

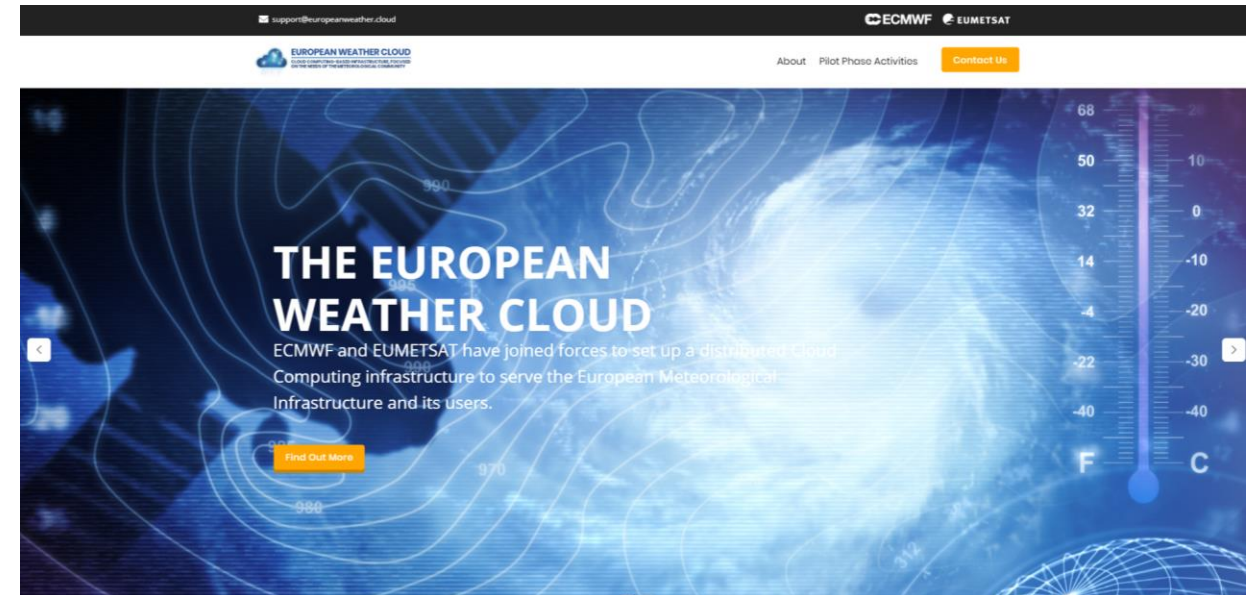


# Introduction to the European Weather Cloud

Jörg Schulz

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European Weather Cloud User Workshop  
26 September 2023



“The European Weather Cloud aims to be 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"**



**26 September 2023**

# Who is it for?

## Member and Cooperating States

## Research & Development

ECMWF Special projects  
EUMETSAT annual R&D calls

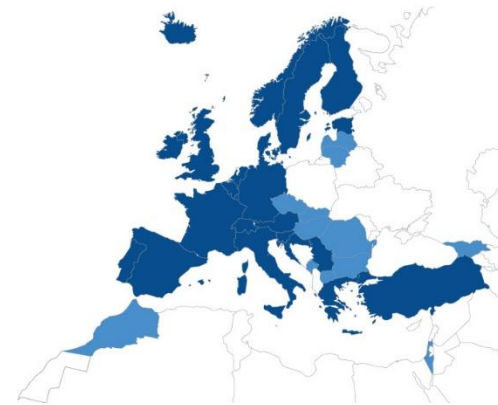
## EMI Partners (e.g. EUMETNET)

## Internal use

Support training, hackathons  
International partners  
Contractor interaction / projects

