EUMETSAT

Funded by the European Union

Destination Earth

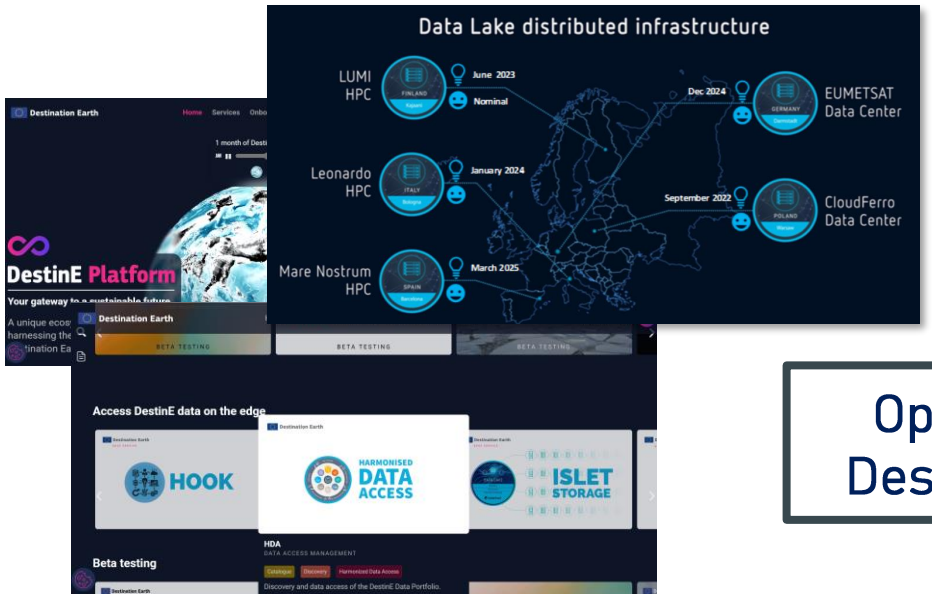
IMPLEMENTED BY EUMETSAT esa ECMWF

Harmonised data access service and Edge services

Danaële Puechmaille & team, EUMETSAT

DestinE User Exchange #5 - Co-design workshop
08-06-2026

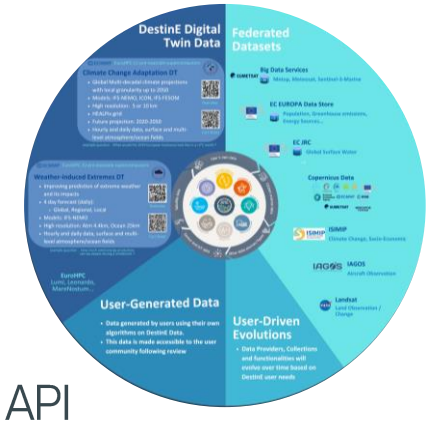
DestinE (Data Lake) services



Harmonised Data access

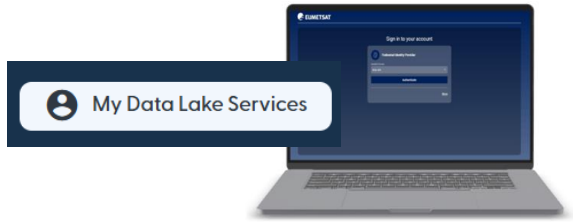
Open to any DestinE users

+250 datasets



EDGE Services

On request – Project assessment *(no cost)*



- Harmonise (standardise) **access to data** with just one API
- Bringing computation to the data (**near data processing**), Destination Earth Data Lake is a cloud-native platform for **discovering, accessing and exploiting DestinE data (and other data from multiple data spaces)** at scale.

Harmonised Data Access (HDA) service

Destination Earth

HARMONISED DATA ACCESS

DestinE Data Portfolio – discover Climate DT datasets

DestinationEarth DataLake - [InPrivate]

https://data.destination-earth.eu/data-portfolio?category%5B0%5D=DestinE...

Data Lake | Destination Earth

Search in online documentation | Sign In

Visit DestinE Platform | Community Website

News | Data Portfolio | Services | Learn | Documentation | Support

DATA PORTFOLIO

The Data Lake Initiative through Harmonized Data Access (HDA) service grants you access to impressive collection of datasets derived from ESA, EUMETSAT, ECMWF as well as from Copernicus, and many other diverse sources, along with new data from the Digital Twins. HDA provides a seamless access to datasets via GUIs and APIs, regardless of data type and location.

Search

Category

- Atmosphere (24)
- Climate/Weather (24)
- DestinE Climate DT - Generation 2 (24)
- DestinE Data (24)
- Ice (24)
- Land (23)
- Marine (24)
- Soil (24)
- Air Quality (0)
- Biomass/Vegetation (0)
- Demographic (0)
- DEMs (0)
- Fire (0)
- Imagery (0)
- Land cover (0)
- Lightning (0)
- Other (0)
- Statistical (0)
- Temperature (0)
- User Generated (0)
- Water (0)
- Wind (0)

Temporal Extent

start date DD/MM/YYYY

end date DD/MM/YYYY

Provider

- ECMWF (24)
- Copernicus Atmosphere Monitoring Service

24 Results

Filters (1) clear all filters

Category: DestinE Climate DT - Generation 2

Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Control Simulation - ICON - Generation-2 - Realization-1

Digital Twins | Climate Change | Atmosphere | Ocean | Land | Sea Ice | Snow | Soil

The Climate Change Adaptation Digital Twin provides global climate projections and sector-specific information over multiple decades at high resolution via a unified framework combining advanced Earth system models, impact assessments, and observations. This Generation-2, Realization-1 Collection gives access to 'Control Simulation' data base...

Learn more

Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Control Simulation - IFS-FESOM - Generation-2 - Realization-1

Digital Twins | Climate Change | Atmosphere | Ocean | Land | Sea Ice | Snow | Soil

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Learn more

Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Control Simulation - IFS-NEMO - Generation-2 - Realization-1

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Learn more

Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Historical

DestinationEarth DataLake - [InPrivate]

https://data.destination-earth.eu/climate-dt

Data Lake | Destination Earth

Search in online documentation | Sign In

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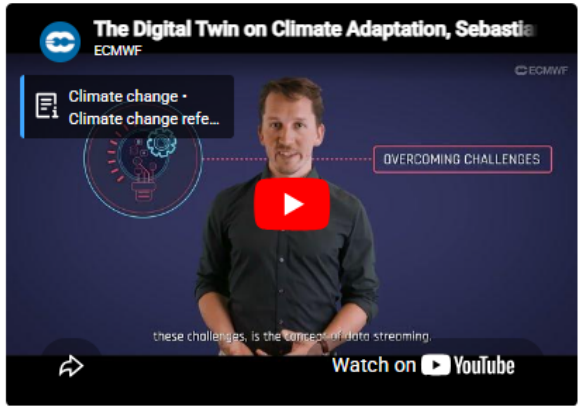
News | Data Portfolio | Services | Learn | Documentation | Support

CLIMATE CHANGE ADAPTATION DIGITAL TWIN

The Climate Change Adaptation Digital Twin (Climate DT) is the first ever attempt to produce multi-decadal climate projections operationally. The Climate DT is implemented by Finland's CSC-IT Center for Science who leads a consortium of European excellence centres with partners in six countries.



Climate change adaptation scenarios

The Climate DT provides multi-decadal global climate simulations with local granularity, including information specific to the sectors most affected by climate change such as renewable energy, urban planning or hydrology. The objective is to produce updated simulations every year or less, compared to the current models, ran only every several years. This enables the inclusion of the latest developments in Earth system science and digital infrastructure. An important innovation of the Climate DT is the data streaming concept, reducing the need for storage of massive data volumes (several decades of km-scale Earth system simulations). Impact-sector applications will be able to run within the digital twin workflow allowing them to obtain the information they need while the simulations are running instead of cherry picking within the stored data.

