European Weather Cloud - Introduction

Online training course
13 October 2025

Samuel Langlois (ECMWF)

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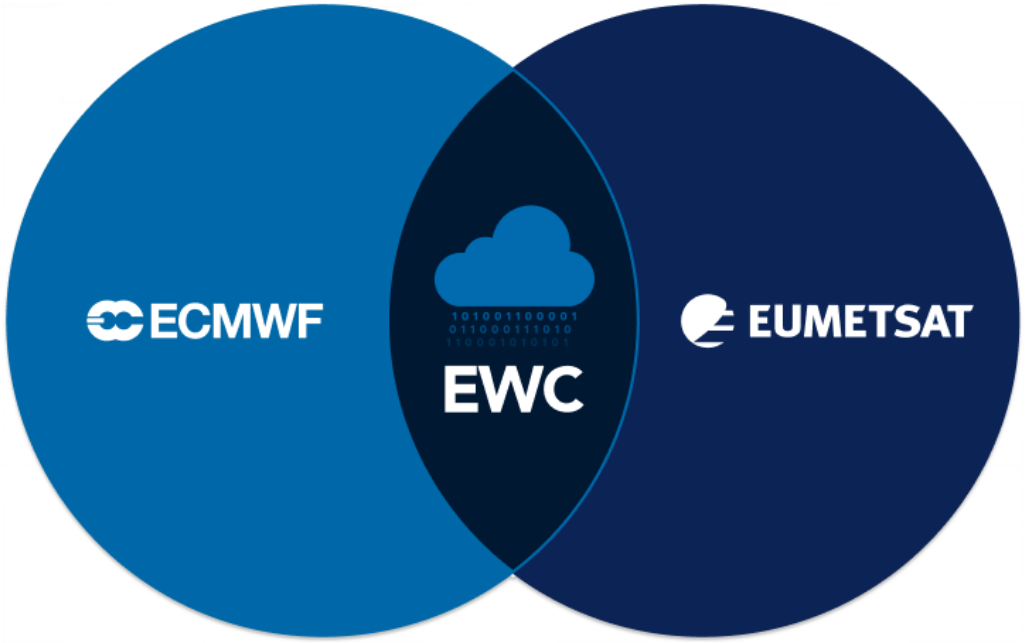
Our mission statement



"The European Weather Cloud is the *cloud-based collaboration platform* for *meteorological application development and operations* in Europe and enables the digital transformation of the European Meteorological Infrastructure. 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* to protect life and property from impending meteorological hazards."

"a community cloud"

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What's in it for you?

Community for sharing and collaboration

The European Weather Cloud is a hub for the meteorological community with the aim to bring its users together in a common environment to collaborate and share resources.

Data access

The platform offers optimised access to the data repositories of ECMWF and EUMETSAT.

Computing and storage

Data proximate cloud computing facilities and storage solutions are provided to boost research, development and operational activities close to ECMWF and EUMETSAT data.

Tools and services

Tools and services are available for the users for the flexible management and orchestration of the cloud resources.

Training and Support

Support services and training resources tailored for the meteorological community guide the user to effectively use the different capabilities of the cloud platform.

Flexible

The platform provides users with a possibility to fully and easily tailor the environment for their use case.

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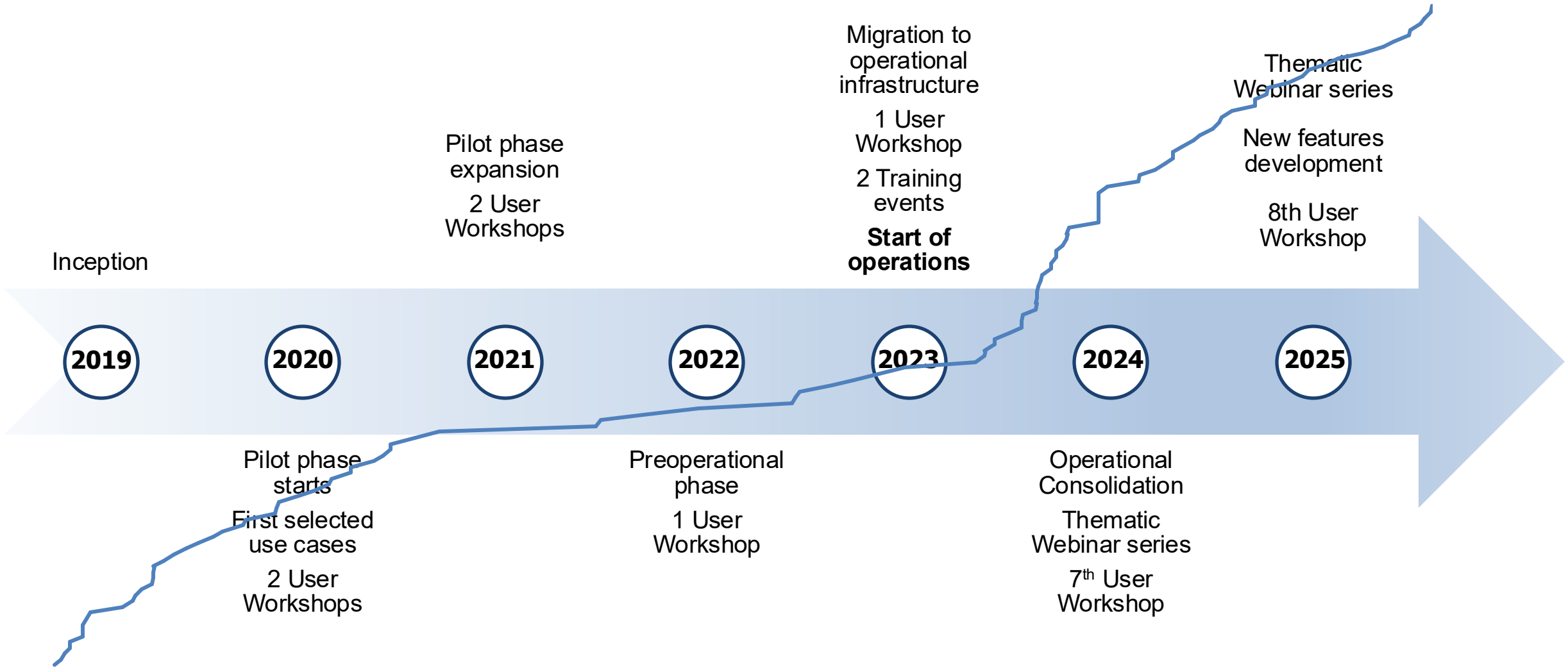
Our Journey



