
EuroGEO
GREEN DEAL
DATA SPACE
Analysing the pattern dynamics in Earth Observation Research & Innovation
#OneEuroGEO
COMBINE, COORDINATE, COOPERATE

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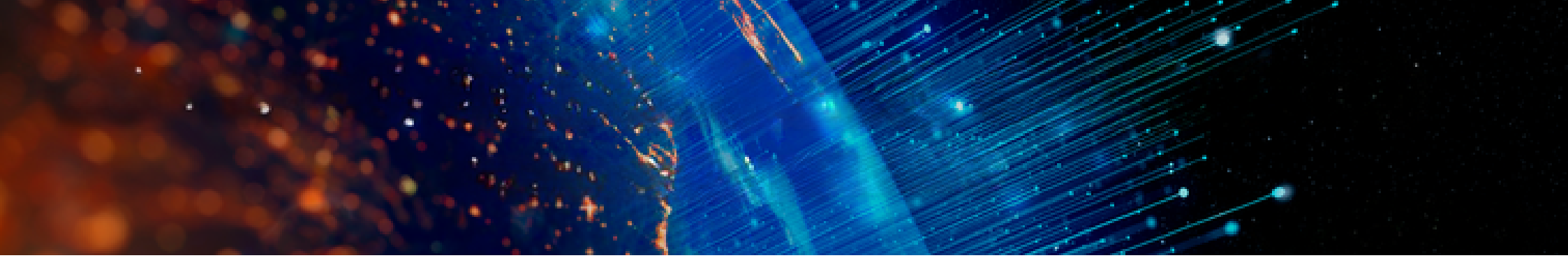


Introduction

In recent years, there has been an **increasing uptake of Earth Observation** (EO) as a tool in support of the implementation of various policies and the execution of a wide range of operational tasks. Users across the value chains of different sectors can utilise EO-based solutions in support of their work, **realising significant benefits** (economic, environmental, societal, etc.). Market demand for such solutions is driven by policies and sector-specific needs. Technological advances have the potential to enable solutions that match the specific needs.

EuroGEO, Europe's part of the Group on Earth Observation, stands at the intersection of research, policy, and markets. This **strategic position** allows it to identify and monitor relevant developments and trends, to engage stakeholders, and to assess the evolving EO landscape in Europe and beyond. Capturing insights relevant for the different stakeholders allows EuroGEO to document the current state of play of EO, its trajectory, and the required steps for broader adoption and increased benefits.

With the support of the ***EuroGEOSec*** **project**, and with the aim of **maximising the impact of Research and Innovation** (R&I), a dedicated effort has been made to establish the **R&I Observatory for Earth Observation** (RIO). This includes a team of analysts and an online tool to monitor and analyse past and ongoing R&I in EO in order to identify trends and support strategic decisions on future R&I activities. Relying on the RIO, the so-called **R&I State-of-Play Reports** are created presenting a concise overview of the policy context, technological perspectives, and market trends within the core application areas covered by the **EuroGEO Action Groups** (AG). This present report focuses on analysing patterns in the **Green Deal Data Space (GDDS) segment**. Research has been complemented by multiple other reports and studies, including studies performed by and for EuroGEO's GDDS-AG.

The aim of this report is to **support EuroGEO and its stakeholders in decision-making** regarding future work programmes and strategic innovation agendas (such as those of the Knowledge Centre on Earth Observation – KCEO), inform the review of the **EuroGEO Implementation Plan**, and contribute to the production of institutional outputs.

The following EuroGEO **Action Groups** develop application pilots/conduct other actions foreseen in the EuroGEO roadmap: Agriculture, Land Cover and Land Intelligence (LC&LI), Urban, Disaster Resilience and Health, Energy, Biodiversity, ecosystems and geodiversity (BEG), Marine, Climate, and Green Deal Data Space.

Methodology

The browser-based tool of the **R&I Observatory for Earth Observation** (RIO) allows retrieving relevant information from a variety of sources, including project information (e.g., descriptions, partners, budgets, results, timelines) for the majority of relevant European R&I programmes. Sources include information related to e.g., Horizon Europe (HE) and its predecessors, the LIFE programme, the Connecting Europe Facility, Eurostars, COSME, the European Defence Fund, and the European Defence Industrial Development Programme. Additional sources are being incorporated as part of the continuous development of the RIO.

The RIO structures the information into a standardised format for the uniform documentation of R&I activities. Functions of search, bookmarking, filtering, visualisation, and export allow the processing and analysis of the pre-curated information.

The focus of the analysis is on **mapping R&I efforts across segments** by analysing data on projects, core applications, budgets, and timelines. The full list of the analysed projects, filtered from the database of projects and mapped against segment-specific EO applications can be found in the original deliverable 🔗 . The segment's **core applications** have been identified and mapped based on the most prominent and important themes, as determined by the Action Group and its leads. They are derived from **AG expert studies** 🔗 – see the classification below:

- Data & Interoperability Foundation
- Governance, Trust & Architecture
- Integration with Broader Ecosystems & Scaling
- Pilots, Demonstration & Uptake
- Policy, Strategy & Recommendations
- Use-cases & Domain Coverage

To address the research questions – i.e., to identify trends in EO-related R&I for GDDS applications and the drivers behind them – the following **limitations or simplifications** were applied:

Data Processing

- Project information sourced from the RIO (including acronym, title, coordinators, topic, programme, pillar, objectives, work programme, status, start and end dates, budget, grant, and links) has been filtered using segment-specific keywords to ensure that only relevant projects are included and no projects are overlooked. This relies on full-text search in existing descriptions and meta data, along with the use of consistent terminology. Where data might be missing or unexpected terminology is used, certain projects may have been missed.
- The filtered list of projects considered relevant has been extracted (i.e., exported into a spreadsheet) for processing.
- Data has been manually checked for relevance and further cleaned accordingly, then augmented by segment-specific categorisation for more detailed analysis.

