



Copernicus - eoSC AnaLytics Engine

Introduction to C-SCALE

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Background



- **Copernicus programme**: EU's Earth observation programme established in 2014
 - largest producer of high resolution EO data in the world
 - significant contribution to the *digital twin Earth* vision of EU
- **No single European processing back-end** that serves all datasets of interest
 - no complete online Sentinel data archive with a FAIR access for researchers
 - limits the integration of these data sources in science and monitoring applications
- **Big (Copernicus) Data Analytics** require a federated infrastructure with a core cloud computing and storage architecture optimised for very large data handling and fast user query response.



The C-SCALE Project



C-SCALE project: Copernicus - eoSC AnaLytics Engine



Vision

To empower European researchers, institutions and initiatives to easily discover, access, process, analyse and share Copernicus data, tools, resources and services through the EOSC Portal in a way that can be seamlessly integrated into their processes and research practices.



Mission

- Enhance EOSC Portal with pan-European federated data and computing infrastructure for Copernicus
- Integrate cross-/inter- disciplinary EOSC services, ensuring interoperability between distributed data catalogues, computational tools and infrastructure
- Increase the service offer of the EOSC Portal providing state-of-the-art research enabling services to its users.

The C-SCALE Consortium



Consortium of 11 partners with pan-European coverage and expertise from:

- the EO sector:
 - EODC
 - Deltares
 - CESNET
 - VITO
 - CloudFerro
 - TU Wien
- e-Infrastructure:
 - EGI
 - CESNET
 - INFN
 - SURF
 - GRNET
 - INCD

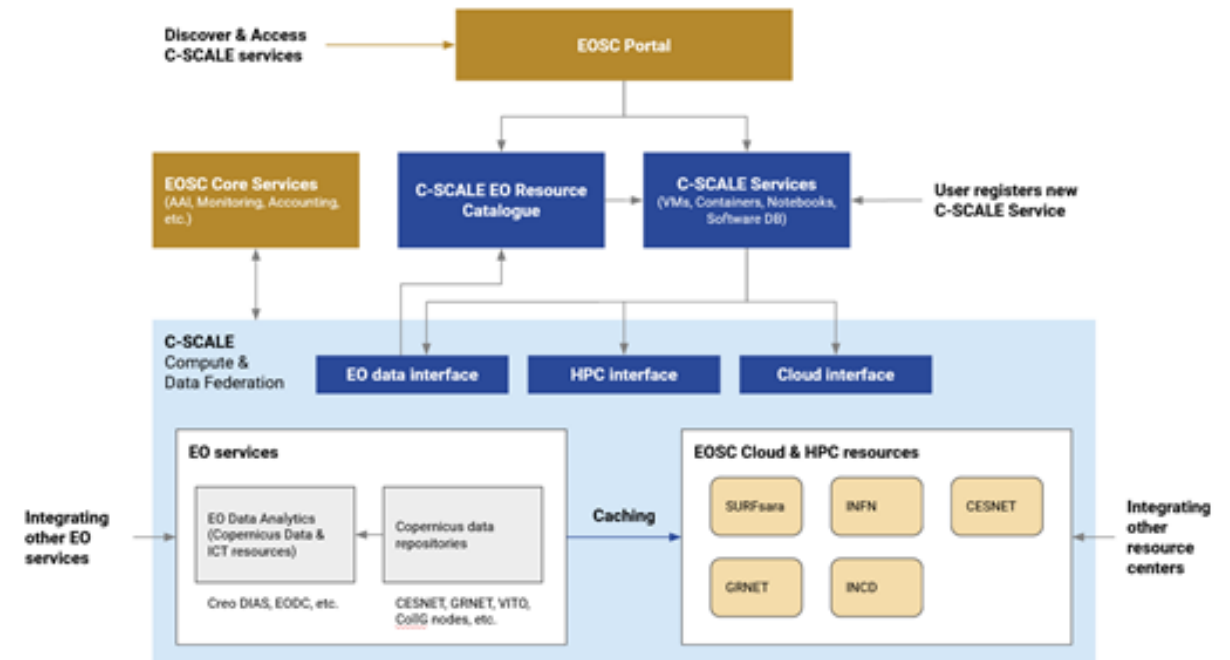


Objective 1



Federate **Copernicus resources** with **EOSC computing and storage** providers to deliver a wide infrastructure optimised for **very large FAIR data** handling

- Maximise **interoperability** with other EOSC services
 - Adhere to **EOSC policies** and **operational and technical requirements**
- Services accessible through **homogeneous and standard interfaces**
- Burden to **join** the federation limited



Objective 2



Scale-up the EOSC Portal integrating pan-European computing and data resources for Copernicus

