

IS-ENES3 support to the Copernicus Climate Change Service (C3S)

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European Union's Earth observation programme

Bringing **together** a **wide range** of **Earth “observations”** to benefit **all European citizens**

Providing data information to help service providers, public authorities, and other international organisations.

Offering **tools** and **expert guidance** to compute **useful by-products** (indicators, statistics, etc.)

A **multi-thematic, high-quality, free** and **open data hub** through the Copernicus **Data Store**

Atmosphere, ocean and land monitoring

Climate change

Emergency management

Security

Managed by the European Commission

Implemented by

The Member States and EU Agencies

The European Space Agency (ESA)

The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)

The European Centre for Medium-Range Weather Forecasts (ECMWF)

Mercator Océan

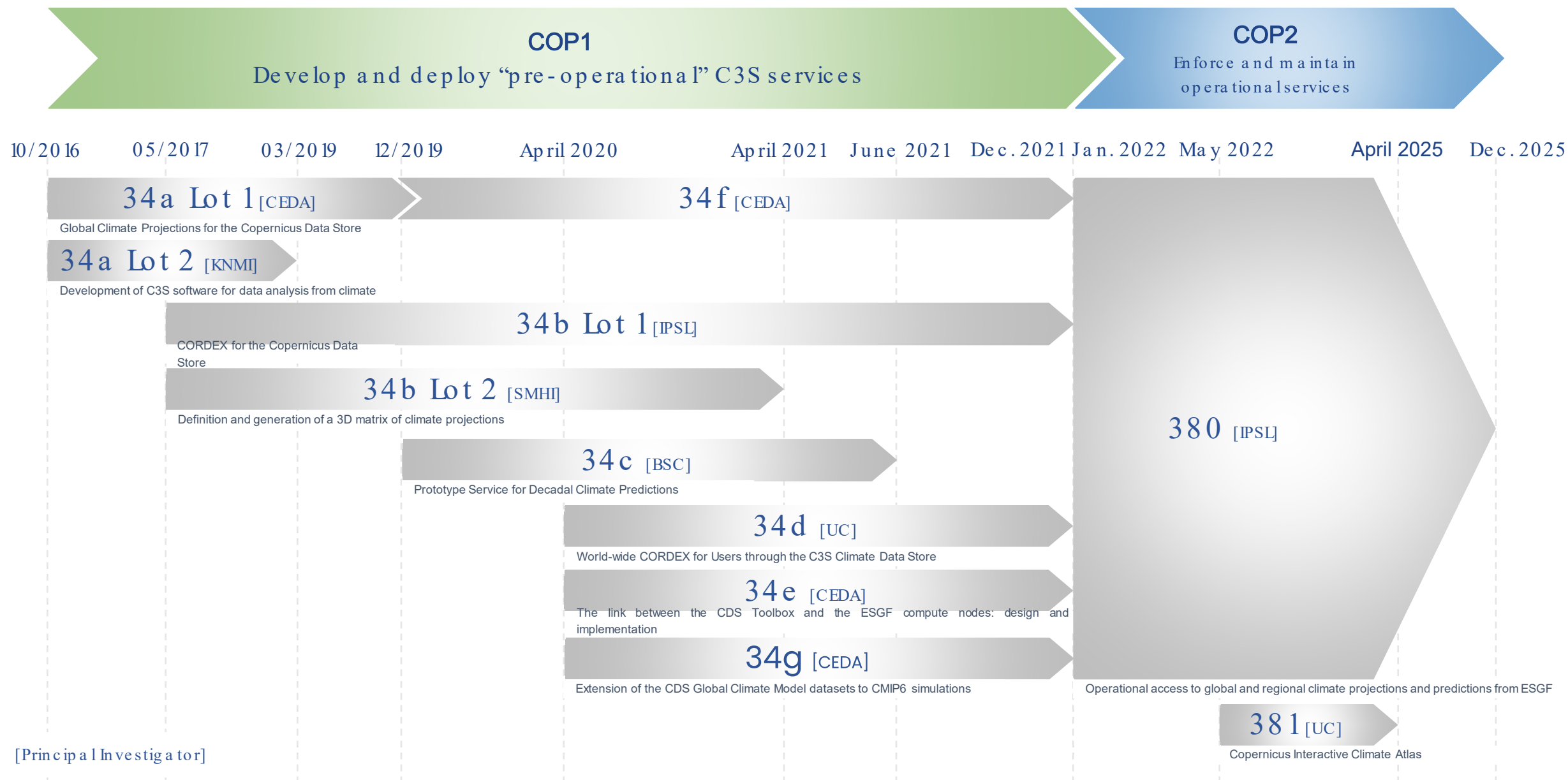
IS-ENES support to C3S

Provides a **subset of CMIP and CORDEX data** from the ESGF comprehensive world-wide catalogue,

Deployed a **dedicated** and **load-balanced infrastructure**

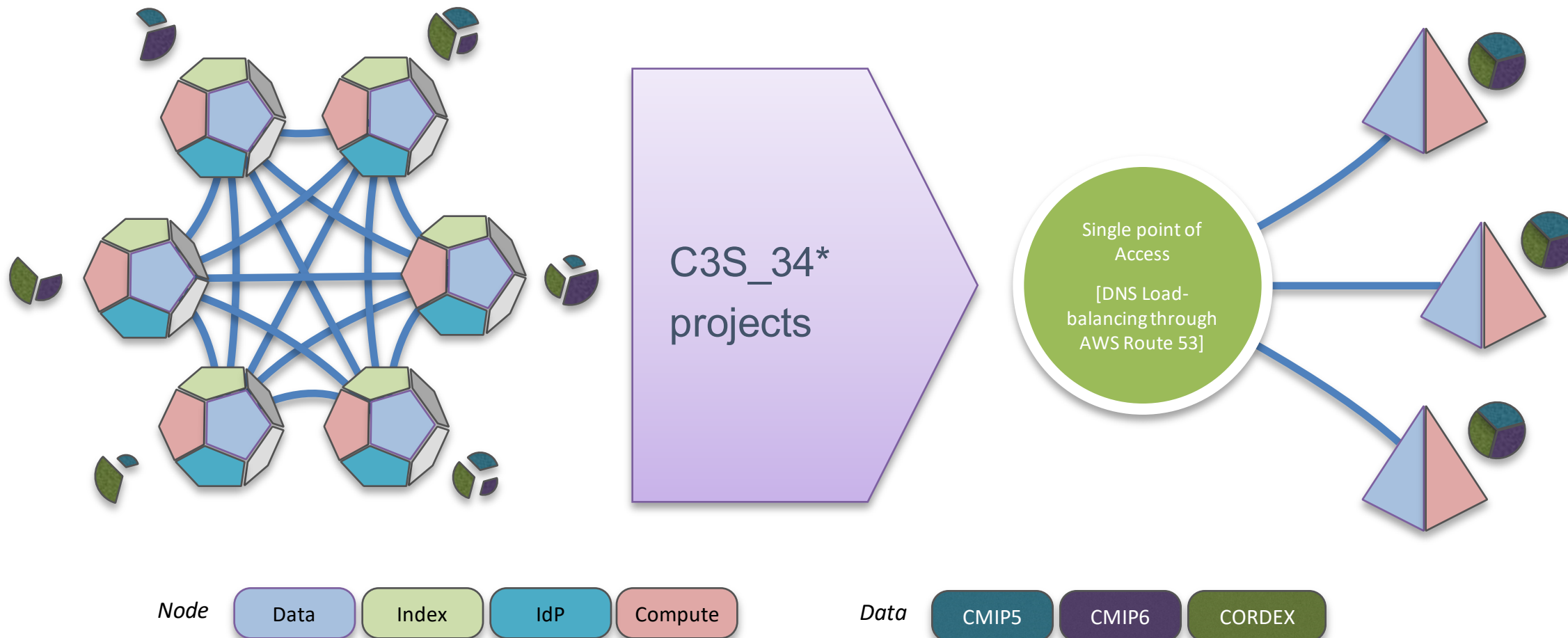
Single resilient point of access to data delivered through **replication** and **redundancy**



