EUMETSAT

# Cloud-native data services at EUMETSAT

## A portfolio approach for scalable user access for a diverse user community

Daniel Lee & Michael Schick
*Data Access Systems Operations Manager*

*BiDS 2025*

# EUMETSAT - A European intergovernmental organisation with 30 Member States

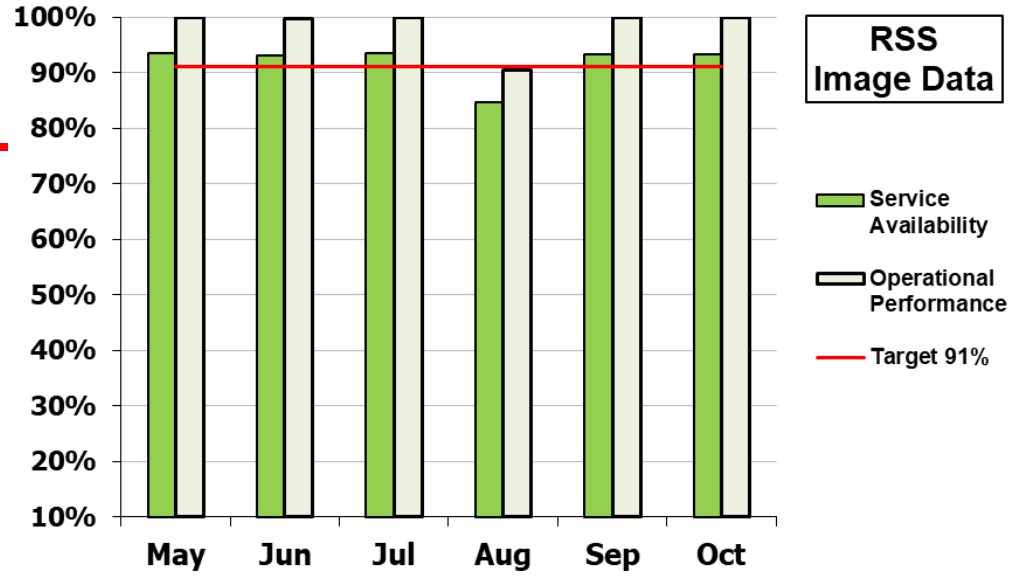
www.eumetsat.int

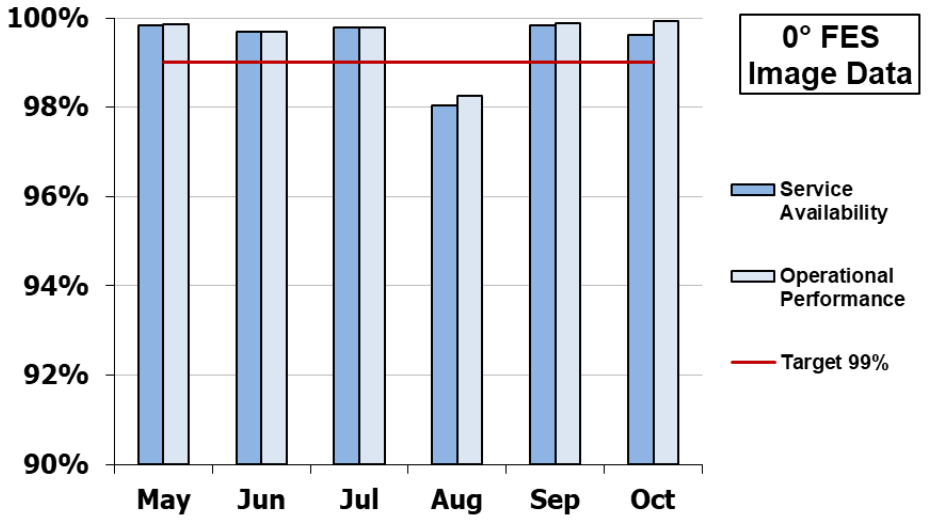
AUSTRIA
BELGIUM
BULGARIA
CROATIA
CZECHIA
DENMARK
ESTONIA
FINLAND
FRANCE
GERMANY
GREECE
HUNGARY
ICELAND
IRELAND
ITALY
LATVIA
LITHUANIA
LUXEMBOURG
THE NETHERLANDS
NORWAY
POLAND
PORTUGAL
ROMANIA
SLOVAK REPUBLIC
SLOVENIA
SPAIN
SWEDEN
SWITZERLAND
TURKEY
UNITED KINGDOM

# Purpose of EUMETSAT



To deliver operational (24/7/365), user-driven space-based data services that are critical for monitoring the weather and the climate relevant for many different applications, including for security and defence.



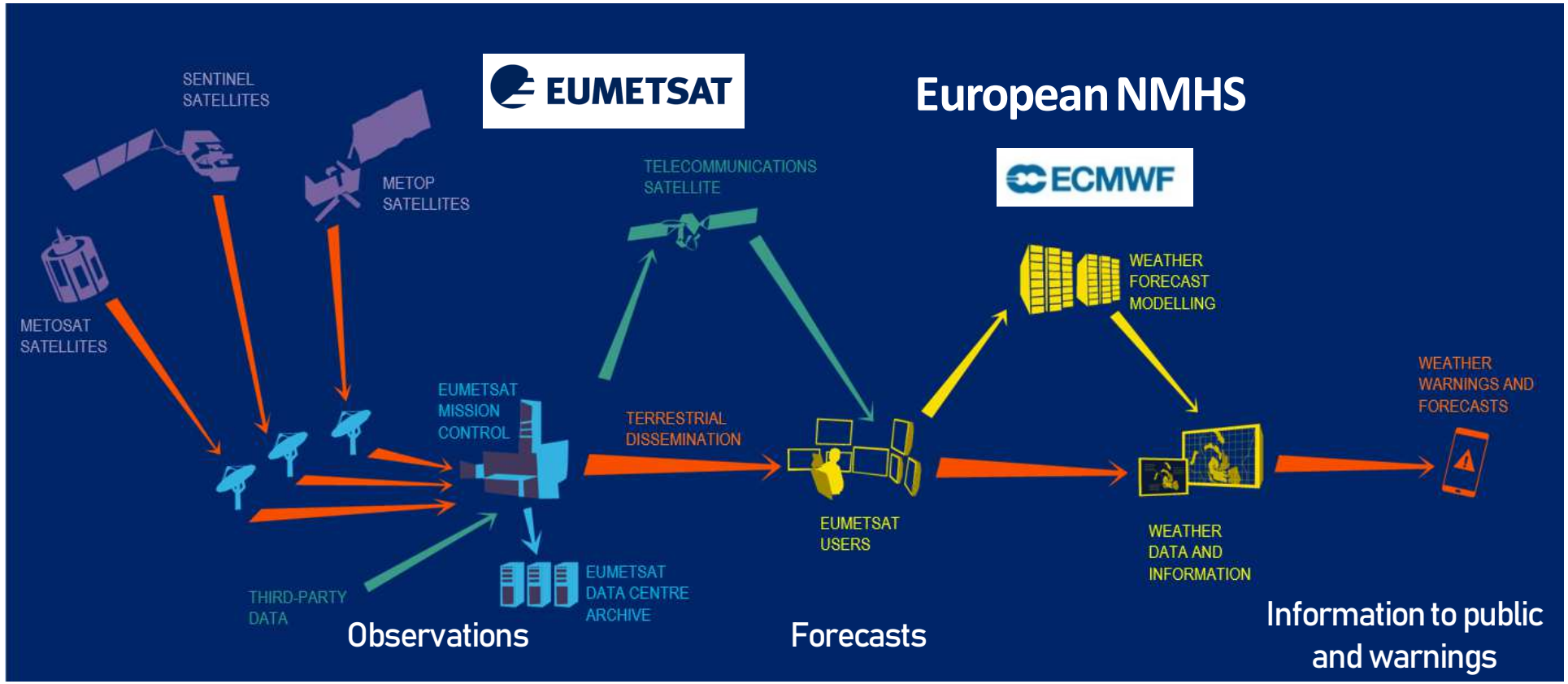
# This is delivered as part of a MET value chain in Europe …