Methodology

Timeframe

In order to restrict the analysis to relevant activities while drawing from a significant enough sample size, a (roughly) **10-year timeframe** is used, covering the period **from 2014 to 2024** (i.e., only projects that have started before 2025 and have not ended before 2014 have been analysed). This timeframe is used to capture long-term trends, technological developments, and measurable outcomes of concluded projects. It also ensures that typical project lifecycles, such as those in Horizon Europe, are included. It coincides with the launch of the first Sentinel-1 satellite in 2014, the free and open data of Copernicus being considered as one driver of EO-related R&I, which has been attempted to confirm through the analysis.

Sample Size

The sample data is limited to the sources **currently included in the RIO**, expected to cover relevant European R&I projects to a large extent, but with further potentially relevant projects not included in the analysis where the data source has not been included yet. It is further limited to the keywords and queries applied (see data processing above) and timeframe selected (see timeframe above).

Budget allocations per application

Breaking down budgets of projects that address more than one segment-specific application and dividing them across these applications has been done following a simplified approach assuming an (unlikely) even distribution. Therefore, budget sizes per application can only **reflect trends** and may not be fully accurate.

To interpret and complement the findings from the RIO tool, **desk research** has been conducted across reports and studies, including:

- European Space Agency (ESA) application or industry articles
- European Commission (EC) documents, e.g., Climate factsheets, Reports on uptake barriers of EU space services
- EUSPA EO and Global Navigation Satellite System (GNSS) 2024 Market Report
- Stocktaking Reports from related Group on Earth Observations (GEO) initiatives
- Horizon Europe's Strategic Research and Innovation Agendas
- Segment-specific as well as EO-related strategic research and innovation agendas including outcomes of the Horizon 2020 (H2020) project *FIRE*
- EuroGEO Workshop Reports
- 🔗**EuroGEO Green Deal Data Space AG Expert Study**

These **sources** were carefully reviewed to extract relevant content that addressed the questions raised during the analysis. They were particularly useful in identifying gaps and barriers in each segment, as well as R&I trends and technologies that are (or can be) applied to address these issues.

GDDS Overview

Europe's **environmental and social systems** have changed quickly: climate change has intensified, biodiversity has fallen, and land, energy and water pressures have grown. **Digitalisation** has also reshaped how policy uses evidence. As a result, Europe needs timely, interoperable, trusted **environmental data**. This is why the **European Green Deal** (EGD) (2020–21) prioritises data-led transformation for climate action, resilience, sustainable farming, zero pollution and a circular economy.

The Green Deal Data Space (GDDS) is emerging within this transition. It supports the European strategy for data, which aims to build a "single market for data" through nationally centralised, **interoperable and sovereign data spaces**. These spaces allow cross-border, cross-sector data flows aligned with European values, standards and governance. The Data Spaces Support Centre (DSSC) 🔗notes that data spaces combine infrastructure and governance to enable data pooling and reuse, especially when data cannot be open.

In this policy context, Earth Observation (EO) is now a key asset, supporting climate reporting, compliance, insurance, agriculture, forestry, urban planning and emergency response. The **Copernicus** programme drives this shift through its free, open Sentinel missions and services across land, ocean, atmosphere, climate, emergency and security. **Sentinel-1** (2014, 2016), **Sentinel-2** (2015, 2017), **Sentinel-3** (2016, 2018) and Sentinel-5P (2017) have strengthened Europe's large-scale monitoring of land, oceans, water quality, air pollution and greenhouse gases.

These missions align with European digital initiatives. Destination Earth (DestinE) 🔗 builds Earth system digital twins for climate resilience and the European Green Deal. The European Open Science Cloud (EOSC) 🔗 advances **FAIR** data, while INSPIRE 🔗 (2007) ensures interoperable spatial data across Europe. Together, DestinE, EOSC and INSPIRE underpin the Green Deal Data Space (GDDS), linking Earth Observation (EO), in situ, statistical, product and citizen data into one **trusted ecosystem**.

The EuroGEO **Green Deal Data Space Action Group** (GDDS-AG), launched in 2022, works in this complex landscape as a community of practice aligning research and innovation (R&I) projects for the Green Deal Data Space (GDDS). The GDDS-AG Expert Study shows it covers all EuroGEO domains – land, biodiversity, climate, agriculture, marine, urban, disaster resilience and health – while defining shared needs, architectures and priority datasets for European Green Deal implementation🔗.

Globally, these efforts support the GEO Post-2025 Strategy, which promotes "Earth intelligence" by combining Earth Observation (EO), socio-economic data, local knowledge and digital technologies for decisions on climate, biodiversity, water, pollution and disaster resilience.

This report reviews the 2024 status of the Green Deal Data Space (GDDS), highlighting technological maturity, future evolution and EuroGEO's role in guiding its direction.

