User Workshop on Satellite Atmospheric Composition: Accessing Data from EUMETSAT

Sally Wannop

The need for new data services

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

The Current State

- EUMETSAT's operational Earth observation data catalogue:
  - Spans over 35 years of meteorological satellite data, as well as climate and Copernicus marine products.
  - Adds new products 24/7/365; with consistency ensured by inter-calibration and reprocessing campaigns.
  - Offers 26% of Global Climate Observing System (GCOS) Essential Climate Variables (ECVs).
  - Is distributed to users through "push" (EUMETCast) and "pull" (Long Term Archive/EUMETView) services.

The Challenge

- The data catalogue continues to grow:
  - Ingesting new satellite programmes and missions that increase complexity of the generated data products.
  - Making traditional workflows, where data holdings are present at user's premises, increasingly infeasible.

The Solution:

- EUMETSAT is reshaping its data services portfolio by:
  - Leveraging big data and on-premises cloud computing technologies.
  - Phasing in **new Data Services** during 2020 to facilitate near real-time data access, data visualisation, data transformation and customisation and cloud processing adjacent to the archive.

The new data services portfolio

New data services for 2020

Pull services | Push services

Transforming the data…

Data Tailor

Improving data access…

EUMETSAT Data store

Viewing the data…

EUMETView

Near-real time data delivery via terrestrial networks.

EUMETCast Terrestrial

Further information:
https://www.eumetsat.int/website/home/Data/DataDelivery/NewPilotDataServices/index.html

Click the icons (here and on the slide header) to navigate to each service

EUMETSAT

Introducing the EUMETSAT Data Tailor

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

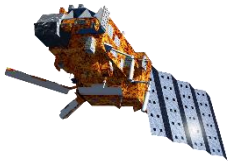
The **EUMETSAT Data Tailor** software makes it possible for users to subset and aggregate our data products in space and time, filter layers, generate quicklooks, project onto new coordinate reference systems, and reformat into common GIS formats (netCDF, GeoTIFF, etc.). It offers a uniform way to transform both historical and near real time satellite data provided by EUMETSAT.

The EUMETSAT Data Tailor: Overview

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

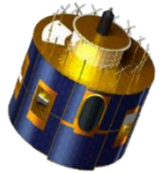
Pilot phase data collections

METOP



- AVHRR RADIOMETRY PRODUCTS
- IASI INTERFEROMETRY PRODUCTS
- ASCAT SCATTEROMETRY PRODUCTS
- GOME SPETROMETRY PRODUCTS
- AMSU SOUNDING PRODUCTS
- MHS SOUNDING PRODUCTS
- HIRS SOUNDING PRODUCTS

MFG/MSG



- MSG SEVIRI RADIOMETRY PRODUCTS
- MFG MVIRI RADIOMETRY PRODUCTS
- MSG CLOUD MASK PRODUCTS

Downstream products:

EUMETSAT OSI SAF OCEAN AND SEA ICE

- SST PRODUCTS
- WIND PRODUCTS

EUMETSAT LSA SAF LAND SURFACE ANALYSIS

- LST PRODUCTS
- EVAPOTRANS. PRODUCTS
- PAR PRODUCTS

Transformation processes:

- SUBSET ROI
- AGGREGATE
- LAYER FILTERING
- REPROJECT
- REFORMAT
- QUICK LOOK

Interfaces

- Web UI interface
- CLI interface
- API interface
- Web service interface

Planned Integrations

- Apply transforms to the **EUMETSAT Data Store** cart
- Generation of GeoTIFFs for **EUMETView**

* pilot service now available

EUMETSAT

The EUMETSAT Data Tailor: Use and access 1

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

Using the WebUI

Access to the Data Tailor, and further information on its installation and use, including “how to” videos can be found through this link.

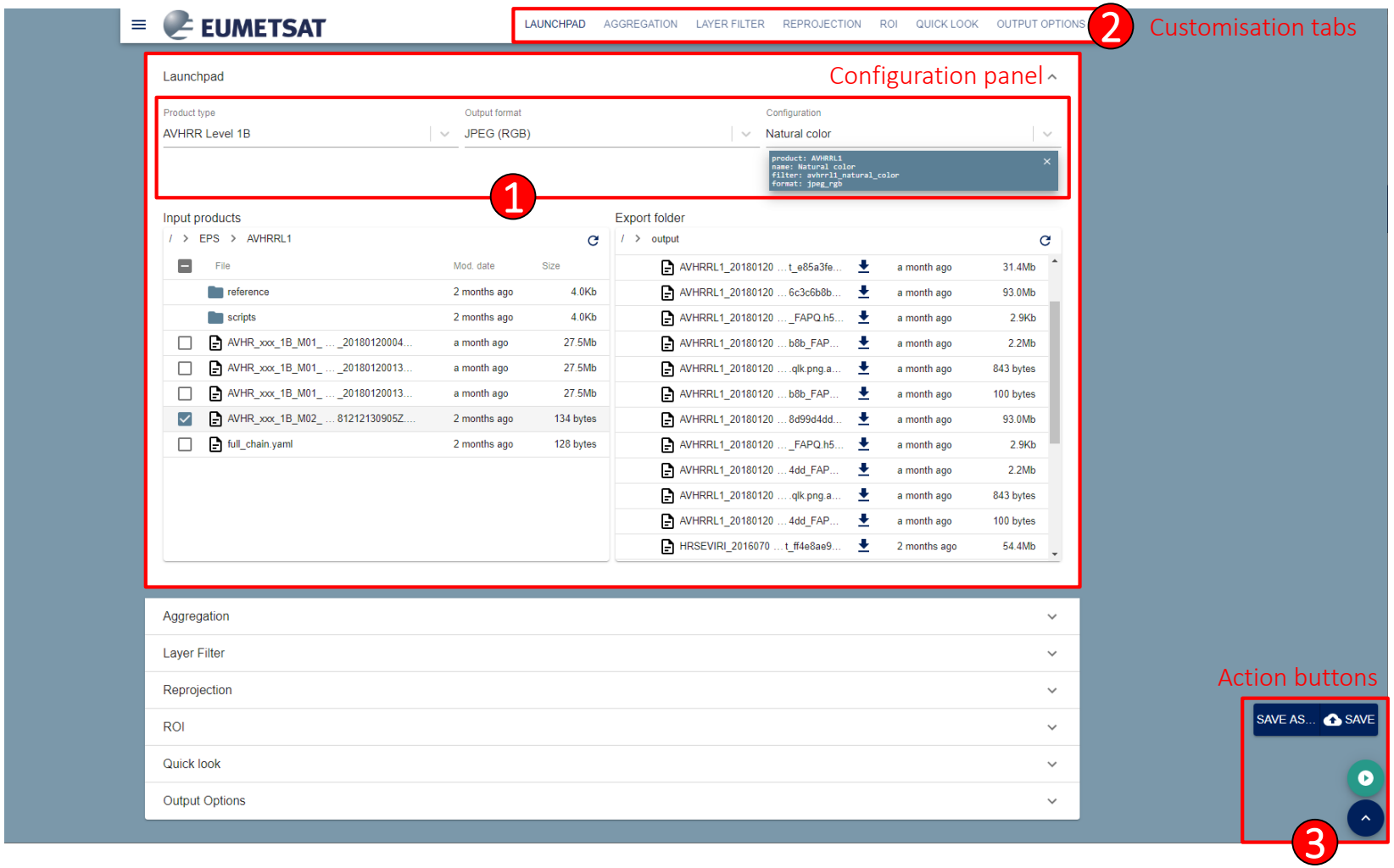
1 Drop down menus allow users to select input product type, output format type, or to load an existing configuration.