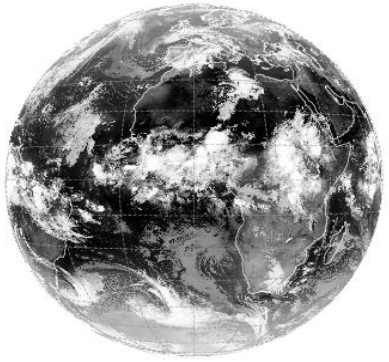
EUMETSAT

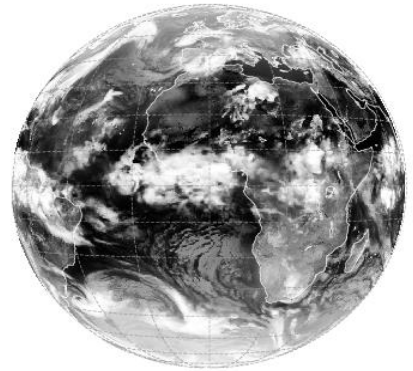
ECMWF

EUMETNET




From observations




To forecasts

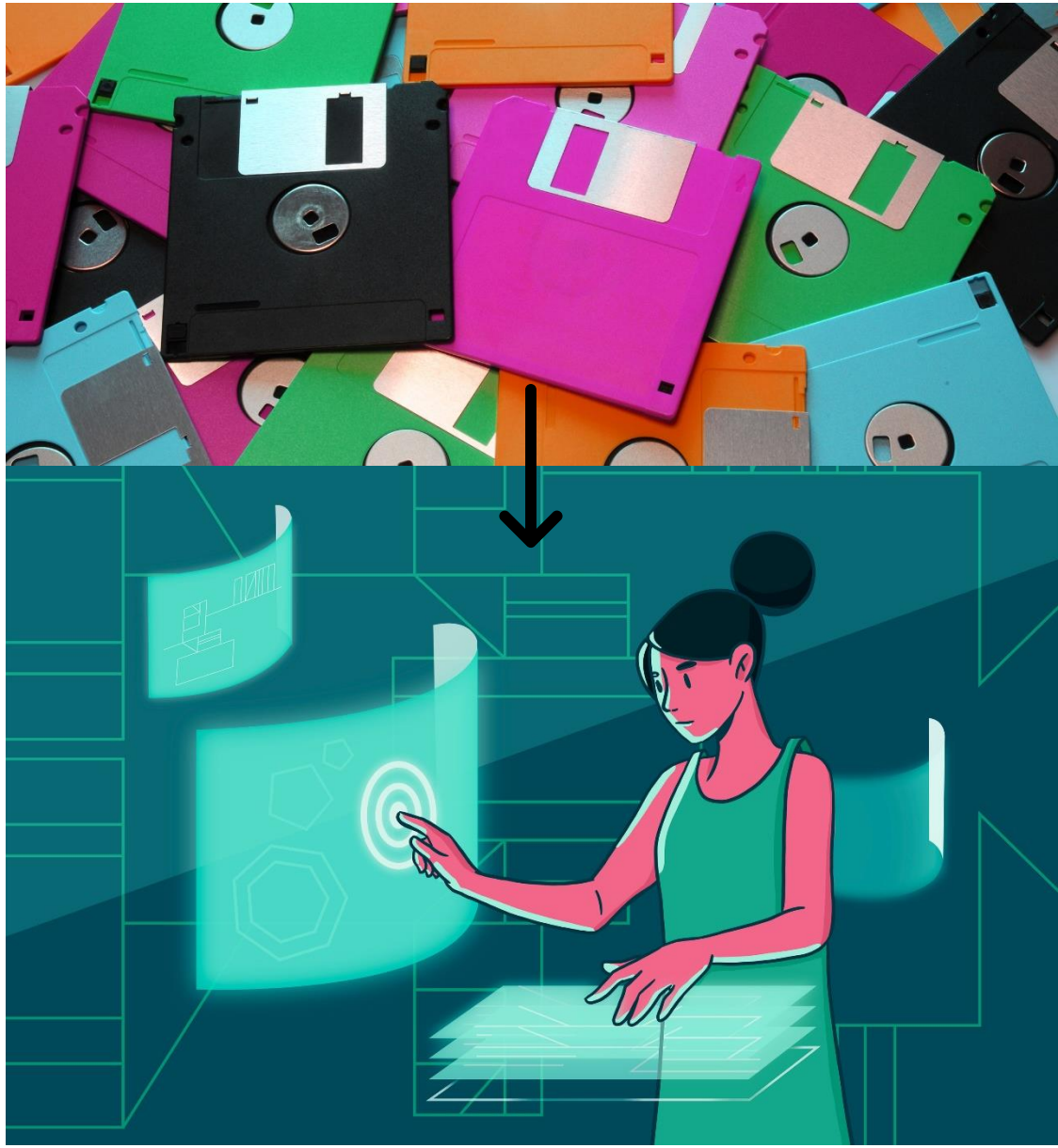
# EUMETSAT data access: The past

# Things changed



- More computing power → Wider addressable community
- Higher urgency of climate change → Greater interest in our products
- More missions → More observable variables and, thus, users
- More capable infrastructure → Greater demand for Internet-based access

