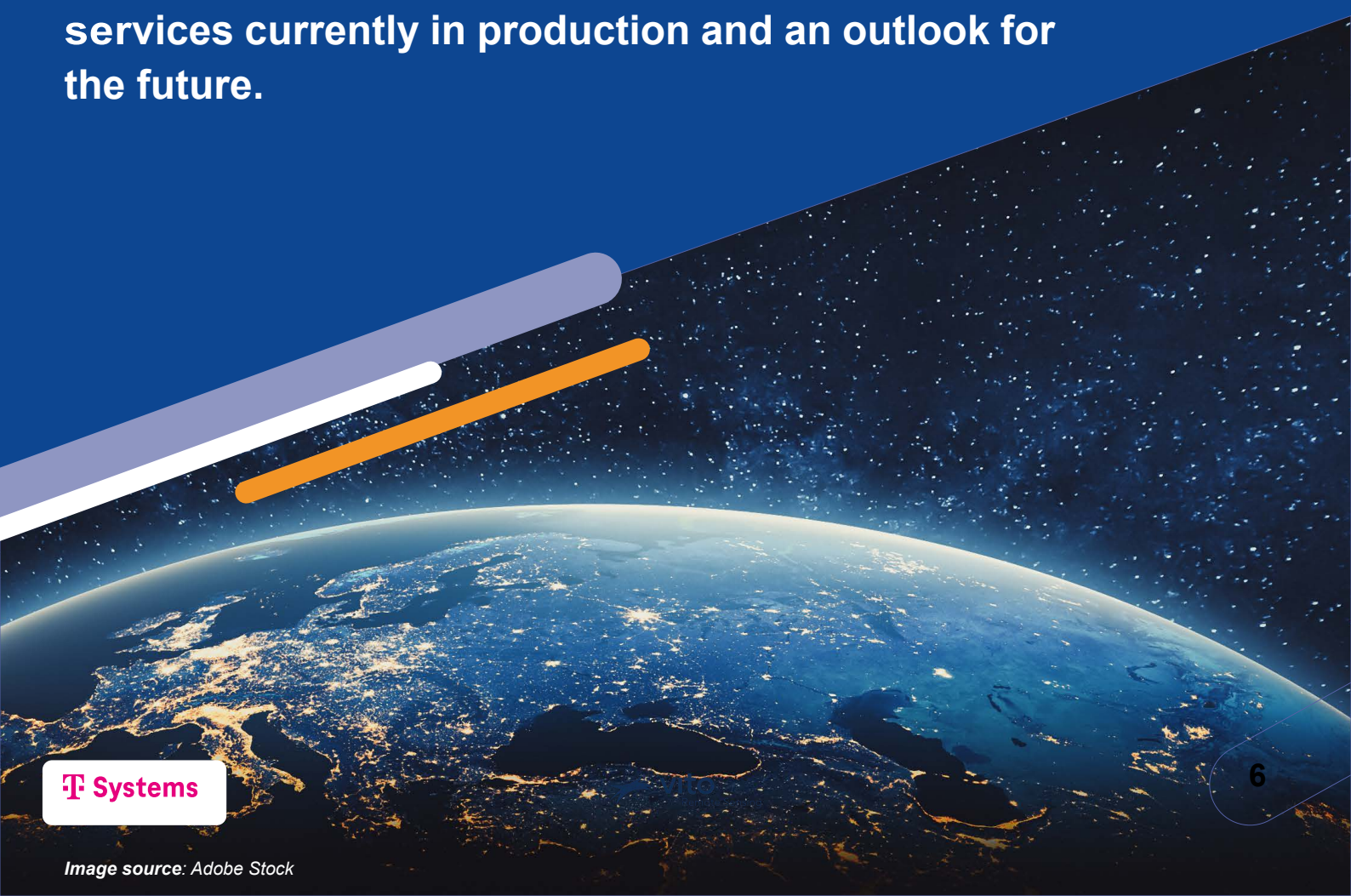


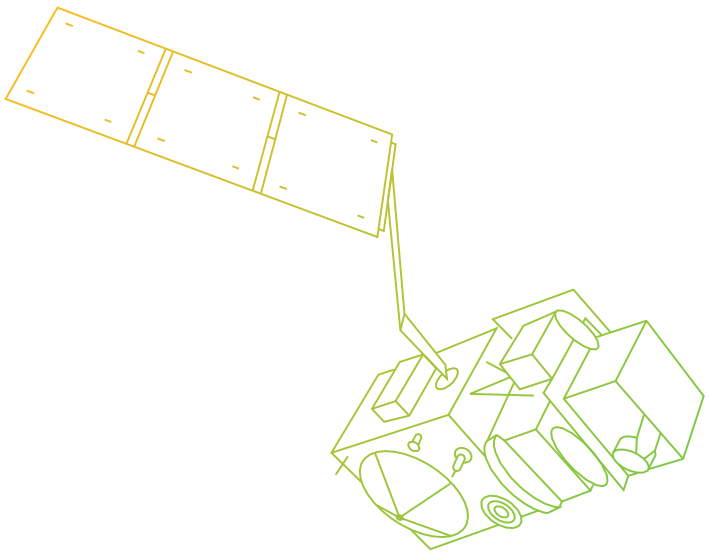
Image source: Adobe Stock

EXECUTIVE SUMMARY

The Copernicus Data Space Ecosystem (CDSE) has continued its remarkable growth and technological evolution throughout 2024, solidifying its position as Europe's premier gateway to Earth Observation (EO) data, with that said it continues to set the standard with its dynamic and forward-looking approach to satellite imagery access and use. Offering instant availability to vast volumes of Earth Observation (EO) data, both real-time and historical, the platform supports diverse user needs through a variety of intuitive interfaces. Built on open-source technologies, CDSE ensures seamless interoperability and scalability, making it an increasingly powerful and flexible resource. Over the past year, the ecosystem has seen strong growth in its user base, driven by expanding capabilities and a consistently reliable, high-availability service. Customer support remains a standout feature, earning consistently high satisfaction ratings. Looking ahead, CDSE is focused on delivering more data, richer services, and an even more accessible and streamlined user experience.

A Breakthrough for Europe's Data Economy

With up to 40 terabytes of EO data generated daily, Copernicus represents one of the largest civilian Earth observation programmes in the world. CDSE removes the traditional barriers to accessing and using this data, empowering users with real-time availability, intuitive interfaces, and scalable cloud-based processing tools. By simplifying access and analysis, CDSE fuels innovation, supports environmental policies, and drives Europe's data-driven economy – making it faster, easier, and more impactful than ever before.



Key Achievements and System Growth

- Massive Data Availability: As of December 2024, CDSE hosts almost 80 petabytes of EO data online, offering instant access to Copernicus Sentinel missions' full spatial and temporal coverage.
- User Surge: The number of registered users tripled, rising from 84,000 to nearly 290,000, with an additional 3.7 million anonymous users utilizing the Copernicus Browser.
- Volume of Data Offer in 2024, more than 34 million Sentinel products were published, totalling over 20.6 PB of data.
- High Performance: Average download speeds of up to 90 MB/s for entitled users; stable 20 MB/s for general users.

Key numbers

- More than **78 PB of online data.**
- More than **100 million individual Sentinel products** in online storage, with up to 1000 catalogue queries per second (2 billion queries monthly).
- In 2024, more than 200 PB of EO data were made available to users from the Copernicus Data Space Ecosystem. Of this amount of data:
  - 80 PB of data downloaded by registered users (using CDSE login) outside the Copernicus Data Space Ecosystem
  - 30 PB of data downloaded by registered CDSE users inside (from user machines located on the CDSE infrastructure closed to data) the Copernicus Data Space Ecosystem
  - 90 PB of data downloaded by users of CDSE federated clouds, including commercial download services
- **289,000 users registered** registered in 2023.
- 77.7% of all data downloads were completed within Europe.

- Up to **90 MB/s** average download speed for entitled users and stable 20 MB/s for general users.
- More than **1.3 billion requests** processed by Sentinel Hub services in 2024, translating to almost 9 billion processing units (PU) consumed for streamlining access to Sentinel data. With one PU corresponding to approximately 26 km2 of Sentinel-2 data processed at full resolution, the total represents almost 230 billion km² or **1600 times the area of Earth landmass**. More than 2 quadrillion pixels of data were processed along the way.
- Over 7.3 million requests processed through the openEO, with a steady increase in the number of users.

Conclusion

- The Copernicus Data Space Ecosystem embodies Europe's commitment to accessible, reliable, and cutting-edge Earth Observation services. With its unprecedented data volumes, simplified access, and broad user engagement, CDSE is enabling science, innovation, and evidence-based decision-making across Europe and beyond. The achievements of 2024 reflect the collective efforts of ESA, the European Commission, and the CDSE consortium, paving the way for continued growth and impact in the years to come.

For up-to-date statistics and information:

https://dashboard.dataspace.copernicus.eu/

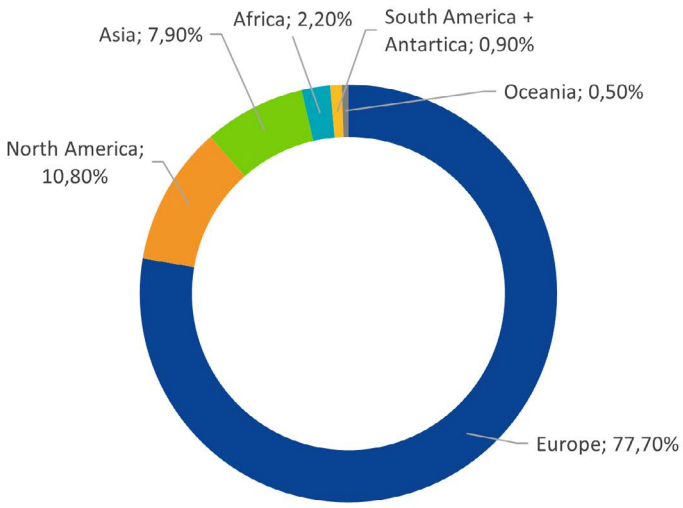


FIGURE 1: Percentage split of downloads by volume per continent in 2024.

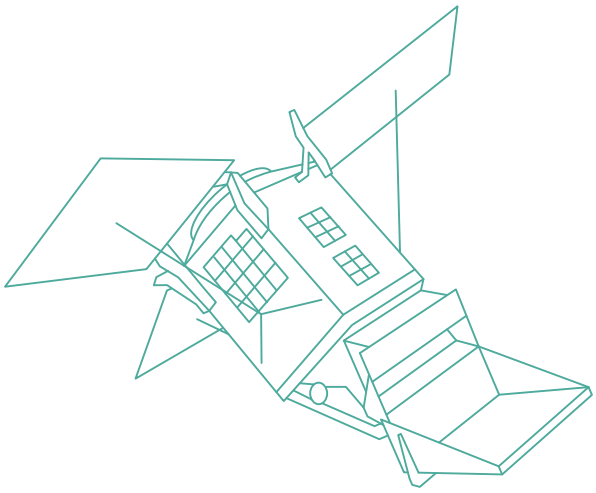
1 INTRODUCTION

Copernicus is the Earth observation component of the European Union's Space programme. It provides accurate, timely and easily accessible information to improve the management of the environment, understand and mitigate the effects of climate change and ensure civil security. ESA has developed a new family of satellites, called Sentinels, specifically for the operational needs of Copernicus. At present, two complete two-satellite constellations, Sentinel-2 and Sentinel-3, are in orbit, along with two additional single satellites, Sentinel-5P and Sentinel-6. With the end of the mission for the Sentinel-1B satellite, Sentinel-1C is planned to join Sentinel-1A in orbit as soon as possible to restore the Sentinel-1 constellation.

The constellation consists of several satellite types with multiple sensors that can be used for Earth's land, oceans, and atmosphere monitoring. With over 78PB of data produced, Copernicus is one of the biggest civilian data sources in the world. The ultimate success of the Copernicus programme depends mainly on the easy, comfortable availability of Copernicus data. Suggestion to update to: The more easily the data is available, the more it is used and processed by various applications, increasing the potential benefits for society.

That is why, within the CDSE, Copernicus data are available in an online form, in a way that data can be immediately discovered, delivered, and processed. While the data are the heart of the ecosystem, the CDSE offers much more than simple data access. On the Figure 2 we present the ecosystem with applications that are available for the users and federated services.

CDSE started its operations in July 2023, replacing the Sentinel Data Access Service from 1 November 2023 onwards. The numbers we are going to present show that the new approach – based on online availability and many parallel access and analysis methods and tools together with federated clouds – is already vastly successful. While we concentrate on 2024 data, we are also going to present recent trends that tell us that users appreciate the new, easy, and comfortable availability of data.



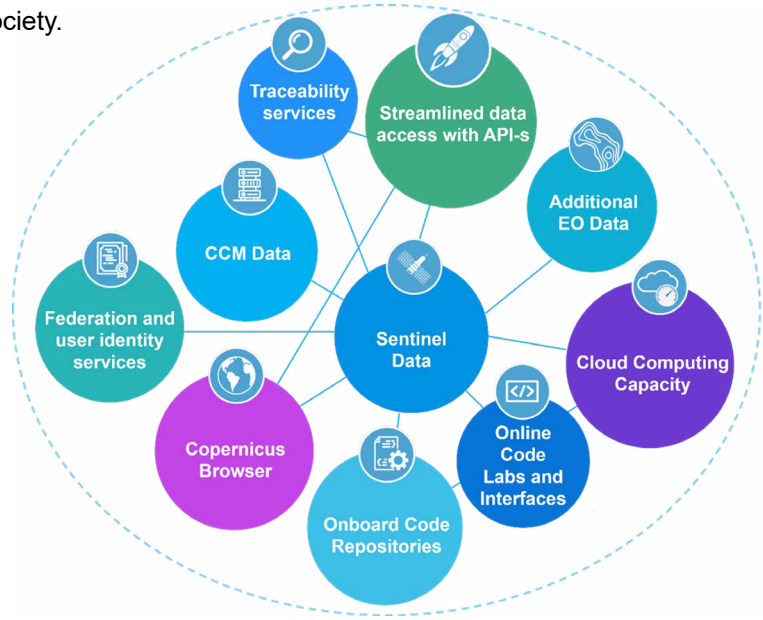


FIGURE 2: Copernicus Data Space Ecosystem in a nutshell.

Even though by providing multiple applications, we reduce the need for simple data download, the CDSE guarantees fast and efficient access to EO data download, and Petabytes of Sentinel data are accessed and downloaded each month. The number of products available for the users is constantly growing, resulting in over 34 million new Sentinel products published in 2024. This report presents the statistics for the number and volume of data downloaded. The statistics show a clear spike in demand for data from the CDSE after the end of previous Sentinel Data Access Service in October 2023, followed by continuing upward demand for data download. Whereas the interest in data is clearly global, the biggest demand for the data still comes from the European users (see Figure 1).

It is worth noting that the statistics for data download do not include data processed and delivered through the Sentinel Hub and openEO, nor the numbers for data retrieved through connected clouds – CloudFerro's cloud and T-Systems' Open Telecom Cloud, and commercial data access through CREODIAS. In 2024 approximately 25 PB of EO data were delivered to users within the clouds connected to EO data repository for commercial EO based services.

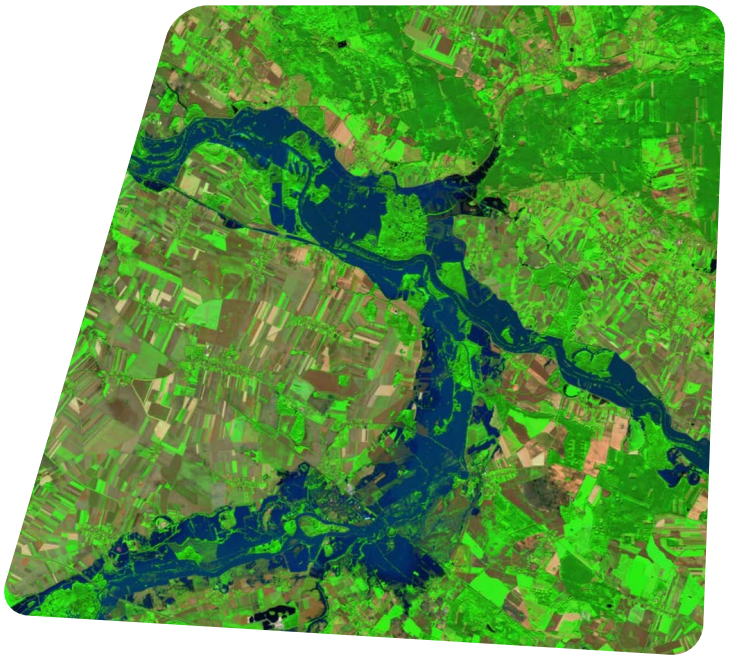


Image source: *pollunit.com, Flood on the Odra and Nysa Klodzka Rivers, image taken by the Sentinel-2_L1C satellite on September 18, 2024 near the town of Lewin Brzeski (Opole Voivodeship, Poland)*

This is where the big potential of CDSE lies – data can be accessed and processed immediately without a need for download. With streamlined data access services – Sentinel Hub and openEO processing services – users get access to serverless processing and ready-to-use insight on top of the raw data. Moreover, these services can be integrated into any EO service that relies on Copernicus data. In 2024 alone, over 1.3 billion requests were processed by Sentinel Hub, which translates to over 1600 times the area of the Earth's landmass. Additionally, openEO processed over 7.3 million user requests. Importantly, the popularity of these services is growing, as confirmed by the increasing usage of the streamlined data access services.

Starting from January 2023, the system attracted a substantial number of users. At the end of 2023, CDSE had almost 85 000 registered active users[1]. Copernicus Browser, which supports anonymous users, recieved over 3.7 million visits. We observed a significant user number increase after the decommissioning of the previous Sentinel Data Access Service in October 2023 (31,000 in December and growing by over 20,000 monthly in the first months of 2024). It is important to note that due to GDPR restrictions, no user accounts were transferred from the former hubs which were operated under the Sentinel Data Access Service. Therefore, all registered users are those who have chosen to register afresh, directly with the CDSE.

CDSE started its operations in July 2023, replacing the Sentinel Data Access Service from 1 November 2023 onwards. Therefore, this report covers part of the year of operations. And yet, the numbers we are going to present show that the new approach – based on online availability and many parallel access and analysis methods and tools together with federated clouds – is already vastly successful. While we concentrate on 2023 data, we are also going to present recent trends that tell us that users appreciate the new, easy, and comfortable availability of data.

This CDSE annual report was compiled by the consortium led by T-Systems as a prime contractor for CDSE. The actual data are delivered by service providers: CloudFerro is responsible for data discovery, access, and retrieval across all elements of the data space; Sinergise manages Sentinel Hub and Vito handles openEO.

1 Registered active means at least one login to the service.

2 SYSTEM OVERVIEW

The Copernicus Data Space Ecosystem (CDSE) provides users with free, open, and immediate access to the complete data repository for the Copernicus Sentinel Missions managed by ESA. The services cater to a broad spectrum of demands, ranging from newcomers in the EO field to companies and academic researchers. The objective of the system is to provide users – individuals and organisations – with a platform to quickly search and process EO data in order to provide actionable insights for decision makers.
It is the first place where users can access Sentinel data published usually within 30 minutes from the data processing within the production services (and a few hours from sensing time). Importantly, there are no restrictions on who can access the user-level data[2].

Whereas the system allows data to be downloaded in a traditional manner, CDSE is much more than a data download service. It is a comprehensive ecosystem of applications with graphical user interfaces (GUI) and application programming interfaces (API) for accessing, visualizing, and processing Copernicus data. Its mission is to simplify data processing, increase its uptake, and build a European ecosystem for EO data processing. CDSE takes away the technical complexity of accessing and processing data, allowing users to focus on applications. The system is built in a multi-cloud environment, including CloudFerro cloud and Open Telecom Cloud (OTC). The EO Data repository and applications are distributed among CloudFerro Cloud in Warsaw and OTC in Amsterdam, providing data and service redundancy.

The product lifecycle in CDSE starts from the data collection from different sources (part of the ESA Ground Segment), followed by the validation of input data. The validated data are then stored in the EO Data Repositories located in multiple locations (Warsaw and Amsterdam) in either packed or unpacked form according to a defined storage policy. Subsequently, product metadata are published in a common unified catalogue and the stored products are registered in the Traceability Service, for confirmation of the data origin.

After the publication, the product can be discovered by the users and accessed through various applications and interfaces. The Figure 3 below presents the data flow within the system, starting from the data retrieval – CDSE retrieves data from the individual mission data production services, stores it in a redundant online repository in accordance with the data policy, and disseminates through multiple interfaces to the users. While users can download the data from CDSE, more importantly, the data can be processed on the fly with streamlined data access and serverless processing applications, such as Sentinel Hub, openEO, Jupyter Hub and on-demand production or in the cloud.

Image source: *Adobe Stock*

2 However, some products are available for selected users only.

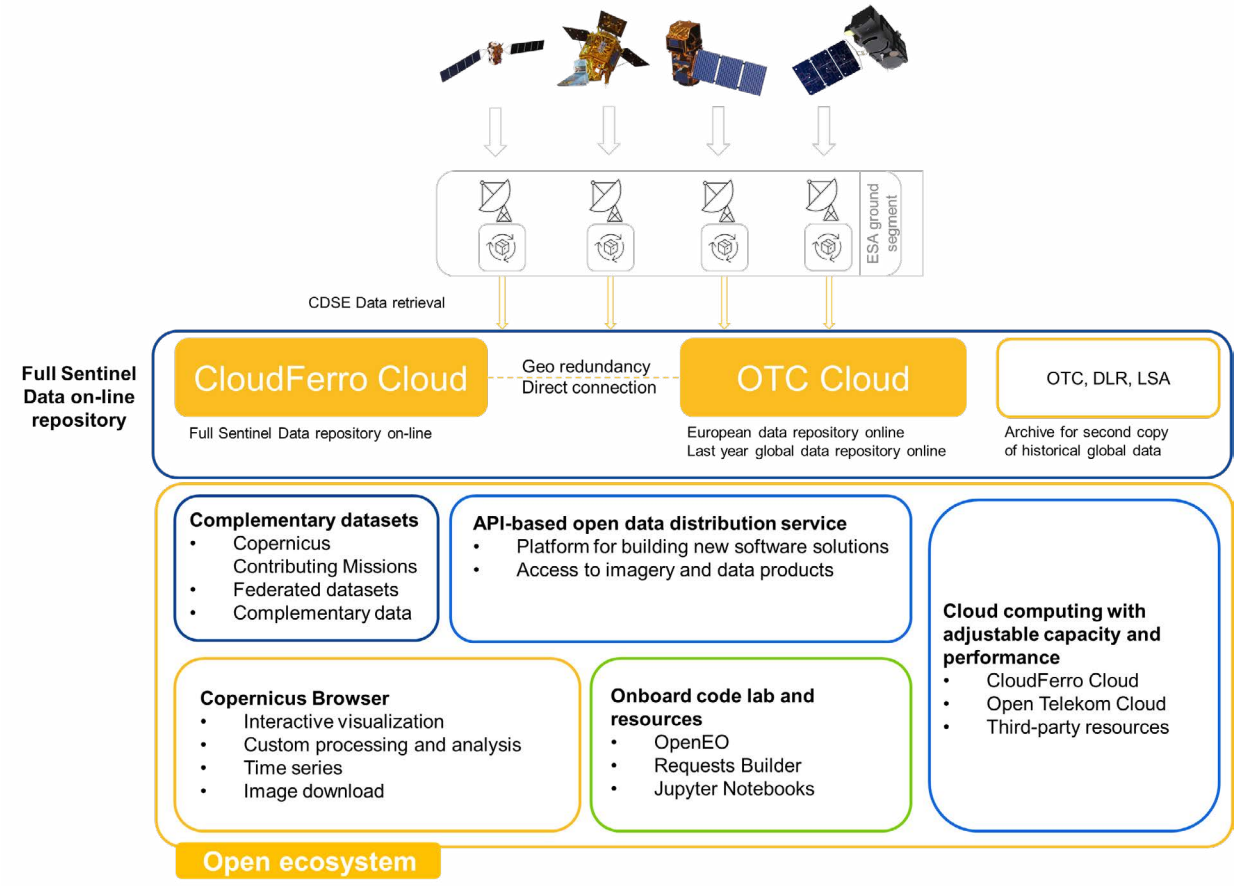


FIGURE 3: The high-level architecture of the CDSE.

Below we present possible ways of accessing the data within the CDSE (Figure 4). Once Sentinel data is stored in the EO data repository, users can search and access it via GUI or API. Importantly, while users can still retrieve a packed (zipped) product using a zipper service, as it was in the previous Data Access Service, users can now also directly access a full file or part of it through the S3 interface – a native interface for cloud applications.

Moreover, users can access the data through the available applications for streamline data access – Sentinel Hub, openEO, and Jupyter Hub, which provide access to requested parts of the data file and powerful processing capacities. The choice of access methods depends on the user's needs. All the complexity of the data access happens in the background and is no concern for the user.

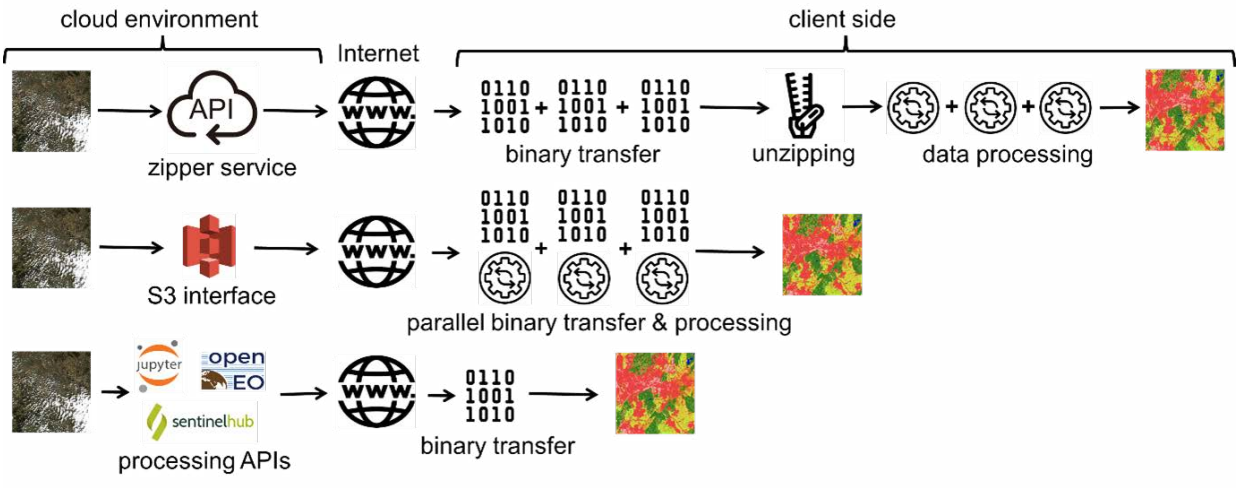


FIGURE 4: Multiple data access and processing scenarios enabled in CDSE.

It is important to note that the Copernicus Data Space Ecosystem is open to everyone. Both public and commercial data sets (e.g. VHR imagery) and services (e.g. applications, cloud computing providers) can join the ecosystem. Interoperability is ensured by implementing open-source standards such as STAC, OData, Open Search, and S3 for data access. External developers can also find the corresponding APIs for applications such as Sentinel Hub or openEO, to develop innovations using the data and resources of the CDSE. The available services can be used for both commercial and non-commercial purposes.

The participation of additional entities, such as third- party providers, is anticipated, happening, and welcomed, enhancing the ecosystem with a diverse array of services, both free and commercial. CREODIAS is the first of these additional providers joining the Copernicus Data Space Ecosystem, allowing users to easily scale up the services implemented in CDSE in an unlimited way on a commercial basis, fostering potential large commercial use cases that require additional processing capacity. The relation between CDSE and commercial services is presented in the Figure 5 below.

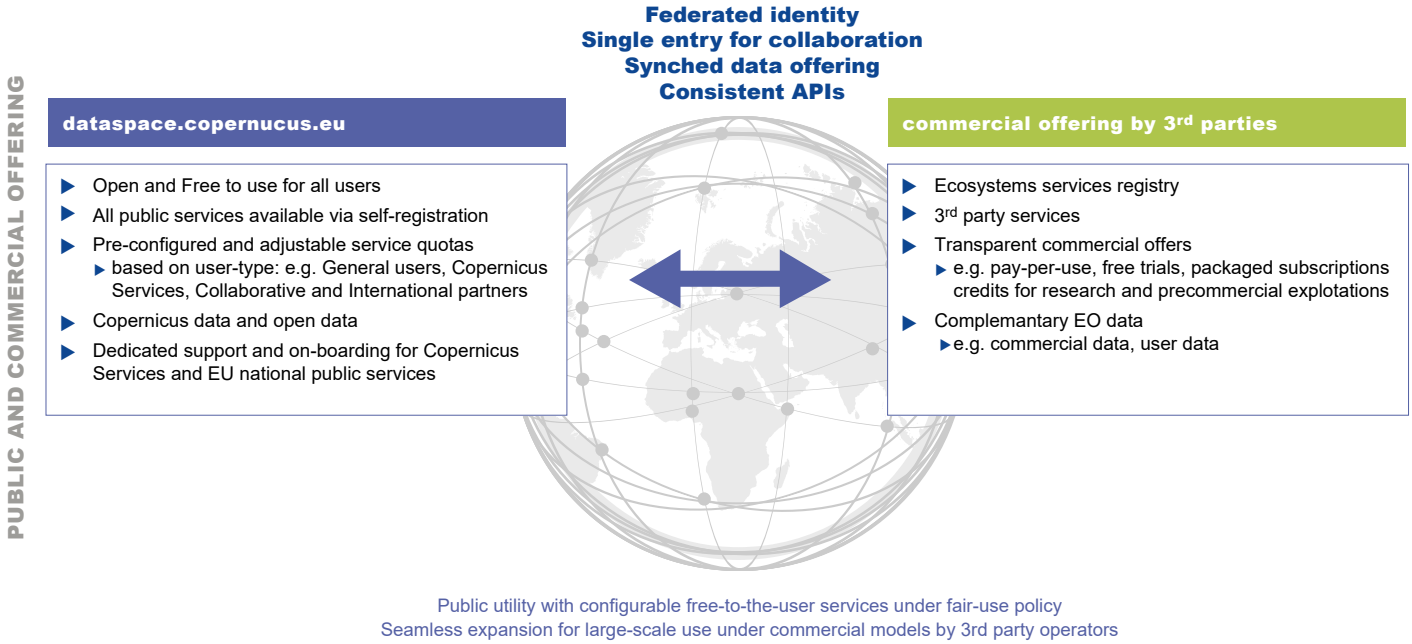


FIGURE 5: CDSE Public and Commercial Service Offering.

The Copernicus Data Space Ecosystem includes all necessary elements enabling growth of the ecosystem, including:

- different cloud computing options from two leading European cloud providers
- a helpdesk with relevant tutorials and a user forum
- EO specific functionalities like catalogue and data ingestion and access service
- identity and user management
- common billing services
- proactive campaigns and offline/online support events to promote the ecosystem and enhance user engagement

All of which are needed to enhance user engagement and grow European capabilities in the area of data processing.

An overview of the common core, integrated, and third-party services available in the ecosystem is shown in Figure 6 below.

User feedback is highly encouraged, and a satisfaction survey is carried out in order to improve the service and make the Copernicus Data Space Ecosystem a valuable asset for all participants.

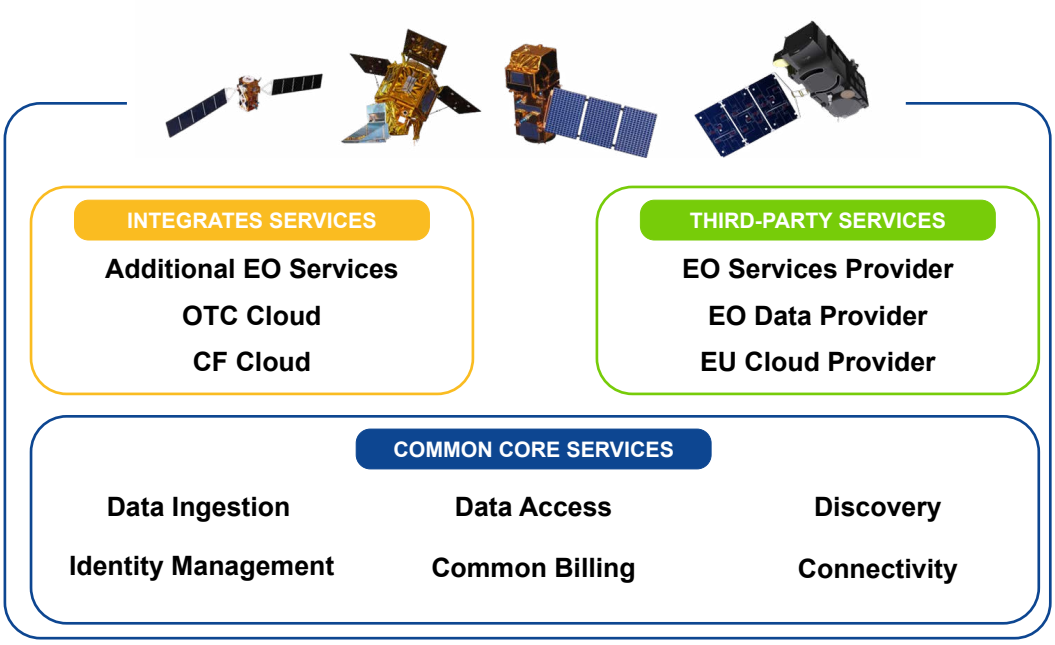


FIGURE 6: Copernicus Data Space Ecosystem services overview.

3 MAIN EVOLUTION MILESTONES OF THE DATA ACCESS SYSTEM IN 2024

SUMMARY 2024
A defining feature of the CDSE is its constant evolution, adaptation to new needs, and openness to innovation. Hence the efforts made year after year to systematically search for new improvements and implement them. The year 2024 was another year of intensive development of services in the Copernicus Data Space Ecosystem. The evolutions portfolio, highlighted below, consists of improvements and new services for users and further enrichment of the EO data products. In addition, the system's infrastructure was strengthened to build the foundations for further growth in the use of the ecosystem and to prepare it to handle further new satellite data in 2025 and the coming years.

Milestones per month:

January 2024

- Push Subscription available: https://documentation.dataspace.copernicus.eu/APIs/Subscriptions.html#push-subscriptions
- Filled in all data gaps for Sentinel-2 Level 2A

February 2024

- New OpenEO use case: parcel delineation using Sentinel-2 data
- New libraries added to the Jupyter notebooks Geo Kernel: pycurl, cdsapi, blake3
- Enabled access to Copernicus Data via the Research Network: https://documentation.dataspace.copernicus.eu/ResearchNetwork.html
- ESA Long-Term Archive services integrated to CDSE Traceability

March 2024

- Compressed product download for Sentinel-1 RAW, GRD and SLC: https://documentation.dataspace.copernicus.eu/APIs/OData.html#compressed-product-download
- Information about EO products for bulk analysis – new functionality: Catalogue CSV: https://documentation.dataspace.copernicus.eu/Applications/Catalogue-csv.html
- Copernicus Contributing Missions data available via OData for search and download for all eligible users
- Increased quotas for OpenEO API & Algorithm plaza from 3000 to 4000 credits per month
- New set of improvements in OpenEO and features: using 'filter_labels' to load data for multiple time intervals, improved support for reading and generating GeoParquet files, UDF signature can use xarray.DataArray directly
- New products for expert users: Sentinel-3 Engineering and Auxiliary products: SR_1_CA{1L,1S, 2K, 2C}AX, MW_1_{NIR, DNB, MON}_AX, SL_1_VSC_AX

April 2024

- Pull Subscription available: https://documentation.dataspace.copernicus.eu/APIs/Subscriptions.html#pull-subscriptions
- Copernicus Contributing Missions data now available via Copernicus Browser
- New metrics available on CDSE Dashboard. Improvements on user engagement, data downloaded, data published, service health and mission snapshop subpages
- Updated openEO backend: faster data loading from object storage, improved download performance of large files: better performance and improvements for resample_spatial and raster_to_vector
- New functionality: On-Demand Production for Sentinel-1

May 2024

- Release of Sentinel-3 collections via openEO
- Time series of Quarterly Cloud Free Mosaics added to Copernicus Browser
- Copernicus Digital Elevation Model (DEM) available via CDSE
- Copernicus Plant Phenology in openEO
- Access to the WorldCover map for 2021 in openEO

June 2024

- Sentinel-2 quarterly global mosaics for years 2022, 2023 and 2024 added to Copernicus Data Space Ecosystem
- SAR Sea Ice data (Copernicus Contributing Mission) in CDSE
- New openEO notebooks on Disaster Monitoring applications, e.g. mapping oil spills using Sentinel-1, forest fire mapping using Sentinel-2, heatwave analysis using Sentinel-3, landslide detection
- New processing baseline for Copernicus Sentinel-1 ETAD Products
- New processing baseline for Copernicus Sentinel-1 L1 and L2 products
- Significant optimization of the data ingestion architecture – high performing mechanism for replication of data to a backup geolocation
- openEO Introduces load_stac
- All historical data traces available for Sentinel-1
- New products for expert users: historical products – Sentinel-5p Fresco
- New products for expert users: Sentinel-3 and Sentinel-6 AUX_COMB, Sentinel-1 AUX_ML2 (Machine learning)
- New functionality: On-Demand Production for Sentinel-3

July 2024

- Sentinel-1 monthly global mosaics added to Copernicus Data Space Ecosystem
- New products for expert users: Sentinel-2 L1B

August 2024

- Sentinel-3 OLCI Level-2 data available for visualization in Copernicus Browser and supported by Sentinel Hub APIs
- Improvements in openEO, i.a. enhanced SAR Backscatter Processing, expanded functionality of apply neighborhood, a new `python-memory` job option over User-Defined Functions (UDFs) memory usage, parallel execution
- A new openEO service „BioPAR" to calculate vegetation-related parameters
- Landsat-8 Level 1 and Landsat-9 Level 1 data for year 2022 available on s3
- The number of data traces in CDSE has surpassed 500 million
- All historical data traces available for Sentinel-3

September 2024

- A complete publication of Sentinel-2 Collection-1 phase 1 products featuring baseline 05.00 on the Copernicus Data Space Ecosystem
- 5 September 2024 – launch of Sentinel-2C: CDSE providing access to the data to the commissioning team before the open publication
- New metrics available on CDSE Dashboard
- openEO updates: support for Sentinel-1 global mosaics collection, improved Quantile Processing, a new separate_asset_per_band format option has been added to Geotiff, the load_stac process supports a wider range of input collections
- Landsat-8 Level 1 and Landsat-9 Level 1 data for year 2023 available on s3
- New functionality: On-Demand Production for Sentinel-2

October 2024

- Introducing the openEO federation
- New Notebooks for openEO's Load_stac functionality, retrieval of the Proba-V collection from Terrascope through the openEO Federation endpoint
- New processing baseline for Sentinel-3 OL_2_LFR, SY_2_SYN, SY_2_VGP
- New products for expert users: NAVATT Level 0 Products, NAVATT Telemetry Source packets including navigation and attitude

November 2024

- New user data: Sentinel-1 SLC Bursts available in CDSE Catalogue, downloadable via extraction tool
- Copernicus Browser improvements: themes and highlights have been extended
- New processing baseline for Sentinel-5p products: NL-L2 v02.08.00, UPAS v02.07.00
- New processing baseline for Copernicus Sentinel-1 L1 and L2 products: v3.9.0
- The production services integrated with CDSE Traceability service
- New products for expert users: historical Engineering and Auxiliary Sentinel-5p

December 2024

- 5 September 2024 – launch of Sentinel-1C: CDSE providing access to the data to the commissioning team before the open publication
- Publication of preliminary Sentinel-2C user level products
- Sentinel-5p product improvement – removed Sentinel-5p cdl from the products' content
- Sentinel-1 SLC Bursts API for download. Also available in Copernicus Browser
- Landsat-8 Level 1 and Landsat-9 Level 1 data for year 2024 available on s3
- Sentinel Hub Batch API updated to V2
- Sentinel-3 Level 2 SYN data collections available

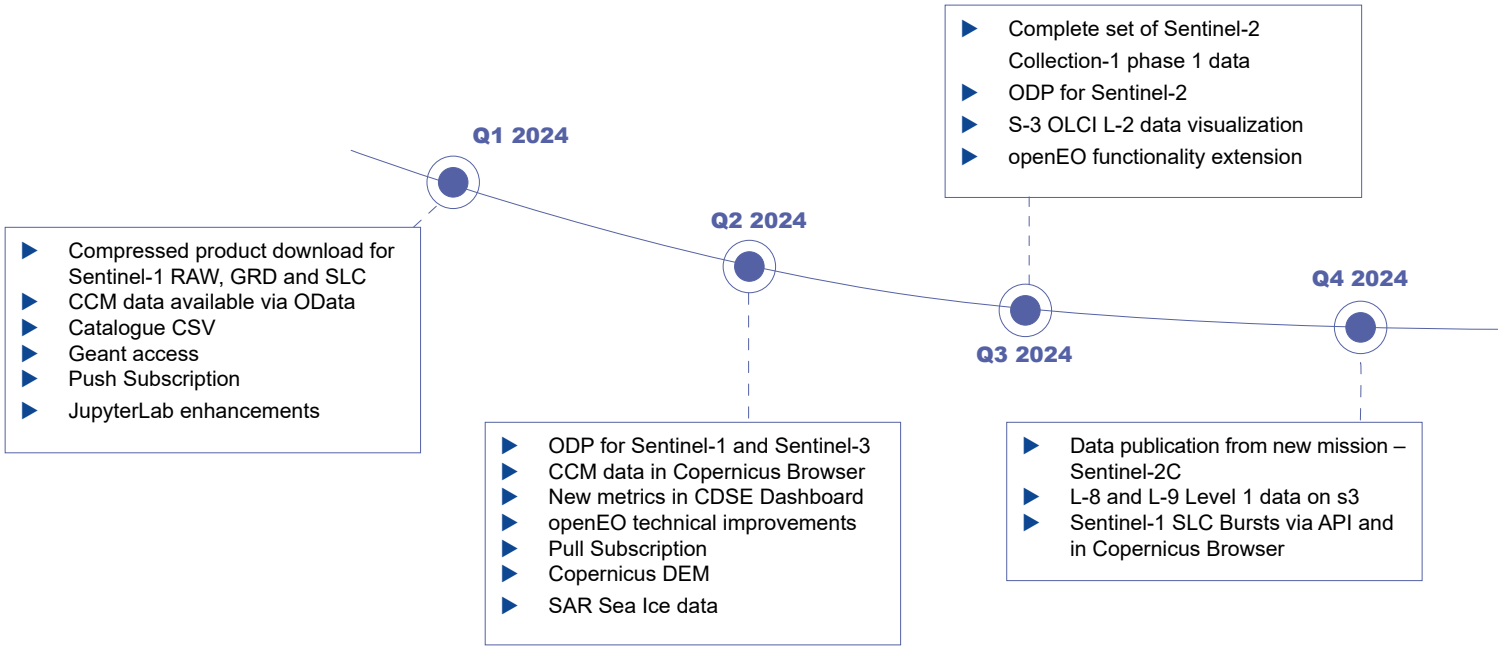


FIGURE 7: Main evolution milestones of the Copernicus Data Space Ecosystem in 2024.

4 OUTLOOK OF THE DATA ACCESS SYSTEM FOR 2025

The consortium is continuously optimizing the platform to ensure service stability, enhance platform performance and to provide a superb end-user experience to meet the sharply increasing visitor needs, while preparing for a massive intake of users over the coming months.

CDSE Roadmap	Delivery outlook
STAC API evolution	▶ New STAC Catalogue has been enabled for users in February 2025. Since that time the portfolio of data collections in STAC Catalogue has been enriched and will continue grow until it contains all user level data available in the Copernicus Data Space Ecosystem (Q2 2025)
New data and missions	▶ New products from Sentinel-1C have been introduced in April 2025 and continued forward collection for 2025 ▶ Sentinel-1 AIS products for expert users (Q3 2025) ▶ Routine publication for Sentinel-2C ▶ Extended campaign for Sentinel-2A publication – three S-2 missions in 2025 ▶ Full Sentinel-2 Collection 1 Phase 2 (Q3 2025) ▶ Landsat-8 and Landsat-9 Level 1 products from 2021 to present and continued forward collection for 2025 ▶ Sentinel-2 OLCI Level-1 and Level-2 data (Q3 2025) ▶ New Space data – data from selected commercial missions to be integrated to CDSE ▶ Modis data – selected datasets (Q3 2025) ▶ Landsat bimonthly 30m mosaics 1997-2022 (Q3 2025)
Copernicus Contributing Missions	▶ Visualization for very high resolution datasets for years 2018 and 2021 in Copernicus Browser ▶ Integration of new datasets – VHR 2024 including visualization in Copernicus Browser ▶ Integration of new CCMs and missions into CDSE (subject to New Space companies onboarding)
Copernicus Land Monitoring Service	▶ A first set of CLMS data products was introduced in the CDSE in May 2025 – **18 product types** (58 data sets) of CLMS Global, including river and lake water level, river and lake ice extent, snow cover extent, snow water equivalent, soil water index, surface soil moisture, top of canopy reflectances, vegetation indices, vegetation phenology, burnt area, lake surface water temperature, lake water quality, net-gross primary production ▶ Work will continue, integrating remaining CLMS products to the CDSE including next Land Cover and Forest Monitoring, High Resolution Water, Snow and Ice data

CDSE Roadmap	Delivery outlook
Global mosaics	▶ Generation of historical global mosaics – quarterly Sentinel-2 L2A and monthly Sentinel-1 GRD will continue on an ongoing basis, providing updated data as the time goes
Streamlined Data Access	▶ Synchronous version of openEO API is being introduced and will be gradually integrated in Copernicus Browser.
Ecosystem Services Registry	▶ CDSE encourages users and organisation to onboard their applications or services within the CDSE Services Registry. This registry is a unified self-service user interface for accessing a wide range of services, provides users and third-party service providers with flexible integration and participation options, allowing them to leverage existing services or onboard new data offerings while maintaining full governance and ownership.

TABLE 1: Upcoming improvements in 2025.

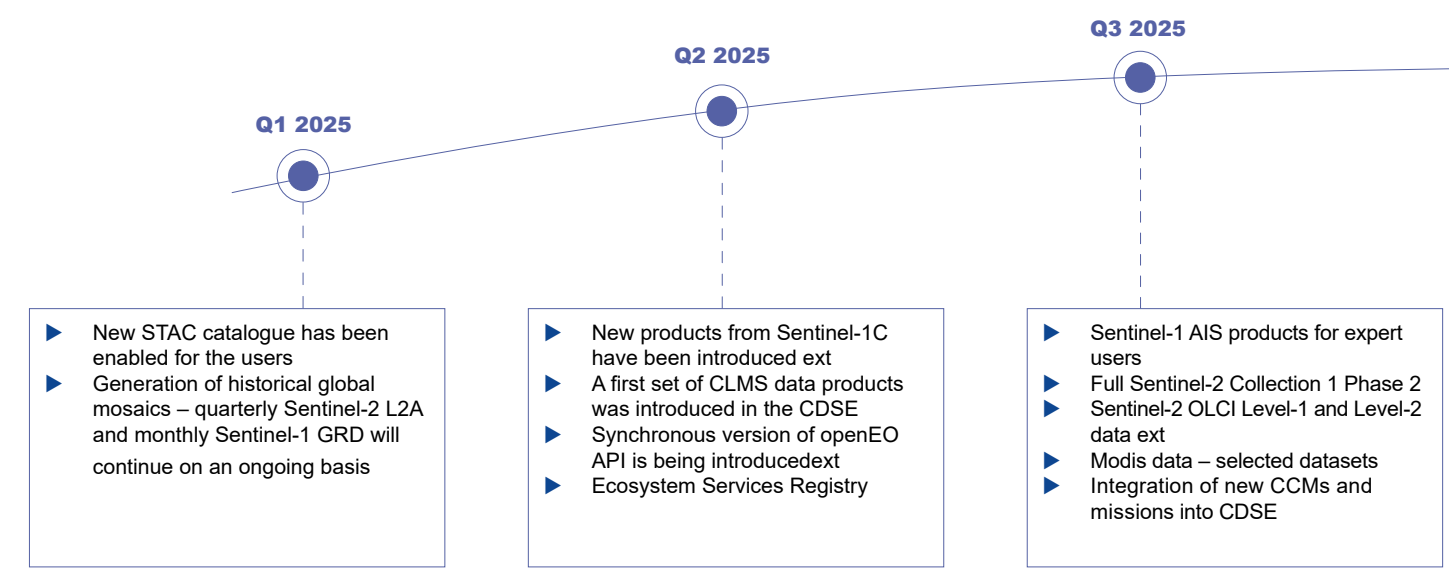


FIGURE 8: Main evolution milestones of the Copernicus Data Space Ecosystem in 2025.

5 USER GROWTH

5.1. Registered Users

The graphic below illustrates the trend of user registrations on the CDSE platform – which are significantly increased – in 2024, showing both the number of new registered users each month and the cumulative total by the end of the year. Throughout 2024, the number of new registrations increased steadily, with between 12,900 (July) new user registrations and 20,935 (November) each month. As a result, the total number of registered users increased from approximately 84,000 at the beginning of the year to 289,592 by December.

It is recalled that none of the user accounts from the former Sentinel Data Access Service was migrated to the CDSE, due to considerations connected to the EU General Data Protection Regulation (GDPR).

This consistent growth throughout the year highlights the continued strong interest in the platform. The steady monthly registration rates ensured a systematic expansion of the CDSE user base, confirming the platform's role as a key source for Copernicus Sentinel data.

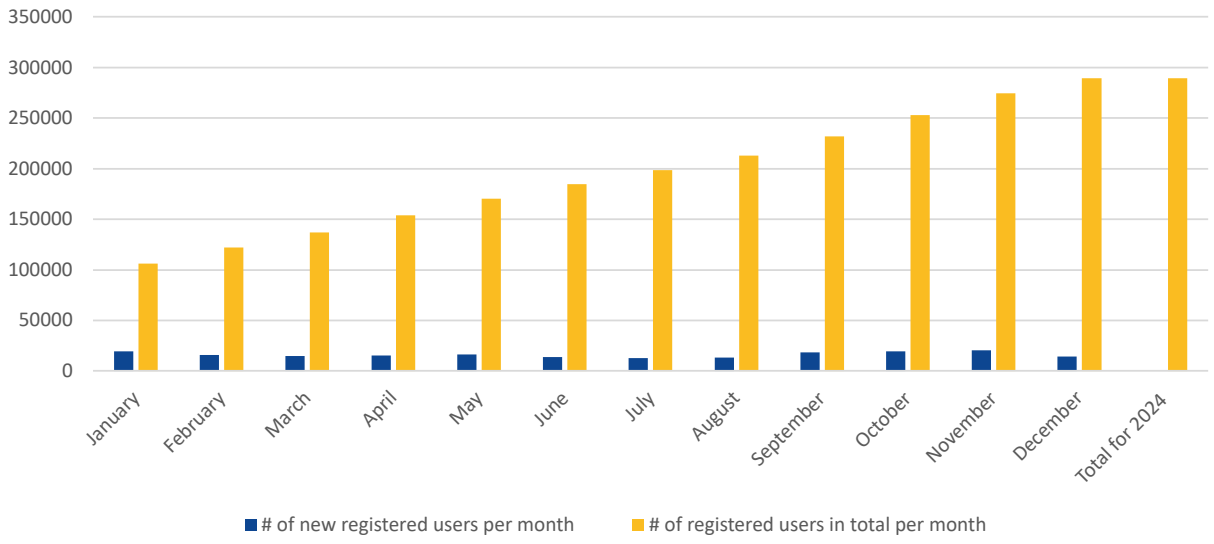


FIGURE 9: Registered users per month and total for 2024.

The user management system organizes users into specific roles, each with defined access rights and performance levels, such as the monthly download volume available from the free quota system which is funded by public resources. On registration, users are automatically assigned the 'Copernicus General Users' role. Additional roles can be granted to eligible users following approval by ESA.

The vast majority of CDSE platform users are classified as Copernicus General Users, with only a small fraction assigned to specialized roles. Figure 10 shows that out of all registered accounts, 289,080 are Copernicus General Users, while Copernicus Service Users, Collaborative Partners, and International Partners account for 327, 18, and 16 users, respectively.

