



Collaborating with EGI in EC Projects

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Some of our active projects...



interTwin

The C-SCALE Project



Europe lacks an **integrated compute** and **storage infrastructure** for the exploitation of **Copernicus** datasets in scientific and applied applications.



C-SCALE responds to that challenge by **enhancing the EO SC Portal** with **pan-European federated data and computing infrastructure** services for Copernicus.

C-SCALE: Copernicus - eoSC AnaLytics Engine

- Project duration: Jan 2021 – June 2023
- Budget: ~ 2 million Euros
- Consortium of 11 partners with pan-European coverage



The infographic is a dark blue vertical panel with a white C-SCALE logo at the top. Below the logo, the word 'enables' is written in white. The panel is divided into four sections, each with an icon and a title:

- Seamless access**: Icon of a key. Text: 'C-SCALE seamlessly integrates access to EO and Copernicus data into the EO SC portal service offerings, exposing Copernicus data to a much broader audience'
- Easy Processing & Analysis**: Icon of a magnifying glass over a line graph. Text: 'C-SCALE federates European e-infrastructures and lay the foundation for a European open Big (Copernicus) Data Analytics platform'
- Cross-disciplinary research**: Icon of a globe with interconnected nodes. Text: 'The integration enabled by C-SCALE helps to make the Copernicus data FAIR and create optimal conditions for cross-disciplinary research'
- Knowledge for sound decision making**: Icon of a person with a question mark. Text: 'Data and service-based knowledge facilitated by C-SCALE will help to monitor and mitigate climate change and improve the quality of life for citizens of Europe and around the world'

Project Objectives and KERs



Objectives

- O1: **Scale-up the EOSC Portal** integrating pan-European computing and data resources for Copernicus
- O2: **Federate Copernicus resources** with EOSC computing and storage providers
- O3: Piloting the provision of a distributed **online Sentinel long-term archive** in EOSC
- O4: **Co-design** of the federation with relevant scientific communities across Europe

Key Exploitable Results:



FedEarthData



openEO Platform



Earth Observation
Metadata Query
Service

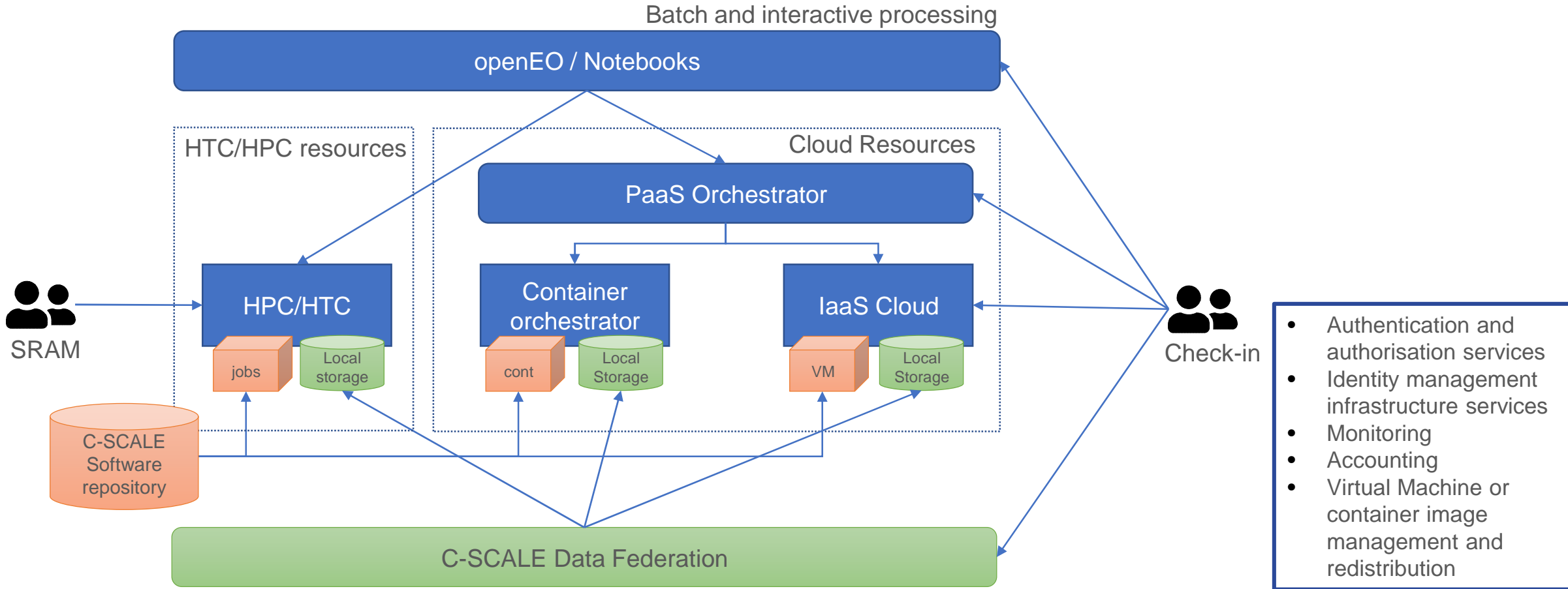


Workflow solutions



C-SCALE Community

FedEarthData: federation of Earth observation data archives and computing resource providers, enabling execution of Earth observation processing workflows with seamless access to data