And then there was the draw of possibility…



# Our organisation's been changing too

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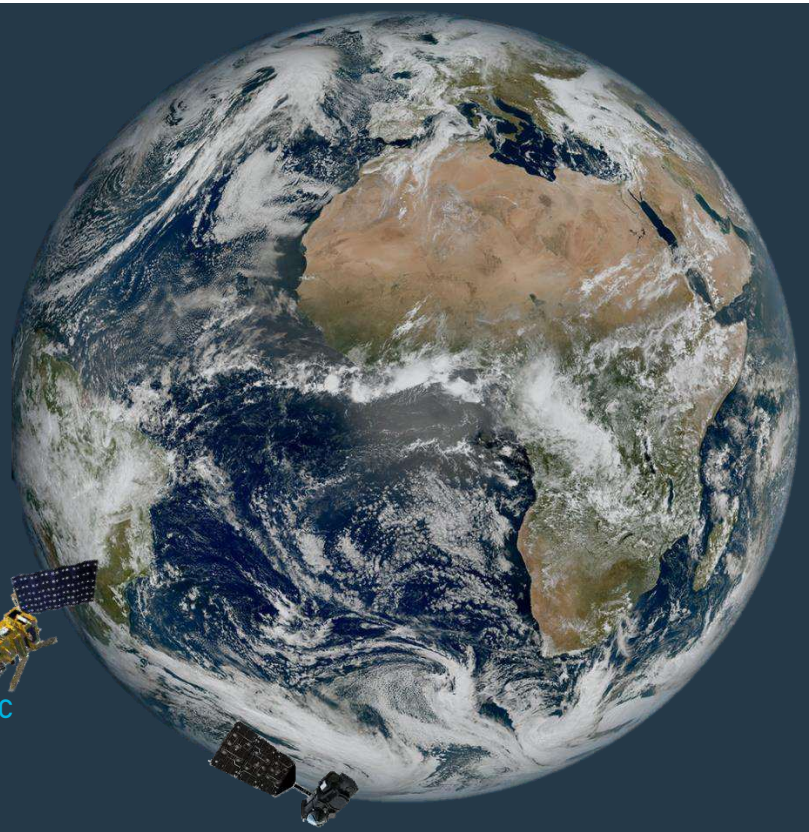


## SENTINEL-3A & -3B (98.7° incl.)
Low Earth, sun-synchronous orbit
Copernicus satellites delivering marine data services from 814km altitude

## JASON-3 (63° incl.)
Low Earth, non-synchronous orbit
Copernicus ocean surface topography mission (shared with CNES, NOAA, NASA and Copernicus)

## Sentinel-6 Michael Freilich (66° incl.)
Low Earth, non-synchronous orbit
Copernicus ocean surface topography mission (shared with NASA, NOAA, ESA and Copernicus with support from CNES)

## METEOSAT-10, -11
Geostationary orbit
Meteosat Second Generation

Two-satellite system
Full disc imagery mission (15 mins) (Meteosat-11 (9.5° E))
Rapid scan service over Europe (5 mins) (Meteosat-10 (0°))

## METEOSAT-9 (45.5° E)
Geostationary orbit
Meteosat Second Generation providing Indian Ocean data coverage

## METOP-B & -C (98.7° incl.)
Low Earth, sun-synchronous orbit
EUMETSAT Polar System (EPS)/ Initial Joint Polar System

## Meteosat-12 (0°)
Geostationary orbit
Meteosat Third Generation imaging mission, operational since 4 December 2024

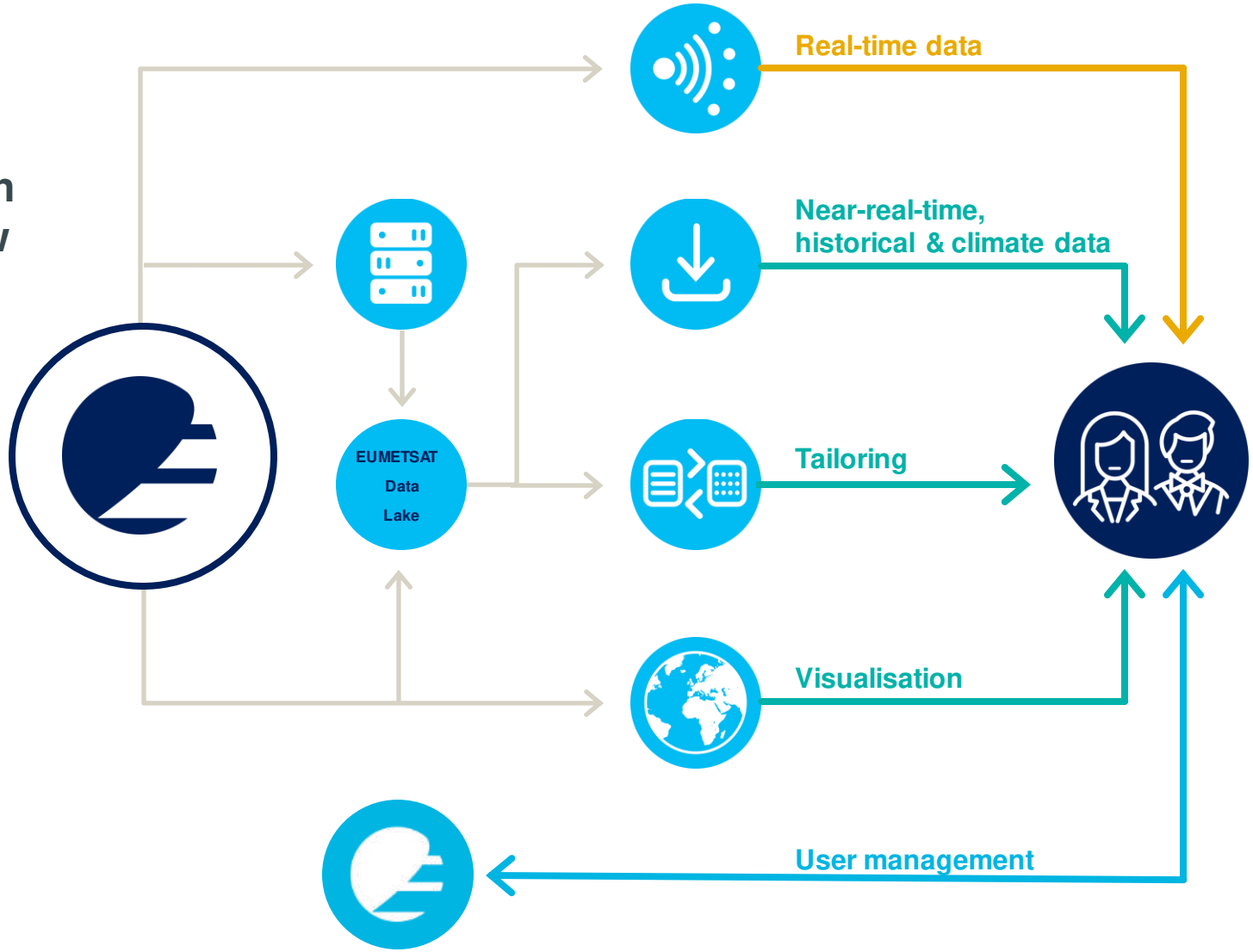
## MTG-S1 (3.4° W)
Geostationary orbit
Meteosat Third Generation sounding mission, launched on 1 July 2025