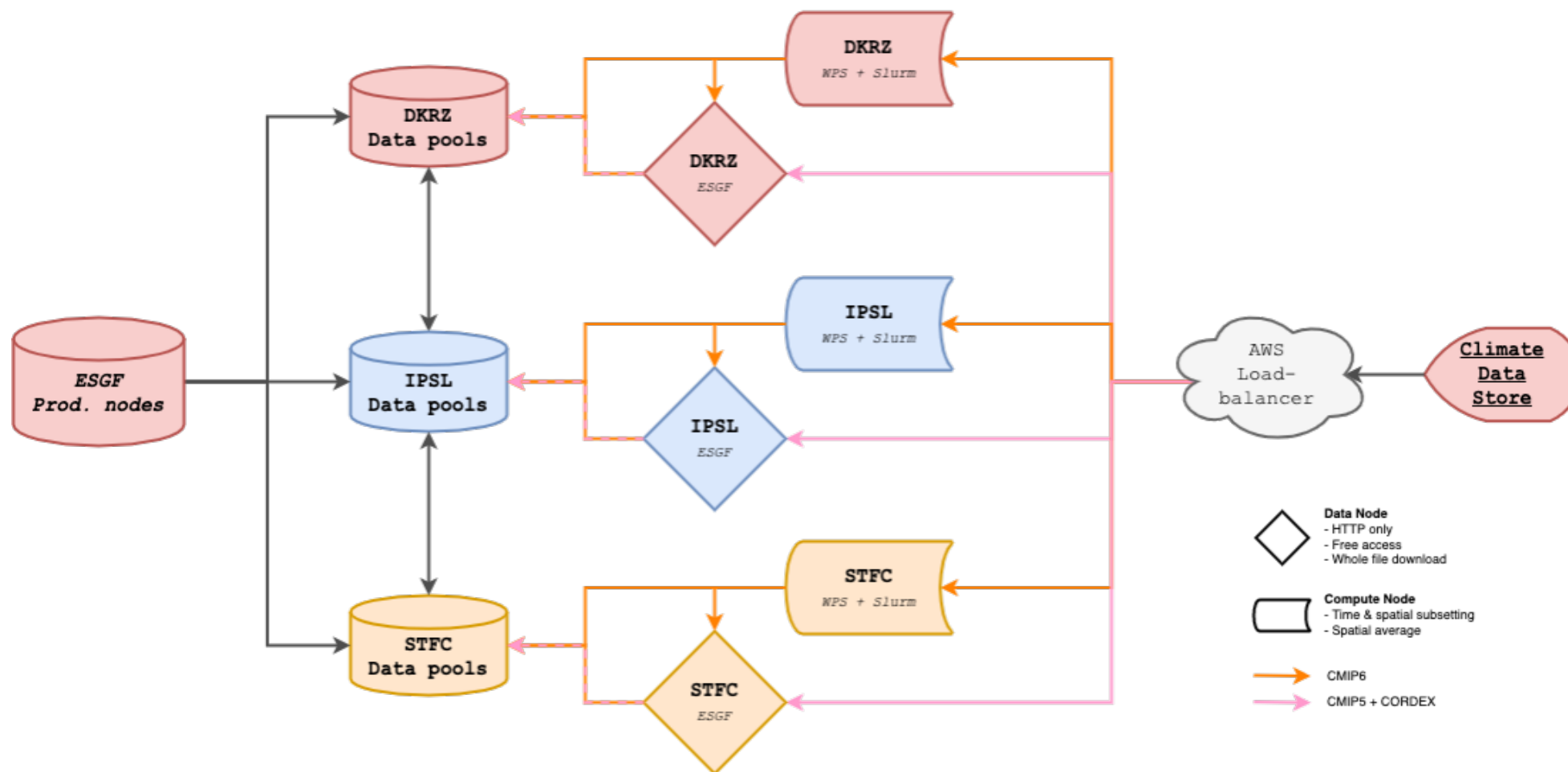


ESGF: an international federation of nodes providing a network of access points to model data