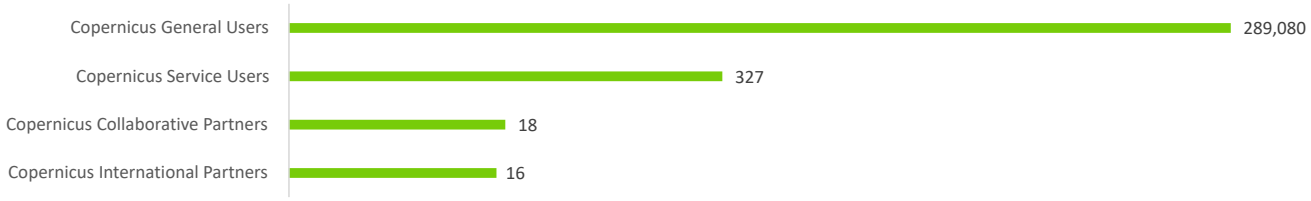


FIGURE 10:
Registered users per role (as of 2024.12.31).

During the registration process, users are invited to indicate their thematic activity preferences from a list of options, though selecting a preference is not mandatory. Figure 11 shows that in 2024, user engagement remained highly concentrated in a few key thematic areas. Most users selected Land (67,752), Research and innovation (42,497), Climate Change (23,648), Environmental compliance (17,999), and Marine environment, maritime affairs, and fisheries (13,282) as their primary interests.

Compared to 2023, the thematic focus of the CDSE user community has remained consistent, with these five areas continuing to dominate user preferences. Notably, though, Transport and Tourism moved up in the ranking in 2024, overtaking Security and Raw materials, which reflects a modest shift in user interests among the less prominent themes. This distribution highlights the ongoing dominance of the main thematic areas, with only minor shifts in the representation and order of less popular themes as new users register for access.

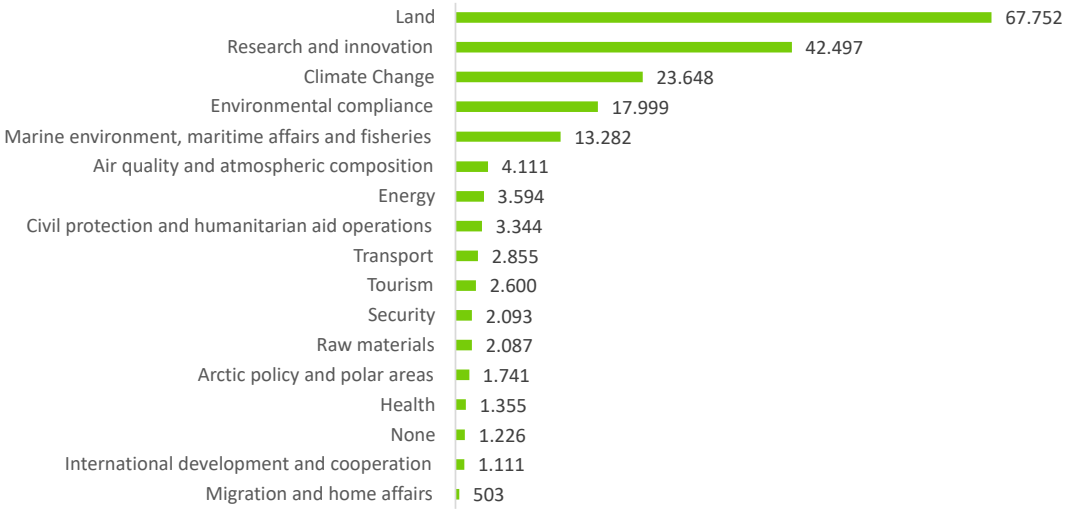


FIGURE 11: Registered users per thematic activity.

Figure 12 illustrates the number of registered users in each continent as of December 2024. The data is based on information provided by users during the registration process, with no additional verification of location (such as IP address checks) being performed. In December 2024, the number of registered users increased across all continents compared to the previous year. Asia and Europe recorded the highest numbers of registered users, with 94,525 and 90,396 respectively. North America reached 34,638 users, South America 43,193, and Africa 22,206. Oceania had 4,494 registered users, while Antarctica, though still minimal, rose to 140 users. Whilst the number of registered users from Asia is slightly larger than that from Europe the majority of use of the CDSE is from European users. Also considering the relative differences in population for the two continents, the take up in Europe is far more significant. Compared to December 2023, user registrations approximately tripled or quadrupled in every region. For example, Europe's user base grew by a factor of 3.4, Asia by 3.3, and South America by over four times. Africa and Oceania also saw their registrations more than triple, while North America's user base nearly tripled. Even Antarctica, starting from a very low base, saw its registrations increase more than sevenfold.

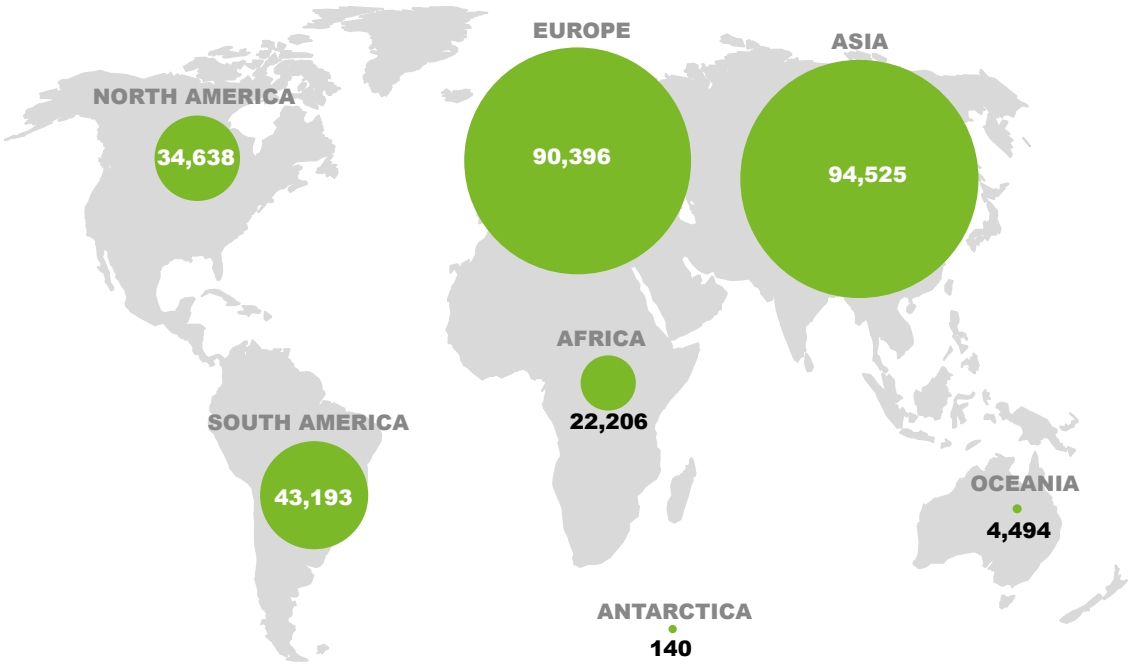


FIGURE 12: Number of registered users per continent as of Dec 2024.

Another perspective on global penetration is to count the number of countries in which there are more than 100 user registrations. Figure 13 illustrates the monthly cumulative increase in the number of countries that exceeded this threshold in 2024. Starting at 96 countries in January, there was a steady upward trend throughout the year of 2-7 new countries per month, reaching 136 countries by December. The data show consistent growth each month indicating a sustained and broadening international uptake.

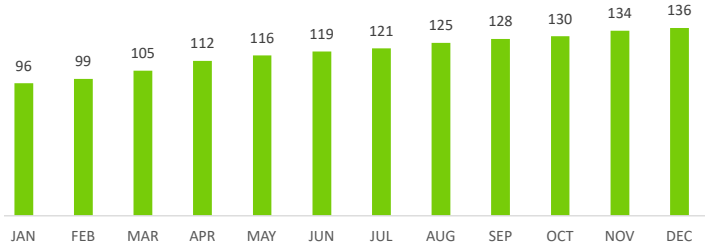


FIGURE 13:
Number of countries exceeding 100 users in 2024.

Figure 14 presents the ESA and European Union member states with the highest numbers of registered users in 2024. Germany leads with 10,587 users, followed by Italy (10,150), Spain (10,092), France (8,197), and the United Kingdom (7,542). This also highlights the strong engagement from major European countries, reflecting their prominent roles within the user community.

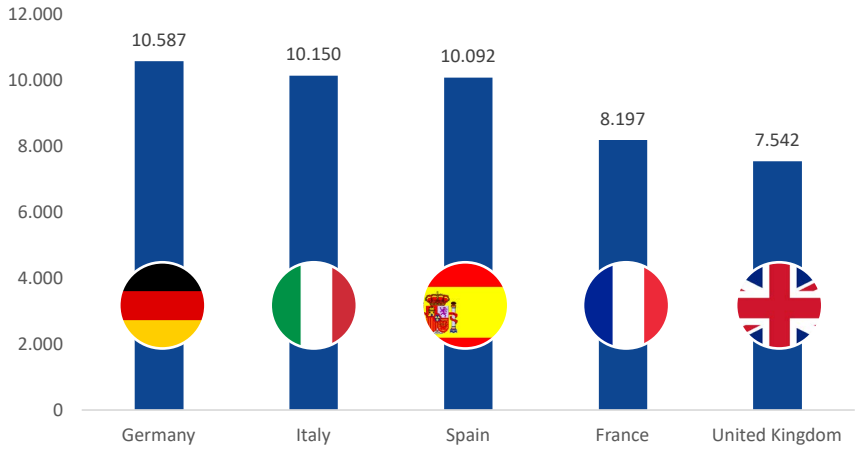


FIGURE 14: Five EU and ESA member states with the highest number of registered users (Dec 2024).

5.2. Anonymous users and visitors

CDSE is providing significant value also to users who do not register at all. Copernicus Browser allows users to search, interactively visualise and analyse data without signing-in, for almost all collections, and up to the full resolution. Only specific features and downloading requires a user to be registered. Similarly, the web portal is a valuable source of information to numerous visitors every year.

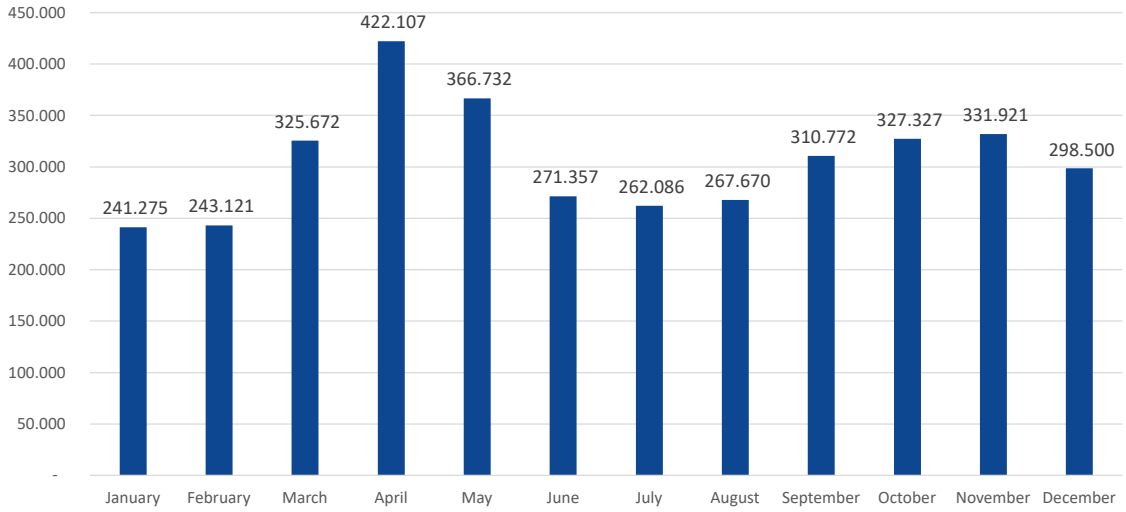
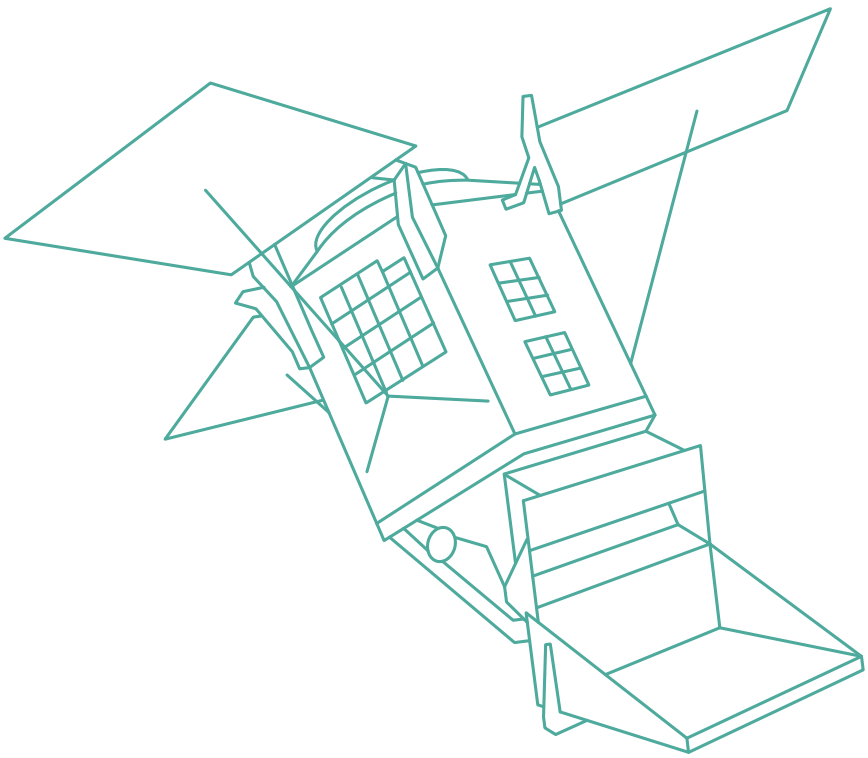


FIGURE 15: Number of all visitors using the Copernicus Browser (both registered and anonymous) varied between 240,000 and 422,000 monthly, totalling to 3.7 million over the year 2024. While this annual figure includes returning users across months, it highlights the sustained and widespread engagement with the platform throughout the year.



6 CDSE DATA OFFER OVERVIEW

6.1. Copernicus Sentinel Data Offer

This section presents statistics on the volume of data available in the CDSE from the core Copernicus data offering: Sentinel-1, Sentinel-2, Sentinel-3, and Sentinel-5P.

The Copernicus Sentinel-1 mission consists of polar-orbiting satellites designed for all-weather, day-and-night radar imaging using C-band synthetic aperture radar (SAR). These satellites acquire images in four operational modes, offering spatial resolutions down to 5 meters and coverage areas up to 400 km. The mission supports dual polarization, short revisit intervals, and rapid product delivery, with each observation accompanied by precise spacecraft position and attitude data. Sentinel-1A remains operational, while Sentinel-1B has been non-operational since a power failure on December 23, 2021. Sentinel-1C, launched in December 2024, will be fully operational by Q2 2025, restoring the constellation's revisit capability and ensuring continuity of the mission's services.

The Copernicus Sentinel-2 mission provides wide-swath, high-resolution, multi-spectral optical imaging. Since September 2024, the mission has operated with three satellites – Sentinel-2A, Sentinel-2B, and Sentinel-2C – providing a configuration that increases data observation frequency. Sentinel-2C, launched in September 2024, has completed commissioning and its products are fully available in the CDSE. All three satellites are operating simultaneously: Sentinel-2B and Sentinel-2C remain in the same sun-synchronous orbit, phased 180° apart, while Sentinel-2A has been manoeuvred into a complementary position 36° away from Sentinel-2B. This unique configuration, planned to be operational for at least one year, ensures more frequent and up-to-date data for users, especially over Europe, before Sentinel-2A is eventually retired or reassessed for further extension. The CDSE offers standard Level-1C (top-of-atmosphere reflectance) and Level-2A (bottom-of-atmosphere reflectance) products (S2 STRD), as well as the Sentinel-2 Collection-1 (S2 RPRO), which aims to provide a harmonized, reprocessed archive with consistent calibration and improved geometric performance for all Sentinel-2 data from 2015 to December 2021.

The Copernicus Sentinel-3 mission is focused on measuring sea surface topography, sea and land surface temperature, and ocean and land surface colour with high accuracy and reliability. Operated jointly by ESA and EUMETSAT, Sentinel-3 uses two satellites, each carrying four main instruments: the Ocean and Land Colour Instrument (OLCI), the Sea and Land Surface Temperature Radiometer (SLSTR), the SAR Radar Altimeter (SRAL), and the Microwave Radiometer (MWR). The mission delivers operational ocean and land observation services, supporting ocean forecasting, environmental monitoring, and climate studies. The CDSE provides access to all Sentinel-3 Level-1 and Level-2 products, including reprocessed baselines to ensure consistent access to the highest data quality.

Image source: *copernicus.eu, Vega-C and Sentinel-1C take to the skies, 06/12/2024*

The Copernicus Sentinel-5 Precursor (Sentinel-5P) mission is dedicated to atmospheric monitoring, providing high-resolution measurements essential for air quality assessment, ozone and UV monitoring, and climate forecasting. The mission's TROPOMI instrument produces a range of data products at various processing levels. The CDSE provides access to Level-1B (calibrated radiances) and Level-2 (retrieved geophysical parameters) products, which support a wide array of atmospheric research and operational applications.

For Sentinel-1, although the constellation by the end of 2024 includes A and C satellites, only Sentinel-1A was operational and contributed data in 2024, as Sentinel-1C, launched in December 2024, was not yet fully commissioned. For Sentinel-2, which comprises A, B, and C satellites, data from Sentinel-2C – launched in September 2024 – became available only from December 2024. Sentinel-3 continues to operate with both A and B satellites as before.

Mission	No. of user-level data published		% for 2024 of total number published on CDSE	Volume of user-level data published [TB]		% for 2024 of total volume published on CDSE
	2024	Since CDSE service start (DEC 2022)	2024 vs DEC 2022	2024	Since CDSE service start (DEC 2022)	2024 vs DEC 2022
S1	1,262,211	5,315,352	24%	2,584.01	7,891.49	33%
S2 STRD	8,651,217	17,732,293	49%	4,923.98	10,093.23	49%
S2 RPRO	21,849,463	42,442,732	51%	12,465.06	24,389.54	51%
S3 STRD	2,314,714	4,975,120	47%	534.52	1,100.56	49%
S3 RPRO	-	438,869	-	-	70.07	-
S5P	112,771	741,247	15%	167.18	930.63	18%
ALL	**34,190,376**	**71,645,613**	**48%**	**20,674.75**	**44,475.52**	**46%**

TABLE 2: Overall number and volume of published user-level data on the CDSE in 2024 compared to data published since the start of the CDSE service in Dec 2022.

STRD: stands for standard user-level data only; refers to products published continuously as part of ongoing Sentinel mission operations.
RPRO: stands for reprocessed user-level data only, i.e. products that are recomputed using improved calibration or processing algorithms after their initial publication.

Since the start of the CDSE Service in December 2022 until the end of 2024, a total of 71,645,613 Copernicus Sentinel user-level data products has been published, with a cumulative data volume of 44,475.52 TB (Table 2). In 2024 alone, over 34.1 million user-level products were published in 2024, with a total data volume reaching approximately 20.7 petabytes – representing 48% of the total number of products and 46% of the total volume published since the launch of the CDSE Service. Sentinel-2 accounted for the largest share of both published product count and volume, with over 30.5 million products (89% of the total count) and 17.4 PB (84% of the total volume).

Table 3 provides a broader context, comparing the number and volume of user-level data published in 2024 to the entire Sentinel catalogue since the beginning of each mission. The data published in 2024 represented 35% of all Sentinel user-level data packages and 29% of the total data volume made available since the start of Sentinel operations.

Mission	No. of user-level data published		% for 2024 of total number published since CDSE service start (DEC 2022)	Volume of user-level data published [TB]		% for 2024 of total volume published since CDSE service start (DEC 2022)
	2024	Total - since Sentinels operations start in 2014	2024 vs total	2024	Total - since Sentinels operations start in 2014	2024 vs total
S1	1,262,211	13,724,710	9%	2,584.01	31,466.67	8%
S2	30,500,680	67,956,208	45%	17,389.04	35,227.85	49%
S3	2,314,714	14,689,100	16%	534.52	3,221.55	17%
S5P	112,771	1,241,320	9%	167.18	1,569.77	11%
ALL	**34,190,376**	**97,611,338**	**35%**	**20,674.75**	**71,485.85**	**29%**

TABLE 3: The total number and volume of Sentinel products published in the CDSE in 2024 compared to the cumulative number and volume of products since the start of Sentinels' operations.

Table 4 details the number and volume of Sentinel user-level data deleted from the CDSE in 2024. In total, 47,469,508 data packages (6,097.11 TB) were deleted, with the majority coming from Sentinel-2, reflecting the removal of older baseline products as part of ongoing data management and reprocessing efforts.

Mission	No. of user-level data deleted in 2024	
	Count	TB
S1	19,318	4.14
S2	35,953,046	3,791.90
S3	7,383,042	1,766.22
S5P	4,114,102	534.86
ALL	**47,469,508**	**6,097.11**

TABLE 4: The total number and volume of Sentinel products deleted in the CDSE in 2024.

Compared to 2023, there have been notable shifts in publication patterns across missions. The number of Sentinel-1 data products published in 2024 was significantly lower than in 2023, averaging 3,449 products per day in 2024 versus 10,916 products per day in 2023, a 68% decrease, with daily average data volume halved (7.06 TB in 2024 vs. 14.00 TB in 2023; Table 5). This sharp reduction is primarily due to the completion in 2023 of publishing the entire S1 historical archive, including the processing of all Cloud Optimized GeoTIFFs (COGs) for previous years (about 2.8 million products) and completing the historical data availability (around 70 thousand products with acquisition dates before 2023 but published in 2023).

For Sentinel-2, the total number of products increased from nearly 60 million at the end of 2023 to around 68 million by the end of 2024. In 2024, approximately 36 million S2 products from older baselines were removed (as shown in Table 4), while nearly 22 million reprocessed S2 products were published (Table 2), highlighting substantial reprocessing activity. In addition, about 9 million standard user-level S2 data were published. The daily average number of S2 STRD products published remained stable (23,637 in 2024 vs. 23,352 in 2023), while S2 RPRO saw a 6% increase (59,698 vs. 56,420), with corresponding increases in data volume (Table 5).

Sentinel-3 reporting changed in 2024, with NRT/STC data excluded from the totals, accounting for a reduction in reported volume (3,221.55 TB in 2024 vs. 5,159.00 TB in 2023). S3 STRD daily average publication decreased by 6% (6,324 in 2024 vs. 6,755 in 2023), while volume increased slightly. No new Sentinel-3 reprocessed data (S3 RPRO) were published in 2024 (Table 5).

For Sentinel-5P, the daily average number of products published in 2024 dropped by 79% compared to 2023 (308 vs. 1,485), and the daily average volume decreased by 77% (0.46 TB vs. 1.99 TB) (Table 5). This significant decrease is explained by the fact that in 2023 a substantial amount of archival Sentinel-5P data was published as part of the migration process from the former Sentinel Data Hubs. In contrast, the 2024 figures reflect only the regular operational production of Sentinel-5P data, leading to the apparently lower daily averages.

Overall, the 2024 data publication reflects a transition from the large-scale release of historical archives and reprocessed datasets toward a more regular, operational output, with ongoing efforts to maintain a complete, high-quality, and up-to-date data offering for the user community.

Mission	Daily average number published in 2024		% of difference	Daily average volume published in 2024 [TB]		% of difference
	2024	2023	2024 vs 2023	2024	2023	2024 vs 2023
S1	3,449	10,916	-68%	7.06	14.00	-50%
S2 STRD	23,637	23,352	1%	13.45	13.29	1%
S2 RPRO	59,698	56,420	6%	34.06	32.67	4%
S3 STRD	6,324	6,755	-6%	1.46	1.43	2%
S3 RPRO	-	1,198	-	-	0.18	-
S5P	308	1,485	-79%	0.46	1.99	-77%
ALL	**93,416**	**100,125**	**-7%**	**56.49**	**63.56**	**-11%**

TABLE 5: Average number and volume of user-level data published per day in 2023 and 2024, with percentage splits per Sentinel mission. The percentages indicate the difference between data published in 2024 and 2023.

Table 6 presents the monthly number and total volume of published user-level data for each Sentinel mission in 2024, while the accompanying charts illustrate the development of these values throughout the year. (Figure 16 to Figure 19)

Over 34 million products were published, corresponding to approximately 20.7 PB (20,675 TB) of data. The Sentinel-2 mission dominated in both categories, accounting for nearly 89% of all published products and 84% of the total data volume across all missions. (Table 6)

For Sentinel-1, the number of products published per month remains relatively stable, ranging from about 93,272 to 123,539, with data volumes between 194.11 TB and 234.87 TB. Sentinel-2 shows significant fluctuations, with monthly product counts varying from around 614,978 in January to over 5.2 million in May. The corresponding data volumes also show large variation, peaking at over 3,000 TB in May. These fluctuations are primarily due to large-scale reprocessing campaigns, which add to the regular flow of new acquisitions and result in much higher product counts in certain months. Over the year, Sentinel-2 accounts for more than 30.5 million published products and over 17,000 TB of data. Sentinel-3 maintains a more consistent monthly output, with product counts generally between 155,733 and 239,304 and data volumes around 41-49 TB per month, totalling over 2.3 million products and 534 TB for the year. Sentinel-5P consistently produces the smallest numbers, with monthly product counts between about 8,460 and 10,844 and monthly data volumes from 12 to 22 TB, totalling about 113,000 products and 167 TB for 2024 (Table 6). The observed increase in October and November is linked to the publication of new products for expert users, specifically historical engineering and auxiliary Sentinel-5P data.

Month	S1		S2		S3		S5P	
	count	TB	count	TB	count	TB	count	TB
January	103,200	214.92	614,978	351.47	194,954	44.44	9,041	12.46
February	98,010	203.11	3,423,560	1,960.60	155,733	41.21	8,787	12.00
March	108,305	222.99	4,272,521	2,457.28	159,130	43.99	9,542	12.57
April	105,682	217.00	4,983,679	2,845.14	239,304	43.54	9,246	12.33
May	103,129	212.24	5,281,701	3,063.01	210,826	48.75	9,574	12.72
June	93,272	194.11	2,928,185	1,611.05	190,826	44.72	9,033	12.62
July	100,493	209.19	1,654,871	972.46	197,512	45.74	9,538	12.85
August	98,784	210.47	1,354,745	754.11	193,969	45.12	9,580	12.87
September	123,539	234.87	751,049	428.06	190,436	44.05	8,460	12.14
October	110,536	224.99	721,217	412.92	197,161	45.33	10,844	22.07
November	107,523	218.00	1,639,408	935.41	189,530	43.43	9,801	19.88
December	109,738	222.12	2,874,766	1,597.51	195,333	44.22	9,325	12.67
Total	**1,262,211**	**2584.01**	**30,500,680**	**17,389.04**	**2,314,714**	**534.52**	**112,771**	**167.18**

TABLE 6: Monthly number and volume of published user-level data per Sentinel mission in 2024.

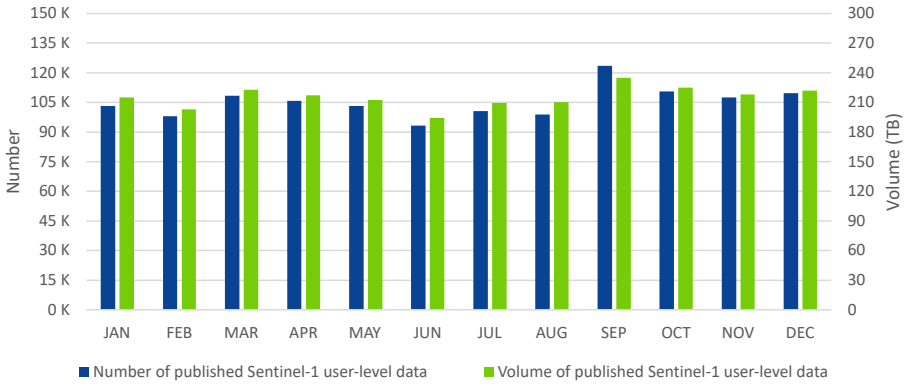


FIGURE 16: Development of the monthly number and volume of published Sentinel-1 products in 2024. 'K' signifies thousands of products.

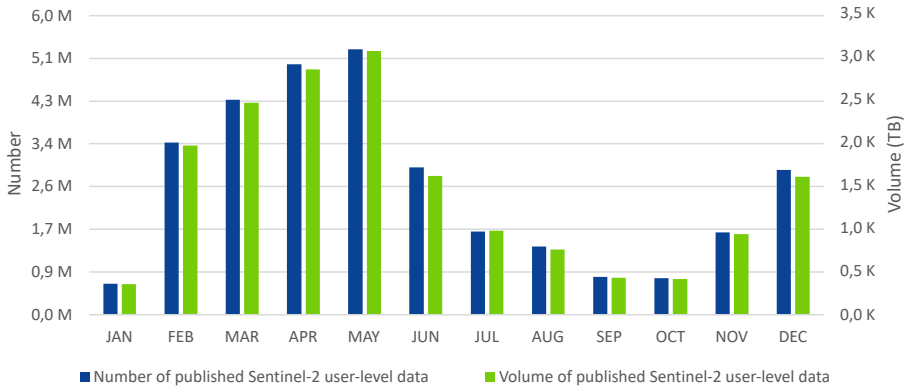


FIGURE 17: Development of the monthly number and volume of published Sentinel-2 products in 2024. 'K' signifies thousands and 'M' signifies millions.

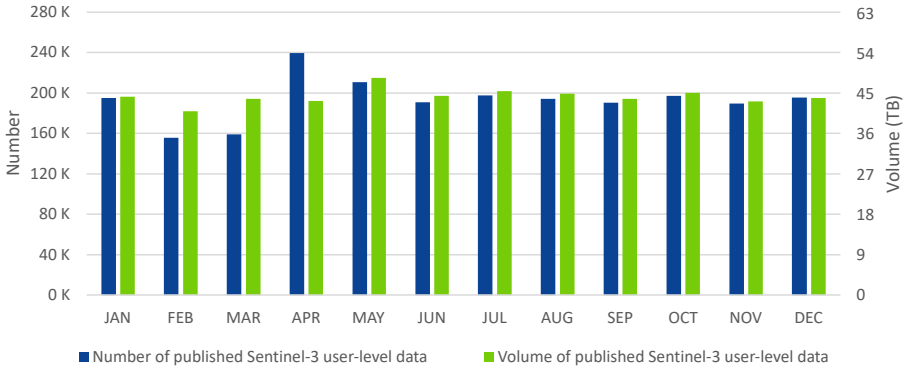


FIGURE 18: Development of the monthly number and volume of published Sentinel-3 products in 2024. 'K' signifies thousands of products.

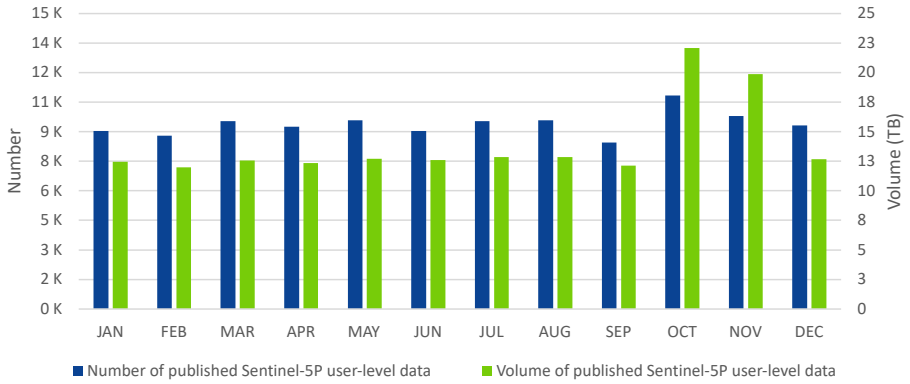


FIGURE 19: Development of the monthly number and volume of published Sentinel-5P products in 2024. 'K' signifies thousands of products.

Tables and figures below highlight monthly publication trends for each Sentinel mission in terms of product counts and data volumes on Copernicus Data Space Ecosystem.

Sentinel-1:

Throughout 2024, the number of published Sentinel-1 user-level products remained relatively stable month to month, averaging approximately 105,000 products. This consistency indicates that the data published were primarily acquired in near real-time, without inclusion of large-scale historical (archival) datasets as compared to 2023.

In total, nearly 1.26 million Sentinel-1 products were published, amounting to 2584 TB of data. Of these, 240,627 products (19% of all S1 products) were delivered in the COG (Cloud-Optimized GeoTIFF) format, corresponding to 233.45 TB. The share of COG products remained steady throughout most of the year, typically ranging between 17% and 19%. A notable exception occurred in September, when previously overlooked COGs were processed and supplemented, driving COG-formatted products to account for 30% of all S1 publications that month. These figures reflect a gradual adoption of the COG format in the operational data dissemination of Sentinel-1 within the Copernicus Data Space Ecosystem.

Table 7 presents the number and volume of published all Sentinel-1 products, along with the share of those provided in the Cloud Optimized GeoTIFF (COG) format. Monthly trends in product count (line chart) and data volume (bar chart) for Sentinel-1 in 2024 are illustrated in Figure 20.

Month	S1		S1 COG		% of COGs to all S1 products
	count	TB	count	TB	(count)
January	103,200	214.92	19,028	18.62	18%
February	98,010	203.11	18,417	17.96	19%
March	108,305	222.99	20,338	19.65	19%
April	105,682	217.00	19,357	18.63	18%
May	103,129	212.24	18,524	18.10	18%
June	93,272	194.11	15,695	15.45	17%
July	100,493	209.19	19,287	18.96	19%
August	98,784	210.47	13,395	12.99	14%
September	123,539	234.87	36,742	35.58	30%
October	110,536	224.99	20,322	19.55	18%
November	107,523	218.00	19,523	18.77	18%
December	109,738	222.12	19,999	19.18	18%
Total	**1,262,211**	**2,584.01**	**240,627**	**233.45**	**19%**

TABLE 7: Monthly number and volume of user-level Sentinel-1 data published in 2024, showing totals for all products and those specifically in COG format.

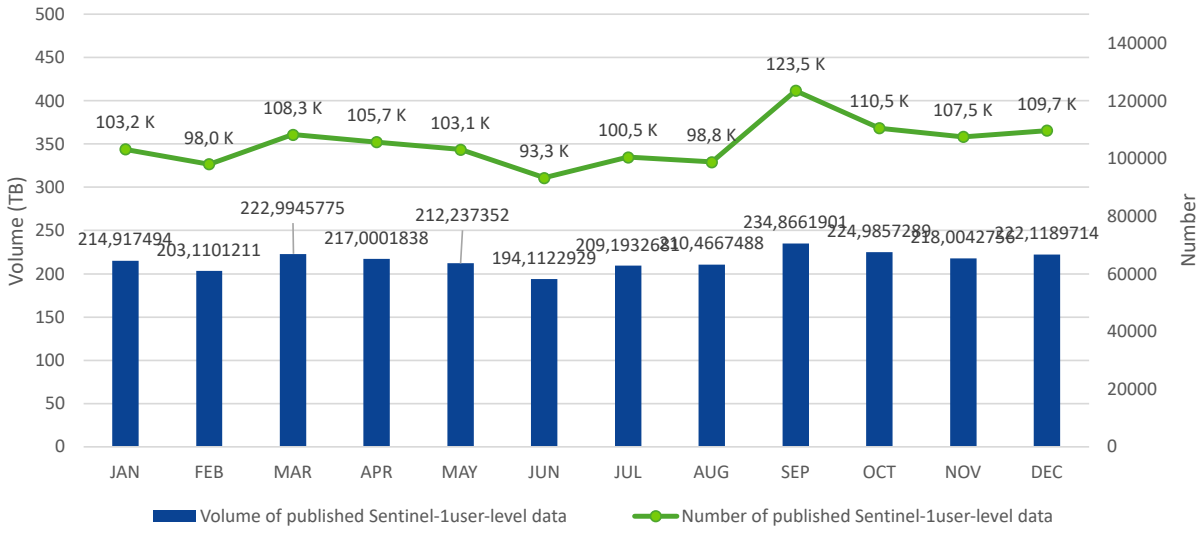


FIGURE 20: Monthly publication trends for the number and volume of Sentinel-1 in 2024

Sentinel-2:

In 2024, more than 30.5 million Sentinel-2 products were published on the CDSE, corresponding to a total volume of over 17,378 TB. Of these, 21.8 million products (approximately 72%) were reprocessed (RPRO) data, contributing more than 12465 TB. This substantial increase was linked to an extensive reprocessing campaign covering historical data from 2016–2019 and 2022.

The first phase of the reprocessing campaign concluded by the end of August, marking the end of the intensive ingestion period in which over 15.8 million RPRO products were published between February and August, peaking in May with 4.5 million reprocessed products (581% of the number of standard products for that month). The average monthly ratio of reprocessed to standard products during this phase was over 300% (Table 8).

Starting in September, efforts transitioned smoothly into the second phase, initially slowed down by timeouts and quality issues, which delayed RPRO data publication in September and October. During this period, incorrectly generated products were also removed and preparations for reingestion began. The campaign resumed in November and December, during which over 3.1 million RPRO products were published, indicating a controlled restart of the second phase.

Overall, the publication pattern of standard Sentinel-2 data in 2024 was more consistent throughout the year compared to 2023. Meanwhile, the total number of reprocessed products made available increased slightly, showing 6% growth compared to the previous year.

Figure 21 illustrates the total volume and number of all published Sentinel-2 products, encompassing both standard and reprocessed datasets, whereas Figure 22 focuses exclusively on standard user-level data.

Month	S2 STRD		S2 RPRO		% of reprocessed products to non-reprocessed (count)
	count	TB	count	TB	
January	591,683	336.60	23,295	14.87	4%
February	630,543	360.01	2,793,017	1600.59	443%
March	764,867	435.21	3,507,654	2022.07	459%
April	759,404	429.94	4,224,275	2415.20	556%
May	775,954	437.97	4,505,747	2625.04	581%
June	752,605	429.84	2,175,580	1181.21	289%
July	776,740	442.42	878,131	530.04	113%
August	777,616	442.96	577,129	311.15	74%
September	751,035	428.05	14	0.01	0%
October	721,217	412.92	0	0.00	0%
November	605,340	346.42	1,034,068	588.99	171%
December	744,213	421.63	2,130,553	1175.88	286%
Total	**8,651,217**	**4,923.98**	**21,849,463**	**12465.06**	**253%**

TABLE 8: Monthly number and volume of published user-level Sentinel-2 data differentiated between reprocessed and standard products.

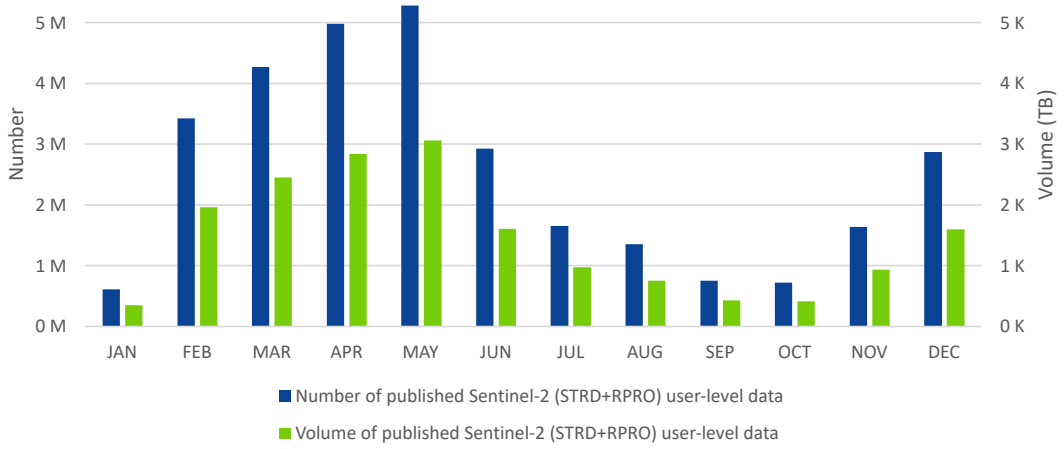


FIGURE 21: Monthly number and volume publication trend for combined standard and reprocessed Sentinel-2 data in 2024.

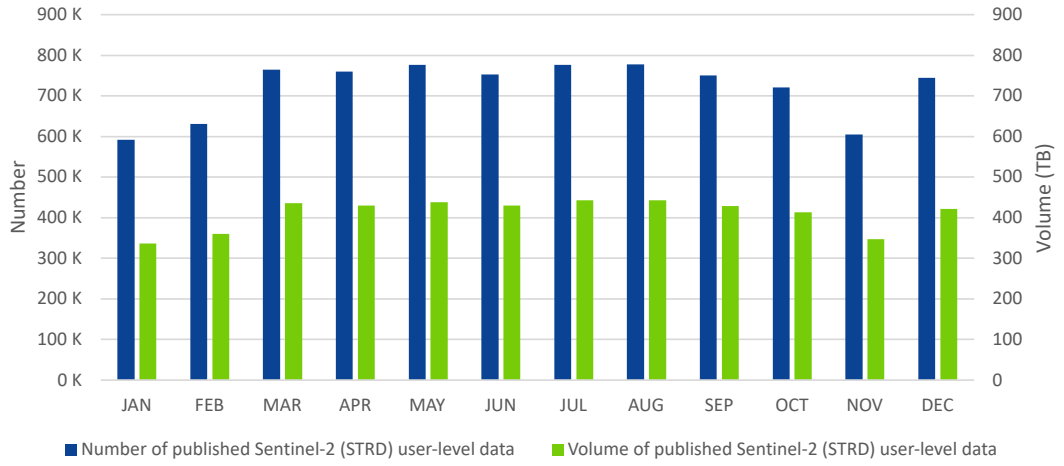


FIGURE 22: Monthly number and volume publication trend for Sentinel-2 standard data in 2024 (user-level data).

Sentinel-3:

Figure 23 displays monthly statistics on the publication of standard Sentinel-3 data, in terms of product count and data volume. In 2024, a total of 2.31 million standard Sentinel-3 products was published on CDSE, corresponding to approximately 535 TB of data. Unlike in 2023, no reprocessed data was published, which explains the roughly 50% decrease in both the number and volume of products compared to the previous year.

Throughout 2024, the monthly number and volume of standard user-level data remained stable, averaging around 192,000 products and 45 TB per month with OLCI and SLSTR contributing the largest volumes.

Table 9 presents a comprehensive monthly analysis of data volumes, categorized by individual sensor. Figure 24 provides a complementary illustration by showcasing the aggregate volume of data disseminated on a monthly basis across all sensors.

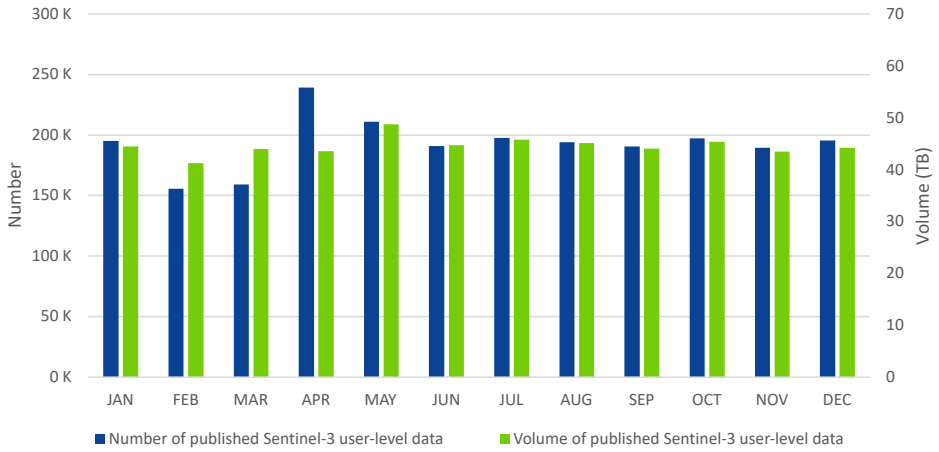


FIGURE 23: Monthly number and volume publication trend for Sentinel-3 in 2024.

Month	TB			
	S-3 OLCI	S-3 SLSTR	S-3 SRAL	S-3 SYNERGY
January	17.6	17.5	4.7	4.7
February	16.9	15.5	4.4	4.4
March	18.3	16.3	4.7	4.8
April	15.7	18.5	4.5	4.8
May	20.8	18.1	4.7	5.2
June	17.9	17.1	4.5	5.2
July	18.7	17.0	4.8	5.2
August	18.6	16.7	4.7	5.1
September	18.4	16.4	4.5	4.8
October	18.5	17.1	4.7	4.9
November	17.7	16.5	4.6	4.7
December	18.0	16.6	4.7	4.9

TABLE 9: Monthly volume publication trend for Sentinel-3 per product source (e.g. sensor) in 2024 (in TB).

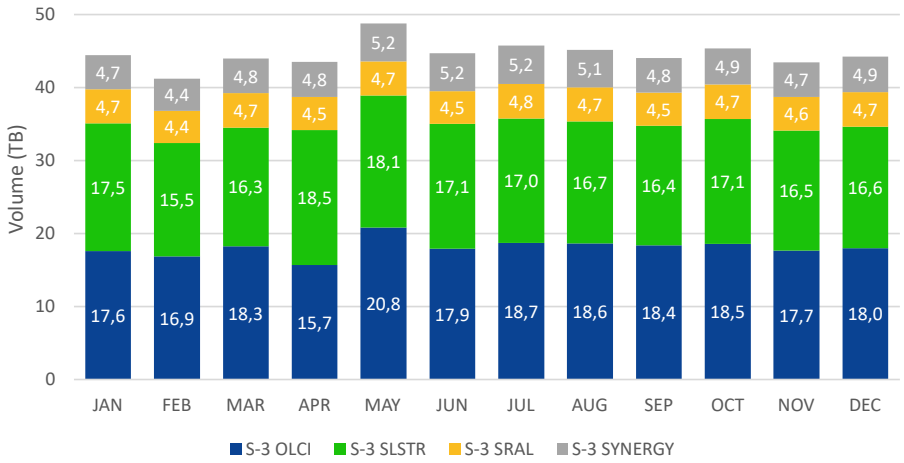


FIGURE 24: Monthly volume publication trend per Sentinel-3 user-level data source (e.g. sensor) in 2024 (in TB).

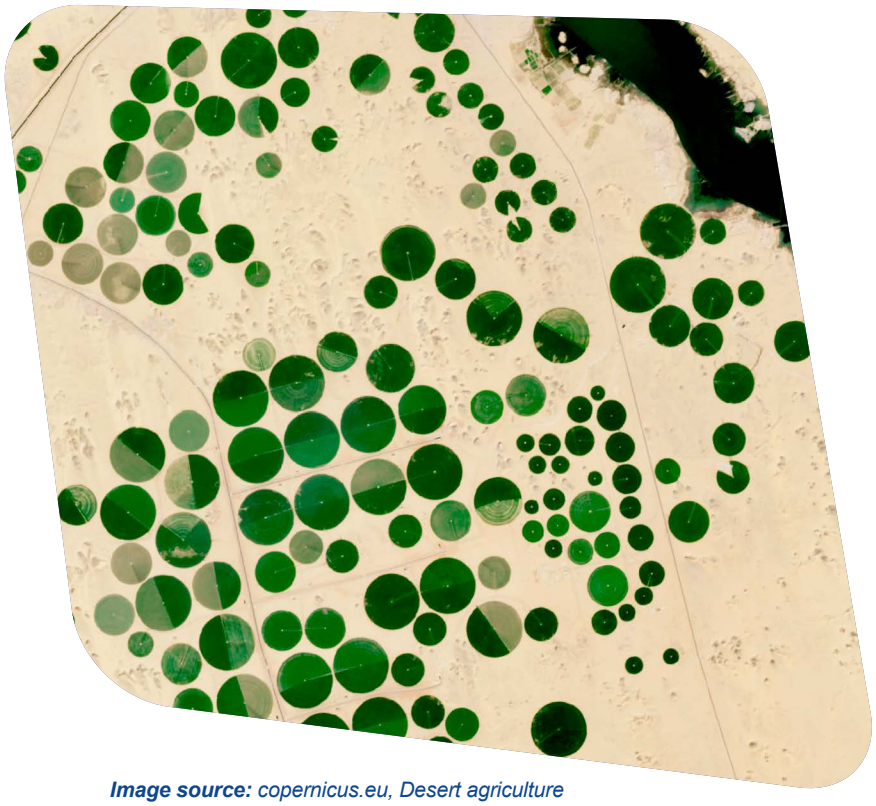


Image source: *copernicus.eu, Desert agriculture in Egypt, 2024/02/03, Copernicus Sentinel-2*

Sentinel-5P:

In 2024, a total of 112,771 Sentinel-5P user-level data were published on the CDSE, corresponding to a data volume of approximately 167.2 TB. The monthly number of published data packages remained relatively stable throughout the year, typically ranging between 8,460 and 10,844 products, which is markedly lower than in 2023, when the monthly average exceeded 100,000 products. As discussed above in Section 6.1, the sharp decline can be attributed to the one-time archival publication of Sentinel-5P data in 2023, whereas 2024 reflects only the ongoing publication of operational data.

A notable increase occurred in October and November, accompanied by a significant rise in data volume, reaching 22 TB and 19.95 TB respectively. This temporary surge was primarily driven by the publication of historical auxiliary data, which complemented the routine data stream.

The yearly distribution of published Sentinel-5P data, both in terms of product count and volume, is visualized in Figure 25, highlighting the overall stability with clearly identifiable peaks during targeted data enrichment periods.

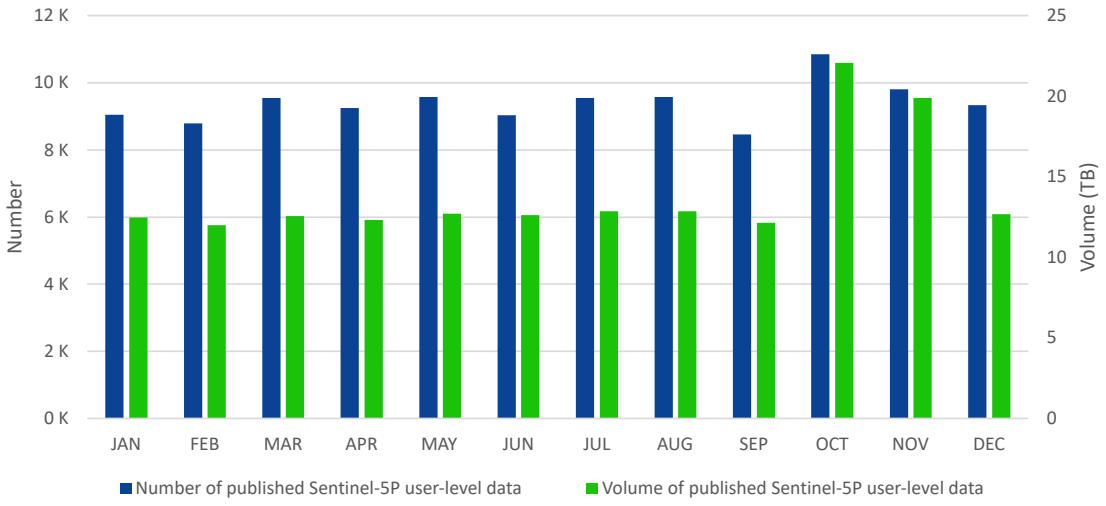


FIGURE 25: Monthly number and volume publication trend for Sentinel-5P in 2024.

A detailed overview of the published products by mission and product type is provided in Table 10, including both their absolute numbers and volumes, as well as their respective percentages of the mission-wide totals. This information is further illustrated in Figure 26 and Figure 27, which offer a visual comparison of the distribution by number and by volume across missions and product types.

Sentinel-2 accounted for the largest share of both published product count and volume, with over 30.5 million products (89% of the total count) and 17.4 PB (84% of the total volume). The data were nearly evenly split between Level-1C and Level-2A products, with each representing around 50% of the total Sentinel-2 product count.