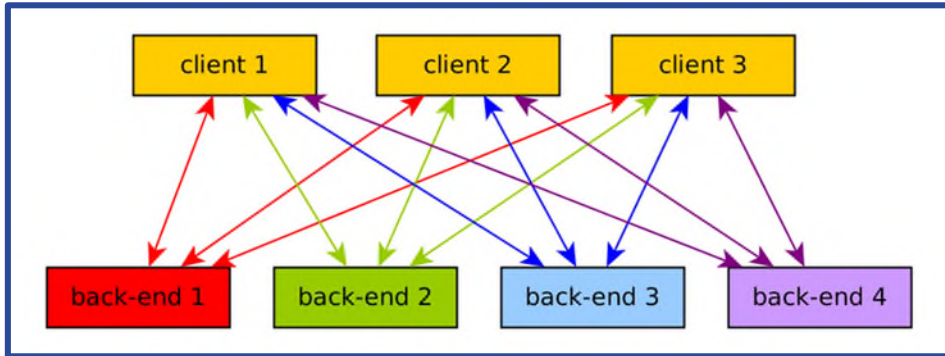


openEO Platform

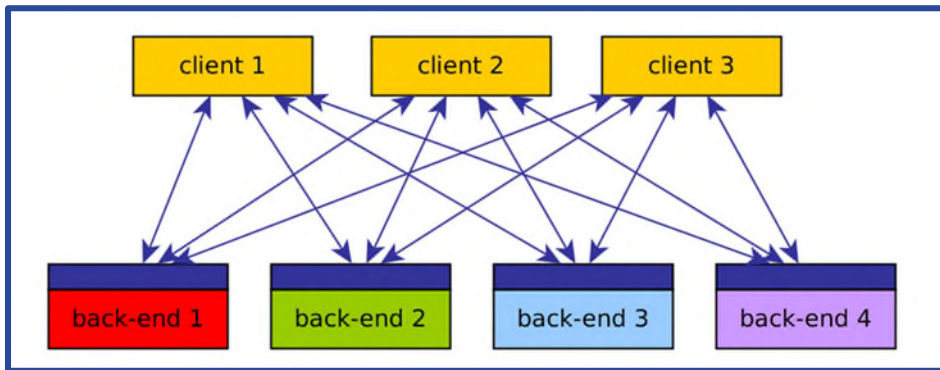
OPERATIONAL



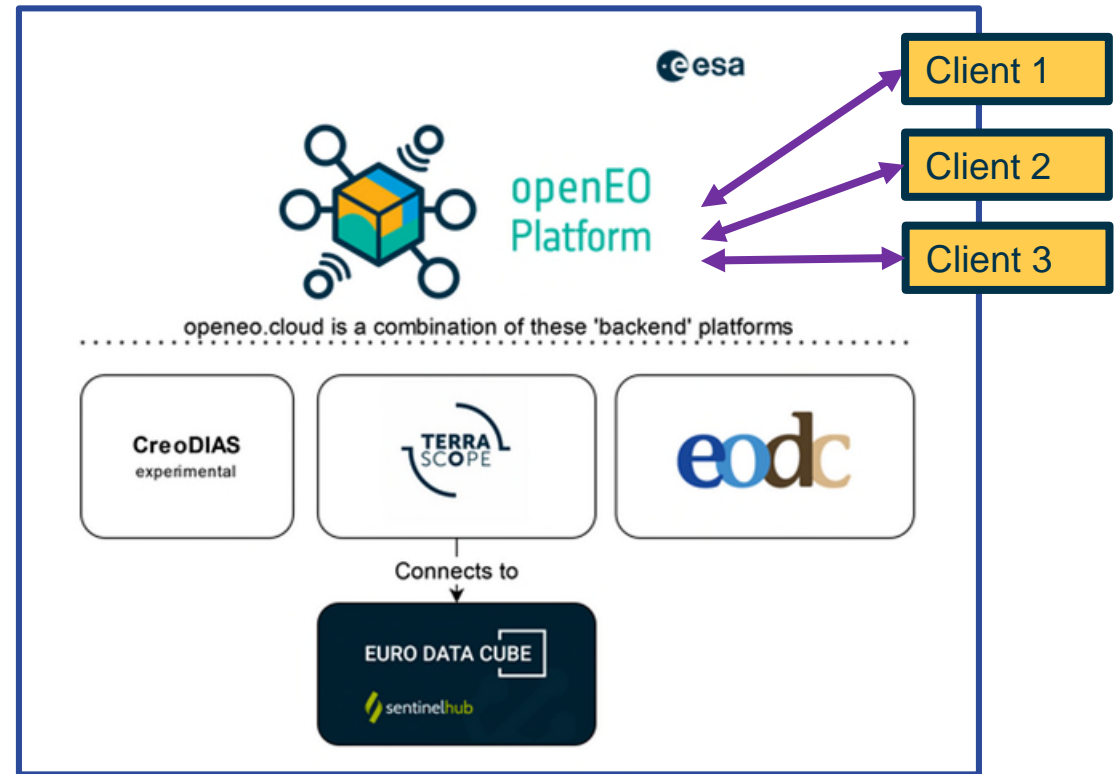
Situation before openEO:



openEO API:



openEO Platform:



- Clients: Python, R, Javascript
- Web Editor
- JupyterLab

Earth Observation Metadata Query Service



OPERATIONAL

- ❑ Earth Observation data discovery service arching over FedEarthData member providers
- ❑ Data providers already know where their data are
 - Bring their discovery interfaces under a common one
 - single point
 - shared protocol
- ❑ Spatio-Temporal Asset Catalogue (STAC) interface to enable queries across the federation
- ❑ EO-MQS is a query broker and aggregator, it is not yet another metadata database.
- ❑ Focus and data retention policies at member sites - avoiding polling resources irrelevant to the given query

C-SCALE Earth Observation Metadata Query Service (EO-MQS)

C-SCALE Earth Observation Metadata Query Service (EO-MQS) (stac-fastapi)

<https://eo-mqs.c-scale.eu/stac/v1>

The Earth Observation Metadata Query Service (EO-MQS) is the central entry point to query for metadata across the C-SCALE federation.

Collections	Catalogs	Items	Links
EOODCSentinel1-grd			
EOODCSentinel-2-11c			
EOODCS1-global-sigma0			
EOODCS1-demo-sigma0			
EOODCSlandsat-c2-11			
GRNET-OPENSTACKSentinel-1-grd			
GRNET-OPENSTACKSentinel-1-ocn			
GRNET-OPENSTACKSentinel-1-raw			
GRNET-OPENSTACKSentinel-1-slc			
GRNET-OPENSTACKSentinel-2-11b			
GRNET-OPENSTACKSentinel-2-11c			
GRNET-OPENSTACKSentinel-2-12a			
GRNET-OPENSTACKSentinel-3-olci-11b			
GRNET-OPENSTACKSentinel-3-olci-12			
GRNET-OPENSTACKSentinel-3-s1str-11b			
GRNET-OPENSTACKSentinel-3-s1str-12			
GRNET-OPENSTACKSentinel-3-s1m-12			
GRNET-OPENSTACKSentinel-3-syn-12			
GRNET-OPENSTACKSentinel-5p-11b			
GRNET-OPENSTACKSentinel-5p-12			
CREODIASLANDSAT-5			

