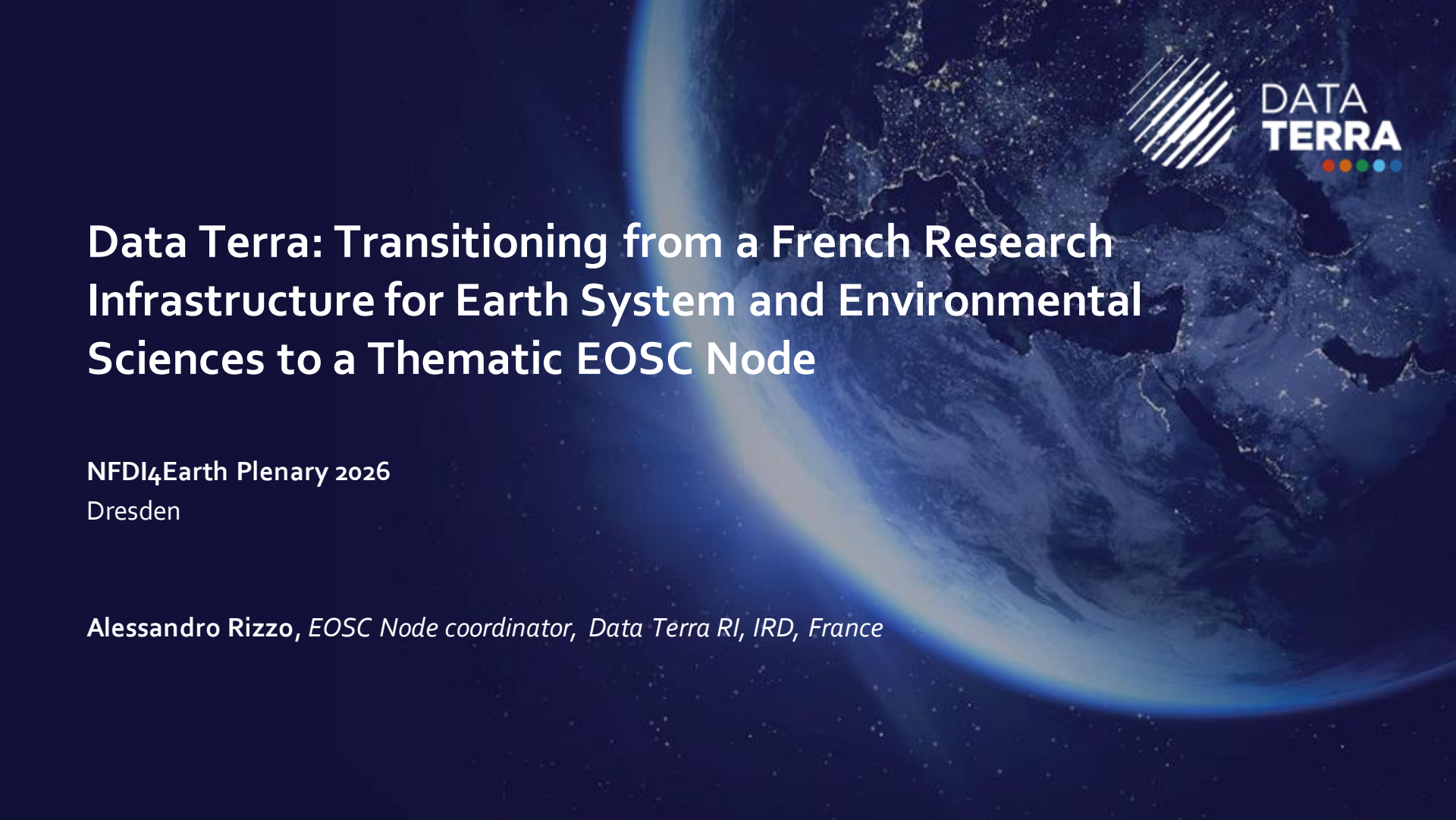


Data Terra: Transitioning from a French Research Infrastructure for Earth System and Environmental Sciences to a Thematic EOSC Node

NFDI4Earth Plenary 2026
Dresden

Alessandro Rizzo, *EOSC Node coordinator, Data Terra RI, IRD, France*

01

The Research Infrastructure

EOSC Node | Data Terra Environment

Data Terra in a nutshell

- **50 M€/year** + external resources
- 34 National Research Organisations and Universities
- 30 Observation Data and Services Centres (CDOS)*
- 32 Scientific expertise consortium (CES)**
- 500 scientists, engineers and technicians

* A Data Observation and Services Center (CDOS) is a sub-structure within a Hub that can organize a set of operational and architectural data management functions.