Mission	Type	Count	% of total count per mission	Volume [TB]	% of total volume per mission
S1	AUX	3,001	0.2%	0.01	0.0%
	ETA	204,228	16%	17.32	1%
	GRD	468,608	37%	584.84	23%
	OCN	138,568	11%	2.89	0.1%
	RAW	228,282	18%	340.57	13%
	SLC	219,524	17%	1638.37	63%
	S1 Total	**1,262,211**		**2584.01**	
S2	AUX	2,569	0.0%	0.01	0.0%
	L1C	15,318,563	50%	7519.38	43%
	L2A	15,179,548	50%	9869.65	57%
	S2 Total	**30,500,680**		**17389.04**	
S3	AUX	4,865	0.2%	0.03	0.0%
	OLCI	524,587	23%	216.99	41%
	SLSTR	1,487,841	64%	203.41	38%
	SRAL	104,430	5%	55.42	10%
	SYNERGY	192,991	8%	58.67	11%
	S3 Total	**2,314,714**		**534.52**	
S5P	AUX	2,807	2%	20.53	12%
	L1	41,996	37%	120.38	72%
	L2	67,968	60%	26.28	16%
	S5P Total	**112,771**		**167.18**	
ALL		**34,190,376**		**20674.75**	

TABLE 10: Percentage published number and volume of user-level data per Sentinel mission and data type during 2024.

As already mentioned, Sentinel-2 accounted for the largest share of both published product count and volume. The data were nearly evenly split between Level-1C and Level-2A products, with each representing around 50% of the total Sentinel-2 product count.

Sentinel-1 followed with over 1.26 million products and a total volume of 2.6 PB. The most significant volume contribution came from SLC products, which represented only 17% of the product count, but accounted for 63% of the mission's total volume. In contrast, GRD products constituted the largest share by count (37%) but only 23% of the total volume.

For Sentinel-3, more than 2.3 million products were published, totalling 534.5 TB. SLSTR data comprised the majority of the count (64%), whereas OLCI products accounted for the largest share of the volume (41%). Other data types, such as SRAL and SYNERGY, contributed smaller but notable proportions.

Sentinel-5P saw the publication of approximately 113,000 products, corresponding to a volume of 167.2 TB. Level-1 products, while making up 37% of the count, represented 72% of the total data volume, indicating their larger data footprint. Auxiliary data also accounted for a considerable share of the volume (12%) despite their low count.

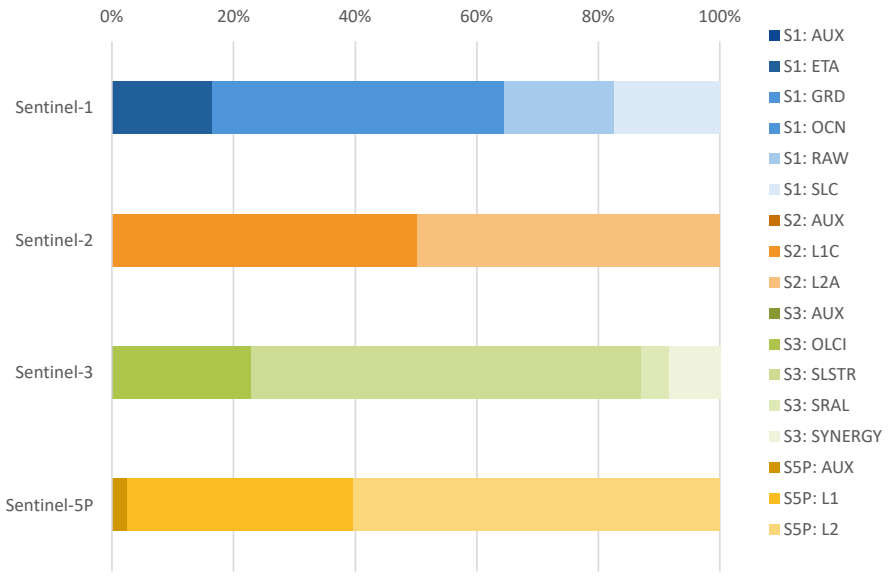


FIGURE 26: Percentage published number of user-level data per Sentinel mission and user-level data type during 2024.

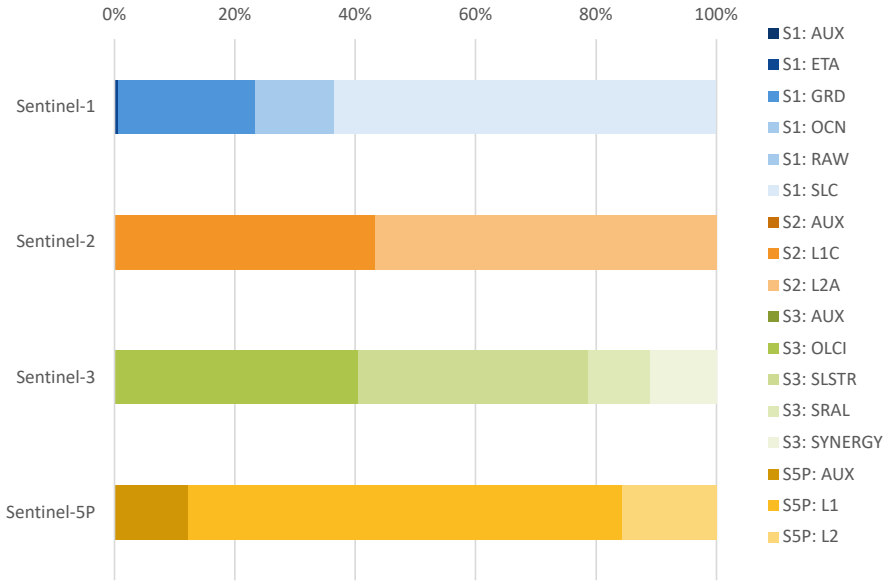


FIGURE 27: Percentage published volume of user-level data per Sentinel mission and user-level data type during 2024.

6.2. Copernicus Contributing Missions Data Offer

The Copernicus Contributing Missions (CCM) provide high to very high resolution optical, radar, and elevation model data, complementing the Copernicus Sentinel Missions. Operated by ESA, its Member States, and international partners, these missions play a key role in Earth observation.

Since March 2024, systematic CCM data collections, previously hosted on PRISM, have been transferred and integrated into the CDSE for long-term archiving and distribution. Following the decommissioning of PRISM by the end of 2024, CDSE will remain the sole access point for CCM systematic datasets. In 2024, the number of users registered to access CCM data reached approximately 37,000, reflecting the growing adoption of the new data access infrastructure.

In 2024, approximately 1.7 million CCM products were published, consisting primarily of optical (666,637 products), digital elevation model (DEM, 725,864 products), and synthetic aperture radar (SAR, 21,610 products) data. The total data volume reached over 512 TB for optical, 31 TB for DEM, and 6.3 TB for SAR products (Figure 28). The progress of archiving throughout 2024 shows a rapid increase in both the number and volume of products in the first half of the year, with the total archived size exceeding 550 TB by December 2024 (Figure 29). These datasets can be visualized using the Copernicus Browser, enhancing accessibility and usability for a wide range of users.

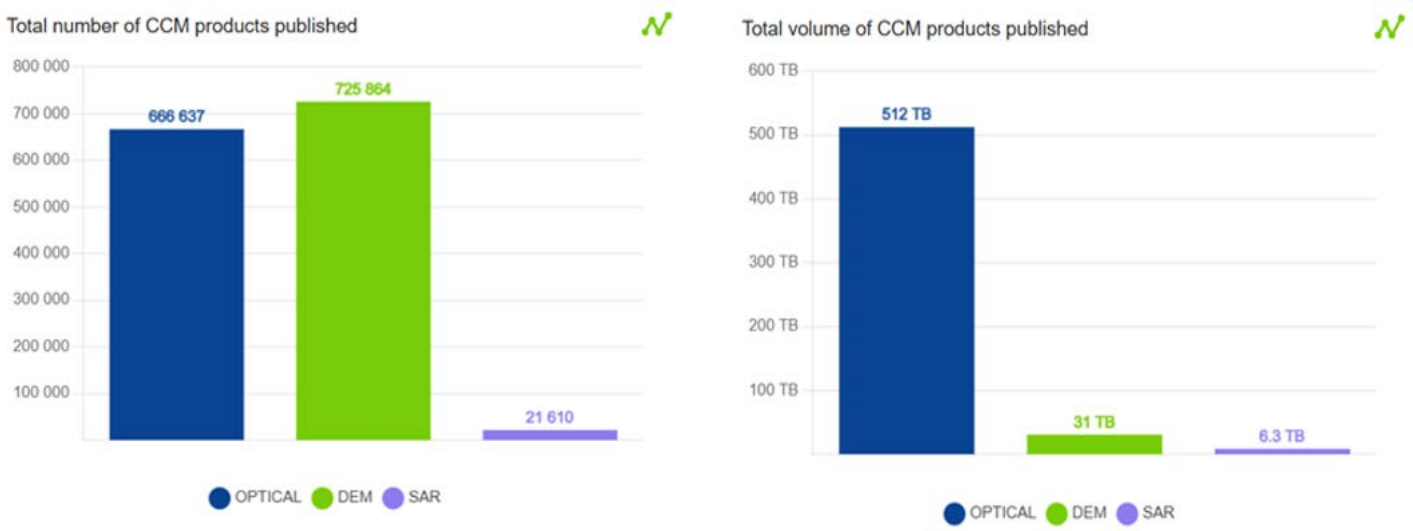


FIGURE 28: Number and volume of published Copernicus Contributing Missions during 2024, broken down by data type: optical, digital elevation model and radar

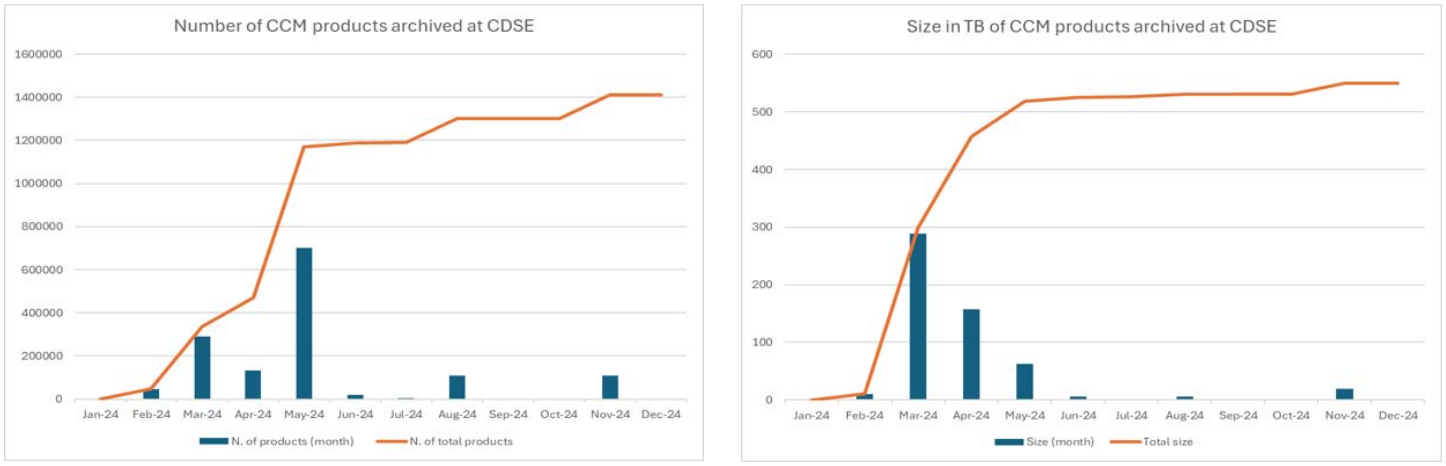


FIGURE 29: Progress of number and volume of published Copernicus Contributing Missions during 2024

6.3. Copernicus Services Data Offer

This section presents the datasets made available in the Copernicus Data Space Ecosystem (CDSE) originating from the Copernicus Services, including the Land, Marine, Atmosphere, and Emergency Management domains. These services offer high-quality, and continuously updated Earth observation products that support a broad range of applications related to environmental monitoring, disaster response, air quality management, and research applications. Through the CDSE, users can access both near real-time and historical data collections via standard interfaces such as S3 or NFS, making it possible to develop applications that cover local and global scales.

The Copernicus Land Monitoring Service (CLMS) provides extensive data sets that describe the state and evolution of terrestrial environments. The service provides three main categories of data: Global, Pan-European, and Local components, complemented by Imagery and Reference Data (IAR). These datasets support activities in land use assessment, vegetation monitoring, soil management, and water resource evaluation. Therefore, users can exploit archival and near real-time environmental information for scientific, commercial, and policy-driven applications.

The Copernicus Emergency Management Service (CEMS) provides rapid, reliable, geospatially detailed information to support emergency response and disaster risk management efforts. CEMS continuously monitors Europe and the rest of the world for potential or ongoing natural and human-induced hazards, producing data derived from satellite, in-situ, and modelled sources. A key component of the service is Rapid Mapping, which delivers geospatial products within hours or days after an event activation. These products include shapefiles dataset describing phenomena such as flood extent, fire scar, storm impact, or damage assessment, organized by event type (e.g. floods, wildfires, earthquakes, volcanic activity, industrial accidents, humanitarian crises).

The Copernicus Atmosphere Monitoring Service (CAMS), which is operated by the European Centre for Medium-Range Weather Forecasts (ECMWF), offers consistent and continuous information about the composition of the atmosphere. CAMS products describe the current state of the atmosphere, provide forecasts, and offer long-term reanalysis datasets. Within the CDSE, CAMS data collections include the Global Fire Assimilation System (GFAS), Global Atmospheric Composition Forecasts (GLOBAL) with associated analysis and forecast data on vertical levels, Global Additional (GLOBAL_ADDITIONAL), and WMO Essential datasets, which contain essential parameters related to atmospheric dynamics and cyclone activity.

More information on the Copernicus Services Data Offer can be found at:

https://dataspace.copernicus.eu/data-collections

6.4. Copernicus Federated Data Sets Offer

The CDSE expands its data offer through a federated access model, which enables integration of additional datasets hosted by external European providers. This approach broadens the scope of available Earth observation data beyond the Copernicus core missions, providing users with complementary long-term and thematic datasets within the same environment.

The following federated datasets are currently integrated into the CDSE: SPOT-VEGETATION and PROBA-V.

The SPOT-VEGETATION mission was designed to deliver daily global observations for monitoring vegetation and land surface dynamics. Operating at medium spatial resolution, it enabled consistent mapping of biophysical parameters, agricultural productivity, forest cover, and the condition of natural ecosystems.

The PROBA-V mission (Project for On-Board Autonomy—Vegetation) built upon the legacy of SPOT-VEGETATION, providing daily global observations at spatial resolutions of 1 km, 300 m, and 100 m. Observations obtained from this mission are used to map surface parameters, monitor agricultural, pastoral, and forest production, and study the processes and dynamics of the terrestrial biosphere.

More information on the Copernicus Federated Data Sets Offer can be found at:

https://dataspace.copernicus.eu/data-collections

6.5. Copernicus Complementary Data Offer

The CDSE also provides access to a set of complementary datasets that extend the core and federated data offerings. These datasets originate from ESA missions and other external entities and contain valuable observations that support land, ocean, and atmospheric research, as well as model validation and long-term environmental analysis. This section provides a brief overview of the available complementary data.

The Soil Moisture and Ocean Salinity (SMOS) mission, launched in 2009 as part of ESA's Earth Explorer programme, measures soil moisture and sea surface salinity using the Microwave Imaging Radiometer with Aperture Synthesis (MIRAS) instrument. MIRAS operates in the L-band (1.413 GHz) and provides dual and full-polarisation measurements across a swath of approximately 1000 km. SMOS Level-1 products contain calibrated instrument data, while Level-2 products provide geolocated estimates of soil moisture and ocean salinity derived from these measurements.

The Medium Resolution Imaging Spectrometer (MERIS) onboard the Envisat satellite (2002-2012) was primarily designed for ocean colour observations but also supported atmospheric and land-surface studies. MERIS operated in the solar reflective spectral range with high spectral and radiometric resolution. It acquired data at a spatial resolution of 260 meters over land and coastal areas and at a reduced resolution of 1040 meters over ocean surfaces.

The Landsat missions – a joint programme of the USGS and NASA – represent the world's longest continuous record of moderate-resolution optical observations of Earth's land and coastal areas. Landsat data available through the CDSE originate from ESA processing and include products from Landsat-5, Landsat-7, Landsat-8 and Landsat-9.

In addition to mission data, the CDSE provides access to third-party and derived datasets, including:

- Sentinel-1 products such as Radiometrically Terrain Corrected (RTC), CARD-BS (Terrain-Corrected Backscatter), and orbit data,
- Sentinel-2–based global mosaics and land cover maps (including S2GLC for Europe and Poland),
- and digital elevation models (COP DEM and SRTM DEM).

https://dataspace.copernicus.eu/data-collections

6.6. Publication per Geographical coverage

The Sentinel observation scenarios generally follow the pre-defined Sentinel High Level Observation Plan (HLOP) which is aimed at delivering the observation requirements for the Copernicus Services. The Sentinel HLOP can be assessed here:

Sentinel High Level Operations Plan (HLOP)

Consequently, the geographical areas covered by specific Sentinel missions are defined by their individual observation scenarios, which can be found online through the following links:

Sentinel-1:
- https://sentiwiki.copernicus.eu/web/s1-mission
- https://sentinels.copernicus.eu/web/sentinel/copernicus/sentinel-1/observation-scenario

Sentinel-2:
- https://sentiwiki.copernicus.eu/web/s2-mission

Sentinel-3:
- https://sentiwiki.copernicus.eu/web/s3-mission

Sentinel-5P:
- https://sentiwiki.copernicus.eu/web/s5p-mission

6.7. Heatmaps

The heatmaps presented in this section illustrate the geographical distribution of the number of user-level data products published from the start of operations until the end of 2024. To ensure the reliability of the visualized results and to exclude potentially erroneous publications, a publication density threshold was applied. Products corresponding to regions with a publication density of less than 5% of the average number of revisits at the equator throughout the entire publication period were excluded from the calculations. The specific user-level data publication density thresholds adopted for each mission were as follows: Sentinel-1 – 25, Sentinel-2 – 30, and Sentinel-3 and Sentinel-5P – 100.

In all heatmaps, white areas indicate regions where either no data was published or where the number of published products falls below the applied threshold limit.

High publication rates at the poles are due to the increased number of observation opportunities. Some striping artifacts may be seen in some of the figures, when there's a periodic misalignment or resonance between the data publication scheme (e.g., satellite swaths, raster tiles) and the binning structure of the heat map (how values are aggregated into visual cells).

Sentinel-1

Figure 30 presents a geographical coverage heatmap of Sentinel-1 user-level data published from the start of Sentinel-1 operations until the end of 2024. The colour scale shows the varying quantities of user-level data published for different areas on the globe. Dark red fields represent regions with the highest numbers of published Sentinel-1 user-level data. This heatmap includes all user-level data type except for OCN.

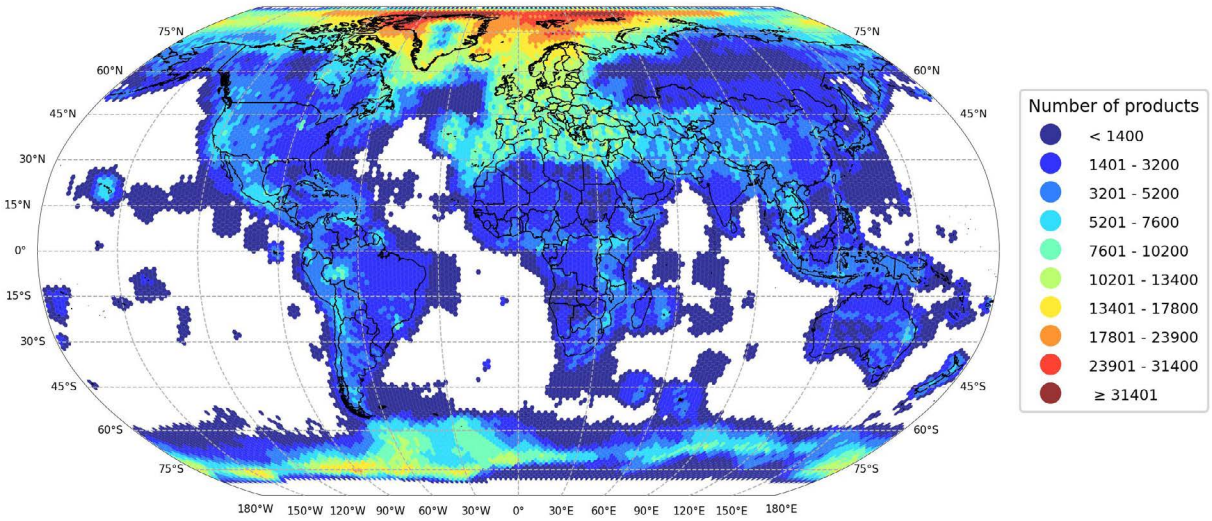


FIGURE 30: Heatmap of Sentinel-1 user-level data (excluding OCN) published from the start of operations to the end of 2024. White colour indicates areas where no data was published.

To facilitate a more detailed analysis on Sentinel-1 user- level data, the following heatmaps show GRDM (Figure 31), GRDH (Figure 32), and SLC (Figure 33) individually.

The Sentinel-1 GRDM (Ground Range Detected Medium Resolution) user-level data type is designed to capture medium resolution radar imagery, with a focus on sea, ice, and polar marine areas.

The Sentinel-1 GRDH (Ground Range Detected High Resolution) user-level data type provides high-resolution radar imagery primarily focused on land areas. This data type is mainly associated with the Interferometric Wide Swath (IW) mode and offers a detailed view of terrestrial features and changes over time.

The Sentinel-1 SLC (Single Look Complex) user-level data type provides radar imagery with a high level of detail and phase information. This data type is primarily associated with the Interferometric Wide Swath (IW) mode and the Stripmap (SM) mode, offering both wide coverage and detailed imaging capabilities.

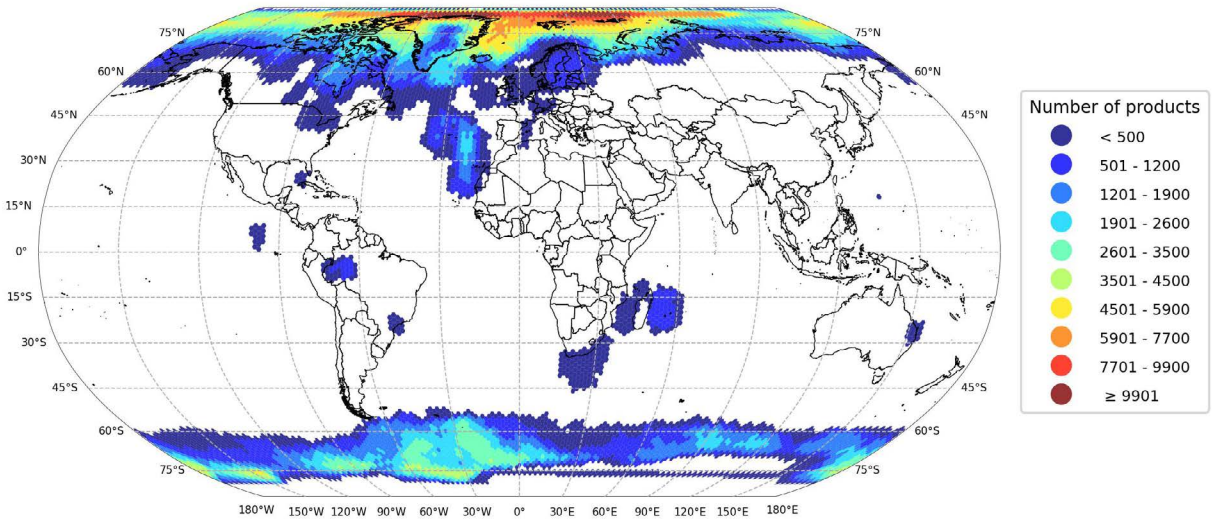


FIGURE 31: Heatmap of Sentinel-1 GRDM user-level data published from the start of operations to the end of 2024. White colour indicates areas where no data was published.

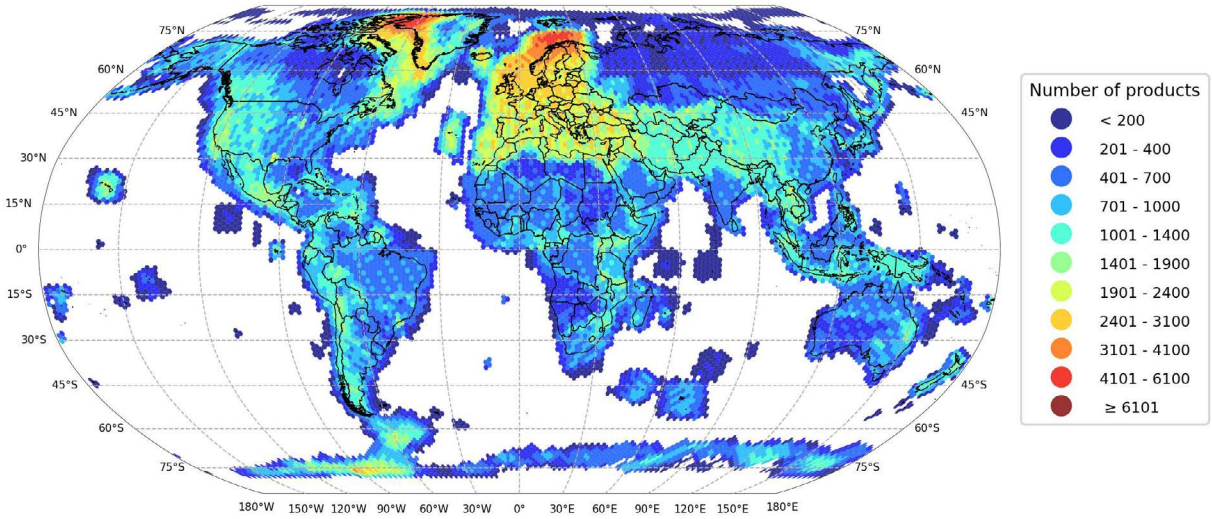


FIGURE 32: Heatmap of Sentinel-1 GRDH user-level data published from the start of operations to the end of 2024. White colour indicates areas where no data was published.

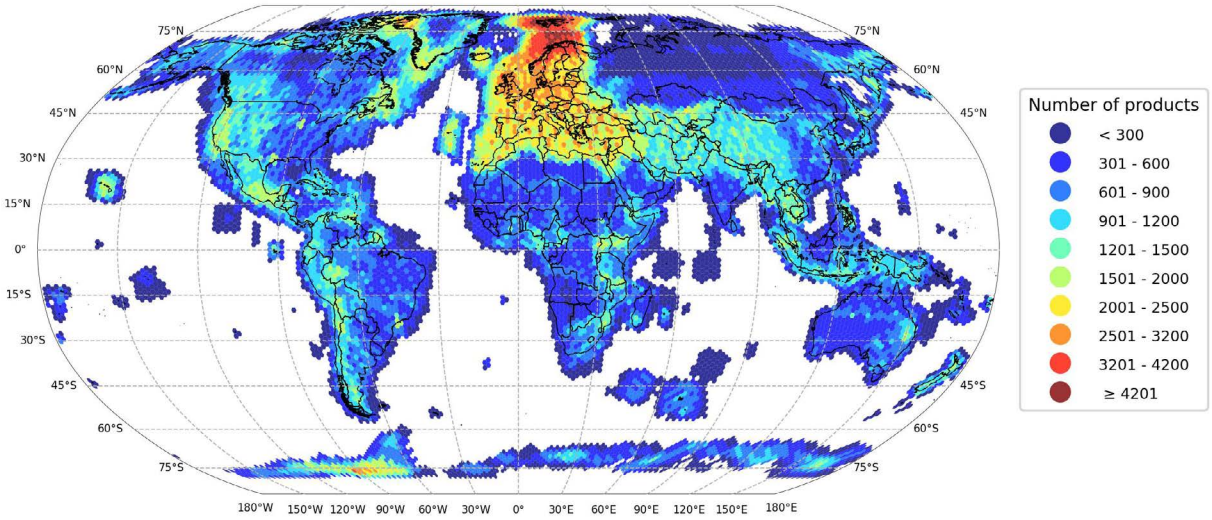


FIGURE 33: Heatmap of Sentinel-1 SLC user-level data (excluding WV SLC) published from the start of operations to the end of 2024. White colour indicates areas where no data was published.

Sentinel-2

Figure 34 and Figure 35 present geographical coverage heatmaps of Sentinel-2 user-level data published from the start of Sentinel-2 operations until the end of 2024, for Level-1C and Level-2A, respectively. Please note that maps include standard user-level data only, i.e. without the reprocessed data.

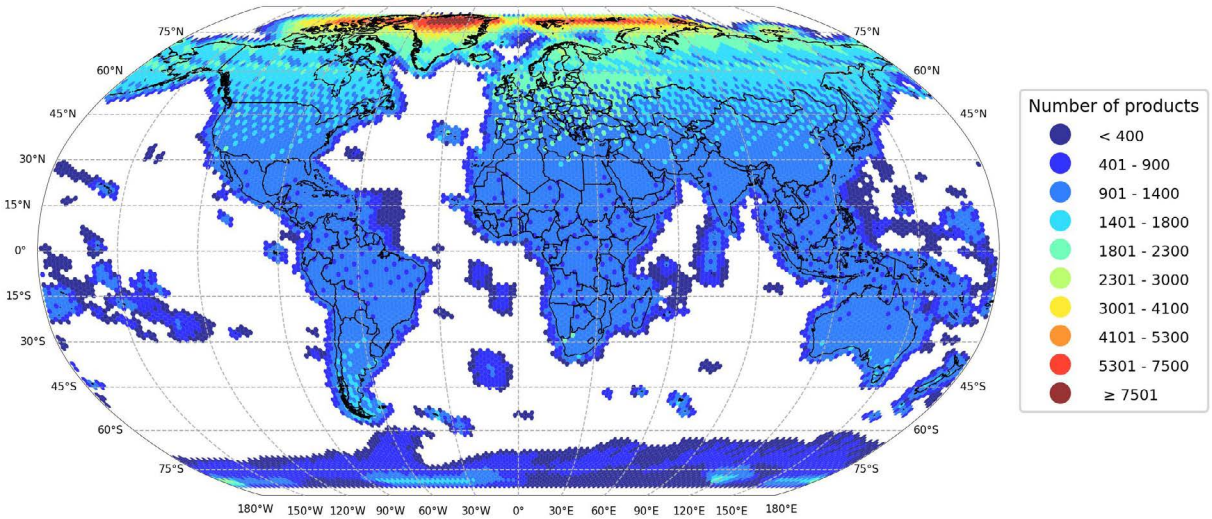


FIGURE 34: Heatmap of Sentinel-2 Level-1C user-level data published from the start of operations to the end of 2024. White colour indicates areas where no data was published.

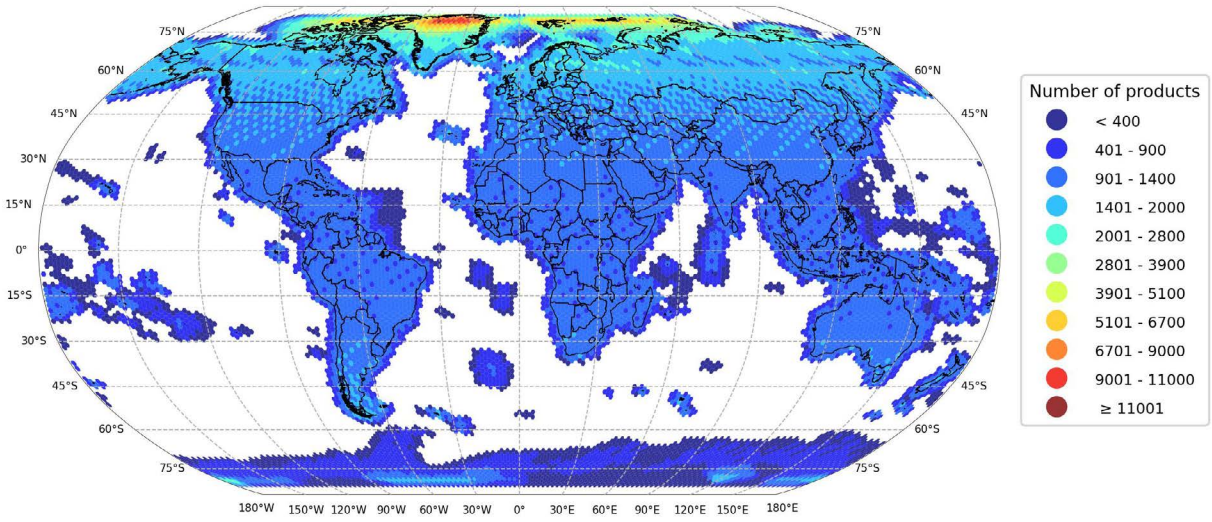


FIGURE 35: Heatmap of Sentinel-2 Level-2A user-level data published from the start of operations to the end of 2024.White colour indicates areas where no data was published.

Sentinel-3

The following heatmaps present the geographical coverage for Sentinel-3 user-level data from the start of operations until 2024. The heatmaps, provided in Figure 36-Figure 40 correspond to five data groups: SRAL (excluding NRT and Level-2), SRAL-NRT Level-2, OLCI, SLSTR, and SYNERGY.

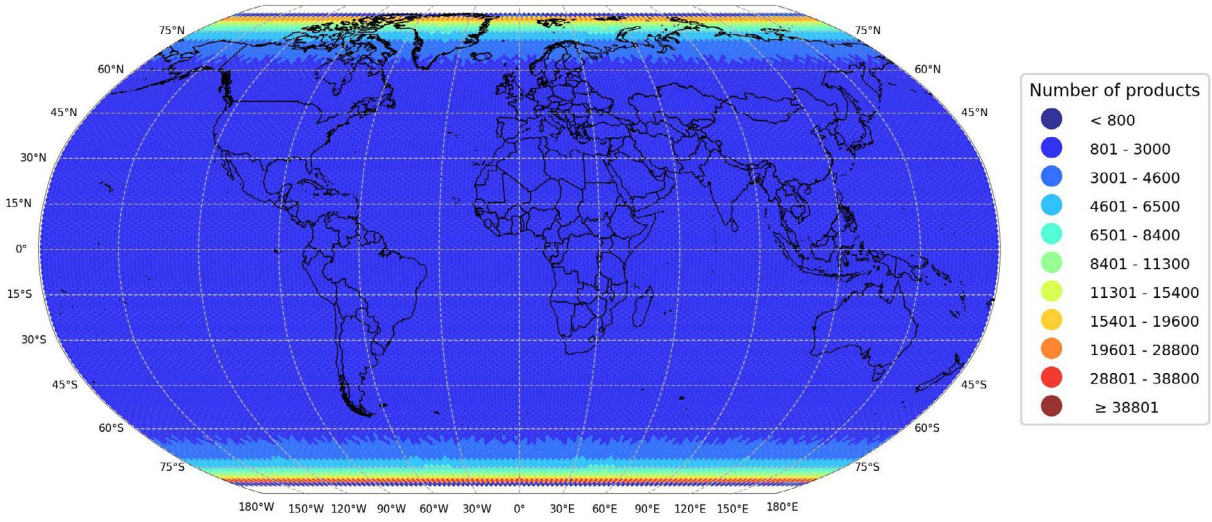


FIGURE 36: Heatmap of Sentinel-3 SRAL (excluding NRT and Level-2) user-level data published from the start of operations to the end of 2024. White colour indicates areas where no data was published.

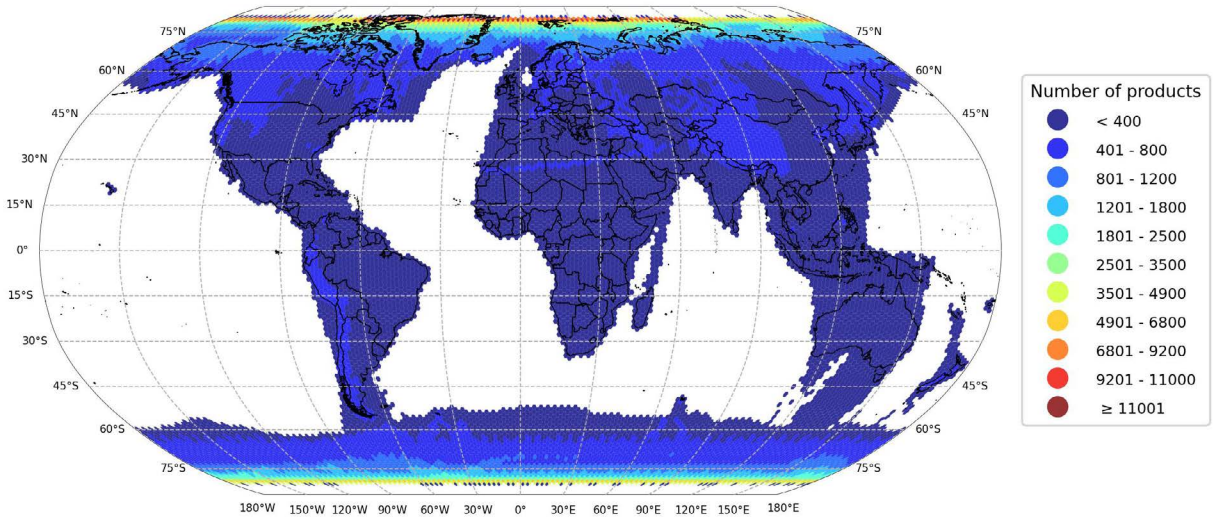


FIGURE 37: Heatmap of Sentinel-3 SRAL-NRT Level-2 user-level data published from the start of operations to the end of 2024. White colour indicates areas where no data was published.

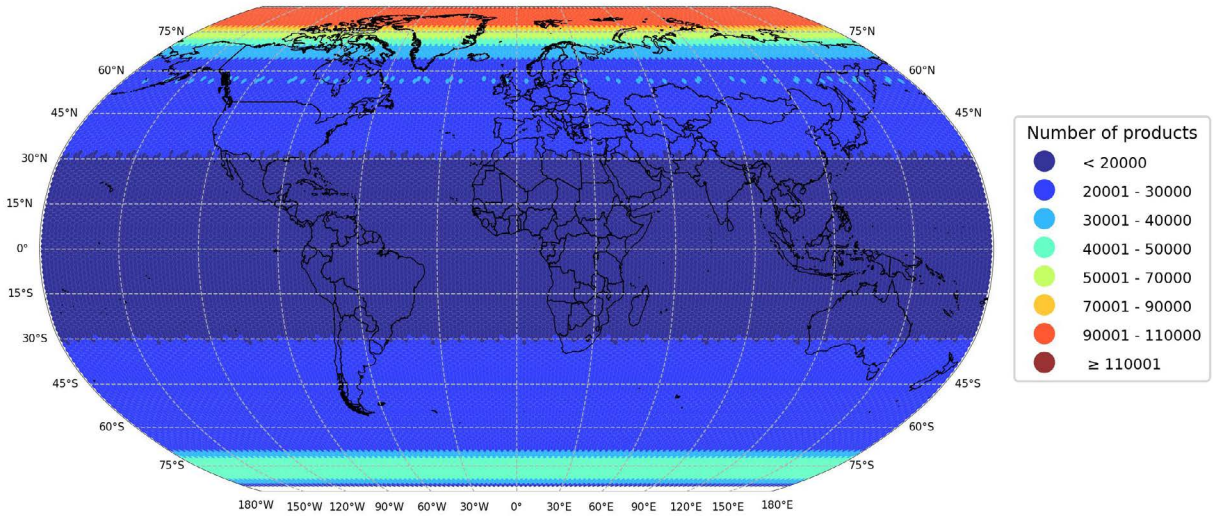


FIGURE 38: Heatmap of Sentinel-3 OLCI user-level data published from the start of operations to the end of 2024.

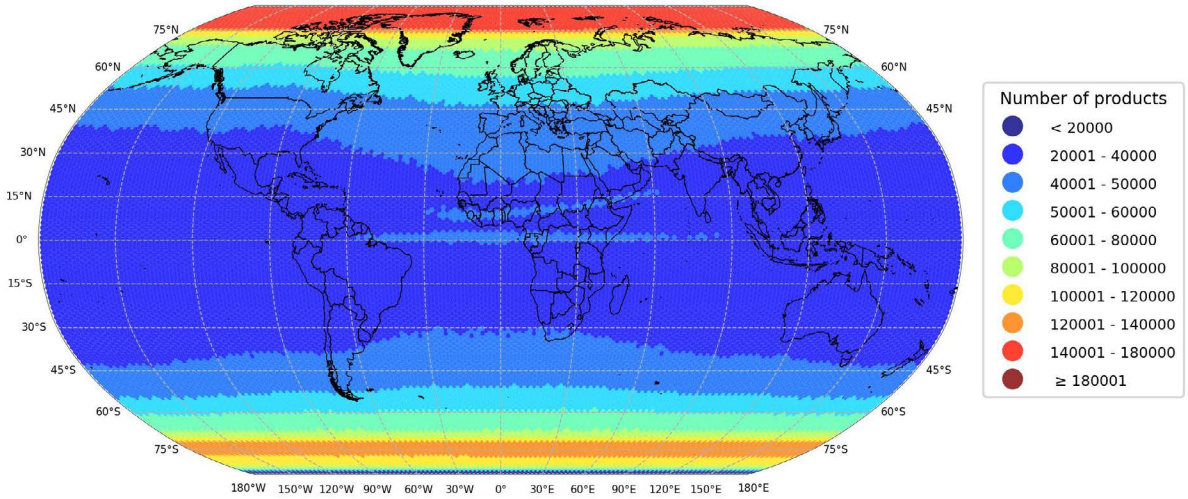


FIGURE 39: Heatmap of Sentinel-3 SLSTR user-level data published from the start of operations to the end of 2024.

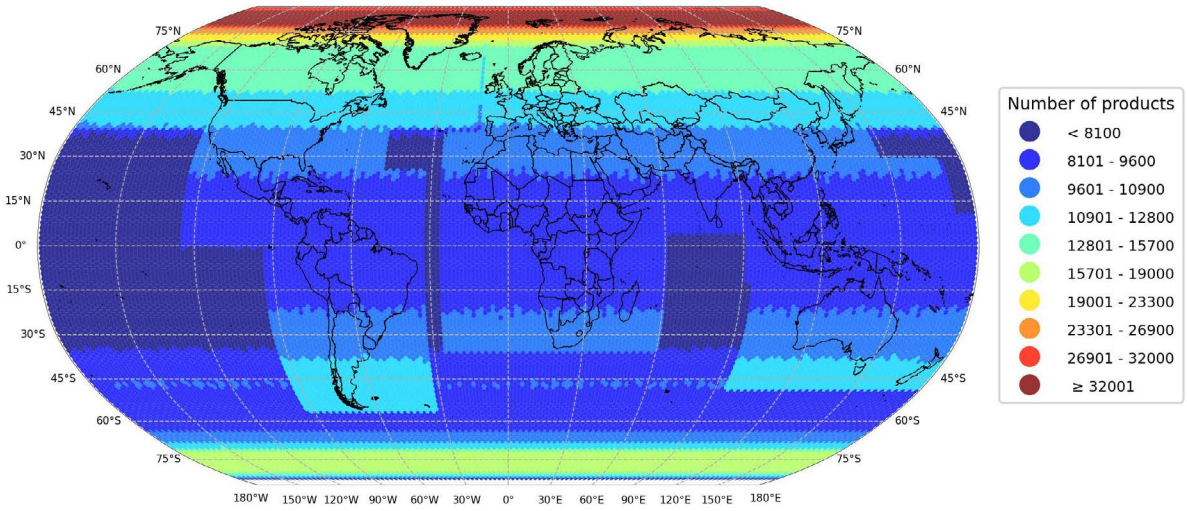


FIGURE 40: Heatmap of Sentinel-3 SYNERGY user-level data published from the start of operations to the end of 2024. White colour indicates areas where no data was published.

Sentinel-5P

Figure 41 presents the Sentinel-5P user-level data (Level-1 and Level-2, NRT and NTC) published from the beginning of operations until the end of 2024. This data is uniformly collected from across the globe, so the increase in the number of products with latitude is solely due to the overlap of the field of view from individual orbits.

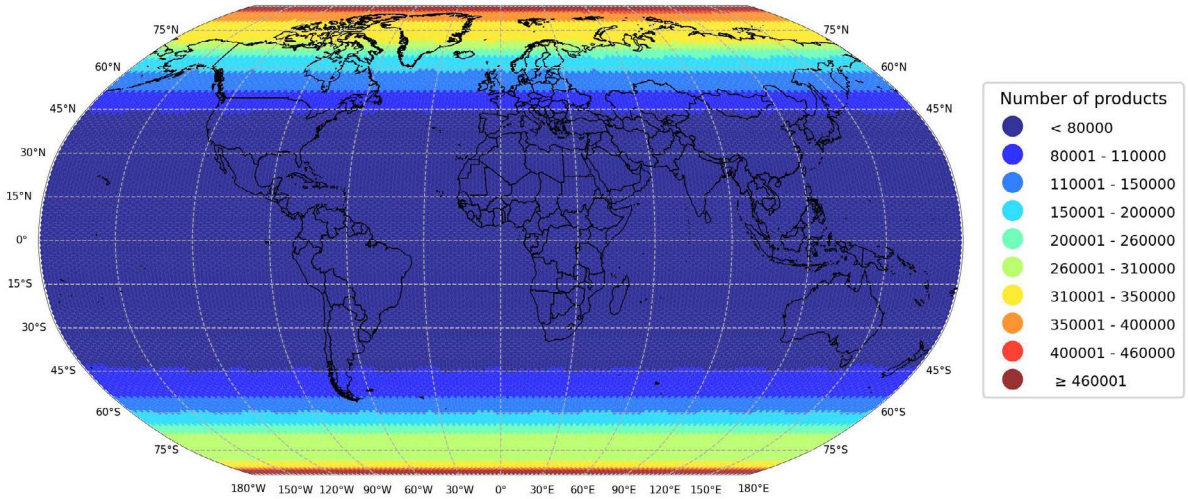
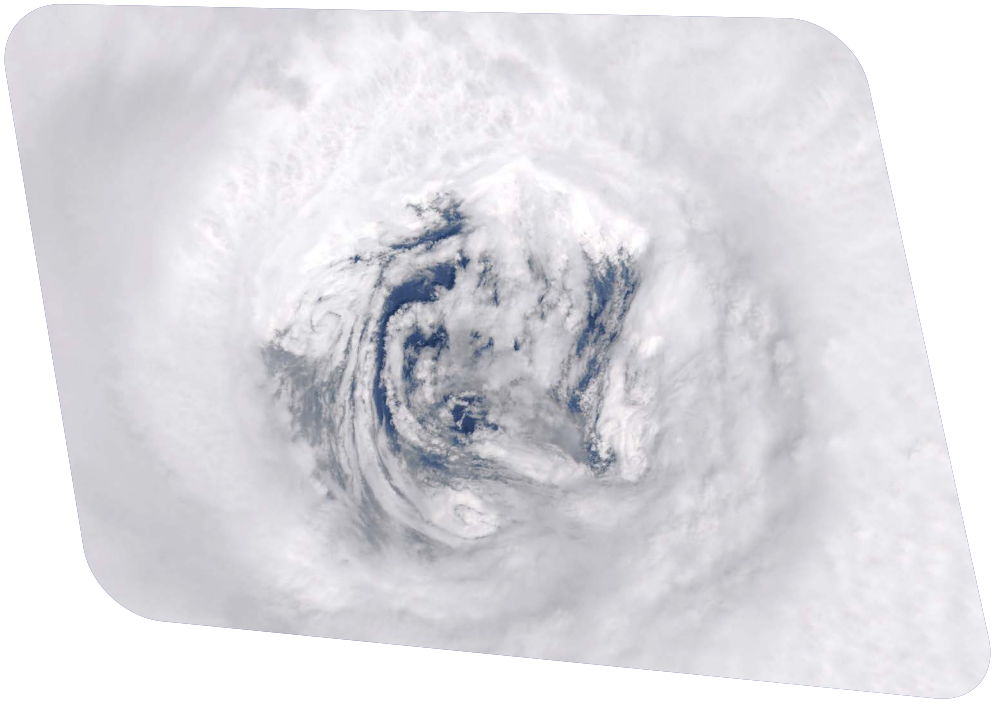


FIGURE 41: Heatmap of Sentinel-5P user-level data (Level-1 and Level-2, and NTC) published from the start of operations to the end of 2024.

Image source: *copernicus.eu, Typhoon Ampil, 2025/10/28, Pacific Ocean, Copernicus Sentinel-2*



7 DATA DELIVERY

This section presents an overview of data delivery trends observed in 2024, with particular emphasis on how users accessed the data through the various interfaces provided by the CDSE. Although users still rely on direct downloads, they represent only a portion of overall data usage, as CDSE enables seamless access and on-demand processing of Sentinel data without the need for local downloads – marking a significant advancement over the former Sentinel Data Access Service. At present, four main delivery channels are available:

- data download
- data access via Sentinel Hub
- data access via OpenEO
- data access from federated cloud environments

The 2024 Annual Report is the first complete report presenting CDSE data delivery statistics across a full calendar year. In contrast, the previous edition covered only the initial operating period, from July to December 2023, following the platform's mid-year launch. With a full year of data now available, it is possible to conduct a more comprehensive analysis of usage trends and to compare both the number and volume of downloaded data with those of previous years.

In 2024, the average monthly volume of downloaded data reached approximately 8.11 PB, compared to 2.67 PB (Table 17, CDSE Annual Report 2023) in the second half of 2023 (July–December). This marks a nearly threefold increase in average monthly downloads within just one year of operation. Furthermore, when compared with historical monthly averages reported for the former Copernicus Sentinel Data Access Service (6.9 PB in 2020, 6.7 PB in 2021, 6.6 PB in 2022, and 6.2 PB in 2023 as reported in the Copernicus Sentinel Data Access Annual Report 2023), it is clear that the CDSE has surpassed prior benchmarks. These results underscore the growing adoption of the new platform by users and the enhanced efficiency and availability of data services within the CDSE.

Over the course of the year, the CDSE provided more than 200 PB of EO data to users via multiple access channels. This included 80 PB downloaded by registered users who accessed data from outside CDSE infrastructure – in other words, by transferring it directly to external environments, such as institutional servers or other end-user machines. In contrast, 30 PB was accessed by users operating within CDSE architecture, leveraging internal virtual resources (e.g., IaaS or hosted environments), and 90 PB was delivered through federated cloud platforms, including commercial download services. These figures not only confirm the continued relevance of traditional download methods but also illustrate evolving access patterns within the Earth observation community.

Meanwhile, user behavior has shifted increasingly toward cloud-native data interaction. As detailed in Section 6.2, services such as Sentinel Hub and OpenEO have played a key role in this transition. In 2024 alone, Sentinel Hub processed over 1.3 billion user requests, analyzing more than two quadrillion pixels through streamlined APIs. Concurrently, the openEO platform has grown its user base to over 2,100 unique users (up from 642 at the end of 2023) and has seen an increase in large-scale batch jobs. This reflects the broader adoption of scalable, on-demand EO data processing.

7.1. Data download

In this section, we present the number and size of downloaded products. Data delivered through other streams (e.g., streamlined data access, cloud data access) is not reflected in the statistics of this section.

All download statistics in this report include data retrieved via both the OData/Zipper interface and the S3 interfaces and encompass all user roles combined. This marks a methodological change from the 2023 Annual Report, where only downloads through the OData/Zipper interface were considered.

7.1.1. Data download summary

The CDSE operates on a multi-cloud infrastructure, designed to provide resilient and redundant services through two distributed cloud environments: CloudFerro Cloud (CFC), located in Warsaw, and Open Telecom Cloud (OTC), located in Amsterdam. Both clouds enable user access via OData/Zipper and S3 interfaces and downloads recorded from either source contribute to overall system activity.

The summary below presents the total volume and number of user-level data downloads per Sentinel mission in 2024, broken down into per-cloud usage. These figures reflect all user roles combined. The corresponding doughnut charts visually represent the data volume and download counts for each mission, including their respective percentage shares.

The findings from CFC can be summarized as follows (Table 11 and Figure 42):

- **Sentinel-1:** A total of 23,930 TB of data was downloaded, accounting for 26% of the total download volume across all missions. The number of Sentinel-1 downloads reached 493,743,639, which represents 5% of all downloads made during the year.
- **Sentinel-2:** This mission remains the most frequently accessed, with a total download volume of 57,343 TB, making up 62% of the total. The number of downloads was exceptionally high at 8,154,121,152, which corresponds to 83% of the total number of downloads made during the year.
- **Sentinel-3:** Users downloaded 8,478 TB of data, which is 9% of the total volume. The download count was 1,127,959,936, or 11% of the total for the year.
- **Sentinel-5P:** This mission accounted for 2,325 TB of downloaded data (3%) and 72,719,149 downloads (1% of the total).