Policy Context

Achieving the objectives of the **European Green Deal** requires a transformation of Europe's economic, environmental, and social systems. This transformation is strongly **driven by data**: effective climate action, biodiversity protection, sustainable agriculture, resilient cities, and clean energy systems all depend on the **availability, accessibility, and interoperability** of trusted, multi-source environmental data. To meet this demand, the European Commission is (through calls and the support of different initiatives) fostering the development of data spaces that connect EO, in situ monitoring, statistical data, administrative records, digital product information, citizen-generated data, and other. In doing so, it responds to a **growing need for integrated evidence** to design policies, monitor their impacts, and ensure **compliance** across Member States and sectors. In this sense, the **Green Deal Data Space** (GDDS) is intended to become not only a technical infrastructure but a core policy instrument for the successful implementation of Europe's green and digital transitions.

Presented in 2019, the **European Green Deal** establishes the overarching goal for Europe to become the first climate-neutral continent by 2050. It initiates ambitious actions across climate, energy, mobility, biodiversity, agriculture, circular economy, water, oceans, and pollution. Each of these policy domains requires systematic measurement, transparent reporting, and continuous monitoring of environmental pressures, states, and trends.

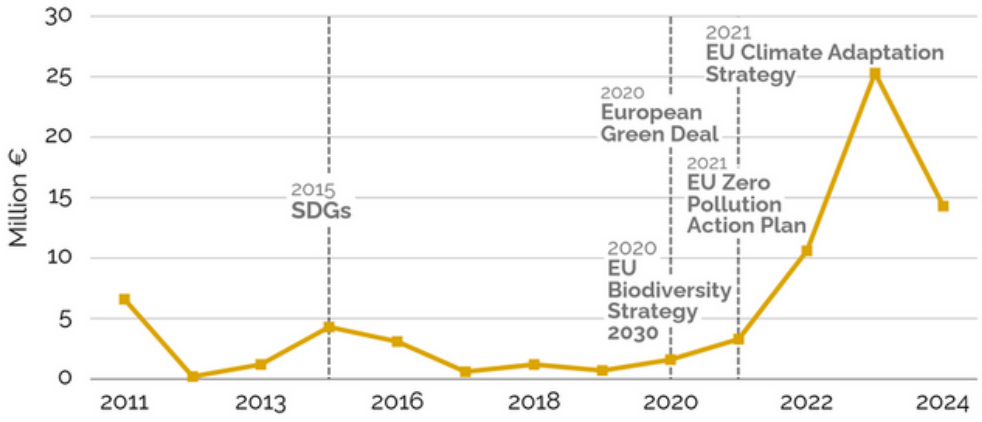
This demand is embedded in binding and non-binding frameworks, including:

- The **European Climate Law**, which forms the legal basis for enforcing climate neutrality by 2050 and requires continuous monitoring of progress toward climate targets.
- The **2030 Climate Target Plan**, **Fit for 55** legislative package, and associated sectoral directives, which rely on data on emissions, energy use, land-use, and industrial activity.
- The **EU Biodiversity Strategy for 2030** and **Nature Restoration Law**, which require monitoring of habitats, species, pressures, and restoration outcomes.
- The **Zero Pollution Action Plan**, which requires harmonised data on air, water, soil, chemical contaminants, and noise exposure.
- The **Farm to Fork Strategy** and the **Common Agricultural Policy (CAP)**, which require data for pesticide and fertiliser use, soil health, land management, and performance-based monitoring.
- The **EU Forest Strategy** and the upcoming **Forest Monitoring Framework**, which call for coordinated and interoperable forest observation.
- The **Marine Strategy Framework Directive** and **Marine Spatial Planning Directive**, which require cross-border ocean and coastal environmental data.

Together, this policy landscape creates **demand for high-quality, consistent, and interoperable data**. GDDS can serve as a mechanism to bring these data sources together. This is confirmed by an uptake of funded research and development related to GDDS, as illustrated in the graph on the right, generated with the help of the R&I Observatory (RIO).

Figure 1 depicts the fluctuations in budgets for EO-related R&I efforts in the GDDS segment, generated with the sampled data of 86 European-funded projects extracted from the RIO. This data has been mapped against specific aspects of GDDS and complemented with annotations of relevant policy implementations or changes to analyse the potential correlation between the two. Thus, there are indications of **increased investment** over time, and a potential **correlation of the investment with key policy drivers** discussed below.

Fig. 1: Evolution of EO R&I GDDS Budget (€M) and Key Policy Shifts



The Green Deal Data Space (GDDS) sits at the crossroads of the EU Green Deal and the **European Strategy for Data**, backed by the **Data Governance Act**, **Data Act** and **Open Data Directive**, and grounded in **INSPIRE**. Together, these frameworks guide **evidence-based** EU policy using high-quality data to measure pressures, model futures, target actions, and assess benefits and trade-offs.

Policy Context

Regulations like the Climate Law, Biodiversity Strategy, and Zero Pollution Action Plan require indicators to track ecosystems, emissions, and pollution, and assess if measures achieve their goals. Directives like environmental and climate laws include reporting, inspections, or MRV rules. Reliable data in trusted data spaces support enforcement, **transparency, and compliance**.

Cities and regions pursuing local Green Deals, **Climate-Neutral and Smart Cities** actions, or adaptation strategies need real-time, detailed datasets linked to infrastructure, mobility, and environment. GDDS support this local implementation.