Supported output formats

BUFR	Binary Universal Form for the Representation of Meteorological Data
GeoTIFF	Geospatial Tagged Image File Format
HDF4/HDF5	Hierarchical Data Format – version 4/5
JPEG	Joint Photographic Experts Group
netCDF-4	Network Common Data Form
PNG	Portable Network Graphics
xarray Dataset	In-memory xarray library object of a netCDF file
Source format	The format of valid input data

2 Customisation tabs allow users to access and configure their method

3 Action buttons allow users to save configurations for later use, run the process and open the monitoring panel.



EUMETSAT

The EUMETSAT Data Tailor: Use and access 2

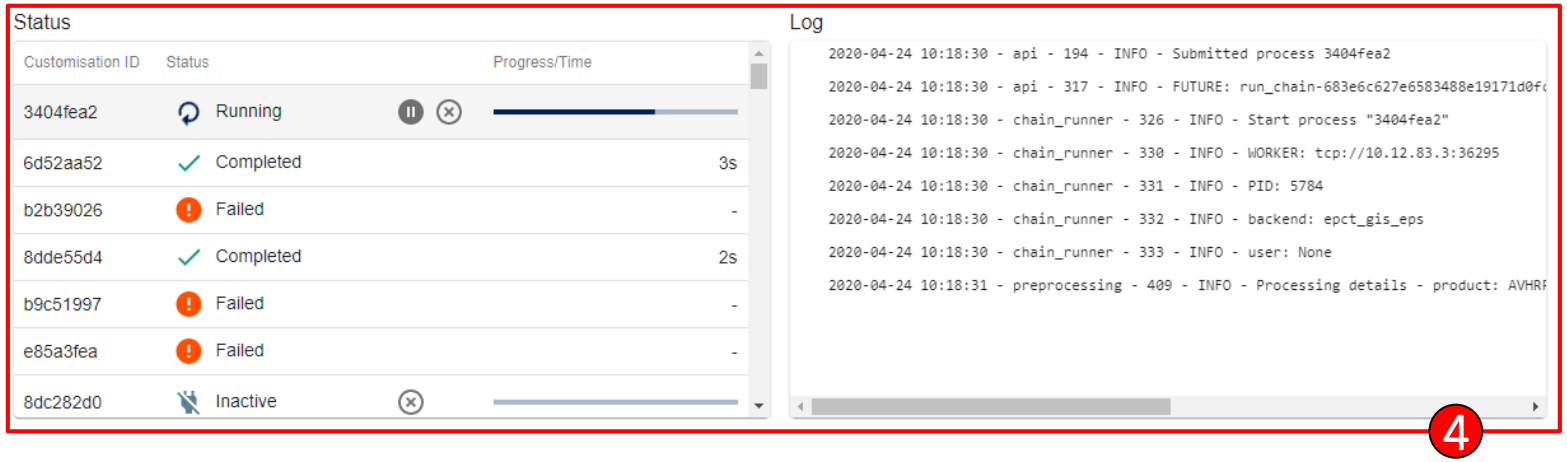
Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

Using the WebUI (cont.)

4 Monitoring panel shows job queue and the current progress and the log for each run

The Data Tailor (v2.4) can be installed on:

- Linux Ubuntu 18.04 LTS 64 bit
- CentOS Linux 6 and 7 64 bit
- RedHat Enterprise Linux 7 64 bit
- Windows 10 (beta stage, feedback welcome)



Using the CLI and API

- The Data Tailor can also be run using a **command line interface** (CLI).
  - This functionality is installed by default and allows the Data Tailor to be exploited for batch processing.
  - More information on using the CLI can be found in the Data User Guide.
- In addition, the Data Tailor features a Python **application programming interface** (API), which
  - allows for external use to Data Tailor capability to be exploited externally
  - supports the use inclusion of the Data Tailor in more complex processing chains (e.g. with PyTroll)

python™ ANACONDA PyTROLL

The Web service

- the **Web Service Interface** provides a REST web interface than can be invoked from other applications

EUMETSAT Data Store

EUMETSAT

Introducing the EUMETSAT Data Store

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

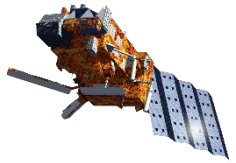
The **EUMETSAT Data Store** provides users with a download and linked data tailoring service for online data; providing access through an online interface and via Application Programming Interface (API).

The EUMETSAT Data Store: Overview

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

Pilot phase data collections

METOP



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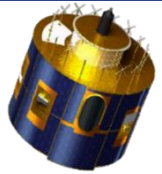

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- MFG MVIRI RADIOMETRY PRODUCTS
- MSG CLOUD MASK PRODUCTS

Downstream products:

EUMETSAT OSI SAF OCEAN AND SEA ICE

- SST PRODUCTS

Planned future data collections

Sentinel-3A / 3B products

Further Satellite Application Facility products

....the full EUMETSAT product catalogue!

European Commission

Copernicus Europe's eyes on Earth

*pilot service available Q3 2020

Interfaces

Online web interface

1. Download API
2. OpenSearch API
3. REST API
4. Subscription API

Planned Integrations

- Product customisation through the **Data Tailor**
- Product viewing through **EUMETView**