Member and Cooperating States usage authorized by Computing Representatives

- Access requests via Computing Representatives or EWC support



ECMWF



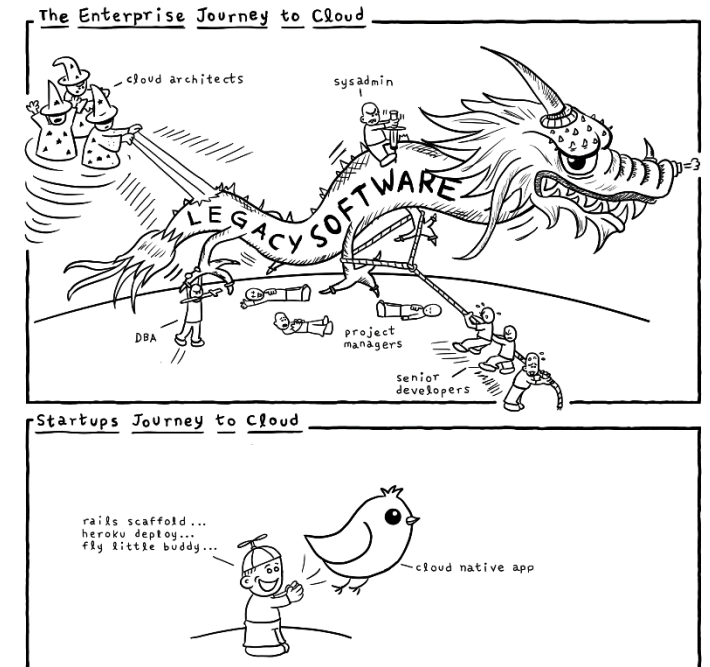
EUMETSAT

EWC provides compute capacity and access to ECMWF and EUMETSAT data holdings, additional external data sets such as OPERA radar data from EUMETNET, and allows users to easily share their own data with others.

# What changes and related challenges do we face?

- 1 New landscape in data ecosystem
- 2 New technical capabilities offered by the cloud
  - **Scaling horizontally** as needed
  - Abstracting away the **computer's OS** / installation
  - Request (or **data**) **driven**
  - **Geo-redundancy**
- 3 Cloud native code needs changes of approach for greatest benefit
  - Containers, object storage, stateless code, triggering / notifications, ..
  - Most of EO user community isn't far along this path
  - Existing code and systems are major investments – **legacy matters!**

The change is required but is a huge task for individual organizations → **Community is required!**



Daniel Stori (turnoff.us)  
Thanks to Michael Tharrington  
Image taken from: <http://turnoff.us/geek/enterprise-vs-startup-journey-to-cloud/> (License CC4BY)

EWC is an efficient way to focus on the key competences of NMHSs and research institutions



# Community engagement



Community engagement and collaboration.

A common framework at Météo-France for working on EWC



Visual Studio + Remote SSH



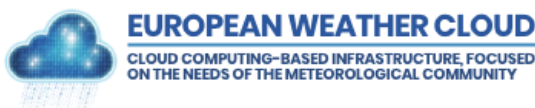
The screenshot shows a JupyterLab environment with the following components:

- EXPLORER:** Shows a file tree with folders like 'open editors', 'SAFO JS...', and 'osi-saf'.
- Code Editor:** Contains Python code for downloading sea ice data and plotting it. The code includes comments and function calls like `download(product, date, hemisphere)` and `spirale(fig, file_daily, file_monthly)`.
- Interactive-1:** Displays a polar plot titled 'Sea Ice Extent (1980-2023) Northern hemisphere'. The plot shows concentric rings representing sea ice extent over time, with a color scale on the right.
- Terminal:** Shows the command prompt with the current directory `/data/safo`.

## Processing climate data records of ocean parameters in the European Weather Cloud

Olivier Membrive, Stéphane Saux-Picart, Emma Saux-Picart, Benoit Tournadre, Météo-France.

Steinar Eastwood, Met Norway. Gorm Dybkjaer, DMI. EUMETSAT Meteorological Satellite Conference, Malmö, 2023



# EUMETSAT R&D Call and ECMWF Special projects



Annual EUMETSAT Research & Development call closes each year on 30 June

- Objectives on improving, development and using products in applications and using the cloud infrastructure (more details [here](#))
- Eligible for application for resources are Member States' public institutions, i.e., public services and academia
- Fast-track projects available anytime of the year for small projects

