

From FAIR-EASE to the EOSC Node Data Terra

Alessandro Rizzo, EOSC Node coordinator (IRD)

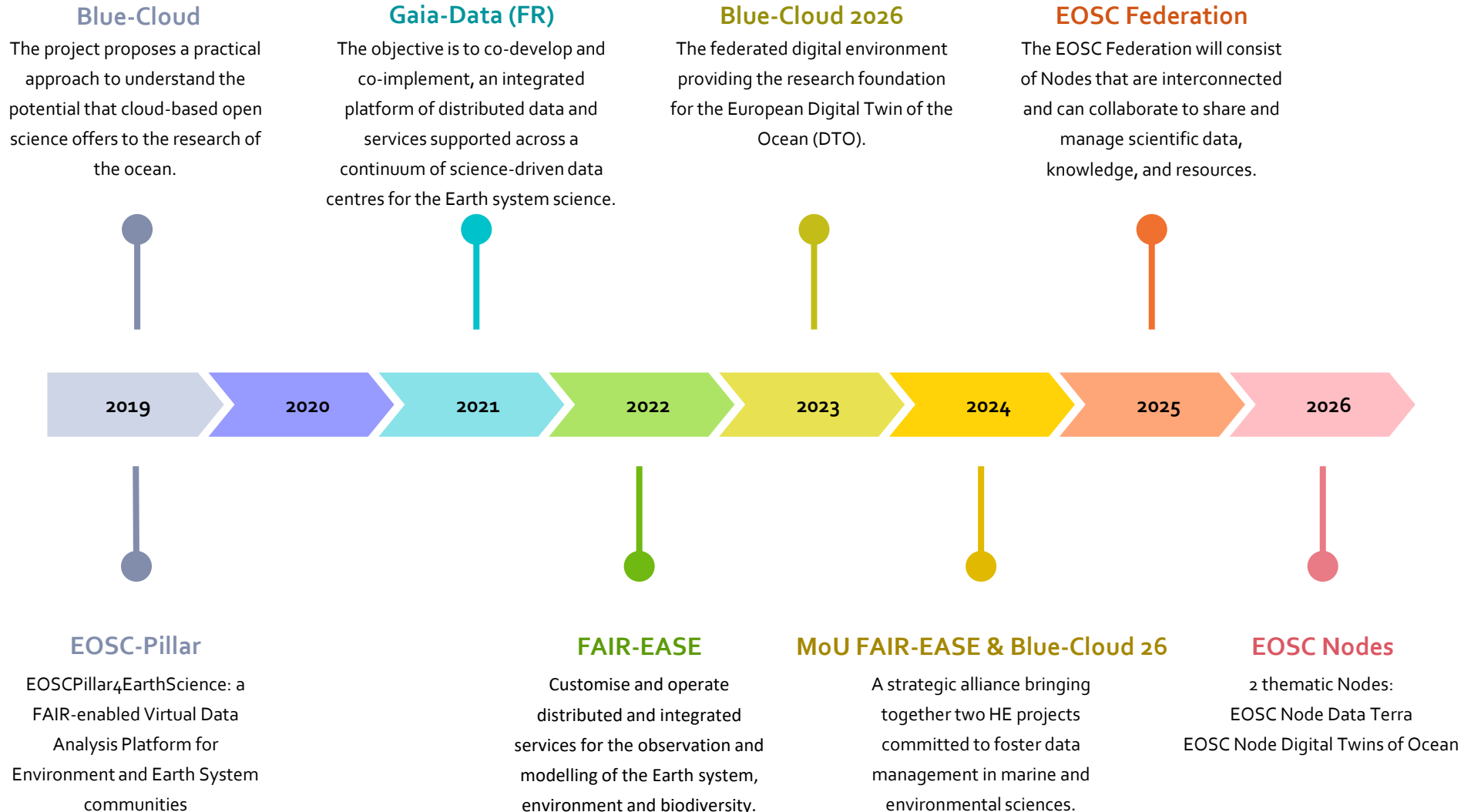
Erwan Boderé, EOSC Node operational manager (Ifremer)

Jérôme Detoc, EOSC Node technical expert (Ifremer)

Erwann Quimbert, Data Terra ODATIS Director (Ifremer)



