eodc Earth Observation Data Center for Water Resources Monitoring

Collaborating with EGI in EC Projects

Charis Chatzikyriakou

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 **EOSC 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

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

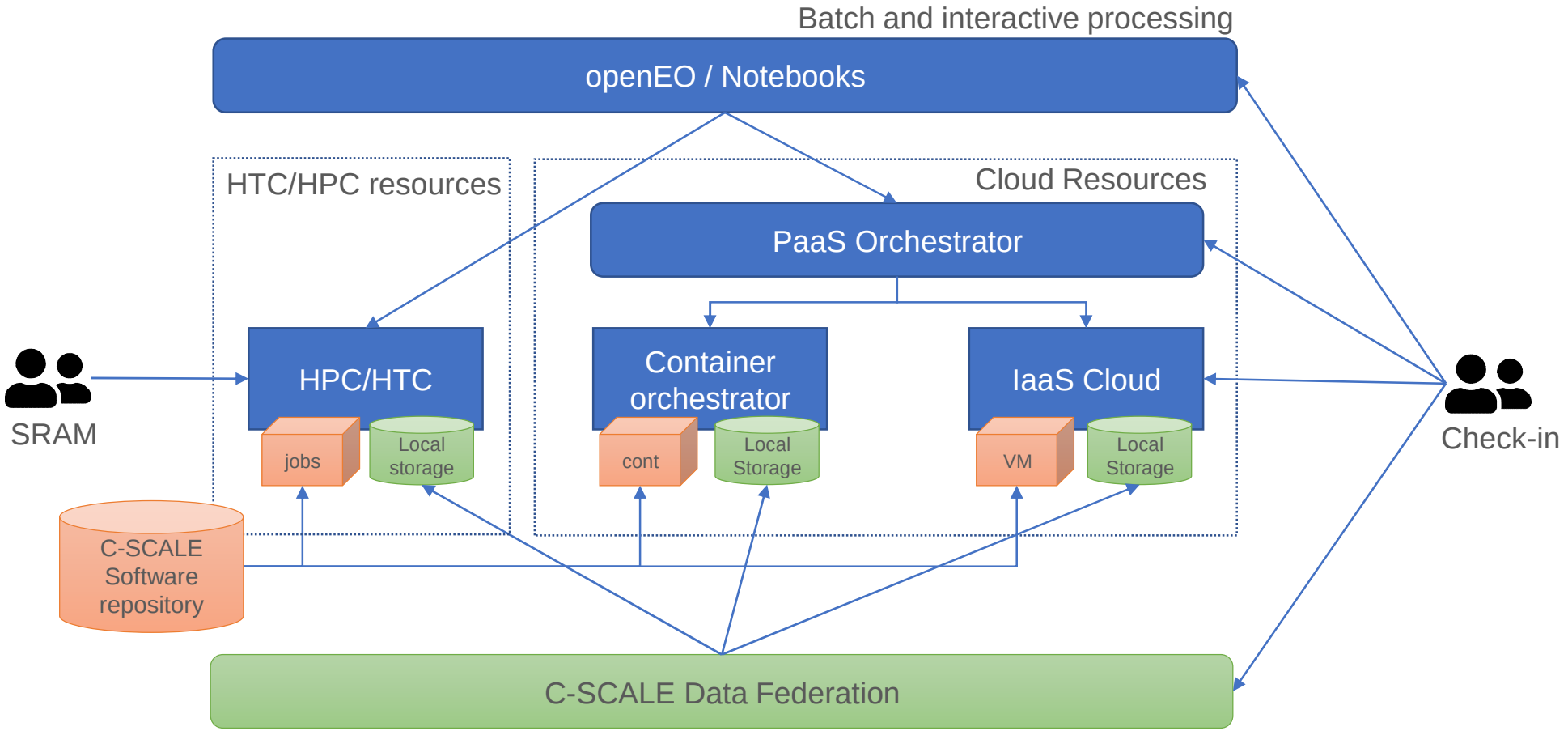
C-SCALE Community

FedEarthData

OPERATIONAL

C-SCALE

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



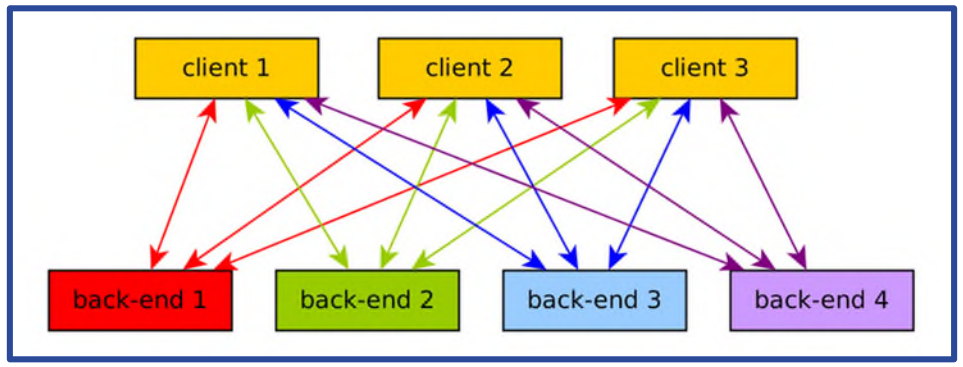
- Authentication and authorisation services
- Identity management infrastructure services
- Monitoring
- Accounting
- Virtual Machine or container image management and redistribution