C-SCALE Earth Observation Metadata Query Service (EO-MQS) / Sentinel-1 SAR L1 GRD

Sentinel-1 SAR L1 GRD (EOODCSentinel1-grd)

<https://eo-mqs.c-scale.eu/stac/v1/collections/EOODCSentinel1-grd>

Level-1 Ground Range Detected (GRD) products consist of focused SAR data that has been detected, multi-looked and projected to ground range using the Earth ellipsoid model WGS84. The ellipsoid projection of the GRD products is corrected using the terrain height specified in the product general annotation. The terrain height used varies in azimuth but is constant in range (but can be different for each IW/EW sub-swath). Ground range coordinates are the slant range coordinates projected onto the ellipsoid of the Earth. Pixel values represent detected amplitude. Phase information is lost. The resulting product has approximately square resolution pixels and square pixel spacing with reduced speckle at a cost of reduced spatial resolution. For the IW and EW GRD products, multi-looked is performed on each burst individually. All bursts in all sub-swaths are then seamlessly merged to form a single, contiguous, ground range, detected image per polarisation.

Title	Date Acquired
S1A_IW_GRDH_1SDV_20220401T233117_20220401T233146_042586_051487_C402	Fri, 01 Apr 2022 23:31:31 GMT
S1A_IW_GRDH_1SDV_20220401T105102_20220401T105127_042579_05143E_B532	Fri, 01 Apr 2022 10:51:15 GMT
S1A_IW_GRDH_1SDV_20220401T015411_20220401T015436_042573_051408_458D	Fri, 01 Apr 2022 01:54:24 GMT
S1A_IW_GRDH_1SDV_20220329T091454_20220329T091519_042534_0512C4_FD57	Tue, 29 Mar 2022 09:15:06 GMT
S1A_IW_GRDH_1SDV_20220324T020806_20220324T020831_042457_051023_3F41	Thu, 24 Mar 2022 02:08:19 GMT
S1A_IW_GRDH_1SSV_20220314T095817_20220314T095848_042316_050854_9E4A	Mon, 14 Mar 2022 09:58:33 GMT
S1A_IW_GRDH_1SDV_20220101T234855_20220101T234921_041274_04E7D7_3FC0	Sat, 01 Jan 2022 23:49:08 GMT
S1A_IW_GRDH_1SDV_20220101T234510_20220101T234535_041274_04E7D7_182F	Sat, 01 Jan 2022 23:45:22 GMT
S1A_IW_GRDH_1SDV_20220101T234445_20220101T234510_041274_04E7D7_79CF	Sat, 01 Jan 2022 23:44:57 GMT
S1A_IW_GRDH_1SDV_20220101T234420_20220101T234445_041274_04E7D7_03C2	Sat, 01 Jan 2022 23:44:32 GMT



METADATA

STAC Version 1.0.0

Keywords sentinel, copernicus, esa, sar, radar

License proprietary

Temporal Extent 03/10/2014, 02:00:00 - now

PROVIDER ESA (producer, processor, licensor)

ITEM SUMMARY

Platform • sentinel-1a
• sentinel-1b

Constellation sentinel-1

How to access the C-SCALE services



Main exploitation paths:

- [EOSC Marketplace](#)
- [C-SCALE website](#)
- [openEO Platform website](#)



Federated Earth System Simulation and Data Processing Platform
FedEarthData
Easy processing of Copernicus data
Organisation: EOI Foundation
Provided by: CESNET, Italian National Institute of Nuclear Physics, Earth Observation Data Centre for Water Resources Monitoring, Portuguese National Distributed Computing Infrastructure (INCD), SURF
0.0 / 5 0 reviews
Add to comparison Add to favourites
Access the service
ORDER REQUIRED
Webpage Helpdesk Helpdesk e-mail Manual Ask a question about this service?

<https://marketplace.eosc-portal.eu/services/eosc.egi-fed.fedearthdata>

Earth Observation Metadata Query Service
EO-MQS
Efficient discovery of Copernicus data assets
Organisation: Earth Observation Data Centre for Water Resources Monitoring
Provided by: CESNET
0.0 / 5 0 reviews
Add to comparison Add to favourites
Access the service
FULLY OPEN ACCESS
Webpage Helpdesk Helpdesk e-mail Manual Training information Ask a question about this service?

<https://marketplace.eosc-portal.eu/services/eosc.eodc.eo-mqs>



openEO Platform

SERVICE OFFERING

openEO platform aims at covering the needs of real-world EO users and experts. Therefore, we invite you to join the development and evolution process! Play around with the platform using the free trial or apply for Network of Resources Sponsoring for running larger use cases. We'd love to hear your feedback and get to know the features and capabilities that you need! The following offers are available right now:

Free Trial	Network of Resources Sponsoring
free	free
You want to try and "play" with the Platform. You don't have a specific use case in mind and want to see how it works.	You want to use openEO Platform for longer running projects or get specific support from our development team for your workflows. Limited funding (5,000 EUR) for non-ESA projects.
Valid for: 30 days	Valid as per sponsoring request
Register	Apply

<https://openeo.cloud/#plans>

C-SCALE workflow solutions



Workflows for Copernicus data processing: easy deployment of workflows supporting monitoring, modelling and forecasting of the Earth system

- Provided by C-SCALE Use Cases
- Templates and reusable components for users to build their own applications on FedEarthData



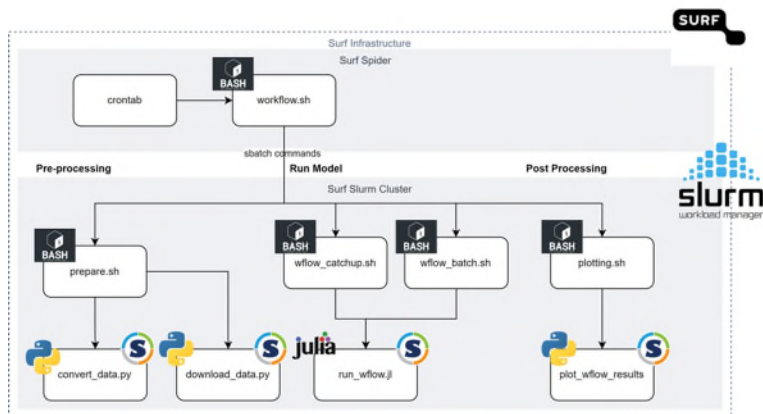
Aquamonitor using OpenEO on C-SCALE

RoHub [Link](#) zenodo [Link](#)