EUMETSAT

The EUMETSAT Data Store: Web UI use and access I

Data Tailor | **EUMETSAT Data store** | EUMETView | EUMETCast Terrestrial

Interfaces

Online interface

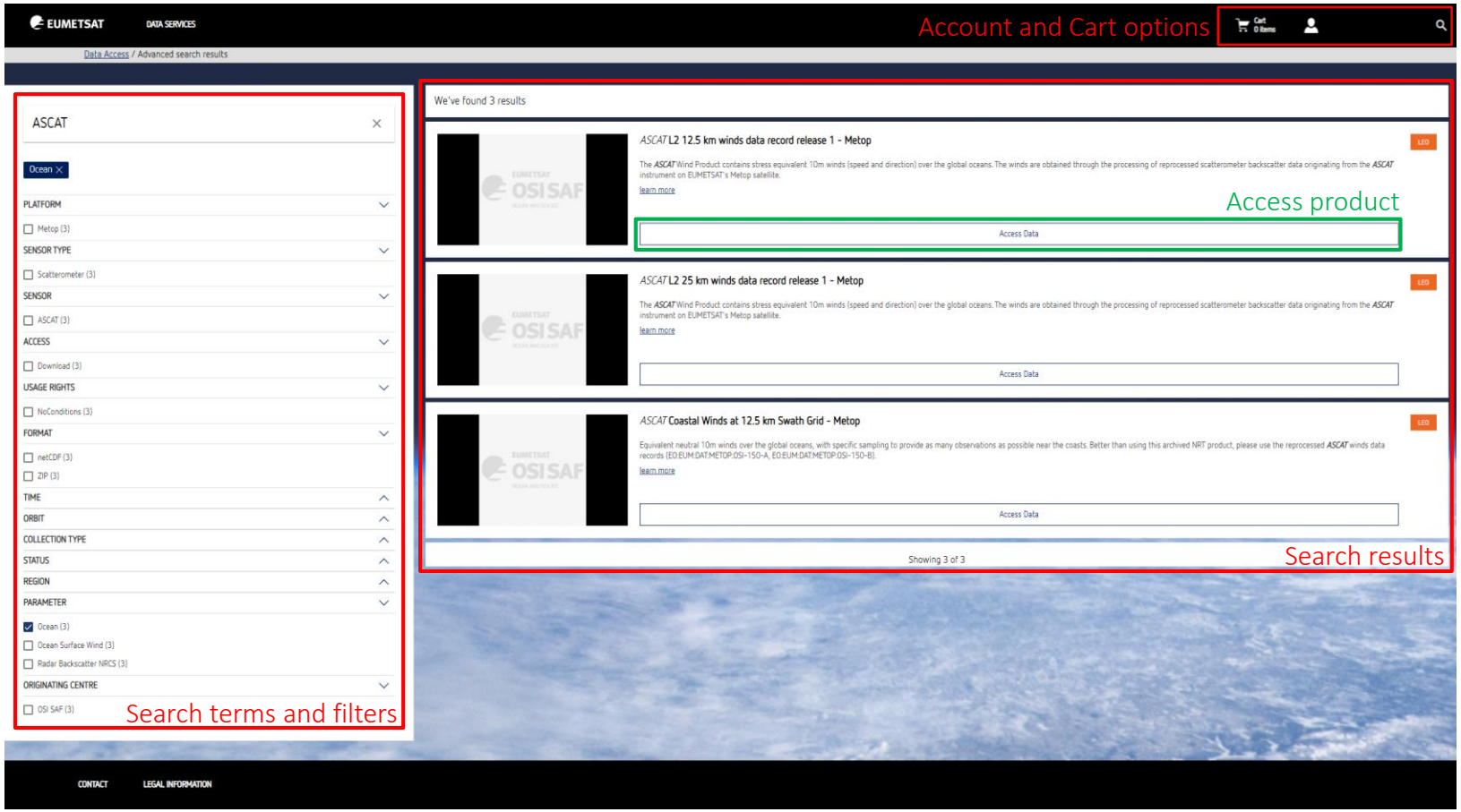
Web UI based catalogue navigation

Download API

OpenSearch API

REST API

Subscription API



EUMETSAT

The EUMETSAT Data Store: Web UI use and access 2

Data Tailor | **EUMETSAT Data store** | EUMETView | EUMETCast Terrestrial

Interfaces

Online interface

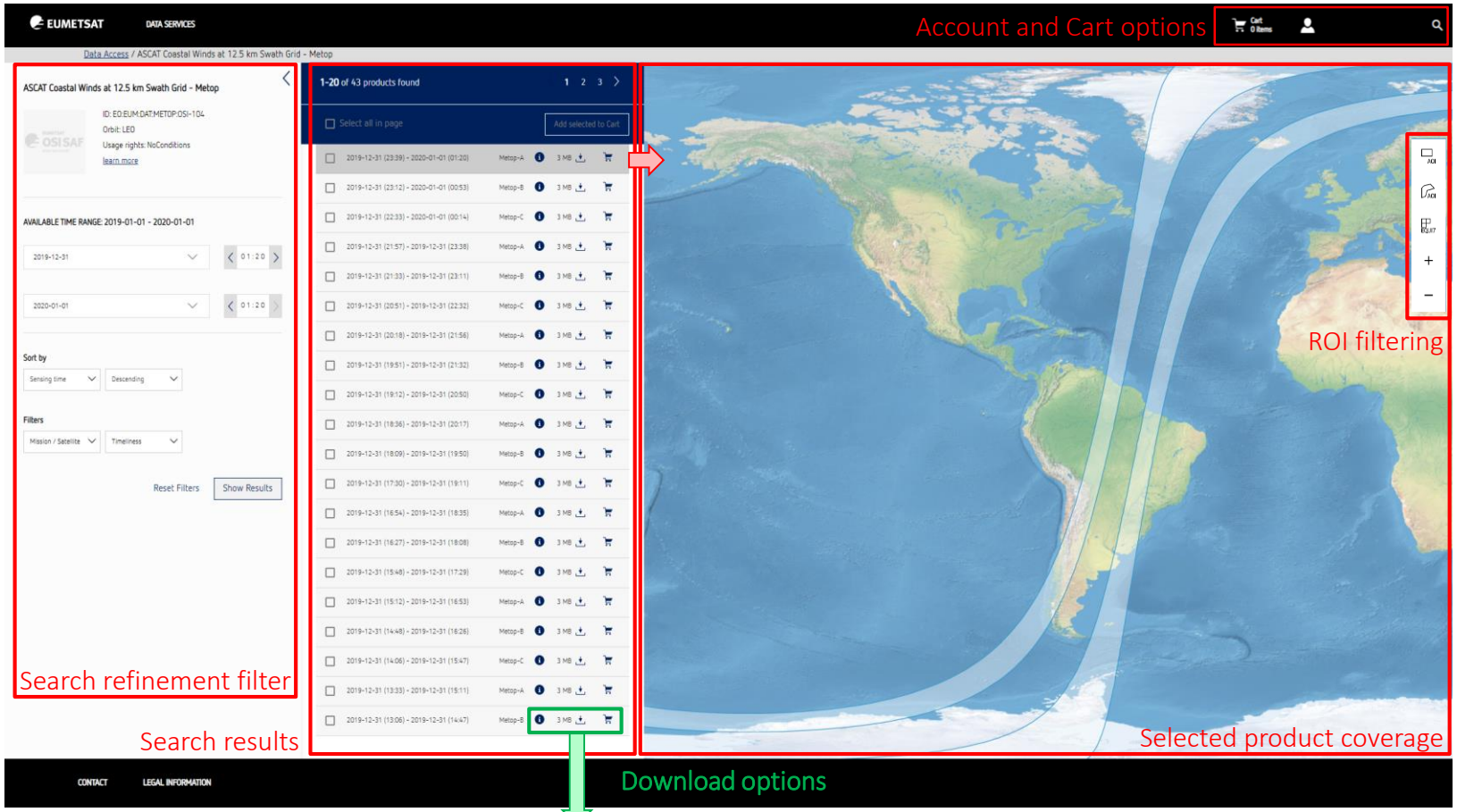
Web UI based catalogue navigation

Download API

OpenSearch API

REST API

Subscription API



Direct download — Command line — Cart

>> Interface with APIs

Data Tailor integration
>> product customisation

EUMETSAT

The EUMETSAT Data Store: API use and access 1

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

Interfaces

Online interface

1 Download API

2 OpenSearch API

3 REST API

4 Subscription API

1 Download data using URL, command line and Python based options using ID or collection and sensing time

2 Search Data Store at product and collection levels. Filter selections by time, ROI, satellite, timeliness

3 Navigate/Browse products and collections by date and spatial coverage / footprint

4 Notification service for new product availability

EUMETSAT

The EUMETSAT Data Store: API use and access 2

Data Tailor | **EUMETSAT Data store** | EUMETView | EUMETCast Terrestrial

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Online interface

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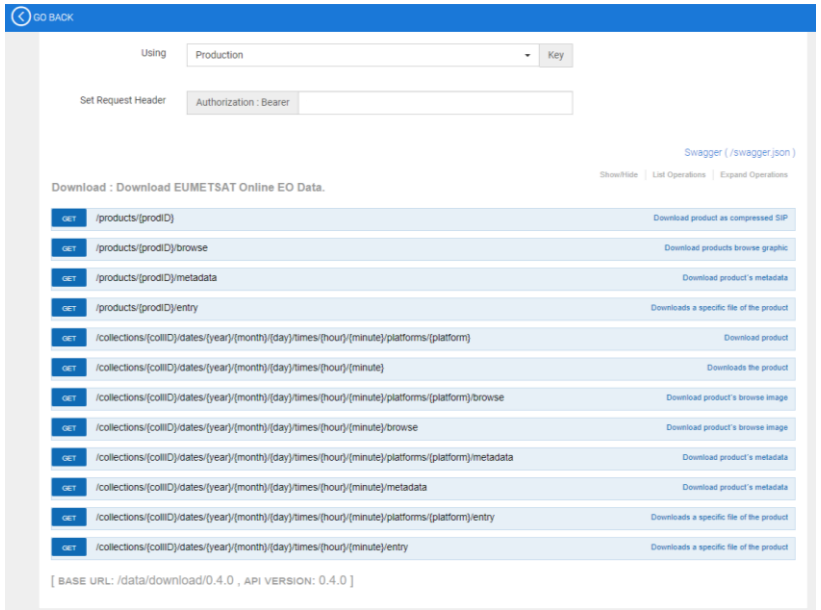
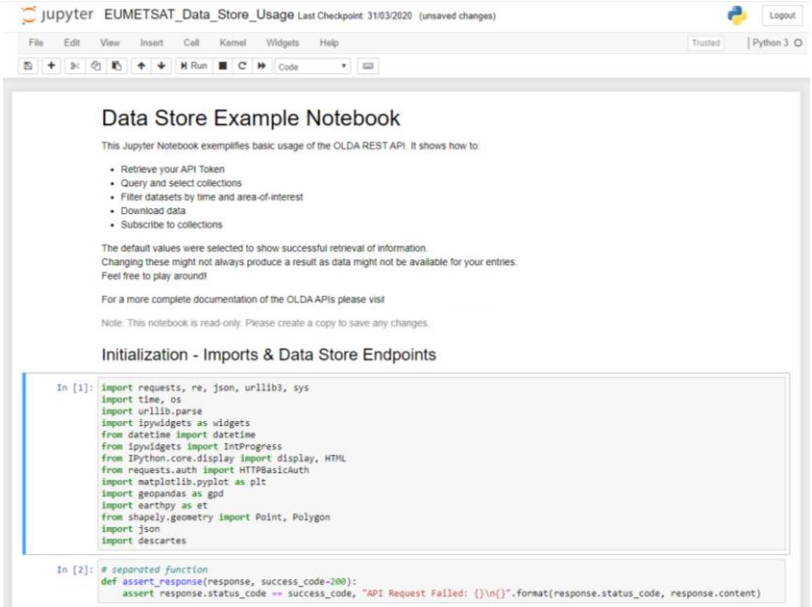