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A growing community

200 tenancies in total

20 new tenancies in 2025

13 active R&D projects

9 active special projects

EUMETNET

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EUMETSAT

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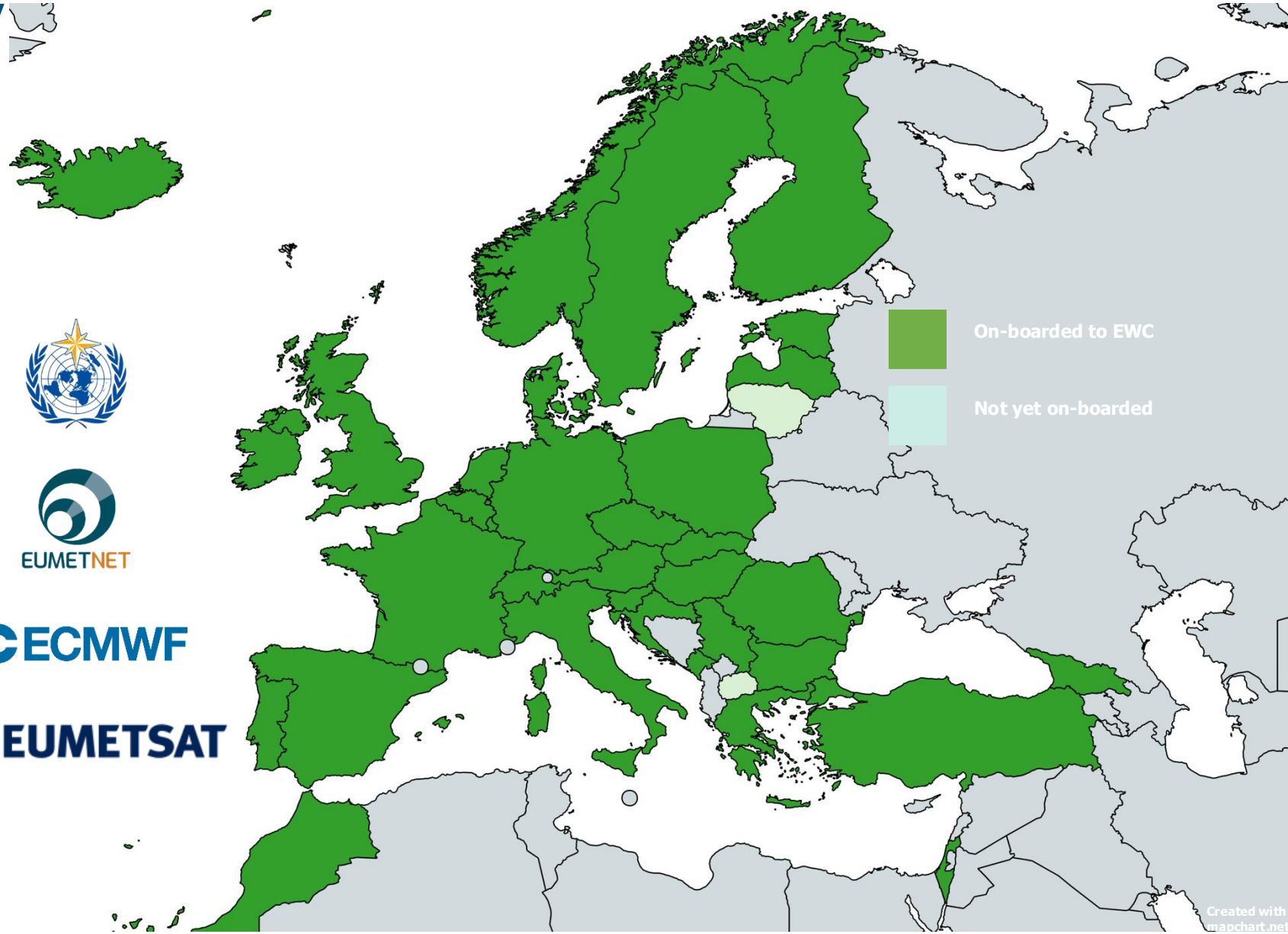

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Who is it for?

Member and Cooperating States

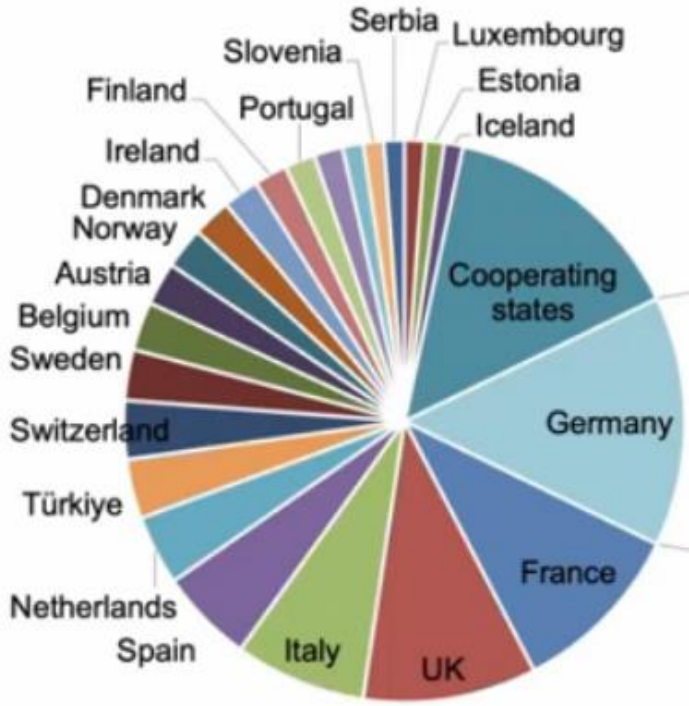
Research & Development

ECMWF Special Projects
EUMETSAT annual R&D calls

European Meteorological Infrastructure

EUMETNET

Internal use at ECMWF and EUMETSAT



ECMWF Special Projects
Experiments or investigations of a scientific or technical nature, undertaken by one or more Member States*, likely to be of interest to the general scientific community

* or Co-operating States, for the EWC

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Getting your own tenancy

Member or Cooperating state

1. Find your Authorizing Officer (CompRep)
2. Create a ticket on our Support Portal, with:
   - A name for the tenant: xx-orga-project
   - A tenant administrator
   - A rough budget
3. Profit!

Special Project

1. Apply on our web site, before the 30th June (”late request” possible)
2. Wait for the decision
3. Profit!

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How does it compare to…

	Public clouds (AWS, Azure, …)	European Weather Cloud	HPC
Available services	Hundreds!	VMs, Storage, Network	Batch, Storage
Proximity to data	✗	✓	✓
Software flexibility	✓	✓	✗
Public hosting	✓	✓	✗
Cost		0	0

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Operational infrastructure

EUMETSAT

Cores	5936
Memory	47.5 TB
Storage	5.9 PB usable
GPUs	371 VGPUs (10 GB partitioning)

- Hosted externally with 10 Gbps link to EUM
- Sizing may increase in coming years, based on demand

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EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

Cores	5632
Memory	53 TB
Storage	4.2 PB usable
GPUs	32 x A100 80 GB

- Co-located with HPC and DHS, in Bologna DC
- 2 Production clouds – one on each computer hall
  - CCI1
  - CCI2

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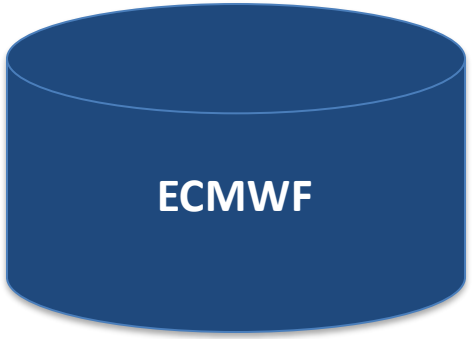
Data Access from EWC

Combined set of “pull” and “push” data access services:



Meteorological Archival and Retrieval System (MARS)

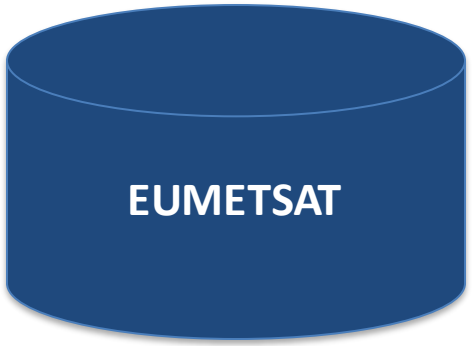
- ECMWF Petabytes-scale data archive providing APIs for data discovery and retrieval

ECMWF Production Data Store (ECPDS)

- Data dissemination service for customised data delivery

Copernicus Climate and Atmosphere Data Stores (CDS/ADS)

- Copernicus Climate Change (C3S) and Atmospheric Monitoring (CAMS) services data



EUMETSAT Data Store & Data Tailor

- Access to all EUMETSAT meteorological, climate and ocean data through a suite of APIs, and incorporating data tailoring capability