openEO Platform

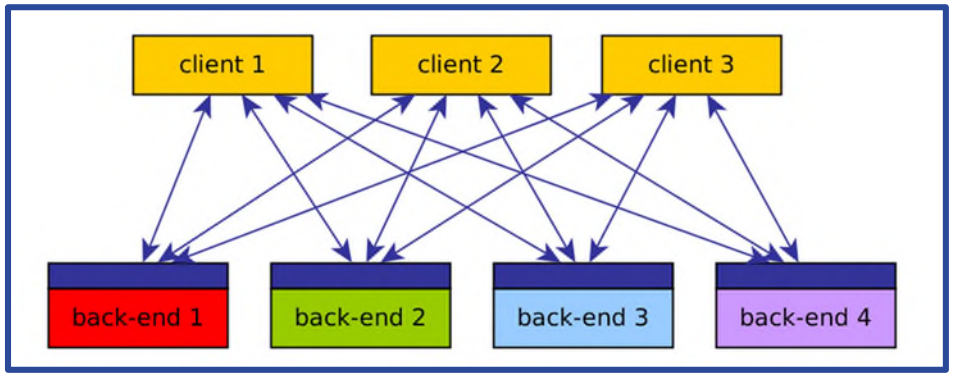
OPERATIONAL

C-SCALE

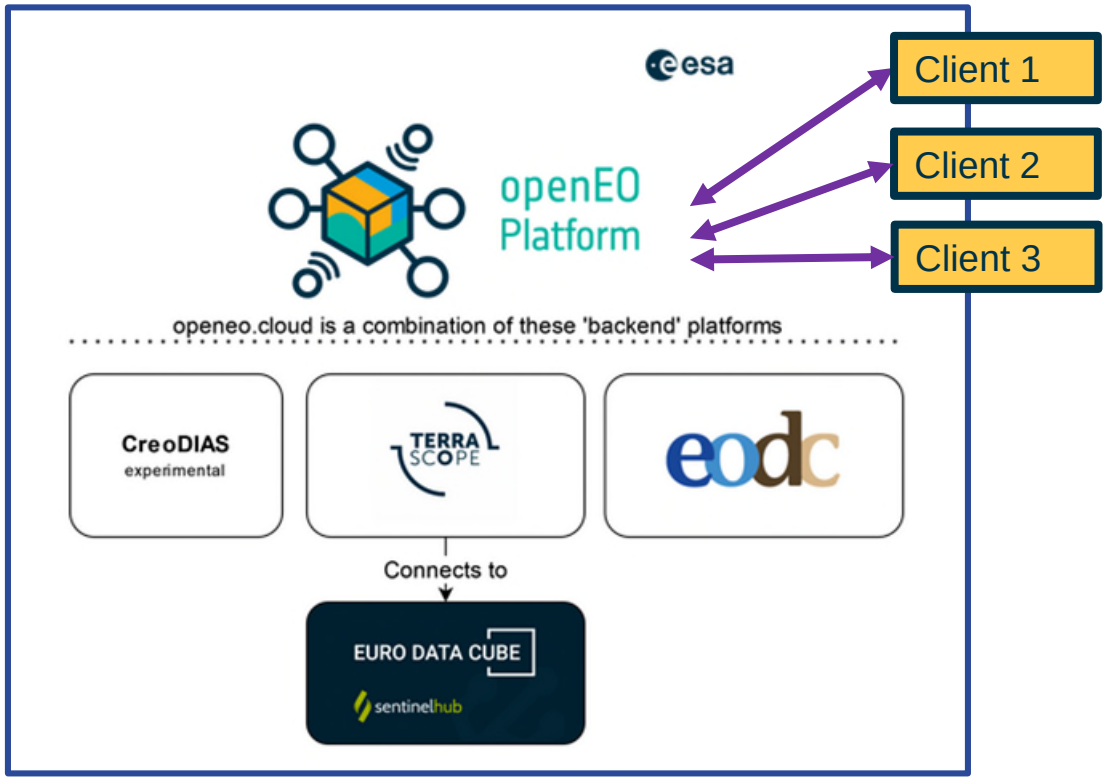
Situation before openEO:



openEO API:



openEO Platform:

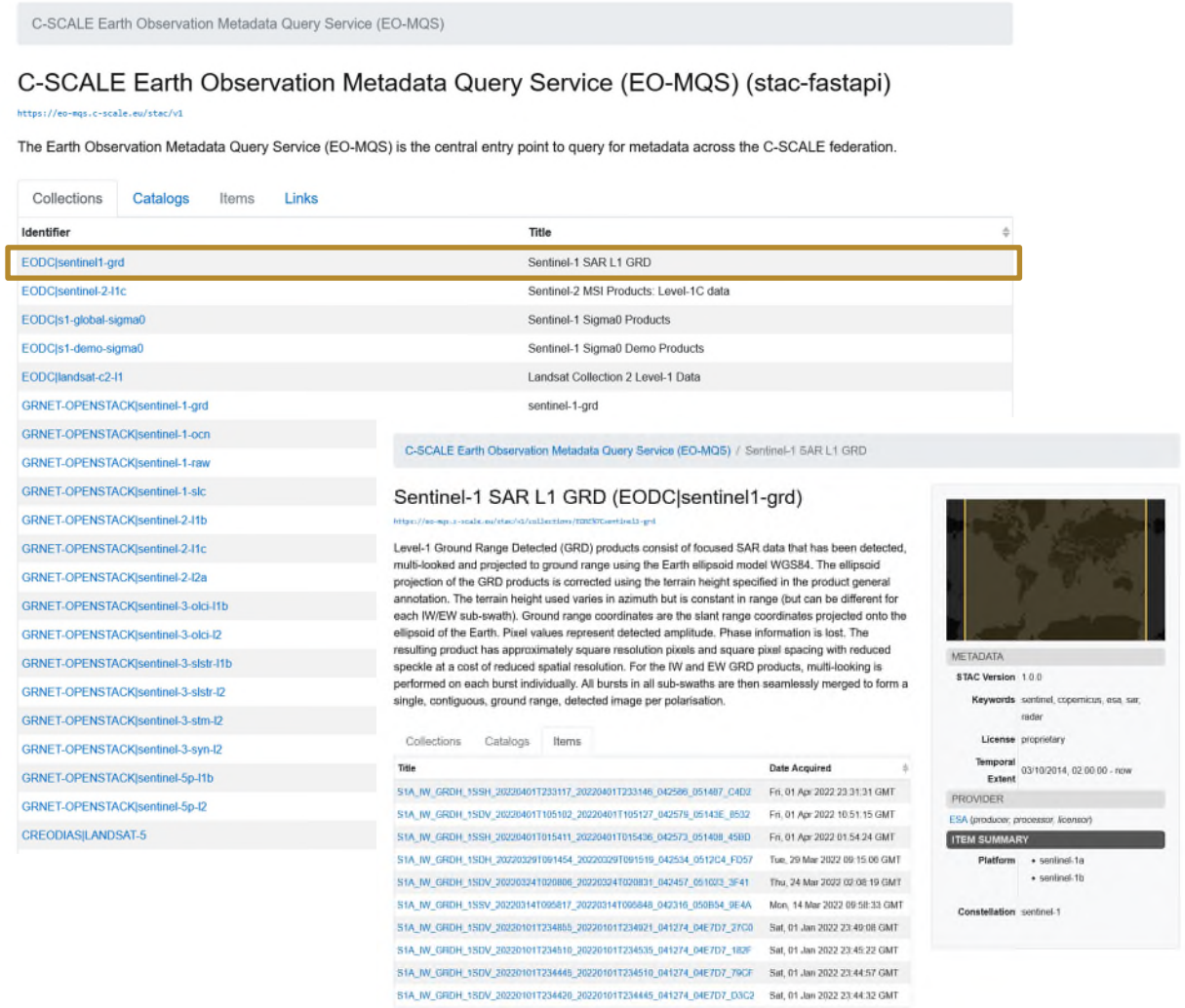


- Clients: Python, R, Javascript
- Web Editor
- JupyterLab

Earth Observation Metadata Query Service

OPERATIONAL

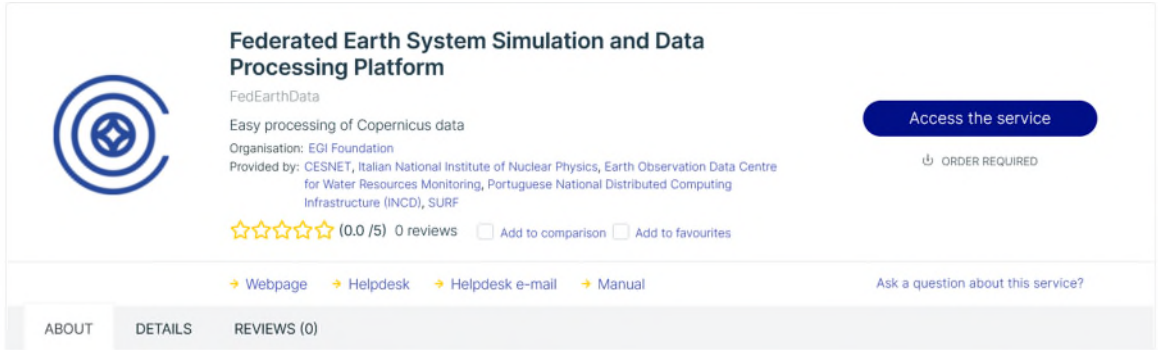
- Earth Observation data discovery service arching over FedEarthData member providers
- Data providers already know where their data are
  - Bring their discovery interfaces under a common one
    - single point
    - shared protocol
- Spatio-Temporal Asset Catalogue (STAC) interface to enable queries 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



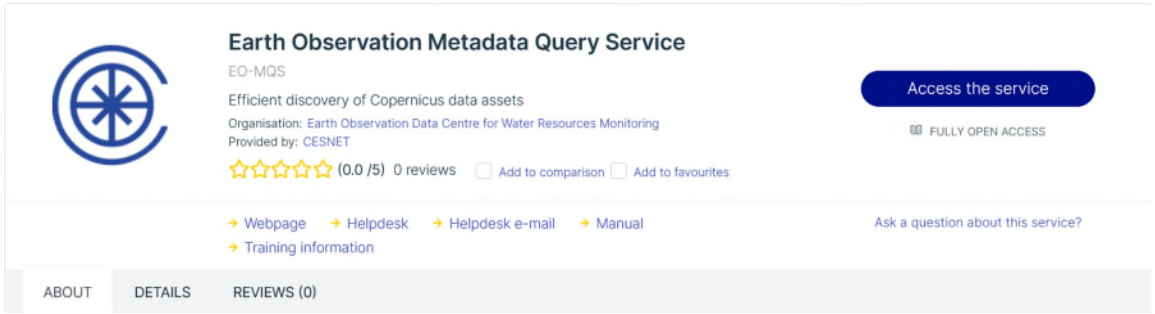
How to access the C-SCALE services

Main exploitation paths:

- EOSC Marketplace
- C-SCALE website
- openEO Platform website

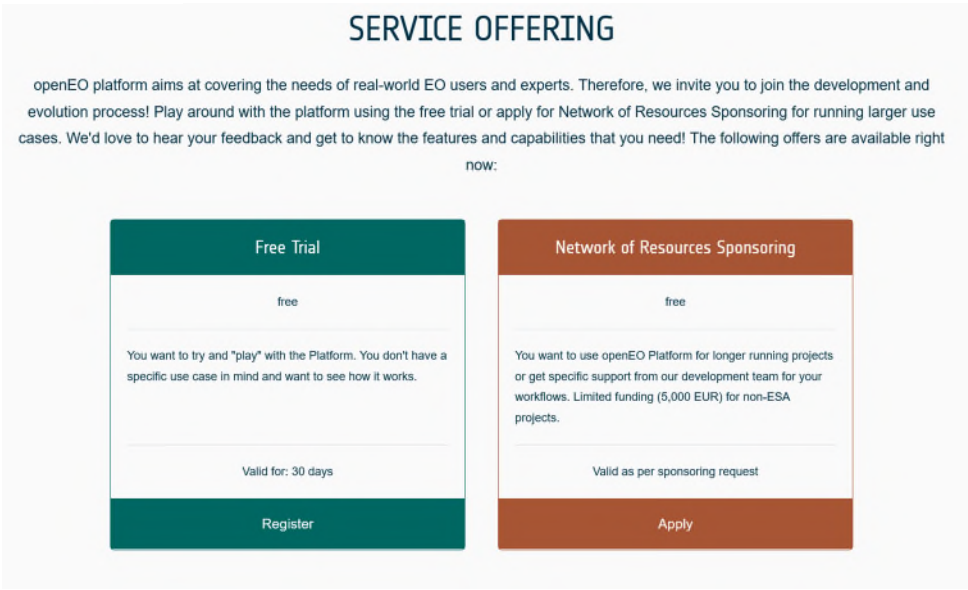


https://marketplace.eosc-portal.eu/services/eosc.egi-fed.fedearthdata



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

openEO Platform



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

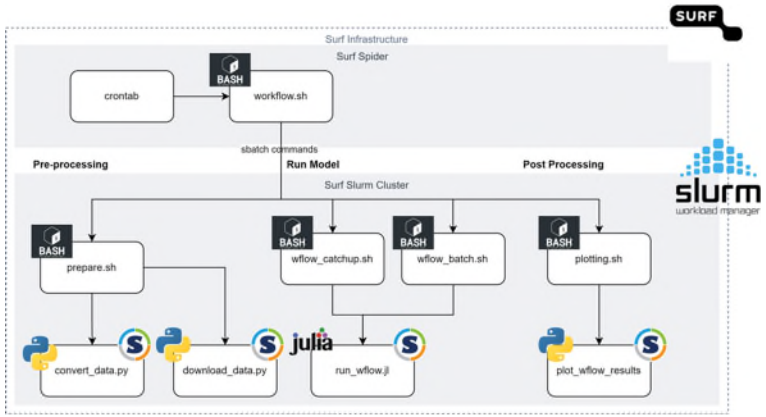
- Provided by C-SCALE Use Cases
- Templates and reusable components for users to build their own applications on FedEarthData

Aquamonitor using OpenEO on C-SCALE

RoHub Link zenodo Link

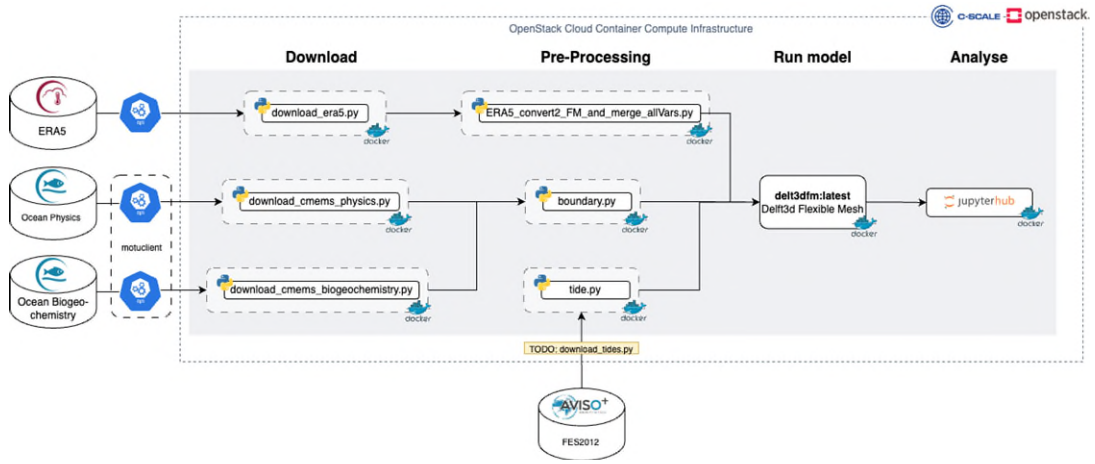
Global Water Watch using OpenEO on C-SCALE