In total, 92,077 TB of data was downloaded from CFC, with a combined total of 9,848,543,876 download requests. This accounted for approximately 94.6% of the global volume and 90.1% of all downloads across both cloud environments in 2024.

Mission	TB	% of Total volume downloaded in 2024	Count	% of Total number downloaded in 2024
Sentinel-1	23,930	26%	493,743,639	5%
Sentinel-2	57,343	62%	8,154,121,152	83%
Sentinel-3	8,478	9%	1,127,959,936	11%
Sentinel-5P	2,325	3%	72,719,149	1%
Grand Total	**92,077**		**9,848,543,876**	

TABLE 11: Total volume and number of user-level data downloads per mission from CFC using OData/Zipper and S3 interfaces from 2024.

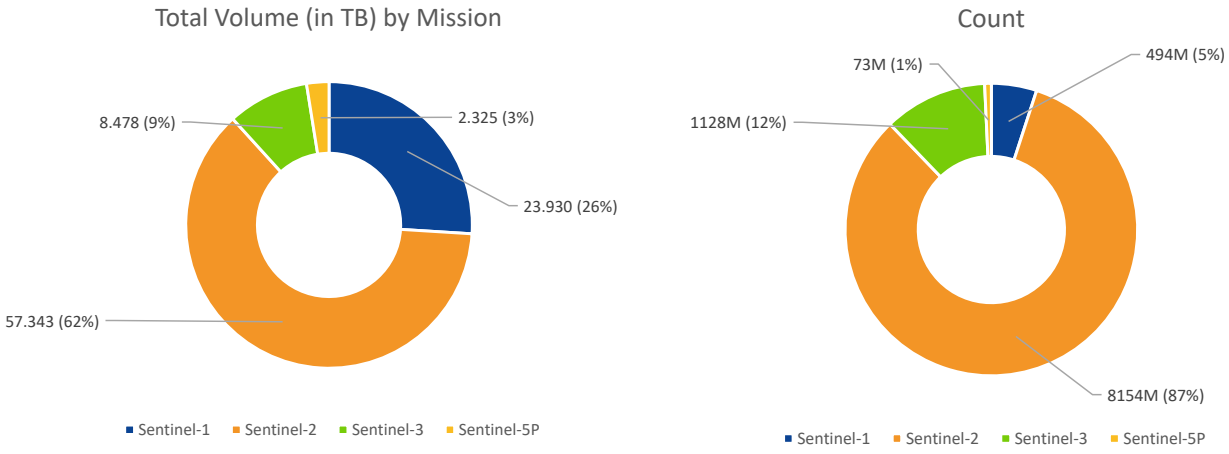
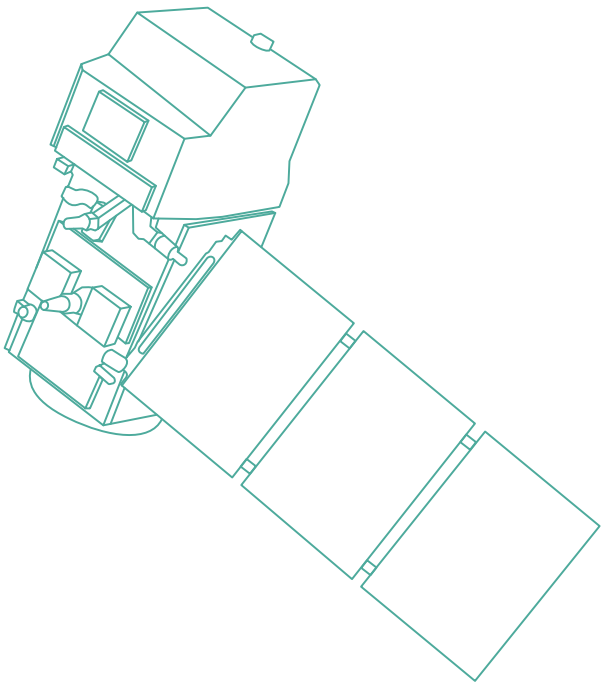


FIGURE 42: Total volume and number of user-level data downloads per mission from CFC using OData/ Zipper and S3 interface in 2024.

Although CFC handled the majority of data downloads in 2024, Table 12 presents download statistics specific to OTC from May to December 2024. These figures cover an eight-month period, as the systematic collection of OTC statistics was initiated began in May 2024. During this period, the same OData/Zipper and S3 interfaces were used, ensuring consistency in access and data recording.

- **Sentinel-2:** led the statistics again with 2,802 TB downloaded (53% of the total volume) and 973,265,721 downloads (90% of the total count).
- **Sentinel-1:** followed with 1,234 TB (24% of the total volume) and 27,496,439 downloads (3% of the total).
- **Sentinel-3:** accounted for 492 TB (9% of the total volume) and 70,478,803 downloads (6% of the total).
- **Sentinel-5P:** contributed 711 TB (14% of the total volume) and 15,557,665 downloads (1% of the total).

Altogether, OTC served 5,239 TB of Sentinel data and registered 1,086,798,628 downloads in just eight months. This represents approximately 5.4% of the global volume and 9.9% of the total download count for the year.



Mission	TB	% of Total	Count	% of Total
Sentinel-1	1,234	24%	27,496,439	3%
Sentinel-2	2,802	53%	973,265,721	90%
Sentinel-3	492	9%	70,478,803	6%
Sentinel-5P	711	14%	15,557,665	1%
Grand Total	**5,239**		**1,086,798,628**	

TABLE 12: Total volume and number of data downloads per mission from OTC Cloud using OData/Zipper and S3 interfaces, between May-December 2024.

In 2024, the total volume of data downloaded from CFC and OTC across all missions was 97,315 TB, with a combined total of 10,935,342,504 downloads (**Table 11** and **12**). A comparative analysis reveals that these figures represent a substantial increase of approximately 5 times the volume recorded in the 2023 reporting period, which stood at 19,275 TB. The observed increase can be attributed, at least in part, to the inclusion of downloads via the S3 interface and the completeness of the statistics throughout the year. Sentinel-2 persists in its role as the predominant source of user activity, as gauged by both the volume of data accessed and the number of downloads.

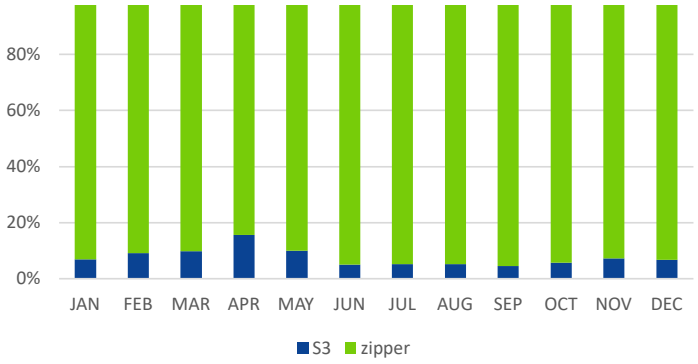


FIGURE 43: Volume of user-level data downloaded in 2024 year via OData/zipper and S3 interfaces

The comparison of the total volume of user-level data downloaded in 2024 via the OData/Zipper and S3 interfaces, presented in Figure 43, offers a valuable insight into user preferences for accessing data within the CDSE. The chart analysis clearly demonstrates that the vast majority of CDSE users chose to access data through the OData/Zipper API interface, which consistently accounted for over 90% of the total monthly download volume during 11 out of 12 months of the year. The only exception was April, when the S3 interface reached its peak share of around 16%. On average, downloads performed via the S3 interface represented approximately 7–8% of the total data volume in 2024. This distribution shows that CDSE users clearly favor the OData/Zipper interface, which remains the primary and most commonly used method for accessing data on the platform.

Figure 44 provides an interesting perspective, showing the total volume of user-level data downloads for each Sentinel mission since operational access began. The chart tracks trends in data volumes over the years and compares the level of user activity in the CDSE in 2024 with previous years under the Legacy Sentinel Data Hubs. The volume statistics for 2015–2023 originate from the Copernicus Sentinel Data Access Annual Report 2023, in which volumes were reported in pebibytes (PiB) and subsequently converted to terabytes (TB) to enable direct comparison. Additionally, it should be noted that the 2023 values cover only ten months, from January to the end of October, as the Legacy system was shut down on 2 November 2023. In contrast, the metrics for 2024 come from CDSE and cover the entire calendar year. The year 2024 marked the highest annual download volume since the beginning of operational data dissemination. Compared to 2023, when the total volume reached 83,879 TB, this represents an increase of 13,436 TB, equivalent to a growth of approximately 14.8%.

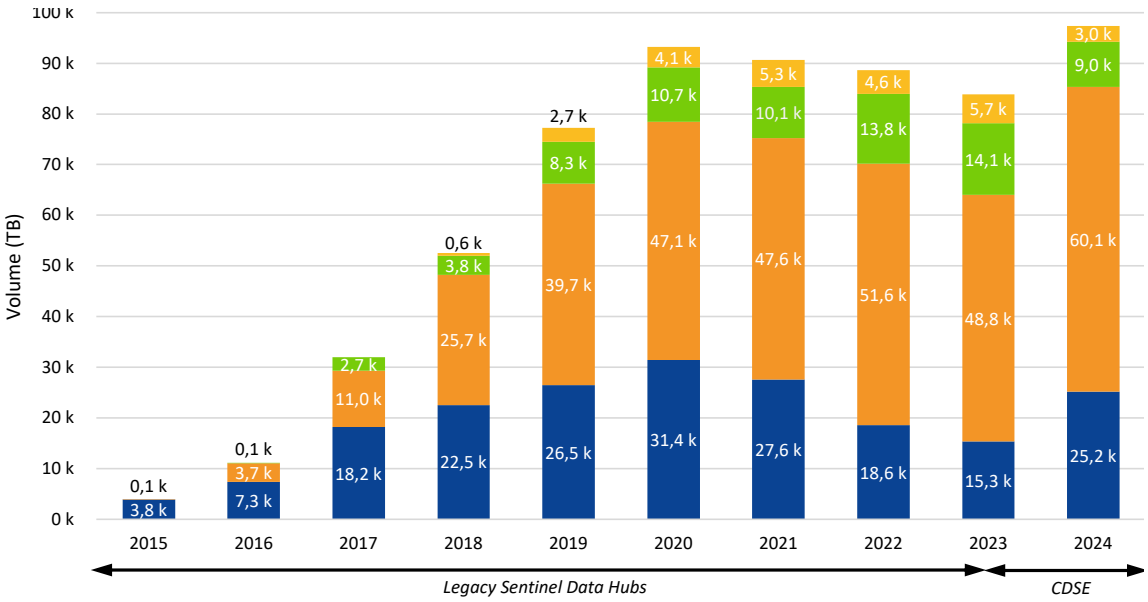


FIGURE 44: Total volume of user-level data downloaded per year since the start of operations for each Sentinel mission. ‚K' signifies thousands of data volumes.

7.1.2. Relative Download Volume Heatmaps

The relative download volume heatmap is another key indicator that helps to evaluate how much Sentinel user-level data is being used in different parts of the world. They provide an overview of where the largest volumes of data are downloaded, offering insight into geographical patterns of data exploitation and regional demand for specific missions and data types. The heatmaps presented in this chapter are mission-specific, broken down by instrument, data level and timeliness.

In this edition of annual report, heatmaps presenting the Relative Download Volume were introduced, as they offer a clearer and more intuitive representation of areas with the highest user interest. Compared to the approaches applied in previous reports – the Archive Exploitation Ratio (AER) used up to 2022, and the Volume Exploitation Ratio (VER) applied in 2023 – this new method allows for simple visual comparison of spatial usage patterns. However, as each of these approaches is based on distinct methodologies and data parameters, they should not be directly compared.

From 2024 onwards, the underlying download statistics include all access interfaces, such as OData/Zipper, S3 interfaces, openEO, Sentinel Hub, and other federated cloud services. Unlike in 2023, when heatmaps were generated based on downloads from the OData/Zipper interface only and were limited to the second half of the year. This comprehensive approach enables better year-to-year comparisons and reliability accuracy of regional demand analysis. To ensure the most accurate visualization of the final outcomes, the scope of the analysed data excludes internal CDSE downloads and those of other technical users.

The relative volume downloaded is calculated by assigning the product download volume to all grid cells overlapping the footprint of each dataset and then normalizing the scale between 0 and 1. This normalization prevents inflated totals that could arise when the same download contributes to multiple cells. High download rates near the poles are linked to the greater number of observation opportunities in these regions and are further accentuated by the systematic retrieval of polar datasets.

In all heatmaps, the colour white is not presented in the legend, but the white areas indicate a lack of data. This lack of data could be due to either no published products in a particular area or zero downloads of those products.

The interval boundaries displayed in the legend for heatmaps are rounded representations of the actual numerical limits used for classification. The precise interval thresholds are defined with higher numerical precision to ensure continuity and non-overlapping ranges between classes.

Sentinel-1

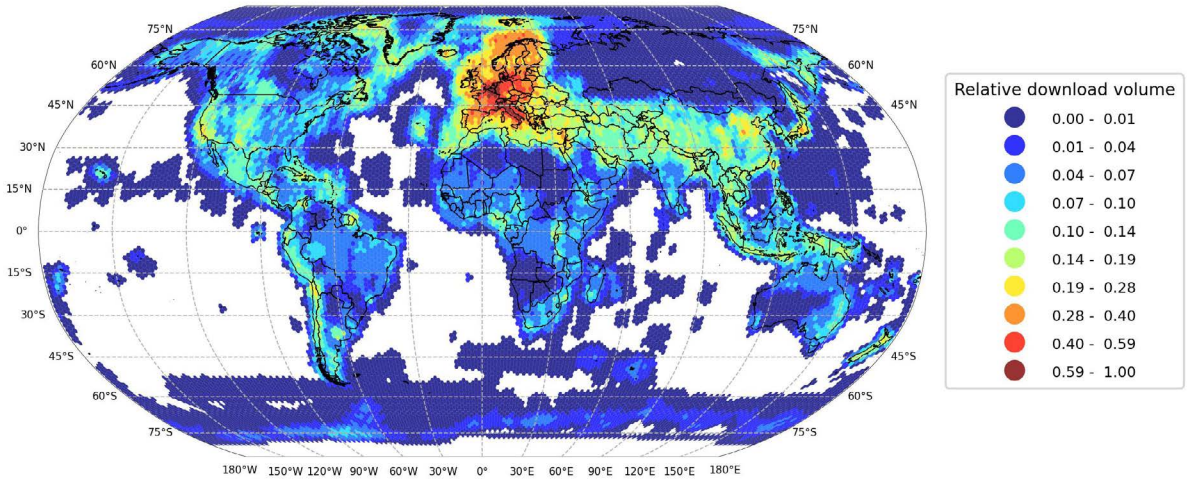


FIGURE 45: Heatmap of the Relative Download Volume for Sentinel-1 (excluding OCN) user-level data in 2024. White indicates areas where either no data was published or downloaded.

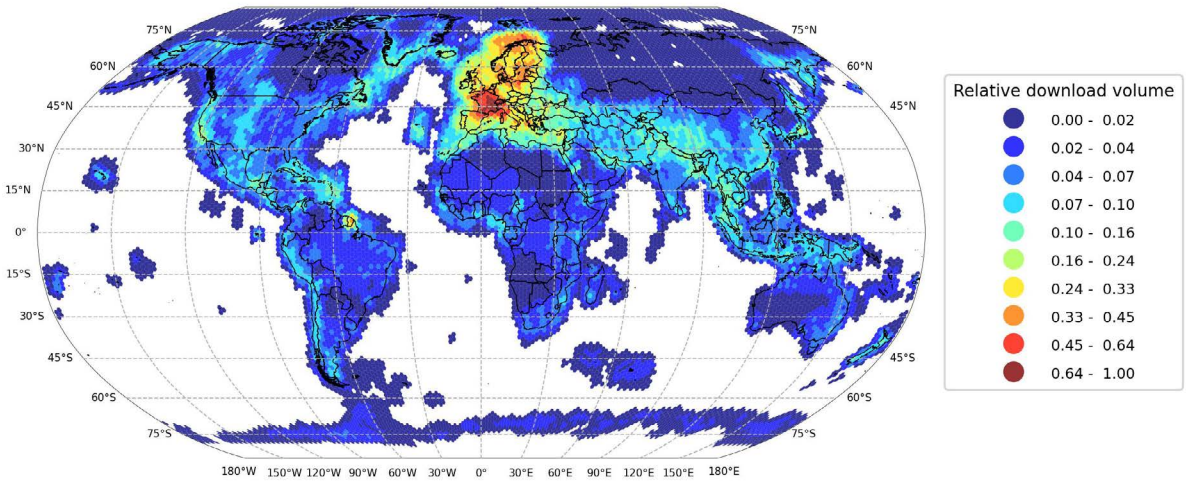


FIGURE 46: Heatmap of the Relative Download Volume for Sentinel-1 GRDH user-level data in 2024. White indicates areas where either no data was published or downloaded.

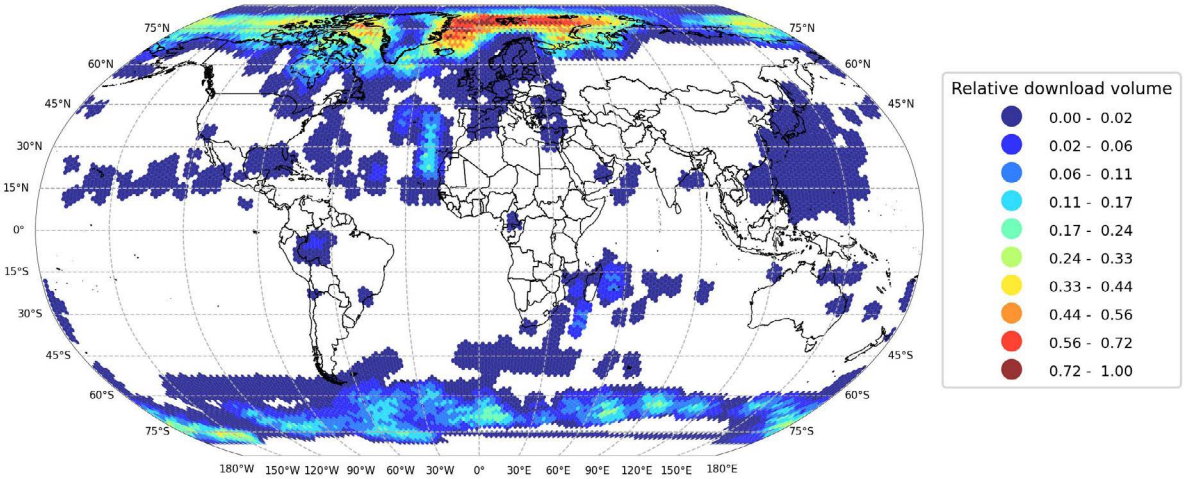


FIGURE 47: Heatmap of the Relative Download Volume for Sentinel-1 GRDM user-level data in 2024. White indicates areas where either no data was published or downloaded.

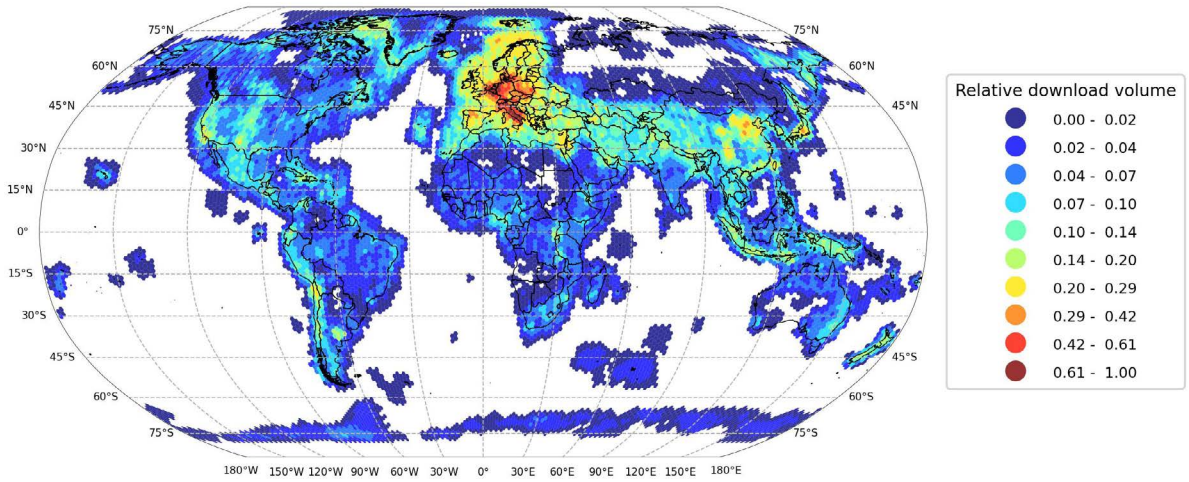


FIGURE 48: Heatmap of the Relative Download Volume for Sentinel-1 SLC user-level data (excluding WV SLC) in 2024. White indicates areas where either no data was published or downloaded.

Sentinel-2

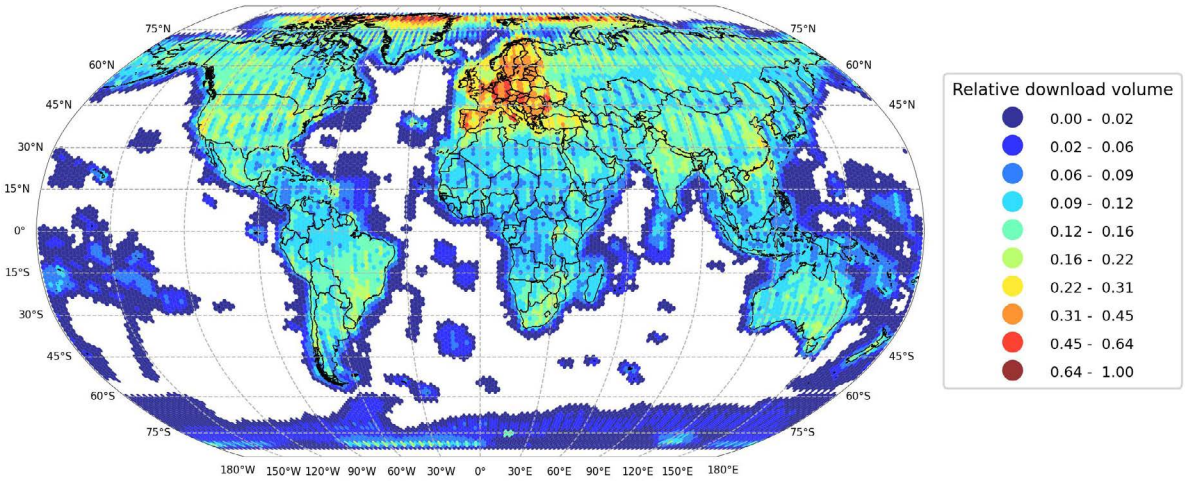


FIGURE 49: Heatmap of the Relative Download Volume for Sentinel-2 Level-1C user-level data in 2024. White indicates areas where either no data was published or downloaded.

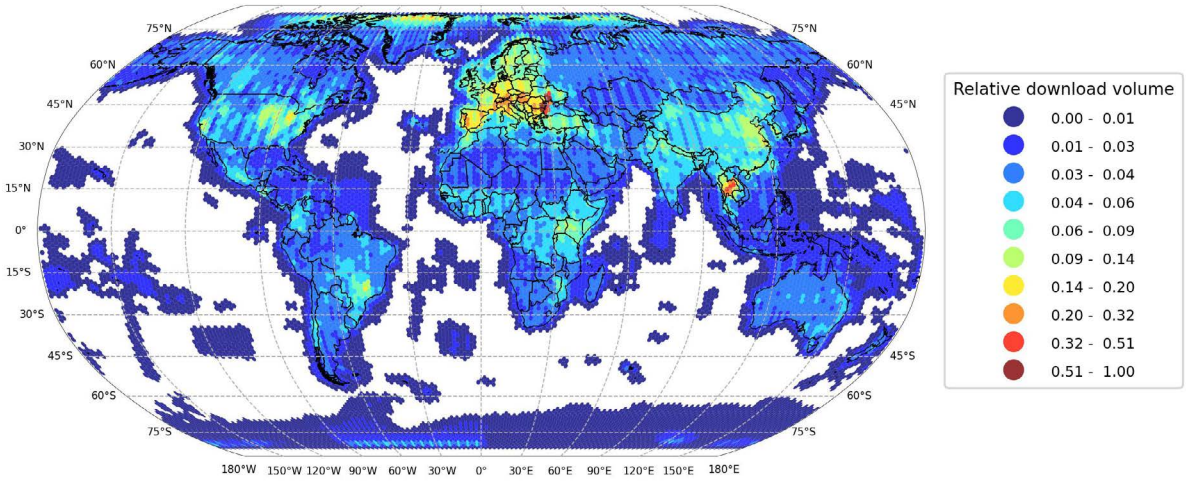


FIGURE 50: Heatmap of the Relative Download Volume for Sentinel-2 Level-2A user-level data in 2024.White indicates areas where either no data was published or downloaded.

Sentinel-3

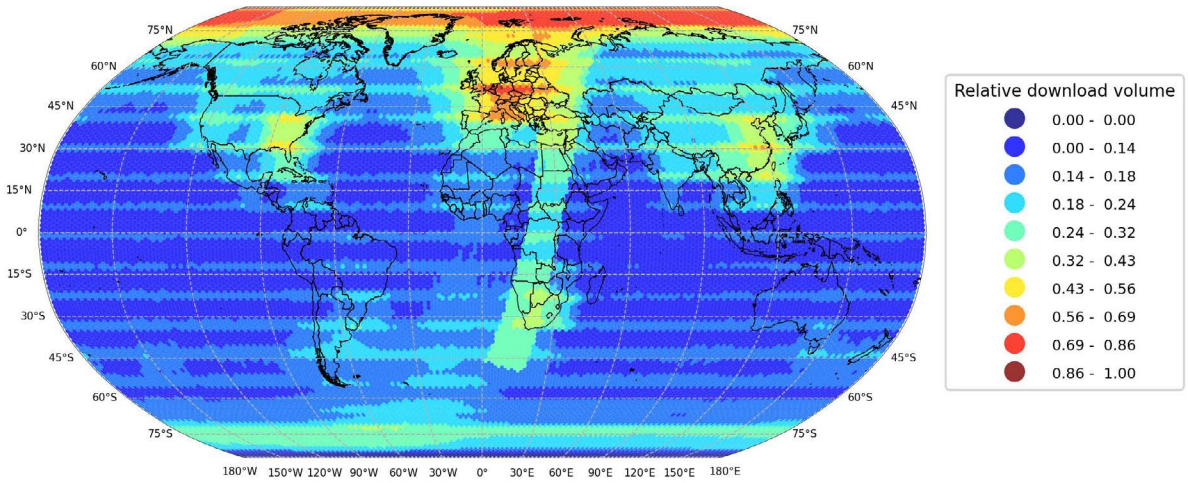


FIGURE 51: Heatmap of the Relative Download Volume Ratio for Sentinel-3 OLCI user-level data in 2024.

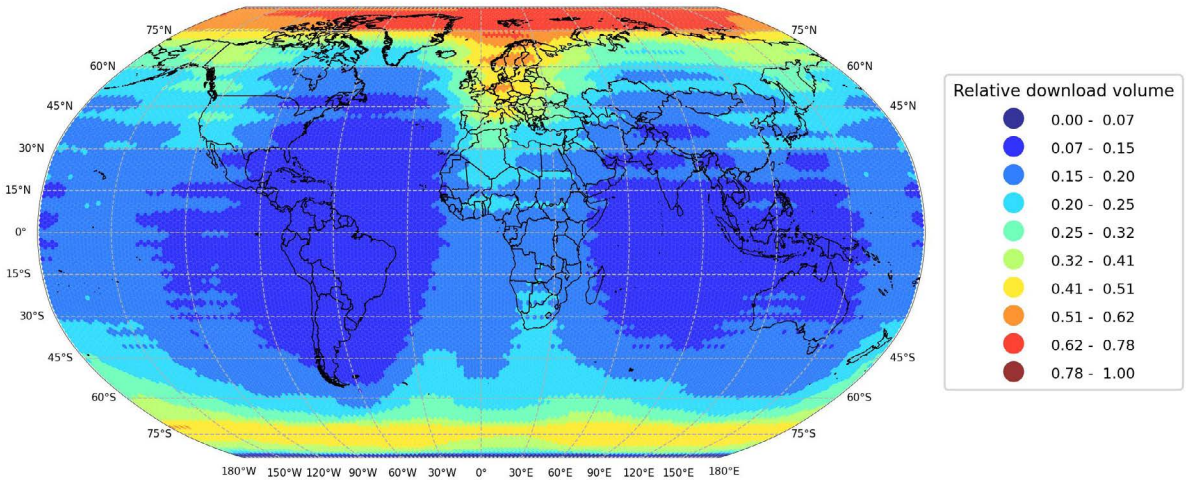


FIGURE 52: Heatmap of the Relative Download Volume for Sentinel-3 SLSTR user-level data in 2024.

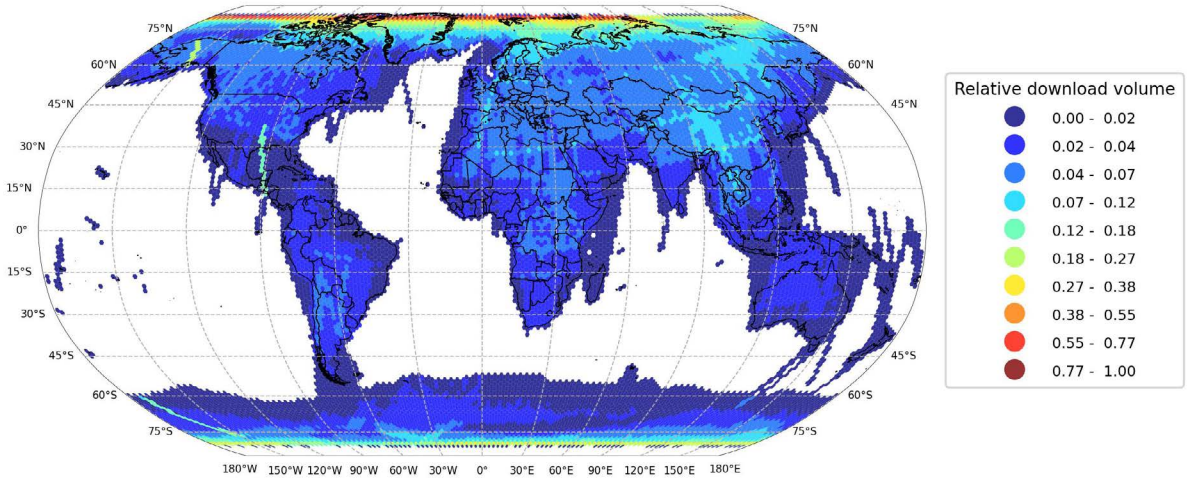


FIGURE 53: Heatmap of the Relative Download Volume for Sentinel-3 SRAL-NRT Level-2 user-level data in 2024. White indicates areas where either no data was published or downloaded.

7.1.3. Data download per collection and type

This section provides a breakdown of data downloads by mission, product type, and reprocessing status for 2024. The statistics are based on combined downloads via the OData/Zipper and S3 interfaces and reflect overall usage patterns across the Sentinel portfolio.

As mentioned, the vast majority of downloads were downloads of Sentinel-2 data, which alone accounted for 82.8% of all user-level downloads, reflecting an increase from 77.2% in the previous year (Table 13). Among Sentinel-2 products, Level-2A (L2A) data represented 42.7% of the total downloads across all missions, followed closely by Level-1C (L1C) with 40.1%. This appears to confirm an ongoing preference for high-resolution, analysis-ready optical imagery.
An important aspect of Sentinel-2 usage is the demand for reprocessed data, as detailed in Table 14. In 2024, 33.56% of L1C and 22.14% of L2A downloads were reprocessed products – an increase for L1C (from 7.80%) and a decrease for L2A (from 51.34%) compared to 2023. In absolute terms, this corresponds to over 1.32 billion L1C and 931 million L2A reprocessed downloads, highlighting users' interest in updated, harmonized datasets and improved data quality (Table 14).

For Sentinel-1, user activity was focused on SLC (2.3%) and GRD (2.0%) products, which together accounted for over 87% of all Sentinel-1 downloads. Other product types like OCN, RAW, and AUX were downloaded far less frequently, indicating more specialized use cases (Table 13).

Collection	Type	Count	% of total
Sentinel-1	AUX	5,457,542	0.1%
	ETA	531,578	0.0%
	GRD	200,408,570	2.0%
	OCN	48,514,279	0.5%
	RAW	16,979,974	0.2%
	SLC	221,851,696	2.3%
	S1 Total	**493,743,639**	**5.0%**
Sentinel-2	AUX	12,473	0.0%
	L1C	3,945,448,819	40.1%
	L2A	4,208,659,860	42.7%
	S2 Total	**8,154,121,152**	**82.8%**
Sentinel-3	AUX	66,635	0.0%
	OLCI	290,231,033	2.9%
	SLSTR	736,044,558	7.5%
	SRAL	18,986,627	0.2%
	SYNERGY	82,631,083	0.8%
	S3 Total	**1,127,959,936**	**11.5%**
Sentinel-5P	AUX	122,305	0.0%
	L1	11,246,408	0.1%
	L2	61,350,436	0.6%
	S5P Total	**72,719,149**	**0.7%**
Grand Total		**9,848,543,876**	**100%**

TABLE 13: Number and percentage of all Sentinel user-level data types downloaded per type, using the OData/Zipper and S3 interfaces in 2024.

Collection	Type	All products	Re-processed	% of reprocessed products downloads
Sentinel-2	L1C	3,945,448,819	1,323,967,845	33.56%
Sentinel-2	L2A	4,208,659,860	931,725,315	22.14%

TABLE 14: Number and percentage of Sentinel-2 reprocessed user-level data downloaded using OData/Zipper and S3 interfaces in 2024.

The outlined statistics are illustrated further in Figure 54 and Figure 55, which show the percentage distribution of user-level Sentinel-1 and Sentinel-2 data downloads by product type in 2024. The charts provide a concise and clear, graphical summary of the usage patterns.

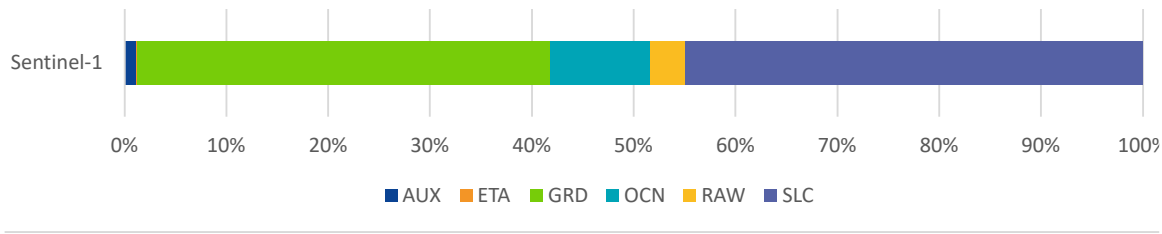


FIGURE 54: Percentage of Sentinel-1 user-level data downloaded per type using OData/Zipper and S3 interfaces in 2024.

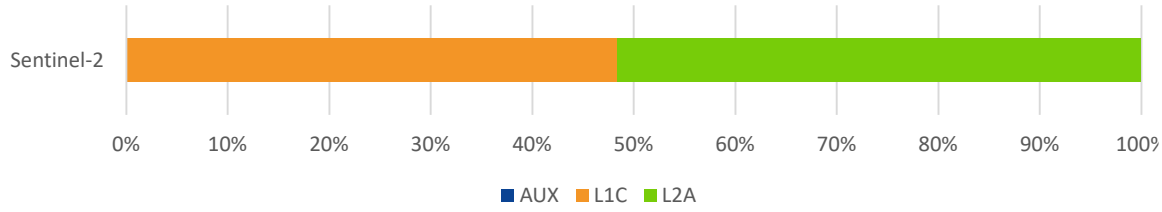


FIGURE 55: Percentage of Sentinel-2 user-level data downloaded per type using OData/Zipper and S3 interfaces in 2024.

Downloads of Sentinel-3 user-level data in 2024 totaled approximately 1.13 billion downloads, representing 11.5% of all Sentinel downloads (Table 13). The majority of these were concentrated on products from the SLSTR (65.25%) and OLCI (25.73%) instruments, which together accounted for over 90% of all Sentinel-3 downloads (notable increase for both together of more than 17% compared to their joint share in 2023) (Table 15).

The most downloaded product for Sentinel-3 was SL_1_RBT (Level-1 radiance and brightness temperature), with over 615 million downloads (54.54%), reflecting high demand for thermal infrared data. OLCI's OL_1_EFR (21.93%) was the second most popular, emphasizing continued interest in full-resolution optical imagery. SYNERGY products contributed 7.33% of total downloads in 2024 – a decrease from 10.92% in 2023 – while SRAL dropped significantly from 15.63% to 1.68%. The sharp decline for SRAL's share may be distorted by the partial-year reporting in 2023 and/or reflect the specialized nature of its data, which is primarily used for altimetry and water-level monitoring. Finally, auxiliary data (AUX) remained marginal, with just 0.01% of downloads. (Table 15 and Figure 56)

S3 Instrument	Product type	Count	% of total
SLSTR	SL_1_RBT___	615,151,032	54.54%
	SL_2_LST___	76,628,372	6.79%
	SL_2_FRP___	42,670,016	3.78%
	SL_2_WST___	1,429,209	0.13%
	SL_2_AOD___	165,929	0.01%
	SLSTR Total	**736,044,558**	**65.25%**
OLCI	OL_1_EFR___	247,388,098	21.93%
	OL_2_LFR___	26,807,110	2.38%
	OL_1_ERR___	8,144,624	0.72%
	OL_2_WFR___	5,984,447	0.53%
	OL_2_LRR___	1,777,144	0.16%
	OL_2_WRR___	129,610	0.01%
	OLCI Total	**290,231,033**	**25.73%**
SYNERGY	SY_2_SYN___	79,149,573	7.02%
	SY_2_VG1___	1,536,096	0.14%
	SY_2_VGP___	1,466,909	0.13%
	SY_2_AOD___	267,734	0.02%
	SY_2_V10___	210,771	0.02%
	SYNERGY Total	**82,631,083**	**7.33%**
SRAL	SR_2_LAN_HY	7,635,588	0.68%
	SR_2_LAN___	3,436,325	0.30%
	SR_2_LAN_LI	2,683,611	0.24%
	SR_2_LAN_SI	2,567,686	0.23%
	SR_1_SRA_A_	1,804,895	0.16%
	SR_2_WAT___	833,589	0.07%
	SR_1_SRA___	17,405	0.00%
	SR_1_SRA_BS	7,528	0.00%
	SRAL Total	**18,986,627**	**1.68%**
AUX	AUX_GNSSRD	24,221	0.00%
	AUX_POEORB	17,173	0.00%
	AUX_PROQUA	13,893	0.00%
	SR___POE_AX	5,505	0.00%
	SR___ROE_AX	2,912	0.00%
	AUX_MOEORB	1,536	0.00%
	AUX_COMB__	929	0.00%
	AUX_PRCPTF	255	0.00%
	SR___MDO_AX	211	0.00%
	AUX Total	**66,635**	**0.01%**
Grand Total		**1,127,959,936**	**100.00%**

TABLE 15: Number and percentage of Sentinel-3 user-level data downloaded using OData/Zipper and S3 interfaces during 2024 per user-level data type.

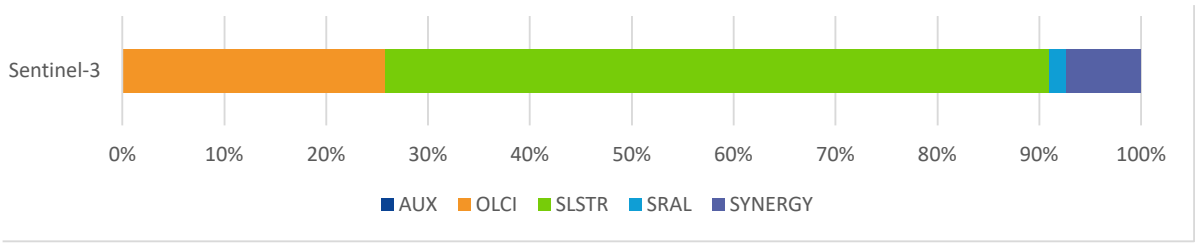


FIGURE 56: Percentage of total number of Sentinel-3 user-level data downloaded using OData/Zipper and S3 interfaces, per group in 2024.

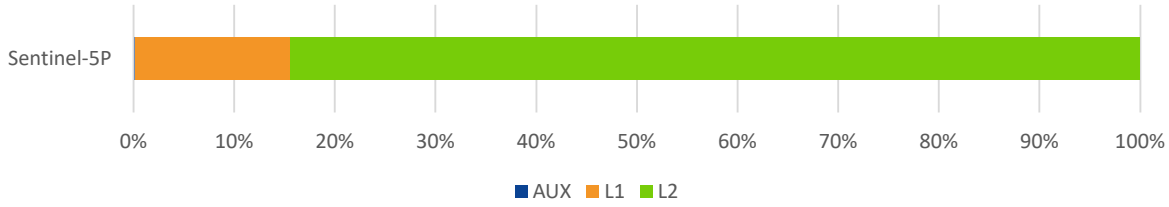


FIGURE 57: Percentage of total number of Sentinel-5P user-level data downloaded using OData/Zipper and S3 interfaces, per type in 2024.

Sentinel-5P represented a relatively small fraction of total downloads (0.7%), with the majority being L2 products (84.3%) primarily used for atmospheric composition analysis (Table 13), as illustrated in Figure 57. This indicates a strong and potentially increasing preference for higher-level atmospheric data: in 2023, L2 accounted for 76.1% and L1 accounted for 23.8%.

Overall, the data show a consistent user preference for higher-level, value-added products, and a growing interest in reprocessed datasets, confirming the importance of data refinement and archive consolidation.

7.1.4. Data download throughout the year

This section presents an overview of data download activity throughout 2024, focusing on the monthly dissemination volumes for each Sentinel mission. The aim is to understand usage patterns, seasonal trends, and the overall demand for Copernicus Earth observation products via the OData/ Zipper and S3 interfaces. The data illustrates how different missions are utilized over time and how download behavior evolves month by month.

Over the course of 2024, a cumulative total of nearly 9.04 billion products were downloaded, amounting to approximately 92.08 PB of data. On average, this equates to over 813 million products and 7.56 PB downloaded per month.

In 2024, Sentinel-2 was by far the most downloaded mission. Its monthly product counts consistently exceeded 630 million, peaking in March at over 754 million and 5.29 PB. It accounted for approximately 78% of all products downloaded that year, highlighting its central role in Earth observation activities. Sentinel-3 ranked second, with a gradual increase in downloads over the year. The number of products peaked in December, surpassing 112 million, while the highest volume – 897 TB – was recorded in October. Sentinel-1 exhibited moderate fluctuations, while Sentinel-5P exhibited stable yet smaller activity levels during the year.

The dissemination trend, when assessed over the course of the year, appears stable and balanced, with a slight upward trend in product counts and data volume toward the end of the year. The lowest total download activity occurred in January, with approximately 589 million products and 5.79 PB downloaded. In contrast, the highest activity occurred in December, with over 903 million products downloaded and 8.91 PB of data transferred, indicating a year-long increase of over 50% in both product count and data volume. (Figure 58)

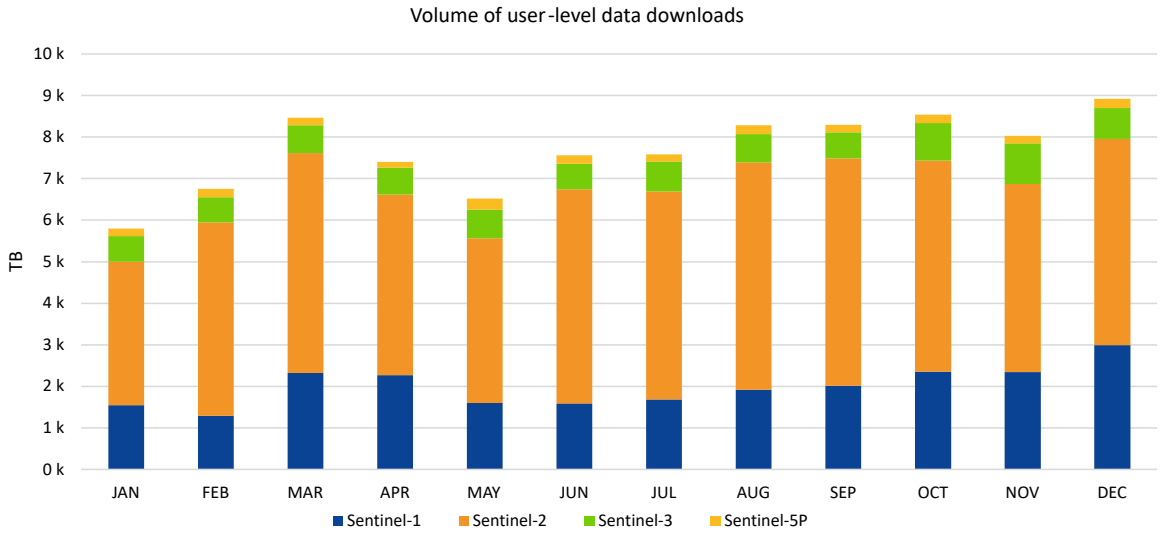


FIGURE 58: Dissemination volume trend using OData/Zipper and S3 interfaces, per month and mission in 2024.

The average daily volume of data disseminated in December 2024 using the OData/Zipper and S3 interfaces reached 287.39 TB (Table 16) representing a major increase compared to 191.45 TB recorded in December 2023. It is important to note that the 2023 figure only accounts for downloads via the OData/Zipper interface, as the S3 access statistics were not yet incorporated at that time.

Sentinel-2 maintained the highest daily download volume in December 2024 with 159.78 TB/day, up from 94.15 TB/day a year earlier, reflecting growing demand and broader access. Sentinel-1 also increased significantly from 70.20 TB/day to 96.54 TB/day. In contrast, Sentinel-3 rose more moderately from 20.58 TB/day to 23.99 TB/day, while Sentinel-5P's volume remained stable at just over 7 TB/day. (Table 16)

Collection	Daily average volume [TB] downloaded in December 2024	Daily average volume [TB] downloaded in December 2023
Sentinel-1	96.54	70.20
Sentinel-2	159.78	94.15
Sentinel-3	23.99	20.58
Sentinel-5P	7.07	6.52
Total	**287.39**	**191.45**

TABLE 16: Average volume of data disseminated using OData/Zipper and S3 interfaces, during December 2024 and 2023. Figures for December 2023 are for the OData/Zipper interface only

7.1.5. Data downloads per continent and per country

The distribution of data downloads across continents and countries serves as a valuable indicator of how the CDSE is being adopted around the world. This geographical perspective enables a deeper understanding of the platform's impact on both global and local scales, uncovering trends in data consumption that may correspond with policy needs, research focus areas, or economic development levels. Identifying where users are most active can inform future decisions about developing services, conducting outreach, and building capacity in emerging user communities.

The percentage split of downloads by continent in 2024 is presented in Table 17 and Figure 59, which both present the same values. Europe accounted for the majority of downloads at 77.7%, with North America at 10.8% and Asia at 7.9%. Africa (2.2%), South America together with Antarctica (0.9%), and Oceania (0.5%) accounted for smaller shares of downloads. Compared with 2023 (July–December), Europe's share grew from 74.6% to 77.7%, while North America saw a decrease from 16.1% to 10.8%. Asia and Africa recorded modest increases of 1.8% and 0.3%, respectively, and Oceania's share doubled from 0.2% to 0.5%. These results confirm that Europe remains the leading continent in terms of total CDSE user downloads.

Continent	Percentage of downloads
Europe	77.7%
North America	10.8%
Asia	7.9%
Africa	2.2%
South America	0.9%
Oceania	0.5%

TABLE 17: Percentage split of downloads using OData/Zipper and S3 interfaces, by volume per continent in 2024.

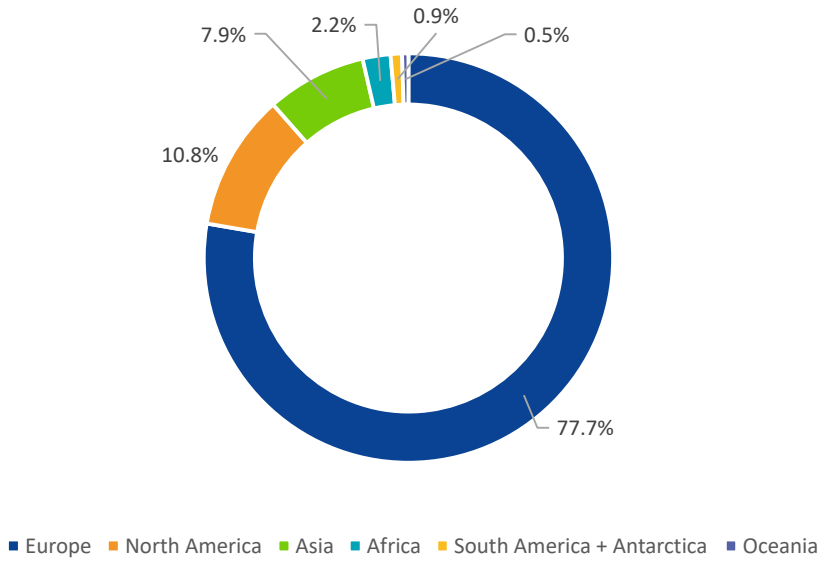


FIGURE 59: Percentage split of downloads using OData/Zipper and S3 interfaces, by volume per continent in 2024

Table 18 presents the percentage breakdown of user-level data downloads by continent in 2024, providing a geographic overview and offering insights into how different regions engage with the CDSE. The data indicates that Europe continues to be the predominant source of downloads, accounting for 77.4% of all activity, with the proportion reaching as high as 76.6% and 91.0% for Sentinel-1 and Sentinel-3, respectively, indicating particularly strong regional expertise in radar and broad-scale environmental monitoring data. (Table 18)

North America followed with 11.5% of the total count of downloads, maintaining its position as the second most active region globally. In terms of proportional download counts for specific missions, North America was ranked second for three of the four Sentinel missions: Sentinel-1 (14.7%), Sentinel-2 (12.2%), and Sentinel-5P (19.5%). Its engagement with Sentinel-3 data was slightly lower, placing third with 4.1% of the download count and being surpassed by Asia with 4.4%. When considering overall download activity across all missions, Asia emerged as the third most active region, contributing 7.2% to the global download count. Africa, South America, and Oceania/Antarctica made smaller proportions of the download count, with 2.5%, 0.9%, and 0.5% respectively, but each continent contributed to the download count of almost every mission, with the exception of Sentinel-3, for which Oceania/Antarctica made almost no registered contribution (only 0.014%) to the download total. (Table 18)

The 2024 results suggest that the geographic distribution of data downloads has not changed substantially, although a direct comparison with 2023 is limited due to the partial availability of statistics for 2023 (July–December only). Europe remains the main region of use and there is steady engagement across other continents, with only minor variations between missions. This stability may indicate the maturation of user bases and the infrastructure supporting Copernicus data globally. It suggests a relatively stable global usage pattern of Copernicus data across continents.

Continent	% of Sentinel-1 Downloads	% of Sentinel-2 Downloads	% of Sentinel-3 Downloads	% of Sentinel-5P Downloads	% of all missions Downloads
Europe	76.6%	75.6%	91.0%	71.3%	77.4%
North America	14.7%	12.2%	4.1%	19.5%	11.5%
Asia	7.3%	7.6%	4.4%	8.6%	7.2%
Africa	0.7%	2.9%	0.4%	0.1%	2.5%
South America + Antarctica	0.3%	1.1%	0.1%	0.3%	0.9%
Oceania	0.5%	0.5%	0.0%	0.2%	0.5%

TABLE 18: Percentage split of downloads using OData/Zipper and S3 interfaces, by number for each Sentinel mission and overall per continent in 2024.

Table 19 presents a detailed breakdown of the top 10 EU and ESA member states by number of downloads for each Sentinel mission in 2024. This ranking provides a comparative perspective on national engagement with the CDSE within Europe, helping to identify the main contributors to overall data usage. Among these leading countries, a distinct pattern of concentrated downloads can be observed, with Italy, France, and Germany consistently ranking at the top across all Sentinel missions. While Germany recorded the highest number of Sentinel-5P downloads, with nearly 13 million downloads, Italy held the top position for the remaining missions: 142.7 million downloads for Sentinel-1, over 1.87 billion for Sentinel-2, and 571.5 million for Sentinel-3. France consistently held second place for Sentinel-1 and Sentinel-2 and ranked within the top five for Sentinel-3, while Germany maintained a strong presence across all missions.