EUMETCast Terrestrial

- Near-real time data delivery via terrestrial network

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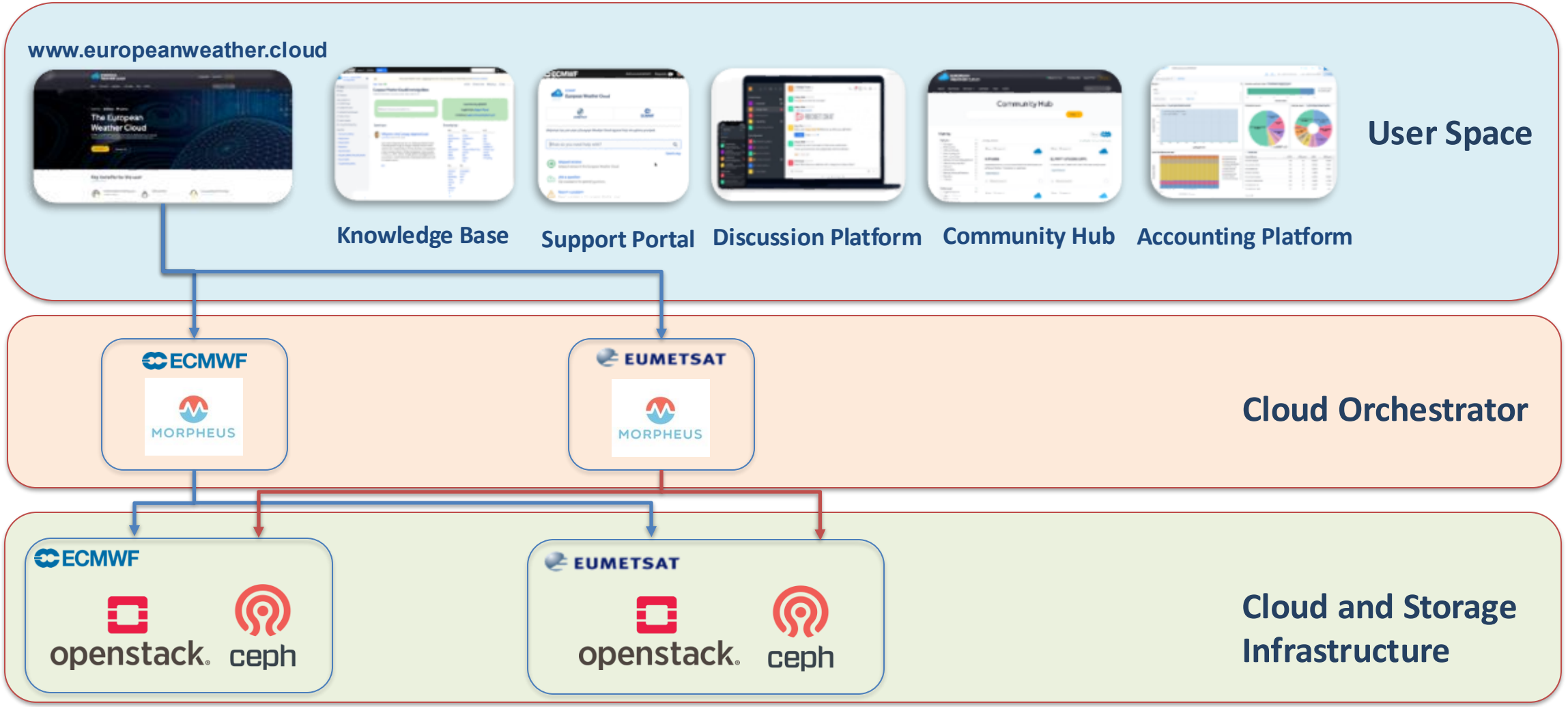
High Level Design



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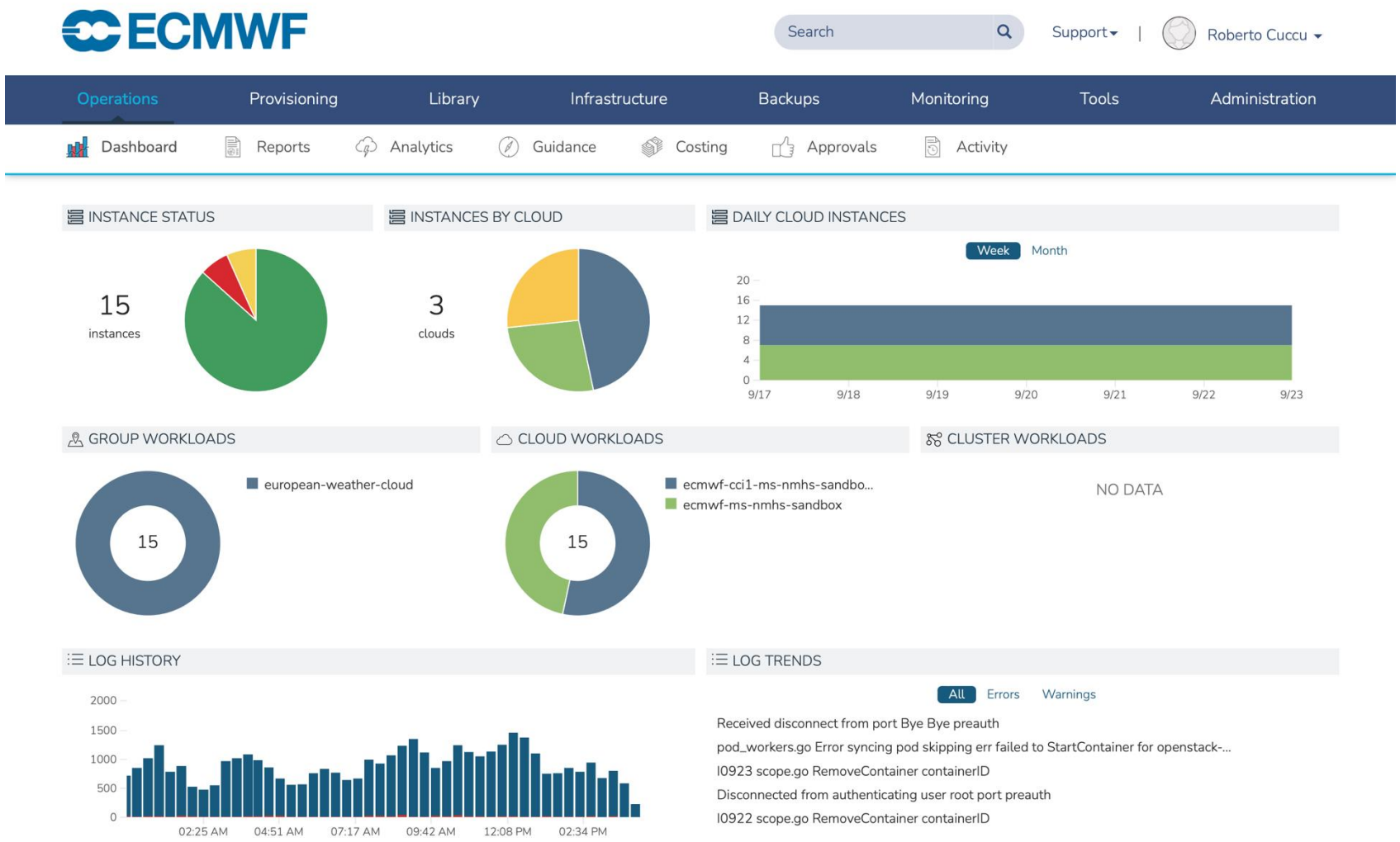
Morpheus



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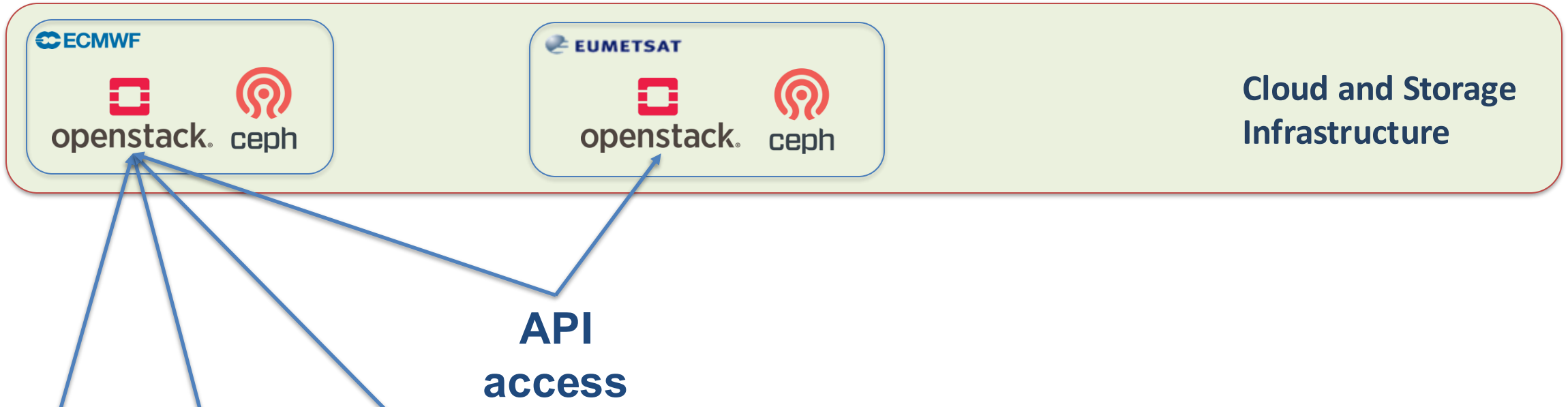
OpenStack access