C3S system: a single resilient point of access to data delivered through replication and redundancy



(Very) brief overview of the COP1 legacy infrastructure



- Rely on “intake - esm” catalogs
- Only one API for geographical operations and whole file download
- Future ESGF new generation stack



CMIP

- Experiments selection : amip, historical, piControl, rcp 26, rcp 45, rcp 60, rcp 85
- **50 core variables** :
 - 37 single level **monthly** variables
 - 6 pressure level monthly variables
 - 7 single level **daily** variables

25 TB

CMIP

- Experiments: historical, piControl, all ssp, decadal projections
- **Same variables** as CMIP5 subset

35 TB

CORDEX

- **All CORDEX domains** (EURO-CORDEX~98%) at **2 resolutions** (0.11° & 0.44°)
- **All CORDEX experiments** (evaluation, historical, rcp 26, rcp 45, rcp 60, rcp 85)
- **26 core variables** (all single level) that loosely intersect CORDEX Core variables and CMIP5
- Monthly, daily & high - frequency outputs (6- and 3-hourly data)

250 TB

Atlas

- A subset of climate indicators computed from CMIP5, CMIP6 and CORDEX
- Historical and rcp/ssp
- Monthly & yearly

1 TB

Data conformance

- Standardization using Climate Model Output Rewriter, when needed
- Adherence to Climate & Forecast convention
- Adherence to CMIP & CORDEX rules

Data integrity

- Temporal consistency
- Data range checking
- QA tool from DKRZ (units checking, etc.)
- Known errata checking

Data traceability

- Adding c3s_disclaimer attribute into each netCDF file
- Modifying the tracking_id attribute into PID format

Data documentation

- CDS Jira pages
- C3S data suitable to Earth System Documentation (ES-DOC)
- CMIP6 DOI collection



es-doc Earth System Documentation

Dataset Errata - Search v0.8.0.0 [Support](#) [Docs](#) [Search](#) [Login](#)

Project: Experiment ID: Institution ID: Source ID: Variable ID: Severity: Status:

CMIP6 * * * * * *

Total Issues = 414. Filtered Issues = 407. << < Page 1 of 17 > >> 25 / page

#	Institute	Title	Created	Updated	Closed	Severity	Status
1	NCAR	Incorrect SST and sea ice used in piSST-pxK simulatio ...	2022-05-17	--	--	Critical	New
2	MPI-M	Problems in the preprocessing of faf-water-HR	2022-04-27	2022-05-03	--	Critical	Resolved
3	MPI-M	Problems in the preprocessing of faf-all-HR	2022-04-27	2022-05-03	--	Critical	Resolved

An OGC Web Processing Service

Using PyWPS - GeoPython

Data reduction "aaS"

<https://rook-wps.readthedocs.io/en/latest/>

Status: Data

CMIP6: used since March 2021

CMIP5: used since December 2022

CORDEX: used since December 2022

CMIP6 decadal predictions: to be deployed in Q1 2023

Operators - "clisops"

Subsetting by point and interval - time, area, level

Averaging - over dimensions

Regridding on regular grid

Members concatenation (for decadal predictions)