Swagger™

jupyter

Full Swagger definitions available for each API

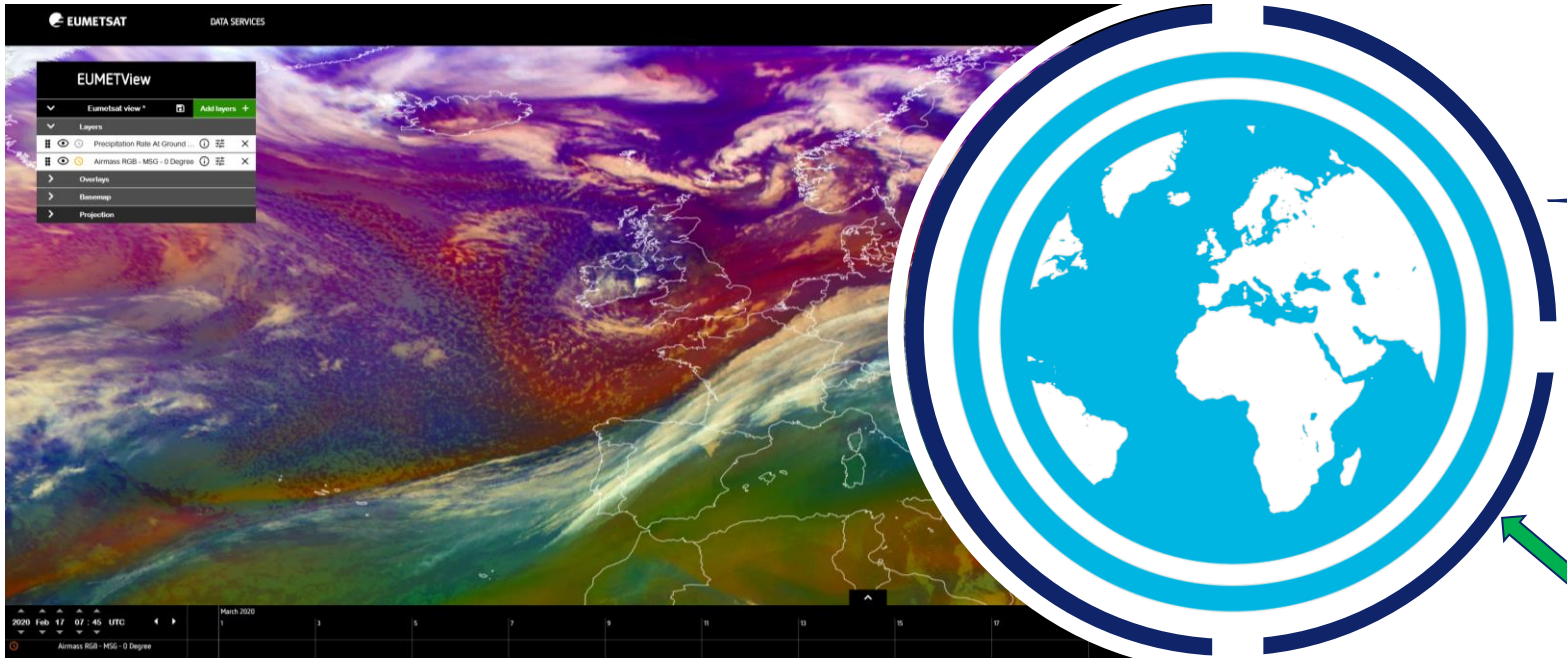
Python and Jupyter notebook examples snippets available for each API

EUMETSAT

Introducing EUMETView

Data Tailor | EUMETSAT Data store | **EUMETView** | EUMETCast Terrestrial

EUMETView is an Online Map Service that provides visualisations of EUMETSAT products through a customisable web user interface and an enhanced set of Open Geospatial Consortium (OGC) standard APIs. EUMETView makes it is possible to create and save maps using the user interface, or integrates with user's personal service, via the API.



- OGC API interfaces
  - Web mapping service (WMS)
  - Web coverage service (WCS)
  - Web feature service (WFS)

Planned Integrations

- **Data Tailor** generates GeoTIFFs of EUMETView products
- **EUMETSAT Data Store** previews EUMETView visualisations

*pilot service available Q3 2020

EUMETView: Web UI use and access 1

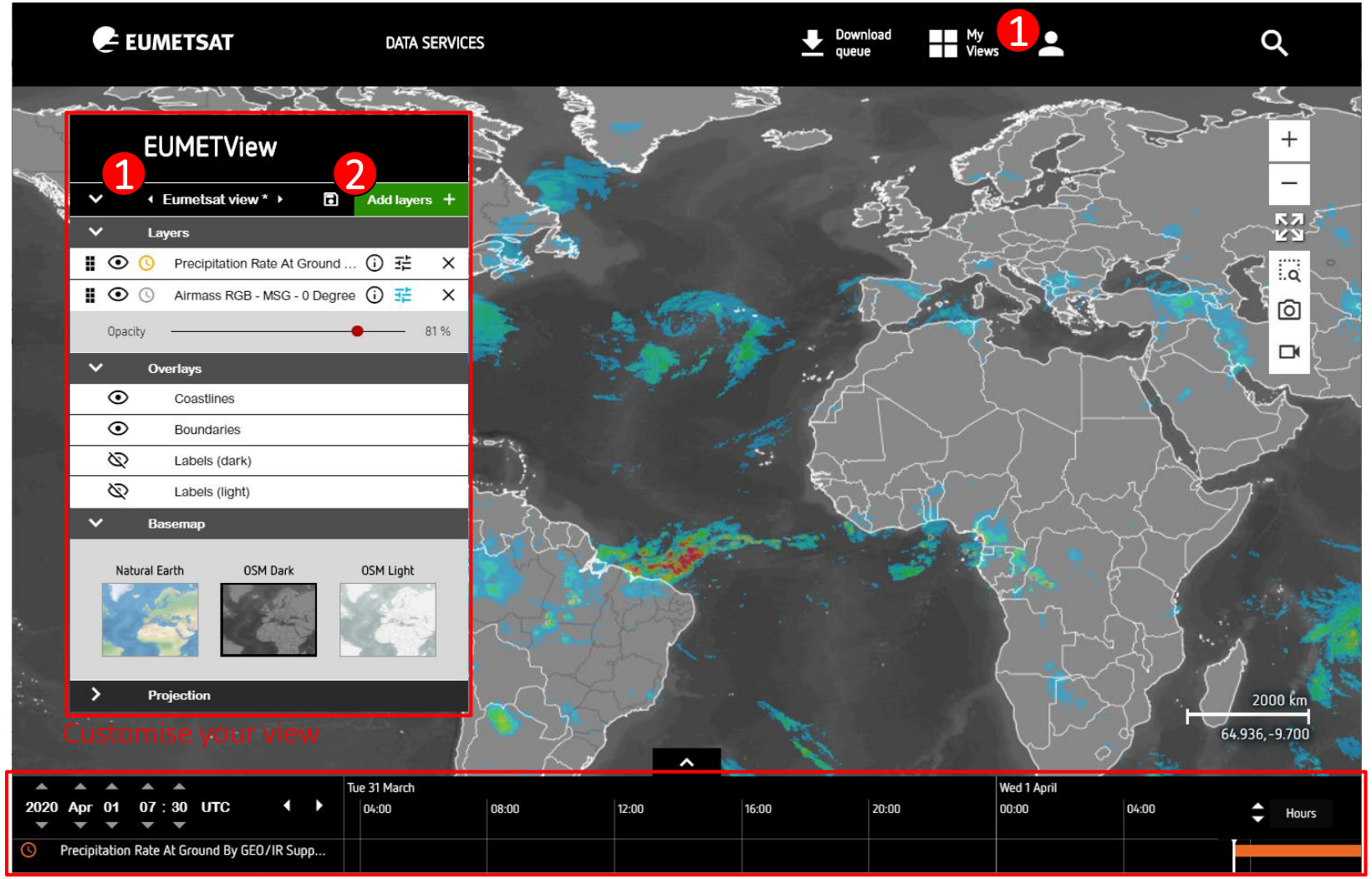
Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