Intertwined pathways towards the Federation



From a national node to a thematic one

34 contributing organisations



Data Terra RI

The EOSC Node for the Earth system and environmental sciences



Atmosphere



Solid earth



Ocean



Land Surfaces



Biodiversity

Key contributions to the Federation

01 Single access

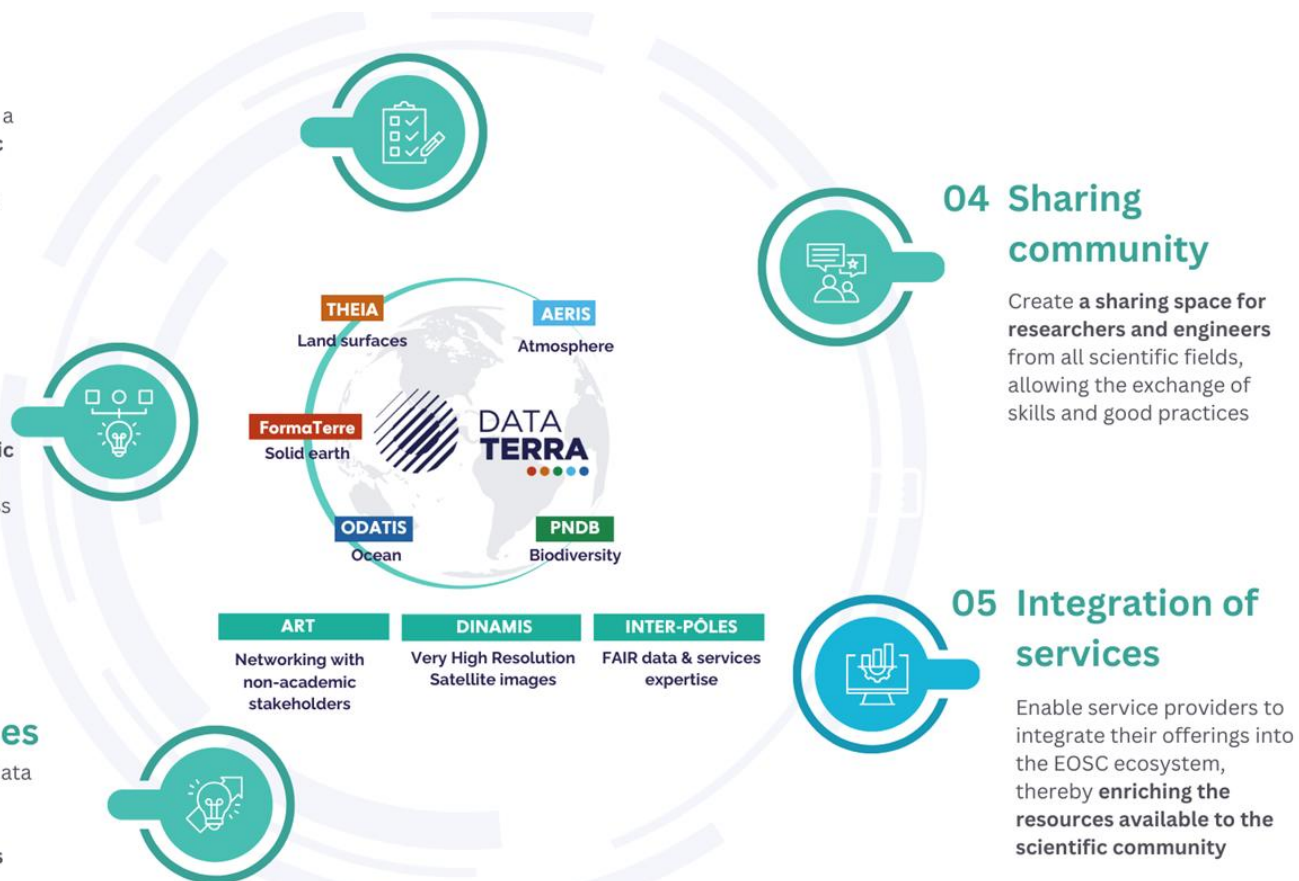
Provide researchers with a single access to scientific data, services and infrastructure needed to analyze the data

02 Federation of resources

Federate existing scientific data infrastructures, currently dispersed across disciplines and Member States

03 Collaboration inter-disciplines

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



04 Sharing community

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

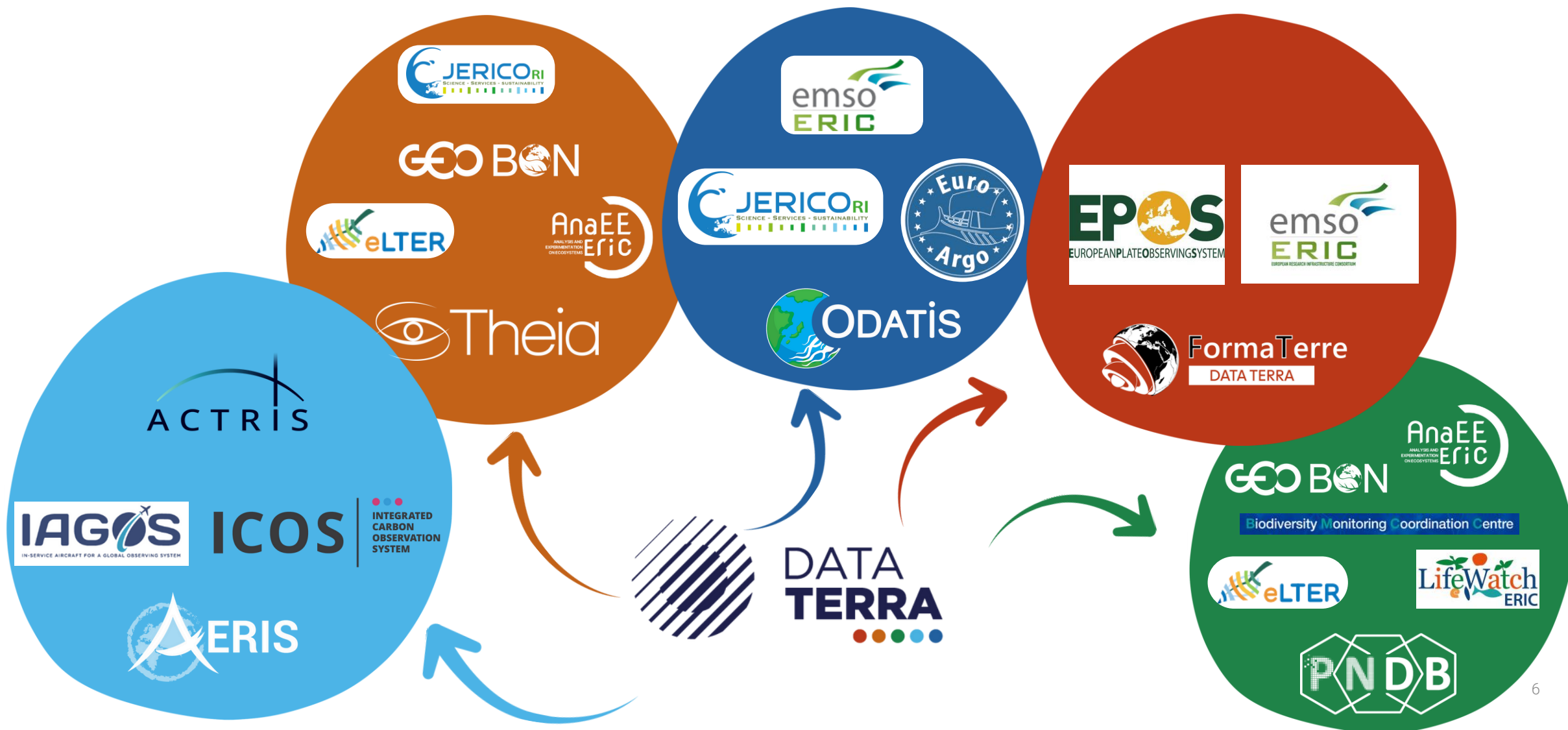
05 Integration of services

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

1. A **seamless access** to high-quality, trusted FAIR and AI-ready multi-domain and multi-source data for the Earth, climate, environment and biodiversity system with rich metadata, semantic interoperability and provenance information.
2. **Cross-domain data analysis** workflows addressing emerging urgent multidisciplinary research challenges in relation to global changes, climate adaptation, extreme events characterisation, loss of biodiversity and societal impacts enhancing the linkages with other Data-Spaces and Data-hubs in Europe and beyond.
3. A **federated layer** towards the environment-oriented Research Infrastructures in coordination, as well as with other European organisations and programs such as Copernicus and Destination Earth.