Status: Operators

Subsetting: used since March 2021

Average: used since December 2022

Members concatenation: to be deployed in Q1 2023

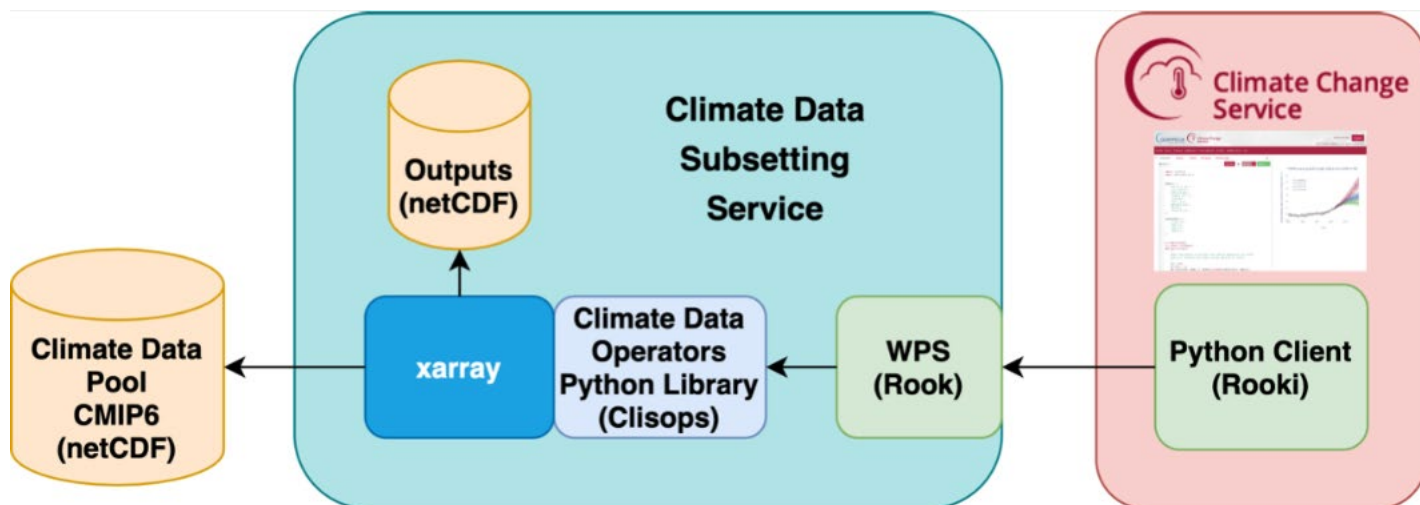
Regridding: expected in 2024-2025

Client = "rooki"

Interactive or as library

Using OWSLib - GeoPython

<https://rooki.readthedocs.io/en/latest/>



Operational Level Agreement approved in February 2022

Operational maintenance and security updates

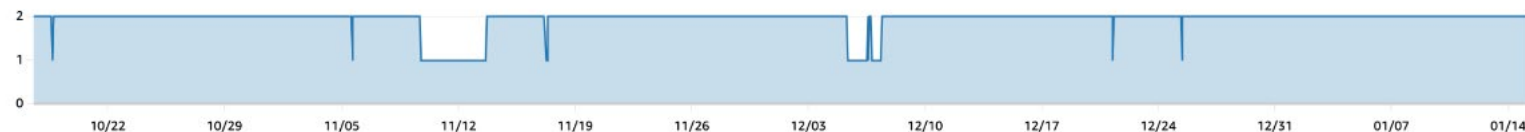
Dedicated and federated helpdesk: enes4cds@listes.ipsl.fr

Log of support actions to Copernicus User Support (CUS) and Climate Data Store (CDS)

Real-time monitoring system through AWS Cloud-Watch and ROOCS Dashboard

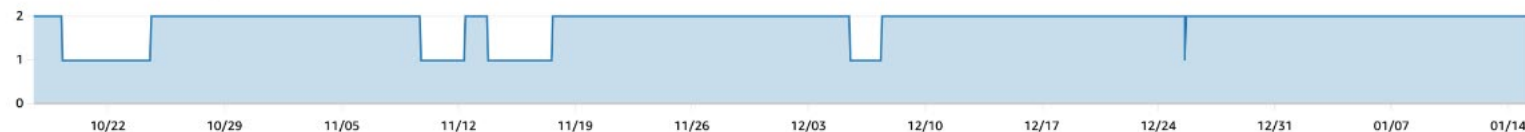
A. Data Node (TDS) deployed for CDS access