- Automate deployments
- Support Infrastructure as Code
- Improve synergies with other infras

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S3 Object Storage

- Computer data storage architecture designed to handle large amounts of unstructured data
- Data is stored as **objects** within resources called **buckets**
- **Benefits**: high scalability, flat structure, resilience, access protocol
- Access via the **S3 RESTful API** is compatible with the basic data access model of the Amazon Simple Storage Service (S3) which runs over HTTPS

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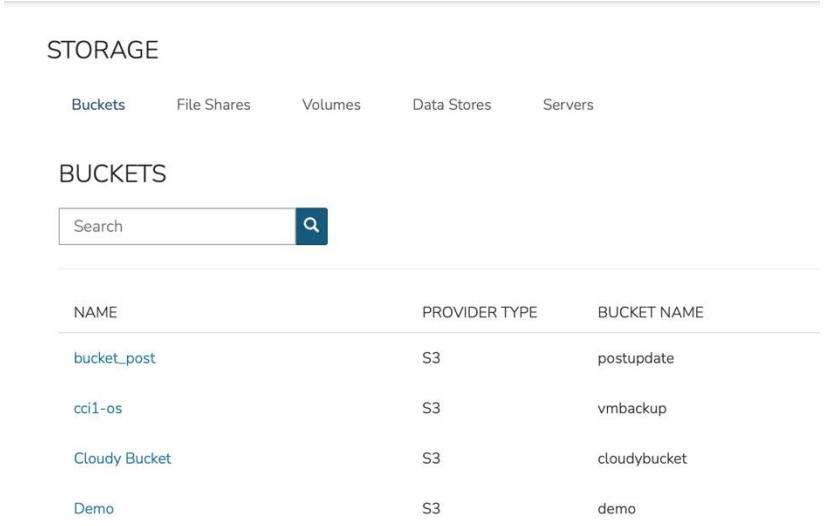
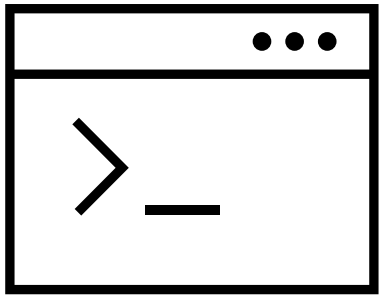
S3 Object Storage - Access

Morpheus GUI



Command Line Tools

- **s3cmd**
- **rclone**
- **awscli**



Python Libraries (boto3)

```
# Initialize the S3 client
s3 = boto3.client(
    's3',
    endpoint_url=S3_ENDPOINT_URL,
    config=Config(
        signature_version=UNSIGNED
    ))
```

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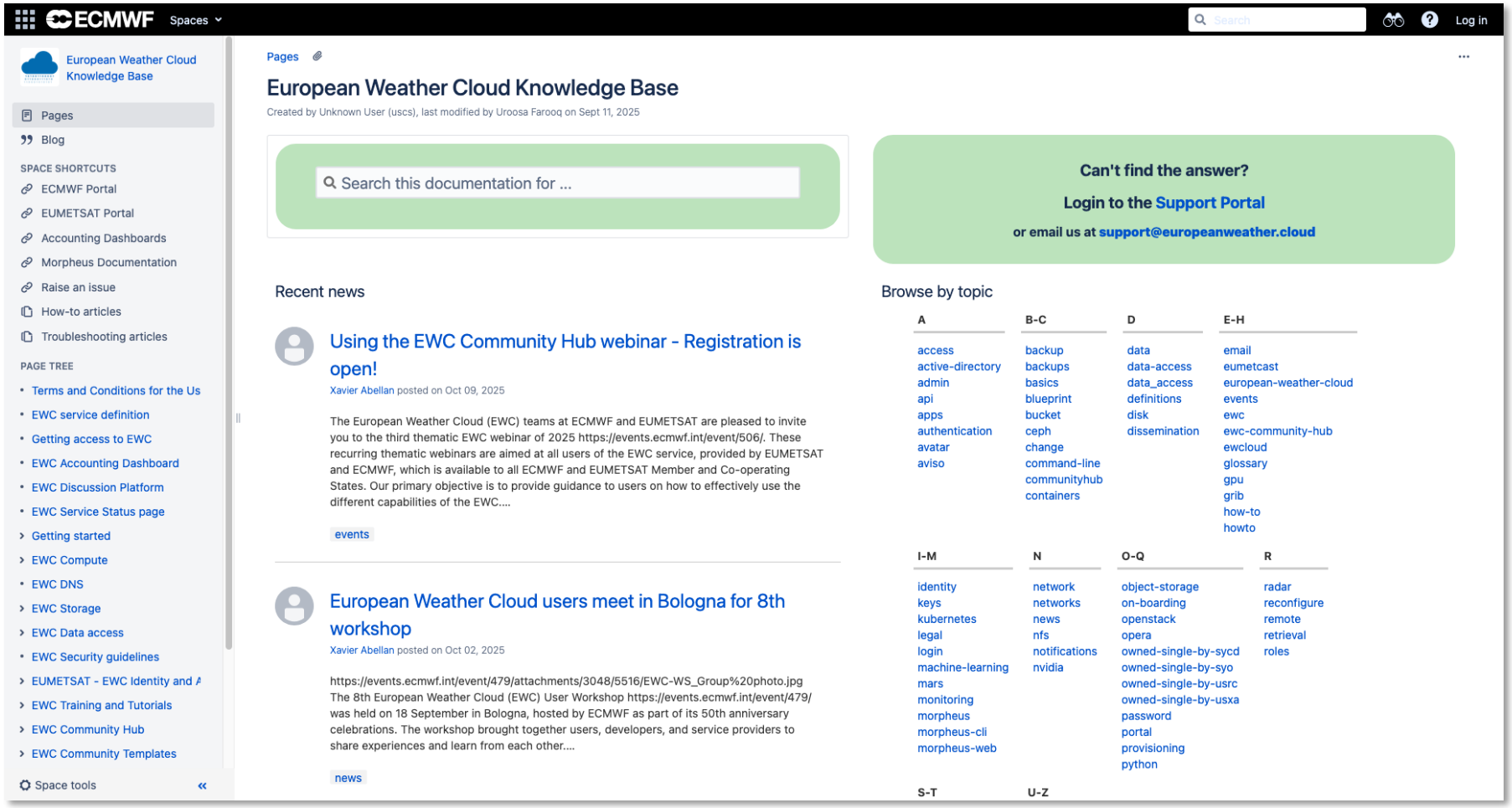
Knowledge Base