** A Scientific expertise consortium (CES) is a sub-structure within a Hub that organize scientific teams around major fields of study addressing a broad range of scientific questions.

Steering Committee
MESRE, CNRS, CNES, IRD, INRAE, IFREMER, IGN, METEO-France, BRGM, MNHN

Executive Board Committee

Research support Unit

Administrative and financial services

IT support

Operations

Data and services hubs
- Atmosphere (AERIS)
- Solid earth (FormaTerre)
- Ocean (ODATIS)
- Land Surfaces (Theia)
- Biodiversity (PNDB)

Transversal devices
- Satellite imagery (DATATERRA DINAMIS)
- Science/Society (Animations Régionales Thématiques)
- EOSC (EOSC Node | Data Terra Environment)

Working Groups
- Europe
- Citizen science
- Science
- Innovation
- Global South
- Drones
- training
- Communication
- Agri-env

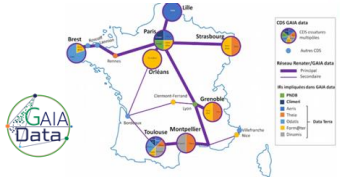
DATA TERRA

EOSC Node | Data Terra Environment

The Data and Services hubs: missions

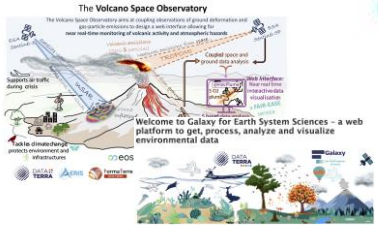
01 Single access

Provide researchers with a single access **to scientific data, services and infrastructure** needed to analyze the data



02 Federation of resources

Federate existing **scientific data infrastructures,** currently dispersed across disciplines



03 Collaboration inter-disciplines

Promote the sharing of data and services **across disciplinary and geographical boundaries**

ART	DINAMIS	INTER-POLES
Networking with non-academic stakeholders	Very High Resolution Satellite images	FAIR data & services expertise

04 Sharing community

Create **a sharing space for researchers and engineers** from all scientific fields, allowing the exchange of skills and good practices

05 Integration of services

Enable service providers to integrate their offerings into the EOSC ecosystem, thereby **enriching the resources available to the scientific community**

DATA TERRA

The Data and Services hubs: synergies with the European Research Infrastructures (ERICs)

Observation
Experimentation

No rigid boundaries but flexible interfaces that vary depending on the scientific domain

e-infrastructure

The Data and Services hubs: synergies with the European Research Infrastructures (ERICs), some concrete examples

AERIS is:
- the European Data Center of IAGOS data;
- the Data Center for French stations of ICOS;
- the Data Center of ACTRIS-France, and part of the Data Center of ACTRIS-EU.

ODATIS is:
- leading the data management activities for Euro-ARGO-EU;
- part of the EMSO-Eric Data Management Team;
- leading the Data & Product Services Centre of JERICO-RI.

FORMATERRE is:
- jointly with EPOS-FR the national data contribution to EPOS-ERIC.

The Data and Services hubs: their contributions to the EOSC Federation

Current contributions:

- The **Thematic-Catalogs** as a single access point to all data on EOSC Node Data Terra;
- Systematic and on-demand **computation services** for research communities & public policy uses;
- **Virtual Research Environment (VRE)** related to environmental domains applications.

Future contributions:

- Implementation of a **semantic-based, AI-assisted, metadata search engine** for fully exploring metadata catalog along with recommendation of semantically-related datasets for enabling data discovery;
- **Extension of the content of** environment-related **metadata catalog** from selected European and worldwide data repositories including datasets from other sectors (i.e. Climate, socio-ecosystem, etc.) for enabling the "Nexus" approach;
- Others **VRE** related to **3D data processing** (Lidar, point cloud, UAV, etc);
- Integration of **full stack services for research & public policy use** in collaborations with other EU & international organisations;
- Distributed storage and data analysis platform for **massive fiber-optics data.**