RoHub Link



Automated monthly river forecasts using Wflow

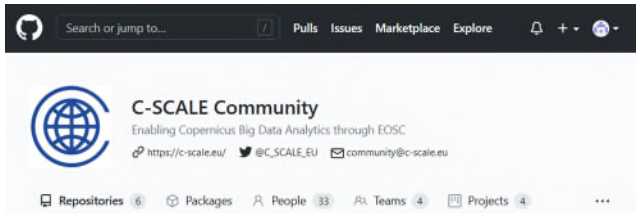
RoHub Link zenodo Link



Coastal hydrodynamic and water quality modelling using Delft3D FM

RoHub Link zenodo Link

User engagement

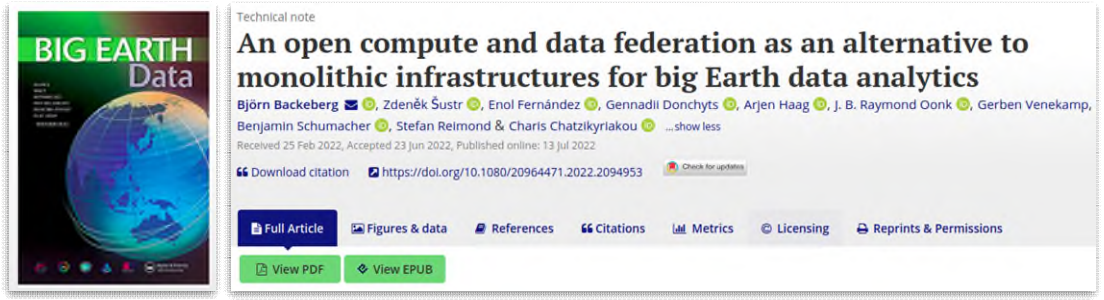


User forum and functional co-design

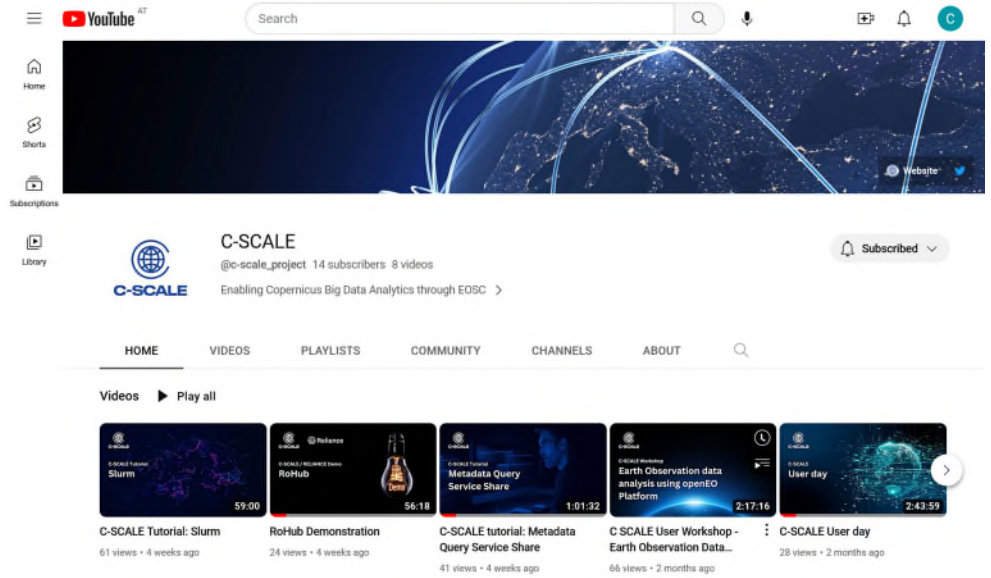
- C-SCALE community: https://github.com/c-scale-community/discussions
- encourages advanced users to become active participants in the development of the future C-SCALE services
- mechanism to engage with the national and international organisations invested in Copernicus services