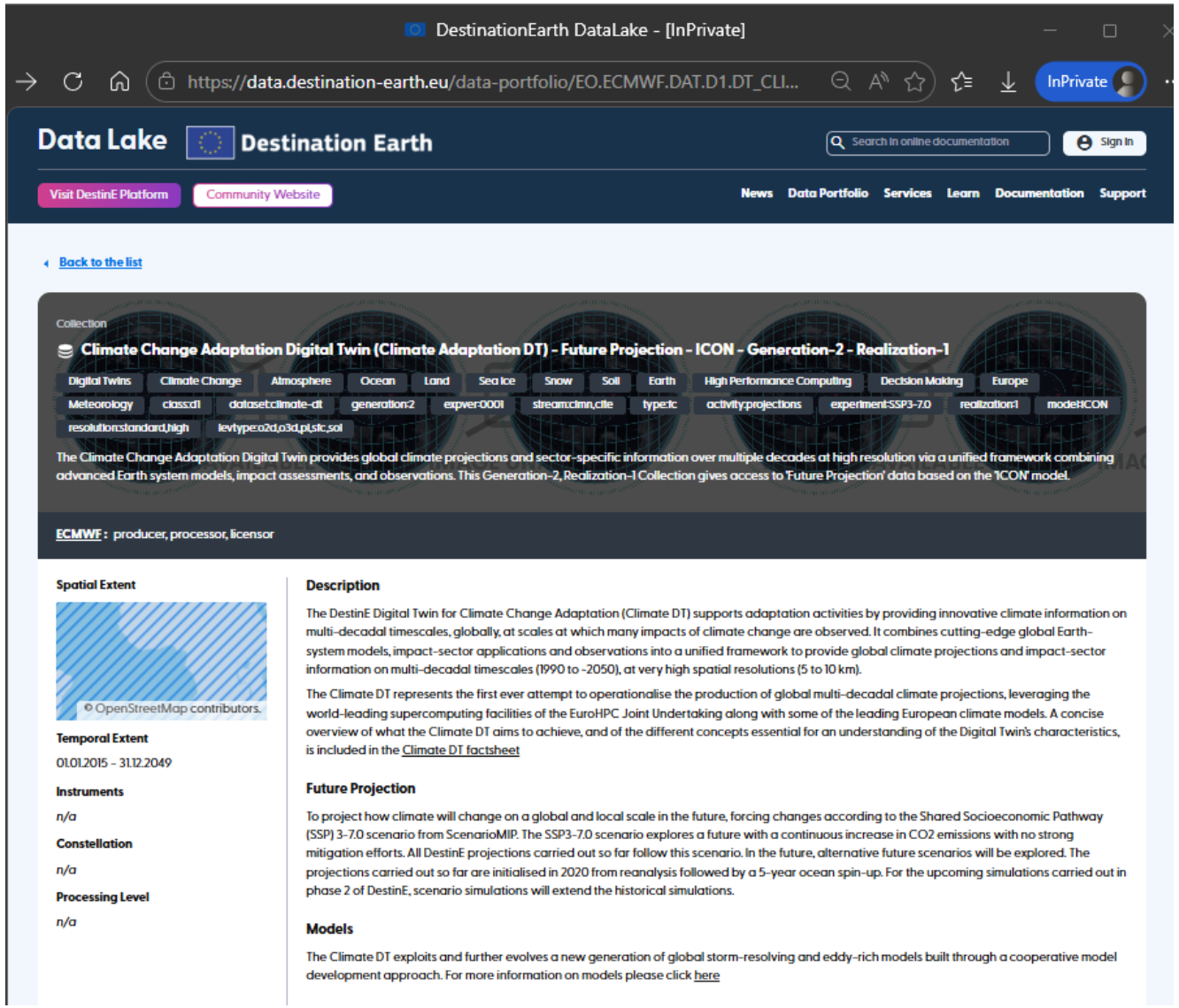
Learn more

Climate DT Datasets

- Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Historical Simulation - ICON - Generation-1 - Realization-1
- Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Historical Simulation - IFS-NEMO - Generation-1 - Realization-1
- Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Control Simulation - IFS-FESOM - Generation-1 - Realization-1
- Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Control Simulation - IFS-NEMO - Generation-1 - Realization-1
- Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Future Projection - ICON - Generation-1 - Realization-1
- Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Future Projection - IFS-FESOM - Generation-1 - Realization-1
- Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Future Projection - IFS-NEMO - Generation-1 - Realization-1
- Climate Change Adaptation Digital Twin (Climate Adaptation DT) - Storyline Simulation Present Climate - IFS-FESOM - Generation-1 - Realization-1

Discover one Climate DT dataset

https://data.destination-earth.eu/data-portfolio/EO.ECMWF.DAT.D1.DT_CLIMATE.G2.PROJECTIONS_SSP3-7.0_ICON.R1



Variables

Name:	10 metre U wind component
Dimensions:	lat, lon, time
Type:	Measured values
Description:	This parameter is the eastward component of the 10m wind. It is the horizontal speed of air moving towards the east, at a height of ten metres above the surface of the Earth, in metres per second.Care should be taken when comparing this parameter with observations, because wind observations vary on small space and time scales and are affected by the local terrain, vegetation and buildings that are represented only on average in the ECMWF Integrated Forecasting System.This parameter can be combined with the V component of 10m wind to give the speed and direction of the horizontal 10m wind.
Unit of Values:	m s-1

Name:	10 metre V wind component
Dimensions:	lat, lon, time
Type:	Measured values
Description:	This parameter is the northward component of the 10m wind. It is the horizontal speed of air moving towards the north, at a height of ten metres above the surface of the Earth, in metres per second.Care should be taken when comparing this parameter with observations, because wind observations vary on small space and time scales and are affected by the local terrain, vegetation and buildings that are represented only on average in the ECMWF Integrated Forecasting System.This parameter can be combined with the U component of 10m wind to give the speed and direction of the horizontal 10m wind.
Unit of Values:	m s-1

Name:	10 metre wind speed
Dimensions:	lat, lon, time
Type:	Measured values
Description:	This parameter is the horizontal speed of the wind, or movement of air, at a height of ten metres above the surface of the Earth. The units of this parameter are metres per second.Care should be taken when comparing this parameter with observations, because wind observations vary on small space and time scales and are affected by the local terrain, vegetation and buildings that are represented only on average in the ECMWF Integrated Forecasting System.The eastward and northward components of the horizontal wind at 10m are also available as parameters.
Unit of Values:	m s-1

Name:	2 metre dewpoint temperature
Dimensions:	lat, lon, time
Type:	Measured values
Description:	This parameter is the temperature to which the air, at 2 metres above the surface of the Earth, would have to be cooled for saturation to occur.It is a measure of the humidity of the air. Combined with temperature and pressure, it can be used to calculate the relative humidity.2m dew point temperature is calculated by interpolating between the lowest model level and the Earth's surface, taking account of the atmospheric conditions.See further information.This parameter has units of kelvin (K). Temperature measured in kelvin can be converted to degrees Celsius (°C) by subtracting 273.15.
Unit of Values:	K

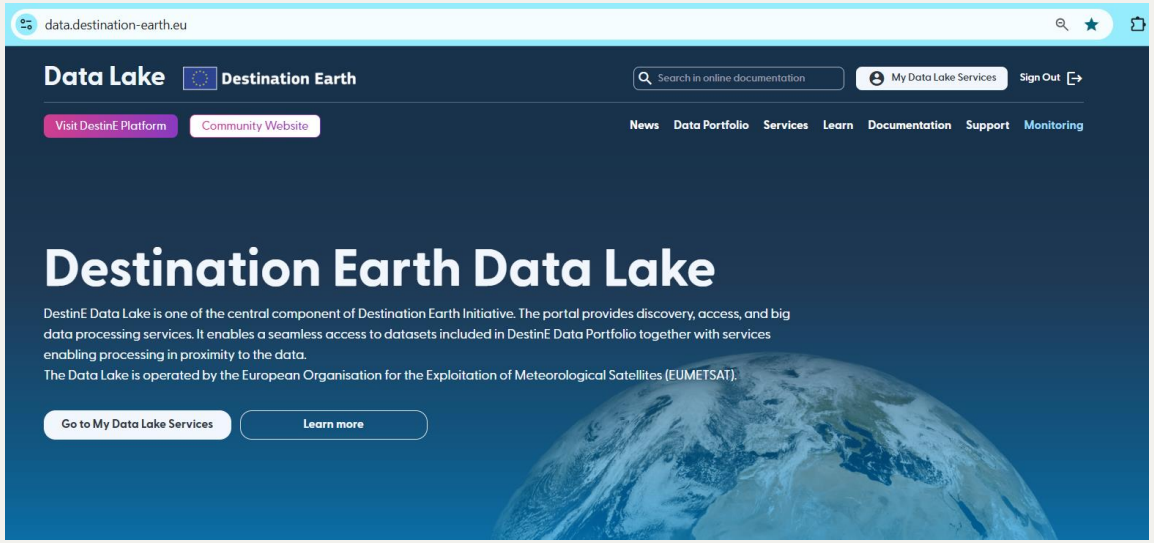
Data Discovery: How & Where

How:

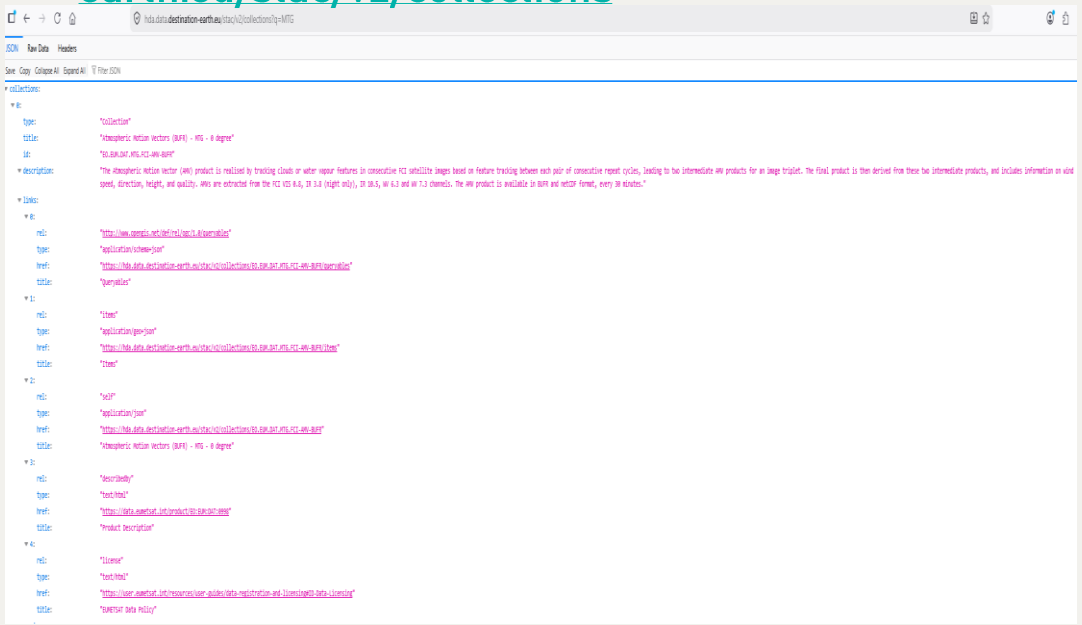
Graphically — via the DEDL web portal - free-text search and advanced filtering capabilities
Programmatically — via the DEDL HDA (Harmonized Data Access) APIs

Where:

🌐 DEDL Web Portal: https://data.destination-earth.eu/data-portfolio



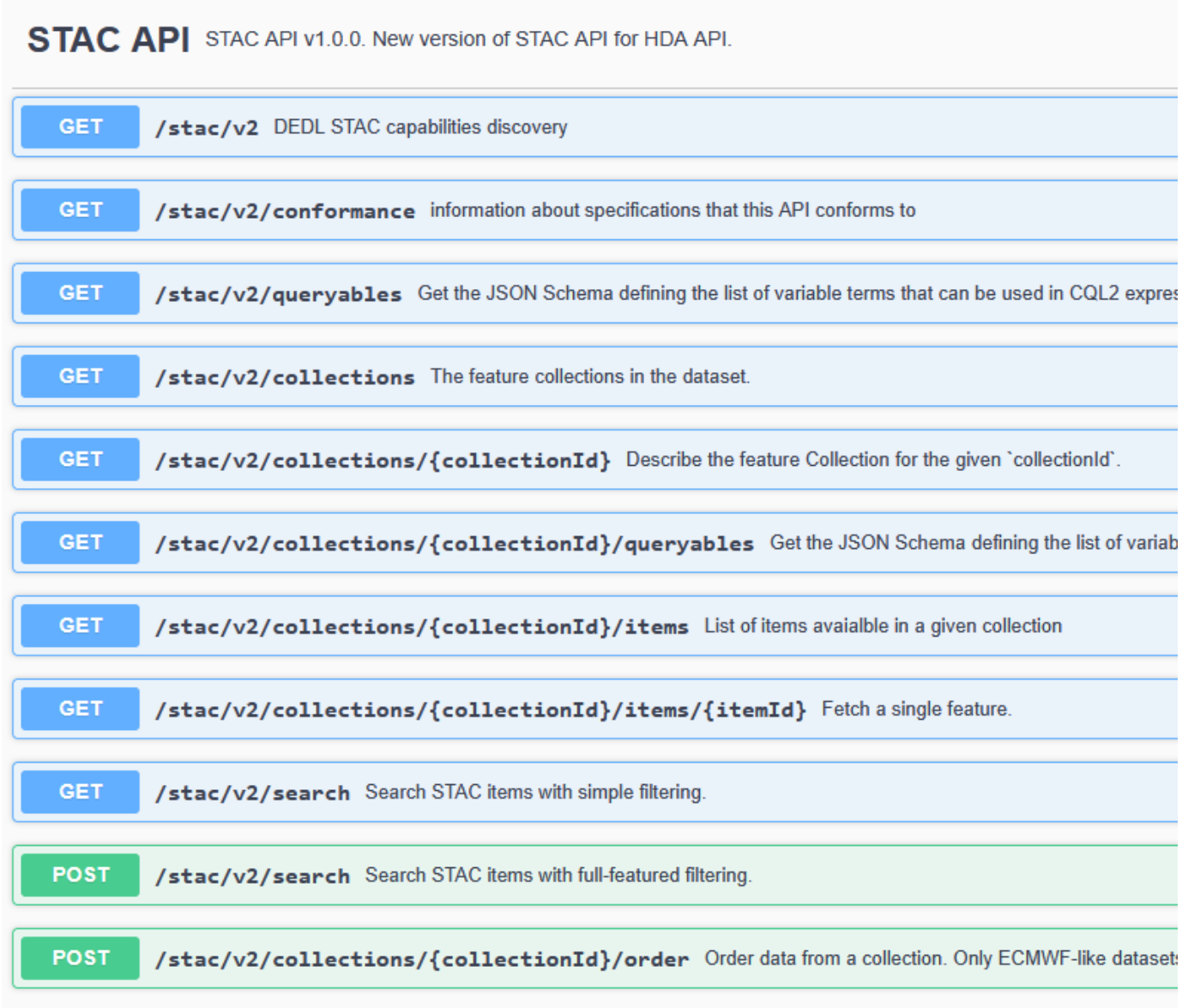
⚙️ HDA–STAC APIs: https://hda.data.destination-earth.eu/stac/v2/collections