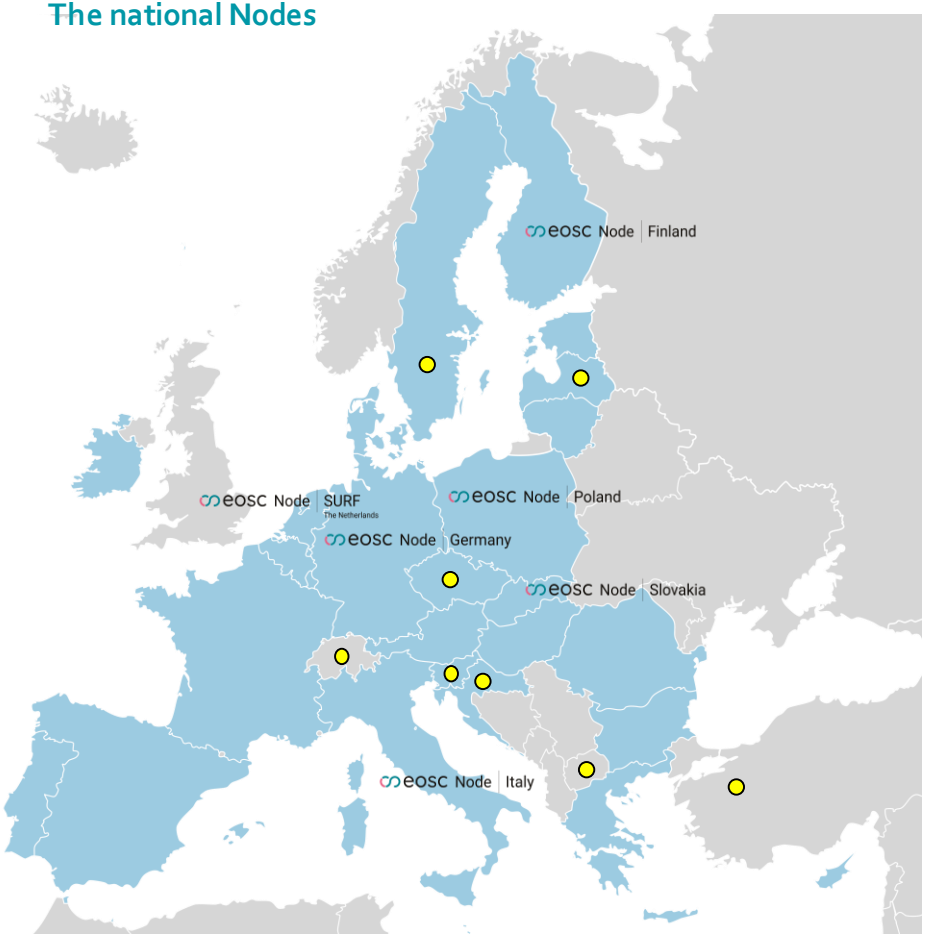
02

The EOSC Node

EOSC Node | Data Terra
Environment

The EOSC Node Data Terra in the Federation

The national Nodes



The thematic Nodes

EOSC Node | BBMRI-ERIC
Health & Food

EOSC Node | CERN
Physical Sciences & Engineering

EOSC Node | PaNOSC
Physical Sciences & Engineering

EOSC Node | Data Terra
Environment

EOSC Node | Life Sciences Connect
Health & Food

EOSC Node | Digital Twin of the Ocean
Environment

- EBRAINS Node
- METROFOOD Node
- ENVRI Node

The e-infrastructures Nodes

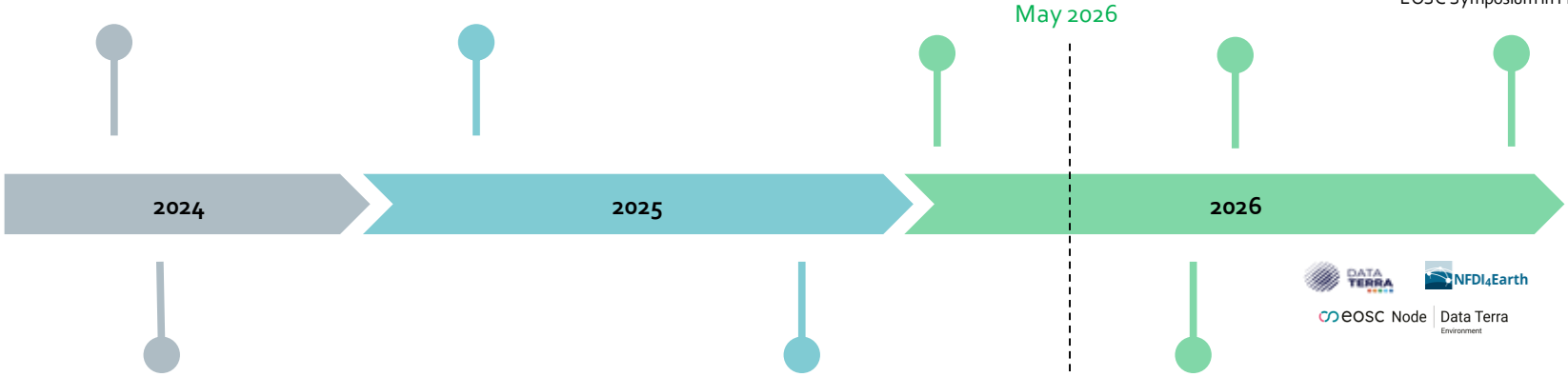
EOSC Node | EUDAT
Data, Computing and Digital