Promoting inter-domain collaboration and integration

Collaboration with European research infrastructures

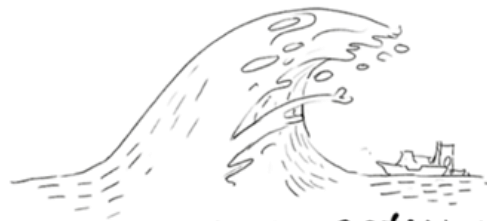


Promoting and facilitating the use of observations made in the ocean or at its interface with other environments

Satellite, in situ, laboratory and modeling data

From the coast to the open sea, from the surface to the ocean floor

Physics, chemistry, biology in the different compartments : Water, Sediment, Biota



Un Océan de DONNÉES

Data

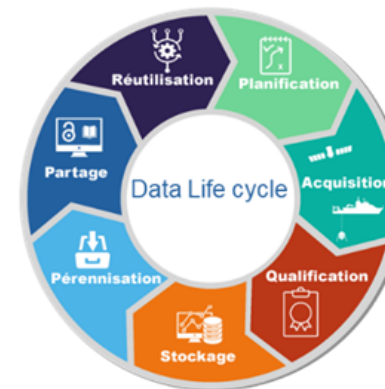
Marine data management applying the FAIR principles: "Findable - Accessible - Interoperable, - Reusable".

Scientific Expertise

Innovative processing methods and products for all ocean data and its interfaces

Services and tools

Training workshops, Services for publishing, host, catalog, combine, analyze, process data.





ODATIS: the Data Terra Ocean data hub

A full range of services

Storage



ODATIS' IT infrastructure is based on 2 HPC data and computing centres, combining computing resources and storage dedicated to hosting and processing massive amounts of data.

Warehouse

The SEANOE marine data warehouse and the ODATIS CDS data warehouse enable datasets to be deposited, described, stored, searched and disseminated.



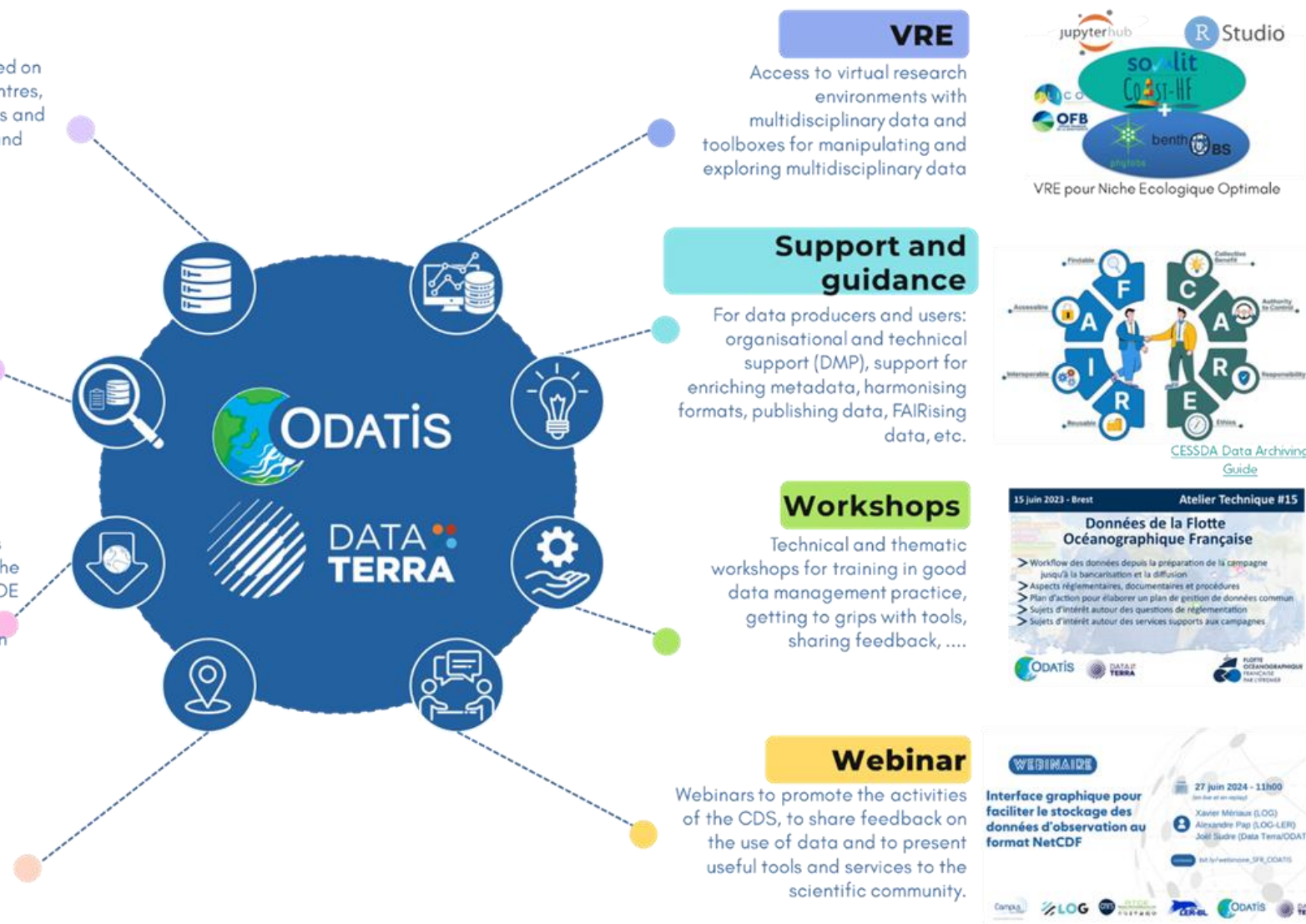
Catalogue

The ODATIS catalogue harvests several existing catalogues in the CDS, OSU, projects and SEANOE with multidisciplinary data in oceanography, with application of the FAIR principles on metadata.



Visualization

The ODATIS catalogue on the Sextant interface enables the creation of interoperable display services and interactive thematic maps.



VRE

Access to virtual research environments with multidisciplinary data and toolboxes for manipulating and exploring multidisciplinary data



VRE pour Niche Ecologique Optimale

Support and guidance

For data producers and users: organisational and technical support (DMP), support for enriching metadata, harmonising formats, publishing data, FAIRising data, etc.