## METOP-SGA1 (98.7° incl.)
Low Earth, sun-synchronous orbit
EUMETSAT Polar System Second Generation (EPS-SG) / Joint Polar System

# EUMETSAT data access strategy



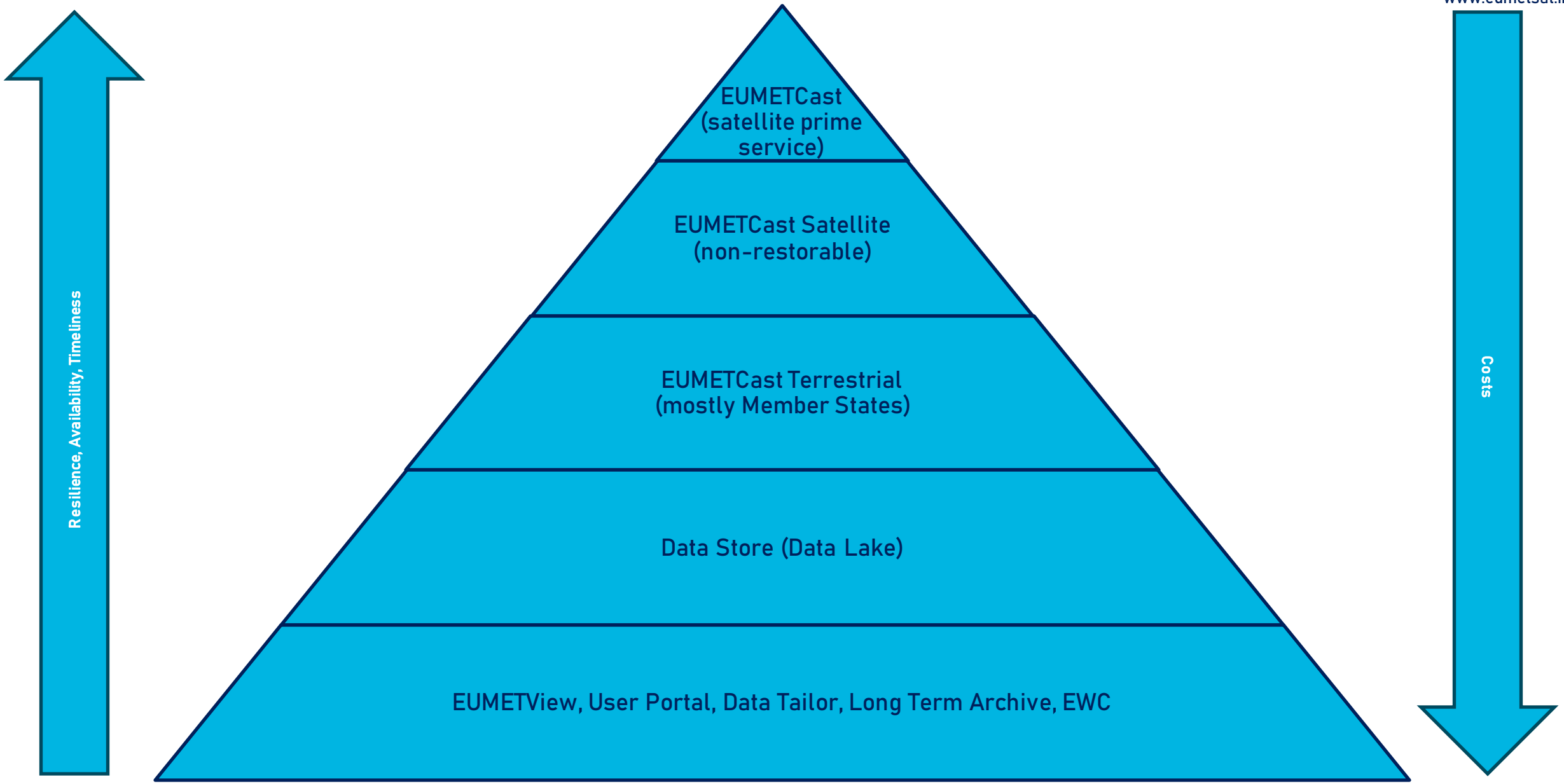
**EUMETSAT's data services evolve continuously to offer unified, user-friendly, and cost-effective access to all EUMETSAT and Copernicus products with appropriate timeliness. The services allow users to employ the data and extract information and knowledge at scale, becoming an indispensable tool supporting safeguarding lives, protecting property and facilitating informed decisions in the face of our changing climate.**




EUMETCast
EUMETView
Data Store
Long-term archive
Data Tailor
User portal
Push services
Pull services