- EGI Node
- GEANT Node
- OpenAIRE/Operas Node

- *Second wave Nodes*

DATA TERRA

The Node implementation and improvement



The EOSC Marketplace

The **EOSC portal** is no longer available since August 2024

The First wave of Nodes

Questionnaire launched in 2024 and selection of **13 Nodes** integrating the Federation

The Second wave of Nodes

14 additional Nodes integrate the Federation

Operational phase

First release of the EOSC Node Data Terra in June/July

EOSC Federation in production

The most of the Nodes from the first wave, including Data Terra, and some from the second one will be **in production** by the EOSC Symposium in Florence

Building-up the EOSC Federation

The **EOSC EU Node** is officially launched during the EOSC Symposium in Berlin

The MoU

The building –up phase is over and the Federation officially launched during the EOSC Symposium 2025 in Brussels, marked by the signature of the **Federation MoU**

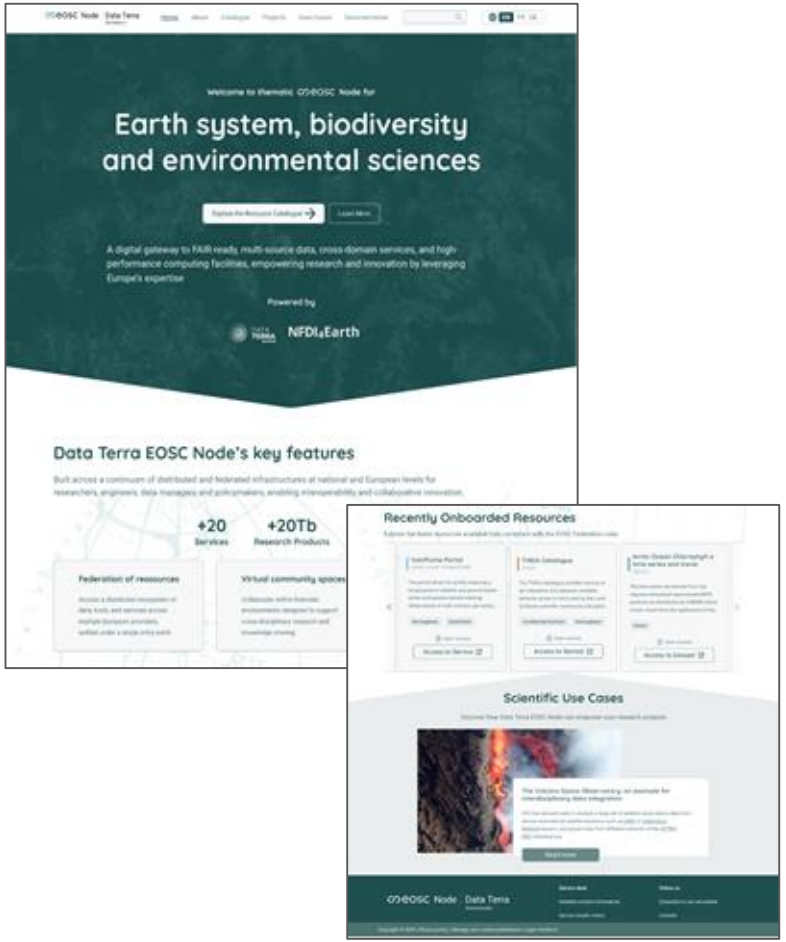
Enlargement phase of the Data Terra Node

Enhancement of the collaboration between **Data Terra and NFDI4Earth** under the framework of the EOSC thematic Node and updated Project Charter for the Node

The landing page

Objectives:

- propose a **single coherent entry point** [earth-data.eu] across multiple institutions and technical systems;
- **guide users** to the right resources: data portals, tools, APIs, documentation, or communities of practice;
- **support service providers** in integrating and onboarding;
- **reduce fragmentation** by acting as a navigation hub for discovery and access resources for Earth system, biodiversity and environmental sciences.



First release: end of June 2026

EOSC Node | Data Terra Environment

Resources Catalogue: scope & data model - what we expose to EOSC

EOSC DEFINITION

An EOSC Resource is a digital entity with a persistent identity, a name, a description, a publishing date, owned by an EOSC Node.