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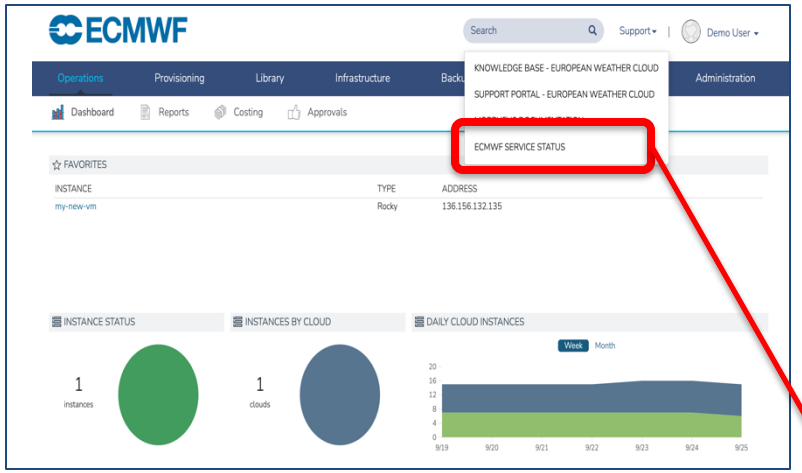
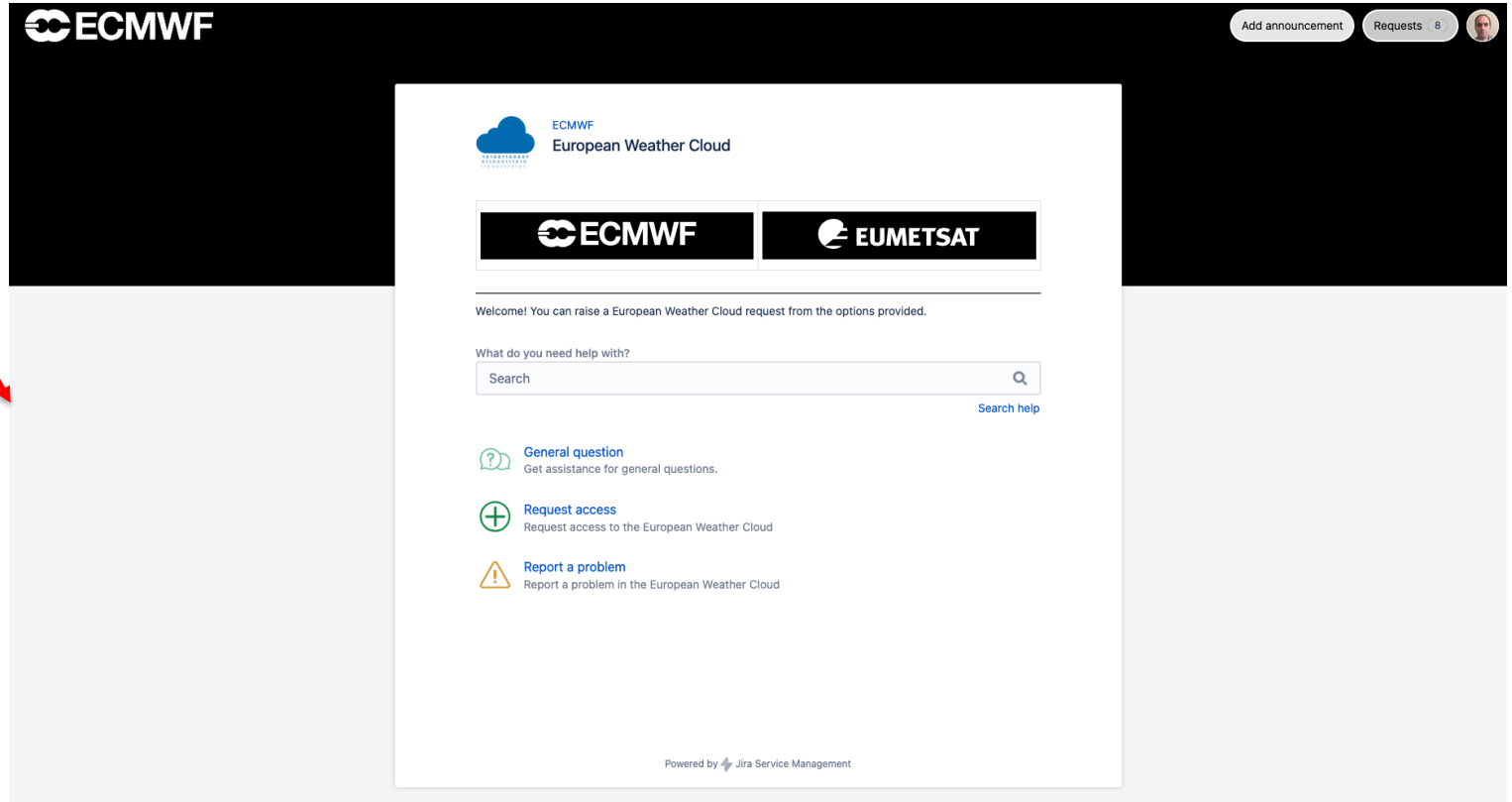
Support Portal

https://support.europeanweather.cloud/





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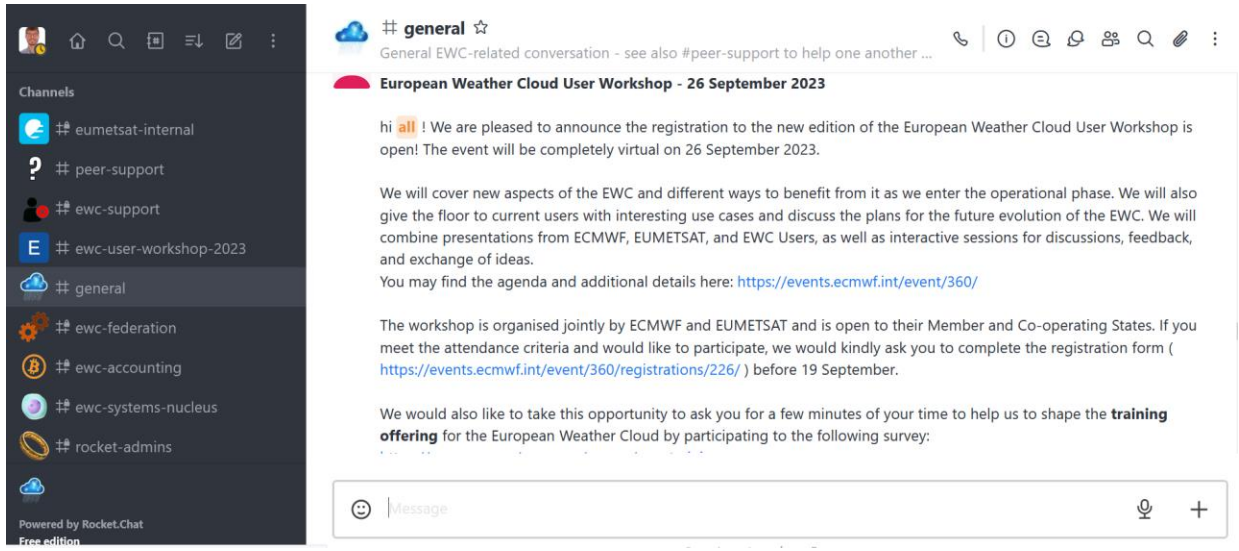
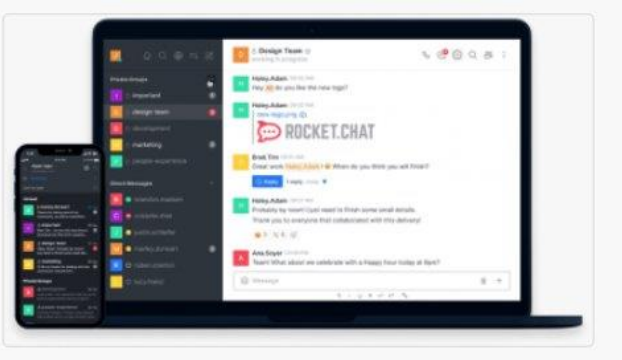
EWC Discussion Platform: Rocket.Chat



Installation

- Web based
- Desktop App
- Mobile



How do I join?