Belgium and Poland also appeared across all four Sentinel mission rankings, while other countries appeared in a selection of the lists: Spain features in the top 10 for Sentinel-1, -2 and -3; Luxembourg features in the lists for Sentinel-1 and -2; Austria for Sentinel-1, -2 and -3; both Finland and the UK for Sentinel-3 and -5P; and The Netherlands for Sentinel-1 and -5P. Canada, Denmark, Ireland, Norway, Slovenia and Slovakia all appear but just in just one of the lists.

#	Sentinel-1		Sentinel-2		Sentinel-3		Sentinel-5P	
	Country	Number of downloads	Country	Number of downloads	Country	Number of downloads	Country	Number of downloads
1	Italy	142,658,289	Italy	1,874,953,103	Italy	571,459,283	Germany	12,918,726
2	France	80,562,822	France	797,326,259	Germany	150,854,482	Poland	11,898,967
3	Germany	43,210,172	Germany	786,882,240	Austria	82,639,412	Netherlands	8,040,453
4	Poland	31,699,675	Luxembourg	759,132,443	Finland	61,392,767	United Kingdom	6,170,918
5	Spain	23,411,803	Belgium	340,524,057	France	48,860,958	Belgium	2,576,264
6	Luxembourg	11,936,332	Poland	236,998,685	Spain	39,939,469	Italy	2,473,749
7	Austria	10,149,005	Slovenia	187,031,164	Belgium	24,134,977	France	2,422,979
8	Denmark	6,930,981	Spain	101,873,341	United Kingdom	23,571,223	Finland	1,801,666
9	Netherlands	5,304,435	Austria	92,895,916	Poland	9,388,452	Canada	1,275,949
10	Belgium	4,820,704	Slovakia	60,944,442	Norway	4,698,923	Ireland	1,082,909

TABLE 19: Top-10 EU and ESA states by number of Odata/Zipper and S3 downloads for each Sentinel mission in 2024.

7.2. Streamlined Data Access

One of the most significant improvements introduced by the CDSE is the ability to access and process data without the need for data download. The scalable processing applications are in the cloud environment, allowing user to access pixels of data and apply both simple and complex processing tasks. The CDSE takes away the technical complexity of accessing and processing data, enabling users to focus on their applications. Below we describe in detail the two main services for streamlined data access: Sentinel Hub and openEO.

7.2.1. Sentinel Hub

Sentinel Hub is a satellite imagery processing service capable of on-the-fly gridding, re-projection, re-scaling, mosaicking, compositing, orthorectification, and other actions required for streamlined data access for end-users. It can be integrated into web-applications, where images are mostly served, or into machine learning and similar data science processes, where pixel values and statistics are essential. Sentinel Hub works with original satellite data to preserve accuracy and uses cloud infrastructure and innovative methods to efficiently process and distribute data in a matter of seconds.

Application Programming Interface (API) is an intermediary that allows applications to access the features or data of another application or system. The Sentinel Hub API allows users to systematically process satellite data and integrate it into their own data analysis workflows and applications. Users can choose between an OGC (Open Geospatial Consortium) API, which enables integration of satellite data into desktop or online applications using the standard WMS, WCS, WMTS and WFS services, or the more powerful Sentinel Hub RESTful API.

For requesting large areas or longer time periods of data, Sentinel Hub includes a Batch Processing API, and for searching and viewing geospatial information, a STAC- compliant Catalog API is provided. Users interested in calculating statistical information from satellite imagery can use the Statistical API. Users can access all the data collections already integrated into Sentinel Hub or bring their own data.

Image source: *copernicus.eu, Unusual weather in Europe 2024/01/07, Copernicus Sentinel-3*

The most interesting highlights from the year 2024 are:

- Addition of new collections, especially Sentinel-1 monthly mosaics and Sentinel-2 quarterly mosaics, Copernicus Contributing missions, Sentinel-3 Level 2 collections, and more.
- More than **1.3 billion requests** were processed by Sentinel Hub services in this period.
- Over **9 billion processing units** (PU) were consumed for streamlining Sentinel data. With one PU corresponding to approximately 26 km2 of Sentinel-2 data processed at full resolution, the total represents almost 230 billion km2 or **1600 times the area of Earth's landmass**. More than **2 quadrillion pixels of data** were processed along the way.
- Regarding the usage per data collection (**Table 20** and **Figure 60**), **Sentinel-2 quarterly mosaics** were the most requested (46% of all requests), followed by Sentinel-2 L2A (37%) and Sentinel-2 L1C (12%).

Data collection offered in SH	% of all SH requests
Sentinel-1 GRD	2%
Sentinel-2 L1C	12%
Sentinel-2 L2A	37%
Sentinel-3 OLCI L1B	1%
Sentinel-3 SLSTR L1B	1%
Sentinel-5P L2	1%
Mosaics	46%

TABLE 20: Percentage of Sentinel Hub requests per data collection.

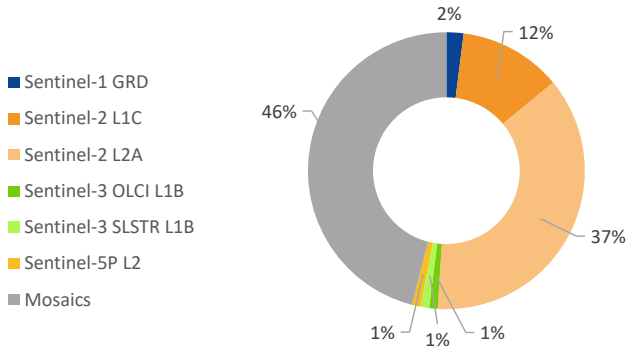


FIGURE 60: Percentage of Sentinel Hub requests per data collection.

In 2025, the data offer in Sentinel Hub will be expanded to include: Copernicus Land Monitoring Services data, Landsat and MODIS collections, and other data. Users will be further encouraged and supported to use the APIs directly, as this has a potential to significantly support, optimize and upscale processing in the Earth Observation community.

Of the 1.3 billion Sentinel Hub requests processed in 2024, the vast majority were to 'Process API', which is the primary synchronous API used for processing and visualisation of data. This API also powers the majority of the Copernicus Browser features, so it is not surprising that it is most used. The next in line are 'Catalog API', which is a STAC-based interface to search for meta-data, optimised for performance, and 'OGC Services', which are typically used to stream data to 3rd party applications, such as QGIS and other web applications.

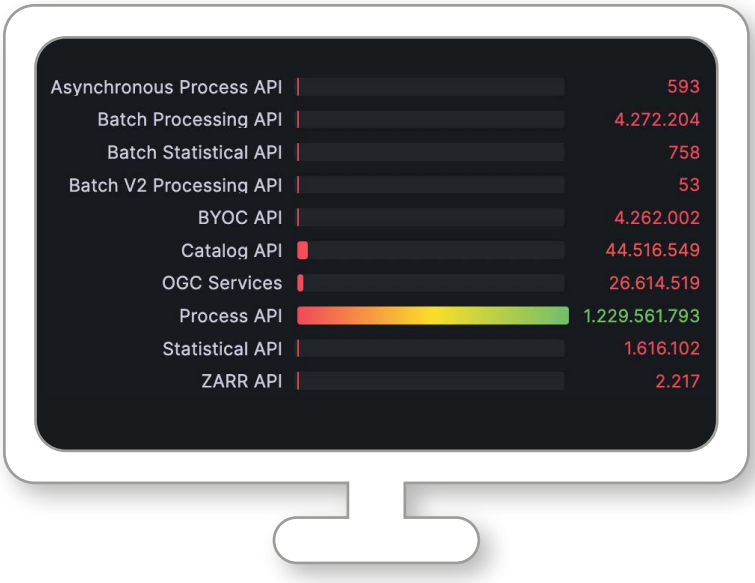


FIGURE 61: Distribution of number of requests to various flavours of the Sentinel Hub API.

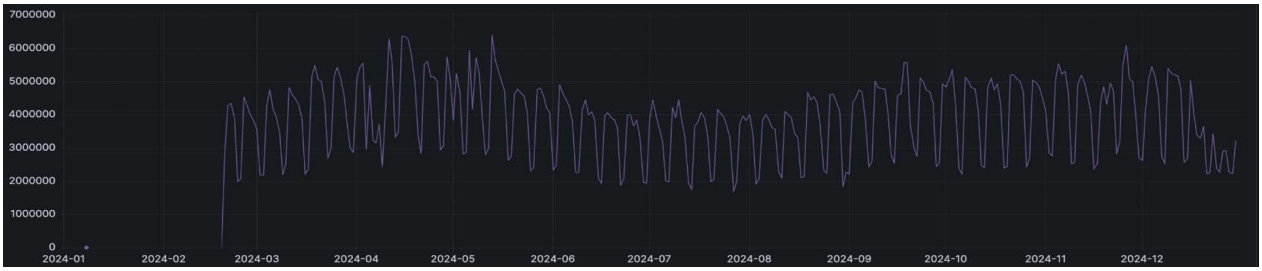


FIGURE 62: Chart of use of Process API through the year, showing typical weekly and seasonal patterns (note that data collection at this level started mid-February)

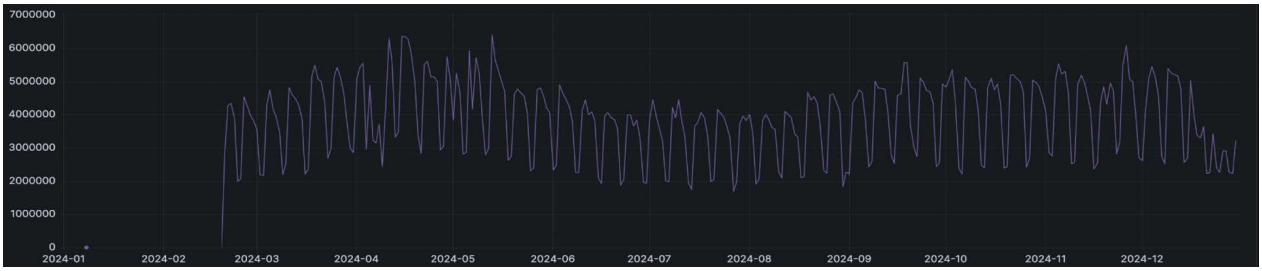


FIGURE 63: Chart of use of OGC APIs through the year, showing typical weekly and seasonal patterns (note that data collection at this level started mid-February). The peak in the September/October period correlates with peak monitoring activities in scope of the Common Agriculture Policy. Many member states are performing validation of automatic extraction of agriculture activities on the field level at the time.

7.2.2. openEO

Since its integration into the CDSE in 2023, openEO has continued to evolve, making it easier and more efficient to access, process and analyze Earth Observations (EO) datasets. In the year 2024, many new features were introduced to openEO API, enhancing existing functionalities, and its collections were expanded to further improve user experience for various remote sensing applications.

The target audience of the openEO service ranges from data scientists who want to easily explore and analyse Copernicus data, to data engineers who aim to build production workflows. Thanks to this service, organisations and teams with limited IT resources can now build workflows that are automatically scaled across the cloud resources that are collocated with Copernicus data.

By directly supporting open science and FAIR principles, openEO tries to increase the quality of scientific output built on the CDSE without adding extra burden on data scientists. Support for Python and the Pangeo ecosystem is included, as well as a client library for R and Javascript users (Figure 64).

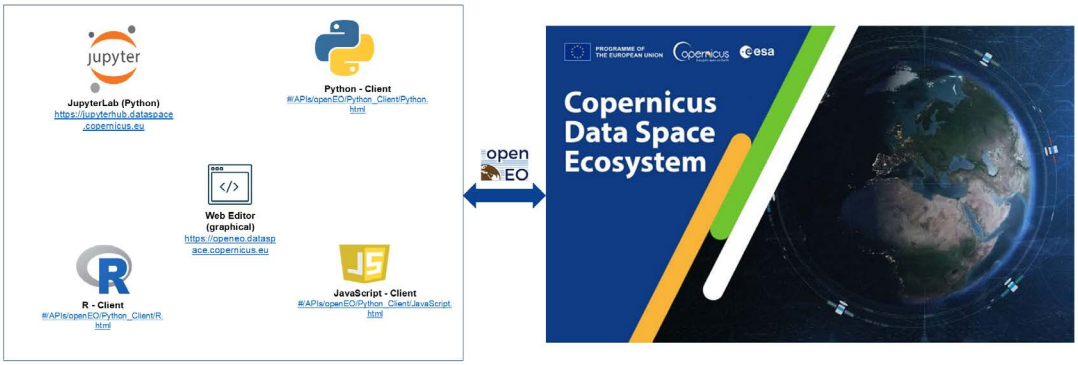


FIGURE 64: openEO API and its application in the Copernicus Data Space Ecosystem.

Federated Access: One Interface, Multiple Platforms

As a part of these ongoing advancements, the concept of openEO federation was introduced, making data access more seamless across different platforms. While EO data are crucial for various applications, accessing and processing them can be challenging due to the availability and distribution of the data across multiple platforms, each requiring separate workflows. The openEO Federation tries to simplify this by providing a unified endpoint that allows users to access data from multiple sources through a single interface, eliminating the need for separate accounts and APIs.

In the first implementation, Terrascope is available as a federation partner. Thus, users can now seamlessly access Terrascope-based collections such as CGLS_FAPAR_V2_GLOBAL, PROBAV_L3_S1_TOC_100M, TERRASCOPE_S2_FAPAR_V2 and many more directly using the same CDSE credentials. This marks a step forward in enabling other data providers to contribute their collections through openEO, expanding the range of available datasets.

FIGURE 65: openEO in a nutshell

Expanding Collection Coverage with Sentinel-3 Data

In addition to these collections, several new collections have been added to the CDSE instance, including various Sentinel-3 products, such as SENTINEL3_OLCI_L1B, SENTINEL3_SLSTR, SENTINEL3_SLSTR_L2_LST, and SENTINEL3_SYN_L2_SYN. These additions provide more opportunities for analyzing satellite data at different processing levels. An example showcasing the use of SENTINEL3_SLSTR_L2_LST is available in the openEO community examples.

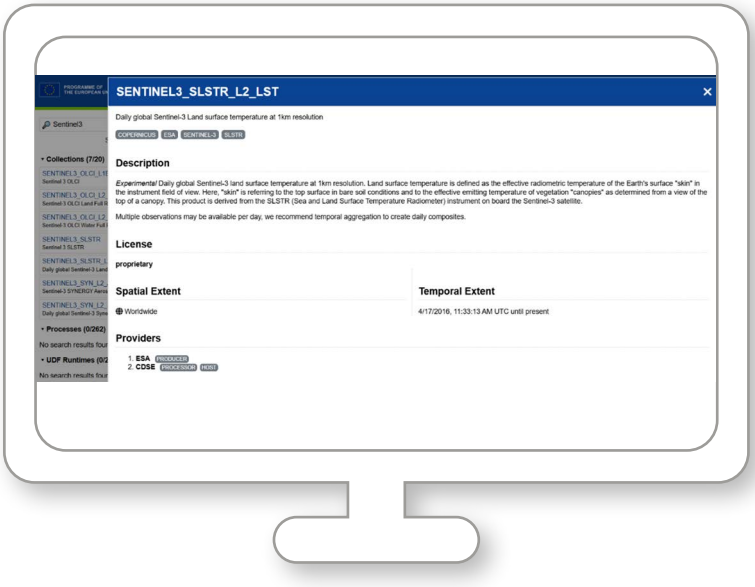


FIGURE 66: Availability of Sentinel-3 SLSTR L2 LST product using openEO.

Custom Data Access via STAC Support

While the available data supports a wide range of applications, some products or collections may not yet be available in the CDSE. To address this, the openEO API introduced a new process, enabling users to load externally hosted datasets from a static SpatioTemporal Asset Catalog (STAC) or an STAC API Collection.

Furthermore, building on this feature, new notebooks were added to the openEO community example repository to support users in leveraging this feature. This feature allows users to work with data beyond the predefined collections, making openEO a more flexible tool for customized analyses.

FIGURE 67: Landsat cloud-free composite of Antwerp 1997 loaded from OpenGeoHUB using load_stac.

Support for Scalability with MultiBackendJobManager

One of the key advantages of using openEO is its support for scalability. While workflows implemented using openEO are scalable, handling large-scale processing tasks, especially with extensive data, can be challenging. In such cases, it is often necessary to divide the area of interest into smaller regions and run the algorithm on each region independently. To simplify this process and manage multiple jobs simultaneously, openEO developed the MultiBackendJobManager functionality. This feature significantly enhances the management of concurrent processing tasks, making it essential for efficiently scaling your workflow. This approach not only reduces computational time but also streamlines the results.

This openEO capability has been validated through large-scale operational projects such as ESA WorldCereal and JRC Copernicus Global Land Cover and Tropical Forestry Mapping and Monitoring Service (LCFM), which leverage its robust, scalable, and reliable infrastructure.

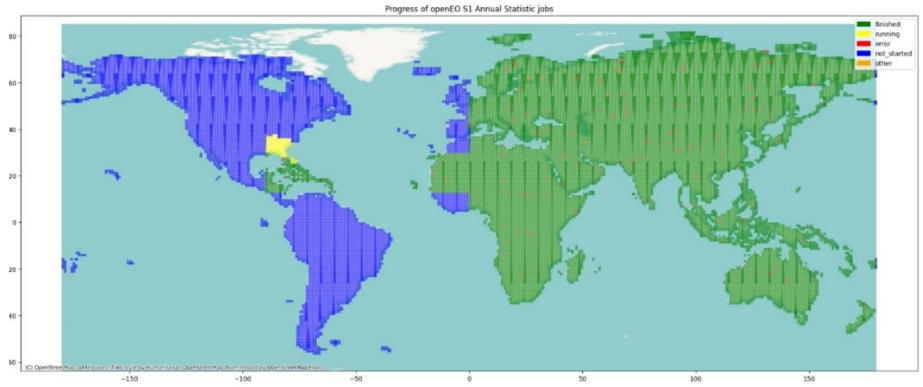


FIGURE 68: Using openEO's MultiBackendJobManager feature for global processing.

When working with large datasets, such as in ESA WorldCereal, openEO optimizes its key workflow components, including data pre-processing and analysis. The workflow uses openEO's point and patch sampling capabilities to collect a large amount of EO samples linked to labeled crop-type data. A catalogue of reference data is being built and continuously expanded, relying on the STAC metadata produced by openEO. During map generation, openEO processes multi-source data through a process graph, prepares it in an analysis-ready format and applies machine learning models via user-defined functions. The final outputs are stored as cloud-optimized GeoTIFFs, facilitating seamless integration into GIS platforms. Moreover, openEO enhances flexibility and scalability by allowing users to train and deploy custom models. By extracting labelled reference data, training locally, and embedding their models into workflows, users can achieve enhanced flexibility and scalability in their processes.

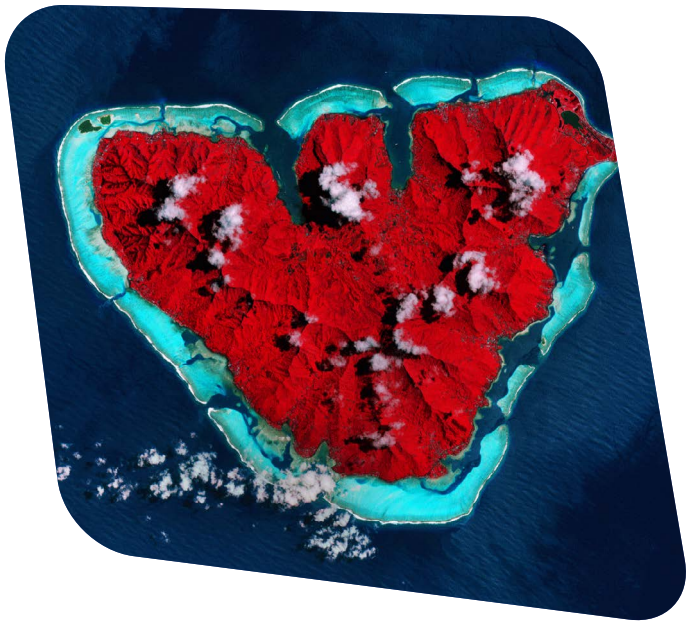


Image source: *copernicus.eu, Moorea Island 2019/02/11, contains modified Copernicus Sentinel data (2017), processed by ESA*

Bringing Machine Learning Closer to EO Experts

As seen in the ESA WorldCereal, there was a growing demand for more sophisticated ML techniques. This led to support the adoption of foundation models in openEO workflow to pre-train on massive datasets and fine-tune for EO applications. These models enable more generic, scalable, and automated classification pipelines without sacrificing precision. In addition, to make ML more accessible for EO practitioners, openEO integrated key algorithms such as Random Forest, a widely used classification model. The algorithm enhances EO data classification by combining predictions from multiple decision trees, reducing the need for deep ML expertise. This integration allows users to train, validate, and deploy models directly within the openEO environment, making complex data analysis tasks more accessible.

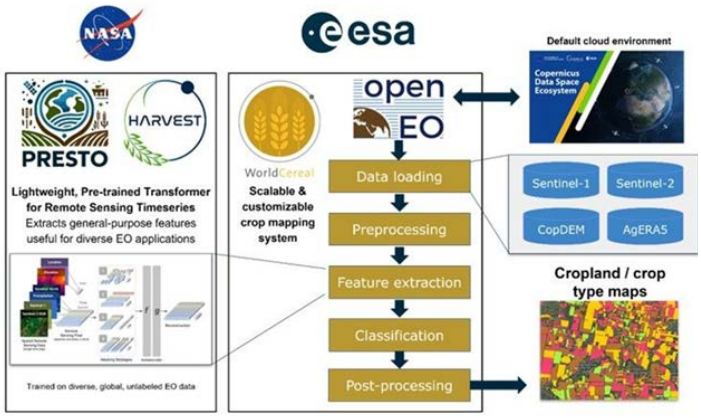


FIGURE 69: ESA WorldCereal: using openEO to streamline global crop mapping

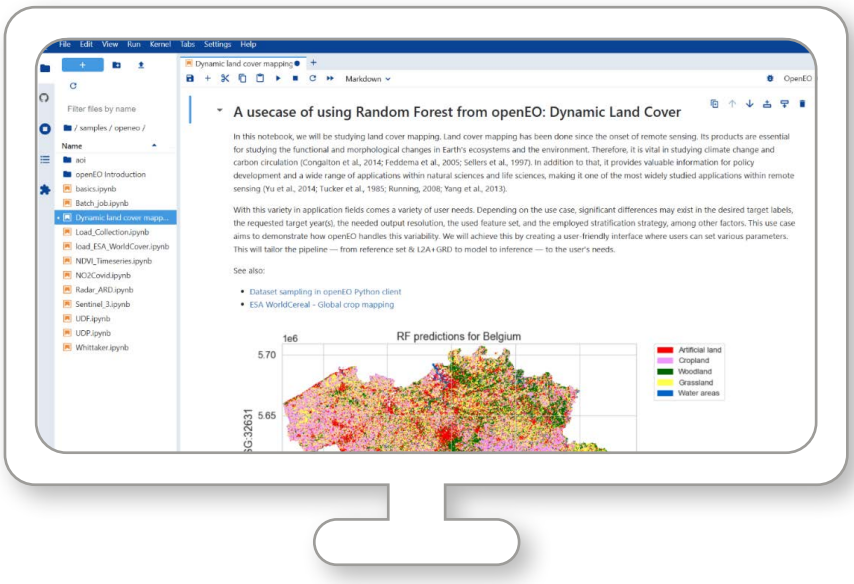
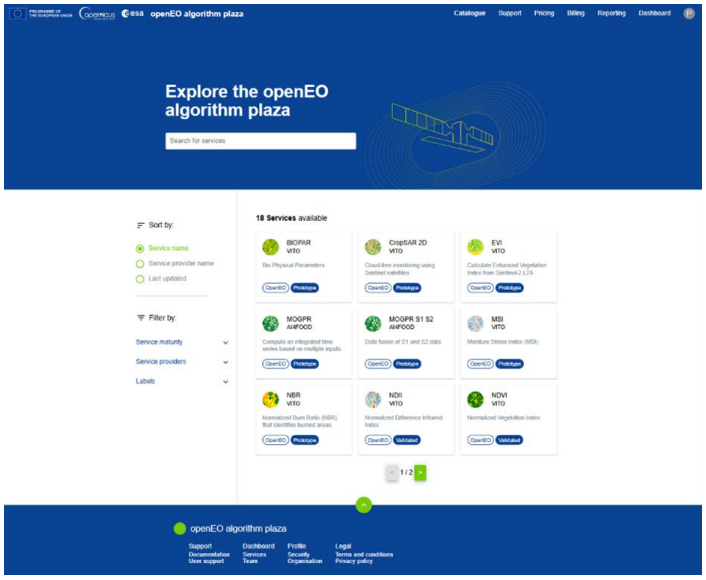


FIGURE 70: Performing Dynamic Land Cover Mapping using openEO in Jupyter Notebook.

Reusable Workflows via openEO Algorithm Plaza

In an era of unprecedented availability of Earth Observation (EO) data, the CDSE plays a key role in bridging the gap between data accessibility and actionable insights. Despite the availability of freely accessible satellite data, widespread adoption of EO applications remains limited due to challenges in extracting meaningful information. Many EO-based projects struggle with non-repeatable, non-reusable workflows, mainly due to the lack of standardized, scalable solutions.



CDSE tackles these barriers by adopting common standards and patterns, most notably through openEO. openEO promotes the development of reusable workflows that are scalable and transferable. The openEO Algorithm Plaza is a marketplace within the CDSE that allows users to discover and share different EO algorithms expressed as openEO process graphs. openEO Algorithm Plaza offers a wide range of services in Earth Observation. These services support algorithms ranging from simple computations like the Normalized Difference Vegetation Index (NDVI) to more complex algorithms that utilize machine learning and multiple parameters. In addition to providing existing services, the marketplace also supports users in showcasing their algorithms as services in its catalogue. While some new services have been added to the catalogue, others have been updated to support the latest features implemented using openEO.

FIGURE 71: openEO Algorithm Plaza in the Copernicus Data Space Ecosystem.

OpenEO web editor

The web editor is a user-friendly interface for creating block-style workflows. It provides an overview of available datasets and processes (Figure 72). Users can also easily monitor the status of their processing workflows using the web editor. It simplifies the workflow creation process by allowing users to drag and drop elements, making it accessible even to those who are not familiar with programming.

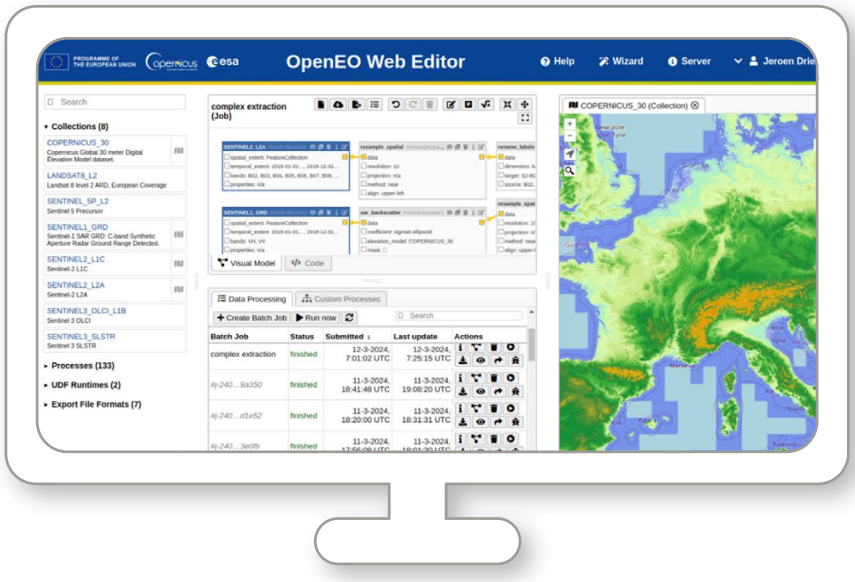


FIGURE 72: openEO web editor view.

Executing openEO processing workflows are linked to credits deduction, which is determined by factors like CPU usage, memory usage, and storage. Furthermore, if a workflow integrates services from the openEO Algorithm Plaza labelled as validated, verified, or operational, there may be additional costs.

In the CDSE, each user is granted 10,000 free credits, which are replenished monthly. However, users can also request additional credits through ESA's Network of Resources, or purchase them through services like CREODIAS.

Usage statistics

The target audience for openEO users encompasses individual data scientists and researchers to software developers and engineers, operating in a wide range of different thematic areas. The statistics shown here represent jobs that are submitted via the openEO API, but one job submitted can represent a single pixel, but also continental scale processing and everything in between. Within the range of the free-tier credits, a typical use case is the application of models and algorithms on a smaller local scale with batch jobs. Only after thorough finetuning and iterations to their models, scale up is typically done in larger scale projects.

Usage statistics for all request types in openEO show a steady increase from January 2024 onwards (following the June 2023 release). The increase seems to continue at a relatively constant rate in the first months of 2024, with expected seasonal variations for this type of service.

As the service is relatively new, there is not yet a large amount of repeated usage from operational processing workflows. Most organisations do need time to adopt these new technologies in their projects and usually start at smaller scale.

Figure 73 and Figure 75 show the evolution over time of batch jobs and total requests. Batch jobs are used for heavier work, such as larger regions of interest, longer time series and more intensive processing. The total number of requests gives a general indication of usage but is not necessarily comparable across different types of services. In openEO, most of the work is performed via batch jobs, which require a limited number of requests to operate.

It was also observed that the number of unique users increased month after month, leading to a total of 2,122 unique users by the end of 2024. It is likely, therefore, that the higher number of batch jobs (Figure 73) seen towards end of the year is mainly attributable to the higher number of users (Figure 74) there were by the end of the year.

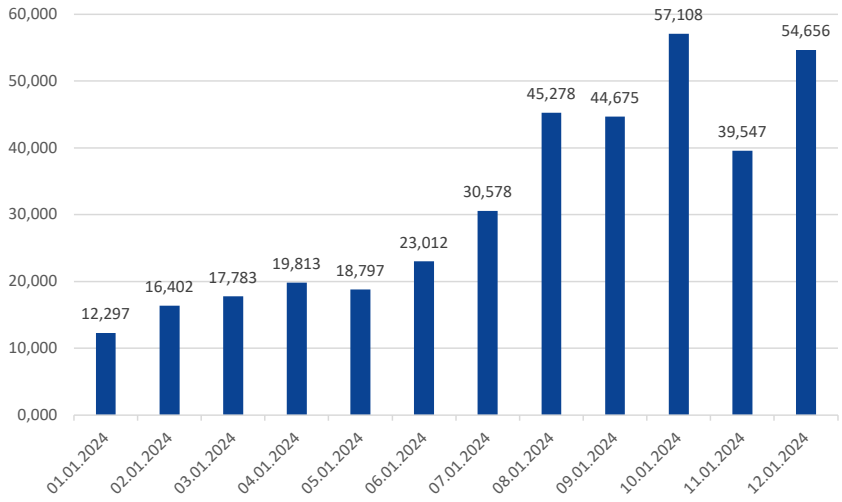


FIGURE 73: Trend of monthly openEO batch jobs in 2024.

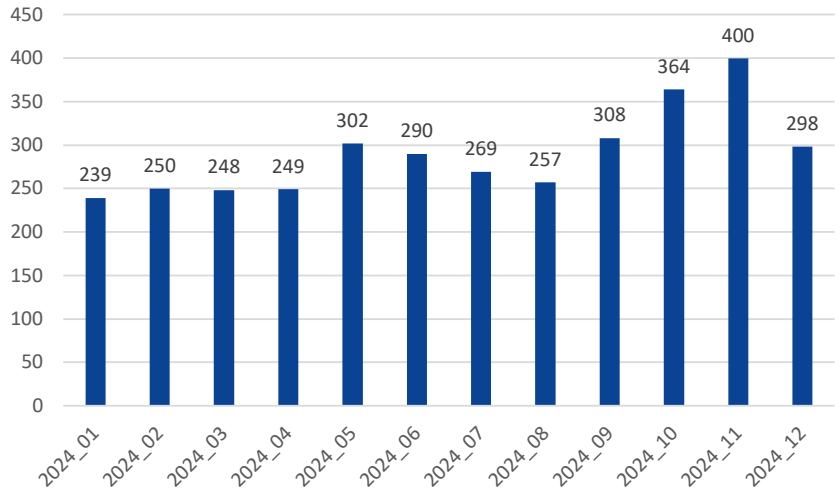


FIGURE 74: Trend of monthly openEO batch job users in 2024.

FIGURE 75: Total openEO requests for the year of 2024.

openEO outlook for 2025

In 2024, the first global scale mapping projects are expected to perform their operational processing using the openEO service. In addition to that, several smaller scale projects will implement their workflows on top of openEO, increasing the variety of demonstrated use cases that are enabled by this platform. These projects will be driving the integration of new features and datasets, next to requests made by other users.

One usage pattern that influenced the CDSE roadmap is users generating datasets of multiple gigabytes in the netCDF format. While this was not entirely expected, we recognize that openEO offers a unique capability to generate such files, which are often more convenient to work with compared to the original data. Therefore, we have been making various improvements to stretch those size limits.

Another example is improved support for classification pipelines, using a variety of methods. These capabilities will be taken to a level where they are usable for operational global processing cases. Next to new features, ensuring the operational stability will remain a big focus of the openEO team.

In 2024, the openEO team also aims to start building an openEO based federation as part of the CDSE. The openEO standard has unique capabilities for federated processing, allowing the user to benefit from datasets and processing capacity that is available in multiple platforms.

To kick off this initiative, the team will start with the integration of the TerraScope platform. This integration will enable CDSE openEO users to effortlessly access TerraScope datasets, including but not limited to PROBA-V.

The team also dedicated efforts to supporting the user onboarding. These efforts have resulted in user-friendly videos and guides to help individuals in getting started with openEO. These resources walk users through basic aspects, such as using the openEO Python library, creating and executing algorithms using a web editor, and exploring the openEO Algorithm Plaza. Furthermore, the online documentation portal has been extended with examples illustrating how openEO can be used for various Earth Observation applications, ranging from basic (indices computation) to advanced (machine learning). As we continue to enhance our offerings, we anticipate more videos and examples to be added over time.

The openEO tutorials can be accessed on YouTube here:

Authenticate your account using openEO API (Python)

Introduction to openEO Algorithm Plaza

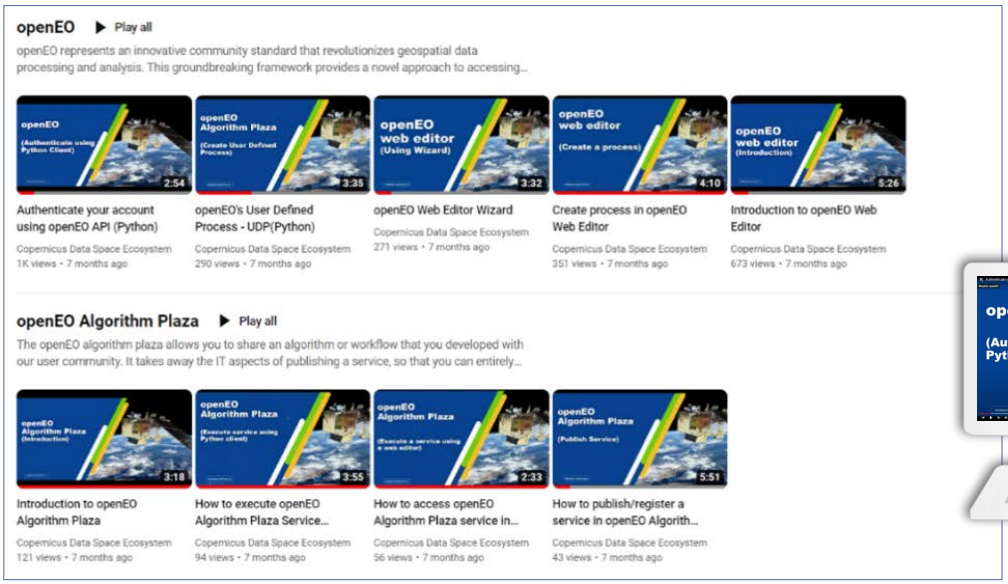


FIGURE 76: Overview of openEO tutorials on YouTube.

8 USER ACTIVITY

In the previous sections we presented the number of registered users, related data download and service usage. In this section, we present a more detailed analysis of user activities and trends in service usage.

8.1. Visitor trends

The Copernicus Browser experienced 3.7 million visitors throughout 2024, and this culminated in 8.1 million views. Figure 77 clearly shows the steady increase in activity as more and more users find out about CDSE.

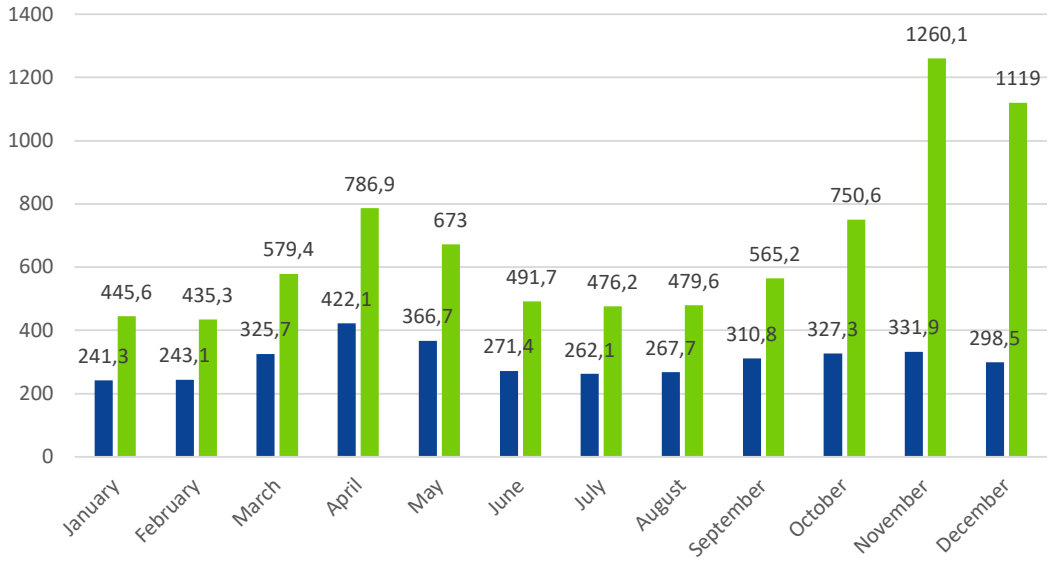


FIGURE 77: Growth of Copernicus Browser visitors (lower line) and views (upper line) in 2024

Figure 78 breaks this activity on the Copernicus Browser down by continent. It is evident that Europe consistently led in user numbers throughout 2024, with a sharp peak in April and a second, smaller increase in the autumn months. Asia followed a similar trend, with steady growth early in the year, a dip in summer, and recovery in the final quarter. North America and South America (grouped with Antarctica) showed more modest yet stable usage across the year, without any dramatic surges. European usage remained dominant, and the year ended with steady participation from all continents.

3 Visitor is defined, per web analytics service, as „unique person, who's visited a site"; due to privacy reasons service is resetting how they determine a visitor every 24 hours.

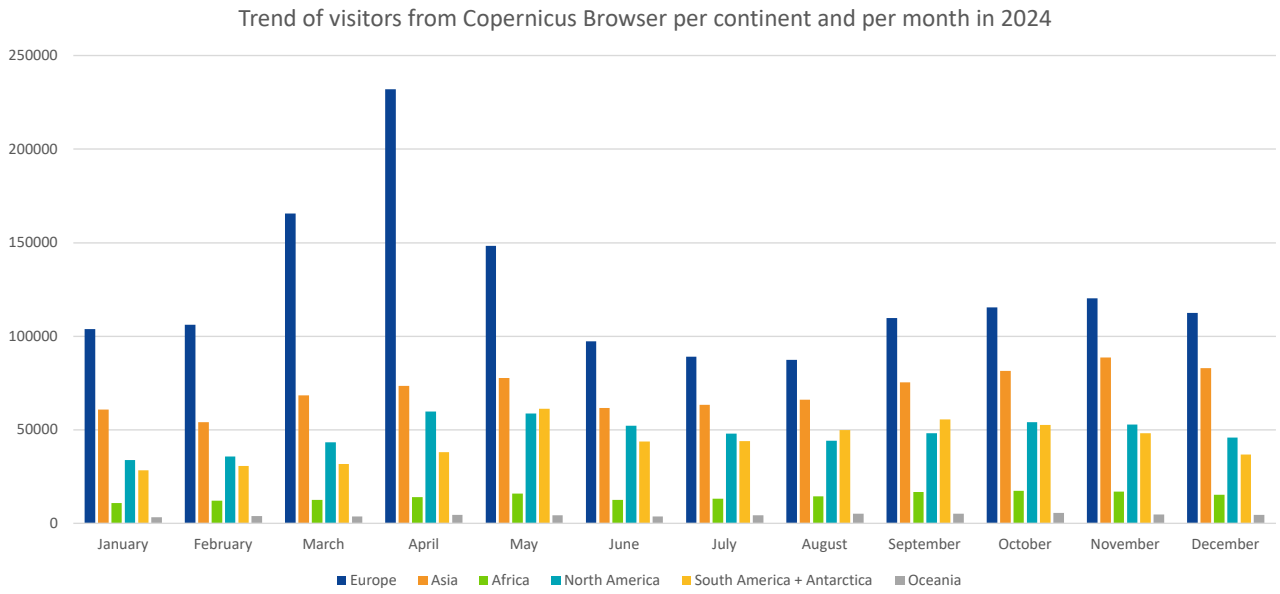


FIGURE 78: Trend of visitors per continent and per month in 2024.

Month	Europe	Asia	Africa	North America	South America + Antarctica	Oceania
January	103,796	60,912	10,910	33,925	28,486	3,423
February	106,273	54,054	12,154	35,828	30,832	3,947
March	165,672	68,415	12,715	43,464	31,799	3,803
April	231,990	73,485	13,990	59,818	38,222	4,651
May	148,295	77,729	16,082	58,876	61,253	4,455
June	97,326	61,795	12,528	52,188	43,782	3,698
July	89,096	63,504	13,157	48,023	44,075	4,300
August	87,361	66,067	14,553	44,336	50,019	5,204
September	109,791	75,359	16,863	48,317	55,573	5,142
October	115,515	81,564	17,393	54,229	52,650	5,645
November	120,309	88,758	16,985	52,802	48,213	4,779
December	112,477	83,106	15,337	45,995	36,882	4,642

TABLE 21: Trend of Copernicus Browser visitors per continent and per month in 2024.

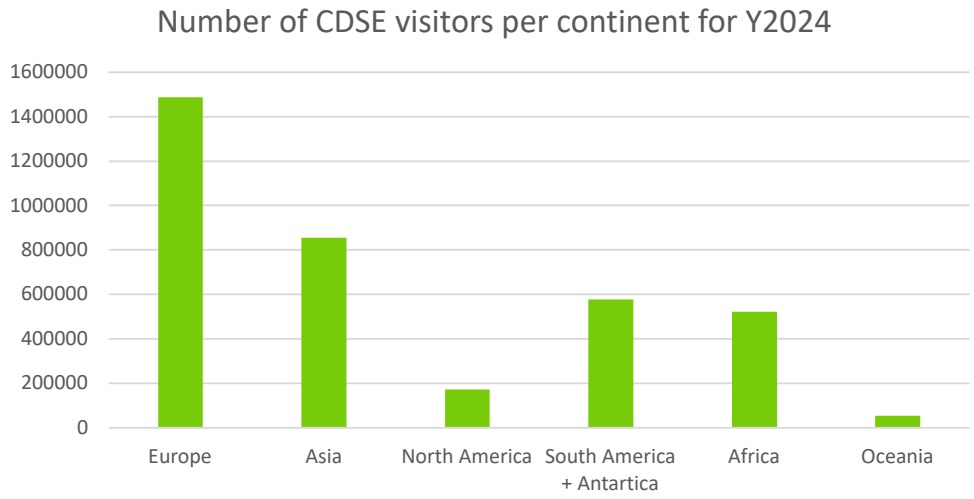


FIGURE 79: Total visitors per continent in 2024

8.2. User download profiles

This section provides an overview of the user download profile, illustrating how frequently users retrieved Sentinel mission data throughout 2024. By grouping users based on the number of downloads, the analysis highlights different patterns of data access, engagement across missions, and user distribution in each category range. Table 22 summarizes the number of users grouped by mission and download range. Each range corresponds to how many times a single user downloaded a data package during the year.

The distribution shows a wide spectrum of user activity – from occasional users (1–9 downloads), through moderately active users (10–100 and 100–1,000 downloads), to the most intensive users (over 1,000 downloads). As in previous years, Sentinel-2 remains the most widely accessed mission by far, with 3,029 users in the 1–9 range, 28,951 users in the 10–100 range, 24,486 users downloading over 1,000 data packages, and nearly 60,000 users in the 100–1,000 range. This accounts for over 51% of all users within the Sentinel-2 group. Such high figures reflect the strong demand for Sentinel-2 datasets, especially among operational users, institutions, and automated systems.

The year 2024 marked a substantial increase in download activity compared to the July–December period of 2023, particularly for Sentinel-2. In 2023, only 741 users reached the threshold of more than 1,000 downloads. In 2024, that number rose sharply to 24,486 – a 33-fold increase. Similarly, the 100–1,000 download range saw even higher rise from 1,343 to 59,458 users – which is more then 48 times higher – indicating a significant shift toward higher download volumes. This remarkable growth likely reflects an increased reliance on automated workflows, an expansion of institutional use, or a greater familiarity with the CDSE platform among active users.

For Sentinel-1 and Sentinel-3, most users fell into the 10–100 and 100–1,000 ranges, indicating steady, mid-volume usage patterns. Sentinel-1, in particular, had a notable increase in high-volume users: 4,514 users downloaded more than 1,000 products in 2024, compared to only 124 in the second half of 2023 – a 36-fold increase. Sentinel-5P shows a consistent usage profile compared to 2023, with the majority of users still falling within the 1–9 download range. The number of users in this category grew significantly, rising from 754 in July–December 2023 to 2,214 in 2024. It is also important to note that the number of users increased across all download ranges, marking continued expansion. Overall results confirm a dynamic and evolving user base with diverse access patterns, including both exploratory and operational usage at large scale. (Figure 80)

Range	Collection			
	Sentinel-1	Sentinel-2	Sentinel-3	Sentinel-5P
1-9	1,117	3,029	684	2,214
10-100	12,288	28,951	2,906	856
100-	690	1,343	337	352
1,000	11,820	59,458	2,013	423
1,000+	4,514	24,486	1,401	792

TABLE 22: User download profile January-December 2024.

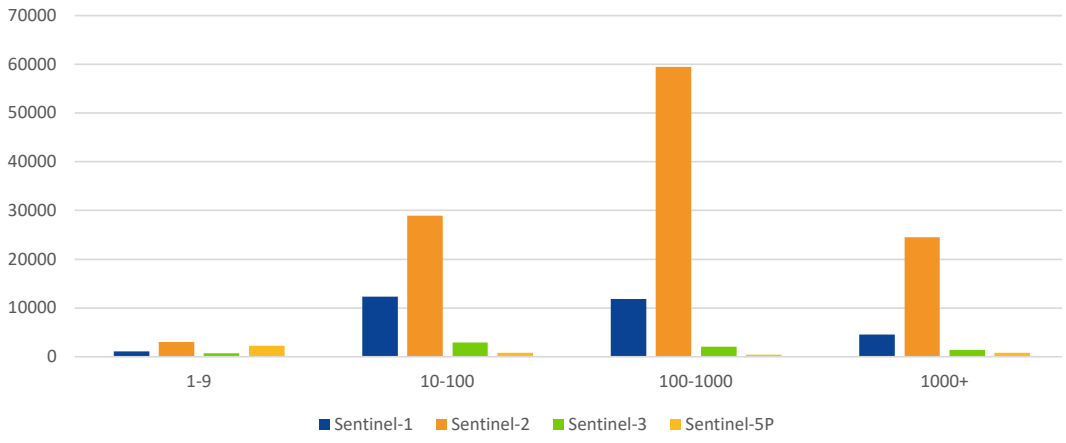


FIGURE 80: User download profile January-December 2024.

8.3. Monthly active users

Monthly active user statistics provide an overview of the number of unique users engaged in downloading Sentinel mission data throughout the year. The graph in Figure 81 presents the monthly count of active users per mission and illustrates access trends and fluctuations over the year that can be linked to both operational cycles and user preferences. Active users are defined as those who downloaded at least one user-level data from a given mission in a particular month.

Sentinel-2 continued to stand out as the most widely used mission in 2024, consistently attracting high user engagement month after month. October saw the highest activity, with over 22,000 active users, and in most other months the number stayed comfortably above 14,000. Compared to the latter half of 2023, this represents a clear rise – the previous peak was just over 15,000 users in November. On average, nearly 18,000 users accessed Sentinel-2 each month in 2024, which is almost 2.8 times more than the ~6,400 monthly users recorded last year.

Interest in Sentinel-1 picked up noticeably in 2024. Monthly active user numbers ranged from just under 4,000 in February to nearly 5,800 in November, averaging about 4,570 for the year. That's a big step up from 2023, when the monthly average during the second half was only around 1,700.

Usage of Sentinel-3 and Sentinel-5P followed more stable patterns, maintaining steady engagement across the year. For Sentinel-3, monthly users ranged from just over 1,000 to nearly 1,400, averaging around 1,217 – more than double the July–December 2023 average. Similarly, Sentinel-5P attracted between 755 and 981 users each month, with an annual average of 825 – nearly 2.8 times more than the previous year's figure.

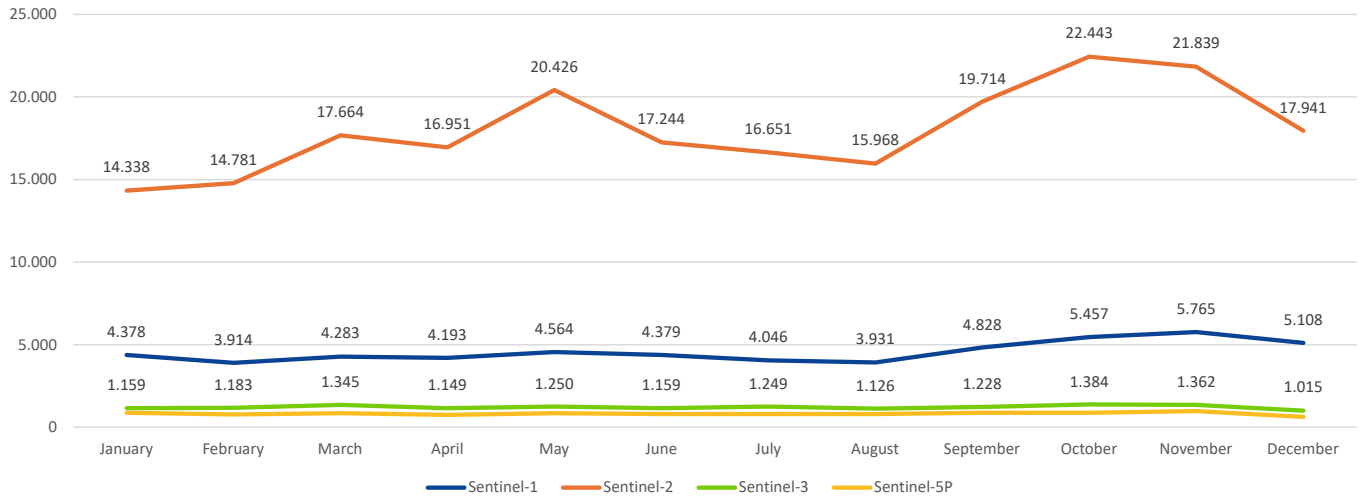


FIGURE 81: Active users' trend per mission in 2024.

8.4. Monthly users per continent and country

This chapter undertakes an analysis of the geographical distribution of active users in 2024, with a focus on the identification of usage patterns across continents and countries. The collected statistics are based on self-declared information provided by users during the registration phase, which includes details such as country, thematic domain, and intended data usage. Since this information is not actively verified, the accuracy of the presented data depends on user input. Additionally, it is important to note that the number of active users does not reflect the volume of data downloaded. For example, a user who downloaded one data package is counted the same as a user who downloaded thousands of packages.