Source: EOSC Beyond Top-Level Ontology v6.1

OUR CATALOGUE MODEL

Single class: dcat:Resource (DCAT v3)

Typed via dcterms:type → skos:Concept (controlled vocab)

No subclassing - unified catalogue response

SKOS vocab to be decided: COAR / DCMI / OpenAIRE

Pattern aligned with EJP-RD resource metadata schema

Close to GeoDCAT

The 8 resource types in our catalogue

Type (dcterms:type)	EOSC classification	What it describes at Data Terra	Primary source
Dataset	Research Product → Data	Earth-system observation, satellite, model outputs	MTEP (SPARQL pivot) + pole fallbacks
Software	Research Product → Software	Processing chains, libraries, scientific code (PID = SWHID)	Software Heritage, GitHub/GitLab ESR
Publication	Research Product → Publication	Articles, preprints, theses linked to Data Terra/Gaia Data	HAL (collections DATA-TERRA, GAIA-DATA, sdu.*)
Semantic Artefact	Research Product → Other	Controlled vocabs, ontologies, thesauri (MOD3 profile)	EarthPortal + NVS, AgroPortal, EcoPortal
Training Resource	Training Resource	Tutorials, courses, notebooks (LRMI profile)	*To be mapped*
Guideline	Interoperability Guideline	DMPs, FAIRification guidance, EOSC-IF specs	*To be mapped*
Service	Service	Galaxy Datalab, Earth Analytics Lab, UDAL, DINAMIS	DataTerra internal service catalogue
Deployable Application	Deployable Application	TOSCA-defined apps deployable on EOSC compute (containers, VRE)	Pole-level tool repositories (to be mapped)

Building an EOSC-compliant catalogue for the Data Terra Node: a unified catalogue, automatically synchronised with the EOSC EU Node (EEN), making all Earth-system resources of the node visible and usable at European scale.

EOSC Node | Data Terra Environment

Architecture & harvesting - from sources to EOSC Federation

1 SOURCES

Pivot: **MTEP** (SPARQL @ terra-vocabulary.org/api/prez/sparql) - 1509 + 519 datasets
Fallback sources: Sextant · EaSyData · AERIS · THEIA/GEODES · FormaTerre
Other domains: HAL · Software Heritage · EarthPortal · NVS · CORDIS/ANR

2 DATA TERRA EOSC CATALOGUE (our build)

Harvest → Transform → Enrich (AI) → Validate → Persist
Normalises to dcat:Resource + dcterms:type (SKOS vocab)
Validates: PIDs (DOI/SWHID/Handle) · licences · mandatory fields (SHACL)

3 EXPOSURE - TWO CHANNELS TO EOSC

PUSH - REST API → **EOSC Resource Catalogue** for Services & Organisations (EOSC profile)
PULL - OAI-PMH endpoint → harvested by **EEN** for Research Products (DataCite profile)

4 EOSC FEDERATION

Indexed in the EOSC Knowledge Graph (EEN Resource Catalogue)
Discoverable via EOSC Resource Hub & EOSC EU Node portal
Federated with sister thematic nodes (Earth-system context)

Key choices

MTEP as upstream pivot

GaiaData WP3 SPARQL endpoint. Already harmonises the poles in GeoDCAT-AP. We sit downstream - no point-to-point connectors.

DCAT 3 + SKOS, not DCAT-AP strict

Single dcat:Resource class typed via dcterms:type. Discrimination by SKOS concept, not by class hierarchy. ADR-001.

Two paths to EOSC

PUSH via REST for Services (EOSC profile). PULL via OAI-PMH for Research Products (EEN harvests our DataSources).

Geo-extension for Earth data

GeoDCAT-AP layer for ISO 19115/19139 sources (Sextant, AERIS, FormaTerre). EPOS-DCAT-AP under evaluation for ForM@Ter.

A 6-month roadmap to deliver a production-grade catalogue: from semantic audit and architecture (Phase 1) to development, deployment and EOSC conformance (Phase 2), backed by continuous testing.

Onboarding resources

1 Sources to harvest

Which catalogues or repositories should feed Data Terra:
datasets, services, training material, software…

+ a technical referent to drive the onboarding phase

2 One or more harvestable endpoints

OAI-PMH (EOSC standard, preferred)
SPARQL or REST API (supported alternatives)

The Node handles harvesting, transformation and persistence into the pivot model.

3 Semantic alignment

A mapping from resource types to our 8 SKOS concepts:
Dataset · Software · Publication · Semantic Artefact · Training Material · Guideline · Service · DeployableApplication

Co-built during Phase 1 (semantic alignment).