C-SCALE documentation, training and support

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



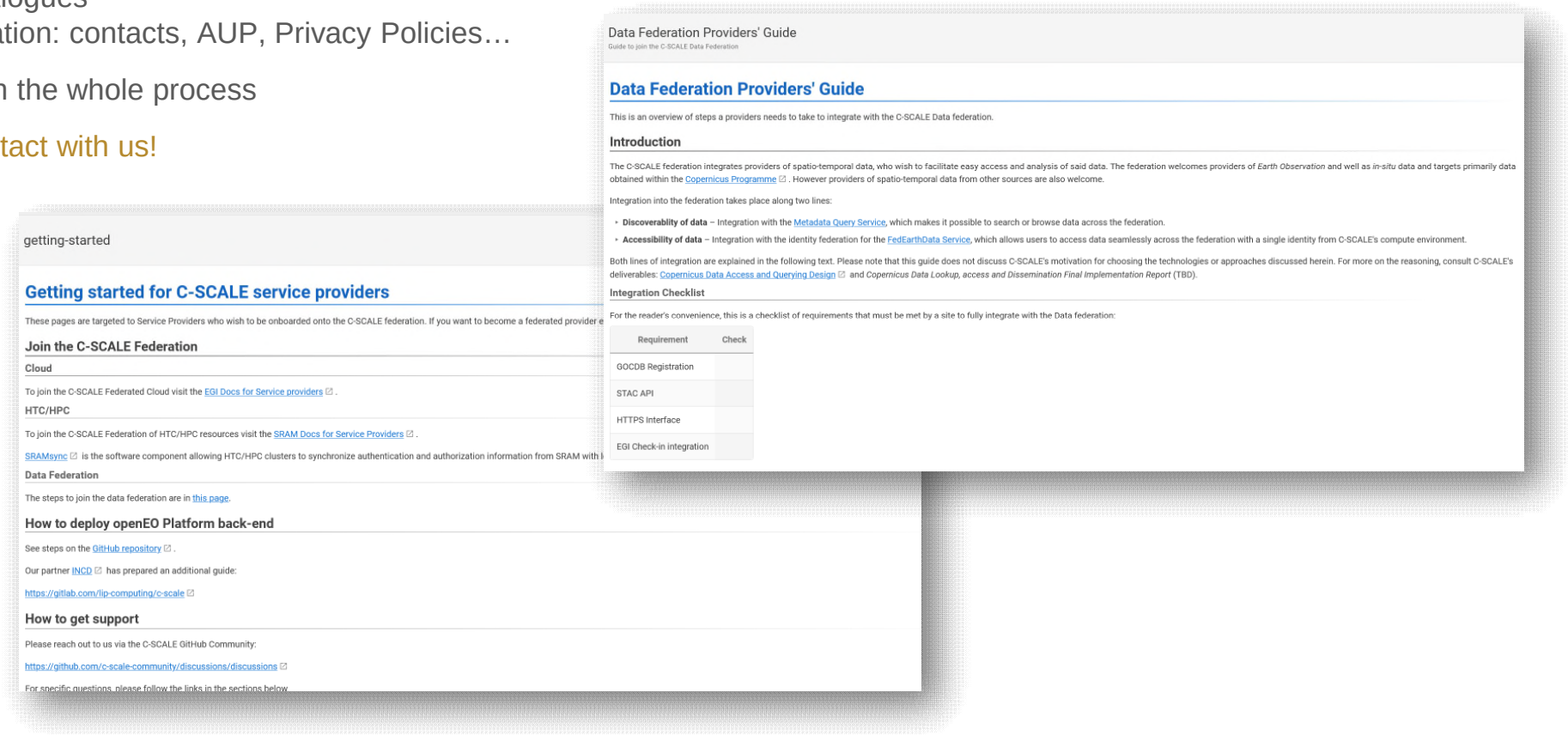
https://doi.org/10.1080/20964471.2022.2094953



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!



interTwin

An interdisciplinary Digital Twin Engine for science

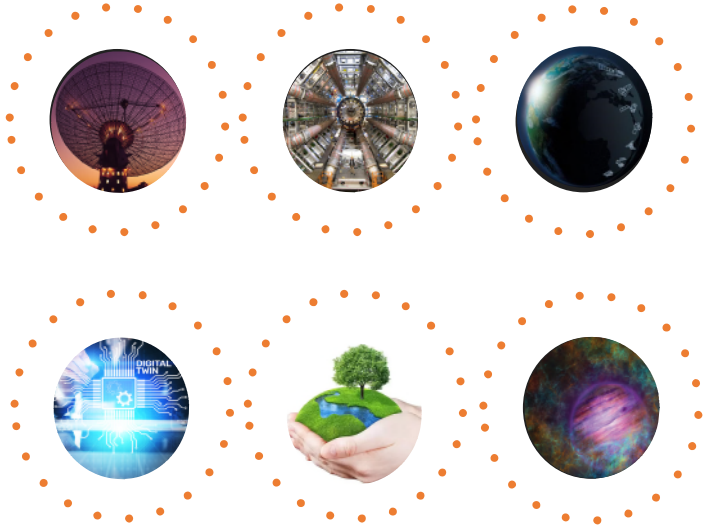
interTwin is funded by Horizon Europe under grant agreement n° 101058386

interTwin overall objective

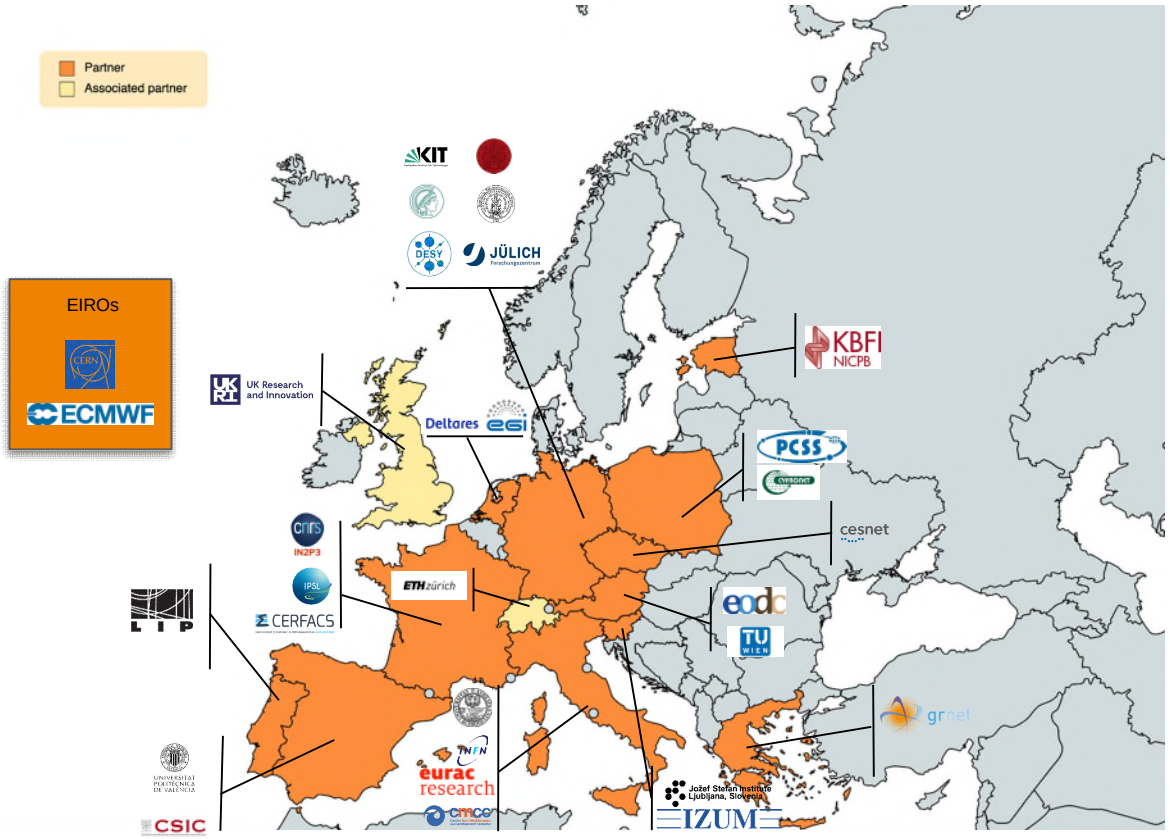
Co-design and implement the prototype of an interdisciplinary Digital Twin Engine.