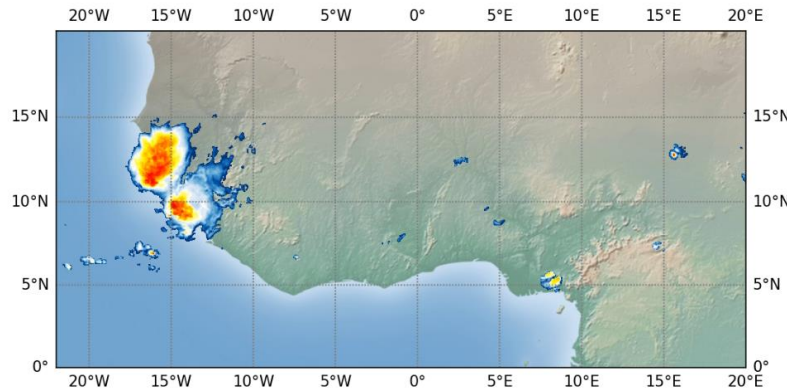


ECMWF Special projects can also include EWC resources in their application, closes each year on 30 June

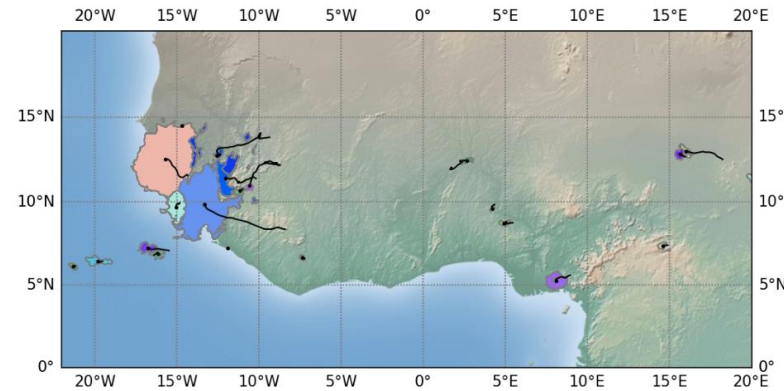
- The scope includes experiments or investigations of a scientific or technical nature, undertaken by one or more Member States, likely to be of interest to the general scientific community
- "Late request" possible after deadline

# Research Collaborations

MSG-10.8 $\mu$ m IR data

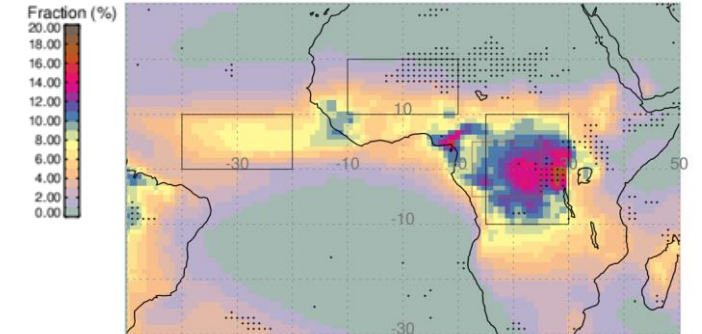


TOOCAN



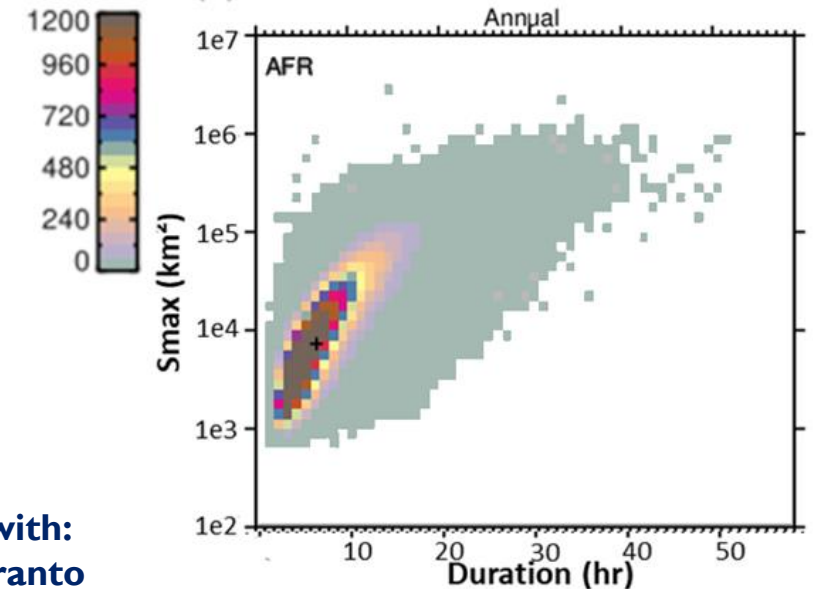
2019/07/03-00:00

Annual Mean Cold Cloud Fraction 1983-2020

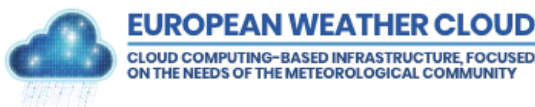


- Generated a 40+ year Meteosat data based climatology of Mesoscale Convective Systems
- EWC allows easy access to all Meteosat data specifically recalibrated for climate applications
- Quick, stable processing on the EWC. More convenient than local HPC resources.
- Strong enhancement of interaction between research and data provider