The global reach of the CDSE platform became even more evident in 2024, as usage surged across all continents. Asia stood out as the most active region, with 61,913 users engaging with the CDSE platform – more than double the 28,623 reported in 2023 (**116% increase)**. Europe followed with 43,253 users, showing a strong rise from 26,368 the year before (64% increase). South America and Antarctica also experienced significant growth, with usage climbing from 10,586 to 23,193 users (**119% increase**). Africa nearly doubled its numbers, reaching 11,587 users compared to 6,305 in 2023 (84% increase). North America showed moderate growth, rising from 11,845 to 15,143 users (**28% increase**). Even Oceania saw an uptick, from 1,176 to 1,844 users (**57% increase)** (Figure 82). These results clearly highlight the platform's expanding worldwide presence and growing importance across both well-established and emerging regions.

At the global country level, China remained the leading country in terms of active users across all Sentinel missions in 2024. For Sentinel-1, China registered 5,205 users, maintaining its top position from 2023. India climbed the ranks to second place (+1 rank), surpassing the United States, which dropped to fourth place (-2 ranks). Indonesia's user base grew significantly, pushing it into third place (+4 ranks). European nations remained steady contributors, with Germany (no change), Italy (-2 ranks), and France (-1 rank) firmly holding positions in the top 10. (Table 23)

For Sentinel-2, China again held the lead with 12,761 users, followed by India (8,539, no change), Brazil (7,432, +2 ranks), and Indonesia (7,208, no change). The United States dropped to fifth position (-2 ranks), despite still maintaining a considerable user base of 5,096. Spain, Germany, and Italy maintained stable rankings (no change), while Colombia moved up one position, and Mexico entered the top 10 as a newcomer. (Table 24)

In the case of the global ranking for Sentinel-3, China surpassed the United States to take the top spot with 1,019 users (+1 rank). India showed the most significant upward movement, climbing from seventh to third place (+4 ranks). Other countries such as Italy (-1 rank), Germany (no change), Spain (no change), and France (-2 ranks) continued to occupy top positions, while Indonesia entered the global top 10 for the first time. (Table 25)

Sentinel-5P showed similar dynamics. China led the list again with 804 users (no change), followed by the United States with 447 users (no change) and India with 366 users (+1 rank). Italy dropped one spot (-1 rank) to fourth, while Germany climbed two positions (+2 ranks), the same as Brazil (+2 ranks). Indonesia and the Netherlands also made the top 10. (Table 26)

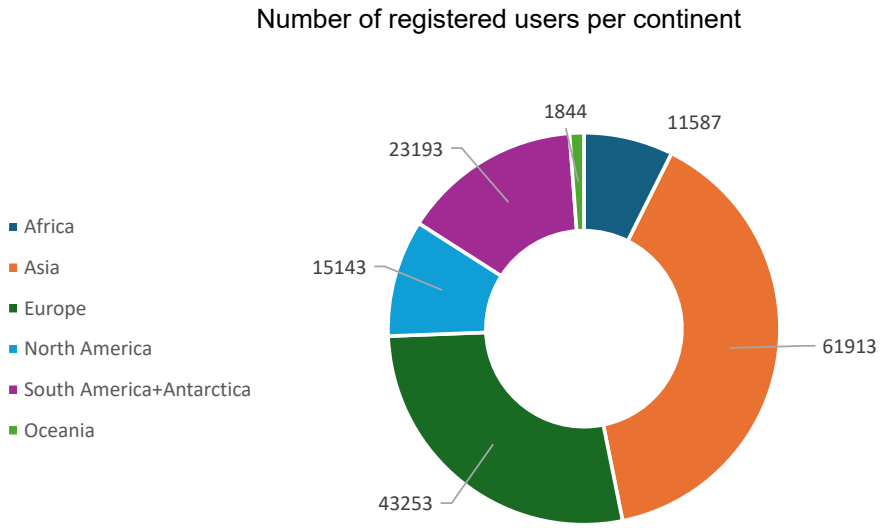


FIGURE 82: CDSE active users per continent for 2024.

Sentinel-1 Global			
Country	**Active Users 2024**	**Ranking 2023**	**Change**
China	5,205	1	0
India	2,744	3	+1
Indonesia	1,530	7	+4
United States	1,451	2	-2
Germany	1,103	5	0
Italy	1,017	4	-2
France	916	6	-1
Spain	699	8	0
Brazil	694	9	0
Japan	667	N/A	N/A

TABLE 23: Top 10 countries in the world by number of active Sentinel-1 users, and comparison of rankings in 2024 versus 2023.

Sentinel-2 Global			
Country	**Active Users 2024**	**Ranking 2023**	**Change**
China	12,761	1	0
India	8,539	2	0
Brazil	7,432	5	+2
Indonesia	7,208	4	0
United States	5,096	3	-2
Spain	4,069	6	0
Germany	3,844	7	0
Italy	3,453	8	0
Colombia	3,385	10	+1
Mexico	2,923	N/A	N/A

TABLE 24: Top 10 countries in the world by number of active Sentinel-2 users, and comparison of rankings in 2024 versus 2023.

Sentinel-3 Global			
Country	**Active Users 2024**	**Ranking 2023**	**Change**
China	1,019	2	+1
United States	537	1	-1
India	434	7	+4
Italy	382	3	-1
Germany	359	5	0
Spain	356	6	0
France	332	4	-2
United Kingdom	197	9	+1
Brazil	186	10	+1
Indonesia	176	N/A	N/A

TABLE 25: Top 10 countries in the world by number of active Sentinel-3 users, and comparison of rankings in 2024 versus 2023.

Sentinel-5P Global			
Country	**Active Users 2024**	**Ranking 2023**	**Change**
China	804	1	0
United States	447	2	0
India	366	4	+1
Italy	181	3	-1
Germany	154	7	+2
Indonesia	147	N/A	N/A
France	146	5	-2
Brazil	95	10	+2
United Kingdom	95	9	0
Netherlands	90	N/A	N/A

TABLE 26: Top 10 countries in the world by number of active Sentinel-5P users, and comparison of rankings in 2024 versus 2023.

In the context of ESA/EU countries, Germany topped the Sentinel-1 rankings in 2024 with 1,103 users, overtaking Italy (1,017, -1 rank). France (no change), Spain (no change), and the United Kingdom (no change) maintained their positions in the top five. Romania newly entered the top 10, while the Netherlands dropped two spots. (Table 27)

For Sentinel-2, the ranking remained largely stable. Spain held the top spot with 4,069 users, followed by Germany (3,844), Italy (3,453), and France (2,678) — all with unchanged rankings. Poland remained in sixth place, ahead of Canada (+1 rank) and Greece (-1 rank). The Netherlands and Portugal maintained their positions. (Table 28)

In the Sentinel-3 standings, Italy (382, no change), Germany (359, +1 rank), and Spain (356, +1 rank) led, while France dropped two spots to fourth place (-2 ranks). The United Kingdom and Poland each dropped one spot, while Romania joined the list as a new entry. (Table 29)

For Sentinel-5P, Italy was the leading ESA/EU country with 181 users (no change), followed by Germany (154, +2 ranks) and France (146, -1 rank). Poland saw the biggest drop, falling from third to sixth place (-3 ranks), while the United Kingdom (+2 ranks) and the Netherlands (+2 ranks) recorded gains, and Portugal (new entry) appeared as a new entry. (Table 30)

In summary, the geographical breakdown confirms the dominant role of Asian countries, especially China and India, in accessing Copernicus data. Meanwhile, Europe remains heavily engaged, particularly among ESA/EU countries, where multiple nations consistently appear across all missions.

Sentinel-1 EU/ESA			
Country	**Active Users 2024**	**Ranking 2023**	**Change**
Germany	1,103	2	+1
Italy	1,017	1	-1
France	916	3	0
Spain	699	4	0
United Kingdom	632	5	0
Poland	579	6	0
Canada	434	7	0
Romania	354	N/A	N/A
Greece	316	9	0
Netherlands	281	8	-2

TABLE 27: Top 10 ESA/EU countries by number of active Sentinel-1 users, comparing rankings in 2024 versus 2023.

Sentinel-2 EU/ESA			
Country	**Active Users 2024**	**Ranking 2023**	**Change**
Spain	4,069	1	0
Germany	3,844	2	0
Italy	3,453	3	0
France	2,678	4	0
United Kingdom	2,142	5	0
Poland	2,126	6	0
Canada	1,888	8	+1
Greece	1,386	7	-1
Netherlands	1,101	9	0
Portugal	917	10	0

TABLE 28: Top 10 ESA/EU countries by number of active Sentinel-2 users, comparing rankings in 2024 versus 2023.

Sentinel-3 EU/ESA			
Country	**Active Users 2024**	**Ranking 2023**	**Change**
Italy	382	1	0
Germany	359	3	+1
Spain	356	4	+1
France	332	2	-2
United Kingdom	197	6	-1
Poland	139	5	-1
Greece	123	7	0
Canada	95	8	0
Netherlands	79	9	0
Romania	66	N/A	N/A

TABLE 29: Top 10 ESA/EU countries by number of active Sentinel-3 users, comparing rankings in 2024 versus 2023.

Sentinel-5P EU/ESA			
Country	**Active Users 2024**	**Ranking 2023**	**Change**
Italy	181	1	0
Germany	154	4	+2
France	146	2	-1
United Kingdom	95	6	+2
Netherlands	90	7	+2
Poland	90	3	-3
Spain	88	5	-2
Greece	51	9	+1
Canada	46	8	-1
Portugal	30	N/A	N/A

TABLE 30: Top 10 ESA/EU countries by number of active Sentinel-5P users, comparing rankings in 2024 versus 2023.

8.5. Users per declared uses and thematic domains

This section provides an overview of how CDSE users intend to use Sentinel data, based on self-declared information collected during the user registration process. Upon creating an account, users are prompted to specify their country, a thematic domain, a type of data use, and the type of user or organisation. These selections are made from predefined lists containing 17 thematic domains, 8 user/organisation types, and 8 usage types. Users are also allowed to update their profile preferences after registration if their scope of interest or professional context changes.

It is important to emphasize that the information provided is not subject to independent verification and reflects only the user's declaration at the time of registration or subsequent update of preferences in the profile. Moreover, each user is allowed to select only one thematic domain and one purpose of data use, even if their work spans multiple domains or purposes. As a result, the statistics in this section may not fully represent the complexity or breadth of real-world data used by individual users or organisation.

Additionally, users who selected „Other" as their thematic domain, type of user, or purpose of data use are excluded from the analyses and visualizations presented in this chapter. While this limitation reduces the statistical representativeness of a small subset of accounts, it ensures consistency in reporting and comparability across defined categories. Despite these constraints, the declared data continues to offer valuable insights into how different sectors and communities around the world engage with Sentinel data.

Thematic domain	# of active users	% of active users
Air quality and atmospheric composition	2,260	2%
Arctic policy and polar areas	503	0%
Civil protection and humanitarian aid operations	1,540	1%
Climate Change	13,064	12%
Energy	1,497	1%
Environmental compliance	10,624	10%
Health	523	0%
International development and cooperation	428	0%
Land	39,812	37%
Marine environment, maritime affairs and fisheries	7,931	7%
Migration and home affairs	166	0%
Raw materials	901	1%
Research and innovation	26,005	24%
Security	766	1%
Tourism	747	1%
Transport	696	1%

TABLE 31: Number and percentage of CDSE active users per thematic domain in 2024.

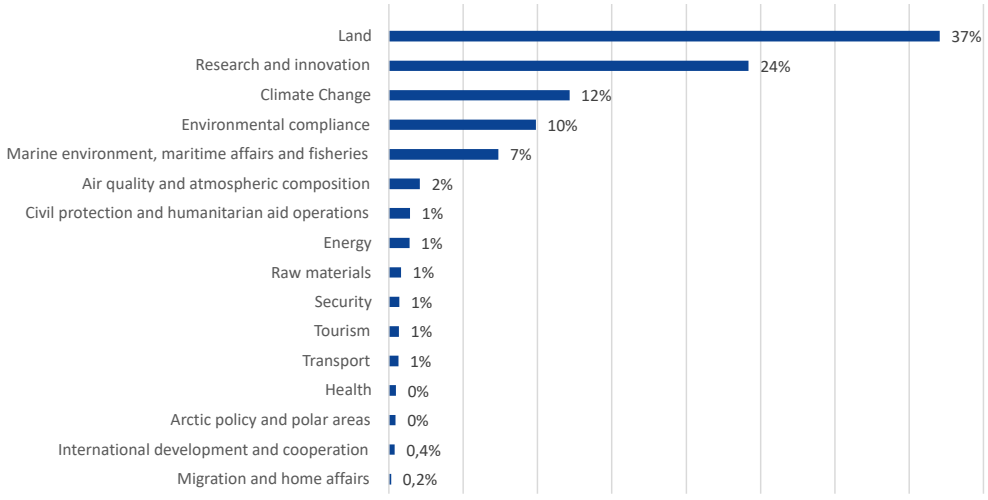


FIGURE 83: Percentage of CDSE active users per thematic domains.

In 2024, the thematic distribution of active CDSE users showed clear and consistent growth compared to the second half of 2023. Not only did the number of users increase across all domains, but several key categories also saw an increase in percentage share. The most prominent areas were Land, Research and innovation, Climate Change, Environmental compliance, and Marine environment, maritime affairs and fisheries. For instance, Land reached 39,812 users (up from 9,836), with its share increasing from 33% to 37%. Research and innovation expanded from 5,451 to 26,005 users, raising its share from 19% to 24%. Climate Change grew from 2,771 to 13,064 users (9% to 12%), and Environmental compliance jumped from 2,369 to 10,624 (8% to 10%). The marine-related category also saw significant growth, from 1,956 to 7,931 users, maintaining a stable 7% share. (Table 31 and Figure 83)

Altogether, these five thematic areas made up 90% of the user base in 2024, compared to 76% a year earlier, suggesting a significant concentration of user interest in environmental and scientific themes. In contrast, other thematic areas remained steady, mostly holding between 1% and 2%, with no major shifts in their user share. The ‚Other' category, which accounted for 16% share in 2023, was excluded from this year's breakdown to provide a more accurate representation of user interests. (Table 31 and Figure 83)

The number of downloads per Sentinel mission within each category provides a complementary view of thematic activity and reveals additional patterns. Land and Research and innovation were again the top domains. However, despite having 13% fewer users, the Research community downloaded more Sentinel-2 data than Land users did (672 million vs. 568 million). Other small user groups also stood out. The Climate Change (2% users) sector generated over 263 million downloads, primarily from Sentinel-3 (145 million) and Sentinel-2 (102 million). Similarly, the Energy (1% users) and Air and atmospheric composition (2% users) domains accounted for over 72 and 91 million downloads, respectively, underscoring highly intensive data usage. (Table 32) Such unusual observation reinforces the finding that high data consumption is not always tied to the size of the user base.

Thematic activity	Sentinel-1	Sentinel-2	Sentinel-3	Sentinel-5P
Air quality and atmospheric composition	709,564	16,875,103	44,198,810	29,808,244
Arctic policy and polar areas	833,926	1,451,831	1,728,544	835
Civil protection and humanitarian aid operations	4,052,011	5,898,307	396,012	242
Climate Change	11,443,004	102,776,489	145,320,952	3,681,265
Energy	55,685,628	14,864,692	1,887,322	168,170
Environmental compliance	2,786,059	27,955,116	823,493	3,581,218
Health	88,108	2,703,186	225,420	7,248
International development and cooperation	1,052,412	5,304,793	463,375	18,255
Land	21,885,998	568,695,751	88,630,379	3,558,937
Marine environment, maritime affairs and fisheries	62,220,133	109,195,262	17,705,966	66,800
Migration and home affairs	34,132	563,168	1,211	2,148
Raw materials	111,718	4,767,462	6,527,538	8,755
Research and innovation	77,095,059	672,794,387	93,559,917	11,446,562
Security	953,311	6,848,912	6,437	38,838
Tourism	323,332	9,244,554	614,389	597
Transport	370,707	2,173,305	2,940	38,155

TABLE 32: Number of downloads performed for Sentinels -1, -2, -3 and -5P for each thematic domain during 2024.

The 2024 breakdown of the percentage of active users by user-declared organisation type shows a strong and growing concentration in two groups: Research & education organisations and Natural persons – personal interest. The former group accounted for 63.5% of all users (up from 55% in 2023), confirming their dominant role in the CDSE and reflecting the academic and scientific communities' increased reliance on satellite data. The percentage of people using the platform for personal interest increased moderately, from 16% to 20.2%, suggesting growing public awareness and accessibility of Earth observation data. Both groups combined make up 83.7% alone of all active users, a rise from 71% in the previous year. The shares of other groups, such as public authorities, businesses, charities and NGOs, remained stable, with changes of less than 1%-point year-on-year. (Figure 84)

The closer look at download patterns reveals several notable shifts. Sentinel-2 usage increased significantly in 2024, with the largest contributions coming from three distinct user types. Research organisations saw a sharp rise in their share of Sentinel-2 downloads – from 2.4% in 2023 (1.21 million downloads) to 19% in 2024 (1.25 billion downloads). International public organisations also played a major role, accounting for 28.9% of Sentinel-2 downloads (nearly 1.9 billion), compared to 43% the year before (21.9 million), reflecting a massive increase in absolute terms. Meanwhile, large commercial users (non-SMEs) expanded their share from 7% (3.58 million) to 20.4% (1.35 billion), pointing to increased integration of EO data in business workflows. Overall, Sentinel-2 accounted for 86.1% of all downloads across all user type groups, up from 77.2% in 2023, highlighting its central role in CDSE activity. (Figure 85)

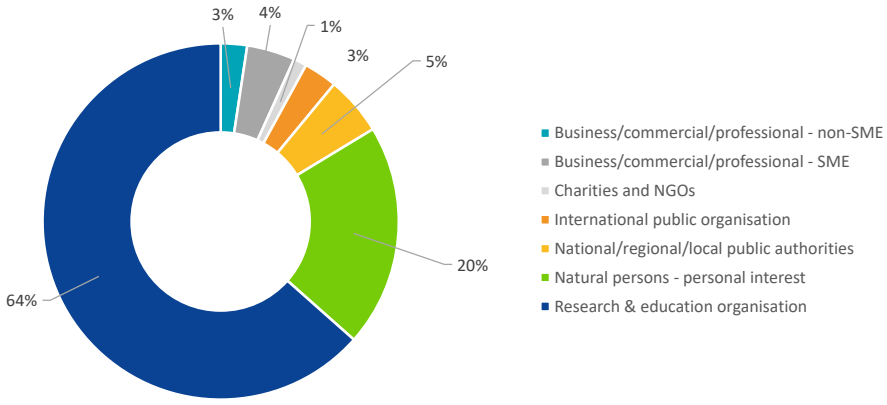


FIGURE 84: Percentage of CDSE active users per user type in 2024.

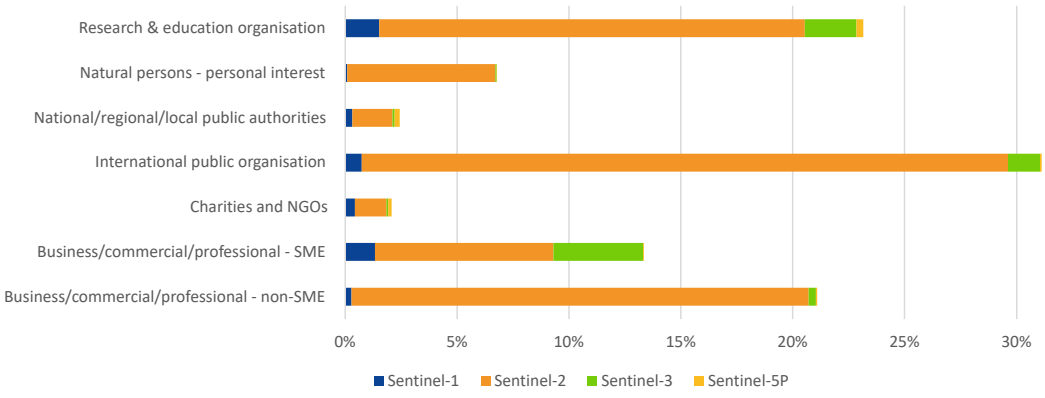


FIGURE 85: Percentage of downloads performed for Sentinels 1, 2, 3, and 5P for each type of user during 2024.

In 2024, the purpose-based distribution of active CDSE users confirmed the continued strong presence of educational and research activities. Users declaring education as their main purpose made up nearly half of the user base (49%), up from 41% the year before. The percentage of research users remained high and stable at 35%, only slightly down from 36%. Together, these two groups represented a significant 84% of all active users in 2024, up from 77% in 2023, thereby reinforcing the platform's scientific and educational role. (Table 33 and Figure 86)

The percentage breakdown of downloaded data by purpose across Sentinel missions further confirms a major focus on research, which contributed 61.1% (1.29 billion) of all downloads, compared to just 9.4% (3.5 million). in 2023. The business sector also saw a notable increase, with 16.9% (358 million) of total downloads, up from 6.6% (2.45 million) the year before. Education followed, generating 9.2% (195 million) of downloads, a significant rise from 0.8% (293 thousand). Public sector entities accounted for 7.4% (157 million), which was nearly identical to their previous share of 6.7% (2.5 million). Meanwhile, charities and NGOs increased their share from 0.5% (192 thousand) to 3.4% (72 million), and individuals using the data for non-commercial purposes contributed 1.7% (36.6 million), up from 0.3% (101 thousand).

Media-related downloads remained consistently low at 0.2% (4 million), like the previous year. It is important to note that the „other" category, which accounted for the majority of downloads in 2023 (75.8%, 28.4 million), was excluded from this year's statistics to provide clearer insight into user activity. (Figure 87)

Domain	# of active users	% of active users
Businesses sector	4,317	3%
Charities and NGOs	994	1%
Education	60,434	49%
Media and public relations purposes	363	0%
Natural persons for non-commercial purposes	7,017	6%
Public sector	7,291	6%
Research	43,435	35%

TABLE 33: Number and percentage of CDSE active users per purpose of use in 2024.

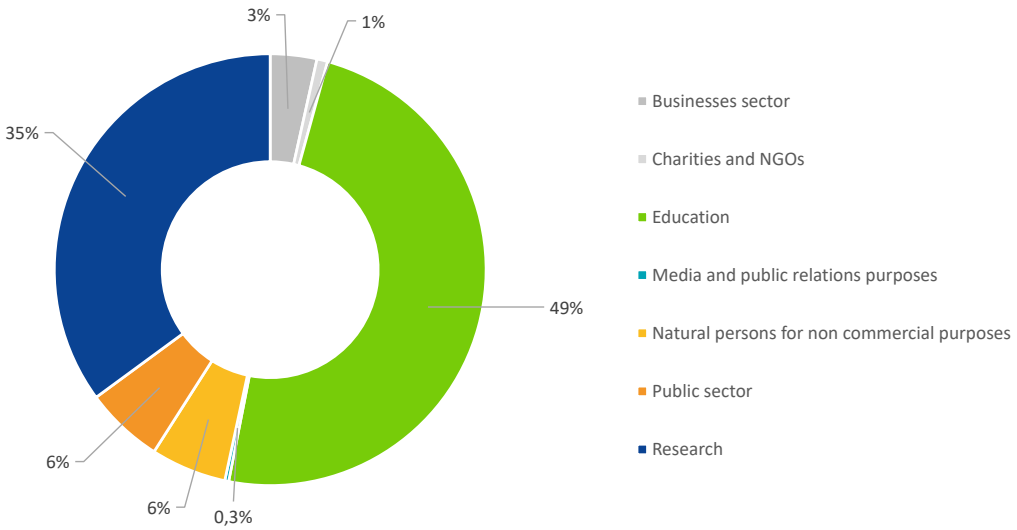


FIGURE 86: Percentage of CDSE active users per purpose of use in 2024.

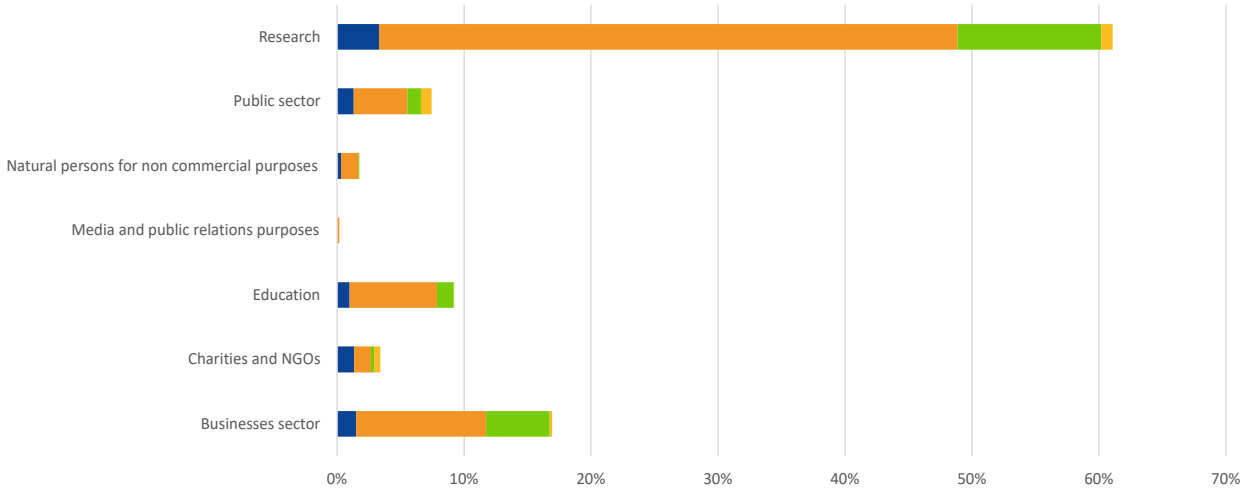


FIGURE 87: Percentage of downloads performed for Sentinels 1, 2, 3, and 5P for each purpose of use during 2024.

9 COLLABORATIVE AND INTERNATIONAL PARTNERS

This Chapter covers the re-distribution activities of the ESA/EU Collaborative Ground Segments and the International Partners.

9.1. Collaborative Partners Dissemination

The access to Copernicus Sentinel data which ESA provides is complemented by an ever-growing number of national and commercial re-distributors which also provide online access to the data. These redistribution points include sites in the Member states of the EU/ESA which are provided in the framework of the Collaborative Ground Segment, and the sites which are provided by international partners in the framework of international agreements. Here below Table 34 set out the links to the Collaborative National Sites. Please note that the list may not be comprehensive, and the content of each site is outside the responsibility of ESA and the consortia managing the ESA data access systems.

It is also highlighted that each data dissemination partner follows its own strategy for the Copernicus Sentinel data it chooses to make available through its site, and the length of time for which it makes the data available. Some sites offer a complete mirror of all available data from one or more of the Sentinel missions, while others offer a very specific sub-set of user-level data types and/or coverages of particular geographical regions. The objectives of each site are not detailed here but the reader is invited to investigate each in detail via the URLs provided.

Category: Collaborative National Sites		Annual Report Section: 4.1
Category	**Partner**	**Access URL(s)**
Collaborative National Mirror Sites	Austria (x2)	https://data.sentinel.zamg.ac.at
		https://www.sentinel.zamg.ac.at
	Belgium	https://www.terrascope.be
	Czech Republic (x2)	https://dhr1.cesnet.cz
		https://dhr2.cesnet.cz
	Estonia	https://ehdatahub.maaamet.ee
	Finland	https://finhub.nsdc.fmi.fi
	France	https://peps.cnes.fr
	Germany	https://code-de.org/
	Greece	https://sentinels.space.noa.gr
	Hungary	https://fir.gov.hu/
	Luxembourg	http://www.lsa-datacenter.lu
	Norway	https://colhub.met.no
	Poland (x2)	https://copernicus.imgw.pl
		https:/dane.sat4envi.imgw.pl
	Romania	https://sentinels.rosa.ro/
	Sweden	https://digitalearth.se/
	UK-1 (x2)	https://www.ceda.ac.uk/
		https://jasmin.ac.uk/

TABLE 34: Collaborative National Mirror sites active during 2024.

9.1.1. Collaborative Ground Segment Agreements

ESA Member States and other Copernicus Participating States are complementing the exploitation of the Copernicus Sentinel missions and supporting the redistribution of Copernicus Sentinel data by establishing additional data access points and, in some cases, developing new user-level data. These national actors access the Sentinel Data from the CDSE directly, or in some cases from the legacy Data Hub service that has been ported to provide backward compatibility to prior interfaces by running within the CDSE cloud infrastructure. The national sites are part of the overall network known as the Collaborative Ground Segment (CollGS).

A total of 20 CollGS agreements had been signed with ESA by the end of 2024. Following the signature of an agreement, ESA passes a dedicated set of credentials to the national contact point to enable it to access the Sentinel Data. ESA also provides technical support to the national contact point to help it optimise its access to the data.

The CollGS partners provide information about the activity on their national sites via an annual questionnaire which ESA sends out. The statistics presented in this section are based on the 16 partners who both had active national initiatives during 2024 and who provided the requested information.

The figures presented in the following sections are based on data from the entire year of 2024 (up to 31/12/2024) as each data centre reported continued to operate throughout the full calendar year.

CollGS	Overall Number of Registered Users since Start of Operations	% Increase since Y2023	Number of Active Users in 2024	% of Registered Users who were active in 2024	Number of Users having accessed the service platform in 2024
Austria	2,144	3	10	0.5	72
Belgium	22,038	43	252	1	365
Czech Republic	965	15	123	13	30
Estonia	561	22	83	15	-
Finland	924	27	50	5	-
France	1,053	9	-	-	-
Germany	5,256	21	279	5	893
Greece	853	2	27	3	-
Hungary	17,458	15	736	4	-
Luxembourg	422	6	54	13	-
Norway	926	-	-	-	-
Poland	1,189	4	93	8	34
Romania	-	-	-	-	-
Sweden	60	20	-	-	100
UK-1	3,898	11	101	3	-

TABLE 35: Summary of active national Copernicus data centres.

Table 35 presents the data on the registered and active users on the national mirror sites, as reported in the annual questionnaires. In this table, and in subsequent figures and tables in the section, statistics are only shown for the CollGS partners which provided their reports, and if the statistics were not provided, this is shown as '-' .

Overall, there was an average growth in the number of users registered on CollGS sites of 7% with respect to 2023. Taking the mean average, roughly 6% of the users registered on the CollGS sites were active during 2024. These overall figures mask huge differences in the way users interact with the national sites, however, and while it is interesting to look at the statistics as a whole, the figures from each CollGS will necessarily be different, partly due to the different start dates for each site but also because partners can impose their own restrictions on registering and accessing the data: some of the CollGS are completely open to all types of users, while others are only open to a few selected users.

Usage Category

In many cases, the CollGS partners categorise their own users according to the same fields used by ESA. Figures 88 and 89 below show the percentage of registered users from each national mirror site assigned to each 'usage category' (research, commercial, education, other) and to each 'usage field' (specific field for which the data is used e.g. land, marine, atmosphere etc). In some cases, the partners do not always use this classification, but if they provided these figures provided in 2023, those values have been used as a reference for the following figures.

It is highlighted that these categories are selected by users when they first register for access to the national site, so the statistics mask any changes which might have occurred in the meantime in the purposes and applications for which users download the data.

Users which placed themselves in the 'Other' category constitute the largest group of users by the end of 2024, making 41% of the total (38% in 2023). The largest number of users categorising themselves as 'Other' is on Hungary's site , with 71% of its users choosing this category.

The 'Research' category accounts for 33% of all registered users across the sites. Greece leads this category, with over 90% of its users falling under 'Research'. Finland, Luxembourg, and Norway also have high proportions of their users who categorise themselves as 'Research', with 51% to 58% of their users having selected this category on registration. The 'Education' category represents 17% of the total user base. The Czech Republic has the highest proportion of users in this category, with 72% of its registered users classified under 'Education'.

9% of all registered users were those who chose the 'Commercial' category on registration. Germany had the highest proportion of registered users in this category (51%), followed by Luxemburg (16%).

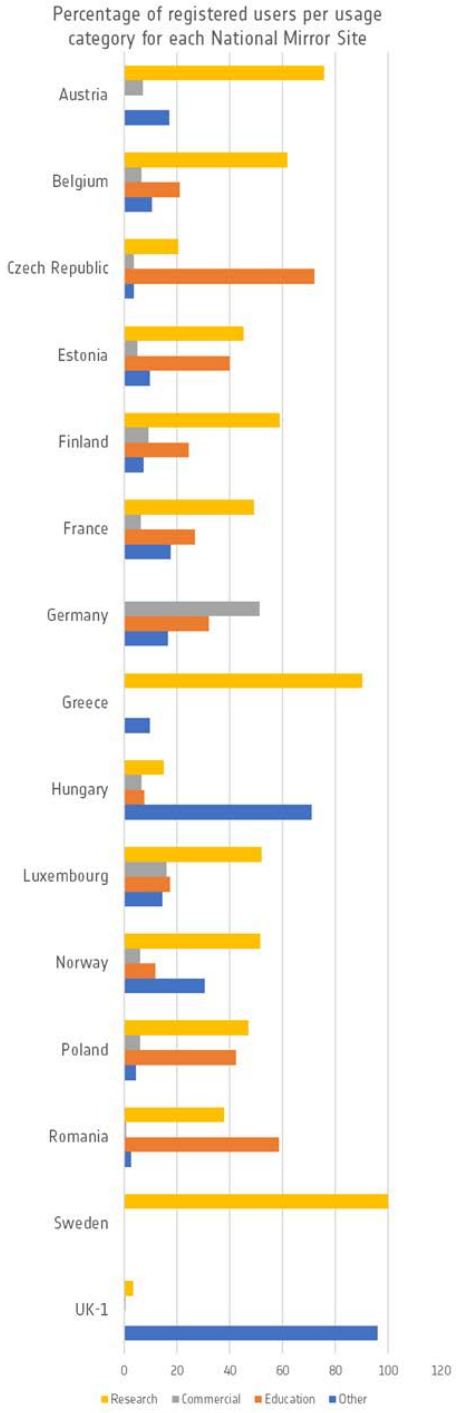


FIGURE 88: Percentage distribution of mirror site users by usage category.

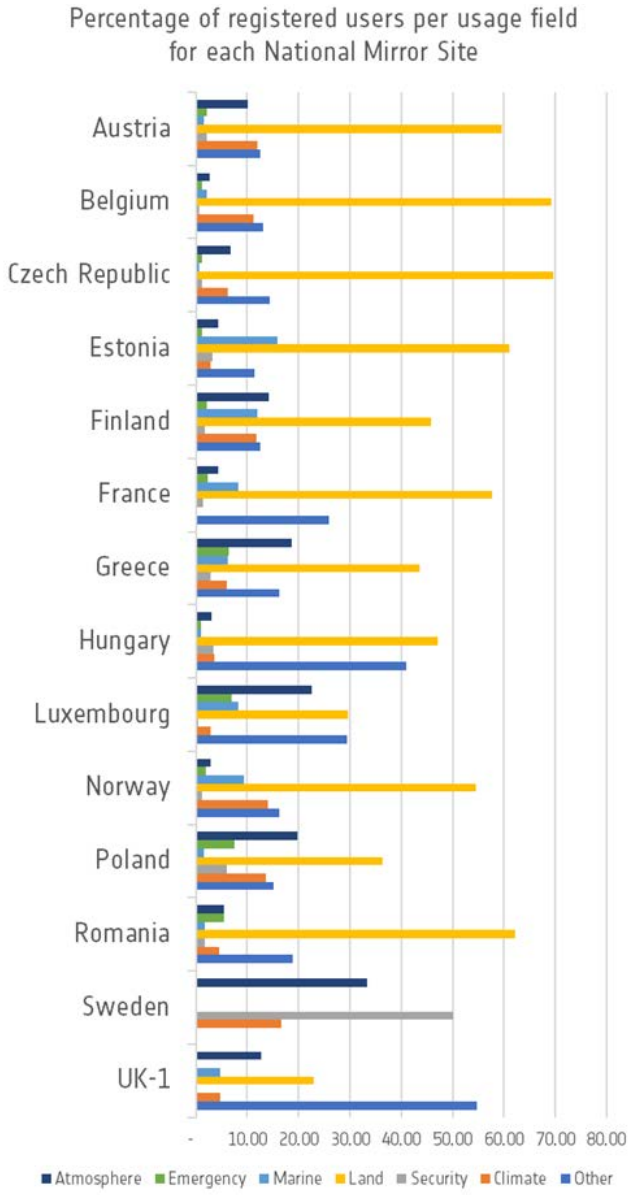


FIGURE 89: Percentage distribution of mirror site users by usage field.

Usage Field

In 2024 the group of registered users which described themselves as 'Land' users was still the largest group of users on most of the CollGS sites, accounting for 58% of the total number of users of the national sites, in line with 2023 figure. The Czech and Belgium sites were the greatest contributors to this figure, with roughly 70% of their users having selected 'Land' applications as their principal use of the data on registration. They are followed by Romania, Estonia and Austria sites with proportions between 59-62%. Overall, 7 out of the 16 national sites had more than 50% of their registered users in the `Land' usage field.

The `Other` application category continues to represent a significant share among users of the CollGS sites, with 26% of all users in 2024 (up from 24% in 2023) having selected 'other' as the main application for which they download data on registration. The German site had the highest proportion of users in this category, with 74%, followed by UK-1 with 55%, in line with 2023 figures. On average, approximately 16% of the users on the other sites also selected 'other'. Users of the Luxembourg site were nearly equally divided between the `Other` and `Land` applications, but a substantial 23% share use the data for 'Atmosphere' applications. Sweden shows 33% preference for 'Atmosphere' usage area, followed by Greek and Polish sites with roughly 19%. By contrast, only low percentages of the national site users selected `Climate`, `Emergency', `Marine' and `Security' as the applications for which they download data. In 2024, the overall percentages for these applications were 3%, 2%, 4% and 2% respectively. In 2024 only Sweden, Norway and Poland sites reached above 13% preferences in this usage category, followed by Austria, Belgium, Finland and Germany with roughly 10% of their registered users falling in this category. Other sites had proportions below 10%.

The percentage of users who selected 'Marine' was minimal overall, with only Estonia and Finland having proportions of 'Marine' users above 10%.

Table 36 and Table 37 show, where available, the total volume of Copernicus Sentinel data both published on and downloaded from the mirror sites during 2024, together with the percentage change with respect to 2023.

In 2024, the average volume of data published on a CollGS site increased by approximately 20%, reaching 2.5 PB per site, up from 2.09 PB in 2023. In contrast, the total volume of data downloaded from all sites over the year was 14.5 PB, marking a 4.2% decrease compared to 2023.

CollGS Partner	2024 Published Volume (TB)	% Increase from Y2023	2024 Downloaded Volume (TB)	% Increase from 2023
Austria	1,856.08	-72%	5,996.84	425%
Belgium	204.61	-2%	1.21	-8%
Czech Republic	44.62	-22%	69.25	235%
Estonia	13.22	3%	128.45	-8%
Finland	56.09	-80%	33.95	89%
France	9,042.00	27%	1,772.90	-84%
Germany	367.93	56%	31.08	295%
Greece	535.36	2%	4.78	-20%
Hungary	23.00	N/A	4.00	N/A
Luxembourg	17,526.79	202%	6,113.40	370%
Norway	6,972.33	-22%	604.18	-44%
Poland	73.50	-36%	-	-100%
Romania	-	-100%	-	-100%
Sweden	63.00	-82%	-	N/A
UK-1	1,621.63	9%	42.09	-65%
Total (PB)	**37.50**	**16.8%**	**14.46**	**-4.2%**
Average 2024 (PB)	**2.50**	**19.6%**	**0.96**	**-1.7%**

TABLE 36: Overall publication and dissemination volumes on mirror sites in 2024.

Overall, however, it is highlighted that the data download volumes discussed in this section are only one way of measuring the 'output' of a particular national site. In fact, several CollGS sites now provide on-demand processing of data, and/or online visualisation and processing and the tools needed to support this. While these cutting-edge uses of Copernicus Sentinel data are not explored further in this section, the interested reader can explore the individual Collaborative Ground Segment portals. The executive summaries of the 'Collaborative Ground Segment Workshops' also highlight such initiatives on a per partner basis and are available to download here:

https://sentinel.esa.int/web/sentinel/missions/collaborative/workshop

In terms of publication volumes, the total number increased by approximately 20% across all sites compared to 2023. This overall growth was primarily driven by a growth in the volume of Sentinel-2 data published on the sites, which rose by a significant 39% in 2024. Notably, the Luxembourg site played a key role in this trend, with its Sentinel-2 publications rising by over 250% during the year.

Looking at the other individual sites, several notable changes emerged in publication volumes compared to 2023. Germany significantly increased its output, publishing nearly 200% more Sentinel-1 data and 80% more Sentinel-2 data than the previous year. France also saw a substantial rise, nearly doubling its Sentinel-1 publications in 2024. Meanwhile, the UK-1 site recorded a 77% increase in Sentinel-2 publication volume compared to 2023.

In contrast, Austria saw significant declines in Sentinel-2 data publication, dropping by 57% compared to 2023. The Finnish site nearly ceased publication of Sentinel-5P data in 2024 and also reported a reduction of over 80% in publication volumes across the other missions.

When looking at the download volumes in 2024, both the total volume and the average volume decreased by 4% and 2% with respect to 2023. At the level of the individual sites, the figures again show very different types of activity across the mirror sites.

Finland and Germany seem to reflect a strong disparity between published and downloaded volumes, with the published volumes being much higher than the downloads, consistent with use of local platforms for processing rather than straight re-distribution. Austria saw a significant surge in data downloads in 2024, reaching nearly 6 PB, primarily driven by increased access to Sentinel-1 and Sentinel-3 data. Other countries also recorded notable increases, including Luxembourg, Germany, and the Czech Republic, each showing growth in specific missions: Sentinel-3 for the Czech Republic, Sentinel-2 for Germany, and both Sentinel-1 and Sentinel-2 for Luxembourg.

Overall, the largest increase in download volume was observed for Sentinel-3, largely driven by heightened activity at the Austrian, Czech, and UK-1 sites.

It is recalled that the Swedish site is not aimed at offering a download service but instead provides users with online hosted processing services.

	2024 Published Volume (TB)				2024 Downloaded Volume (TB)			
CollGS Partner	**Sentinel-1**	**Sentinel-2**	**Sentinel-3**	**Sentinel-5P**	**Sentinel-1**	**Sentinel-2**	**Sentinel-3**	**Sentinel-5P**
Austria	-	1,856.08	0.00	-	1,758.78	3,443.98	663.72	130.36
Belgium	32.00	171.18	1.35	0.08	0.51	0.37	0.07	0.27
Czech Republic	9.01	20.71	10.56	4.34	30.81	16.11	20.06	2.28
Estonia	10.82	1.45	0.95	-	39.34	57.71	31.40	-
Finland	34.88	7.33	13.87	0.01	30.60	1.41	0.16	1.78
France	2,107.00	6,935.00	-	-	1,100.00	672.90	-	-
Germany	123.17	80.72	25.99	138.05	1.69	29.36	0.01	0.02
Greece	230.31	215.53	47.48	42.03	2.42	1.40	0.55	0.41
Hungary	9.00	5.00	9.00	-	2.00	2.00	-	-
Luxembourg	1,450.88	16.075.91	-	-	98.98	6,014.42	-	-
Norway	1,892.25	4,090.50	833.33	156.26	197.69	176.04	114.01	116.43
Poland	20.61	5.59	19.59	27.72	-	-	-	-
Romania	-	-	-	-	-	-	-	-
Sweden	-	63.00	-	-	-	-	-	-
UK-1	1,126.33	64.40	344.90	86.00	7.62	6.56	11.00	16.91
Total	**7,046.25**	**29,592.39**	**1,307.02**	**454.49**	**3,270.43**	**10,422.26**	**840.97**	**268.46**
% increase/ decrease	**-4%**	**39%**	**-52%**	**-41%**	**-70%**	**156%**	**1345%**	**250%**

TABLE 37: Overall publication and dissemination volumes on mirror sites in 2024.

Figure 90 illustrates the volumes of data published on each national site, next to the volume of data downloaded from each site. This makes it easy to compare user interest in the data with the data offering on the site. For the most part, user interest in the data roughly matches the data offering. There are several instances, however, in which the data uptake appears markedly more varied than the data offer.

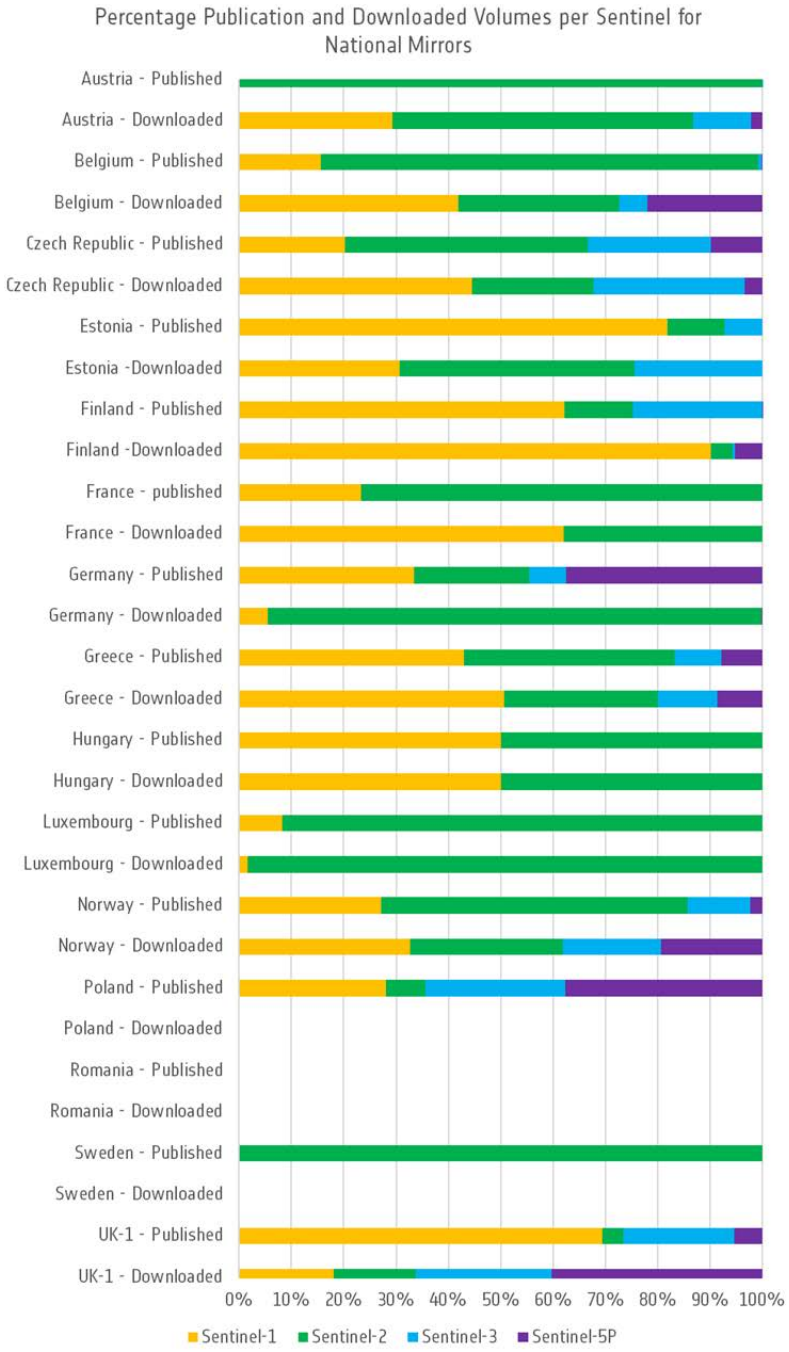


FIGURE 90: Percentage publication and dissemination volumes per Sentinel on mirror sites in 2024.

9.2. International Technical Agreements

The Copernicus programme has a strong international dimension. In support of the international data sharing principles of the Group for Earth Observation (GEO), and in line with the Copernicus programme's policy of full, open and free-of-charge access to Copernicus data and information, the European Commission has entered into 14 Cooperation Arrangements with international partners to advance the mutually beneficial exchange of satellite data, in-situ data and support for calibration/validation activities.

ESA is entrusted with ensuring the exchange of satellite data under these cooperation arrangements, and for that purpose enters into technical operating arrangements (TOAs) with the agencies nominated by the partner countries. Under the TOAs, the nominated agencies are able to download Copernicus Sentinel data, initially from the International Data Access Hub and now from the CDSE, and to transfer the data to their national data access sites for use by their own user communities.

During 2024, the Canadian Space Agency joined the list of Copernicus International partners, as well as the National Space Research and Development Agency (NASRDA), which became ESA's 3rd African Copernicus international partner when the TOA was signed on 25 July 2024.

Table 38 below presents an overview of the 15 Copernicus international partner sites which are currently operational, or which are in the process of being established. The partners are listed in order of the date on which they signed the TOA with ESA.

International Partner	TOA signature date	Purpose of the national data access site
United States National Aeronautics and Space Administration (NASA)	18 February 2016	The aim of NASA's mirror site is to re-use and re-disseminate Copernicus Sentinel data, to increase distribution capacity, and maximise the benefits to Earth Science research and applications. The site is primarily intended to enable users to download the data. NASA started distributing Sentinel-1 user-level data from its Alaska Satellite Facility data portal, Vertex, on 12 December 2015. In addition, Sentinel-3 OLCI data is made available as part of the OceanColor Web; all user-level data from 16/02/2016 to the present being available for re-dissemination. As well as the Sentinel-1 and -3 user-level data, during 2018 data from the Sentinel-5P mission began to be published on the NASA Sentinel Gateway (NGS). The relevant websites are: S1: https://vertex.daac.asf.alaska.edu S2 (HLS which are data derived from Sentinel-2): https://lpdaac.usgs.gov/products/hlss30v015/ S3:https://oceancolor.gsfc.nasa.gov and https://ladsweb.modaps.eosdis.nasa.gov/missions-and-measurements/olci/ S5P: https://disc.gsfc.nasa.gov
United States National Oceanic and Atmospheric Administration (NOAA)	1st signed 7-Mar-2016 – update signed 19 December 2017	NOAA provides access to satellite data for understanding and managing oceans and coasts. It makes available the oceanographic user-level data from the Copernicus Sentinel missions. Data is made available on the CoastWatch – OceanWatch site. For Sentinel-1, published user-level data include those over the US, Arctic and Antarctic. The data is then processed into wind speed and the original data is not generally mirrored. NOAA publishes a collection of Sentinel-2 MSI over a limited region. Sentinel-3 marine data has also been made available from May 2016, received from EUMETSAT's Multicast Terrestrial. The site is primarily intended to enable users to download the data and to visualise it online. https://coastwatch.noaa.gov

International Partner	TOA signature date	Purpose of the national data access site
Australia Geoscience Australia (GA)	24 March 2016	GA publishes Copernicus Sentinel data on its data access site 'Sentinel Australasia Regional Access' (SARA). SARA is primarily intended to provide free and open download access to data from Copernicus Sentinels 1-3, primarily for users in Australasia, South-East Asia, the South Pacific, the Indian Ocean and the Australian Antarctic Territory. For the Sentinel-3 Land user-level data, the site provides a 60 day rolling archive of Global S3 user-level data, which is reduced to a subset cut to the Australasia region of interest (ROI) after that period. Limited provision of Sentinel 5P data from the Australasia ROI is now also being trialled. SARA is hosted at the National Computational Infrastructure and operated by the Regional Copernicus Data Hub consortium formed by GA, the New South Wales Office of Environment and Heritage, Queensland Department of Environment and Science, Western Australian Land Information Authority and the Commonwealth Scientific Industrial Research Organisation. https://copernicus.nci.org.au
Serbia The BioSense Institute – Research Development Institute for Information Technologies in Biosystems	25 January 2019	BioSense is revamping its regional data access mirror site/analysis hub, which is aimed at improving access to and the exploitation of Copernicus Sentinel data in the Republic of Serbia and the wider Balkan area. The relevant websites are: https://biosens.rs and https://agrosens.rs.
Brazil Brazilian Space Agency (AEB) and the National Institute for Space Research of Brazil (INPE)	14 March 2019	INPE has incorporated Copernicus Sentinel data into its regional data access/analysis STAC server, to facilitate the access to and exploitation of Copernicus Sentinel data in Brazil. Collections of Sentinel images are available for searching using the STAC protocol and can be browsed at https://data.inpe.br/stac/browser/. For Sentinel 2 data, the bands are being available as in COGeotiff format. The Brazil Data Cube project is developing EO Data Cubes from Sentinel-2 for the extension of Brazil. In 2023, the project started generating the data cubes directly from the local interfaces to the Brazilian Mirror Site. The Sentinel-2 data cubes are being used to develop land use and land cover for the Brazilian biomes. The updated list and descriptions of the Sentinel data cubes can be found using the link http://www.brazildatacube.org/en/data-cube/.
Ukraine State Space Agency of Ukraine (SSAU)	28 March 2019	SSAU has established a regional data access mirror site, the 'Data Hub System – Ukraine', to facilitate access to and the exploitation of Copernicus Sentinel data in Ukraine. SSAU publishes on the Data Hub System – Ukraine all available Copernicus Sentinel data over Ukraine and the immediately surrounding regions. The site is primarily intended to enable users to download the data. http://sentinel.spacecenter.gov.ua/
India Indian Space Research Organisation (ISRO)	11 April 2019	ISRO has established a regional data access site called Bhoonidhi, which provides access to all data from Sentinels -1 and -2 over India and the immediately surrounding regions, together with data from other EO missions, such as Landsat-8. The site is primarily intended to enable users to download the data. https://bhoonidhi.nrsc.gov.in

International Partner	TOA signature date	Purpose of the national data access site
Chile University of Chile	20 August 2019	UdeChile, through the Center for Mathematical Modelling (CMM) and its specialised units, in particular the HPC Center and its Image Processing Working Group, operates a regional data access/analysis mirror site to improve access to and the exploitation of Copernicus Sentinel data, initially in Chile and later also in the Latin American region. Currently the site maintains a window of 60 days of all Sentinel-1 and -2 data tiles which intersect the Chilean territory. The site is primarily intended to enable users to download the data. www.datoscopernicus.cl
Colombia Institute of Hydrology, Meteorology and Environmental Studies of Colombia (IDEAM)	26 December 2019	IDEAM intends to establish a regional data access/analysis site to facilitate access to and the exploitation of Copernicus Sentinel data in the Latin American region. The current area of interest is limited to Colombia. The initial aim of the site is to provide data to create annual reporting of deforestation of the country.
Tunisia Sahara and Sahel Observatory (OSS)	30 Dec 2022	OSS operates a regional Earth Observation centre which it intends to use as a platform for improving access to, and the exploitation of Copernicus Sentinel data in the North Africa region, and by OSS's partners in GMES and Africa. The website is http://misbar.oss-online.org/
Democratic Republic of Congo Commission Internationale du Bassin du Congo-Oubangui-Sangha (CICOS)	22 March 2023	CICOS is incorporating Copernicus Sentinel data into the Earth Observation products and tools which it makes available for users in the field of hydrological forecasting, weather forecast, vegetation cover, land use (Habitat), monitoring of bush fires and the flooded areas forests in the Congo Basin.
Panama National Institute for Government Innovation (AIG)	10 May 2023	AIG is developing a data centre providing regional access to Copernicus Sentinel data, as part of DG-INTPA's Regional Copernicus Centre in Panama initiative ('CopLAC').
Philippines Philippine Space Agency (PhilSA	11 December 2023	PhilSA is developing a local Copernicus data centre for supporting the creation of value-added information and the development of new data products and downstream services in the Philippines. This activity is being developed as part of the European Commission's National Copernicus Capacity Support Action Programme for the Philippines ('CopPhil').
Canada Canadian Space Agency (CSA)	27 May 2024	CSA offers Copernicus Sentinel data access through the Earth Observation Data Management System (EODMS), which is managed by Natural Resources Canada. ESA and CSA have also established contingency conditions to facilitate the sharing of satellite data in the event of a failure and / or interruption in the operations of the Sentinel-1 mission (ESA) or the RADARSAT Constellation Mission (RCM). The website is: https://eodms-sgdot.nrcan-rncan.gc.ca/index-en.html
Nigeria National Space Research and Development Agency (NASRDA)	25 July 2024	NASRDA is establishing a regional Copernicus data centre, to facilitate the exploitation of Copernicus Sentinel data in West Africa.