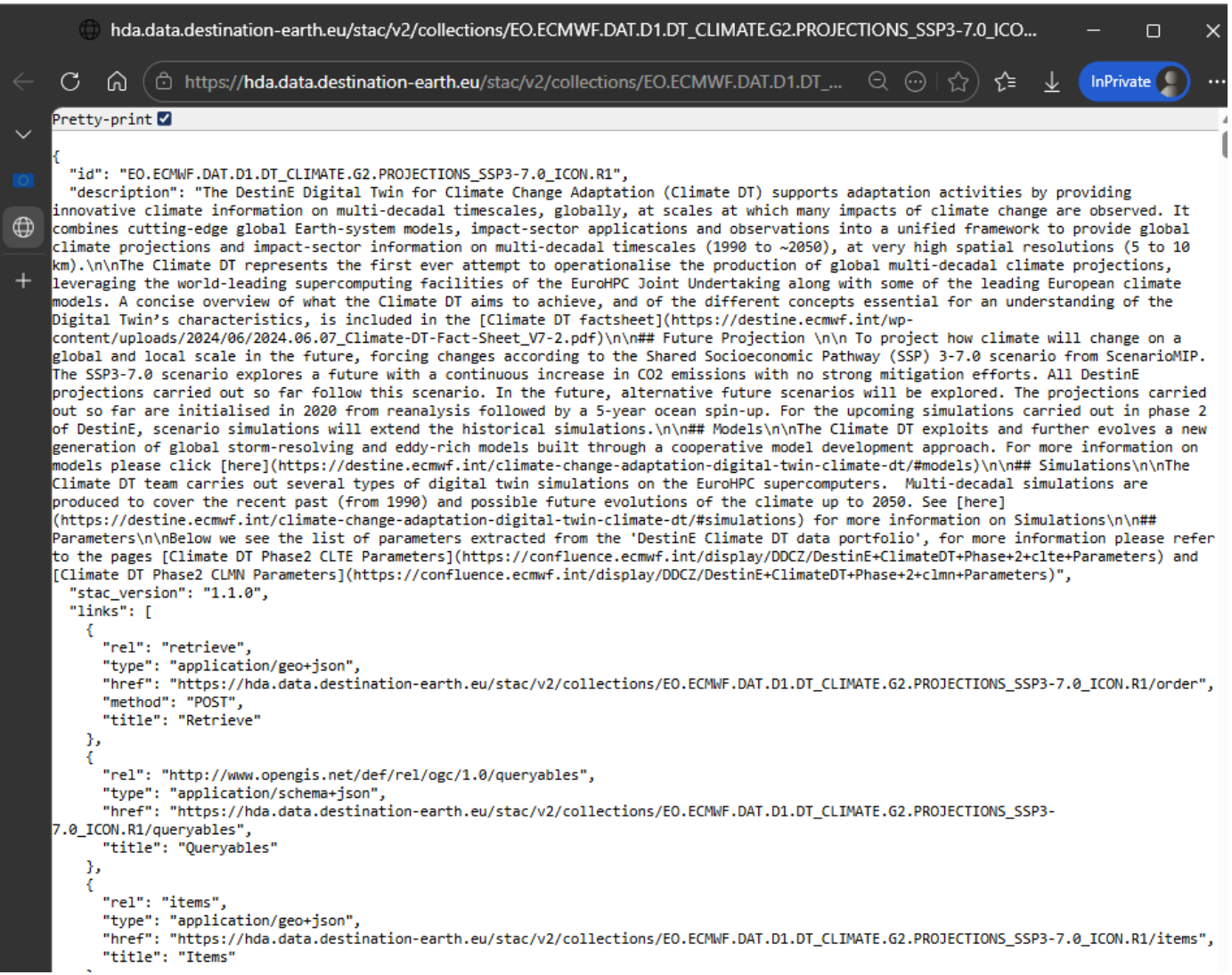


High-value metadata at your fingertips—multiple providers per dataset, guided notebook examples, and query endpoints exposing all search possibilities per dataset.

STAC - A standard interface

- SpatioTemporal Asset Catalog (STAC)
  - STAC collection specification
  - STAC Item specification
- v1.1.0
- Dataset discovery filters
  - Free-text search
  - Temporal extent
  - Area of interest
  - CQL filters
- Product search filtering capabilities
  - Temporal extent
  - Area of interest
  - Custom properties per dataset such as cloud cover, etc.
  - Specific id
  - Sort

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InPrivate
Pretty-print
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"description": "The DestinE Digital Twin for Climate Change Adaptation (Climate DT) supports adaptation activities by providing innovative climate information on multi-decadal timescales, globally, at scales at which many impacts of climate change are observed. It combines cutting-edge global Earth-system models, impact-sector applications and observations into a unified framework to provide global climate projections and impact-sector information on multi-decadal timescales (1990 to ~2050), at very high spatial resolutions (5 to 10 km).\n\nThe Climate DT represents the first ever attempt to operationalise the production of global multi-decadal climate projections, leveraging the world-leading supercomputing facilities of the EuroHPC Joint Undertaking along with some of the leading European climate models. A concise overview of what the Climate DT aims to achieve, and of the different concepts essential for an understanding of the Digital Twin's characteristics, is included in the [Climate DT factsheet](https://destine.ecmwf.int/wp-content/uploads/2024/06/2024.06.07_Climate-DT-Fact-Sheet_V7-2.pdf)\n\n## Future Projection \n\n To project how climate will change on a global and local scale in the future, forcing changes according to the Shared Socioeconomic Pathway (SSP) 3-7.0 scenario from ScenarioMIP. The SSP3-7.0 scenario explores a future with a continuous increase in CO2 emissions with no strong mitigation efforts. All DestinE projections carried out so far follow this scenario. In the future, alternative future scenarios will be explored. The projections carried out so far are initialised in 2020 from reanalysis followed by a 5-year ocean spin-up. For the upcoming simulations carried out in phase 2 of DestinE, scenario simulations will extend the historical simulations.\n\n## Models\n\nThe Climate DT exploits and further evolves a new generation of global storm-resolving and eddy-rich models built through a cooperative model development approach. For more information on models please click [here](https://destine.ecmwf.int/climate-change-adaptation-digital-twin-climate-dt/#models)\n\n## Simulations\n\nThe Climate DT team carries out several types of digital twin simulations on the EuroHPC supercomputers. Multi-decadal simulations are produced to cover the recent past (from 1990) and possible future evolutions of the climate up to 2050. See [here](https://destine.ecmwf.int/climate-change-adaptation-digital-twin-climate-dt/#simulations) for more information on Simulations\n\n## Parameters\n\nBelow we see the list of parameters extracted from the 'DestinE Climate DT data portfolio', for more information please refer to the pages [Climate DT Phase2 CLTE Parameters](https://confluence.ecmwf.int/display/DDCZ/DestinE+ClimateDT+Phase+2+clte+Parameters) and [Climate DT Phase2 CLMN Parameters](https://confluence.ecmwf.int/display/DDCZ/DestinE+ClimateDT+Phase+2+clmn+Parameters)",
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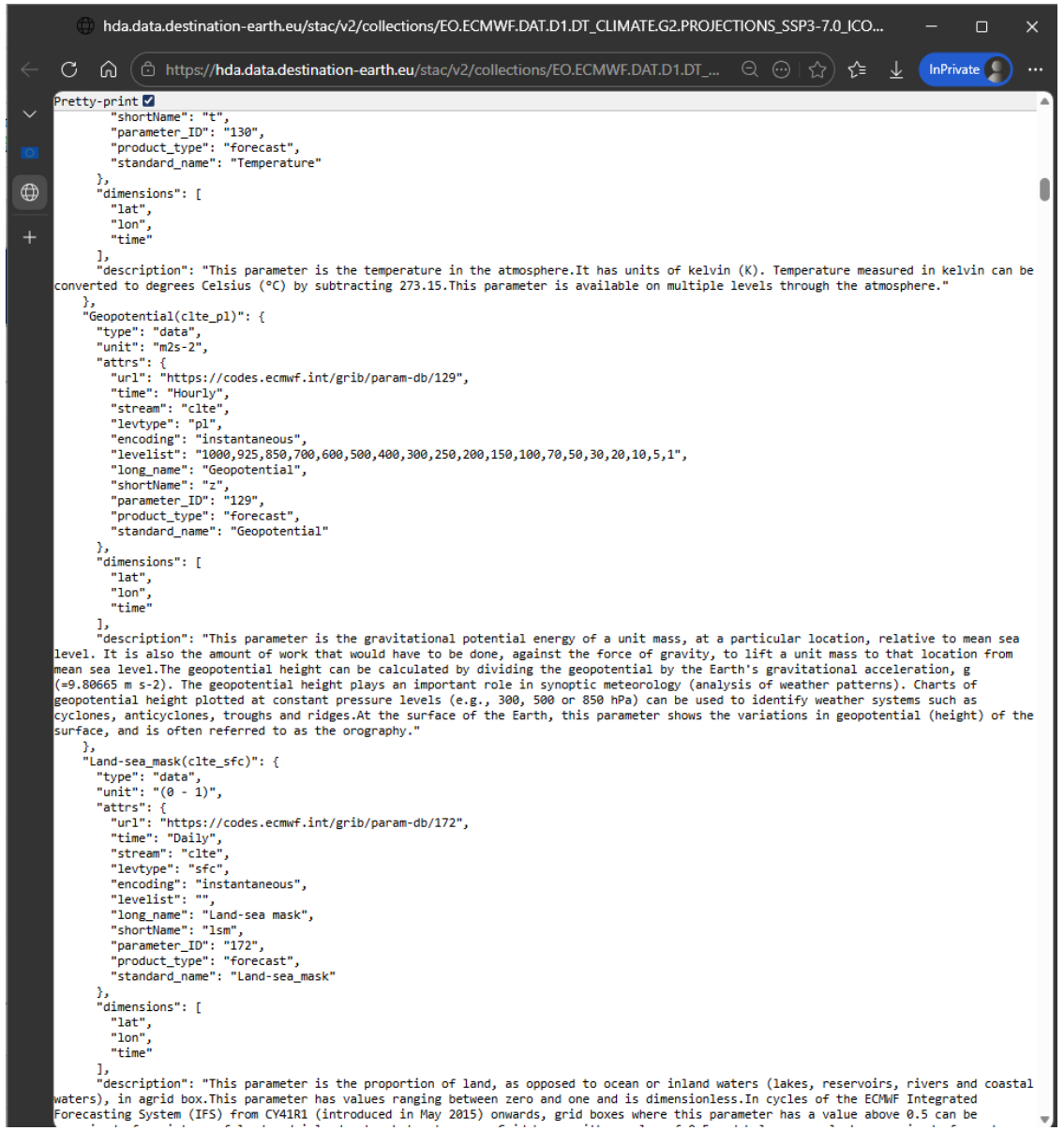
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InPrivate
Pretty-print
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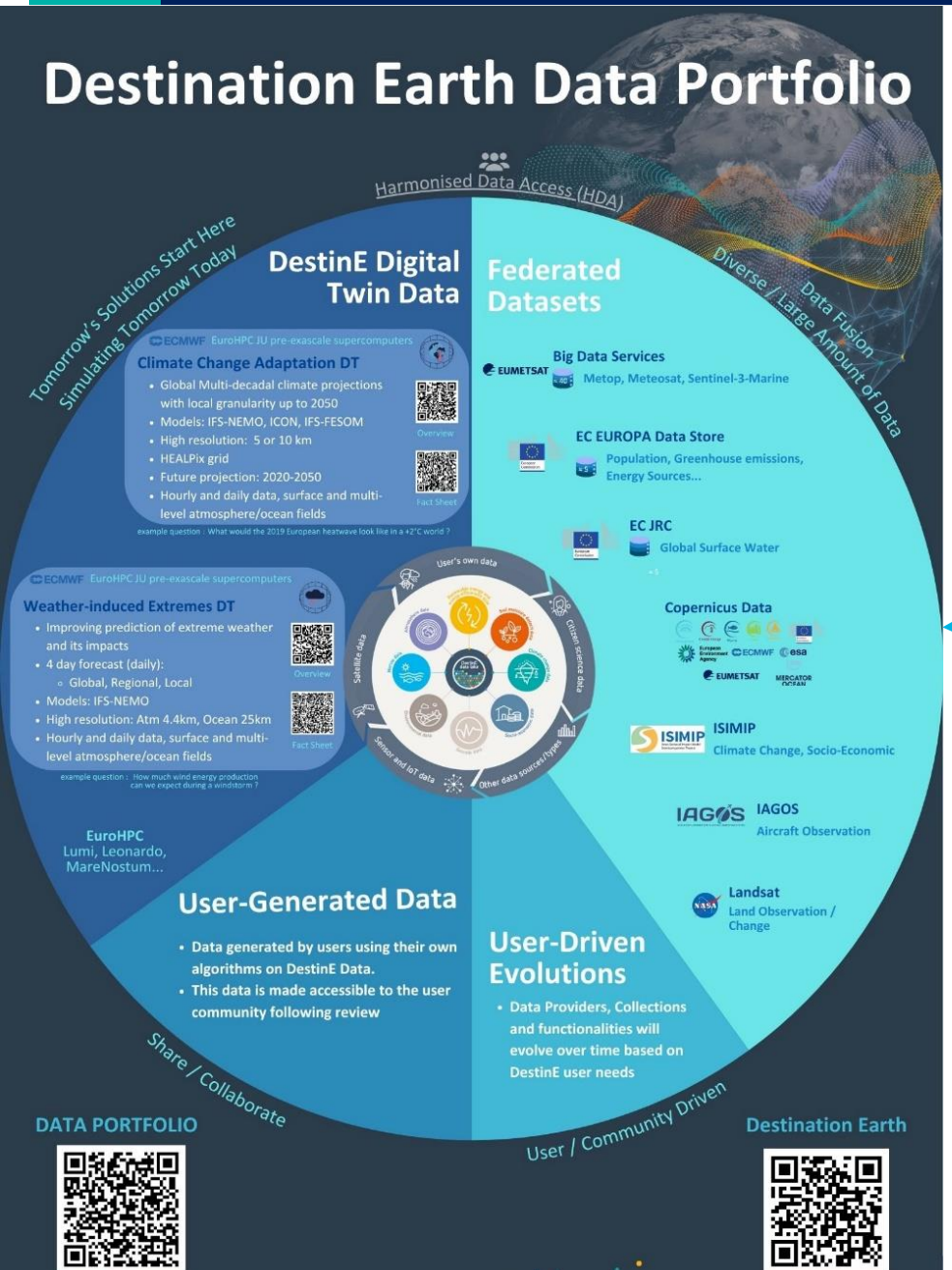
DestinE Data Portfolio and HDA