The EUMETView web interface

> Customisable data viewing

1. New: My Views functionality to customise and save maps. EUMETSAT visualisations tailored to users' needs.

2. Search and add data layers by satellite/theme



Customise your view

View your data timeline

EUMETSAT

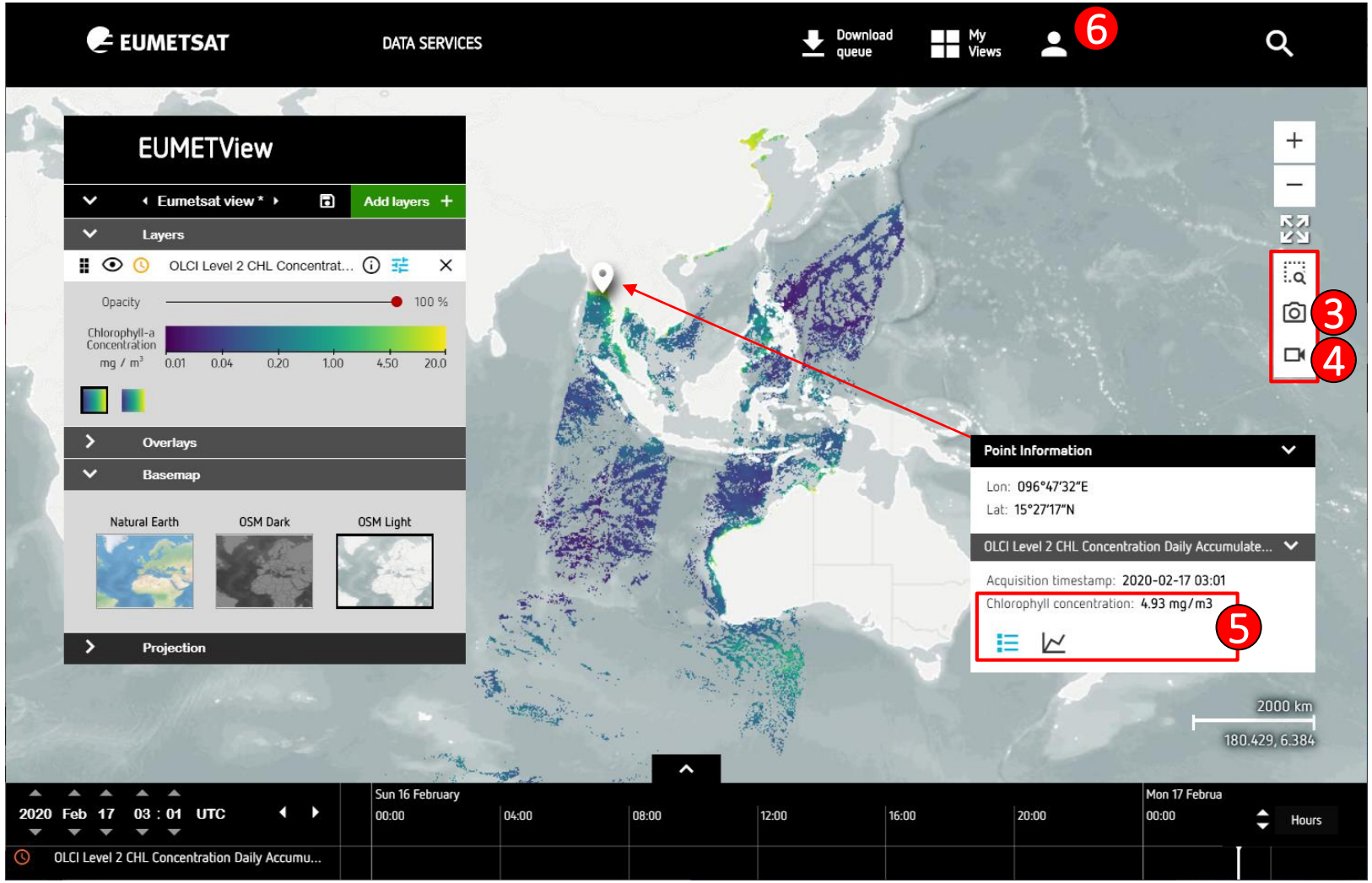
EUMETView: Web UI use and access 2

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

The EUMETView web interface

> Customisable map download

3. Create snapshots of the displayed maps or download the georeferenced products.
4. Animate and download maps
5. View data as point value information or time series
6. Account-based data policy for licensed visualisations



The new EUMETView will run in parallel with the existing service during the pilot phase (Q4 2020)