CESSDA Data Archiving Guide

Workshops

Technical and thematic workshops for training in good data management practice, getting to grips with tools, sharing feedback, ...



Webinar

Webinars to promote the activities of the CDS, to share feedback on the use of data and to present useful tools and services to the scientific community.





ODATIS: the Data Terra Ocean data hub

Data and Service Centres (DSCs)

| | |
|--|--|
| | Ifremer |
| | multi-tutelles |
| | Shom |
| | OSU Roscoff, Banyuls Villefranche |
| | Océanographie Méditerranéenne |
| | OSU Observatoire Aquitain des Sciences de la Terre |
| | Ifremer |
| | CNES |

in situ data

Biogeochemistry

Dissolved oxygen, carbonate system - CO₂ Marine pH, nutrients, pigments, CDOM, metals, chemical elements and contaminants, isotopes, marine waste, ...



Marine biology

phytoplankton, zooplankton, benthic habitats, macroalgae, dissolved organic matter, biotoxins, bioinformatics, pathogenic organisms



Ocean Physics

Salinity, temperature, sea surface height, tides, waves, currents, ice, heat content, optical parameters, turbidity, ...



Geology

Geomorphology, coastline, bathymetry, sediment flows, sediment cores, mineral resources, etc.

Meteorology

Surface pressure and wind, radiative flux, ...

A DSC assembles, harmonizes, maintains and makes accessible the data sets for the perimeter for which it is responsible.

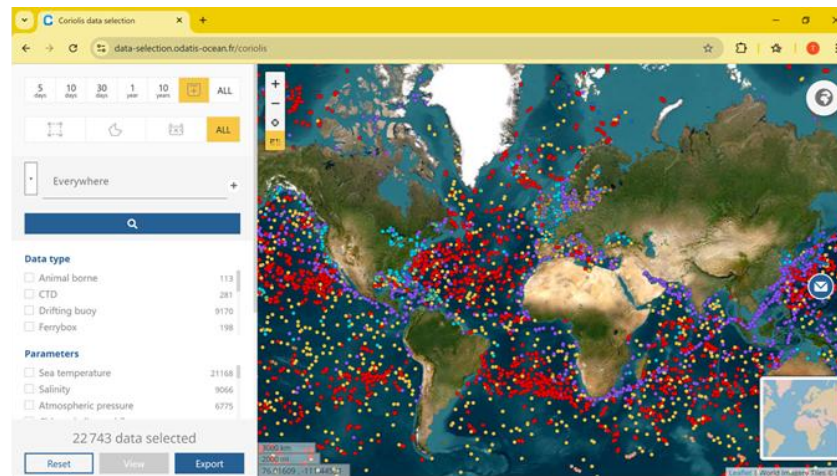
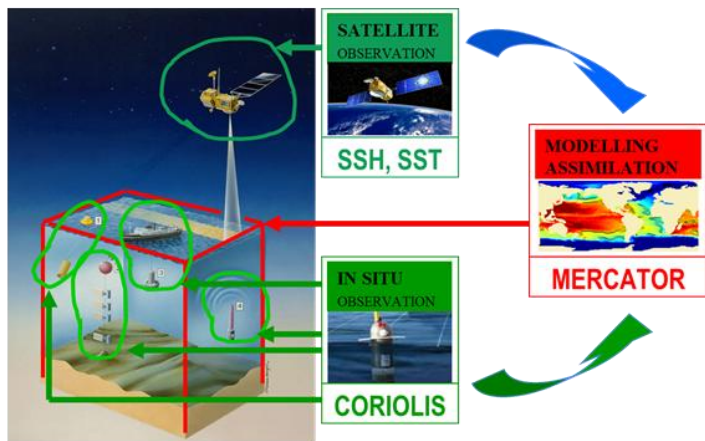
- Data Management
- Storage
- Metadata
- Quality control
- Online access services
- Preservation





ODATIS: the Data Terra Ocean data hub

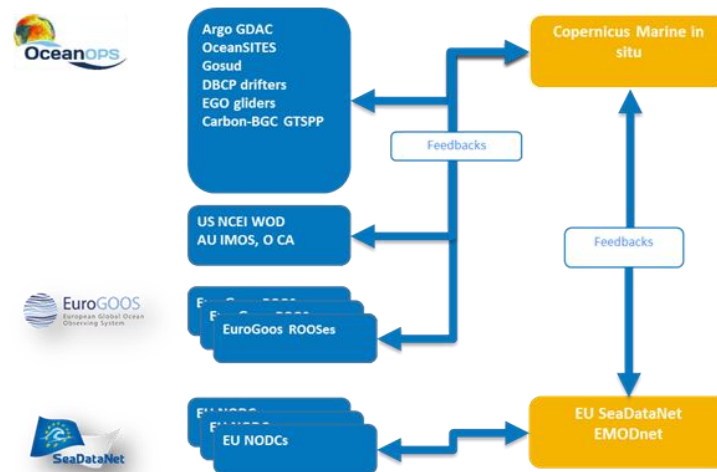
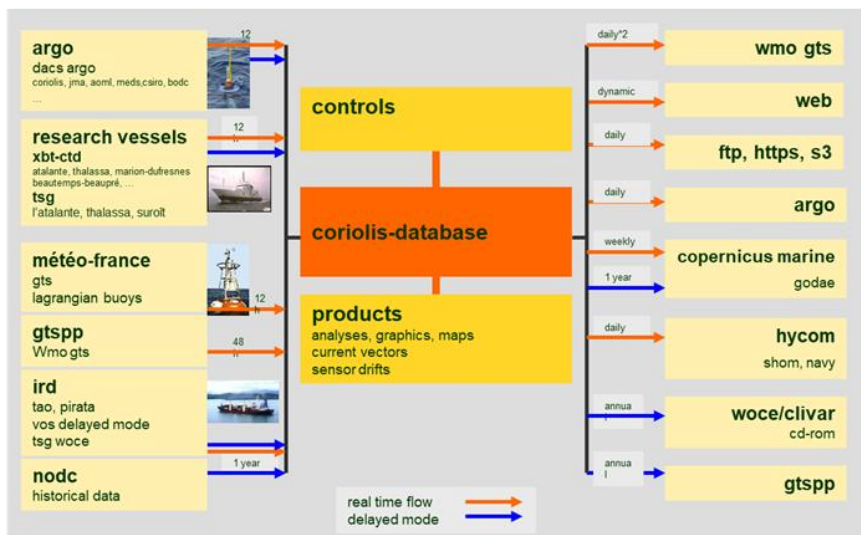
The most european Data and Service Centre: CORIOLIS