Annual Occurrence (#)



Collaboration on the European Weather Cloud with:  
T. Fiolleau, R. Roca, D. Bouniol, S. Cloché, P. Raberanto

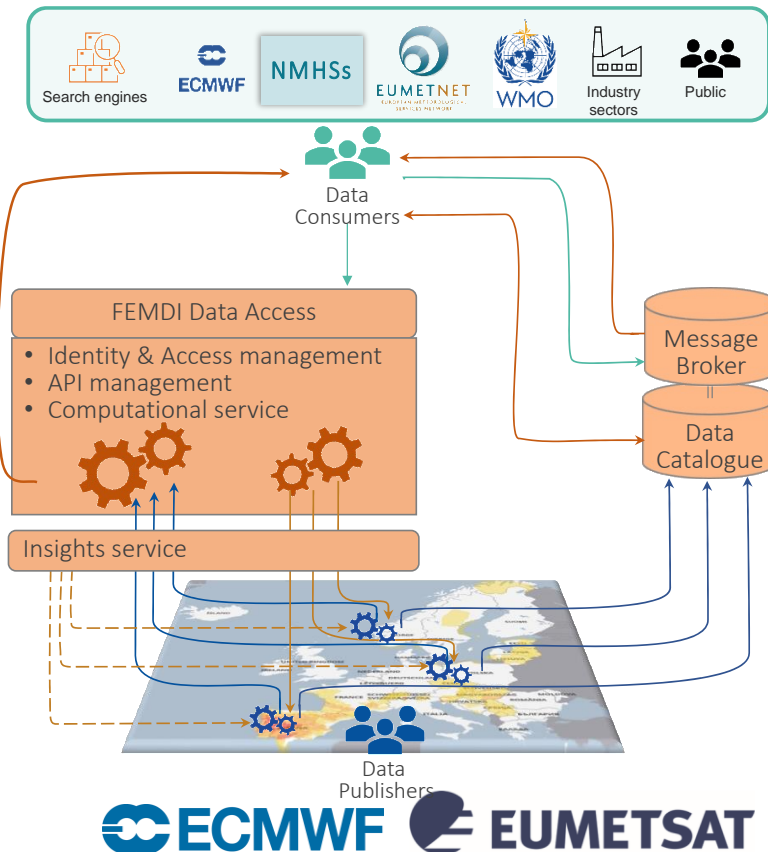
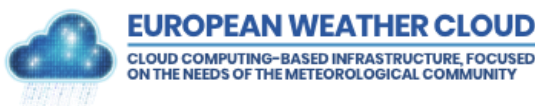


# European RODEO Project – Bringing more meteorological data open for all users

European Weather Cloud (EWC) is a central platform for many datasets on the HVD deployment, other platforms and services are also being considered