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



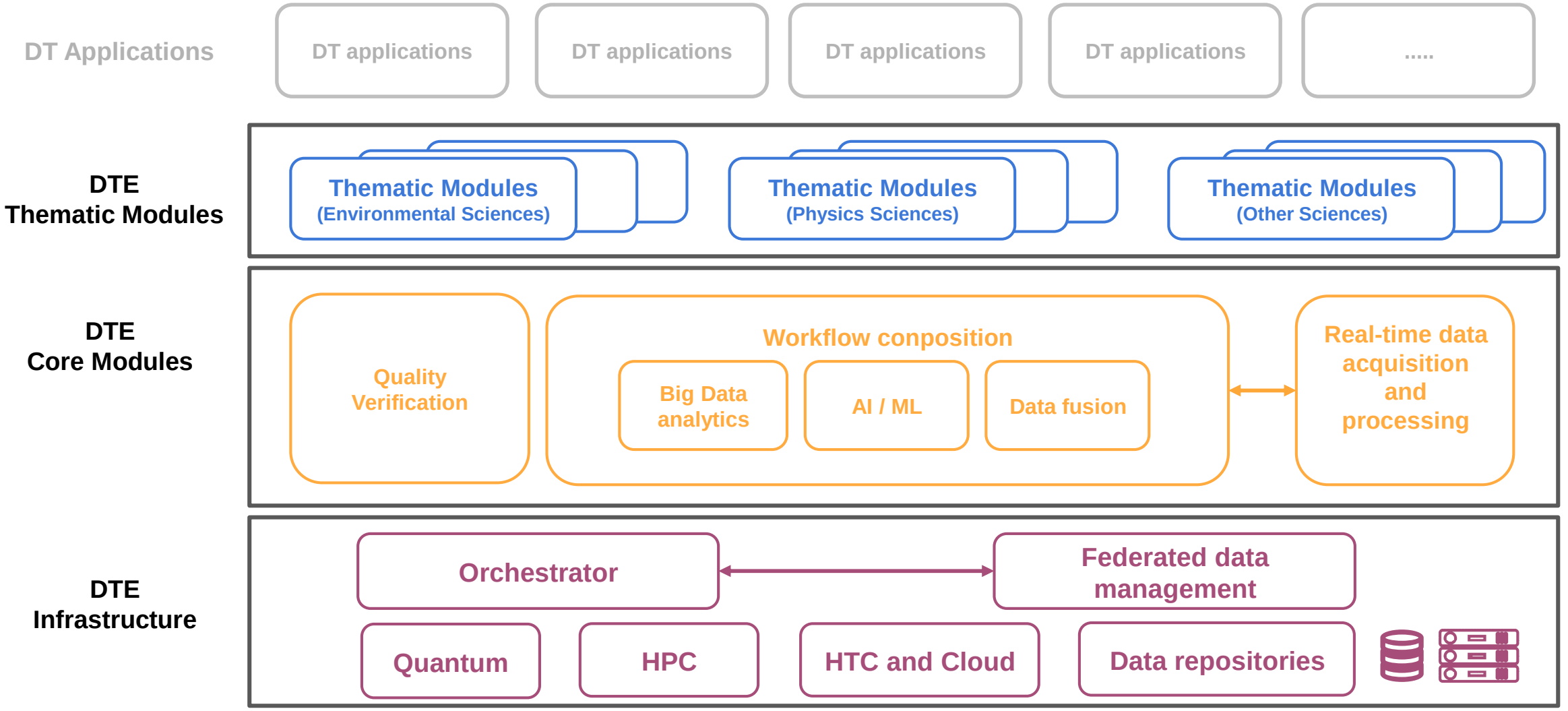
EGI Foundation as coordinator

29 **Participants**, including 1 affiliated entity and 2 associated partners

Consortium at a glance

10 Providers	11 Technology providers	14 Community representants
cloud, HTC , HPC resources and access to Quantum systems	delivering the DTE infrastructure and horizontal capabilities	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