TABLE 38: International Partners summary.

The international partners send ESA annual feedback on the status of their sites and the uptake of Copernicus Sentinel data from those sites. This year, statistics were received for the sites operated in the Australia, Brazil, Chile, India, Tunisia, Ukraine and the US (NASA and NOAA), and the input provided is summarised in Tables 39 and 40 below. Where information was not available in their reports this is shown as 'np'. No statistics could be provided for the Serbian data centre because it was still being renovated in 2024. Statistics were also not available for Colombia, Congo, Nigeria, Panama and the Philippines, where the data centres are still under construction. Canada does not operate a user registration system, so it is not able to collate the statistics requested.

The Tunisian platform is still being developed, and OSS aims to enable users to download images and develop derived products from the platform next year. However, OSS was already able to provide statistics on registration figures and publication numbers for the year.

Table 39 presents information about the number and type of users on each of the operational sites. On each site which submitted this statistic, the number of registered users increased in 2024. There was an average increase in the number of registered users across all sites of 57% per site, although it should be noted that this average is heavily influenced by the massive 275% increase seen on India's Bhoonidhi site. The Brazilian site does not yet have a user registration system, although INPE plans to install one on its site within 2025, so there are not yet any statistics for registered users, active users, or category of user for the Brazilian site. Australia's Copernicus Australasia Regional Data Hub does have a user registration process but it does not record the registered user for all download events, so statistics are not available on the number of active users.

It is interesting to see that users of Australia's Hub are relatively evenly spread across the user categories, while those of India's, NASA's and Ukraine's sites are more concentrated in a selection of user categories, with as many as 92% of NASA's users coming from international public organisations, 88% of Ukraine's users coming from research and education organisations and 57% of India's users also from research and education organisations.

International Partner	Operations start date	No of registed users since start of operations	% increase since 2023	Pricipal user catergories (% of registered users, unless otherwise stated)
Australia	26 June 2021	2,200	21	4%-International public organisation 16%-National/reginal/local public authority 34%-Research & education organisation 20%-Business/commercial/professional – SME 4%-Business/commercial/professional – non-SME 2%-Charity or NGO 21%-Private Individual 0.2%-Other
Brazil	12 January 2021	np	np	np
Chile	27 September 2019	4,514	11	np
India	26 January 2020	2,080	275	2%-International public organisation 22%-National/reginal/local public authority 57%-Research & education organisation 20%-Business/commercial/professional – non-SME
US-NASA	12 December 2020	186,870	28	92%-International public organisation 2%-National/reginal/local public authority 5%-Research & education organisation 1%-Business/commercial/professional – SME 0.4%-Other
US-NOAA	01 May 2016	9,751	22	np
Tunisia	01 January 2023	830	35	np
Ukraine	01 January 2020	313	10	88%-Research & education organisation 3%-Business/commercial/professional – SME 10%-Other

TABLE 39: International Partner general characteristics and statistics for 2024.

International partner	No. of active users S1	S2	S3 Land	S5P
Australia	np	np	np	np
Brazil	np	np	np	np
Chile	23	28	71	-
India	500	1,338	-	-
NASA	50,230	2,782	778	1,815
NOAA	565	9,174	12	-
Tunisia	np	np	np	np
Ukraine	6	11	5	3

TABLE 40: No. of active users on the site in 2024 (an active user is a user which has made one or more successful downloads during the year)

The table 40 shows the number of active users in the year, for each site which was able to submit this statistic. NASA's site registered an even higher level of activity during the year than seen during 2023, with a 17% increase in the number of active users. In terms of the proportion of registered users which were active, however, it was NOAA's and India's sites which registered the highest numbers, with approximately 94% of NOAA's users actively downloading products during the year and 81% of India's registered users.

The table 41 summarises, per partner, the number of published and downloaded data since the start of operations.

International partner	No. of Copernicus Sentinel user-level data published on the site since the start of operation S1	S2	S3 Land	S5P	Total	No. of Copernicus Sentinel user-level data downloaded from the site since the start of operation S1	S2	S3 Land	S5P	Total
Australia	1,303,294	8,090,955	8,973,500	256,638	18,624,387	6,437,780	15,616,949	12,834,887	-	34,889,616
Brazil	44,729	777,607	17,523	-	839,859	np	np	np	np	-
Chile	61,080	325,730	275,022	-	661,832	1,238	10,941	10,657	-	22,836
India	80,911	906,968	-	-	987,879	175,219	517,937	-	-	693,156
US-NASA	37,946,418	28,780,182	16,150,798	2,041,882	84,919,280	213,316,979	1,249,020,002	10,572,969	32,689,123	1,505,599,073
US-NOAA	752,545	642,238	4,356,638	-	5,751,421	1,177,473	788,289	1,966,768	-	3,932,530
Tunisia	704	3,428	1,502	-	5,634	1,335	6,492	2,122	-	9,949
Ukraine	93,892	324,083	263,461	42,275	723,711	2,910	3,050	71	14	6,045

TABLE 41: International Partner publication and download statistics for 2024.

The NASA site has the most striking download statistics with over 1.5 billion downloads since the start of operations. Australia and Tunisia also register a large volume of downloads with respect to size of the data holdings. However, the number of downloads from the international partners is not necessarily the full measure of use, and depends on the focus of the operations, with some partners offering hosted processing capabilities and focusing less on pure re-distribution.

The table 42 summarises, per partner, the volumes of published and downloaded data in 2024 and, where applicable, also the percentage change with respect to the end of 2023.

Overall, the average volume of data published per site in 2023 was 2,262 TB, but this figure masks big differences in the approach of each data site with respect to the amount of data they chose to make available to their users.

International partner	No. of Copernicus Sentinel user-level data published on the site in 2024 [TB]					Change in published volume since 2023	No. of Copernicus Sentinel user-level data downloaded from the site in 2024 [TB]					Change in download volume since 2023
	S1	S2	S3 Land	S5P	Total		S1	S2	S3 Land	S5P	Total	
Australia	311	701	295	22	**1,329**	**0.8%**	1,550	805	304	-	2,659	-8%
Brazil	12	143	9	-	**164**	**3%**	np	np	np	-	-	n/a
Chile	29	43	25	-	**96**	**0%**	0.2	0.1	0.1	-	0.3	0%
India	27	254	-	-	**281**	**30%**	30	155	-	-	185	4%
US-NASA	10,945	526	1,040	1,134	**13,645**	**10%**	78,375	8,936	1,284	3,246	91,841	30%
US-NOAA	21	46	129	-	**196**	**n/a**	1	5	51	-	57	n/a
Tunisia	np	np	np	-	**np**	**n/a**	np	np	np	-	np	n/a
Ukraine	43	36	17	28	**125**	**36%**	0.020	0.083	0.003	0.006	0.112	-72%

TABLE 42: International Partner publication and download statistics for 2024

By far the highest volume of data published on an international partner site in 2024 was again on NASA's site, which published over 13,645 TB of additional data in 2024, 10% more than the volume published in 2023, and leading to a total of 34,821 TB of data published on the site since December 2015. Users of NASA's site kept pace with the high publication volume and downloaded 91,841 TB of data in 2024, 30% more than the volume they downloaded in 2023, making a total of 285,139 TB of data downloaded since NASA started publishing Sentinel data. The team attributes the particularly high number of Sentinel-2 downloads in 2024 compared to the previous year to the fact that JPL's Observational Products for End-Users from Remote Sensing Analysis (OPERA) use Sentinel-2 data.

The overall volumes of data published and downloaded in 2024 are broken down by Sentinel, to show the focus of each site in terms of the Sentinel missions which are made available to their users, and the respective interest of the users. The same three sites are publishing Sentinel-5P data (Australian, Ukrainian and NASA's), and there is a high AER of 1:16 for the data on NASA's site. Geoscience Australia again reported for the Australian site that although Sentinel-5P data is being published on the site, the volume of Sentinel-5P data downloads is currently not yet being recorded.

The Indian site continues to publish only Sentinel-1 and Sentinel-2 data, and although a higher number of Senitnel-2 data is published on the site, the AER for the Sentinel-1 data is actually much higher, at 1:2 take compared to 1.8:1 for the Sentinel-2 data. Brazil's, Chile's, NOAA's and Tunisia's sites all continued to publish data from Sentinels -1, -2 and -3 throughout the year.

More information about the Commission's international cooperation on EO data exchange under Copernicus can be found at:

https://www.copernicus.eu/en/international-cooperation-area-data-exchange

10 OUTREACH AND ENGAGEMENT

The CDSE consortium maintains a strong focus on outreach and engagement, ensuring that all upcoming events are regularly announced in the EVENTS section of the CDSE website (https://dataspace.copernicus.eu/events) as well as in the monthly CDSE Newsletter – Spotlight. The CDSE consortium's communication strategy is designed to effectively engage a wide spectrum of stakeholders – including application developers, data scientists, journalists, the general public, policymakers, educators, agricultural professionals, and start-ups. By tailoring messaging and materials to each group and delivering them through appropriate channels, the consortium ensures that the platform's capabilities, benefits, and opportunities are clearly conveyed. This comprehensive and inclusive approach supports continued growth of the user base, helping make Copernicus data more accessible and impactful across sectors and communities.

Spikes in the number of registered users frequently align with major international conferences where CDSE is actively represented or where Earth Observation (EO) and Copernicus initiatives feature prominently. Beyond these events, the CDSE employs a wide range of communication channels to reach and engage diverse user groups. Besides frequently publishing news in the NEWS section of the CDSE website (https://dataspace.copernicus.eu/news), also social media platforms such as LinkedIn, and YouTube are used to regularly share news updates, technical documentation, and educational content, including tutorial videos.

In response to feedback gathered through the 2024 User Survey, a dedicated monthly newsletter was launched in July 2024. This publication, reached over 32,000 subscribers, by the end of 2024, has quickly become a key communication tool for keeping the community informed and engaged.

Throughout the year, consortium partners also organize and host a variety of workshops, webinars, and outreach events. These initiatives are instrumental in raising awareness, deepening user understanding, and encouraging broader adoption of the platform.

10.1. Communication objectives in 2024

Overall objectives:

- reinforce awareness of Copernicus data among policy makers
- build trust in the services and the data among European institutions, researchers and service providers
- communicate service capabilities
- communicate service evolution plans (roadmap, maintenance works)
- showcase the use of services and data in specific domains to broaden its application
- gather feedback from various user communities on relevant existing and future functionalities

10.2. Communication channels

The structure of the CDSE communication channels is as follows:

- Web portal: regular news updates are released for additional features or datasets, and the image gallery provides attractive content for newcomers to earth observation. Users can also subscribe to the CDSE RSS feed at https://dataspace.copernicus.eu/rss.xml

- Social media: news features, videos and blog posts are also communicated through the social media channels (Twitter, LinkedIn, Facebook) of the consortium partners, who together have a following of about 83 000. CDSE-related content is also shared on the Copernicus and EU Space Office channels, which have about 230 000 followers. Social media posts that directly reach specific user community (such as QGIS) have been especially popular.

- CDSE YouTube: this channel collects all technical video tutorials and manuals for CDSE, with videos currently having several hundred to several thousand views. You can find it on: https://www.youtube.com/@copernicusdataspaceeco-system

10.3. Onsite events

In 2024, CDSE was actively promoted through a variety of community events aimed at engaging the scientific community and relevant stakeholders across different domains. These events provided a valuable platform to showcase the capabilities of the ecosystem, share updates on its ongoing development, and highlight its potential use cases. Presentations and demonstrations offered during these conferences served not only as educational and onboarding materials for new and prospective users but also as opportunities to foster dialogue and collaboration. The feedback collected from participants was instrumental in identifying user needs, shaping feature development, and setting priorities for the platform's future roadmap. Among the numerous events held throughout the year, the following stand out as particularly significant:

- **EU Space Conference**, Brussels, Belgium, Conference 2024-01-23 – at this conference we participated in panel discussion with Christoph Krautz, Director for Satellite Navigation and Earth Observation, European Commission.
- **EGU General Assembly** Vienna, Austria, Conference 2025-04-14/19 – this conference was an opportunity to address a very wide and diverse audience in science and industry. The main communication channels were a system of demonstrations at the ESA booth and a townhall meeting.
- **EXPANDEO 2024**, Brussels, Belgium, Conference, 2024-06-12 – this conference is one of the main forums of the Earth Observation industry. CDSE was featured in a dedicated session including both an overview and technical demonstrations, in addition to a booth where participants could ask questions. The presentation was particularly well received and generated substantial interest in follow-up, especially in the fields of CAP monitoring and, environmental law and EO education.
- **INTERGEO 2024**, Stuttgart, Germany, Conference 2024-09-24/26, this is one of the largest conferences of the EO industry. CDSE and CREODIAS were displayed in cooperation between T-Systems and GAF.
- **Smart Country Convention**, Berlin, Germany, Conference, 2024-10-15/17 – CDSE was showcased in an oral presentation and a panel discussion. This event focused on policymakers and government agencies.

10.4. Image gallery

The CDSE provides a wealth of satellite data for several use cases. Through the online CDSE image gallery, users can easily search, access, and download satellite images from the Copernicus Sentinel satellites and contributing missions.

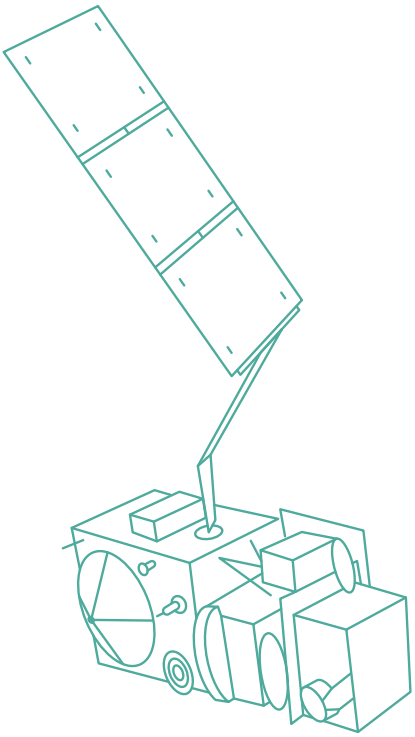
CDSE engages actively with its users by sharing at least four captivating satellite images every month. These images showcase the global reach of satellite data, the diversity of our global landscape, and the ever-increasing need to constantly monitor our Earth. This monitoring is essential to measure the effects of, among other things, climate change and population increase. By providing these accessible and appealing images, we highlight the indispensable role of satellite technology in understanding and enhancing our planet.

The image gallery is updated on a regular basis to highlight use cases, global events and CDSE-related news activities. Each gallery item may contain one or more satellite image, depending on the topic we aim to emphasize, such as a specific location or date, timelapse, or images with zooms. For each image gallery topic, CDSE provides:

- Clean satellite image(s)
- Edited satellite image(s) with annotations to highlight important elements in the landscape
- High-resolution images(s) for download & external use
- Content to inform people about the satellite data, event and location (landscape)
- Animated GIF or video (sporadic).

10.5. Use Cases

The „Use Cases“ section of the CDSE portal was introduced in 2024, showcasing practical applications of Earth observation (EO) data and tools, highlighting how various stakeholders leverage Copernicus resources to address real-world challenges across sectors such as agriculture, climate, disaster management, and urban planning. These case studies demonstrate the integration of CDSE services—like openEO, Sentinel Hub, and JupyterLab—into workflows that support scientific research, governmental initiatives, and commercial solutions. By providing detailed examples, this section serves to inspire and guide users in effectively utilizing EO data for innovative and impactful projects.



10.6. News Management

The CDSE consortium keeps the News section of the website (https://dataspace.copernicus.eu/news) up to date with essential operational information and promotions. This page provides the latest news from the ecosystem, ensuring all users are informed about the necessary operational details.

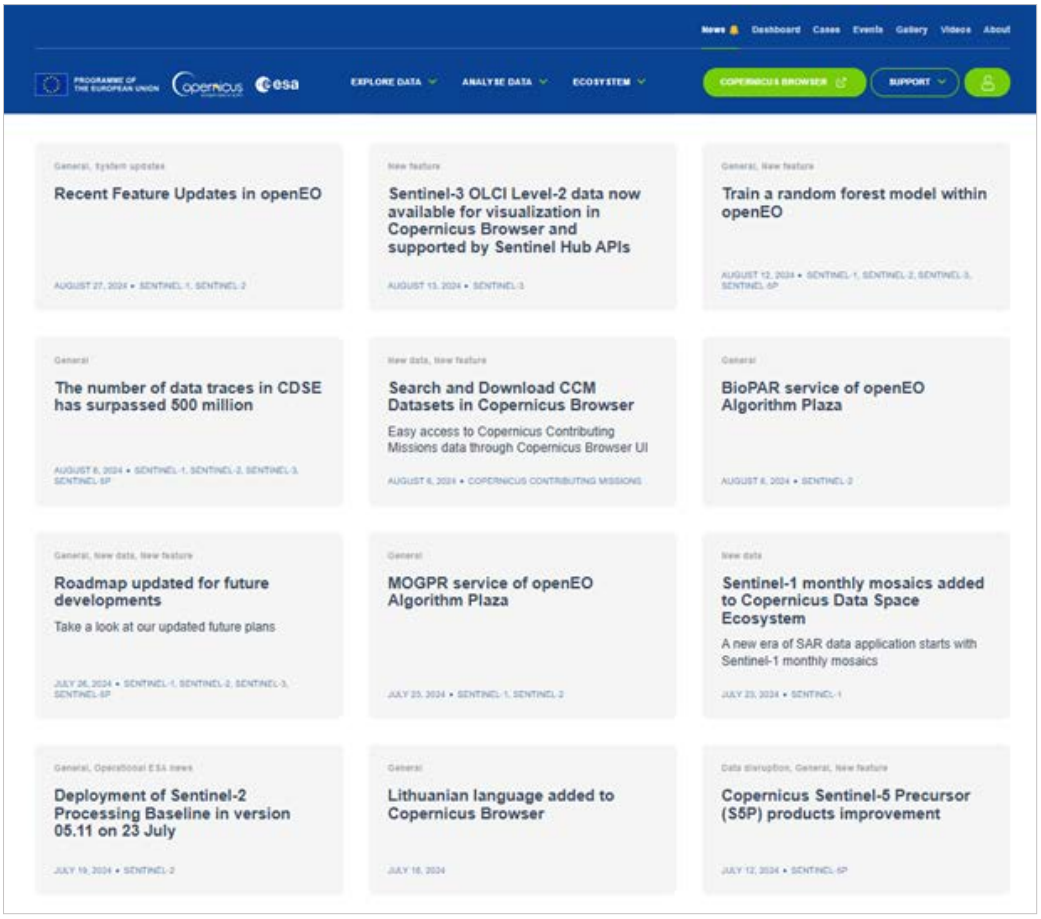


FIGURE 91: CDSE News page

RSS feeds from the Copernicus Data Space Ecosystem

Users can follow our general RSS feed or use on of the labeled RSS feeds to select which updates the user want to receive in its preferred RSS reader. User will receive notifications as soon as new content is published on our website.

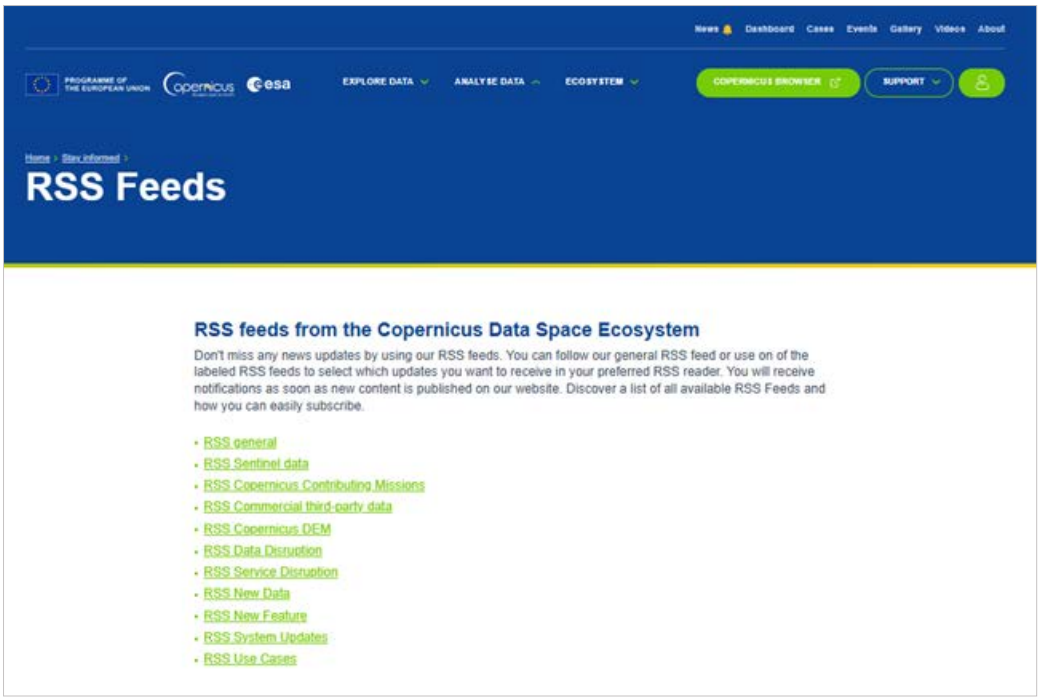


FIGURE 92: List of all available RSS Feeds in Copernicus Data Space Ecosystem.

10.7. Newsletter

In 2024 we introduced monthly CDSE newsletter named Spotlight, subscribed by 32,133 users (end of December 2024), where each edition brings to users:

- **Event News & Invitations** – Be the first to know about upcoming conferences, training sessions, and user forums, including major events like the ESA Living Planet Symposium.
- **New Datasets** – Discover the latest additions to CDSE, from Sentinel mosaics to land and water monitoring data, and learn how to access and visualize them.
- **Platform & Feature Updates** – Learn about new tools, improved APIs, faster download services, and enhanced user experiences.
- **Training & Resources** – Access new tutorials, Jupyter notebooks, API guides, and blog posts to boost your Earth observation data skills.
- **User Contributions** – Submit your use cases, provide feedback, and join our ecosystem of service providers and data contributors.
- **Highlights & Visuals** – Explore the Image of the Month, showcasing unique Earth views from space, and download stunning backgrounds for your desktop.
- **Past & Upcoming Events** – Catch up on recent activities and find out where to meet us next.

User can subscribe to it here.

11 DATA ACCESS SYSTEM PERFORMANCE ANALYSIS

Performance analysis has played a key role in the continuous improvement of the CDSE. This section outlines the approach and the results from this continuous analysis process.

Up-to-date system health and performance metrics are available in the Copernicus Dashboard.

11.1. Service availability

Service availability, in general, is defined as the percentage of a given period during which performance is above or below the committed threshold. In particular, the CDSE measures availability on the basis of two different measurements: the Performance Metric for Query (PMQ) and the Performance Metric for Immediate Access (PMIA). The PMQ measures availability of the catalogue interfaces and is continuously checked by a system health-check probe from central monitoring. The Service is considered unavailable when the PMQ average performance drops below the threshold for 5 seconds and is resolved when the average performance is re-established. The PMIA measures the download performance via the APIs, with unavailability declared when the download performance drops below 20 MBps. In this way, service availability is measured as the availability of system operation at a specific level, rather than periods of total availability or unavailability of the system. To determine overall service availability for the year, a monthly key performance indicator (KPI) is derived. This KPI takes the lower of the two metrics (PMQ or PMIA) as the availability level for that month. The final annual value is based on the average of the monthly indicators.

Service availability remained high in 2024, averaging 98.7% for the year — the same as in 2023 (May–December). This figure was derived as weighted average of two metrics over the year. The PMIA was the limiting factor in seven months (averaging 98.87%), while PMQ was lower in five months (averaging 98.36%). Availability reached or exceeded 99% in eight of the 12 months, proving the CDSE‘s consistent and stable performance. However, it should be noted that a single unexpected service interruption occurred in April due to an infrastructure failure, rendering the system temporarily unavailable for two days (April 9-10). During the outage, user access was blocked, and network traffic was reduced to a minimum. After successful recovery, there was a temporary surge in downloads and requests before network usage returned to normal over the next two days (April 11–13). This isolated event did not affect long-term availability, and no further interruptions of this type occurred during the year. Nevertheless, several technical and procedural enhancements were introduced to improve system resilience and maintain continuity of data access in case similar major contingencies occur again. In the third quarter of the year, there were some dips in the recorded availability, mainly due to isolated network issues affecting one of the external monitoring sites. Independent verification confirmed that these issues were not connected with the CDSE infrastructure. In December, the lowest monthly availability was recorded at 95.5% associated with the PMQ, and this was correlated to database maintenance activities – once completed, these resulted in approximately 25% faster response times. Despite the temporary decline in some months, the system achieved a satisfactory and high level of availability throughout the year.

11.2. Network analysis

An important metric for evaluating the CDSE‘s performance is the volume of outgoing network traffic, reflecting user download activity and internal platform operations, such as data dissemination and reprocessing. Figure 90 illustrates the daily outgoing traffic in gigabits per second (Gbps) in 2024, delivering insights into usage patterns and periods of increased system activity. The 2024 data reveals a steady and regular traffic pattern in contrast to 2023, when outgoing traffic was more inconsistent as a result of the phased rollout of the CDSE and the gradual migration of users to the new platform. The average monthly outgoing traffic was approximately 29 Gbps, ranging from a low of 23 Gbps in January to a high of 33.6 Gbps in June. Notably, the minimum and maximum values exclude the brief, yet extreme fluctuation observed in mid-April, when traffic temporarily decreased and then quickly rebounded. This anomaly was associated with a temporary service interruption that was swiftly resolved, as described above.

Several large-scale data operations contributed to sustained traffic throughout the year, including:

- Gap-filling activities to ensure the Sentinel-2A L2A products completeness (January),
- Reprocessing campaign of Sentinel-2 archive imagery (Phase 1: February–August; Phase 2: September–December),
- Release of Copernicus Contributing Missions (CCM) data via OData and Copernicus Browser (March–April),
- Publishing of Sentinel-2 global quarterly mosaics (2022–2024) and Sentinel-1 monthly mosaics (June–July),
- Providing access to Landsat-8 Level1 and Landsat-9 Level 1 data (2022–2024) via S3 interface (August–December),
- Publication of new expert-level datasets, such as auxiliary and engineering products for Sentinel-1, Sentinel-3, Sentinel-5P, and Sentinel-6 (second half of 2024).

Across the year, eight out of twelve months had average traffic levels above 29 Gbps, indicating consistent demand and efficient scaling of network resources. This consistent trend, driven by intensive platform development and user activity, underscores the success of CDSE's first full operational year and its readiness for continued growth and the incorporation of new satellite data in 2025 and beyond.

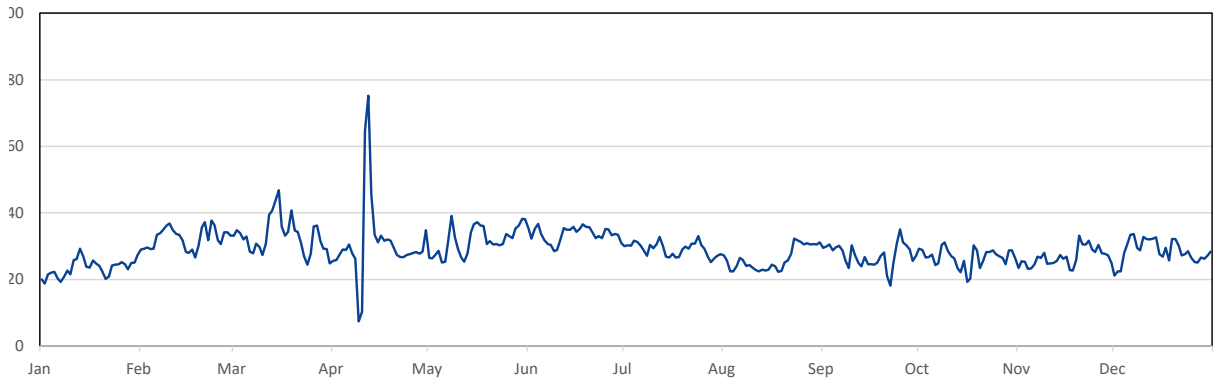


FIGURE 93: The daily outgoing traffic in Gbps in 2024.

11.3. Publication timeliness

Timely access to Earth observation (EO) data is essential for the performance of the CDSE, especially for services and applications that rely on near real-time data. Monitoring average publication timeliness provides insight into the efficiency of the data flow from acquisition to user availability.
Publication timeliness is the time between when a satellite acquires data and when that data becomes available on the CDSE platform. This process is influenced by various mission-specific factors, including the orbit point of image sensing, the geographical position of the receiving antenna, and factors such as on-board data latency (i.e. the time between acquisition and data transmission to ground), the availability of auxiliary data required for processing, and the subsequent stages of data publication. Any interruption in this sequence, whether technical or operational, has the potential to impact the overall timeliness of data publication.

User-level data are divided into three timeliness categories: Near-Real Time (NRT), Short-Time Critical (STC), and Non-Time Critical (NTC). Each category, within a given mission, is associated with specific expectations regarding how quickly the data should be published. These requirements may vary depending on the mission, instrument, or product level. It is important to note that the requirements for each timeliness category may not apply to an individual operation and may change over the course of an operation's lifetime. A detailed, up-to-date breakdown of timeliness requirements is shown below.

- **Sentinel-1:**
  - **NRT** and **NTC**: within 24 hours from sensing.
  - **STC**: not applicable.
- **Sentinel-2:**
  - **NTC** within 24 hours from sensing.
  - **NRT** and **STC**: not applicable.
- **Sentinel-3:**

  NRT:
  - **OLCI, SLSTR** and **SRAL**: less than 3 hours after acquisition.
  - **SYNERGY**: not applicable.

  STC:
  - **SRAL** and **SYNERGY**: less than 48 hours after acquisition.
  - **OLCI** and **SLSTR**: not applicable.

  NTC:
  - **OLCI, SLSTR, SRAL** and **SYNERGY**: less than 30 days from acquisition.
- **Sentinel-5P:**

  NRT:
  - **Level-1B** and **Level-2**: within 3 hours from sensing.

  NTC:
  - **Level-1B**: within 24 hours from sensing.
  - **Level-2**: within 14 days from sensing.

Mission	Timeline category		
	NRT	STC	NTC
S1	< 3 hours	-	< 24 hours
S2	-	-	< 24 hours
S3-OLCI	< 3 hours	-	< 30 days
S3-SLSTR	< 3 hours	-	< 30 days
S3-SRAL	< 3 hours	< 48 hours	< 30 days
S3-SYNERGY	-	< 48 hours	< 30 days
S5P-L1B	< 3 hours	-	< 24 hours
S5P-L2	< 3 hours	-	< 14 days

TABLE 43: Reference timeliness thresholds for user-level data publication by mission.

Table 44 presents the average publication timeliness for user-level data across Sentinel missions, based on values recorded over the last three months of the 2024 reporting period. The columns entitled „Increase/Decrease“ reflect the difference in the mean publication time in comparison with the same interval in 2023. A minus sign (–) indicates an improvement, i.e., a reduction in publication time, while a plus sign (+) denotes an increase, suggesting a delay in data publication.

Mission	Average timeliness for NRT	Increase/ decrease since Y2023	Average timeliness for NTC	Increase/ decrease since Y2023	Average timeliness for STC	Increase/ decrease since Y2023
S1	1h 26m	+4m	3h 17m	-21m	-	-
S2	-	-	3h 57m	-1m	-	-
S3-OLCI	1h 54m	-8m	18h 34m	-39m	-	-
S3-SLSTR	1h 48m	-14m	1d 2h 55m	-17m	-	-
S3-SRAL	1h 59m	-9m	25d 3h 47m	-10m	1d 15h 44m	+1h 27m
S3-SYNERGY	-	-	1d 9h 5m	-59m	7h 43m	-38m
S5P-L1B	59m	-6m	3h 20m	-31m	-	-
S5P-L2	1h 10m	-6m	2d 21h 29m	+14h 33m	-	-

TABLE 44: Average publication timeliness over last trimester of 2024 and comparison with last trimester of 2023.

The subsequent sections provide a detailed comparison of the average publication times and highlight trends based on timeliness category per Sentinel mission.

Sentinel-1:

In 2024, the classification of publication timeliness categories for user-level Sentinel-1 data was categorized into two levels: Near-Real Time (NRT) and Non-Time Critical (NTC). Conversely, the CDSE Annual Report 2023 grouped all Sentinel-1 products under a single NTC category. In order to enable meaningful year-on-year comparisons, the 2023 data had to be recalculated and reclassified according to the new structure.

As for the Sentinel-1 NRT data, the average publication time for products was 1 hour and 26 minutes – slightly longer than the previous year's value, by just 4 minutes (Table 44). Despite this minor increase in the overall average, all monthly averages throughout the year remained well within the 24-hour threshold. The highest value, reaching 2.72 hours, occurred in April and was linked to the brief service unavailability described above, which was followed by a surge in network activity after system recovery. It is interesting to note that a peak occurred in the publication timeliness at the same point in 2023. That increase, however, was caused by an anomaly affecting the Production Interface Point Server (PRIP), which led to delays in publishing Sentinel-1 NRT and NTC products and consequently extended the publication times. August and October saw the lowest average publication delays, averaging 0.93 and 0.97 hours. These results reflect a steady and efficient publication trend, with minimal fluctuations over the course of the year (Figure 94).

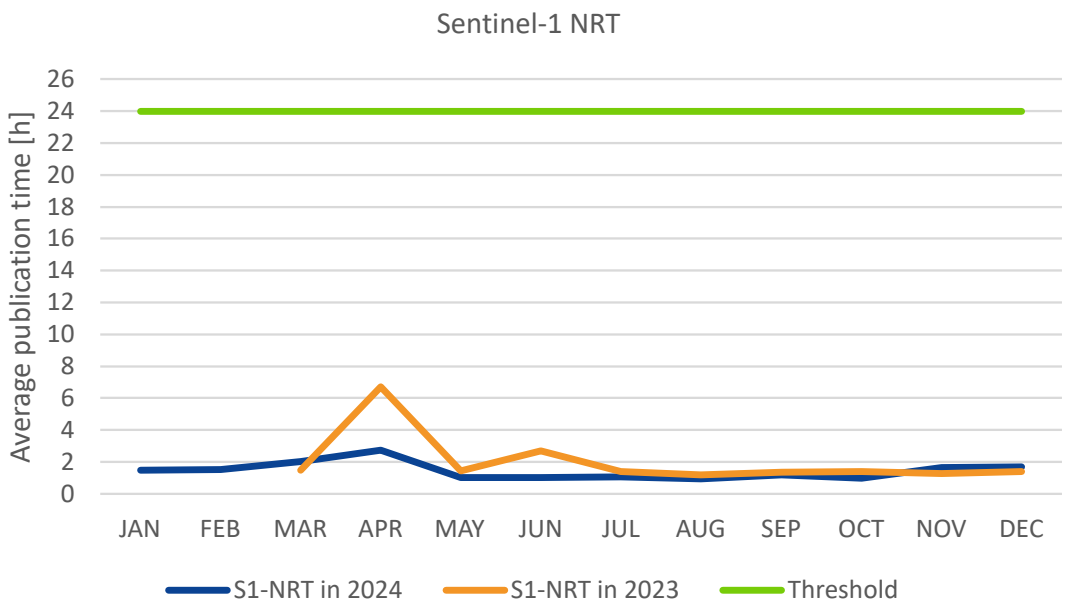


FIGURE 94: Monthly Average Publication Timeliness for Sentinel-1 NRT user-level data during 2024.

During the last trimester of 2024, Sentinel-1 NTC data was published in an average of 3 hours and 17 minutes, marking a 21-minute improvement over the same period the year before (Table 44). The peak value occurred in April with 4.72 hours, while the shortest publication time was achieved in July – 2.75 hours. October and June also recorded low averages of just over 3 hours. Overall, these figures reflect stable operational performance throughout the year for Sentinel-1 NTC data (Figure 95).

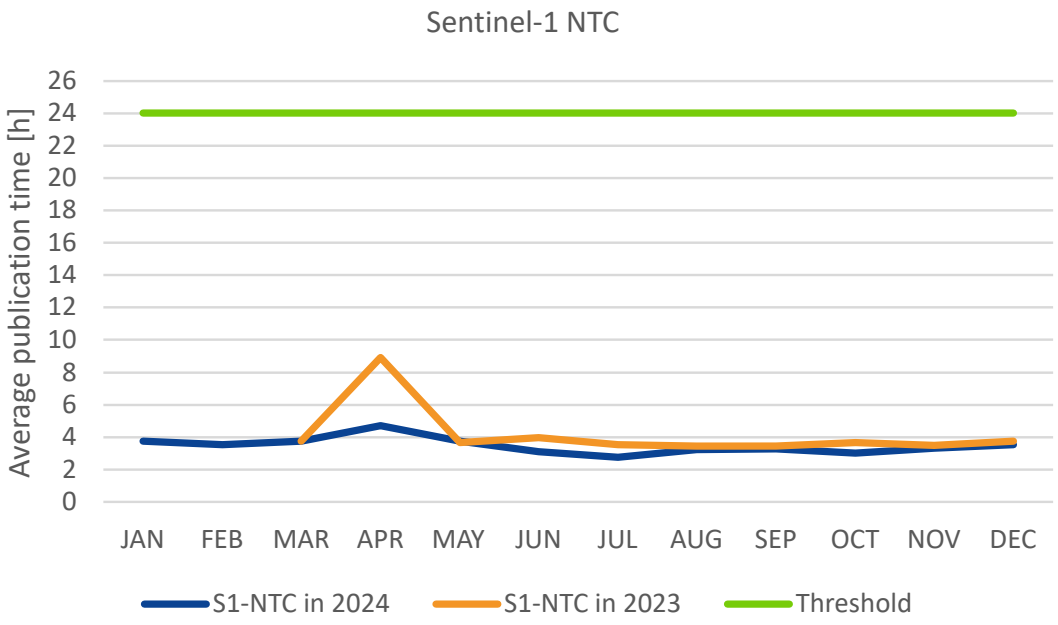


FIGURE 95: Monthly Average Publication Timeliness for Sentinel-1 NTC user-level data during 2024.

Sentinel-2:

Timeliness metrics for Sentinel-2 user-level data during the final trimester of 2024 was on average 3 hours and 57 minutes. This value is almost equal to the corresponding period in 2023, showing only an unrecognizable difference of a single minute (Table 44). Although the average suggests consistent performance, a closer look at the monthly breakdown reveals notable shifts throughout the year.

Publication times stayed below the 24-hour limit the entire year, showing that the system operated reliably and efficiently. Seamless performance was particularly observed in December (3.43 hours), November (3.72 hours), and February (3.73 hours), when timeliness figures were lowest and consistent. In contrast, August and September stood out with significantly higher publication times – 10.93 hours and 14.20 hours, respectively. Those temporary anomalies were caused by delays in product publication at the data source, which affected the overall end-to-end timeliness. Importantly, even higher values remained within the expected range and were followed by a return to optimal performance in the final quarter of the year. (Figure 96)

In summary, it is worth highlighting that the timeliness goal was achieved despite periodically occurring disruptions that were clearly identified as factors external to the CDSE publication process.

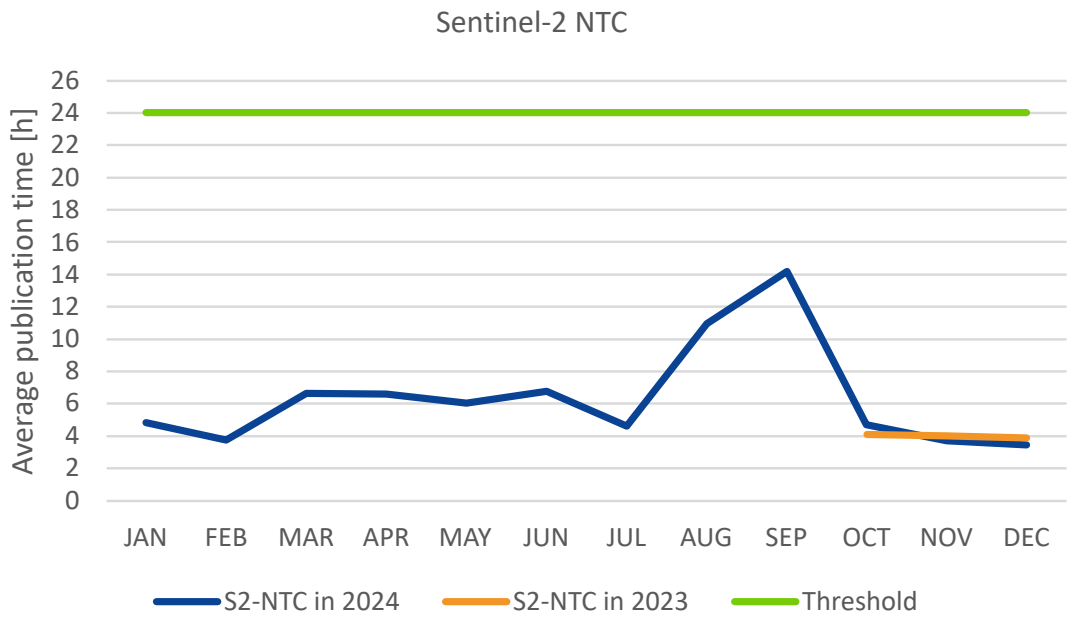


FIGURE 96: Monthly Average Publication Timeliness for Sentinel-1 NTC user-level data during 2024.

Sentinel-3:

Across all instruments (OLCI, SLSTR, and SRAL), the average publication timeliness for Sentinel-3 NRT data in the final trimester of 2024 consistently met the 3-hour requirement. The respective averages for this period were 1 hour and 54 minutes for OLCI, 1 hour and 48 minutes for SLSTR, and 1 hour and 59 minutes for SRAL. These figures represent slight improvements over 2023, with decreases of 8, 14, and 9 minutes, respectively. (Table 44)

Monthly numbers generally remained below the threshold when seen over the course of the year. March and April were the only months when each instrument came close to or surpassed the 3-hour mark (Table 45). This is a notable time reduction over 2023, particularly in April when publication delays were over six hours due to an unexpected anomaly in the PRIP cluster. In general, the trend for NRT data points to quicker publication times, especially in the second half of the year. Figure 97, which is based on the exact numbers in Table 45, illustrates this trend by presenting the monthly publication averages across 2024.

Sentinel-3 NRT			
Month	Average publication time [h] per instrument		
	OLCI	SLSTR	SRAL
JAN	1.85	1.85	1.98
FEB	1.90	1.85	1.92
MAR	3.10	3.00	3.05
APR	3.05	2.78	2.30
MAY	2.00	1.72	1.88
JUN	2.00	1.72	1.88
JUL	2.05	1.77	1.93
AUG	1.95	1.70	1.87
SEP	1.97	1.78	1.88
OCT	2.13	1.98	2.17
NOV	1.87	1.77	1.95
DEC	1.72	1.65	1.82

TABLE 45: Monthly Average Publication Timeliness for Sentinel-3 NRT user-level data during 2024.

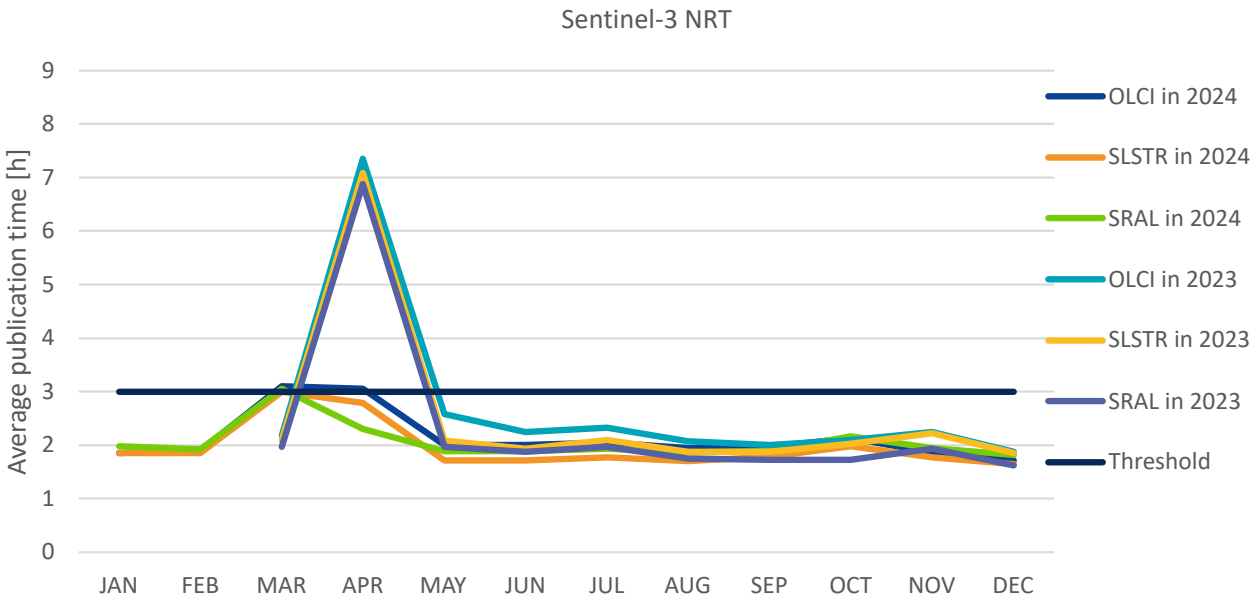


FIGURE 97: Monthly Average Publication Timeliness for Sentinel-3 NRT user-level data during 2024.

The average timeliness for NTC products across Sentinel-3 instruments persisted significantly below the 30-day threshold throughout 2024. According to the collected metrics, the average publication times were as follows: 8 hours and 34 minutes for OLCI; 1 day, 2 hours, and 55 minutes for SLSTR; and 1 day, 9 hours, and 5 minutes for SYNERGY. The most notable improvement was observed with SYNERGY products, for which the average publication time was shortened by nearly one hour. OLCI and SLSTR saw smaller, yet still positive, reductions of 39 and 17 minutes compared to 2023. (Table 44)

Month-by-month analysis supports these findings, indicating a high level of consistency in delivery times. The differences across months were minor, with slight seasonal differences and no significant variations from the average that would suggest unusual events or disruptions in the data publication process. Additionally, a noteworthy improvement in publication times for all Sentinel-3 products was observed in April 2024 compared to the same period the previous year (with reductions ranging from approximately 5.6% to 18.0%). (Figure 98)

SRAL NTC data represent a separate case. They operate on a significantly longer publication cycle and are displayed on a dedicated chart due to the extended time scale (Figure 99). The average publication time for this dataset was consistently around 25 days and three to four hours per month, staying within the 30-day threshold (Table 44).

A temporary increase in April was observed and can be linked to the short period of system unavailability that month. Other than that, year-on-year changes were minimal, reflecting the products' inherently prolonged publication timeline.

Sentinel-3 NTC				
Month	Average publication time [h] per instrument			
	OLCI	SLSTR	SRAL	SYNERGY
JAN	18.88	27.05	603.97	33.68
FEB	18.90	27.60	603.85	33.75
MAR	19.80	27.75	603.77	34.50
APR	20.30	30.50	605.60	35.68
MAY	19.50	26.92	603.72	34.42
JUN	18.62	26.68	604.12	33.12
JUL	21.17	27.48	603.77	35.87
AUG	18.58	26.67	603.68	32.97
SEP	19.45	27.45	604.13	33.85
OCT	18.93	27.18	603.97	33.47
NOV	18.45	26.58	603.67	33.00
DEC	18.32	27.00	603.73	32.77

TABLE 46: Monthly Average Publication Timeliness for Sentinel-3 NTC user-level data during 2024.

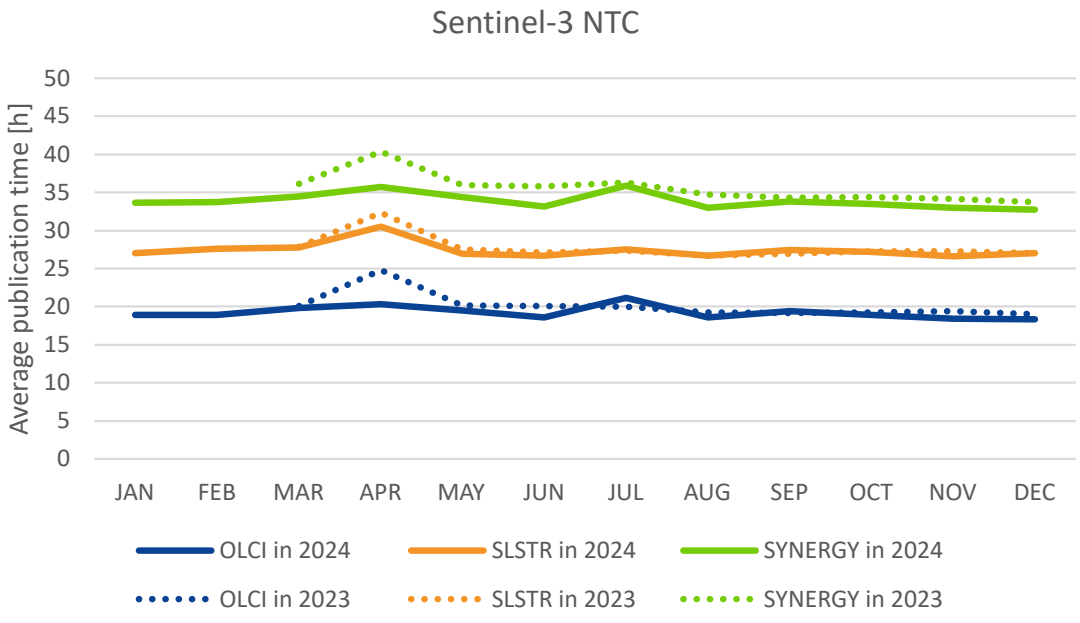


FIGURE 98: Monthly Average Publication Timeliness for Sentinel-3 NTC (OLCI, SLSTR, SYNERGY) user-level data during 2024.