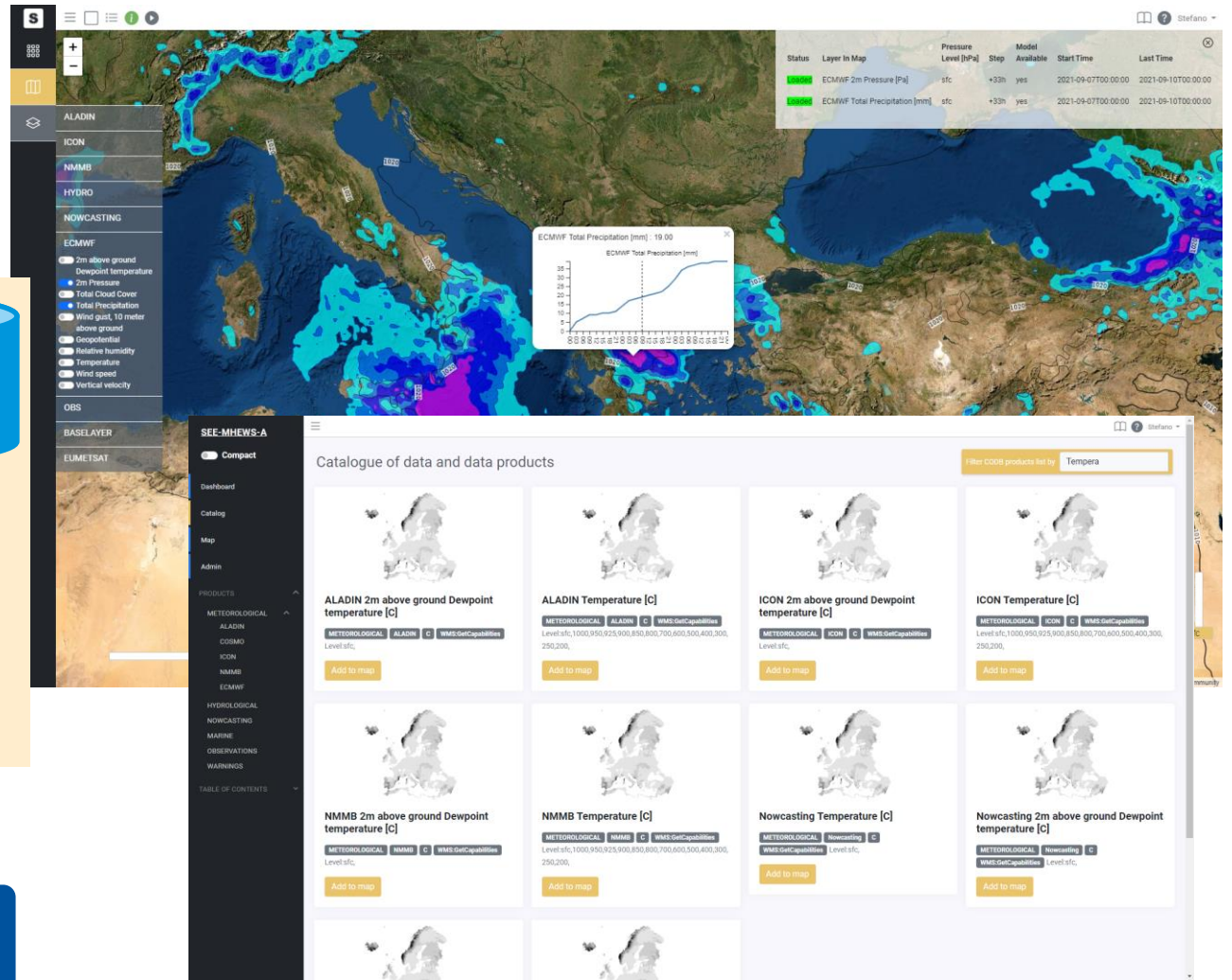