The last five days of observations from Coriolis data selection

<https://data-selection.odatis-ocean.fr/coriolis>

Coriolis data flows



CDS-Coriolis major in situ data sources



ODATIS: the Data Terra Ocean data hub

FrOOS-ODATIS dashboard on French Oceans Observing System

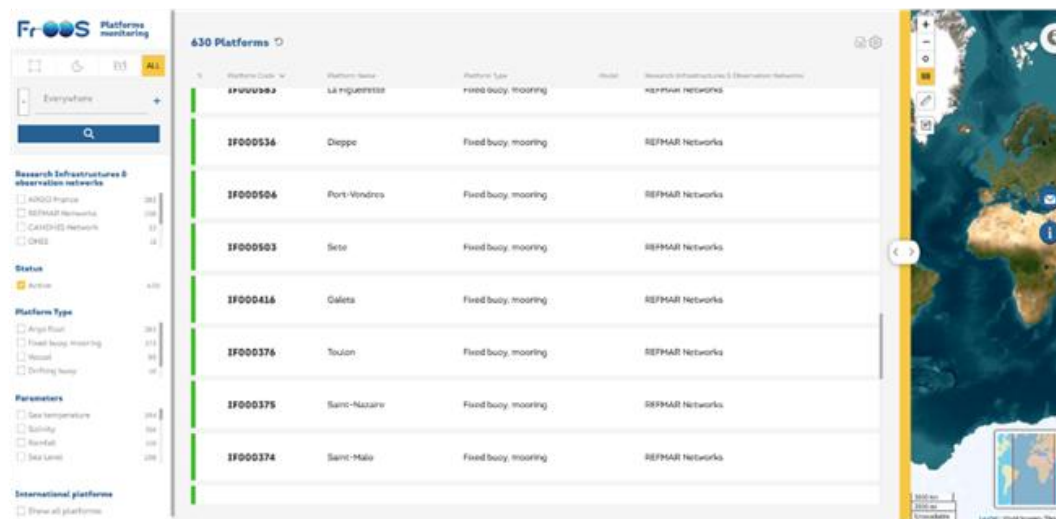
Objective - To set up a dashboard of the French observation systems, showing the various IRs and observation networks (observation points, parameters measured, access to data) and development plans.

Data selection



<https://data-selection.odatis-ocean.fr/froos>

Platform catalogue



<https://platform.odatis-ocean.fr/froos>



ODATIS: the Data Terra Ocean data hub

Activities with EMSO ERIC (forecasted actions)

Data visualization

The screenshot shows a web-based data visualization interface. On the left, there are several filter panels: 'Parameters' (Sea temperature, Salinity, Oxygen, Waves), 'Data type' (Bottle, CTD, Ferrybox, Fixed platform), 'Quality' (Good), and 'Data sources' (Include all data sources). A search bar at the top left contains 'Everywhere'. Below the filters, it says '805 data selected'. The main area is a satellite-style map of the Atlantic Ocean with numerous blue and red data points plotted. A sidebar on the right contains a search bar and a 'Filter' button. At the bottom, there are 'Reset', 'View', and 'Export' buttons.

<https://data-selection.odatis-ocean.fr/emso>

Data publication in SEANOE

Geochemistry of hydrothermal fluids at the Lucky Strike Hydrothermal Field data from the EMSO-Azores observatory, 2025

DATE: 2025
 TEMPORAL EXTENT: 2020-09-16 - 2025-09-01
 AUTHORS: Chantal Valse, Cécile Alam
 AFFILIATIONS: I CMR, GET, UNRMS63
 DOI: 10.17842/SEANOE
 PUBLISHER: SEANOE

High temperature hydrothermal fluids are collected by gas-tight fluid sampler manipulated and triggered by the hydraulic arm of the submarine vehicle (ROV Nautilus). Several hydrothermal vents are sampled, namely: Aicosa, Eiffel tower, Montsaguier, Isabel Sintra, Y3, White Castle, Cypress, South Crystal, Crystal, Capelinhos, Rokdan.

Several chemical analyses are performed aboard the research vessel, such as salinity and CaSO_4 by refractometer, Conductivity, salinity and total dissolved solid (TDS) by electrode (standard solution at 1483 $\mu\text{S/cm}$), pH and Eh by electrode (pH standard 4.01 and 7.0 standard solution at 220mV), iron concentration by photometer (up to 5 ppm), H_2S and total S concentrations measured by electrode (AquaMS, amperometric method) at measured pH value.

DISCIPLINES: Environment, Chemical oceanography
 PARAMETERS: Alkalinity, acidity and pH of the water column; Dissolved metal concentrations in the water column; Salinity of the water column; Density of the water column; Temperature of the water column; Water total metal content; thermistor chains; pH sensors; redox potential sensors; spectrophotometers; refractometer
 DEVICES: Mid-Azores Ridge; EMSO-Azores, hydrothermal fluids, Lucky Strike, geochemistry, MONTAGUT 2025
 LOCATION: 37.28N, 37.28E, -32.27E, -32.27W



Data catalogue in progress

The screenshot shows the EMSO France data catalogue interface. At the top, there is a navigation bar with 'About', 'Data', 'Azores', 'Ligue Ouest', 'Nice', 'DYFAMED', 'Marmara', 'Iroise', and 'Resources'. Below the navigation bar is a search bar and a 'CATALOGUE' tab. The main area displays a grid of data entries. Each entry has a title, a description, and a small image. The entries include: 'ANTARES observatory data (monitoring ILDT)', 'ATLAS - Advanced ecosystem monitoring in ecologiAI observatory', 'Abundance, functional traits and stable isotopes of species colonizing slate and wood substrata along a vent gradient at and away from the Eiffel Tower edifice', 'Acoustic signal, data from the EGM, EMSO-Azores observatory, 2017-2018', 'Anthropogenic pressures at the Lucky Strike hydrothermal vent field: 30 years of research activities. Data repository', 'Array of Ocean Bottom Tilt Current Meters, data from the EMSO-Azores observatory, 2016-2017', 'Array of Ocean Bottom Tilt Current Meters, data from the EMSO-Azores observatory, 2017-2018', 'Array of Ocean Bottom Tilt Current Meters, data from the EMSO-Azores observatory, 2018-2019', and 'Array of Ocean Bottom Tilt Current Meters, data from the EMSO-Azores observatory, 2021-2022'. On the left side, there are filters for 'Date publication', 'Dispositif régional', 'Site', and 'Plateforme'.