Regulations like the **LULUCF Regulation**, **ETS Directive**, and **Effort-Sharing Regulation** require monitoring carbon in forests, wetlands, peatlands, and soils. Copernicus EO provides continuous, harmonized data to support MRV and transparency under EU laws and the **UNFCCC Paris Agreement**.

The **EU Climate Adaptation Strategy** and **Sendai Framework** call for cross-border hazard data, exposure maps, and climate-risk indicators. EO satellites, hydrological and meteorological networks, and socio-economic data must be integrated for risk assessments, early warning, and resilience planning.

The **Nature Restoration Law and Biodiversity Strategy** require data on habitats, species, connectivity, fragmentation, invasives, coastal/marine pressures, and land-use change. Copernicus, field observations, citizen science, and national biodiversity databases provide this in a harmonized framework.

The **Water Framework Directive** and **Marine Strategy Framework Directive** require chemical, ecological, and physical quality indicators, while the Maritime Spatial Planning Directive needs cross-border, interoperable spatial data. Multi-source ocean observing systems, EO products, and maritime activity data support this.

The CAP performance framework, Farm to Fork Strategy, and **Soil Monitoring Law** require monitoring soil carbon, erosion, degradation, management, nutrients, and crops. EO, sensors, farm data, and soil sampling build a European soil and agricultural data ecosystem.

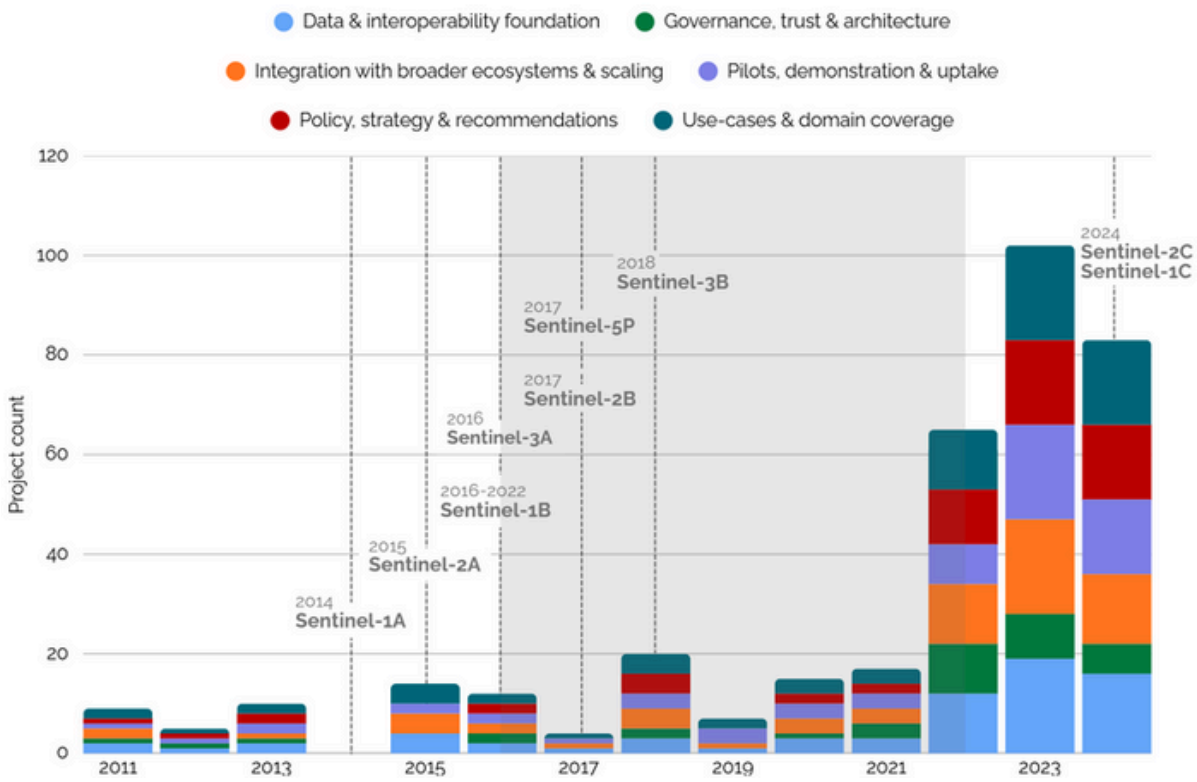
The **Energy Efficiency Directive**, **Renewable Energy Directive**, and **Energy Performance of Buildings Directive** require detailed data on buildings, industry, renewables, and mobility. Real-time streams, digital twins, and interoperable energy systems are essential.

International commitments increase the need for high-quality environmental data: the UNFCCC Paris Agreement requires transparent MRV and EO-supported Global Stocktakes; the **UN 2030 Agenda** (SDGs) relies on environmental, climate, biodiversity, and socio-economic indicators supported by Copernicus and GDDS; the **Convention on Biological Diversity** and **Kunming-Montreal Global Biodiversity Framework** require ecosystem and restoration monitoring; the **UNCCD** tracks land degradation and drought. These mandates highlight the need for interoperable, cross-border data systems like GDDS.

GDDS could become central to Europe's environmental and climate governance, uniting diverse policy needs into **federated, interoperable data ecosystems**. By integrating EO satellites, in situ monitoring, administrative, statistical, private-sector, and citizen data, GDDS enable precise policy design, progress monitoring, and transparent compliance.