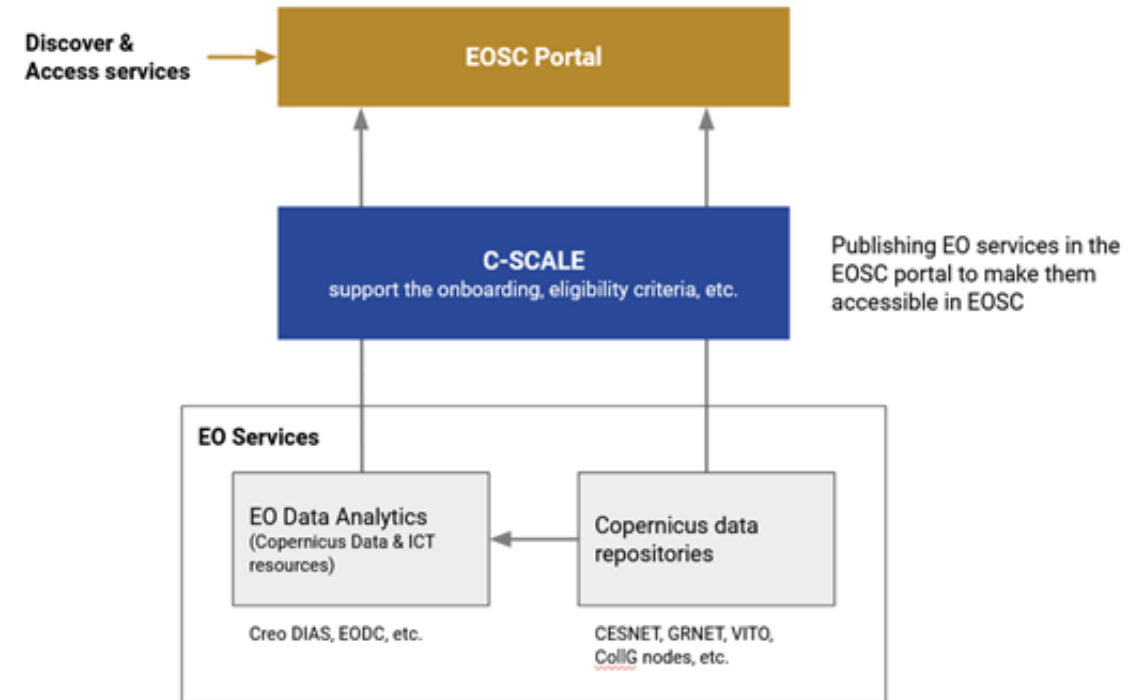
□ Copernicus DIAS platforms:

- CREODIAS
- WEkEO DIAS



□ Collaborative Ground Segment nodes:

- EODC global Sentinel archive and processing infrastructure
- ESA Sentinel Collaborative Ground Segment: CESNET, GRNET, VITO



Objective 3



Pilot the provision of a **distributed online Sentinel long-term archive** in EOSC

- No plans for Europe to maintain a full on-line archive of Copernicus data
- Cold storage not adequate for processing of long time series in arbitrary geographical area
- EOSC may fill this gap offering a Copernicus historical distributed data archive
- C-SCALE will develop a technical strategy to offer this archive in EOSC



<https://medium.com/@koosg/use-sentinel-basic-and-archive-logs-fae3bb3a6299>

Objective 4



Co-design of the federation with relevant scientific communities across Europe

- 6 project-internal use cases
- Additional (external) use cases through an **Open Call**
- Provide **user needs** and **challenge** the federation
- **User forum** to coordinate and provide feedback to the providers



| # | Internal Use Cases |
|---|---|
| 1 | Aqua Monitor : mapping surface water changes globally |
| 2 | WaterWatch : quantification of water resources |
| 3 | HiSea : High-Resolution Copernicus-Based Information Services at Sea for Ports and Aquaculture |
| 4 | HLSDA : High-resolution Land Surface (Drought) Analysis |
| 5 | RETURN : Monitoring tropical forest recovery capacity |
| 6 | Wetland Water Stresses : Impact of water stress on wetland areas |

Key project results



FedEarthData

Uniform access to a federation of computing and data providers to execute Copernicus and Earth Observation workloads



openEO Platform

Versatile cloud-based processing and analytics environment for Earth Observation data on infrastructures supporting openEO API



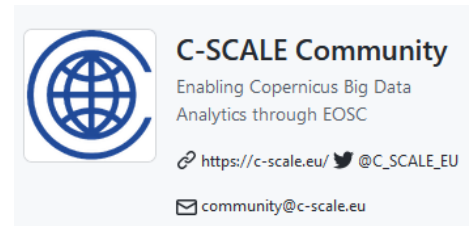
Metadata Query Service

One-step discovery of Copernicus data in data archives across the C-SCALE Data Federation and across Europe



Workflow solutions

Easy deployment of workflows supporting monitoring, modelling and forecasting of the Earth system



C-SCALE Community

Functional co-design through a user forum for Copernicus users accompanied by a documentation site



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Thank you for your attention.

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