OSO ontology

OSO (Observatories of Seas Ontology) provides a semantic framework to describe marine research infrastructures, with a focus on deep-sea observatories operated by EMSO-ERIC and national nodes like EMSO-France.

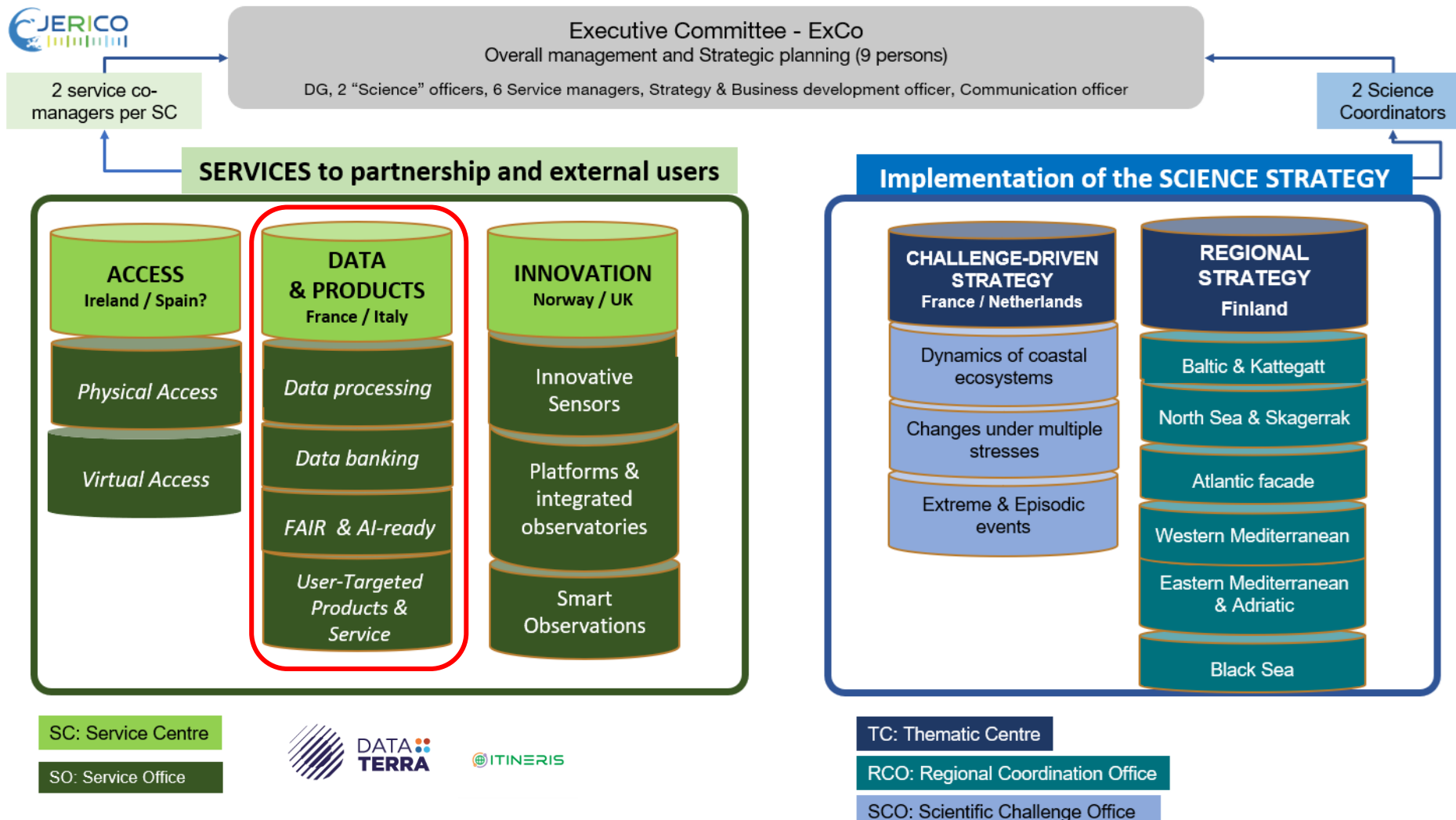
<https://earthportal.eu/ontologies/OSO>

<https://github.com/emso-eric/oso-ontology>

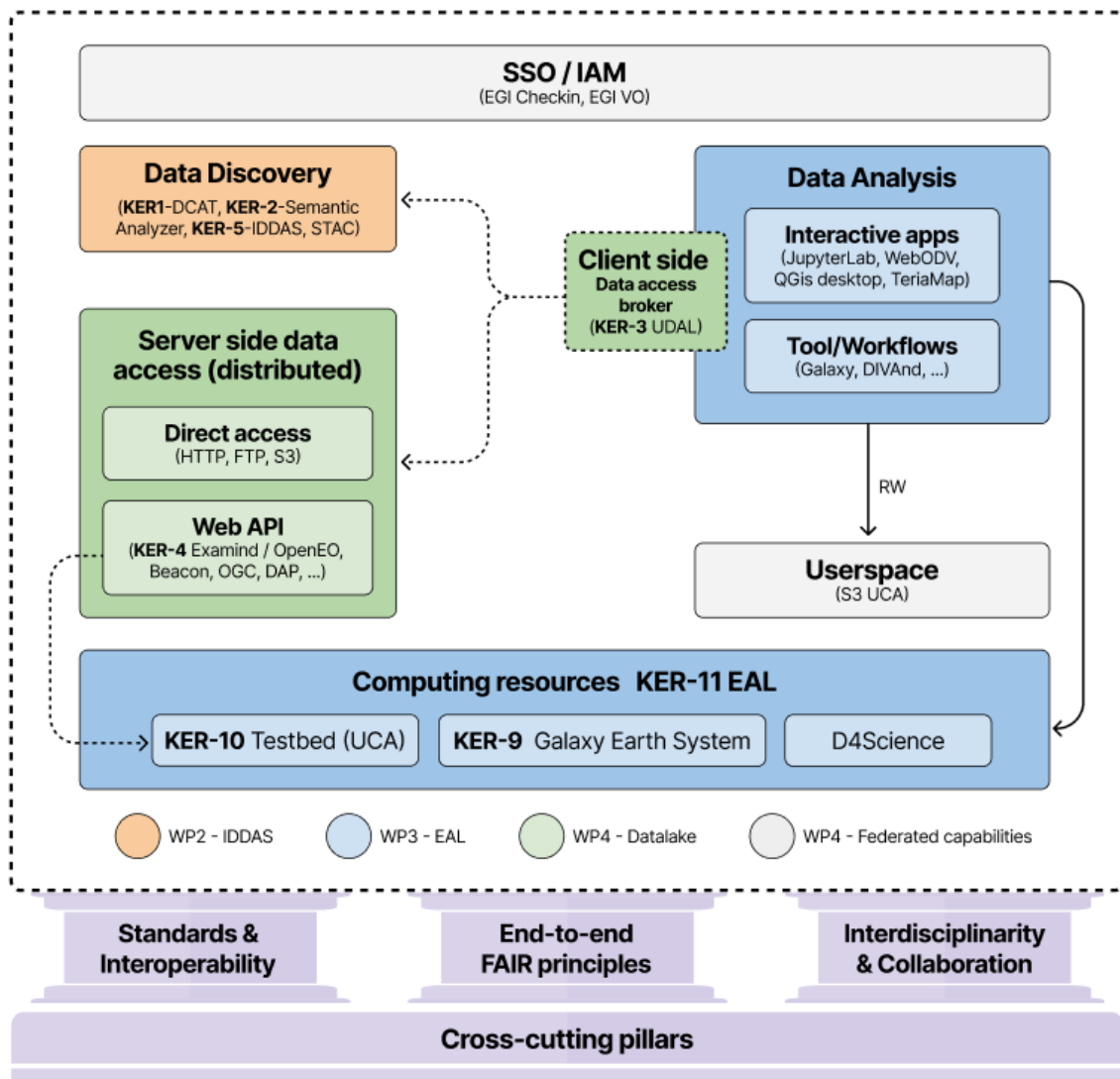


ODATIS: the Data Terra Ocean data hub

Activities with JERICO RI - Data Terra co-lead with ITINERIS of the Data and products Service Center



How FAIR-EASE paves the way to the EOSC Node Data Terra



Data Discovery

IDDAS (Interdisciplinary Data Discovery and Access Service) Semantically enriched metadata catalogue based on a customised DCAT-AP profile, enabling seamless data discovery and access across domains and platforms, both for human and machine.