Number of nodes up and running

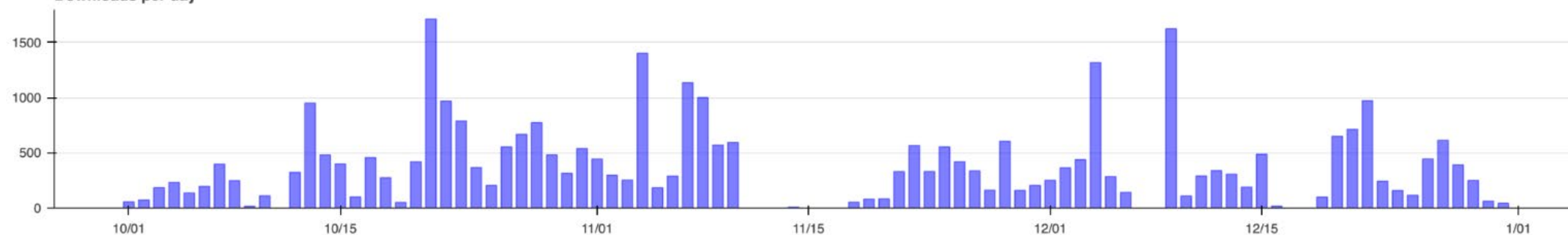


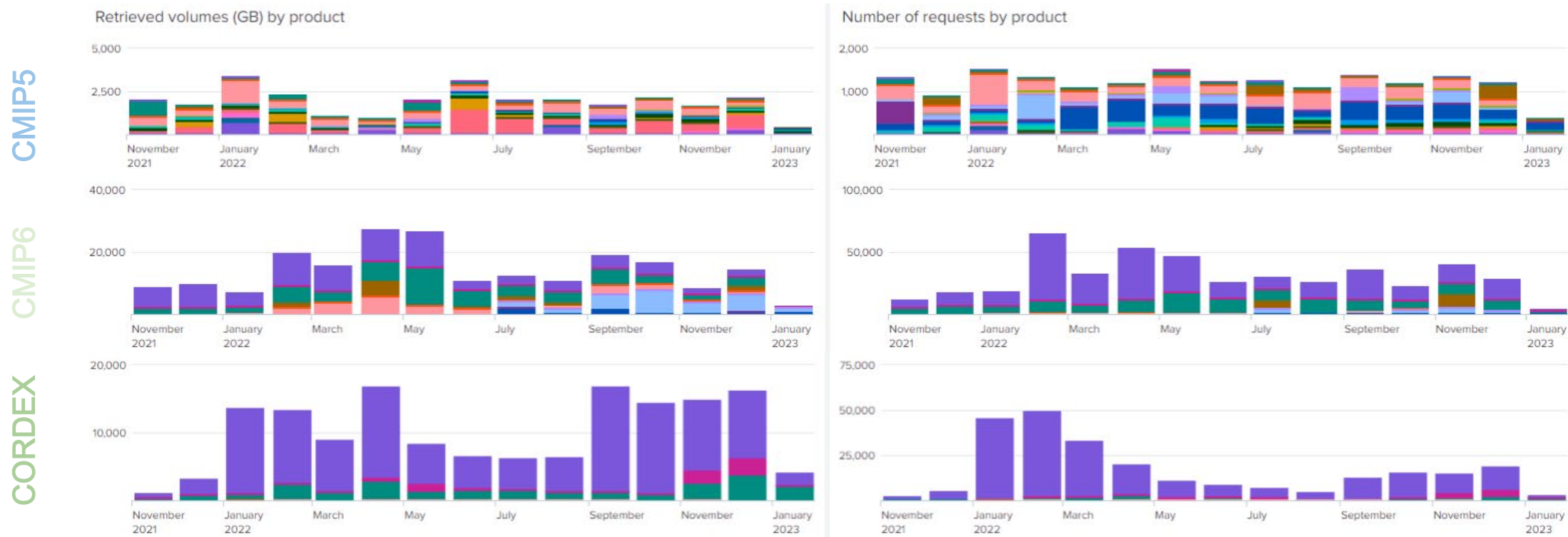
B. Compute Node (WPS) deployed for CDS access

Number of nodes up and running



Downloads per day





In 2022	Number of active users	Total number of requests	Total retrieved volume (TB)
CMIP5	1,999	19,632	29
CMIP6	4,399	763,922	213
CORDEX	1,058	763,384	153
ALL	7,456	1,526,938	395

THE CONSORTIUM

Coordinated by CNRS-IPSL, the IS-ENES3 project
gathers **22 partners** in **11 countries**



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