4 Shared metadata baseline

Persistent identifier (DOI, Handle, SWHID…)
Explicit licence (machine-readable)
Mandatory DCAT properties
Etc…

Same EOSC requirements we apply to our own resources before exposing them.

First release: end of June 2026 / beginning of July 2026

DATA TERRA

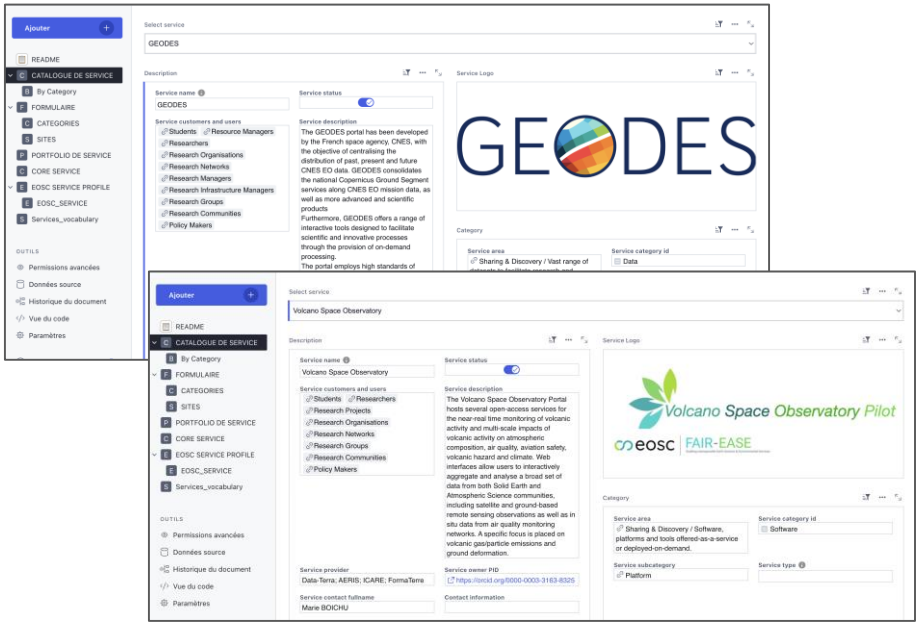
Services catalogue (I)

Services registry:

- more than 20 service providers expressed interest for **onboarding services**;
- **registry tool** (via API) for integrating services into the Node catalogue under development based on the most recent recommendations from EOSC TF and WGs.

Current challenges:

- establishing a clear and stable service categorization model for our communities;
- adopting and integrating helpdesk and monitoring systems across service providers with different technical solutions.