Technological Perspectives

Fig. 2: GDDS Project Count Timelines by Application & Sentinel Missions

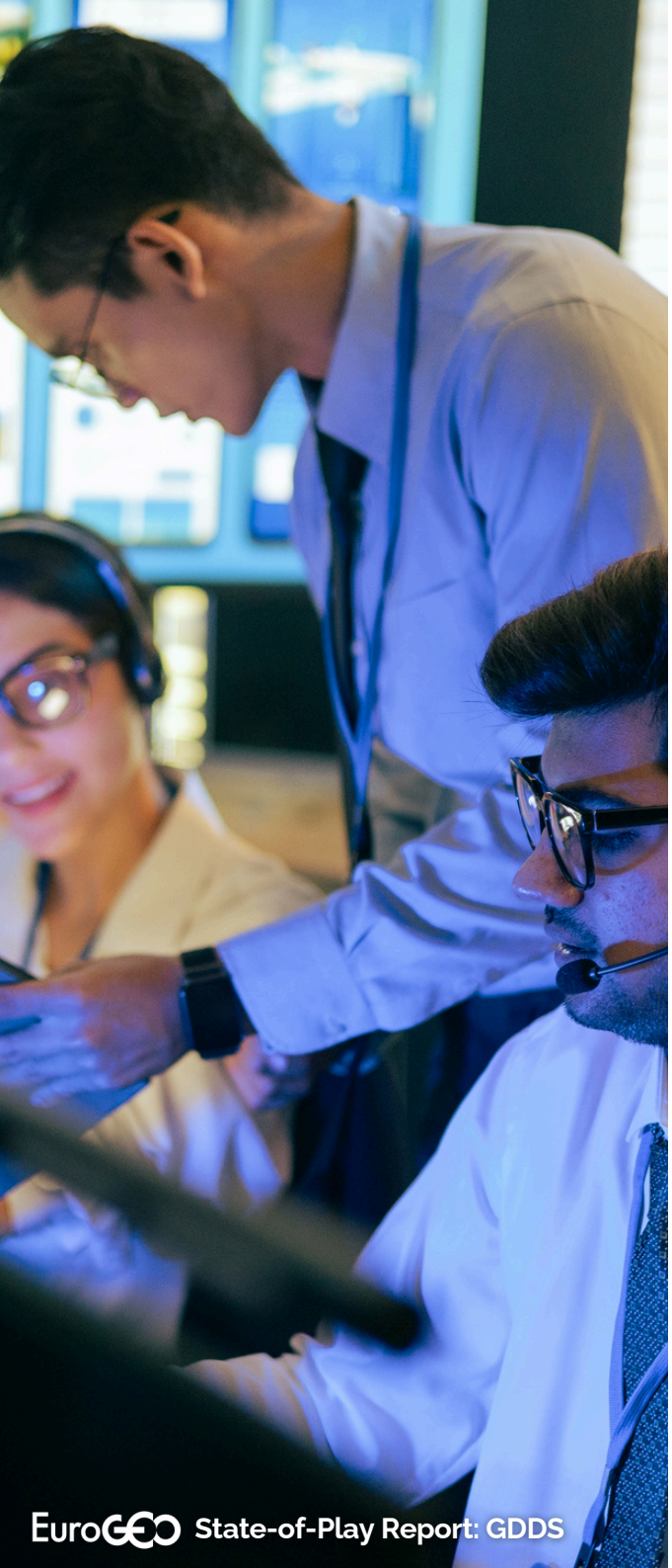


The GDDS is a technologically ambitious effort: it needs to connect the richness of EO, the granularity of in situ data, the reliability of official statistics and the dynamism of citizen-generated observations into a federated architecture that respects data sovereignty and allows for **reuse across European Green Deal domains**. Achieving this requires a combination of **mature EO capabilities**, robust data-space building blocks and emerging technologies that can scale and integrate diverse data sources.

Many GDDS-aligned projects rely heavily on the Copernicus Services' datasets. WaterSENSE, FORCOAST, CoastObs and EGSIEM, for instance, use Sentinel-1/2/3 for water and coastal monitoring; IntelliAQ and URBAN-FLOW draw on Sentinel-5P and CAMS to model air quality; and projects such as TERRA, SingleTree, CURE and NextGenCarbon use a combination of Sentinel-1 and Sentinel-2 to provide land and carbon-related intelligence. These examples from our analysis illustrate how embedded Copernicus technologies already are in the GDDS ecosystem.

Beyond satellites, the GDDS segment will incorporate **in situ and citizen-generated data**, increasingly through sensor Application Programming Interfaces (APIs) and Internet of Things (IoT) networks. The GDDS-AG study notes that harmonising these heterogeneous data streams – from water-quality probes to particulate sensors – remains a central technical task🔗. Concerns about the FAIRness of citizen science data are being addressed systematically in recent European initiatives like CitiObs🔗, more4nature🔗, and ENFORCE🔗.

While EO maturity is high, the defining technological feature of GDDS will lie in its data-space dimension. The DSSC Blueprint 1.0🔗, the GREAT GDDS reference architecture🔗 and the SAGE architecture provide the guiding frameworks, outlining federated data governance, secure data space connectors, semantic interoperability through shared vocabularies, and mechanisms for provenance, usage control, and data sovereignty. GREAT identifies **high-priority datasets** for GDDS – from biodiversity indicators to soil health, deforestation alerts, water status and pollution flows – and maps the existing gaps in availability, harmonisation and interoperability. These **gaps** are not only technical but also **institutional**: many datasets remain scattered across national services or held under restrictive licences that require new governance arrangements. The SAGE project is working with 10 cases and incorporates the GREAT experience to define the requirements for the implementation of the GDDS.