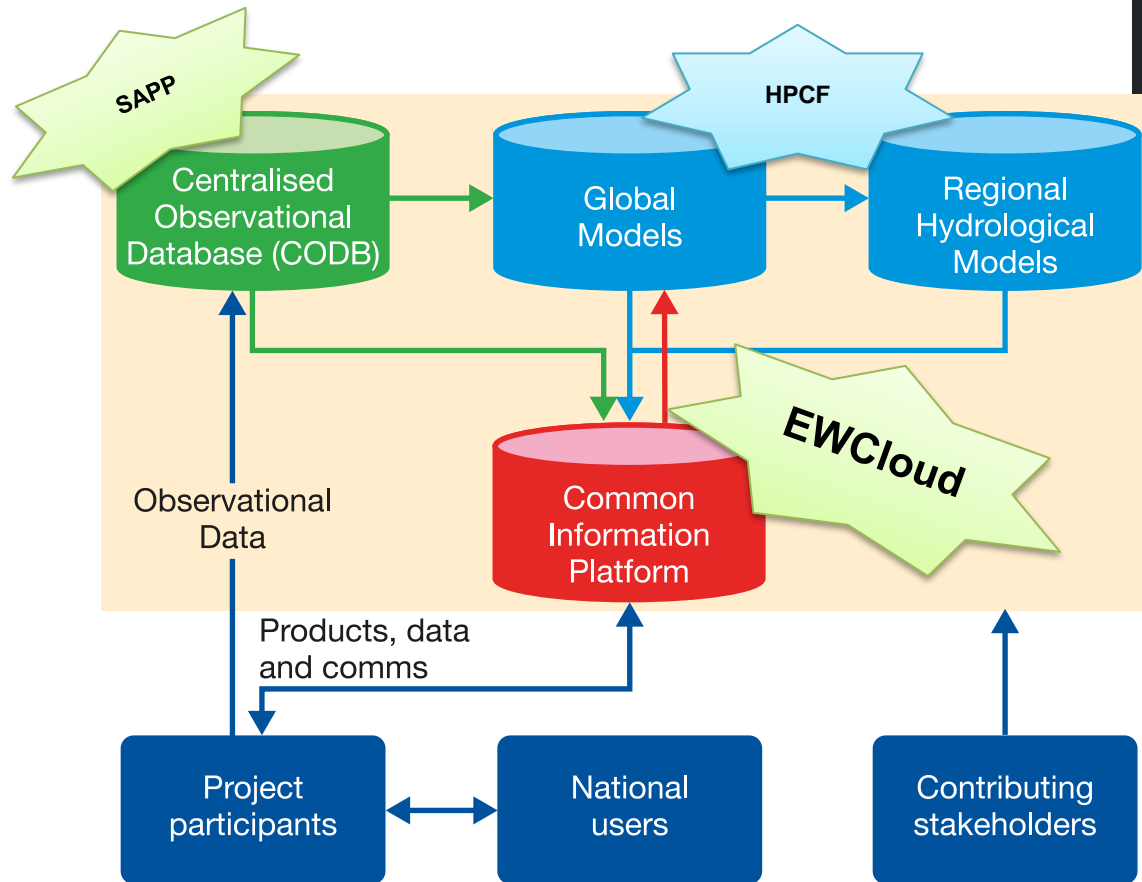