DestinE service open to any DestinE users
Subject to provider Data policy

Destination Earth

HARMONISED DATA ACCESS

1 Credential

1 Harmonised API

STAC

+250 datasets

+ 15 different providers

https://github.com/destination-earth/DestinE-DataLake-Lab

Edge services

Destination Earth

ISLET

Destination Earth

HOOK

Destination Earth

STACK

openstack

kubernetes

S3

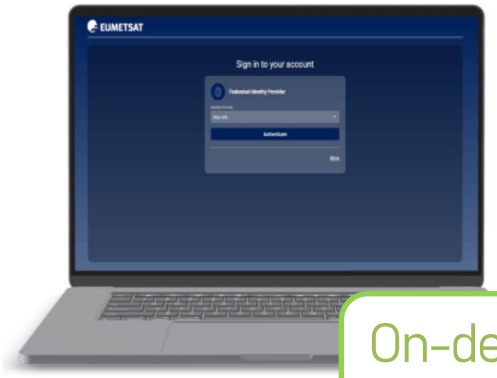
odata based API

Data-harvester workflow

jupyter

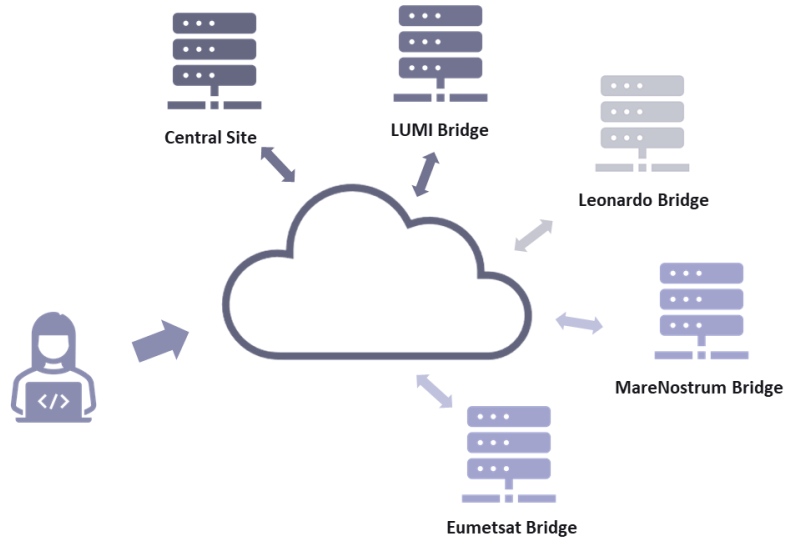
dask

data.destination-earth.eu



MyDataLake services

On-demand services
Subject to EC approval



STACK

Stack Services are ready-to-use, multitenant data processing solutions, running on the Data Lake, enabling Data Processing Services.