Technological Perspectives

INSPIRE remains a major asset, providing harmonised spatial data themes and metadata standards that help reduce fragmentation. Its relevance is explicitly recognised by the European Commission as a "public-sector contribution to the Green Deal Data Space". As emphasised in the GDDS-AG Expert Study, Europe must now **connect INSPIRE, Copernicus, EOSC and the emerging data spaces** into a coherent architecture compatible with the **GEO/GEOSS** ecosystem. This requires shared standards, shared semantics and trusted data exchange mechanisms – some of which are now in development, while others are consolidated.

As seen in Figure 2, the timeline of Sentinel launches aligns with an observable increase in GDDS-related R&I activity. The analysed dataset shows that until around 2018, most GDDS application areas recorded only 1–4 projects per year. From 2020 this grows steadily to about 3 per category, and from 2022 onwards there is a marked acceleration, with many applications reaching 12, 15 or even 19 projects annually by 2023–2024. This rise reflects the operational consolidation of the Sentinel-1, -2, -3, and -5P missions (2014–2018), the growth of Copernicus services as stable operational backbones from 2016, and the launch of Horizon Europe programmes with GDDS-relevant calls from 2021, all reinforced by the political drive of the 2020 European Data Strategy and the Green Deal. This correlation can suggest that technological maturity in EO has directly supported the expansion of GDDS-aligned R&I, especially in "Use-cases & domain coverage", "Data & interoperability foundation", and "Integration with broader ecosystems & scaling" – the categories where most projects cluster.

Despite technological progress, gaps remain. The GDDS-AG study identifies weak coverage in circular economy and material-flow data, where product passports and supply-chain environmental data are increasingly required by EU regulation. Legal-grade provenance – necessary for environmental crime detection or enforcement cases – is underdeveloped. Semantic interoperability between EO, in situ, statistical and administrative data is also uneven. Despite the definition of the Dataspace protocol, dataspace connectors are still not interoperable. These gaps represent both technical obstacles and opportunities for innovation.

Exciting progress is being made with high-resolution digital twins – like DestinE – which combine EO, modelling and HPC to help analyse the European Green Deal. AI and machine learning, already in use in projects such as Green.Dat.AI, AD4GD and FAIRiCUBE, are enabling smarter analytics, data fusion and spotting anomalies. FAIR-by-design data pipelines are making data easier to find and reuse. Together, these technologies will pave the way for the next phase of GDDS.

Market Trends

Fig. 3: Budget Distribution for EO-Related R&I in Green Deal Data Space

The Green Deal Data Space is emerging at the intersection of **two big ongoing transitions** in Europe: the **European Green Deal** on one side, and the European Strategy for Data on the other. The EGD sets legally binding and political objectives across climate neutrality, biodiversity recovery, zero pollution, resilient food systems, circular economy and just transition. To design these policies, target them to where they matter most, monitor their impact, and enforce compliance, the EU and Member States increasingly depend on **rich, interoperable data**: satellite and in situ observations, administrative records, corporate disclosures, sensor networks, citizen science and research outputs. The European Strategy for Data explicitly answers this need with the concept of **common European data spaces** in 14 domains, including a GDDS, to make such data "available, accessible and reusable" across sectors in a trustworthy way.

Economically, these infrastructures fuel a growing data economy. The European Commission estimates the **EU data economy** could reach €630 bn by 2025 and €815 bn by 2030 (~4.7% of GDP), driven by data sharing. The EU invests ~€2 bn via Digital Europe, Horizon Europe, and related programmes to launch common data spaces. Environmental and Green Deal domains – climate, biodiversity, agriculture, oceans, cities, energy – are strategic, supporting the European Climate Law, 2030 Climate Target Plan, Biodiversity Strategy, Farm to Fork, Zero Pollution, Soil Strategy, Forest Strategy, Nature Restoration, Circular Economy Action Plan, and sectoral regulations.

On the market side, data spaces are still in an early but fast-maturing phase. Recent analyses performed by the Data Spaces Support Centre (DSSC) identify a rapidly expanding landscape of sectoral and cross-sectoral data space initiatives in Europe, supported by both Member States and EU programmes such as the Digital Europe Programme, Horizon Europe, and Connecting Europe Facility. The DSSC **Blueprint for Data Spaces** provides the reference architecture, governance patterns, and interoperability frameworks underpinning all common European data spaces. The European Commission has defined 14 priority common European data spaces , including a dedicated Green Deal Data Space as well as data spaces tied to European Green Deal priorities such as agriculture (AgriDataSpace), energy, or cities/communities (DS4SSCC, CitCom.ai). The report points out the relevance of capabilities related to **Artificial Intelligence** and **Digital Twins** in this context, referring to e.g. the EU Local Digital Twin toolbox or the Destination Earth initiative.