# Service pyramid for serving data portfolio





# How did we get there?

Pathfinders

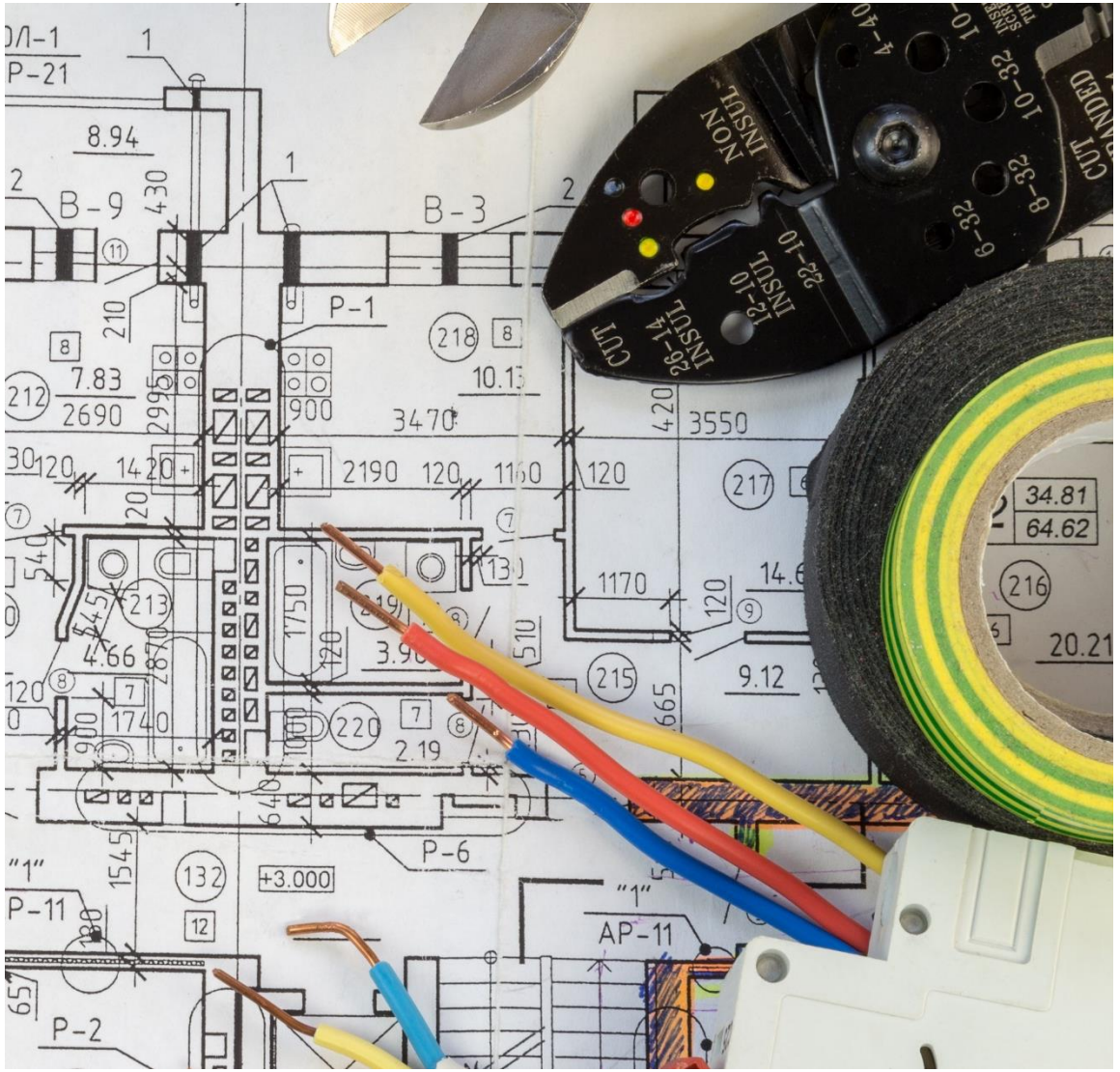
Pilots

Operations

# Design principles



- Build for the cloud
  - Reproducible deployments
  - Containers
  - APIs first



# User Portal

www.eumetsat.int

EUMETSAT USER PORTAL

Search user portal

- Dashboard
- Data catalogue
- Using data
- Data access
- News & events

Log in

Go to EUMETSAT website

## Welcome to the EUMETSAT User Portal

### New European Weather Cloud Community Hub launched

A new European Weather Cloud (EWC) Community Hub was been launched by EUMETSAT and ECMWF. The hub is a centralised platform where EWC users can discover, evaluate, select, and deploy items and services tailored to the European Meteorological Community and running in the EWC.

The European Weather Cloud (EWC) was set up by EUMETSAT and ECMWF as a cloud-based collaboration platform for meteorological application development and operations in Europe. The European Weather Cloud is dedicated to support the National Hydro-meteorological Services of the Member States of both ECMWF and EUMETSAT in fulfilling their official duties and related R&D activities.

European Weather Cloud Community Hub — Data & service news

1 Oct 2025

New EWC Community Hub where users can discover, evaluate, select, and deploy items and services running in EWC.

## Events & notifications

October 2025 View all

| Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|---|---|---|---|---|---|---|
| 29 | 30 | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | 1 | 2 |

## Using MTG and Metop-SG data

MTG in operations — User guide

V7.6, 5 Sep 2025

Information on the deployment of the MTG services and timelines for the release of operational data.

Metop-SG in operations — User guide

V1.5, 29 Sep 2025

Information on the deployment of the Metop-SG services and timelines for the

## News

EUMETCast Terrestrial over AMT service change — Data & service news

30 Oct 2025

EUMETCast Terrestrial over AMT is being upgraded to support anycast addressing on the relays.

NOAA-21 OMPS — Data & service news

## Satellite operation service status

*The indicator reflects the timeliness and availability of the data disseminated by EUMETCast. It does not provide an indication of the data quality. For further information on the status of satellite and data services see our **Alerts & Notifications**.*

**12 Nominal services**

**1 Unavailable service**

# EUMETView

www.eumetsat.int

# Data Store



EUMETSAT USER PORTAL

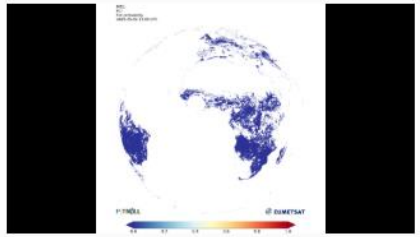
Support | API Access | Cart 0 items | Log in

Data Store > Search results

## Data Store

e.g. "Atlantic Sea"

Perform an advanced search >

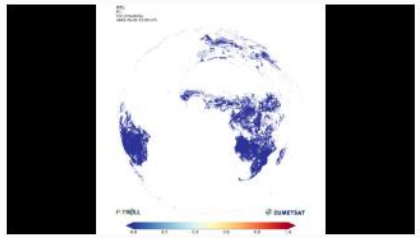


**Active Fire Monitoring (CAP) - MTG - 0 degree** GEO

The Active Fire Monitoring product indicates the presence of fire within a pixel. The key input to the algorithm is the FCI channel IR-3.8, which is very sensitive to hot spots caused by fire.