Member and Cooperating States users can self-register (based on email domain) on:
https://chat.europeanweather.cloud

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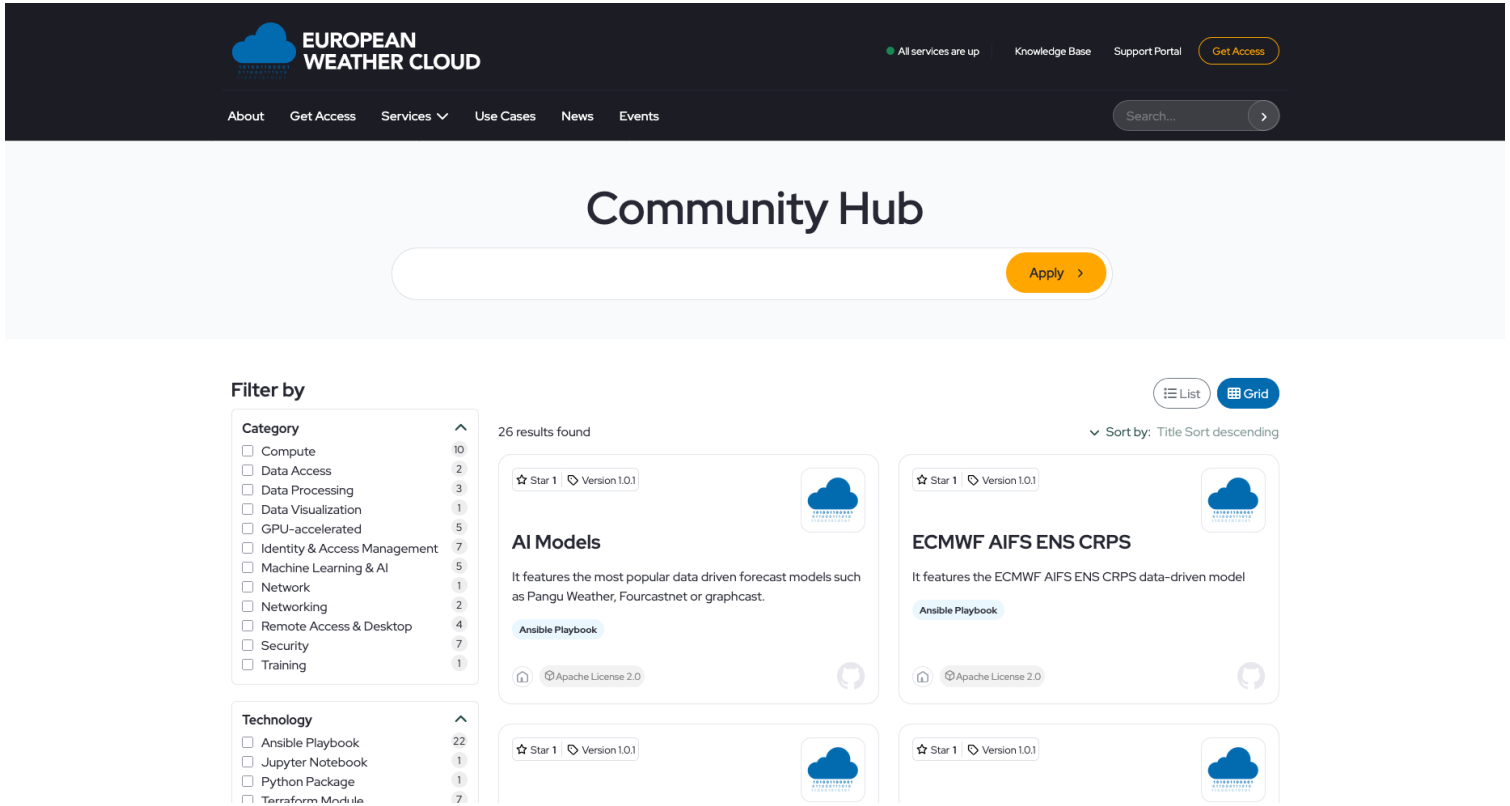
EWC Community Hub

- Centralised platform where EWC users can exchange components, such as:
  - Ansible playbooks
  - Jupyter notebooks
  - Terraform modules
  - Python packages
  - Examples
  - …



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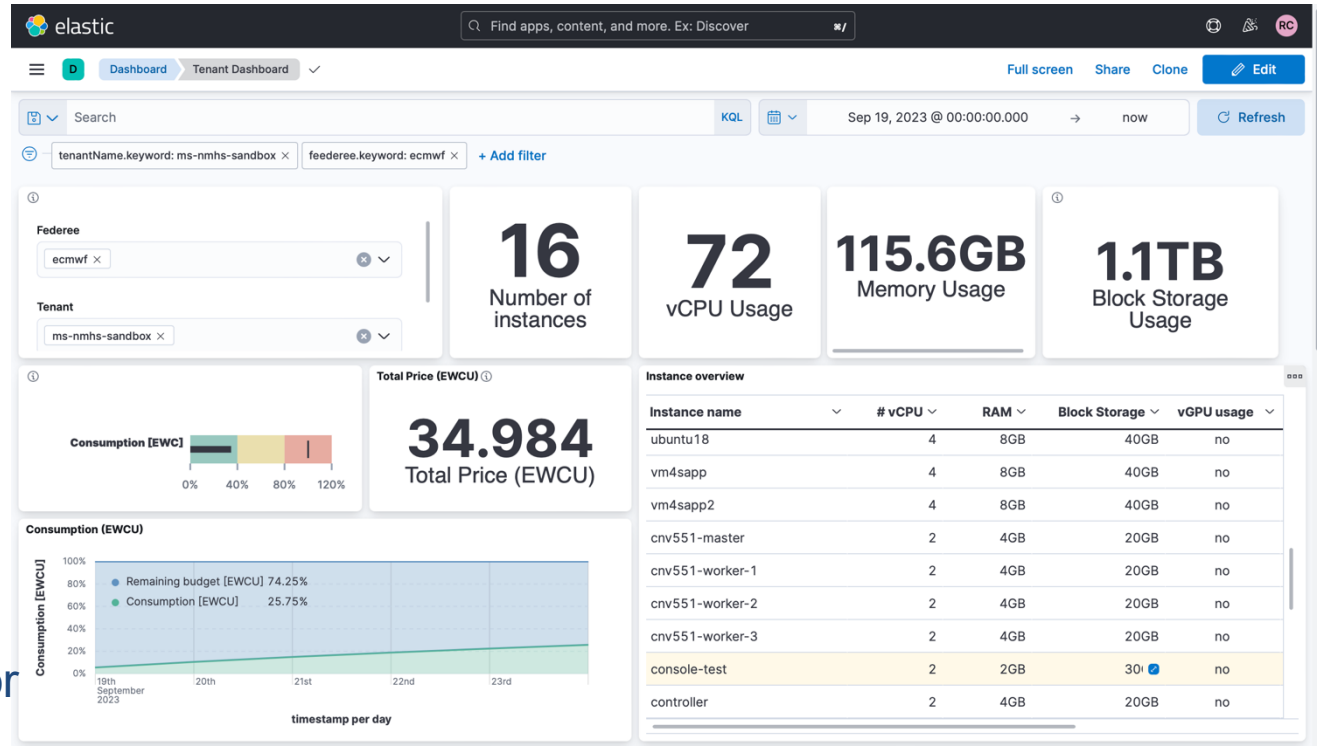
EWC Accounting

The **Accounting dashboard** provides a cross-cloud overview of the resource usage of the tenancies.

A web GUI provides metrics, time series, graphs, and dashboards displaying the accounting information.

Accounted resources include:

- Virtual Machines
  - vCPU
  - Memory
  - Local Disks
- Object Storage (S3)
- vGPU usage



A **CBU (Cloud Billing Unit)** is the virtual currency for the accounting of the consumed cloud resources.