Market Trends

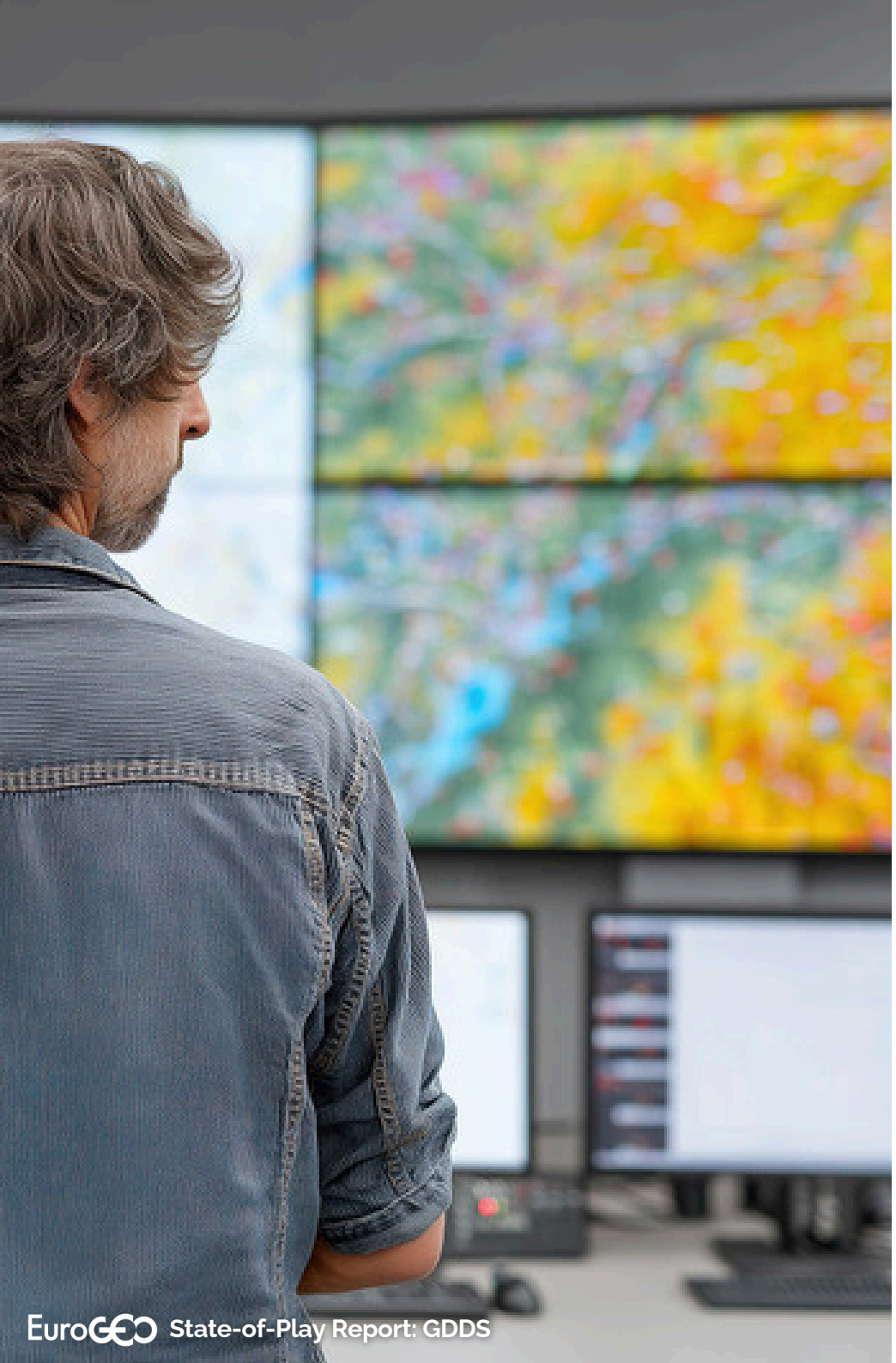
The DSSC is documenting **dozens of emerging implementations** of data spaces, which are directly relevant in the context of the EGD, or cross-cutting GDDS initiatives such as GREAT. These efforts are converging on common building blocks for semantics, governance, interoperability and trust, often leveraging open specifications from Gaia-X, IDSA and FIWARE.

Mapped to the thematic focus areas of EuroGEO (i.e. Action Groups) in Figure 3, a majority of budget for projects identified for the analysed period is for such with focus on use cases and pilots in the areas of climate and urban, but also land use and disaster resilience. The largest number of projects include use cases on Land Cover & Land Intelligence (38 projects with combined budgets of more than €66m) and Climate (35 projects with combined budgets of over €81m), followed by Urban (31 projects, combined budgets of nearly €80m) and Agriculture (27 projects, combined budgets of over €49m).

Our analysis shows there is a rather even distribution of clusters addressed by the totality of analysed projects, with a lower number of projects addressing aspects of governance.

Overall, the market for GDDS is expected to be less about selling raw data and more about enabling an ecosystem of interoperable, policy-relevant services. As the regulatory environment hardens (EGD legislation, Environmental, Social, and Governance (ESG) and disclosure rules, nature reporting) and as digital twins mature, **demand for high-quality environmental data, robust governance and cross-domain integration will continue to grow**. GDDS are an essential part of this evolution, helping to turn fragmented environmental data flows into shared, trusted infrastructure that supports both public policy and private-sector innovation across sectors and domains.

Using the RIO as a source, we have identified key stakeholder groups driving innovation in the development of R&I EO solutions for GDDS in order to assess the uptake and awareness maturity of the segment. We found that academia is by far the most prevalent stakeholder group in R&I, followed distantly by Small and Medium-sized Enterprises (SMEs). The SAGE project is an exception of this distribution with a considerable quantity of companies.