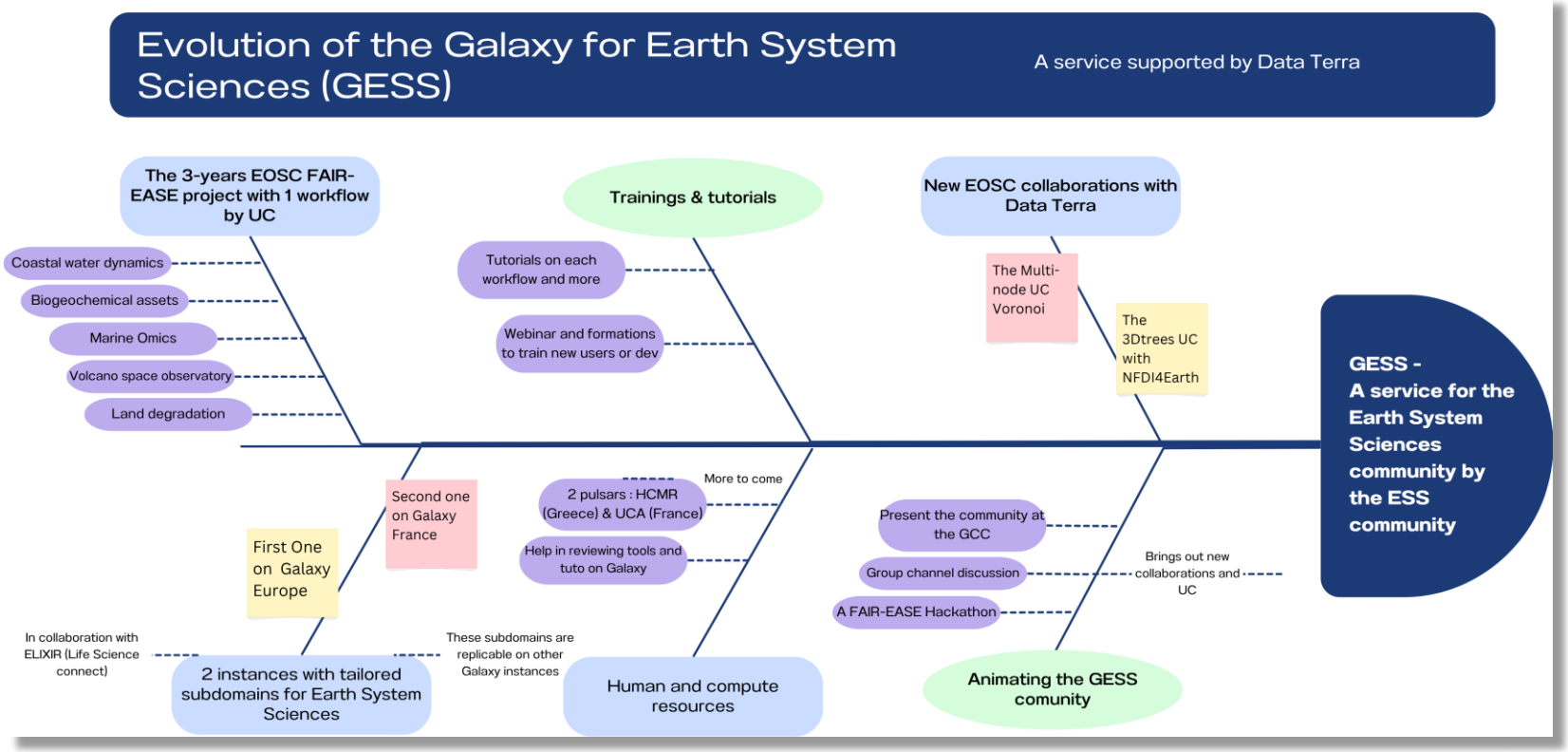


First release: end of June 2026 / beginning of July 2026

Services catalogue (II)

Service category	Service type	Service name
Processing & Analysis	Data analysis / Visualization, Image analysis	Geodesy Plotter AERIS/ICARE Stations Hub AERIS/ICARE Co-location and extraction tool ACTRIS-FR Lidar Panel ACMCC Network Visualisation Tool Digital Surface Models from Optical stereoscopic very-high resolution imagery (DSM-OPT)
Sharing & Discovery	Software / Platform	Galaxy Ecology Galaxy for Earth System Sciences Volcano Space Observatory IAGOS Footprint Viewer
	Metadata / Data catalog	GEODES ECCAD THEIA Catalog AERIS Catalog VolcPlume Portal
	Software / API Gateway	DAALIA

Use case: Galaxy



Use case: VSO

Open-access services
for remotely monitoring volcanic activity and atmospheric hazards

Volcano Space Observatory (VSO) Portal

Interdisciplinary: *Atmospheric Sciences & Solid Earth/Volcanology*
(volcanic gas/particle emissions & ground deformation)

VOLCPLUME service

2022

ANR VOLCPLUME

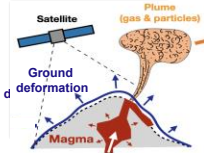
AERIS & CaPPA LabEx

1) VOLCPLUME (extended)
2) SO_2 Flux Calculator
3) Emission Height Estimator
4) EOS-SAR VOLC

(fast chain operational, interface soon open)

New!

API access

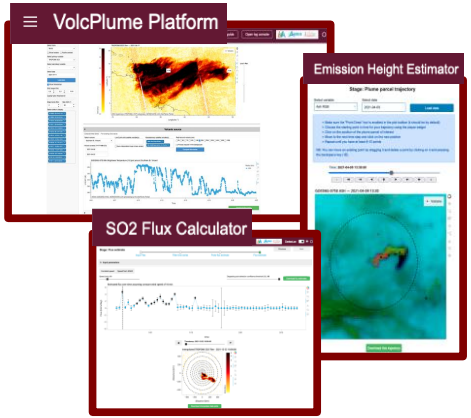


2022-2025

2026-today

HORIZON EUROPE FAIR EASE
(DATA TERRA IR)

- **EOSC NODE service & use case** (among 2), **DATA TERRA**
- **ACTRIS ERIC & ACTRIS FR** (Horizon Europe: ATMO ACCESS & ACTRIS-NEXT proJects)
- **EPOS-FR:** AS «Télédétectio Activi é Volc.» (in prep.)
- **CNES**
- **AREA Cross Disc. Prog (Univ. Lille & France 2030 prog.)**
- **Ministère Transitio E co. (Applisat)**
- **ESA & Copernicus/CAMS:** projects in prep.