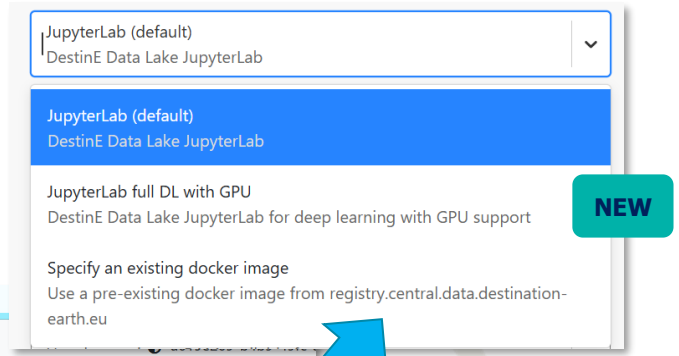
Jupyter Hub & JupyterLab, DEDL instance of JupyterHub, acting as proxy for authenticated user to spawn JupyterLab instances

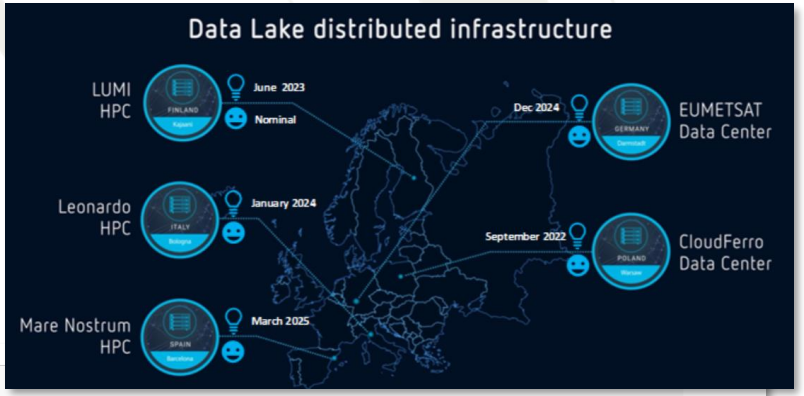
Jupyter Enterprise Gateway, enables users to launch Jupyter. kernels at the individual data sites of the distributed infrastructure

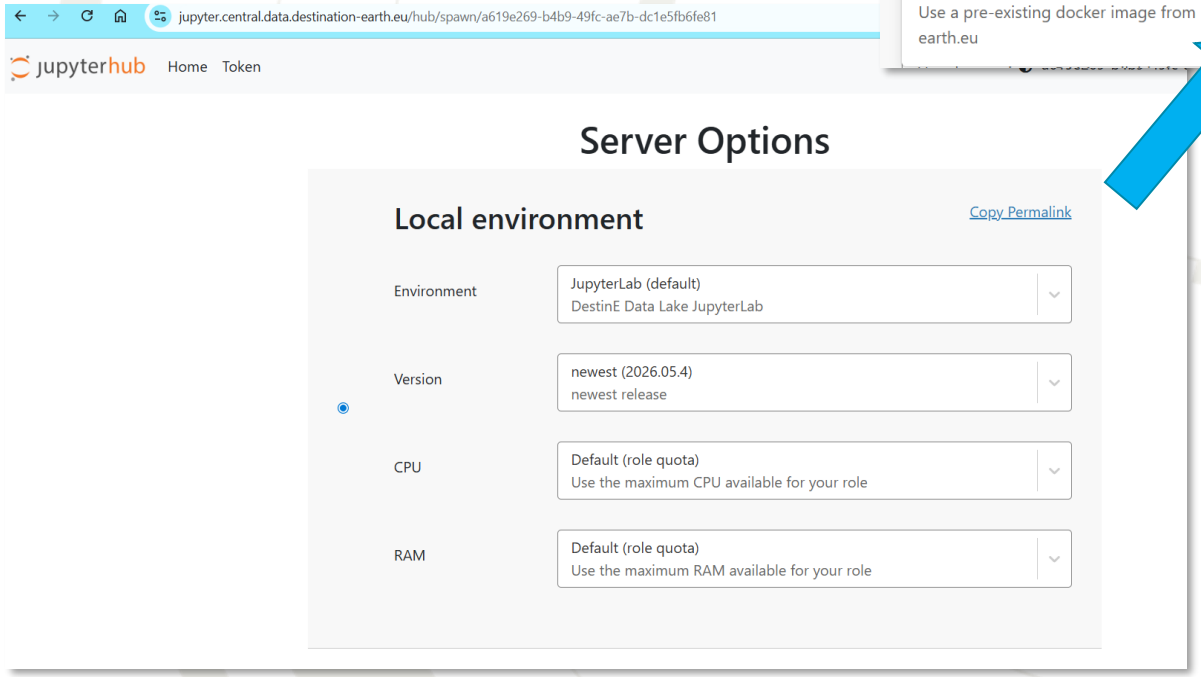
Dask Gateway, enables users to request Dask clusters on-demand to be used to distribute compute jobs across all federation sites and executing computations next to the data.

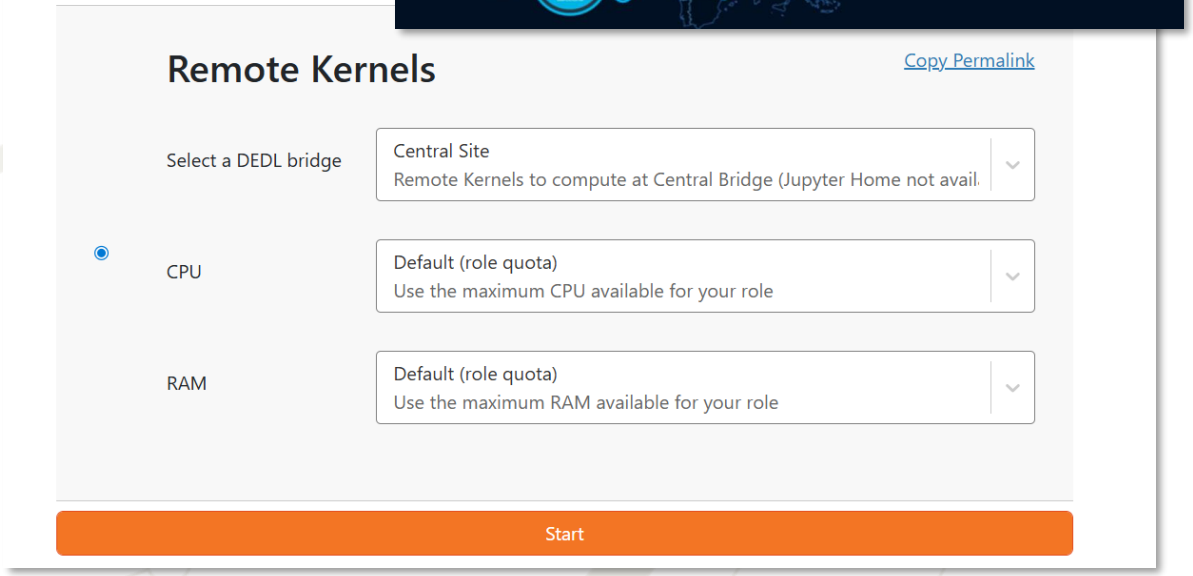
STACK : Connecting to JupyterHub: Options