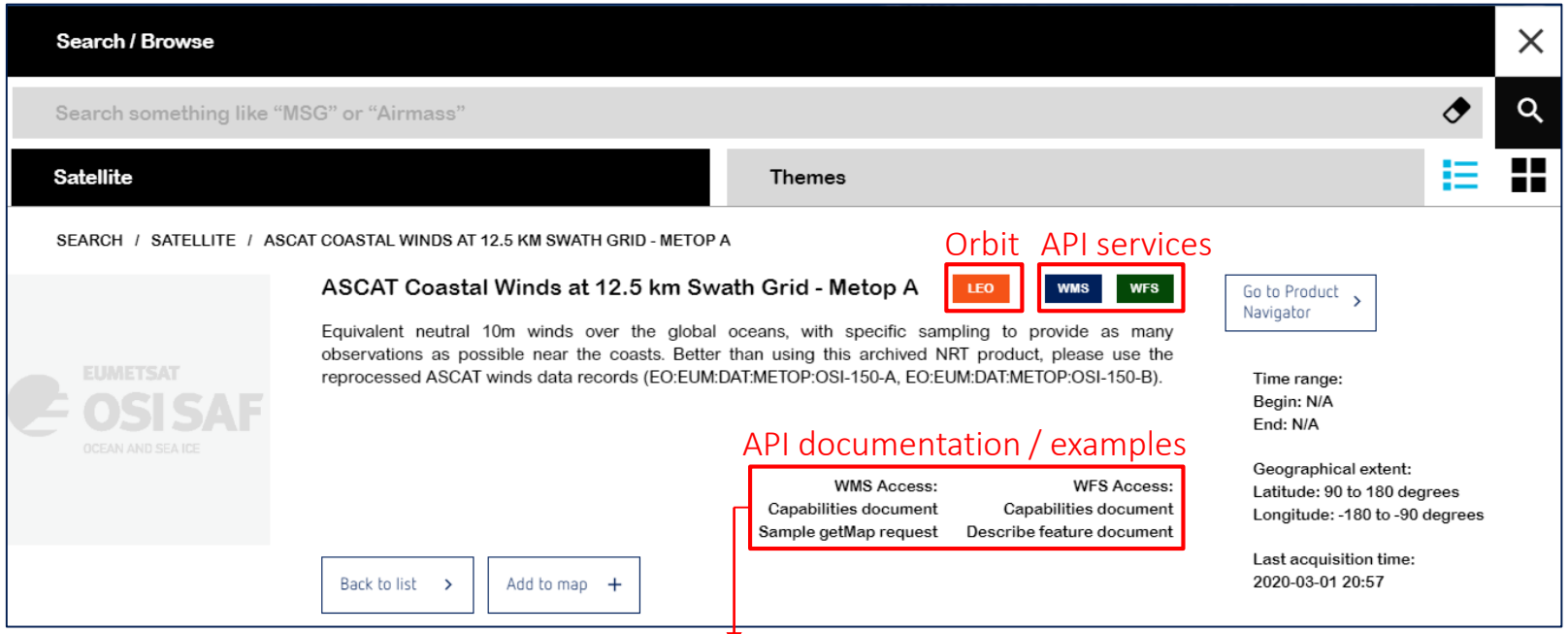
EUMETSAT

EUMETView: API use and access

Data Tailor | EUMETSAT Data store | **EUMETView** | EUMETCast Terrestrial

OGC API interfaces

- Each product has its available API services listed
- API access determined by user specific license.
- Full API capability documents provided
- Example OGC requests provided
- This will allow the users to be able to integrate EUMETView in their own applications and to be able to perform systematic images and products download without accessing the GUI

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EUMETSAT

Introducing EUMETCast Terrestrial

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

EUMETCast is EUMETSAT's primary "push" mechanism for the near real-time delivery of satellite data and products, delivering a wide range of products through a multi-service dissemination system based on multicast technology. The **EUMETCast Terrestrial** service augments the existing EUMETCast Satellite service, using the terrestrial National Research and Education Network (NREN) and GÉANT infrastructure as a delivery mechanism.

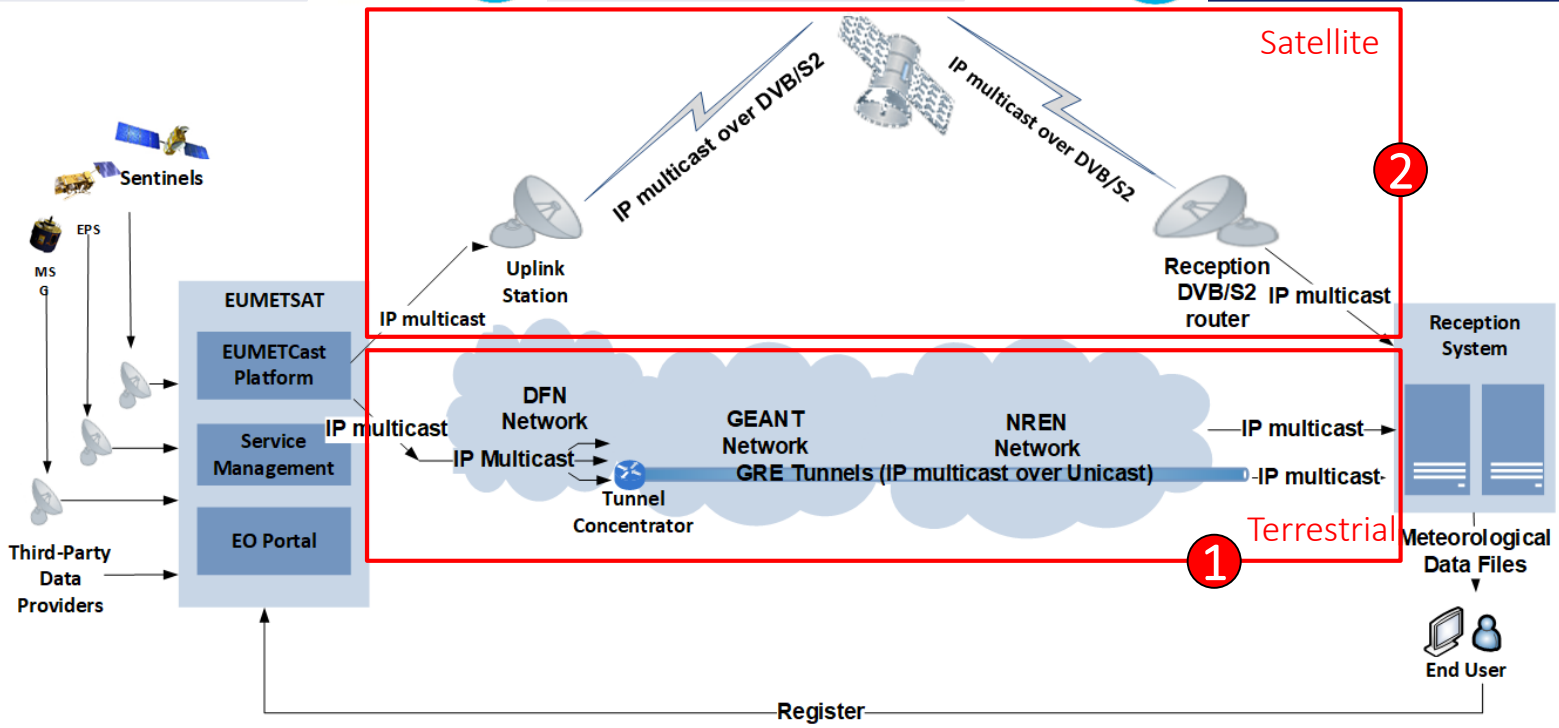
EUMETCast Terrestrial overview 1

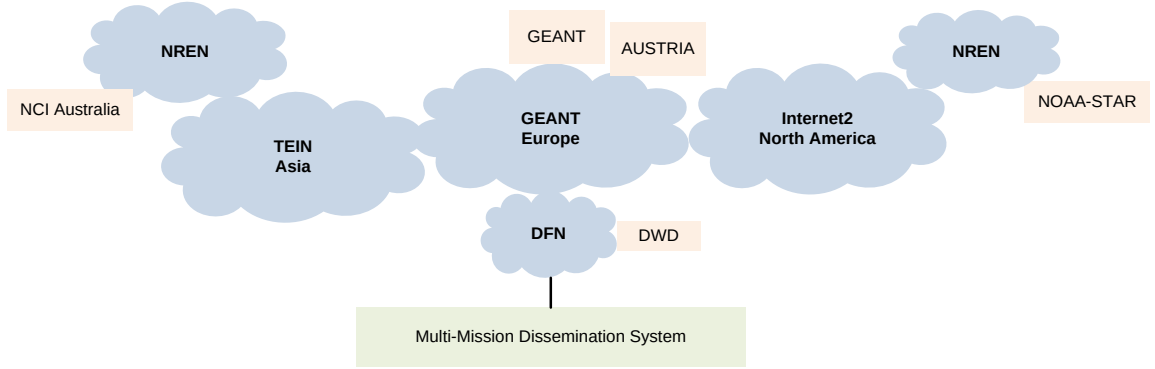
Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

EUMETCast Terrestrial

- EUMETCast Terrestrial services have been developed to be similar and consistent with its EUMETCast Satellite counterpart.
- All services provide a harmonised interface to the end-user, irrespectively of the EUMETCast service of choice.
- All services can be subscribed using one single interface (EO Portal) and the same EUMETCast Reception Station can be used for both Satellite and Terrestrial services.
- Data is distributed using National Research and Education Networks (NRENs).
- The NRENS use the GEANT worldwide network architecture as sole network service provider and interface point.