<https://rodeo-project.eu>

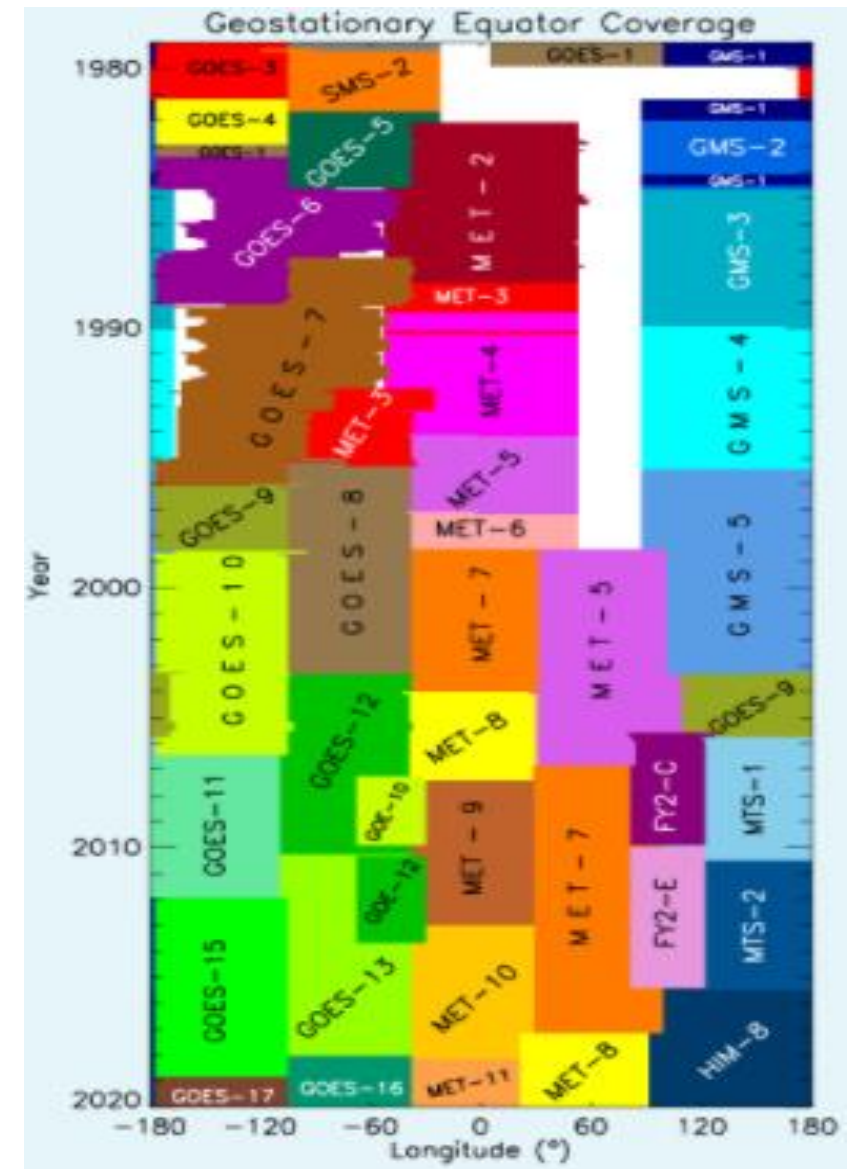
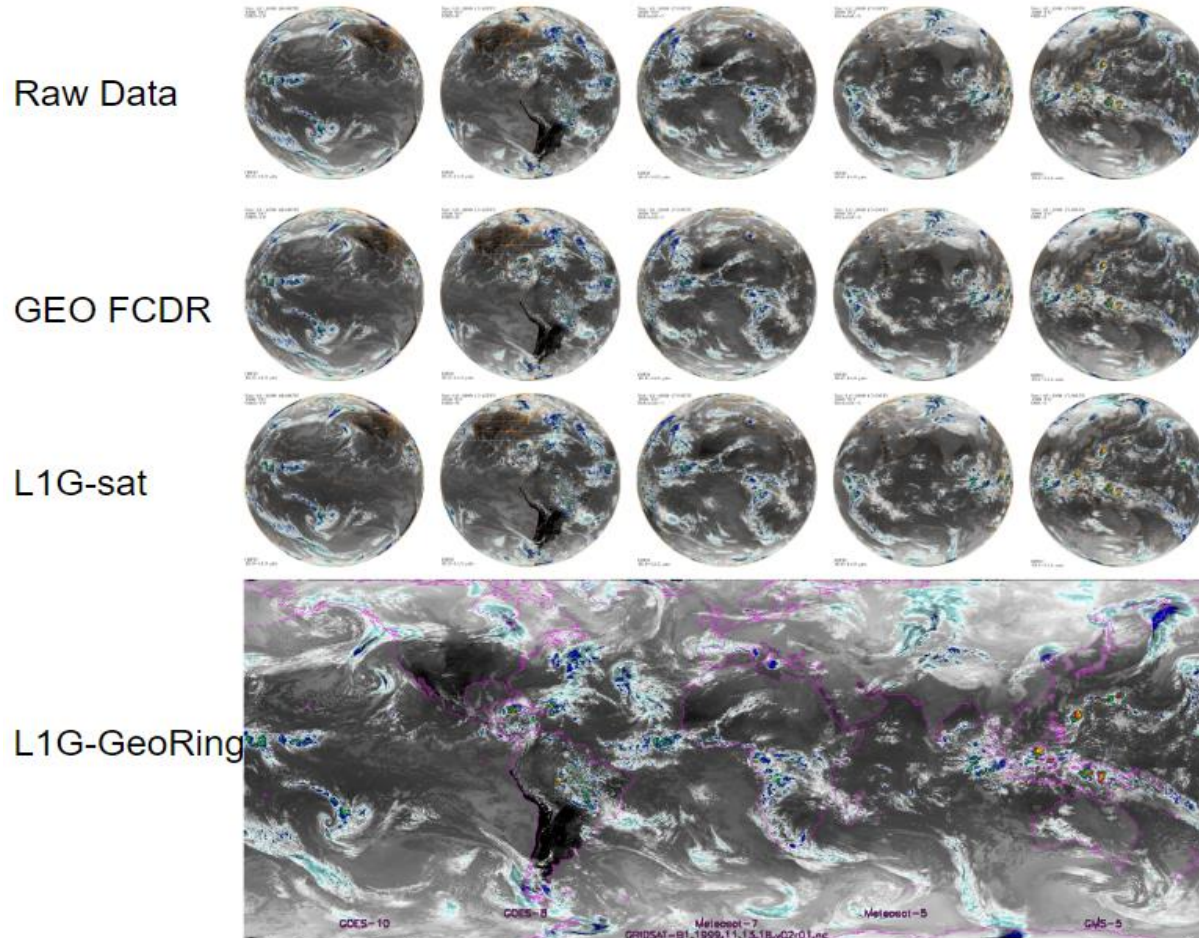