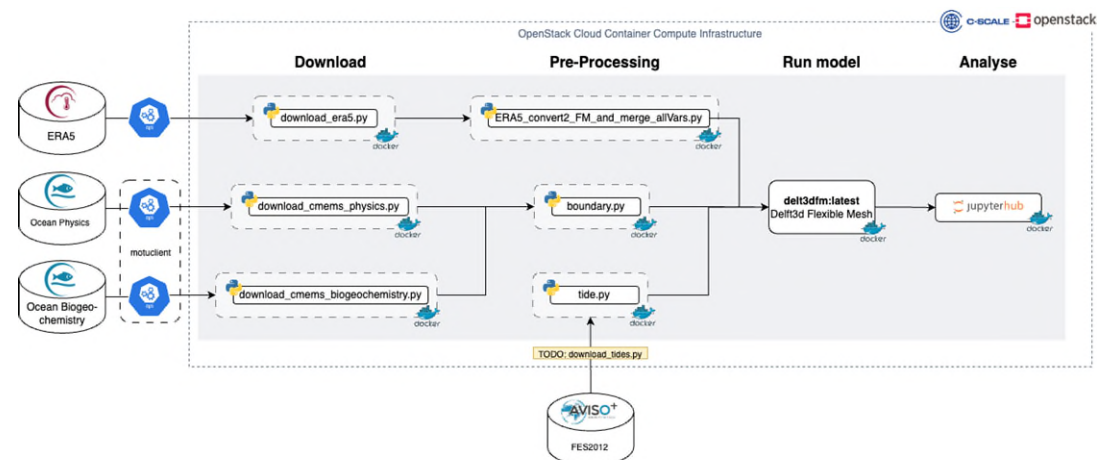
Global Water Watch using OpenEO on C-SCALE

RoHub [Link](#)



Automated monthly river forecasts using Wflow

RoHub [Link](#) zenodo [Link](#)



Coastal hydrodynamic and water quality modelling using Delft3D FM

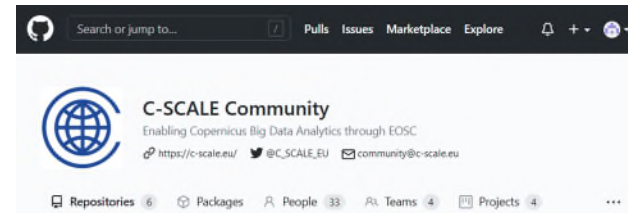
RoHub [Link](#) zenodo [Link](#)

User engagement



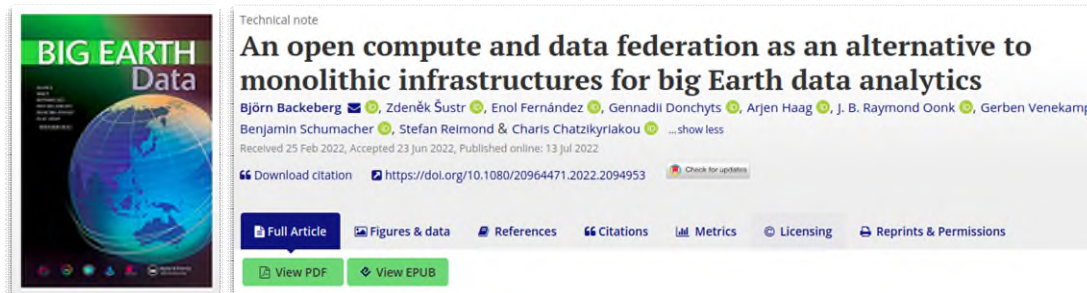
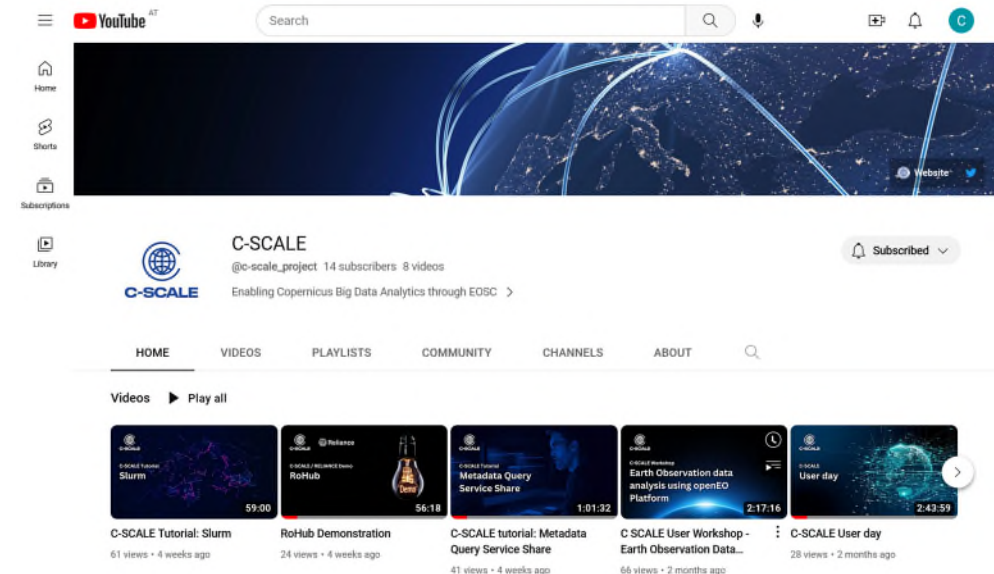
User forum and functional co-design

- C-SCALE community: <https://github.com/c-scale-community/discussions>
- encourages advanced users to become active participants in the development of the future C-SCALE services
- mechanism to engage with the national and international organisations invested in Copernicus services