learn more

Access Data

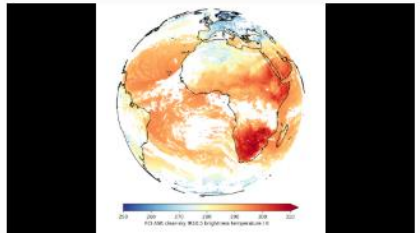


**Active Fire Monitoring (netCDF) - MTG - 0 degree** GEO

The Active Fire Monitoring product indicates the presence of fire within a pixel. The key input to the algorithm is the FCI channel IR-3.8, which is very sensitive to hot spots caused by fire.

learn more

Access Data



**All Sky Radiance (BUFR) - MTG - 0 degree** GEO

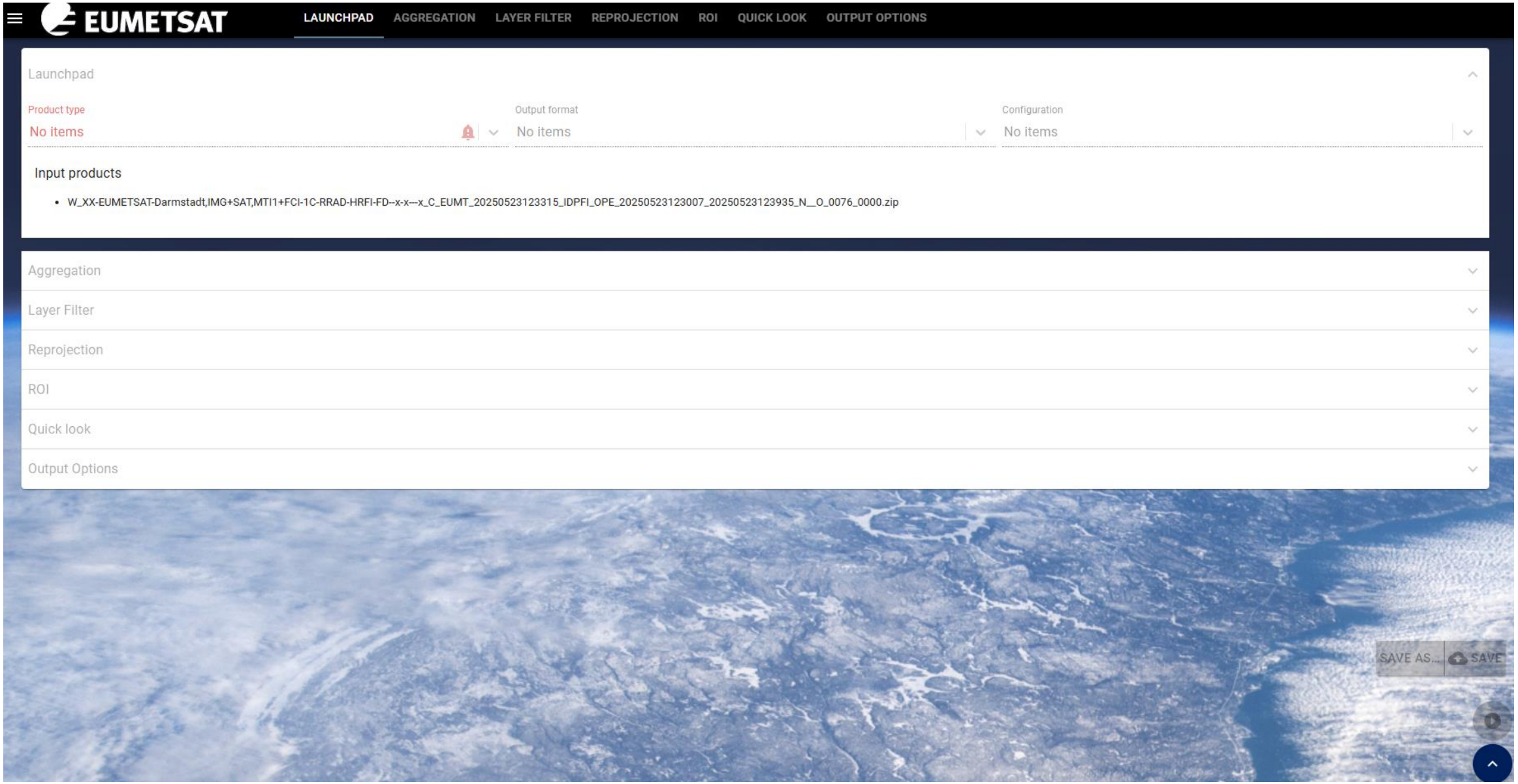
The All-Sky Radiance (ASR) product is a segmented product that provides FCI Level 1C data statistics within processing segments referred to as Field-of-Regard (FoR). The statistics are computed on the L1C radiances (for all FCI channels), brightness temperatures (for the eight IR channels) and reflectances (for the eight visible and near-infrared channels) and include the mean value, standard deviation, minimum and maximum value...