Data Access

High-performance subsetting with S3/ARCO/STAC/OpenEO, and Beacon.

UDAL (Uniform Data Access) Innovative client-side layer that decouples data functionality from its source and format, reducing technical complexity and enhancing flexibility.



Data Analysis

Interactive applications: interactive notebooks, Galaxy, WebODV

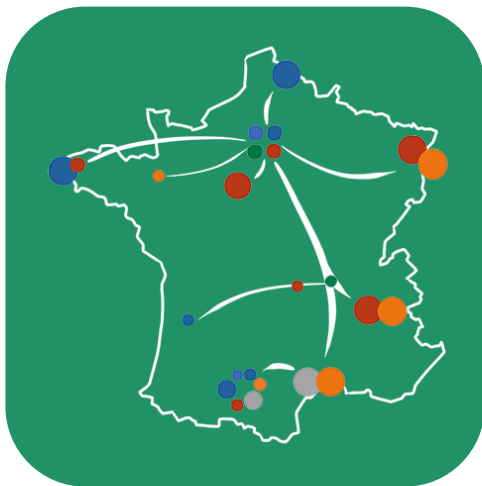
EAL (Earth Analytics Lab) Integrated e-infrastructure providing tools for data processing and visualisation, supporting collaborative research. Federated capabilities allows to move from one EAL to another.

In close collaboration with Real-life use cases

Coastal Water Dynamics, Ocean BGC, Volcplume, Marine Omics, Earth Cirtical Zone, Hunga Tonga