C-SCALE documentation, training and support

- <https://wiki.c-scale.eu/C-SCALE>
- https://www.youtube.com/@c-scale_project

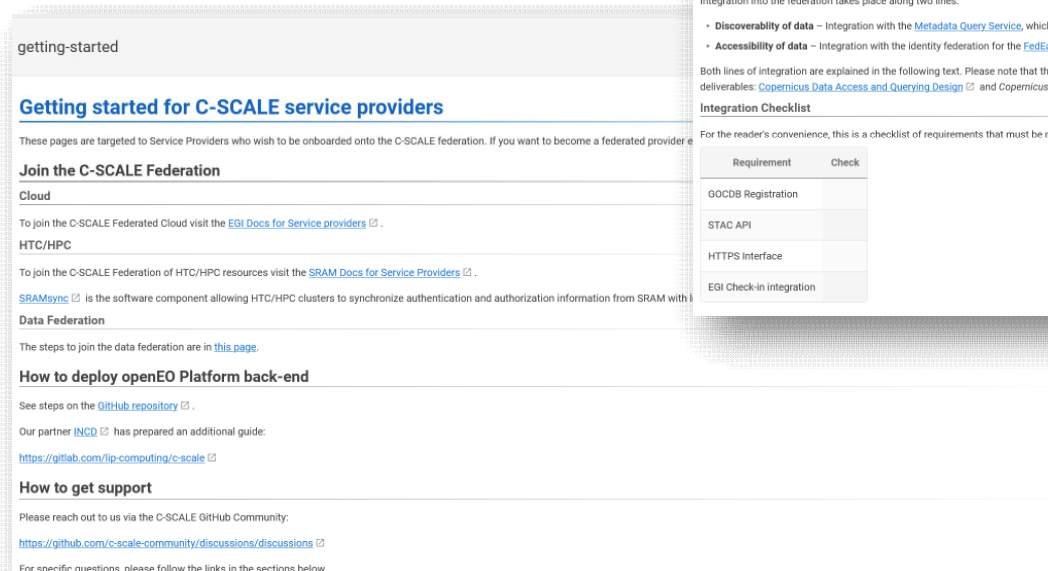


<https://doi.org/10.1080/20964471.2022.2094953>

Provider onboarding

C-SCALE aims to **expand its Compute and Data federation** with new service providers!

- **Well-defined guidelines** to join the federation
 - Technical integration
 - configure your system to allow federated identity
 - register in catalogues
 - Non-technical integration: contacts, AUP, Privacy Policies...
- **Support** is provided through the whole process
- If you interested, **get in contact with us!**



getting-started

Getting started for C-SCALE service providers

These pages are targeted to Service Providers who wish to be onboarded onto the C-SCALE federation. If you want to become a federated provider...

Join the C-SCALE Federation

Cloud

To join the C-SCALE Federated Cloud visit the [EGI Docs for Service providers](#).

HTC/HPC

To join the C-SCALE Federation of HTC/HPC resources visit the [SRAM Docs for Service Providers](#).

[SRAMsync](#) is the software component allowing HTC/HPC clusters to synchronize authentication and authorization information from SRAM with the Data Federation.

Data Federation

The steps to join the data federation are in [this page](#).

How to deploy openEO Platform back-end

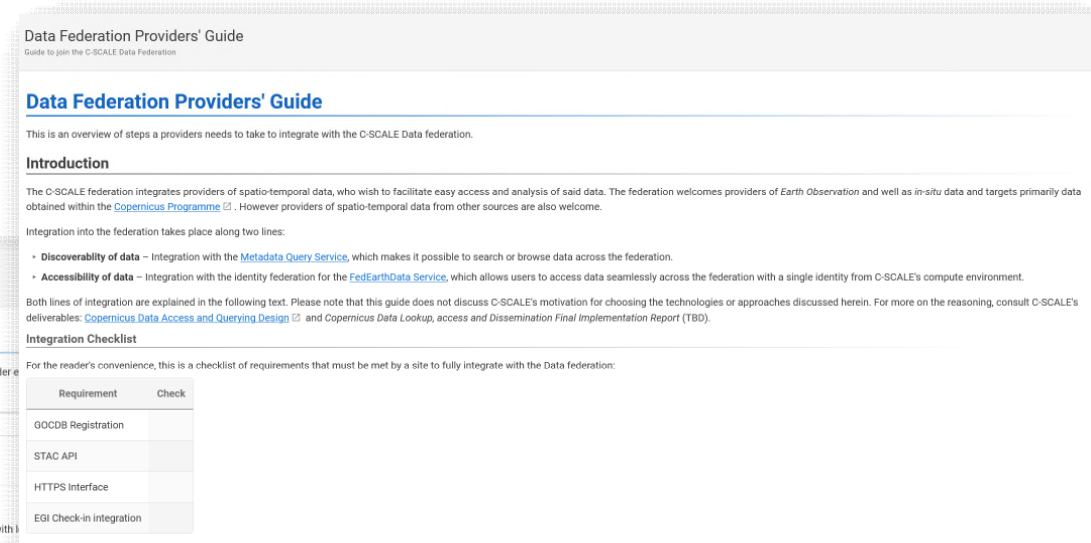
See steps on the [GitHub repository](#).

Our partner [INCD](#) has prepared an additional guide:
<https://gitlab.com/lip-computing/c-scale>

How to get support

Please reach out to us via the C-SCALE GitHub Community:
<https://github.com/c-scale-community/discussions/discussions>

For specific questions, please follow the links in the sections below.



Data Federation Providers' Guide

Guide to join the C-SCALE Data Federation

Data Federation Providers' Guide

This is an overview of steps a providers needs to take to integrate with the C-SCALE Data federation.

Introduction

The C-SCALE federation integrates providers of spatio-temporal data, who wish to facilitate easy access and analysis of said data. The federation welcomes providers of Earth Observation and well as in-situ data and targets primarily data obtained within the [Copernicus Programme](#). However providers of spatio-temporal data from other sources are also welcome.

Integration into the federation takes place along two lines:

- **Discoverability of data** – Integration with the [Metadata Query Service](#), which makes it possible to search or browse data across the federation.
- **Accessibility of data** – Integration with the identity federation for the [FedEarthData Service](#), which allows users to access data seamlessly across the federation with a single identity from C-SCALE's compute environment.