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Usage context examples

- Pre-operational / Operational usage
- Backup infrastructure
- Cloud “bursting” / elasticity
- Application development and testing support
- Systems architecture setup / testing
- Research / scientific activities
- Training activities
- Collaboration environments

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Emergency response

- In March 2020, a magnitude 5.3 earthquake hit Croatia Meteorological Service
- A backup was created on the EWC, in a few days

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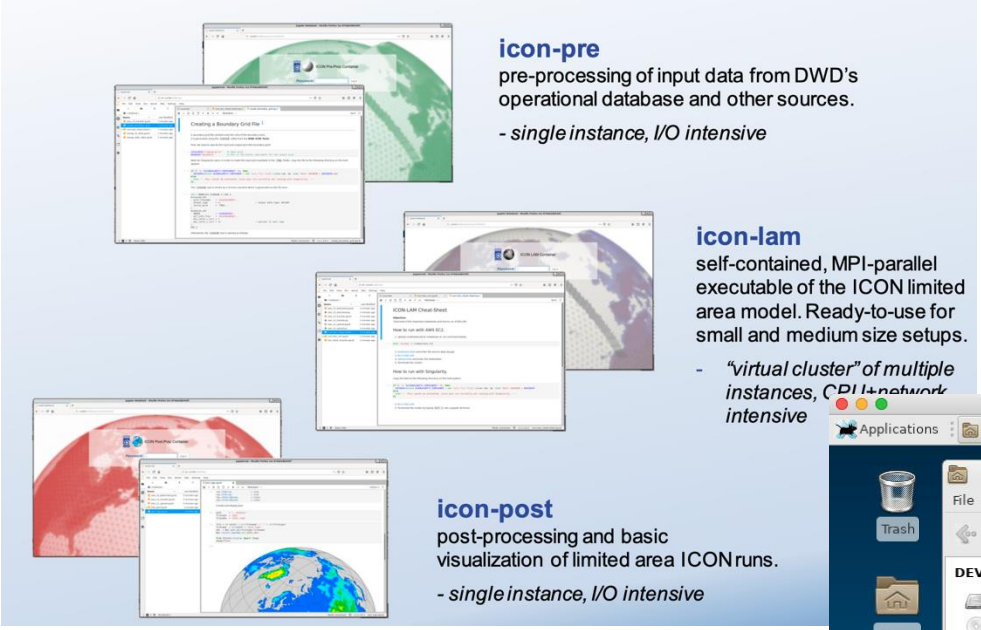
Training



icon-pre
pre-processing of input data from DWD's operational database and other sources.

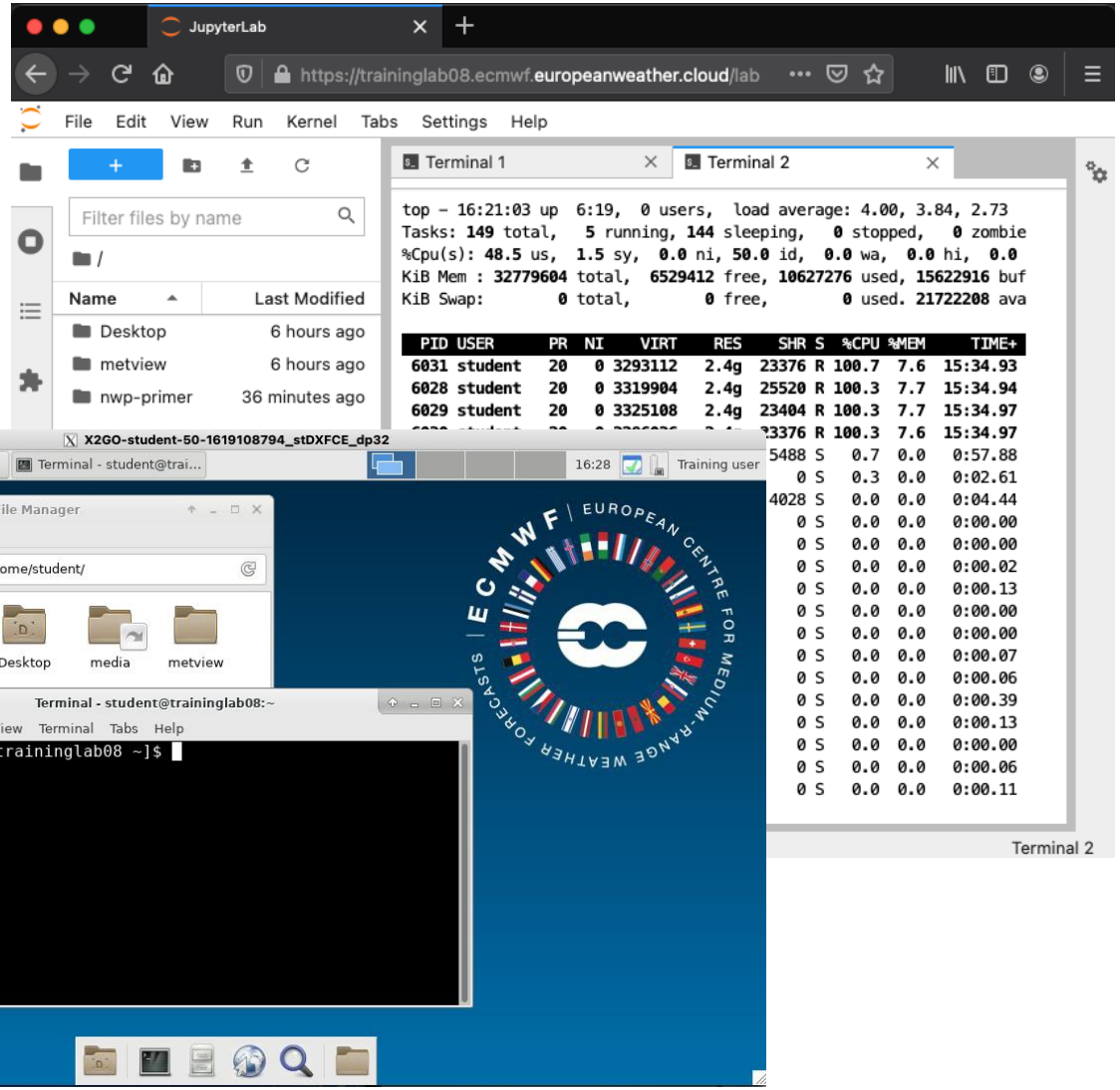
- single instance, I/O intensive

icon-lam
self-contained, MPI-parallel executable of the ICON limited area model. Ready-to-use for small and medium size setups.

- *"virtual cluster" of multiple instances, CPU+network intensive*

icon-post
post-processing and basic visualization of limited area ICON runs.