Projections

The GDDS is at a pivotal point: with policies tightening, technologies maturing, and data spaces emerging across sectors, the coming years could see GDDS evolve from a research-driven initiative into a fully operational ecosystem.

Policy trends provide strong direction; The European Green Deal, Nature Restoration Law, zero pollution initiatives, carbon-removal certification frameworks and sustainable finance instruments all **require reliable, interoperable environmental data**. The European strategy for data and related legislative instruments – including the Data Governance Act and the Data Act – consolidate expectations that sensitive, restricted or sovereign data must be shared under controlled conditions. Combined with the Open Data Directive and high-value datasets, these policies create a structured demand for the very federated, interoperable environment that GDDS provides.

Copernicus will continue expanding (with **new Sentinel missions** and service evolutions), while DestinE digital twins will increase demand for consistent, machine-readable datasets. Data space technologies are also standardising connectors, while semantic models and governance frameworks are becoming increasingly mature, thanks to initiatives such as DSSC, IDSA, and GREAT.

EO-enabled services are expanding rapidly across agriculture, climate risk assessment, biodiversity monitoring, water management, and infrastructure resilience. These trends indicate that **“Use-cases & domain coverage”** will remain the most dynamic GDDS application domain, with data interoperability and integration capabilities also growing.

Overall, projections suggest that the GDDS landscape will **evolve towards scalable, policy-driven use cases** such as climate adaptation and biodiversity monitoring, stronger cross-sector integration across areas like agriculture, water, climate, and energy, and a greater focus on semantics, provenance, and trust. AI-assisted analytics and digital-twin simulations are set to play a larger role, while the emphasis moves from prototype pilots to pre-operational and fully operational services.

EuroGEO Contribution

The GDDS-AG is one of its most strategically positioned Action Groups. It was designed to bring together the community of R&I projects working on the GDDS and to ensure coherence between their outputs, European policy requirements and GEO/GEOSS developments.

The GDDS-AG Expert Study highlights that this Action Group already performs several crucial functions:

- It acts as a **community of practice**, allowing projects to share their use cases, methodologies and technical components.
- It synthesises insights from diverse projects to **articulate needs and requirements** for common architectures, standards, tools and high-priority datasets.
- It ensures that GDDS developments remain **aligned with GEO principles**, **FAIR** data and **GEOSS** interoperability.
- It helps disseminate **knowledge across sectors and countries**, supporting capacity building and the spread of best practices.🔗

Previous EuroGEO Workshops reports reinforce this strategic role, highlighting the importance of cooperation between AGs, open discovery of GDDS assets, and the use of EuroGEO as an "innovation conveyor belt" that accelerates research-to-operations (R2O) transitions. The reports also stress that GDDS is central to demonstrating European Green Deal achievements internationally.🔗

Looking ahead, EuroGEO can strengthen its contribution to GDDS in several ways; by using its **established networks** to foster systematic communication between GDDS projects and other AGs especially those in biodiversity, climate, agriculture, marine and urban domains. This cross-pollination is essential because GDDS is transversal by design. Secondly, by supporting the harmonisation of high-priority datasets identified by GREAT D3.2, helping Member States adopt shared semantics, interoperability profiles and data-space-ready formats. Moreover, by accelerating experimentation with digital twins, AI-based analytics and data-space building blocks across EuroGEO pilots. Doing so will increase readiness for operational GDDS deployments. Finally, EuroGEO can reinforce its role as the **bridge to GEO**, so that the lessons from the European GDDS feed into global efforts to create interoperable, equitable Earth intelligence systems.

Project statistics indicate that "Use-cases & domain coverage", "Data & interoperability foundations", and "Integration with broader ecosystems & scaling" are among the active application areas within the GDDS segment. While the relative activity across application areas is not conclusive, EuroGEO should continue to focus on these areas, aligning its activities with observed trends and supporting uptake among Member States and international partners.

Glossary

AG	Action Group
API	Application Programming Interface
CAMS	Copernicus Atmosphere Monitoring Service
CAP	Common Agricultural Policy
CURE	Copernicus-based Urban Resilience information service (project)
DSSC	Data Spaces Support Centre
EGD	European Green Deal
EO	Earth Observation
EOSC	European Open Science Cloud
ETS	Emissions Trading System
EU	European Union
FAIR	Findable, Accessible, Interoperable, Reusable
GDDS	Green Deal Data Space
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GDP	Gross Domestic Product
HPC	High-Performance Computing
IDSA	International Data Spaces Association
INSPIRE	Infrastructure for Spatial Information in the European Community
IoT	Internet of Things
LULUCF	Land Use, Land Use Change and Forestry
MRV	Monitoring, Reporting and Verification
NGO	Non-Governmental Organisation
R&I	Research and Innovation
R2O	Research-to-Operations
SDGs	Sustainable Development Goals
SMEs	Small and Medium-sized Enterprises
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change

This report has been developed by **Evenflow** under the **EuroGEOSec** project. Further reviewers include EuroGEOSec's project management team and the Green Deal Data Space Action Group leads.

Disclaimer: This report is based on research from the prototype Research & Innovation Observatory (RIO), and complemented by expert input where available, it may not fully represent the positions of the Green Deal Data Space EuroGEO Action Group.

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