Both lines of integration are explained in the following text. Please note that this guide does not discuss C-SCALE's motivation for choosing the technologies or approaches discussed herein. For more on the reasoning, consult C-SCALE's deliverables: [Copernicus Data Access and Querying Design](#) and [Copernicus Data Lookup, access and Dissemination Final Implementation Report \(TBD\)](#).

Integration Checklist

For the reader's convenience, this is a checklist of requirements that must be met by a site to fully integrate with the Data Federation:

Requirement	Check
GOCDB Registration	<input type="checkbox"/>
STAC API	<input type="checkbox"/>
HTTPS interface	<input type="checkbox"/>
EGI Check-in integration	<input type="checkbox"/>



interTwin

An interdisciplinary Digital Twin Engine for science



interTwin is funded by Horizon Europe under grant agreement n° 101058386

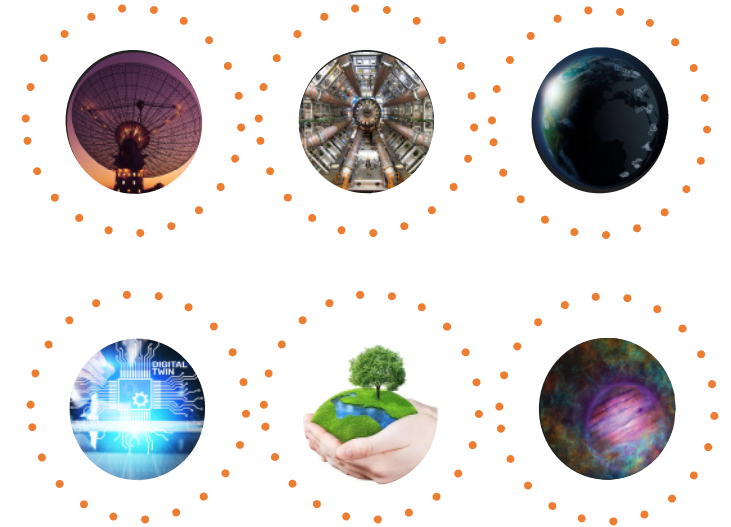


interTwin overall objective

Co-design and implement the prototype of an interdisciplinary Digital Twin Engine.

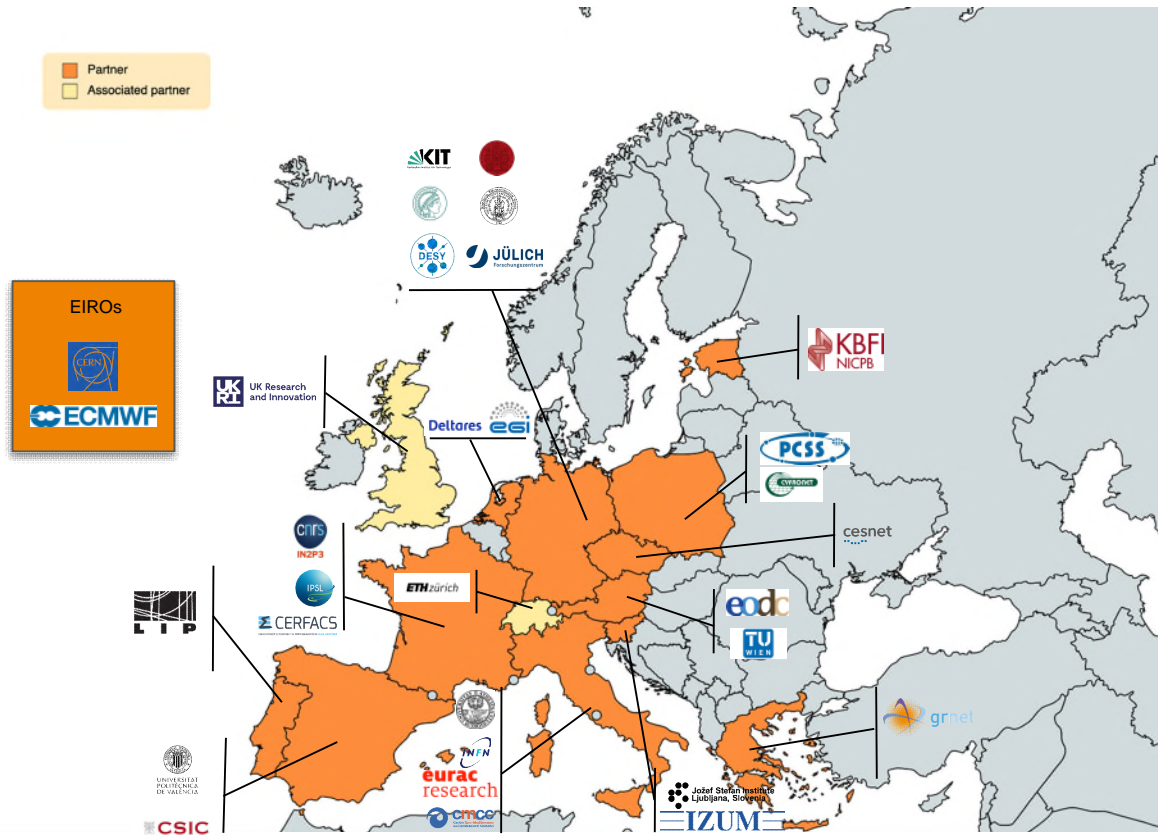
Digital Twin Engine

- It is an **open-source platform** based on open standards.
- It offers the capability to integrate with **application-specific Digital Twins**.
- Its functional specifications and implementation are based on
 - a **co-designed interoperability framework**
 - conceptual model of a DT for research - **the DTE blueprint architecture**.