learn more

Access Data

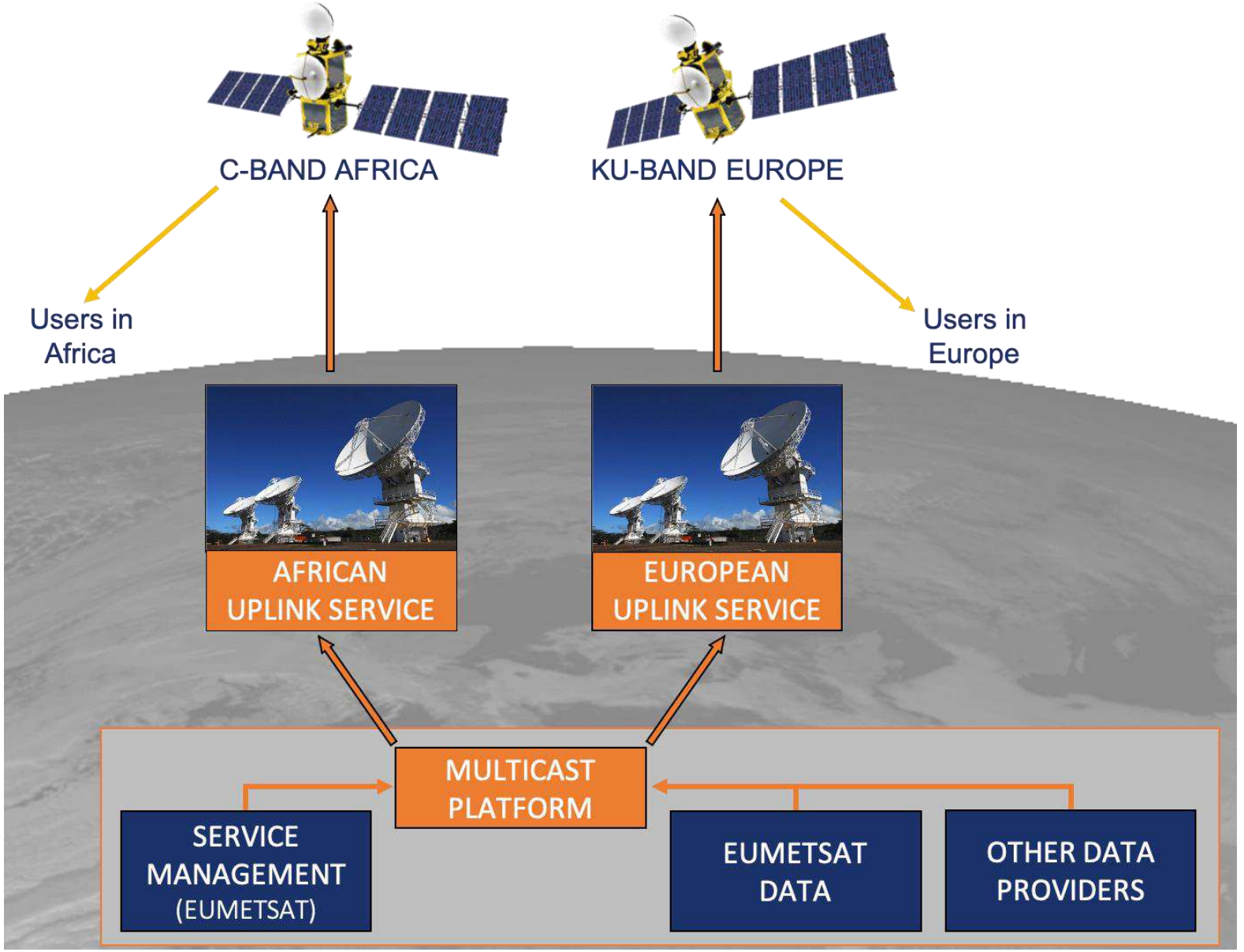
# Data Tailor




EUMETSAT
LAUNCHPAD
AGGREGATION
LAYER FILTER
REPROJECTION
ROI
QUICK LOOK
OUTPUT OPTIONS
Launchpad
Product type
No items
Output format
No items
Configuration
No items
Input products
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-HRFI-FD--x-x---x_C_EUMT_20250523123315_IDPFI_OPE_20250523123007_20250523123935_N__O_0076_0000.zip
Aggregation
Layer Filter
Reprojection
ROI
Quick look
Output Options
SAVE AS...
SAVE

# EUMETCast




C-BAND AFRICA
KU-BAND EUROPE
Users in Africa
Users in Europe
AFRICAN UPLINK SERVICE
EUROPEAN UPLINK SERVICE
MULTICAST PLATFORM
SERVICE MANAGEMENT (EUMETSAT)
EUMETSAT DATA
OTHER DATA PROVIDERS

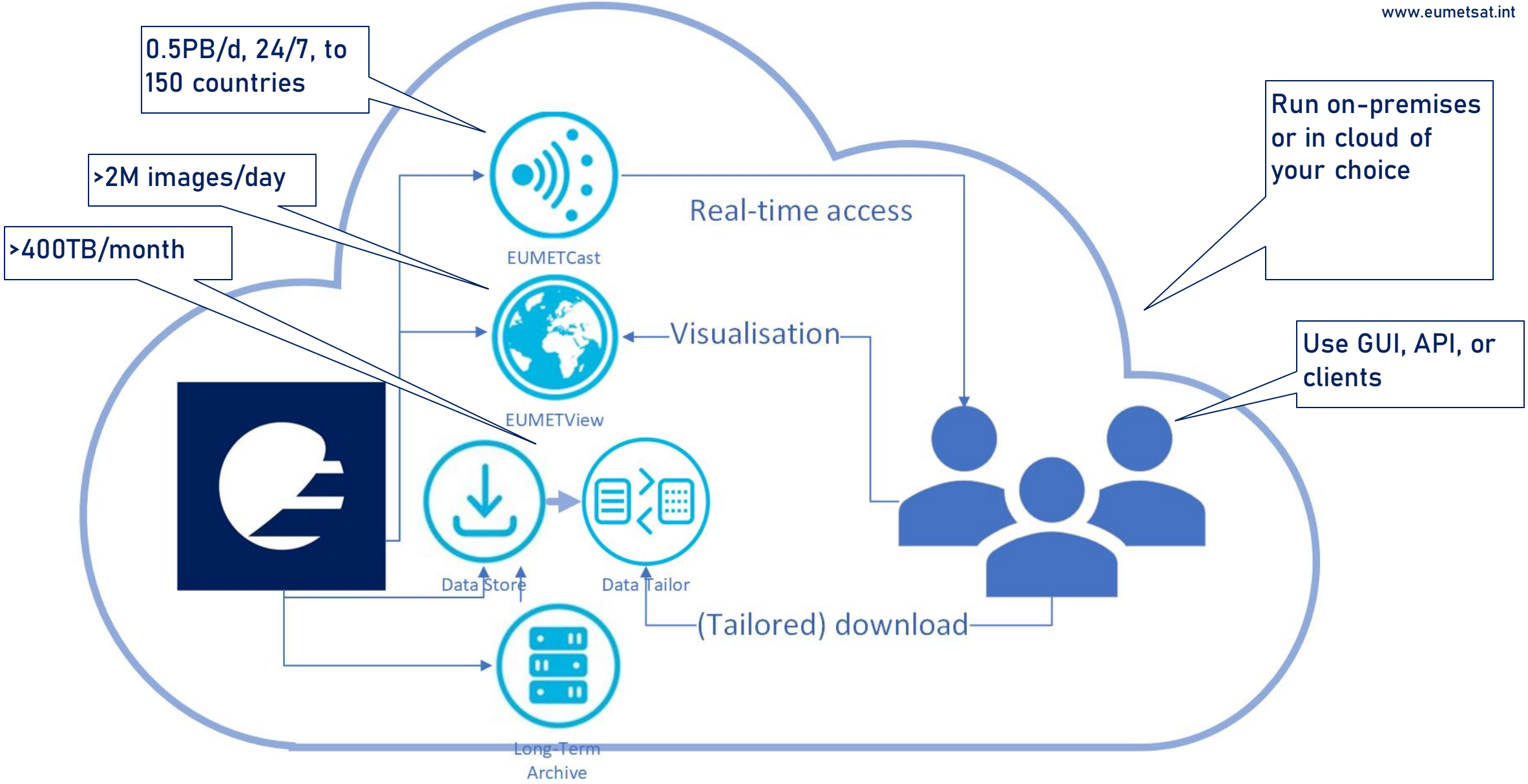
# What would we do all over again?