1





2

EUMETCast Satellite will remain the backbone service for safety critical applications of our data, complemented by EUMETCast Terrestrial and the EUMETSAT Data Store in line with a "multi-channel" data services strategy

EUMETSAT

EUMETCast Terrestrial overview 2

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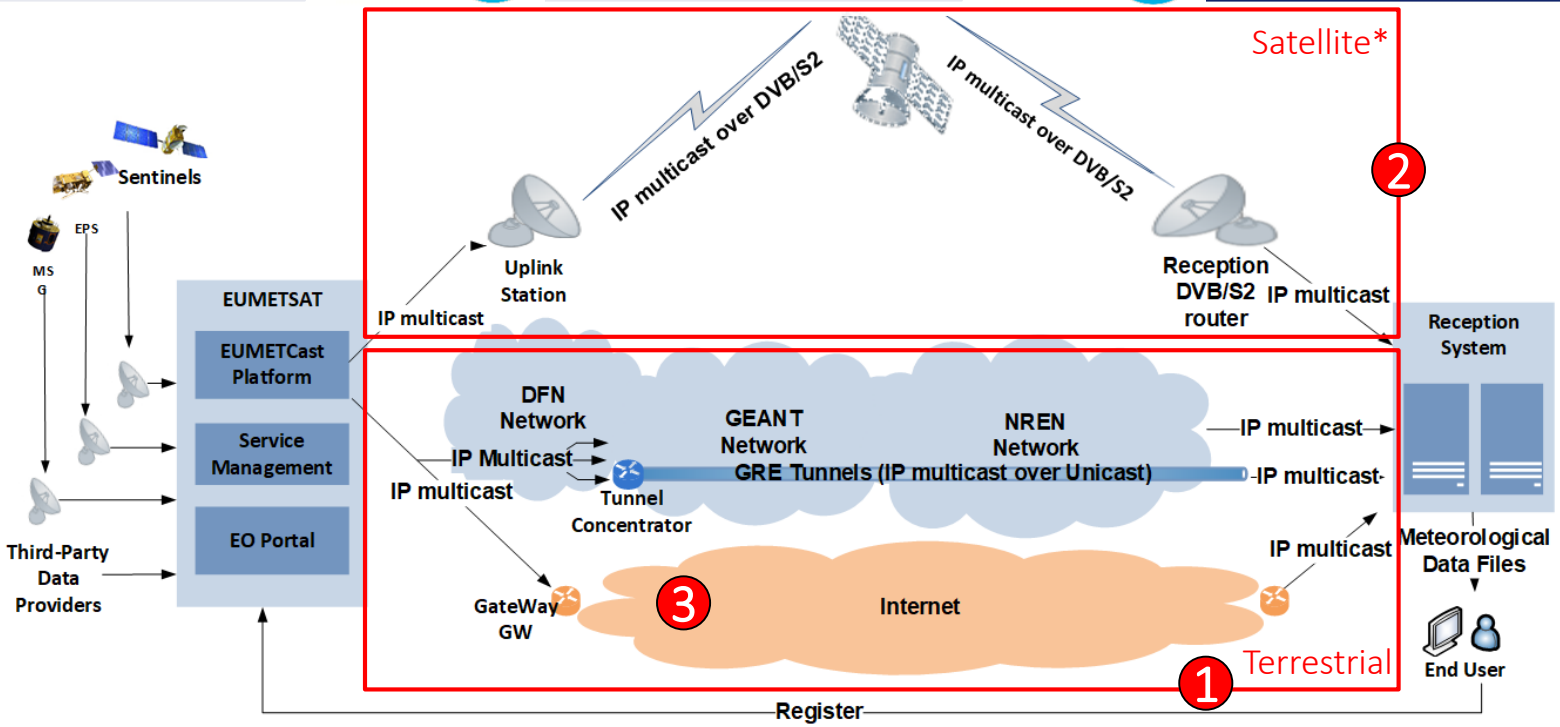
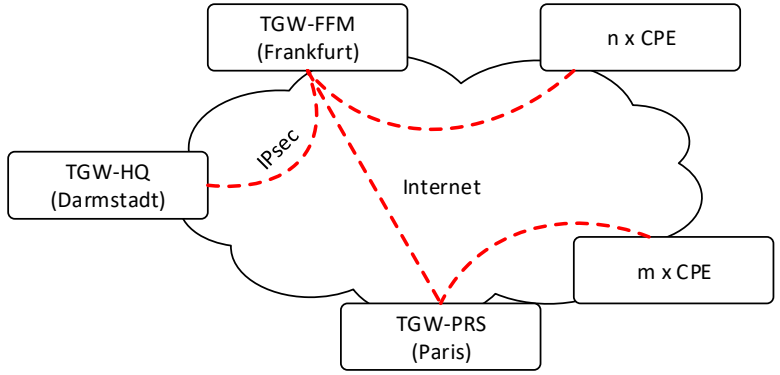


3

Future augmentation of EUMETCast Terrestrial with an Internet based service are currently in the pilot phase.



EUMETSAT

Summary

Data Tailor | EUMETSAT Data store | EUMETView | EUMETCast Terrestrial

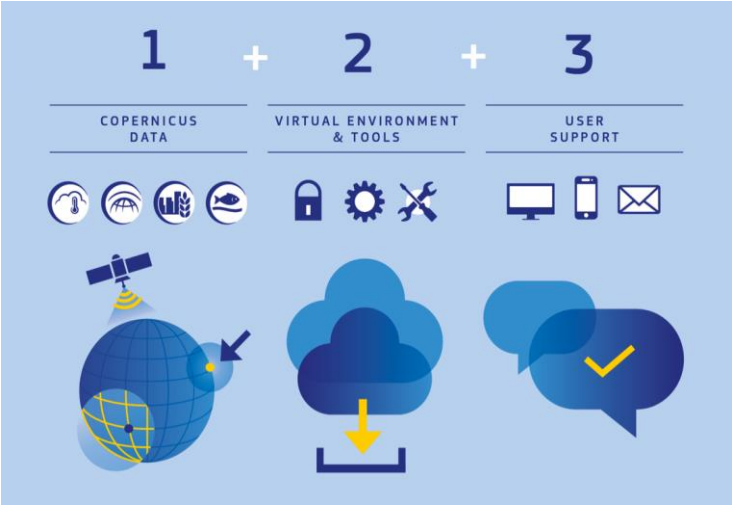
EUMETSAT is offering an array of new data services

- These will support an increased ability to receive, access, view and transform satellite data
- They will provide access to the full EUMETSAT product catalogue, including near real-time data, historic products and climate data records.
- Pilot phases are expected begin in Q3 2020. The Data Tailor is available for use now!

More information

- For more information on the data services, please follow this link.
- More user support resources will be available soon! Please follow @eumetsat_users on Twitter for up to date news, or contact our Helpdesk via ops@eumetsat.int.