Consortium Overview



EGI Foundation as coordinator

29

Participants, including 1 affiliated entity and 2 associated partners

Consortium at a glance

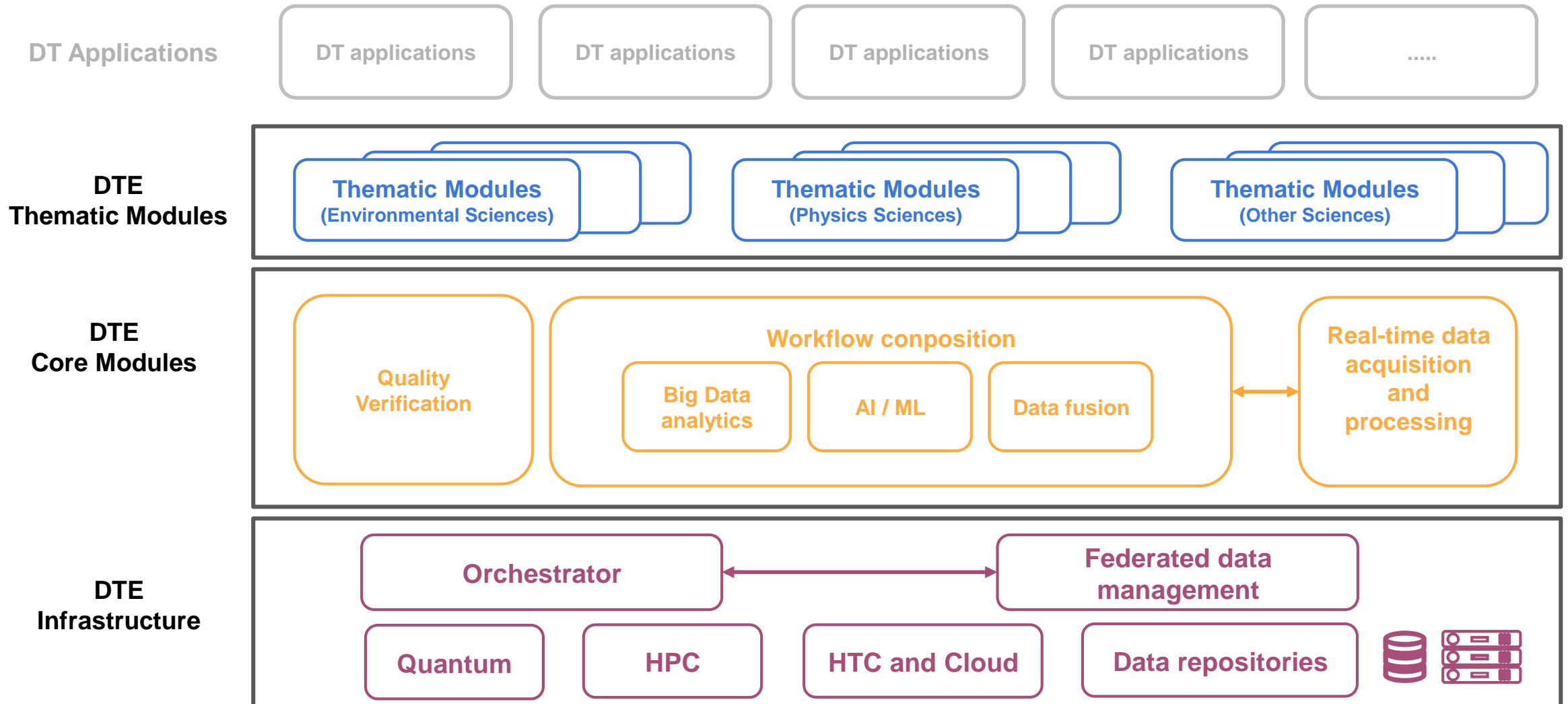
10
Providers
cloud, HTC , HPC resources and access to Quantum systems

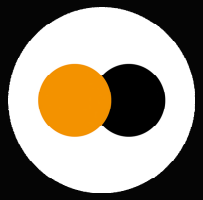
11
Technology providers
delivering the DTE infrastructure and horizontal capabilities

14
Community representants
from 5 scientific areas; requirements and developing DT applications and thematic modules



interTwin components





DTE Thematic Capabilities



interTwin DTE Thematic modules

addons providing **capabilities tailored to the needs of specific groups of applications** (i.e. of general applicability to multiple ‘adjacent’ communities) developed with the aim to be “**promoted**” as Core modules following the successful adoption by multiple resource communities from different domains

- Lattice QCD simulations
- Noise simulation for radio astronomy
- GAN-based modules to manage noise simulation, low-latency de-noising and veto generation
- Climate analytics and data processing
- Earth Observation Modelling and Processing
- Hydrological model data processing
- Fast simulation with GAN



GREAT
Green Deal Data Space



GREEN DEAL DATA SPACE FOUNDATION & ITS COMMUNITY OF PRACTICE



Funded by
the European Union



The Green Deal Data Space



Single Market for data
[COM/2020/66](#)



**Tackling climate and
environmental-related challenges**
[COM/2019/640](#)

Green Deal Data Space

A federation of data ecosystems enabling policy makers, businesses, researchers and citizens, from Europe and around the world, to jointly tackle climate change.



Green Deal Data Space Foundation & its Community of Practice



- **Duration:** 18 Months
- **Running:** September 2022 –February 2024
- **Consortium:** 11 Partners 3 Associated Partners