- Think in microservices – build a portfolio with loose coupling, not a monolith
- Build for cloud first
  - Automated deployment pipelines
  - Automated testing
  - Reproducible deployments
  - APIs first
- Keep the playing field level for all users so that we can embrace a diverse community rather than try to bring them to our walled garden

# So what does the portfolio actually DO?





# Evolution of WMO data exchange



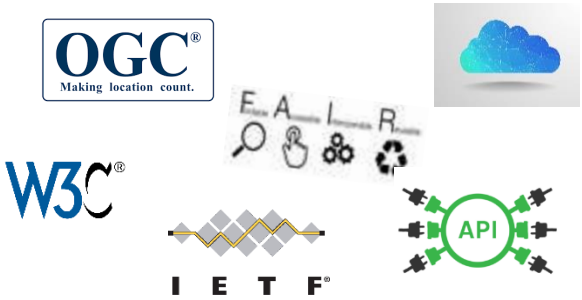
**1963** World Weather Watch

**1970s** Global Telecommunication System (GTS)

**2007** WMO Information System (WIS)

**2019** WMO Reform (Earth System Approach)

**2021** WMO Unified Data Policy (Core, Recommended)




**Resolution 34 (EC-76)**
Implementation plan update of the WMO Information System 2.0
[WMO-No. 1314, pg. 1147]

**Resolution 25 (Cg-19)**
Technical Regulations of the WMO Information System 2.0
[WMO-No. 1326, pg. 209]

## WIS 2.0

*… collaborative system of systems using Web-architecture and open standards to provide simple, timely and seamless sharing of trusted data and information …*

- Open Standards (OGC, W3C, IETF, …)
- Free and Open Source tooling
- Data sharing through Web and real-time notifications with publication/subscription (pub/sub) protocols
- Cloud ready (turn-key solutions)
- Web services and APIs (Application Programming Interface)

# WIS2 Components: Global Services

## Global Services

**Global Monitoring**

**Global Discovery Catalogue**

Provides an API to discover datasets and services

**Global Broker**

Sends notifications of new data to be downloaded from Global Caches or WIS2 nodes

**Global Cache**

Provides users HTTP download of core data cached from WIS2 nodes

Discovers datasets

Subscribes to topics

Downloads core data

**Data users**

Downloads recommended data

Downloads recommended data

Downloads recommended data

**WIS2 node**

**WIS2 node**

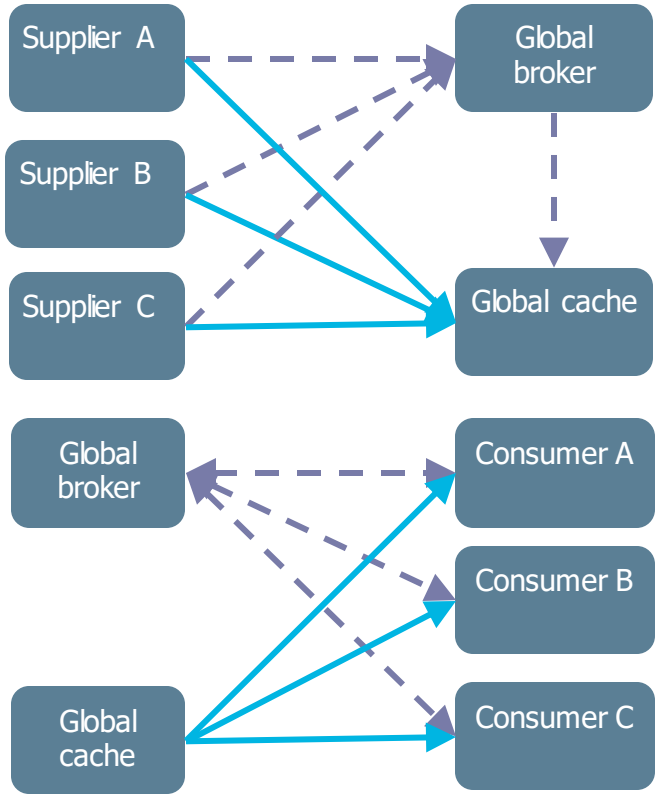
**WIS2 node**

Scale to highly-available, global data sharing

# Architectural overview – core data



**Simple architecture:** Illustrated here for core (essential) data, much of which will be available from the global caches. Other core data will be provided directly by the supplier (see next slide)




## Suppliers' perspective:

- Suppliers inform global broker of data availability
- Global broker informs global cache of data availability
- Global cache collects and caches the data from the suppliers

## Consumers' perspective:

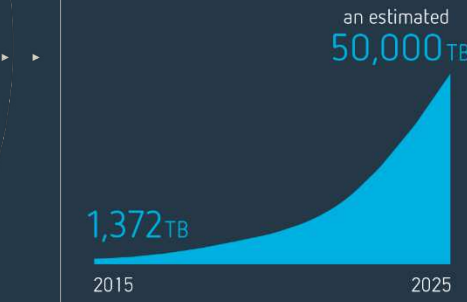
- Consumers request notification of data availability from global broker
- Global broker informs consumers of data availability
- Consumers collect data from the global cache

# Getting more data to those who need it, faster

www.eumetsat.int

Our data services provide quick and easy access to all of EUMETSAT's satellite data. And now, users can work directly with this data through new cloud platforms.

EUMETSAT
## Data Centre
Preserving an archive of more than four decades of satellite data for climate monitoring.




In 2025, there will be roughly 3,500% more data available to users than 10 years ago.

PARTNER DATA SERVICES

### European Weather Cloud
With the ECMWF

Providing satellite data and cloud-based processing for national weather services in their member states.

### WEkEO
With the ECMWF, Mercator Ocean International and EEA

Providing online access to Copernicus data and cloud-based processing.

EUMETSAT DATA SERVICES

### Data Store
The front-end access point for satellite data.

### Data Tailor
A service where users can process and transform satellite data.

### EUMETView
A service for users to visualise satellite data from the data store with the option to download.

### EUMETCast
Providing satellite data directly via satellite and terrestrial networks.