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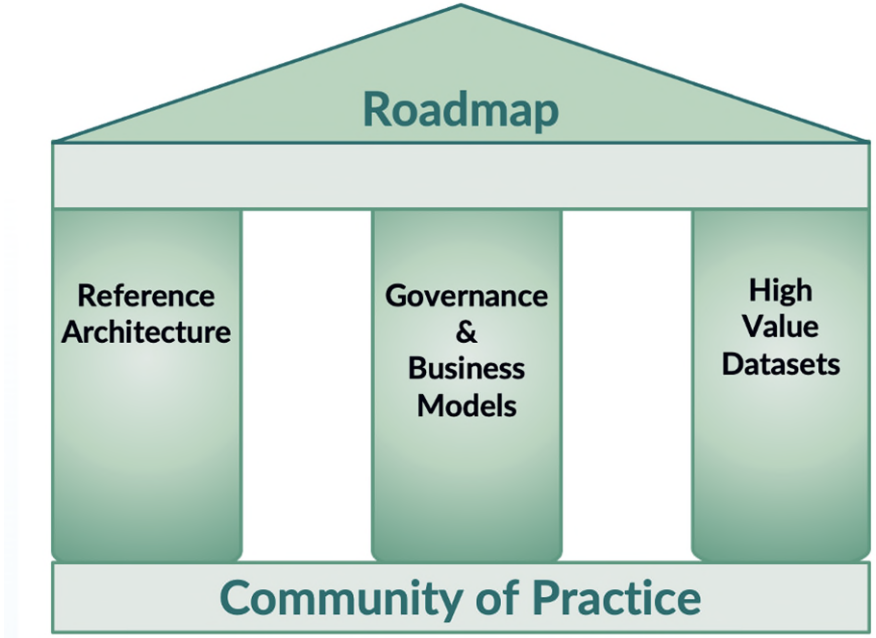
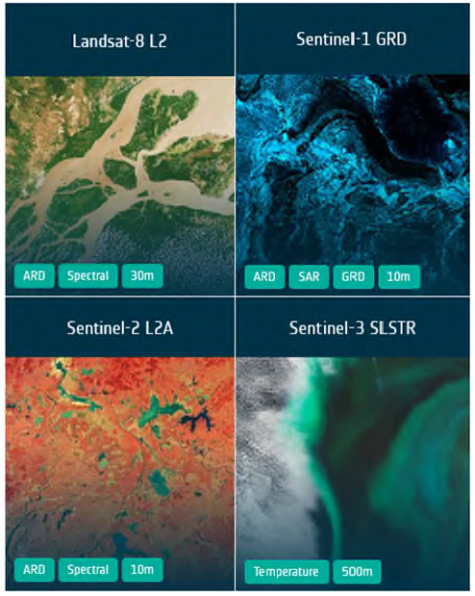
Our pillars and what we stand for

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)



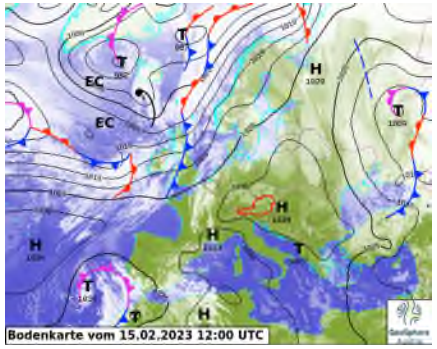
DATASETS

Earth Observation & Environment :



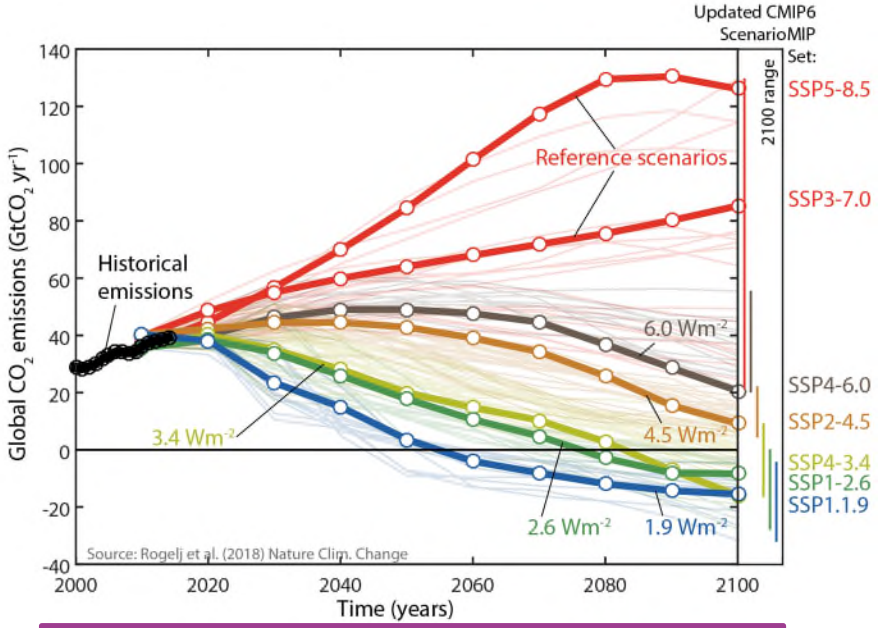
Copernicus space-based or remotely-sensed data, ground-based and in situ data, ECMWF climate datasets etc.

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?