- single instance, I/O intensive



- ICON Lab by DWD
- ECMWF NWP Training labs
- EUMETSAT Training infrastructure

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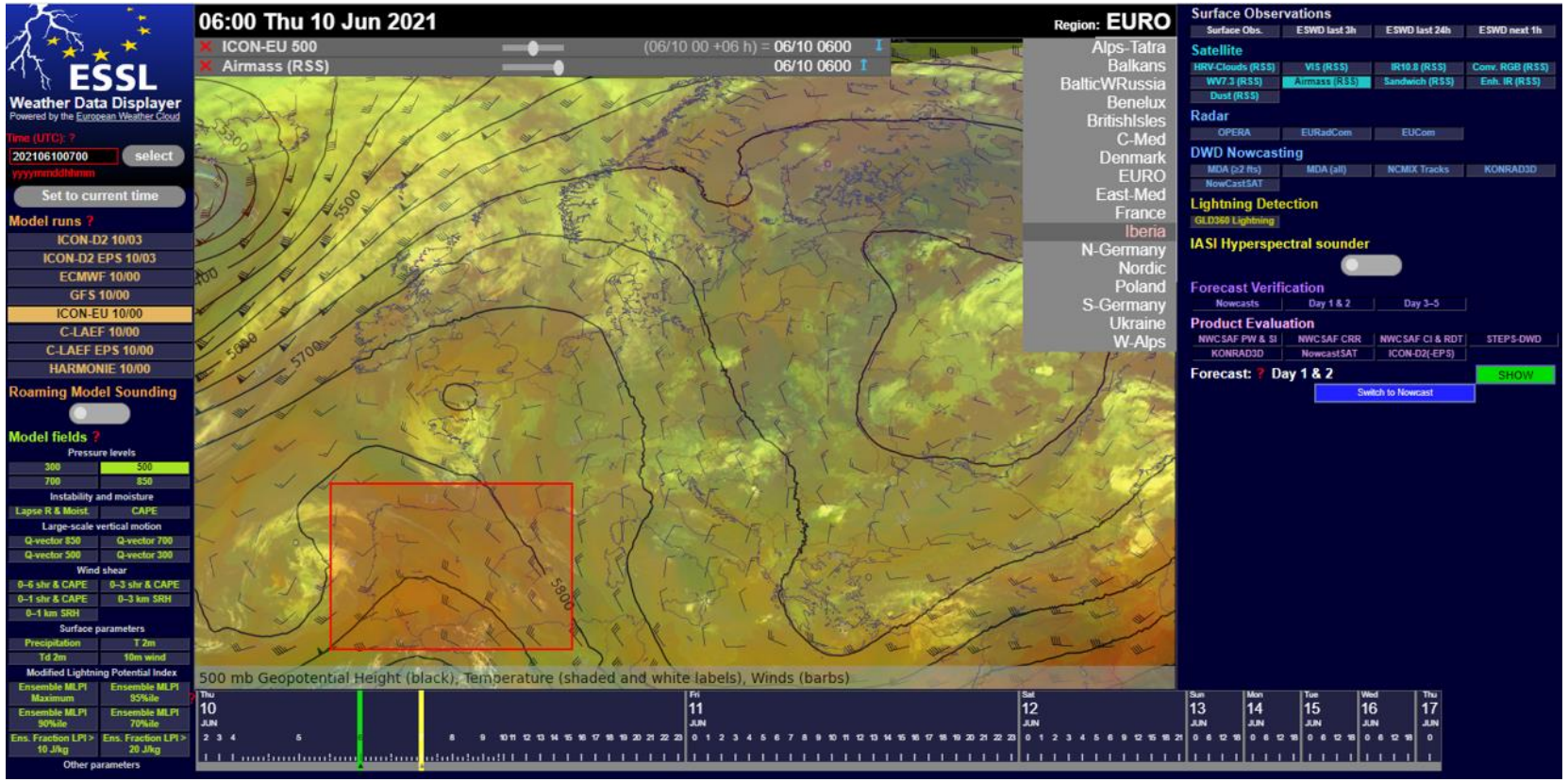
Data & visualisation services

- European Severe Storm Lab – Weather Data Displayer



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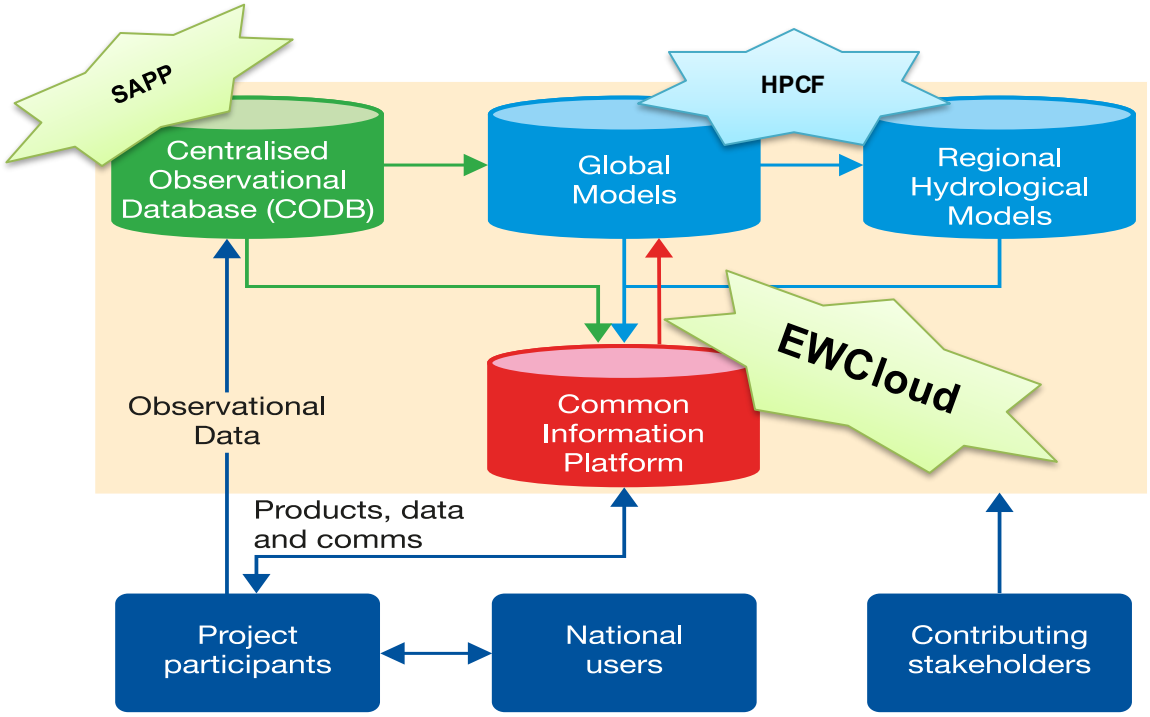
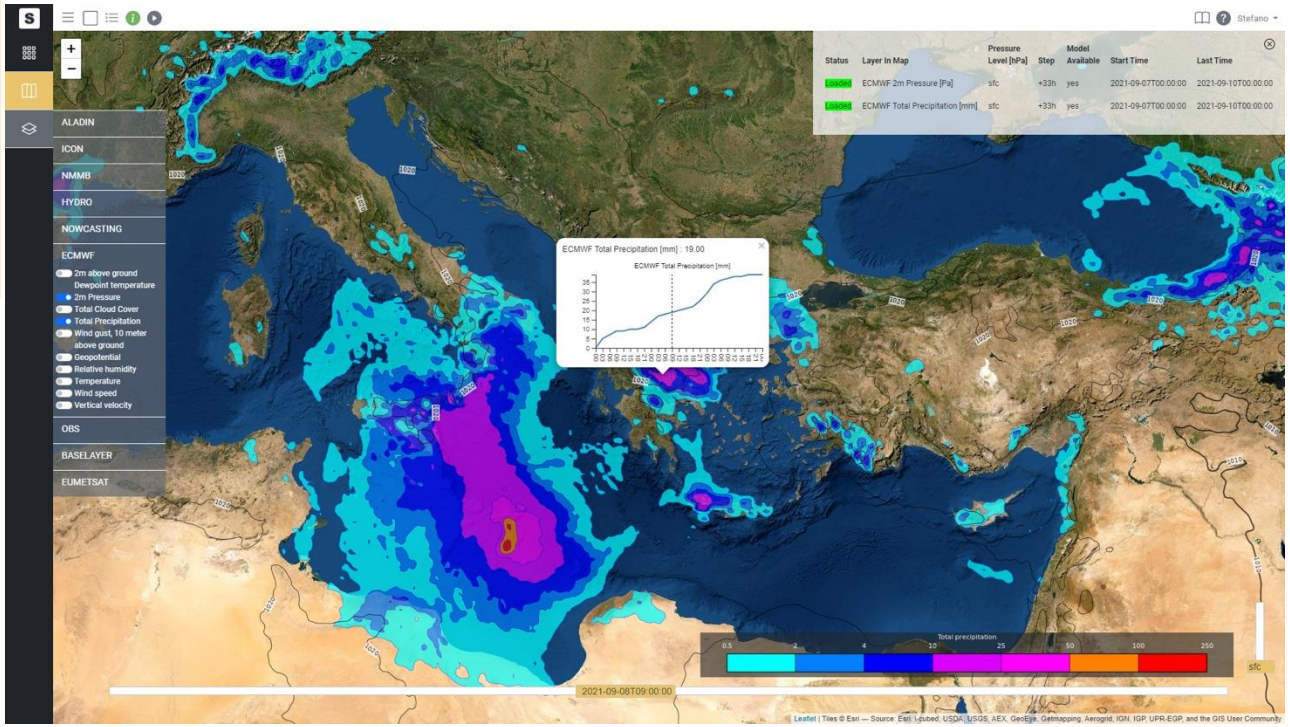
International collaboration projects

- South-East European Multi-Hazard Early Warning Advisory System (SEE-MHEWS-A)





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Demo!

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Questions?

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