- Choose an Environment for your JupyterLab Instance
- Or a Remote Kernel



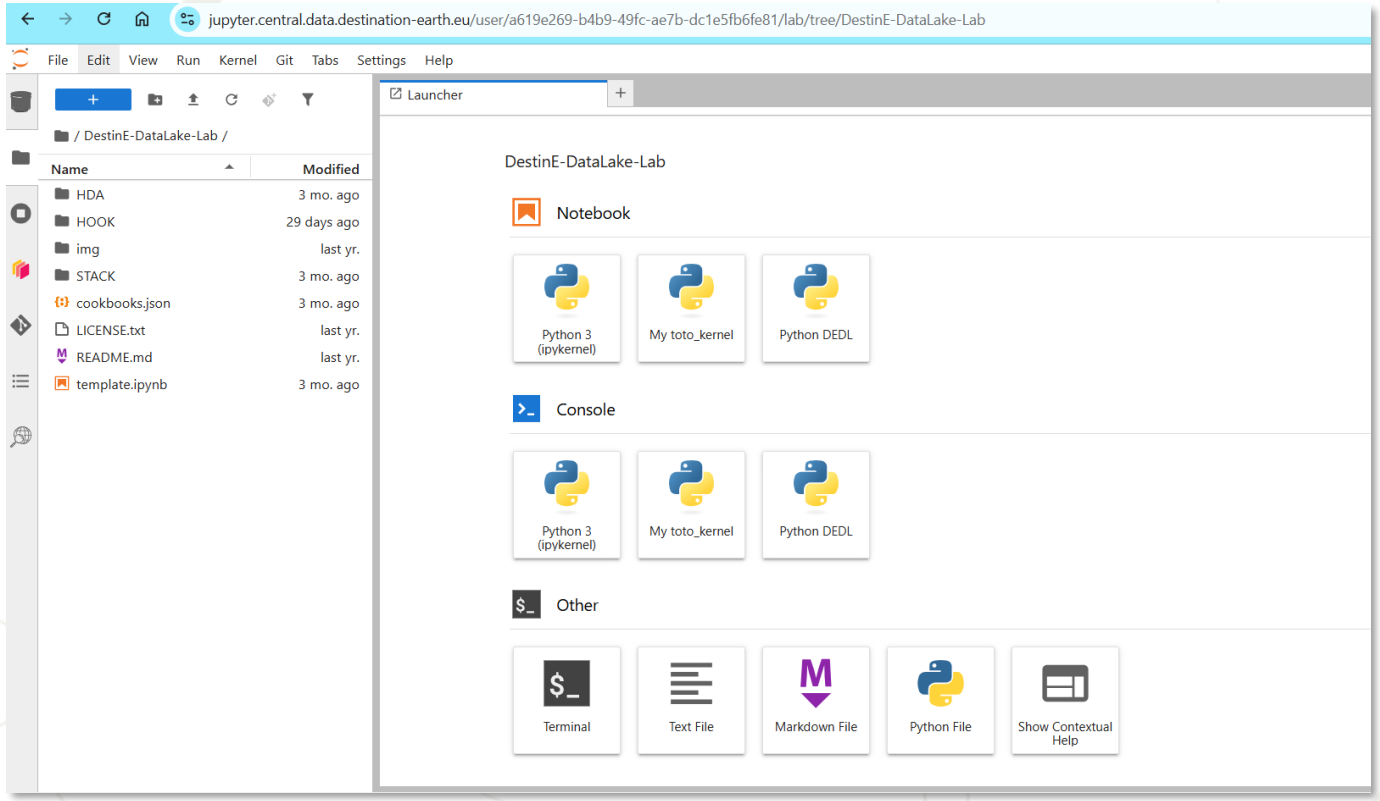






When Connected

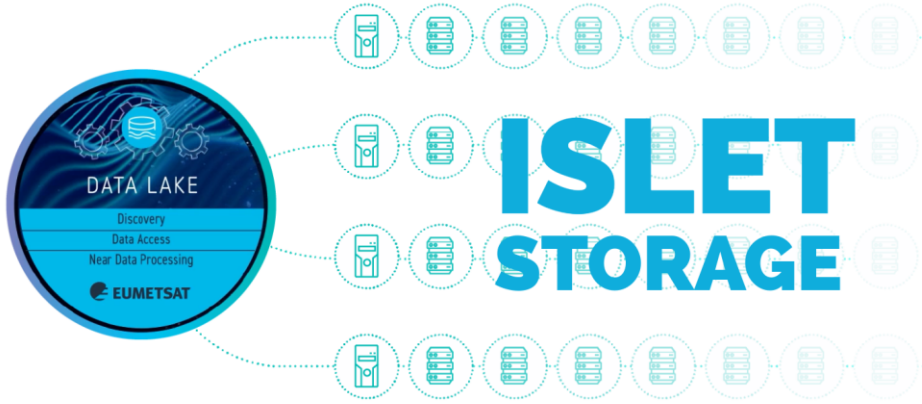
- Connecting to standard JupyterLab environment on Central infrastructure



ISLET services

Destination Earth

Destination Earth



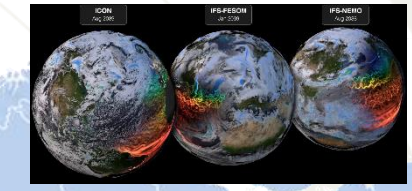
ISLET: Sites

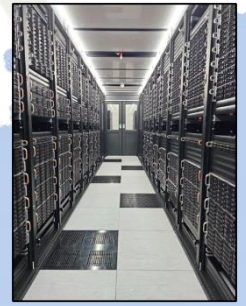
Databridges:

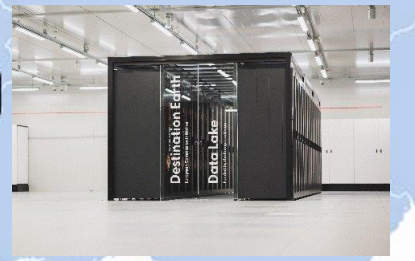
- Central (Poland)
- LUMI (Finland) - HPC
- Leonardo (Italy) - HPC
- Marenostrum (Spain) - HPC
- EUMETSAT (Germany)

Based on

openstack.







Totals	
Storage (PB):	120
vCPUs:	42680
GPUs:	76
Datasets:	+200

ISLET: OpenStack

Destination Earth

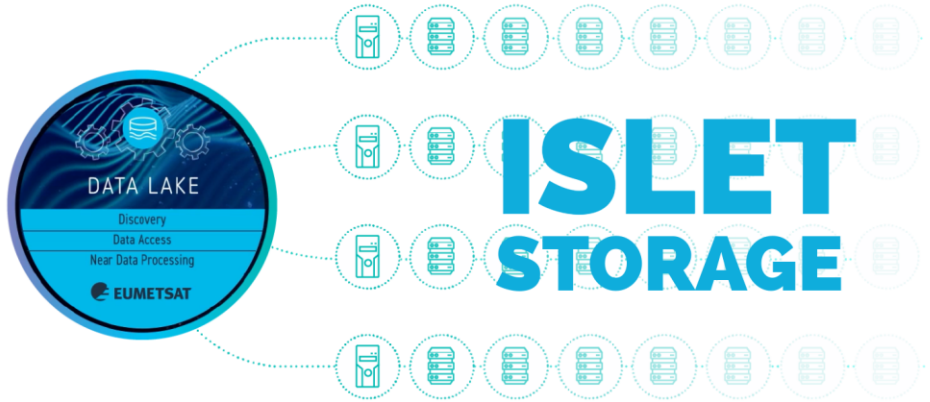
Virtual environment based on the OpenStack