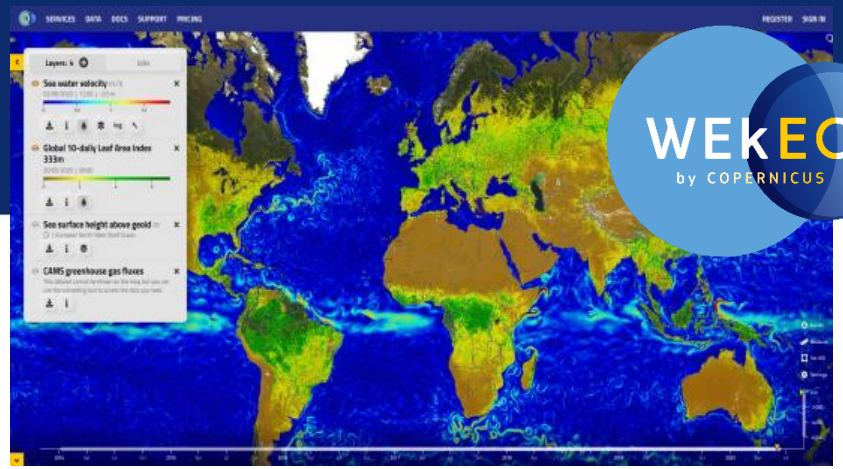
WEkEO by COPERNICUS



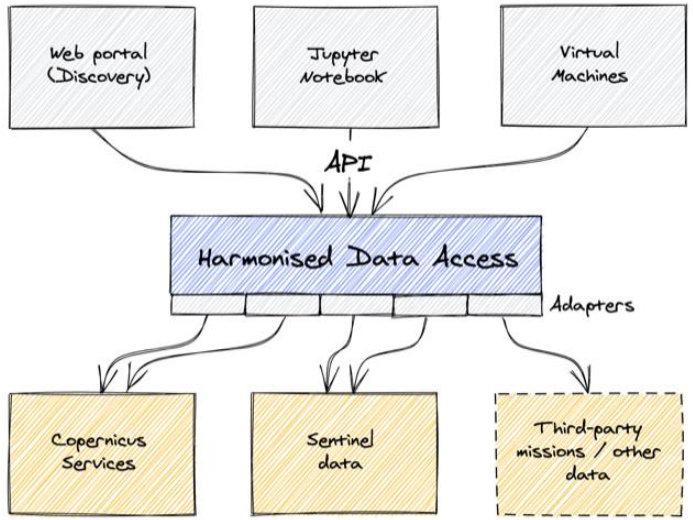
Visit www.wekeo.eu for more information!

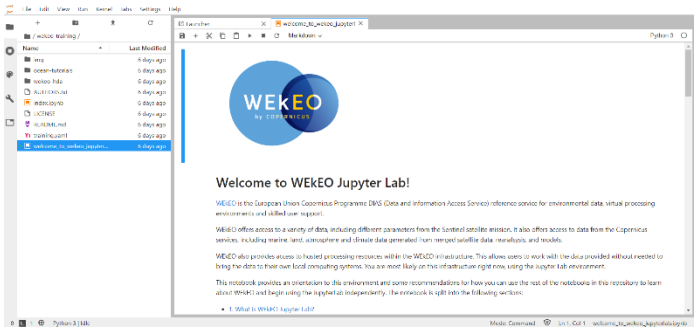
- A Copernicus Data Information and Access Service (DIAS)
- Run by Mercator Ocean International, ECMWF, and EUMETSAT with a range of private sector industry partners.
- Aims to:
  - Provide unified access to Copernicus data
  - Allow user specific processing adjacent to this data in hosted environments
  - Provide expert user support and training

WEkEO Data access and tools

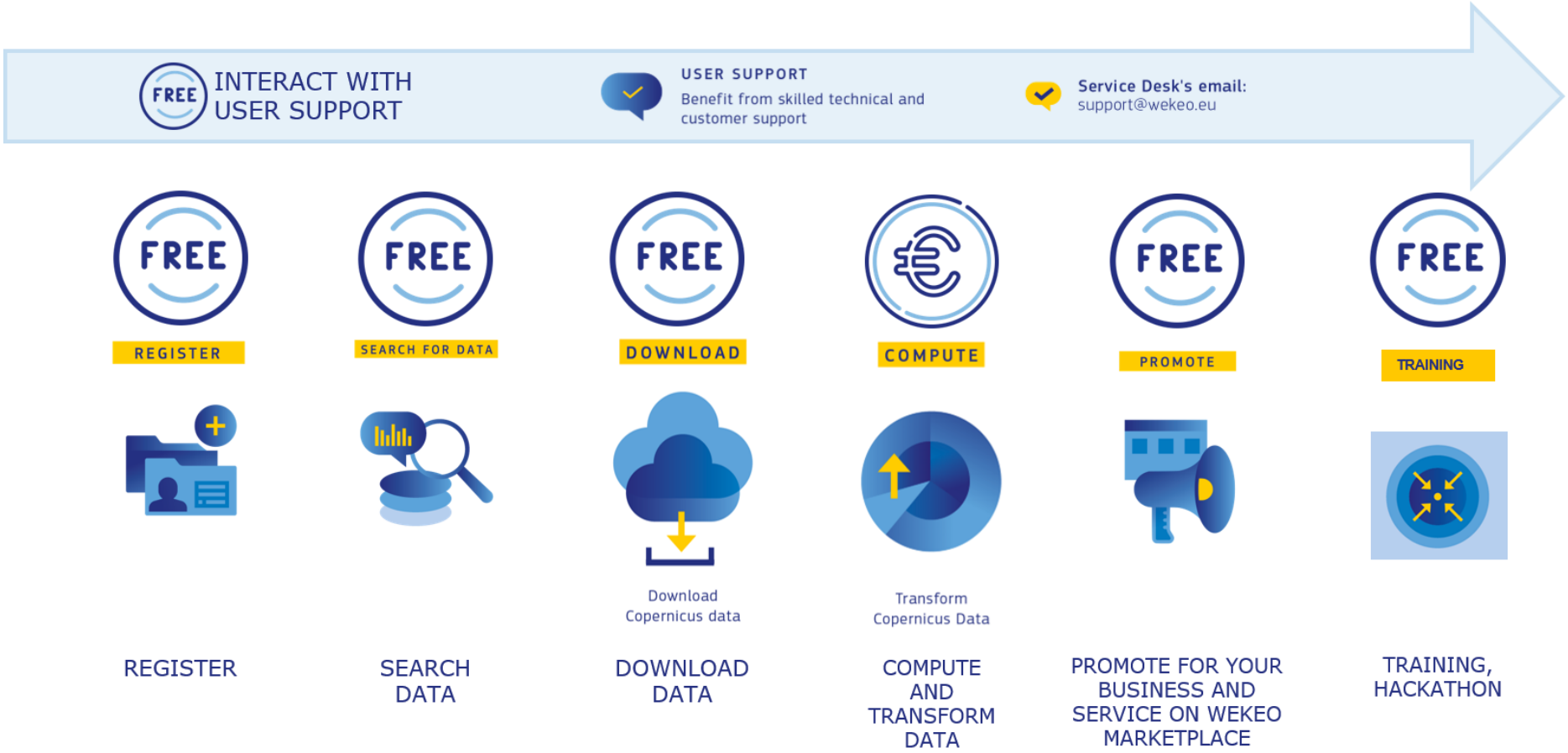


- Harmonised data access across Copernicus satellite and service data
- Data discovery web portal
- Python-based Jupyter notebooks through a hosted JupyterLab
- Virtual machines to scale data use and provide services to your own users

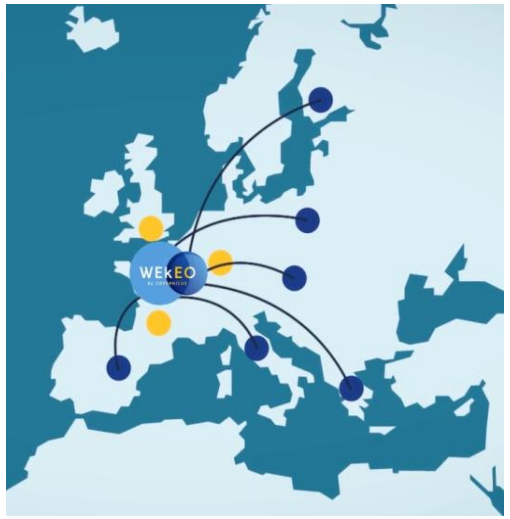




WEkEO Services



…also open federation - bringing further benefits to partners and users



Thank you for your attention