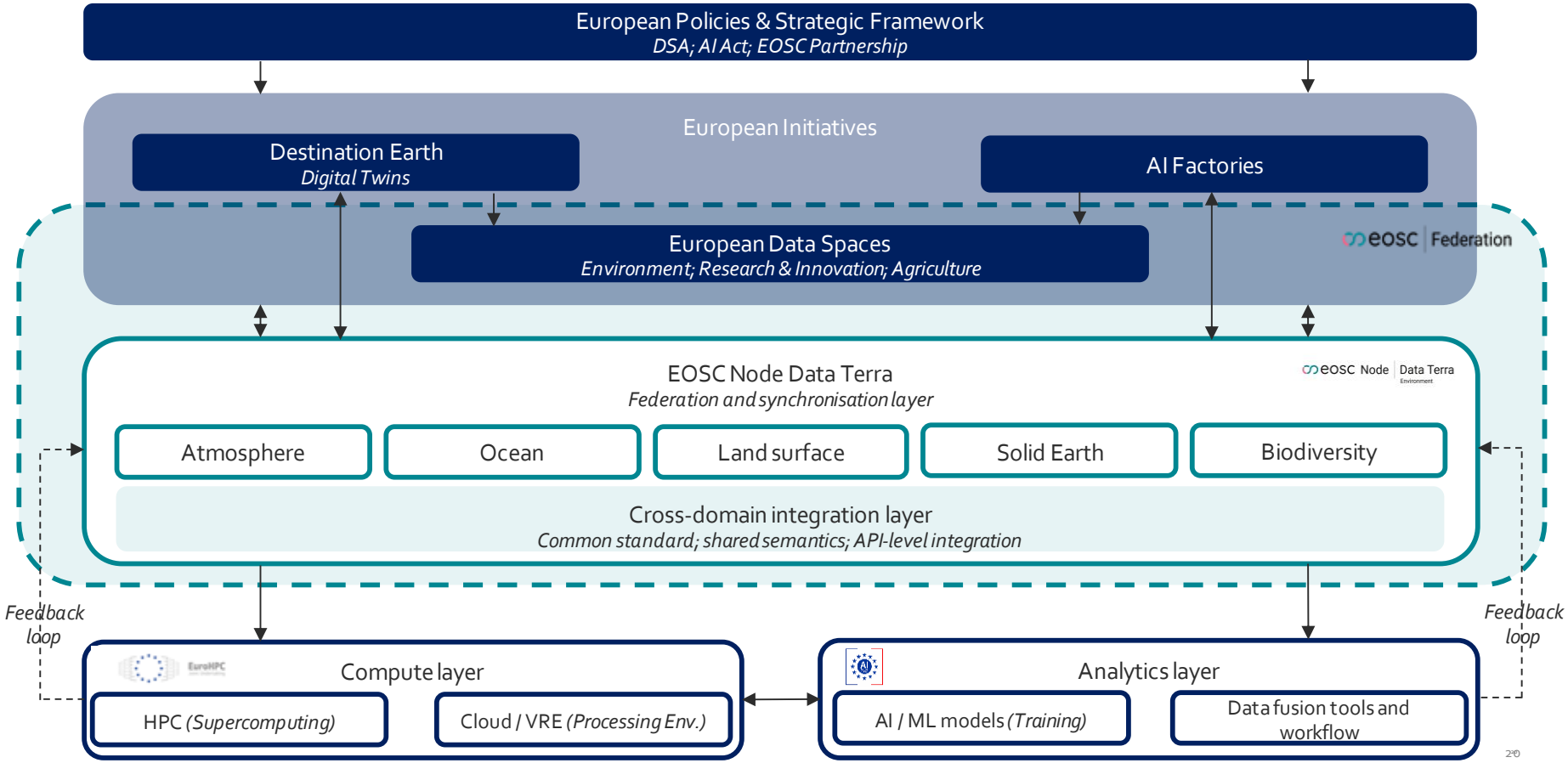


03

Concluding remarks and takeaways

EOSC Node | Data Terra Environment

EOSC Node Data Terra into the European digital landscape



Takeaways

- The EOSC Node Data Terra wants to contributes to a **better alignment** of International activities, enables **seamless and trusted data sharing and access** across scientific disciplines, makes available **documentation for data interoperability**, enhances **training materials** in FAIRness and Openness, that will be easily findable by all ESS researchers in Europe and beyond making them accessible through the EOSC Federation.

- Synergies with European initiatives are designed to **eliminate fragmentation** by enabling seamless, end-to-end workflows across data, models, and computing resources.

- User engagement is operationalized as a continuous feedback loop that directly drives the evolution of services, ensuring sustained **alignment with scientific needs** (scientific Use-cases).

THANK YOU !

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