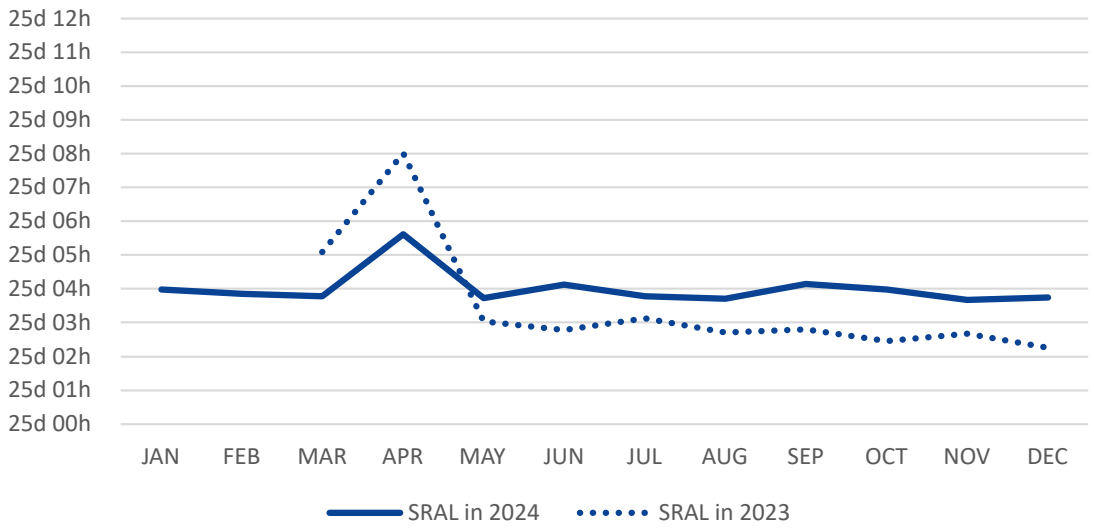


FIGURE 99: Monthly Average Publication Timeliness for Sentinel-3 NTC (SRAL user-level data during 2024).

In 2024, publication timeliness for Sentinel-3 STC, covering SRAL and SYNERGY products, fell within the 48-hour threshold. In the last trimester, SRAL data had an average publication time of 1 day, 15 hours, and 44 minutes – close to the defined limit but still compliant. SYNERGY products were delivered much faster, with an average time of 7 hours and 43 minutes. Compared to the same period in 2023, SYNERGY improved by 38 minutes, while SRAL publication time increased by 1 hour and 27 minutes, indicating a slight downward trend in timeliness performance (**Table 44**). It should be noted that the 2023 CDSE Annual Report (Table 47) contained an inaccurate figure for the average publication time of Sentinel-3 SRAL STC data. The revised value is 1 day, 14 hours, and 17 minutes, rather than 1 day, 15 hours, and 55 minutes, as previously stated.

Monthly breakthrough publication times across the entire year were stable with minor fluctuations. SRAL data ranged from 39 to 44 hours, while SYNERGY products ranged from 7 to 9 hours (**Table 47**). Both metrics peaked in April, which may be linked to the temporary infrastructure failure that occurred mid-month. However, the highest values were still within the expected limit. When compared to 2023, SRAL products experienced slightly longer publication times across most months, while SYNERGY saw a general improvement. Consequently, these results indicate a reliably managed publication process with no significant anomalies across individual months, except for April. (**Figure 100**)

Month	Sentinel-3 STC Average publication time [h] per instrument	
	SRAL	SYNERGY
JAN	39.78	7.92
FEB	40.28	7.98
MAR	42.98	8.78
APR	44.15	9.93
MAY	41.15	9.12
JUN	39.53	8.13
JUL	39.53	7.97
AUG	39.47	7.72
SEP	39.88	8.38
OCT	40.07	8.03
NOV	39.62	7.70
DEC	39.50	7.42

TABLE 47: Monthly Average Publication Timeliness for Sentinel-3 STC user-level data during 2024.

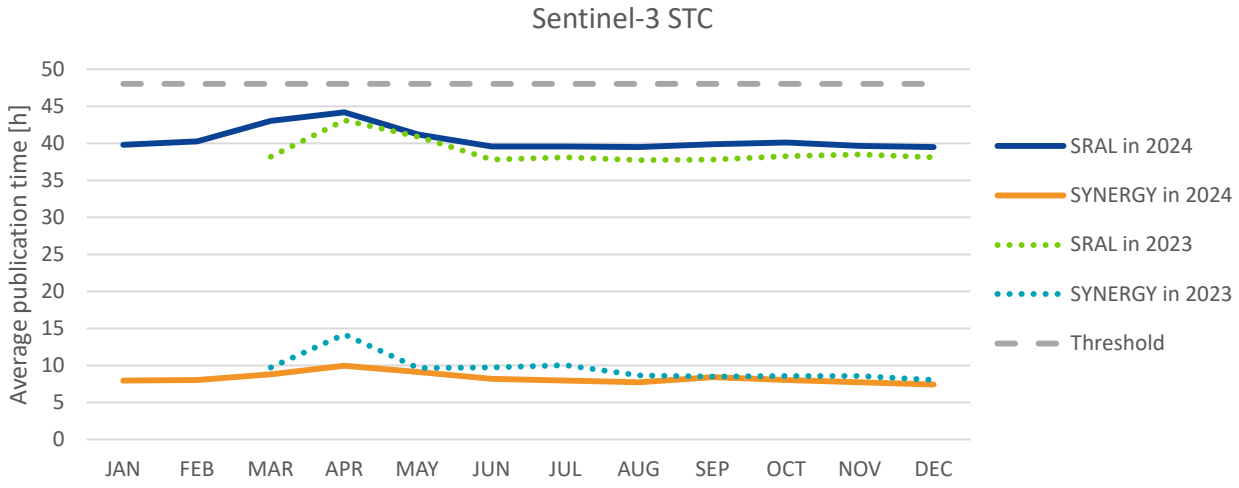


FIGURE 100: Monthly Average Publication Timeliness for Sentinel-3 STC user-level data during 2024.

Sentinel-5P:

For Sentinel-5P Level 1B and Level 2 NRT products, a highly stable and efficient timeliness was maintained throughout 2024. Based on Table 44, the average availability time in the final trimester was 59 minutes for L1B and 1 hour 10 minutes for L2, both reflecting a 6-minute uptick compared to the same period in 2023. Monthly values confirm this consistency, with mean publication times well below the 3-hours threshold, oscillating narrowly between 0.90 and 1.30 hours for L1B and between 1.05 and 1.43 hours for L2 (Table 48). Notably, 2024 did not experience the kind of disruption seen in June 2023, when a change in the data source combined with the parallel ingestion of historical products led to a temporary increase in L1B publication time to over 48 hours. (Figure 101)

Sentinel-5P NRT		
Month	Average publication time [h] per instrument	
	L1B	L2
JAN	0.98	1.18
FEB	1.05	1.27
MAR	1.05	1.22
APR	1.30	1.43
MAY	1.08	1.25
JUN	1.10	1.27
JUL	1.10	1.25
AUG	1.10	1.27
SEP	1.03	1.25
OCT	1.05	1.23
NOV	1.00	1.20
DEC	0.90	1.05

TABLE 48: Monthly Average Publication Timeliness for Sentinel-5P NRT user-level data during 2024.

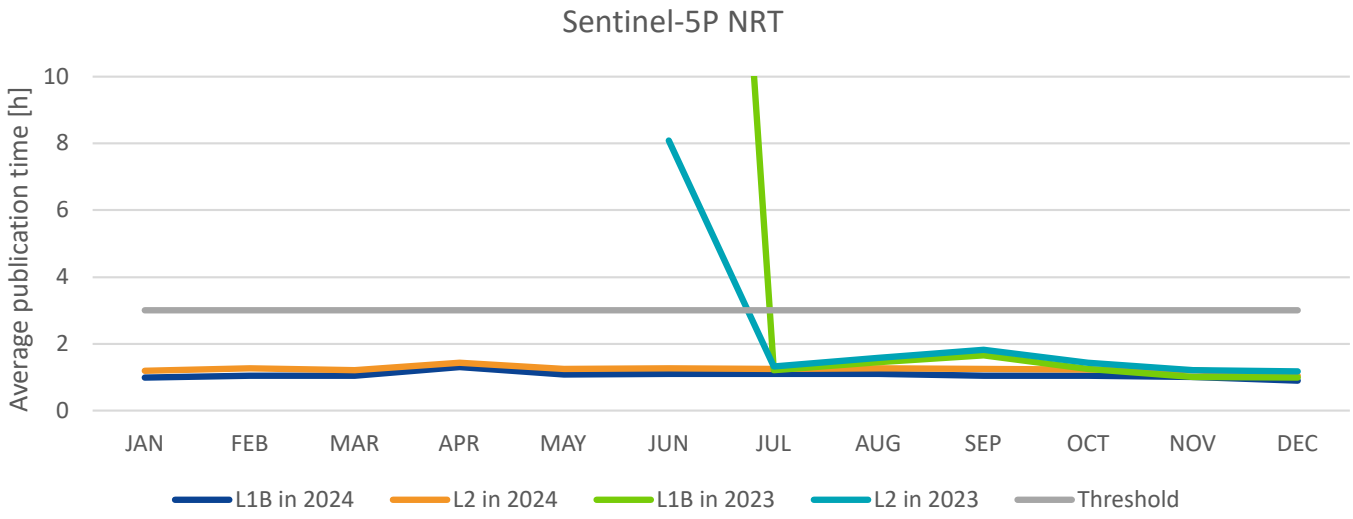


FIGURE 101: Monthly Average Publication Timeliness for Sentinel-5P NRT user-level data during 2024.

Considering Non-Time-Critical (NTC) data for Sentinel-5P, Level 1B products showed a very stable trend across all months, with publication times ranging from 3.5 to 5.5 hours. In fact, the average delivery time was far below the 24-hour permissible limit, reaching only about one-third of it, which highlights the reliability of the process. (Table 44)

Level 2 products in the NTC line, although consistently delivered within the broader 14 days window, displayed more fluctuation. Higher values appeared in June (86.2 h), August (90.7 h), and November (77.3 h), likely impacted by minor technical issues, such as slowdowns in the ingestion queue or delays in internal processing flows. A further cause of delay was the parallel ingestion of reprocessed products, which temporarily increased the system load in addition to regular operational data publication. Increased delays were also linked to missing metadata for source products, a known issue that affected publication in 2023 as well. Similar known issues that had also affected publication in 2023. Even with these occasional peaks, most values stayed well under the limit and an average close to half the required criteria of 120 hours. (Table 49 and Figure 102)

Sentinel-5P NTC		
Month	Average publication time [h] per instrument	
	L1B	L2
JAN	4.52	55.65
FEB	3.53	57.52
MAR	4.80	62.02
APR	4.58	73.17
MAY	4.52	61.13
JUN	4.55	86.23
JUL	4.48	65.10
AUG	5.48	90.70
SEP	3.97	60.30
OCT	3.72	75.05
NOV	5.37	77.32
DEC	3.60	56.08

TABLE 49: Monthly Average Publication Timeliness for Sentinel-5P NTC user-level data during 2024.

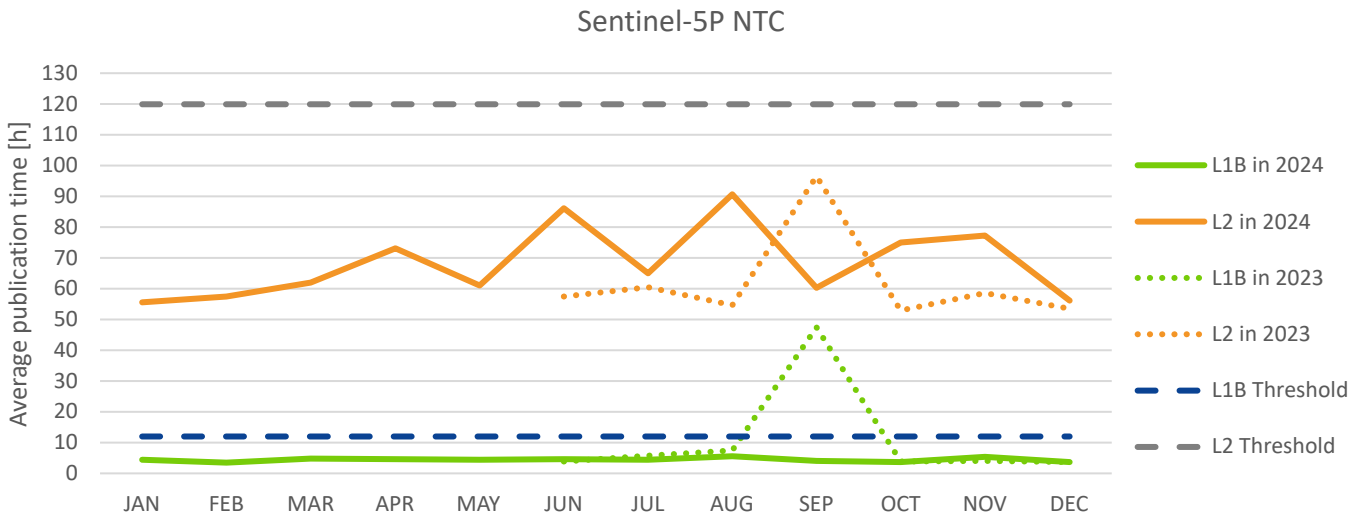


FIGURE 102: Monthly Average Publication Timeliness for Sentinel-5P NTC user-level data during 2024.

12 END-USER SUPPORT AND FEEDBACK

User feedback is continuously monitored to ensure our data access service meets expectations and to quickly address any issues. Users can easily reach the user support help centre via the CDSE web portal (https://helpcenter.dataspace.copernicus.eu/hc/en-gb), and are encouraged to contact support using ‚Submit a request. This support is available to users of all expertise levels in the EO industry, public administration, and academic community.

We have established five pillars of support for our users. Each year, we assess user experiences using the insights gathered from our CDSE Annual Satisfaction Survey.

12.1. The five pillars of the CDSE user support

The CDSE user support is based on five pillars: the FAQ collection, the documentation portal, the user helpdesk, community forum, and video tutorials (Figure 103).

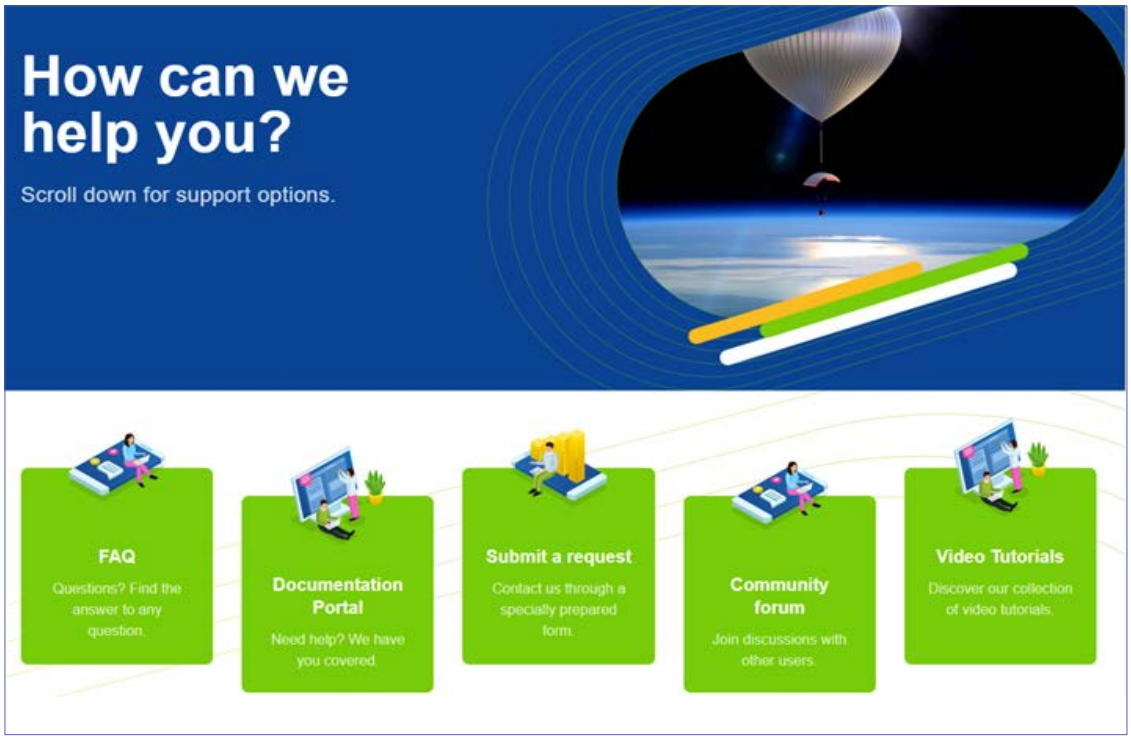


FIGURE 103: The five-pillar structure of the user support.

FAQ

The FAQ section continually gathers the most common problems, questions, and use cases. While there is already a substantial collection available, it is continuously evolving. The FAQ page is designed provide quick answers to common questions and queries.

Documentation portal

CDSE offers extensive documentation that provides end-users with insights into the comprehensive Earth Observation data collection and the various data access and processing capabilities. The documentation is a dynamic resource, continuously updated to provide the latest information.

Main sections of the documentation:

- Data: Users can explore large amounts of open and free Earth Observation datasets, including Sentinel Data, Copernicus Contributing Missions, Federated Datasets, and Complementary Data, with detailed information.
- APIs: Users can find the perfect interface for their needs in our suite of APIs. Whether they seek catalogue access, product downloads, data visualization, or processing capabilities, our offerings encompass a range of options, including S3, STAC, openEO, and Sentinel Hub APIs.
- Applications: User can learn how to simplify their satellite data journey and engage with data using our user-friendly applications for searching, visualizing, modifying, and downloading data effortlessly.
- Quotas and Limitations: Users can get to know the quotas and limitations that come with their user type and plan their data download and processing pipelines accordingly.

If users have any questions that remain unanswered on this portal, they are always encouraged to contact the CDSE Support team (Documentation – support (copernicus.eu)), who is ready to assist anytime.

Submitting a request

The User Helpdesk is responsible for end-user support, including the follow-up of any requests logged by end-users using the CDSE. The objective of the helpdesk service is to ensure a positive end-user experience in request follow up. End-users of the Copernicus Data Space Ecosystem (CDSE) have two options to contact the Helpdesk, depending on their registration status and the nature of their inquiry:

1. General Inquiries

Users who are not registered and have general questions can submit their inquiries via the webform available on the About Copernicus Data Space Ecosystem page (https://dataspace.copernicus.eu/about#contact-form)

2. Technical Inquiries

For technical issues or questions, users are required to register and then submit a request through the User Support Help Center (https:// helpcenter.dataspace.copernicus.eu/hc/en-gb).The dedicated request form allow users to specify the nature of their query (e.g., data offerings, analysis tools, APIs, etc.). Once logged in, users can:

- Track their submitted requests directly through their account, and
- Follow related email conversations via support@dataspace.copernicus.eu.

The technical inquiries from CDSE registered users are tracked via a ticketing system, sorted into five main categories and 18 subcategories according to the following Service Catalogue:

Data Offering
- Copernicus and Sentinel Data
- On Demand and Commercial Data
- Copernicus Contribution Missions
- Federated Data Sets

Analysis Tools
- Copernicus Browser
- Marketplace
- JupyterLab
- Data workspace and On-Demand processing
- openEO
- Dashboard
- Traceability service

API's
- Catalogue and download API's
- openEO
- Sentinel Hub
- Traceability
- On demand production

Ecosystem
- Commercial services
- Public services

Other

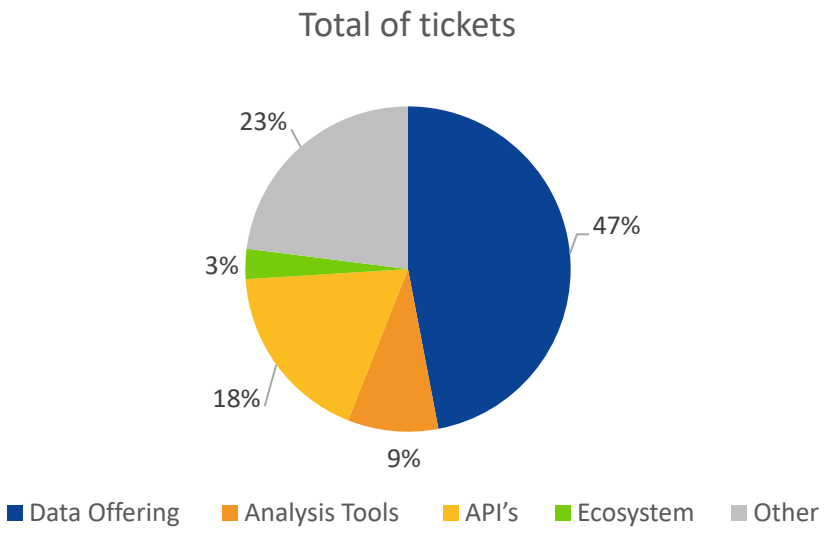


FIGURE 104: Percentage of each category of tickets received.

In **2024**, the CDSE helpdesk received a total of **2,029** tickets. Of these, **99.4%** were resolved within the nominal threshold resolution time of 5 normal working days. The average resolution time for solved tickets was 8.7 hours. Only **12** tickets required a longer resolution time, due to their complexity.

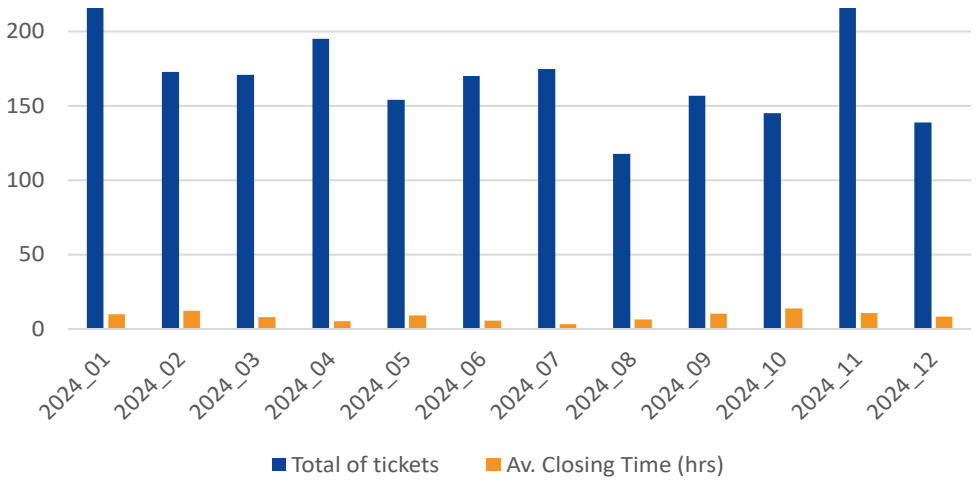


FIGURE 105: Total number of tickets received per month and average closing time (hrs).

Communities around the CDSE

With the increase in registered users, there is a great opportunity for flourishing user communities. CDSE is proud of the existing EO communities and envisions significant growth in the coming years. To support this, CDSE is continuously improving the forum environment (https://forum.dataspace.copernicus.eu) according to the user needs, creating a user-friendly space where end-users can share their experiences with others. Building a top-notch user forum community is a key objective for CDSE.

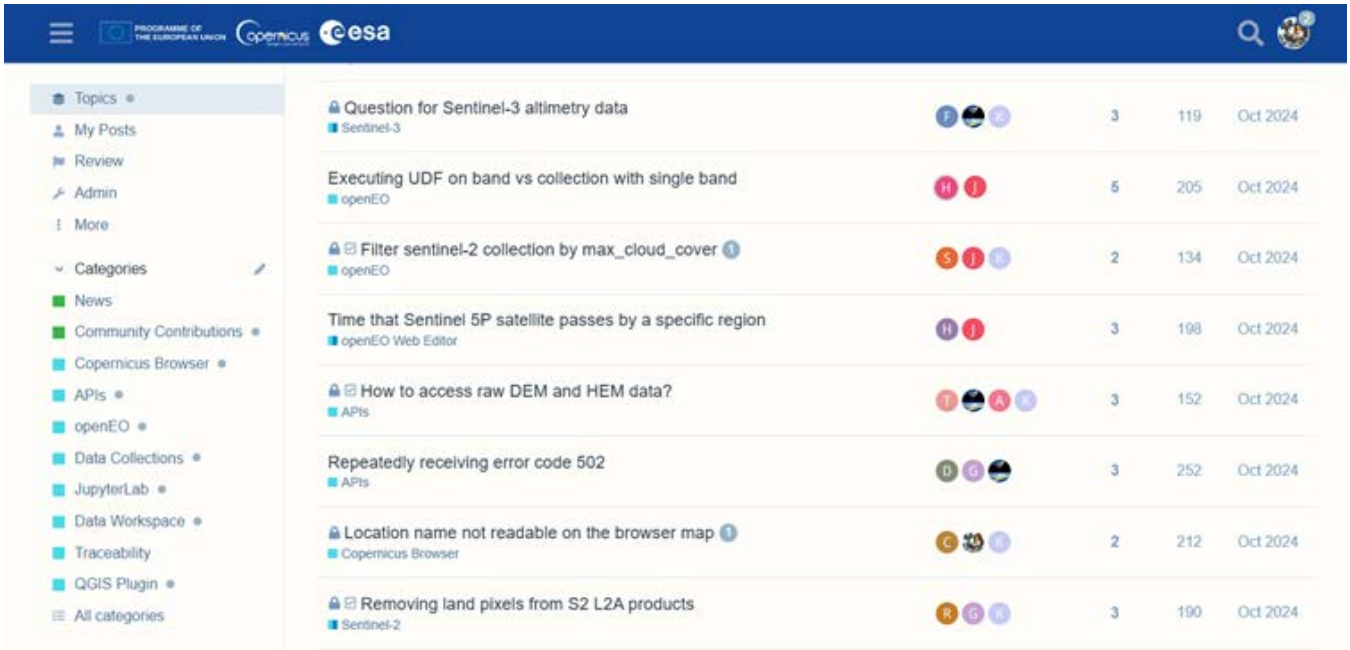


FIGURE 106: CDSE Forum environment.

Video tutorials

The Copernicus Data Space Ecosystem offers several videos about features, tutorials and highlights that demonstrate the use of the Ecosystem. These videos (https://dataspace.copernicus.eu/videos) cater to both EO professionals building scientific or business solutions and members of the public interested in remote sensing. User can access several introductory videos directly via CDSE or via the YouTube channel. The video section is constantly extended based on user feedback and requests.

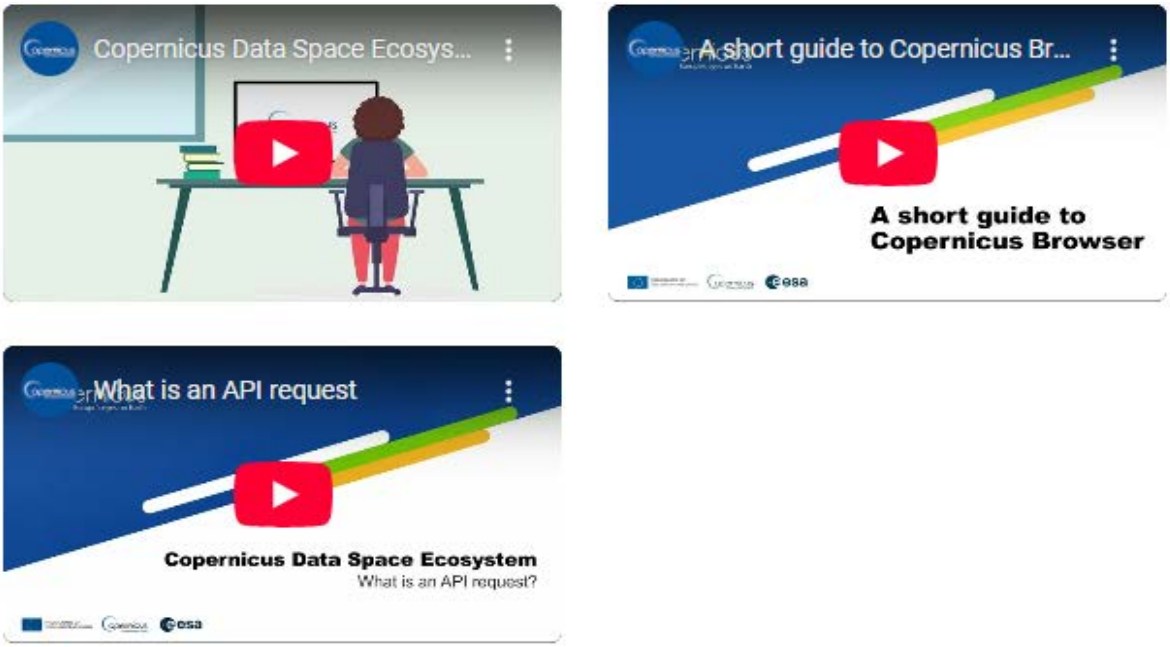


FIGURE 107: Total number of tickets received per month and average closing time (hrs).

12.2. User satisfaction

The CDSE consortium organized its first User Review Meeting on April 15, 2024, both, onsite in Vienna and online. This hybrid event aimed to enhance the CDSE through valuable user insights. The User Review Meeting was crucial for shaping the future, fostering innovation, and meeting the evolving needs of the users.

Prior to the event, a User Review Survey was distributed among the user groups, and the results were analyzed and presented at the meeting.

Helpdesk Performance

The CDSE helpdesk has implemented a satisfaction rating system to better evaluate ongoing services and understand user needs, with the goal of continuous service improvement.

After a support ticket is resolved, users are invited to submit their satisfaction feedback by indicating either a positive or negative experience and, if desired, providing an additional comment for context. Since feedback is voluntary, not all users choose to participate.

The graph below presents the number of tickets received each month in 2024, along with the number of positive and negative ratings submitted through the feedback system.

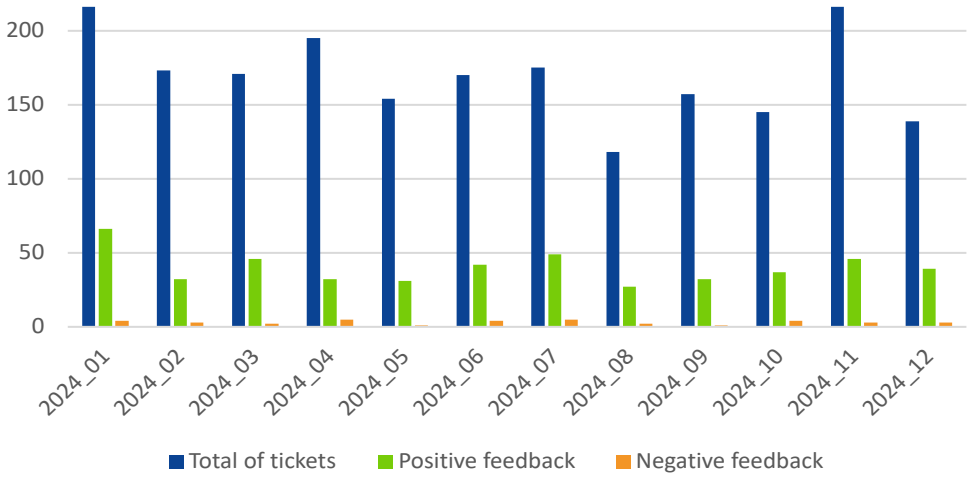


FIGURE 108: CDSE User Helpdesk tickets and feedback 2024. The total number of tickets received by support (blue), with positive ratings (green) and negative ratings (orange).

13 SUSTAINABILITY

The European Commission (EC) has made it a top priority to cut its greenhouse gas (GHG) emissions by 46% by 2030 compared to 2019 levels and to reduce the environmental footprint of its programmes and activities. In this context, ESA is committed to taking a proactive stance in assessing the environmental sustainability of its services and products while identifying further actions to mitigate their environmental effects. One of the key methods for this assessment is carbon footprint analysis.

ESA considers the long-term well-being of future generations across environmental, economic, and societal dimensions, aligning with the three pillars of sustainability. The "ESA Agenda 2025" was adopted in 2021 and defines the priorities as well as the vision until the year 2025. This agenda made it clear that ESA seeks to strongly contribute to the carbon neutrality of Europe. The political objectives set out in the Paris Agreement and the European Green Deal were specifically integrated into the ESA Agenda 2025.

13.1. Measuring scope and methodology

The calculation of the CDSE's sustainability is governed by T-Systems, ensuring the same methodology is used by the two major public cloud providers supporting the CDSE infrastructure, the Open Telekom Cloud (OTC) and the CloudFerro cloud (CFC).

The calculation focuses on:

- Scope 1 emissions (i.e., GHG emissions which result directly from within both companies – T-Systems and Cloud Ferro)
- Scope 2 emissions (i.e., indirectly caused from the use of purchased energy).

For this purpose, the energy consumption, input and output energy data of the hardware (servers, switches, routers) used for CDSE were collected from the data centres of the OTC and CloudFerro clouds.

13.2. Sustainability aspects of the Open Telekom Cloud

The OTC ensures sustainability because it helps its users to operate in a more environmentally friendly way. Thanks to scaling effects, optimized utilization, and a more energy-efficient infrastructure, cloud computing is significantly more sustainable than on-premises IT resources.

T-Systems is committed to green IT and sources 100% green electricity for the data centres of the OTC, and meets the requirements of the Climate Neutral Data Center Pact, which T-Systems joined in 2021. Its goal is to design and operate data centres in Europe in a way that they meet high sustainability requirements, for example through 100% carbon-free energy, server recycling, water conservation or heat recovery.

Thus, the data centres of the OTC require 30% less energy than comparable data centres. The decisive factor here is efficient power consumption, e.g. for servers and cooling systems, which the OTC continuously optimizes. The Power Usage Effectiveness (PUE) value in Aalsmeer and Almere, where the CDSE is hosted, is 1.46 and 1.40 respectively. Another factor in the sustainability of the data centres is that the emergency diesel power used in the event of a power outage is offset with CO_2 emissions certificates. Moreover, the heat emissions from the servers pre-heat the generators in a certified process, so no additional power is needed for this.

T-Systems overall has made significant strides/measures in reducing CO_2 emissions and ensure power-efficiency:

1. **Energy Efficiency:** The T-Systems data centres are one of the most energy-efficient in Europe, they have a Power Usage Effectiveness (PUE) of 1.3 – 1.5, consuming around 30% less energy than comparable data centres. This efficiency significantly reduces CO_2 emissions. In Aalsmeer and Almere, where the CDSE is hosted, the PUE is 1.46 and 1.40 respectively.

2. **Reduction in Data Centres:** T-Systems has reduced the number of its data centres globally from 89 to 13, while increasing compute and storage capacity by approximately 25 percent. This transformation has led to a 56% reduction in CO_2 emissions for computer centre operations.

3. **Renewable Energy:** Since 2021, T-Systems' electricity consumption has been fed 100% from renewable energies. The company aimed to achieve net zero for direct and indirect energy consumption by 2025.

4. **Waste Heat Recovery:** The majority of T-Systems' data centres use waste heat to heat office and storage areas, further improving energy efficiency.

5. **Cold Aisle Containment:** The T-Systems datacentre employs cold aisle containment with highly efficient airflow to optimize cooling and reduce energy consumption.

6. **Research and Development:** T-Systems has launched a research project at its datacentre in collaboration with the Fraunhofer Institute for Factory Operation and Automation (IFF) to develop measures for more sustainability such as improved cooling technology, the use of solar energy and wind power, or heat recovery. The goal is to create a net-zero energy data centre that no longer draws any energy from the public power grid and is powered solely by CO_2-neutral energy.

7. **Technology Partnerships:** T-Systems has partnered with Envision Digital to offer the EnOSTM net zero platform on T-Systems' Sovereign Cloud. This platform helps reduce energy consumption by up to 15 percent and provides transparent control over CO_2 emissions.

8. **T-Systems "susTain calculator":** as sustainability is part of the T-Systems and Telekom culture, we put enormous effort to into this subject, not only do we invest in our data centres but we also develop our employees in this matter, we are very proud about our achievements. T-Systems has a dedicated unit with teams of experts, and as a recent "innovation" we have developed our "susTain calculator", this is to support translate the data we calculate the CO_2.

9. **Resource-saving Data Centres:** Open Telekom Cloud meets the requirements of the Climate Neutral Data Center Pact, which T-Systems joined in 2021. Its aim is to design and operate data centres in Europe that meet high sustainability standards, for example by using 100% renewable energy, recycling servers, saving water, or recovering heat.

10. **Internationally Certified:** The OTC data centres are certified Gold Status by the U.S. Green Building Council, the highest award of the LEED (Leadership in Energy and Environmental Design) rating system. They are also ISO 14001 certified for the establishment and operation of their environmental management system.

13.3. Sustainability aspects of the CloudFerro Cloud

CloudFerro places a strong emphasis on sustainability by integrating eco-friendly practices into its cloud services. From reducing our carbon footprint to supporting green innovations, we strive to minimize our environmental impact while delivering cutting-edge IT solutions. We are taking a structured approach to environmental responsibility through dedicated policies and procedures that define our sustainability objectives and key performance indicators. These measures ensure that environmental considerations are an integral part of our operations and long-term strategy.

We design our solutions to minimize environmental impact and maximize energy efficiency by leveraging virtualization and reusing hardware components, extending equipment lifespan and ensuring responsible resource management. We also successfully carried out the Green Edge Processing (GEP) research project, developing an innovative technology for managing and distributing tasks within a distributed server infrastructure, powered by renewable energy sources, enhancing efficiency, sustainability and resource optimization. Our environmental policy is reviewed and updated annually to ensure continuous improvement, alignment with evolving sustainability standards, and the integration of best practices in energy efficiency and resource management.

Our commitment to reduce negative impact of our activities on environment includes, but is not limited to:

1. **Energy Efficiency:** All data centres in CloudFerro's portfolio strive to achieve the highest energy efficiency that is possible for a data centre. The PUE varies from 1,2 to 1,65.

2. **Renewable Energy:** CloudFerro's data centres have been continuously increasing renewable energy sources share in the energy mix, resulting in 99,5% in 2024, and forecasted to reach 100% in 2025.

3. **Energy Saving:** We have increased the % share of large 20-22TB disks on EO Data (DIAS) from 11% to over 35% by the end of 2024, replacing smaller 8TB disks. Our goal is to further increase this share from 35% to 53% of 20TB disks by the end of 2025, including multisite EO Data. We exclusively add large disks to EO Data or replace smaller disks at the end of their life cycle. Given that small and large disks consume a similar amount of power, this approach allows us to achieve nearly three times the energy savings and reduce the carbon footprint of storage by almost three times.

4. **Cybersecurity:** Our IaaS equipment is located in specialised neutral data centres designed in compliance with Tier III standard and certified for compliance with security standards (which is independent confirmation of implementing organisational and technical security measures). Data centres have redundant Internet connectivity and antiDDoS protection.

5. **Cold Aisle Containment:** All of our data centres use an energy-efficient cold aisle systems and purchase renewable energy.

6. **24/7 Support:** All services provided by CloudFerro are covered by an experienced and reliable support available in 24/7 mode.

7. **3R methodology – Reuse/Recover/Recycle:** we have introduced Waste Management Policy and Waste Management Procedure for all electronic equipment to make sure it is either reused, sold or donated, or in case it's not usable anymore, it is responsibly disposed, in compliance with legal and environmental standards.

8. **Sustainable Procurement and Supply Chain:** All our key suppliers have signed the Sustainable Procurement Policy and committed to fully comply with it till the end of 2025.

9. **Democratic data access:** Simplicity of EO data usage for all users is our priority, therefore we decided in 2024 to join STAC community and have been gradually adding catalogues since April 2025, with 120 added by far and strong commitment to continue in the following months and years.

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A Annex 1: Special Terms and Definition

Name	Definition
ArcGIS	ArcGIS is a family of client software, server software, and online geographic information system services developed and maintained by Esri. ArcGIS was first released in 1999 and originally was released as ARC/INFO, a command-line based GIS system for manipulating data.
CDSE	Copernicus Data Space Ecosystem. An open ecosystem that provides free instant access to a wide range of data and services from the Copernicus Sentinel missions and more on our planet's land, oceans, and atmosphere.
CREODIAS	The brand of the commercial service platform, that has been implemented in 2015, advanced to a Copernicus DIAS service in 2018 and since then has become the leading cloud-service platform for the user communities. It will provide the core platform for the new Copernicus Data Space services and the brand will be continued for the commercial services of the Copernicus Data Space, whereas the free and open services contracted by ESA will be provided through the linked Open Data Space.
EARSC	The European Association of Remote Sensing Companies is a membership-based, not for profit organisation which coordinates and promotes the activities of European companies engaged in delivering Earth observation-derived geo-information services. EARSC represents this sector in its broadest sense, creating a network between industry, decision makers and users and covering the full EO value chain from data acquisition through processing, fusion, analysis to final geo-information products & services.
Euro Data Cube	Euro Data Cube is a partnership between industry leading companies, working together to reduce the gap between data and knowledge, led by Sinergise and supported by ESA. It provides immediate access to analysis-ready data, various applications and tools for exploitation and a marketplace for third parties to foster collaboration. Users have access to free and commercial services with a public price list. Euro Data Cube also supports the ESA Rapid Action on COVID-19 programme (RACE).
Gaia-X	Gaia-X is an initiative that develops a software framework of control and governance and implements a common set of policies and rules that can be applied to any existing cloud/ edge technology stack to obtain transparency, controllability, portability and interoperability across data and services. The framework is meant to be deployed on top of any existing cloud platform that decides to adhere to the Gaia-X standard. Gaia-X is not a market operator, nor will it operate directly or exclusively any of the services required by the framework. Gaia-X services will be created, operated, and adopted by the market through operators deciding to adopt the Gaia-X standard.
GeoServer	GeoServer is an open-source server written in Java that allows users to share, process and edit geospatial data. Designed for interoperability, it publishes data from any major spatial data source using open standards.
IDS	The International Data Spaces Association (IDSA) is on a mission to create the future of the global, digital economy with International Data Spaces (IDS), a secure, sovereign system of data sharing in which all participants can realize the full value of their data.
Open Data Space (Portal)	The Open Data Space is the portal proposed to provide a neutral and free entry to the CSC Data Access Services in the Data Space provided by the Consortium. It could replace the Copernicus Open Access Hub and other portals currently providing the Data Access and e.g., continue the Copernicus branding and domain names.

Name	Definition
openEO	openEO is an H2020 project funded under call EO-2-2017: EO Big Data Shift, under grant number 776242. The project ran from Oct 2017 to Sept 2020. openEO developed an open API to connect R, Python, JavaScript, and other clients to big Earth observation cloud back-ends in a simple and unified way.
Open Telekom Cloud	The leading public cloud service in Europe based on the Open-Source Cloud Computing Infrastructure OpenStack. Open Telekom Cloud was launched in 2015 and meanwhile manages more than 500 Petabyte of customer data. Since 2018, Open Telekom Cloud provides the infrastructure and services for the Copernicus DIAS Mundi Web Services. Open Telekom Cloud is owned by Deutsche Telekom AG and operated by its 100% subsidiary T-Systems, in multiple data centers spread over two regions around Amsterdam (Netherlands) and Magdeburg (Germany).
QGIS	QGIS is a free and open-source cross-platform desktop geographic information system application that supports viewing, editing, and analysis of geospatial data.
Sentinel Hub	Sentinel Hub is an engine for processing of petabytes of satellite data. It is opening the doors for machine learning and helping hundreds of application developers worldwide. It makes Sentinel, Landsat, and other Earth observation imagery easily accessible for browsing, visualization and analysis. Scale your system globally with an intuitive and user-friendly interface, without any hassle.
STAC (Catalogue)	The Spatio-Temporal Asset Catalogue (STAC) specification provides a common language to describe a range of geospatial information, so it can more easily be indexed and discovered. A 'spatiotemporal asset' is any file that represents information about the earth captured in a certain space and time.
Swagger	Swagger is an Interface Description Language for describing RESTful APIs expressed using JSON. Swagger is used together with a set of open-source software tools to design, build, document, and use RESTful web services. Swagger includes automated documentation, code generation, and test-case generation.
Terrascope	Terrascope is the Belgian Collaborative Ground Segment hosting a multitude of cutting-edge services on top of Copernicus-based added value datasets. The platform is developed, hosted, and maintained by VITO.
WEkEO	WEkEO is the EU Copernicus DIAS reference service for environmental data, virtual processing environments and skilled user support. A platform operated by EUMETSAT.
Zendesk	Zendesk is the name of a company that provides software-as-a-service products related to customer support, sales, and other customer communications under the Zendesk brand.

B Annex 2: Abbreviation and Definition

Abbreviation	Definition
AARC	Authentication and Authorization for Research and Collaboration
AER	Archive Exploitation Ratio
API	Application Programming Interface
AOI	Area Of Interest
B2B2x	Business-to-Business (relation) that may also include the end-user (relations)
B2C	Business-to-Consumer (relation)
BCP	Baseline Price Component
BOC	Beginning of Contract
BIPR	Background Intellectual Property Rights
BM	Bare Metal (server)
CCM	Copernicus Contributing Missions / Complementary Missions
CDAS	Copernicus Data Access Services
CDSE	Copernicus Data Space Ecosystem
CDSA	Copernicus Data Space Attractiveness
CF	CloudFerro
CLS	Collect Localization Satellites
CMEMS	Copernicus Marine Environment Monitoring Service
CoIHub	Collaborative Hub
CoIIGS	Collaborative Ground Segment
CPU	Central Processing Unit
CSC	Copernicus Space Component
CSV	Comma Separated Values
DAD	Deferred Access Data / Deferred Available Data
DAPS	Dynamic Attributes Provisioning Service
DAT	Dynamic Attribute Tokens
DDoS	Distributed Denial of Service
DEM	Digital Elevation Model
DHR	Data Hub Relay
DHuS	Data Hub Software
DFT	Default timeliness
DIAS	Data and Information Access Services
DIL	Deliverable Items List
DLR	German Aerospace Center (Deutsches Zentrum für Luft und Raumfahrt)
DR	Disaster Recovery
DWDM	Dense Wavelength Division Multiplex
EARSC	European Association of Remote Sensing Companies
EC	European Commission
ECSS	European Cooperation on Space Standardization (ECSS standard)
EDRS	European Data Relay System

Abbreviation	Definition
EO	Earth Observation
EOSC	European Open Science Cloud
ESA	European Space Agency
ESRIN	European Space Research Institute
EU	European Union
GA	Geoscience Australia
GDPR	European General Data Protection Regulation
GIS	Geographic Information System
GML	Geography Markup Language
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GRD(H/M)	Ground Range Detected (High/Medium Resolution)
GRNET	Greek Research and Technology Network
GS	Ground Segment
GUI	Graphical User Interface
HA	High availability
HDD	Hard Disk Drive
HLOP	High Level Operations Plan
HSQL	HyperSQL (Database)
HTTP	Hypertext Transfer Protocol
IaaS	Infrastructure as a Service
IAD	Immediate Access Data / Immediate Available Data
IAM	Identity and Access Management
ICT	Information and Communication Technology
IDPS	Intrusion Detection and Prevention System
IDS-RAM	International Data Space Reference Architecture Model
IntHub	International Hub
IOCR	In Orbit Commissioning Review
IPF	Instrument Processing Facility
IPR	Intellectual Property Rights
ISRO	Indian Space Research Organisation
ITIL	IT Infrastructure Library
ITSM	IT Service Management
ITT	Invitation to Tender
KPI	Key Performance Indicator
LEO	Low Earth Orbit
LRM	Low Resolution Mode
LTA	Long Term Archive
MET-NO	Norwegian Meteorological Institute
ML	Machine Learning
MSI	Multispectral Instrument (Sentinel-2 instrument)

Abbreviation	Definition
MTU	Maximum Transmission Unit
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NASA	National Aeronautics and Space Administration
NOA	National Observatory of Athens
NOAA	National Oceanic and Atmospheric Administration
NRT	Near-Real Time
NTC	Non-Time-Critical
NWD	Normal Working Days
NWH	Normal Working Hours
OCN	Ocean (S-1 user-level data category)
OCP	Optical Communications Payload (for EDRS)
OData	Open Data Protocol
OBS	Object-based Storage
OCRE	Open Clouds for Research Environments
ODS	Open Data Space
ODP	On-Demand Production
OFFL	Offline
OGC	Open Geospatial Consortium
OLCI	Ocean and Land Color Instrument (Sentinel-3 instrument)
Open Hub	Copernicus Open Access Hub
OSF	Open-Source Framework
OSS	Open-Source Software
OTC	Open Telekom Cloud
OTS	Off the shelf
PAC	Processing and Archiving Centre
PaaS	Platform as a Service
PDS	Professional Data Space (using the CreoDIAS brand)
PDGS	Payload Data Ground Segment
PI-TDO	Performance Indicator to measure the trend in data sets offer in the Copernicus Data Space
PI-TSO	Performance Indicator to measure the trend in services offer in the Copernicus Data Space
PI-TSE	Performance Indicator to measure the trend in service event organized to foster growth of the Copernicus Data Space
PI-TUO	Performance Indicator to measure the trend in users onboarded in the Copernicus Data Space
PMBOK®	Project Management Body of Knowledge
PMI	Project Management Institute
PLRM	pseudo-LRM
POD	Precise Orbit Determination
PoP	Point-Of-Presence
PRIP	Production Interface delivery Points
PuP	PARC Universal Packet

Abbreviation	Definition
SaaS	Software as a Service
SIEM	Security Incident and Event Monitoring
SIN	Sinergise
SMP	Service Management Plan
QA	Quality assurance
R&D	Research and Development
RAID	Redundant Array of Independent Disks
RAM	Random-access memory
REST, RESTful	Representational state transfer (internet protocol)
RINEX	Receiver Independent Exchange Format
S3	Interface to operate Object Storage
S-1	Sentinel-1
S-2	Sentinel-2
S-3	Sentinel-3
S-5P	Sentinel-5 Precursor
SAFE	Standard Archive Format for Europe
SAR	Synthetic Aperture Radar
SARA	Sentinel Australasia Regional Access
ServHub	Copernicus Services Hub
SIEM	Security Information and Event Manager
SLA	Service Level Agreement
SLC	Single Look Complex
SLSTR	Sea and Land Surface Temperature Radiometer (Sentinel-3 instrument)
SME	Small and Medium Enterprise
SMOS	Soil Moisture and Ocean Salinity satellite
SOC	Security Operations Centre
SPOC	Single Point of Contact
SRAL	SAR Altimeter (Sentinel-3 instrument)
SSAU	State Space Agency of Ukraine
SSI	Self-Sovereign Identity
STAC	Spatio-Temporal Asset Catalogues
STC	Short Time Critical
STFC	Science and Technology Facilities Council
SYN	Synergy (Sentinel-3 user-level data type group)
TCI	True Color Image
TEC	Total Electron Content
TOA	Top Of Atmosphere
TROPOMI	TROPOspheric Monitoring Instrument (Sentinel-5P)
TSY / TSI	T-Systems
TT	Trouble Ticket
URL	Uniform Resource Locator

Abbreviation	Definition
USGS	United States Geological Survey
UTC	Coordinated Universal Time
VC	Verifiable Credentials
VLAN	Virtual Local Area Network
VM	Virtual Machine
WAN	Wide Area Network
WBS	Work Breakdown Structure
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
WMTS	Web Mapping Tiling Service
XML	Extensible Markup Language
ZAMG	Zentralanstalt für Meteorologie und Geodynamik

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PROGRAMME OF THE EUROPEAN UNION

PUBLISHER

T-Systems International GmbH
Hahnstraße 43d

D-60528 Frankfurt am Main

CONTACT

Mail: Copernicus@t-systems.com

DATASPACE.COPERNICUS.EU