Consiglio Nazionale
delle Ricerche



European Association
of Remote Sensing
Companies



EUROPEAN CENTRE FOR MEDIUM RANGE WEATHER FORECASTS



Utrecht
University



seascape
BELGIUM



ERI EUROPEAN RESEARCH
INFRASTRUCTURE
CONSORTIUM



ISTITUTO NAZIONALE
DI GEOFISICA E VULCANOLOGIA

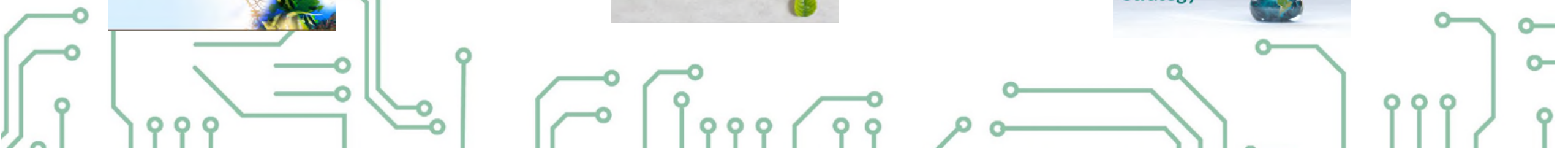
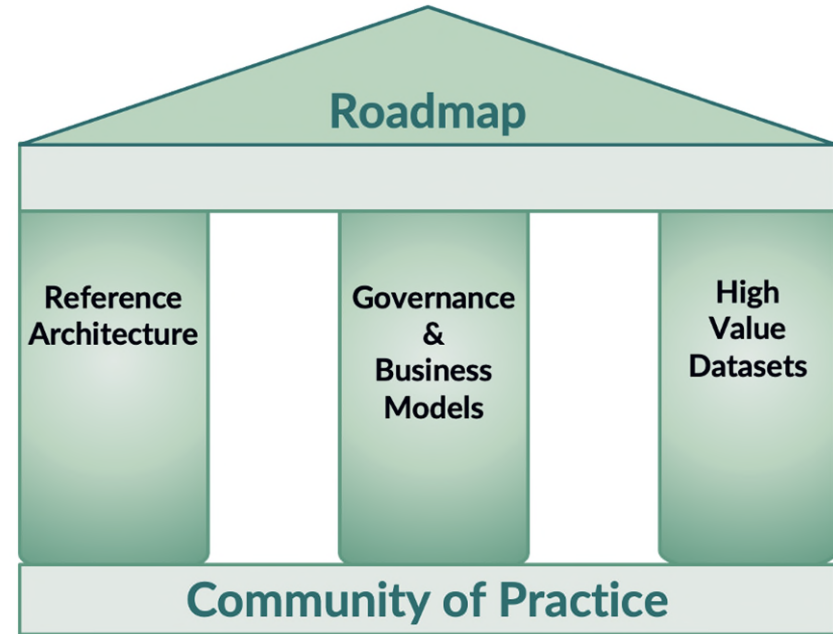


Instytut Geofizyki
Polskiej Akademii Nauk



Our pillars and what we stand for

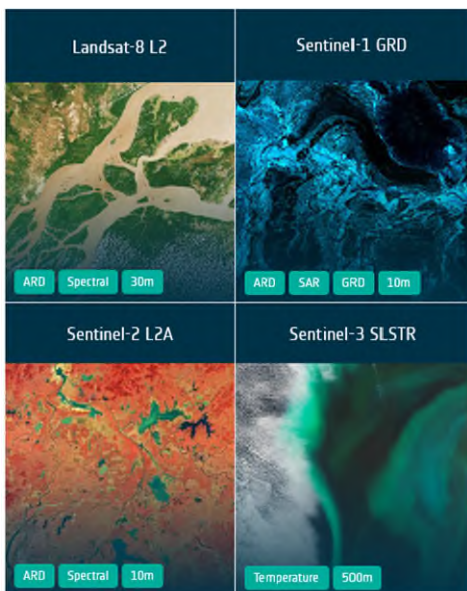
DATA SPACES, NOW!
FREE FLOW OF DATA & SINGLE MARKET
CROSS-DOMAIN DATA ACCESS
STANDARDISE DATA SHARING PRACTICES
CONNECT DATA SILOS
EMPOWER DATA INNOVATION & NEW BUSINESS MODELS
DATA SOVEREIGNTY
REGULATORY FRAMEWORK
VALUES (Privacy, Security & Fairness)
WE ARE TECH READY (AI/ML, DATA ANALYTICS, DIGITAL TWINS)





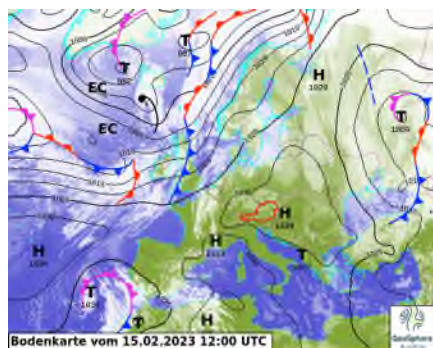
DATASETS

Earth Observation & Environment :



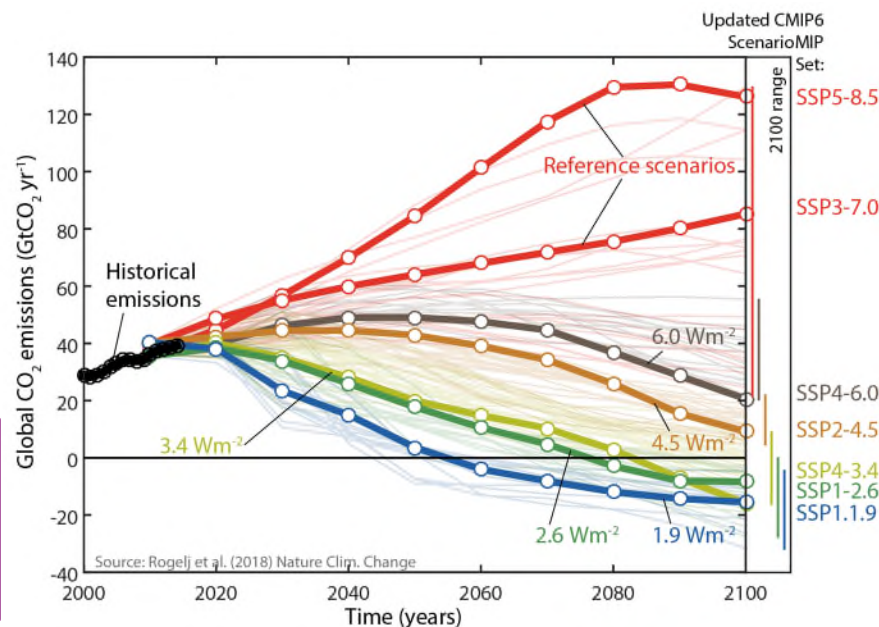
Copernicus space-based or remotely-sensed data, ground-based and in situ data, ECMWF climate datasets etc.

Meteorological:



Weather station datasets, climate data, numerical weather prediction (NWP) model data etc.

Climate:



Global CO2 emissions to meet the goals of the Paris Agreement

Geospatial & Statistical



E.g. Administrative units, geographical names, cadastral parcels

Thank you very much!

Questions?