Preconfigured images

vCPU and GPU

Kubernetes clusters

Destination Earth

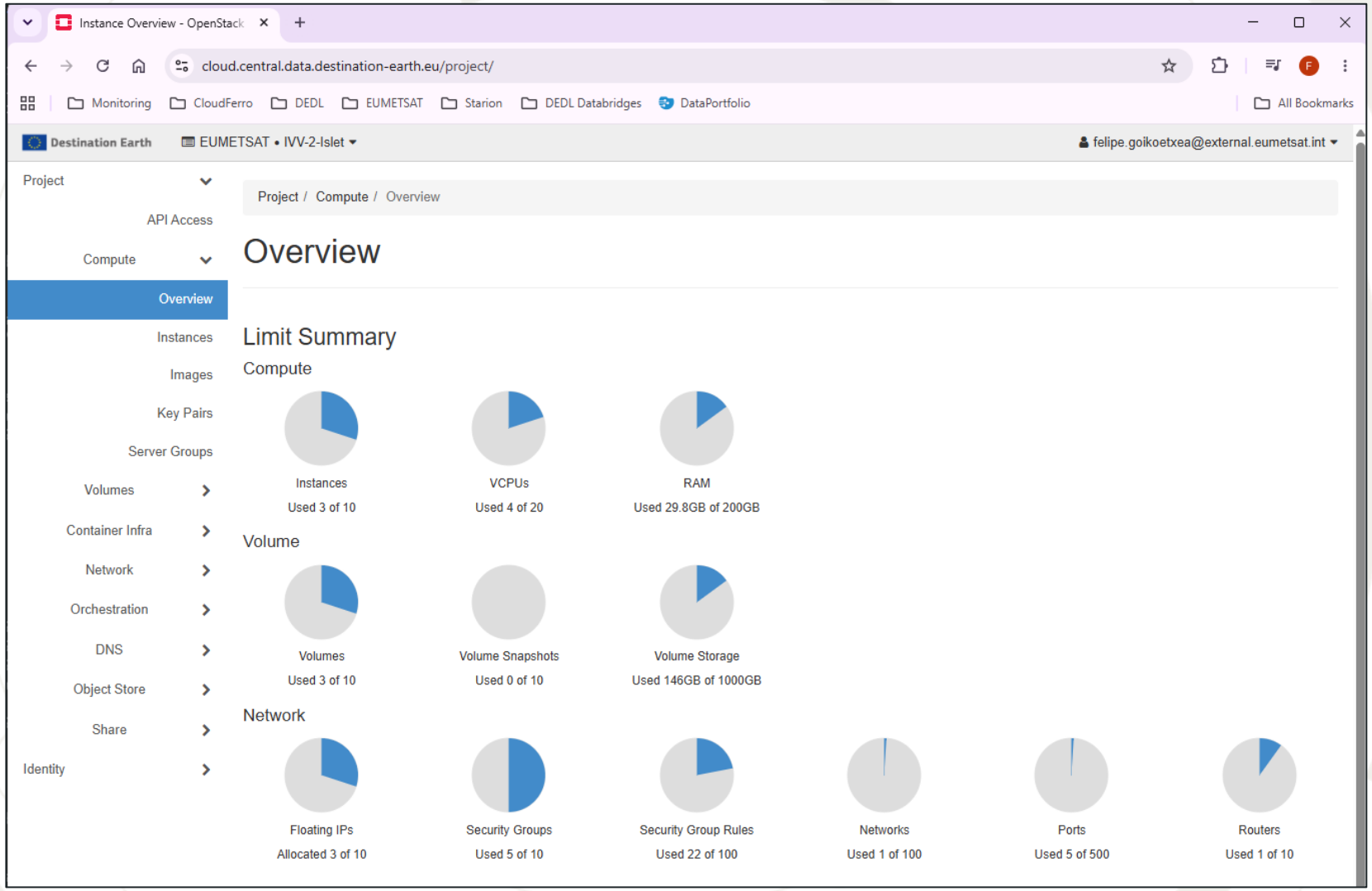


Access to S3 storage

Manage S3 storage

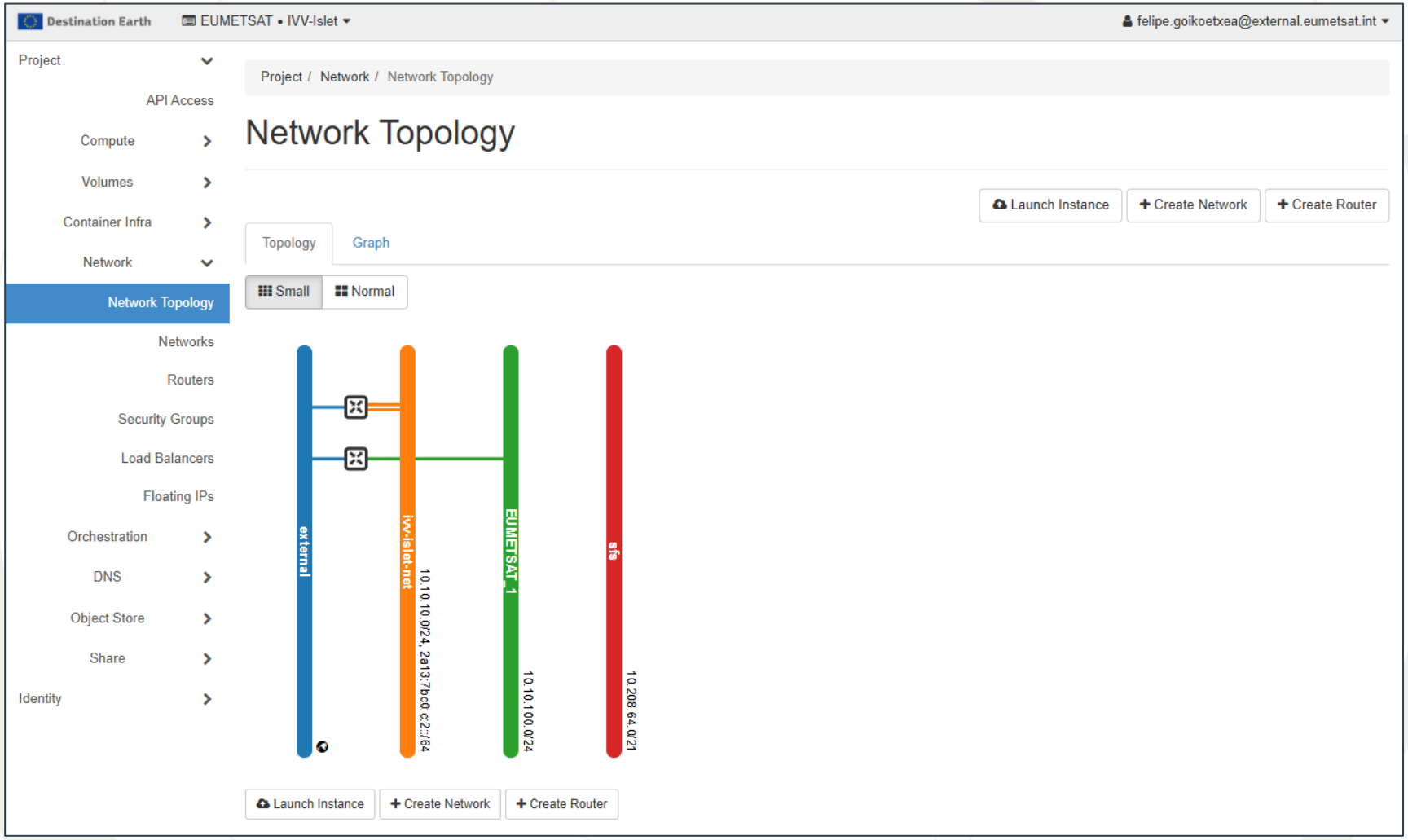
ISLET: OpenStack Horizon Dashboard

- Horizon Dashboard – Overview

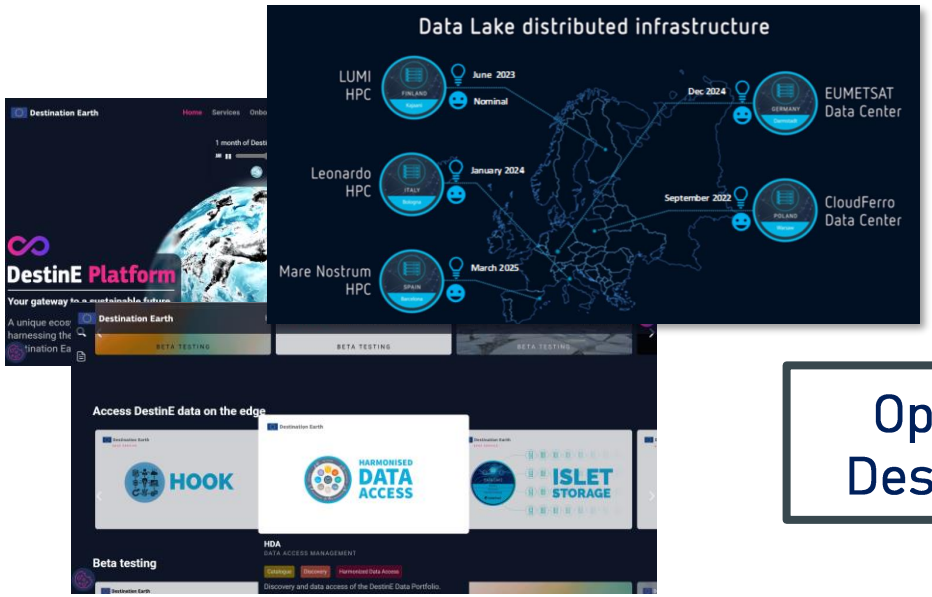


ISLET: OpenStack Network Topology

- Horizon Dashboard - Network Topology



DestinE (Data Lake) services



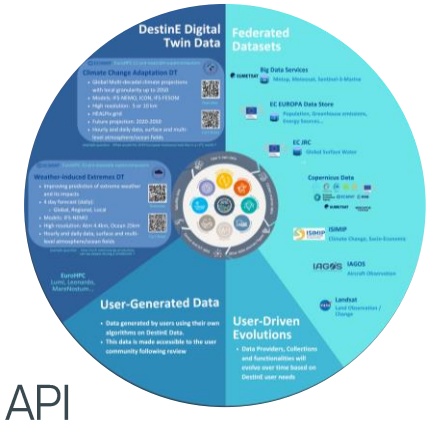
Harmonised Data access

Destination Earth

HARMONISED DATA ACCESS

Open to any DestinE users

+250 datasets



EDGE Services

Destination Earth

STACK

Destination Earth

ISLET

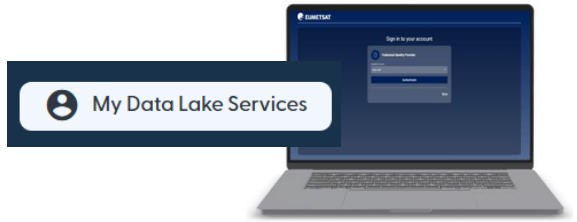
Destination Earth

HOOK

Destination Earth

ISLET STORAGE

On request – Project assessment *(no cost)*



- Harmonise (standardise) access to data with just one API
- Bringing computation to the data (near data processing), Destination Earth Data Lake is a cloud-native platform for discovering, accessing and exploiting DestinE data (and other data from multiple data spaces) at scale.