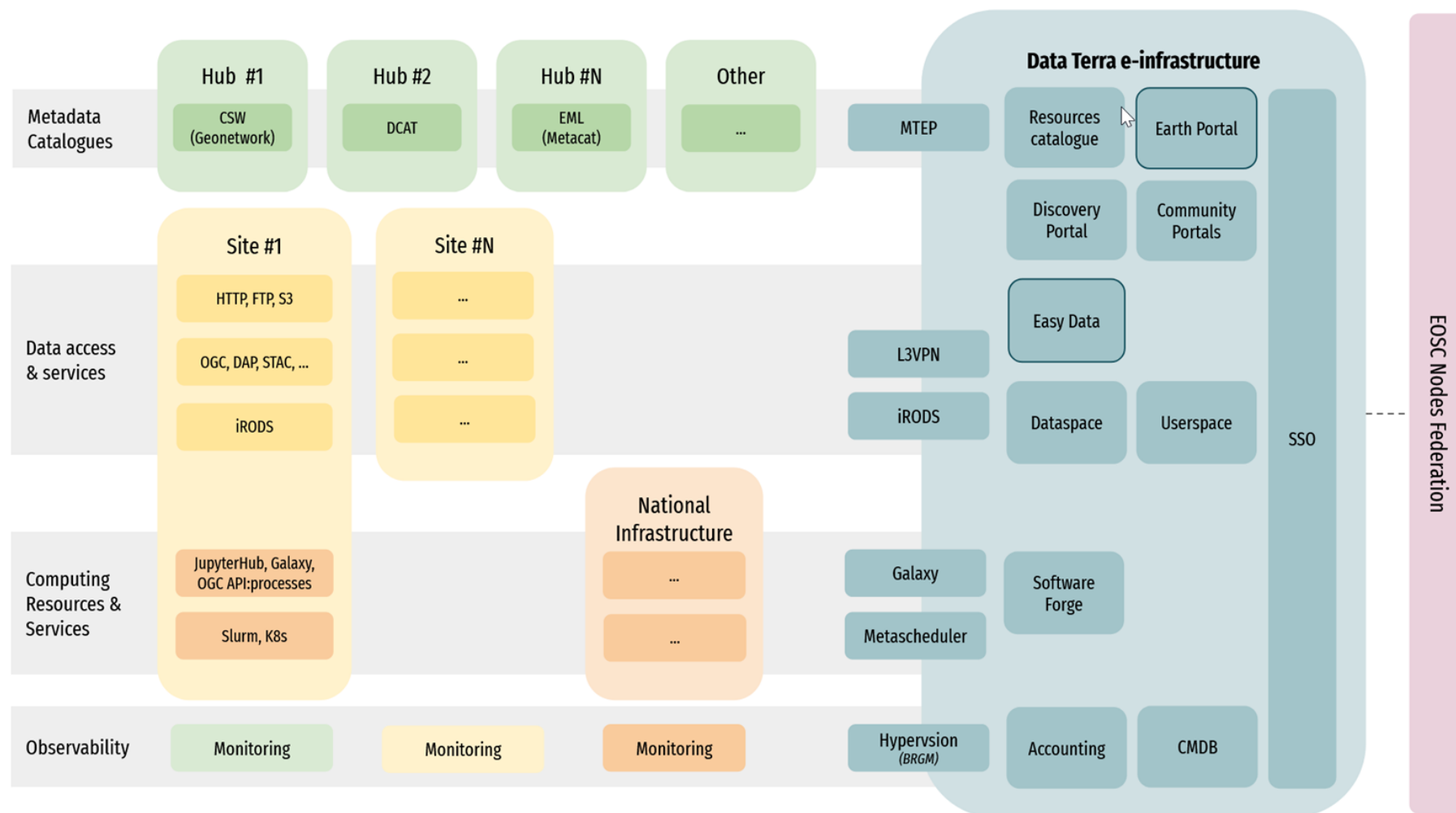
To Data Terra e-infrastructure

Distributed and federated infrastructure, with shared services

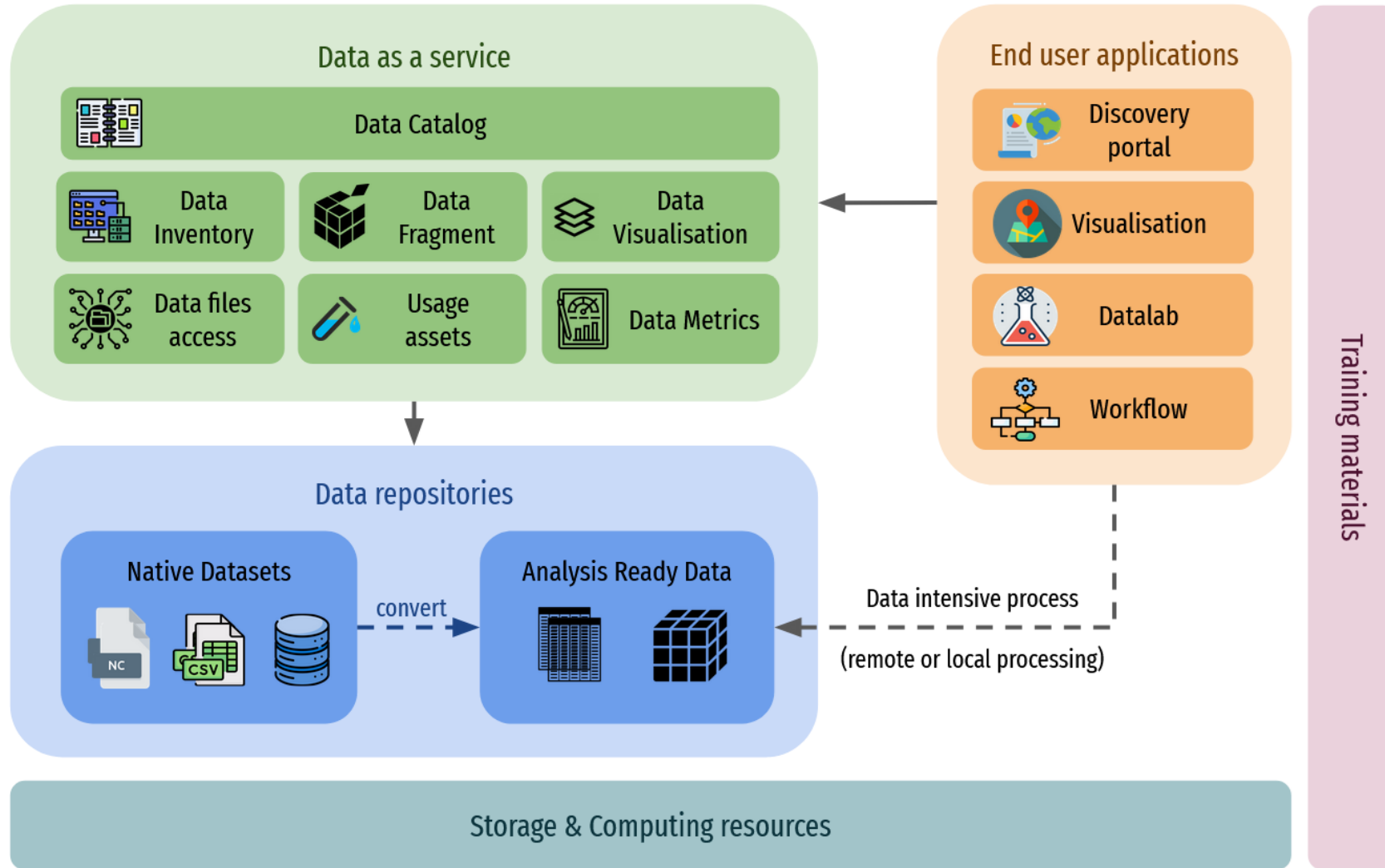


Relying on existing, interconnected and reinforced storage and computing capacities.

Distributed services with new capabilities and functionalities to facilitate seamless and continuous cross-fertilisation and exploitation.



Towards Data As a Service



Managing data as a software

- Track changes as with git
- Check the quality, performance, security, etc.
- Provide documentation : user manual, examples of use with notebooks, etc.

Meeting user expectations

- Discover data collections
- Download raw files
- Retrieve a data fragment
- [Pre]Visualise

Simplified use

- Hide technical stuff
- Interoperability
- Integrated in analysis platforms
- Compatibility with big data and AI techniques

eosc Node

Data Terra
Environment

eosc

FAIR-EASE

Building Interoperable Earth Science & Environmental Services

eosc Node

Data Terra

Environment