# International collaboration SEE-MHEWS



# International collaboration EUMETSAT-NOAA Geo-Ring FCDR Project



Participants: Ken Knapp, Jessica Matthews, Joseph Mani, Andy Heidinger (NOAA), Jörg Schulz, Viju John, Roope Tervo (EUMETSAT)

# International collaboration

## Benefits of using cloud infrastructure

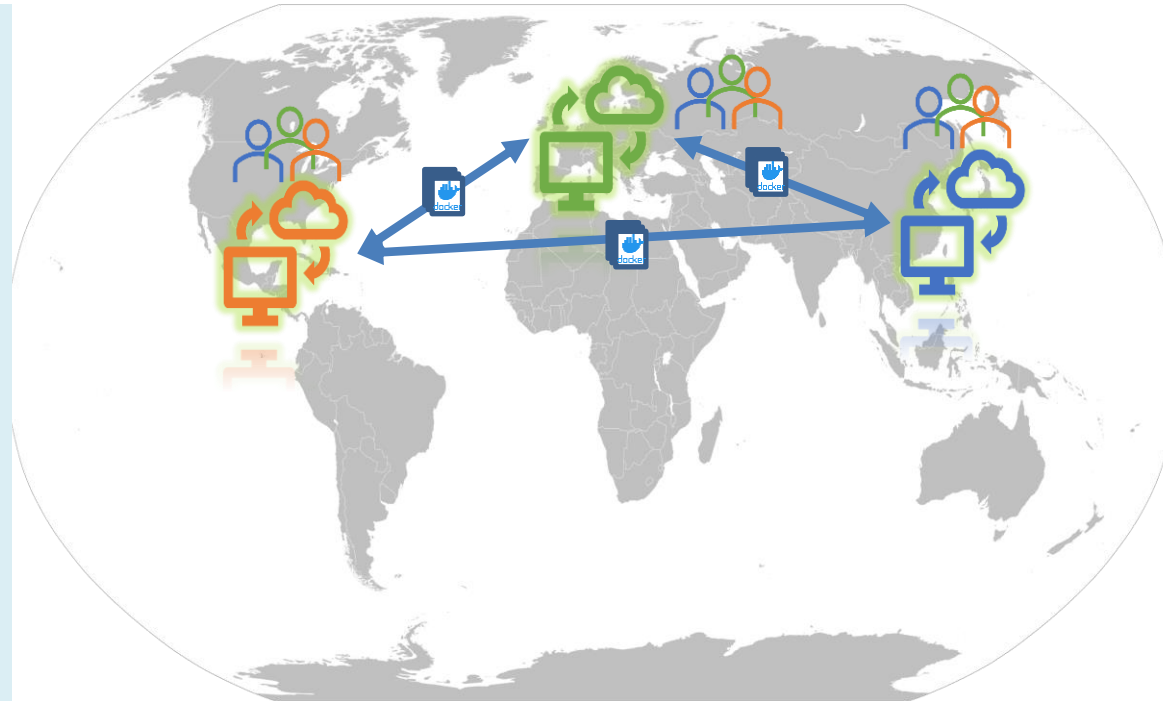
### Processing to the data

Share “best-of-breed” code

- QC including image anomaly detection
- Instrument cross-calibration
- Data processing
- Product validation
- ...

Use (Docker) containers

- Interoperability in different cloud environments
- Allows local customisation



### Possibility of mutual access to remote processing infrastructure

- to co-develop in different cloud environments
- to provide support in running processing code
- to facilitate remote validation work

### Output data

Global gridded product

- Consistent and available from both agencies
- User service regionalised per continent (TBC)

Opens opportunity for later analysis-ready data and/or data cube approaches

- Simplifies usage
- Support usage in AI/ML  
Supports using subsets of the data, e.g., for local area analyses

# Thank you!

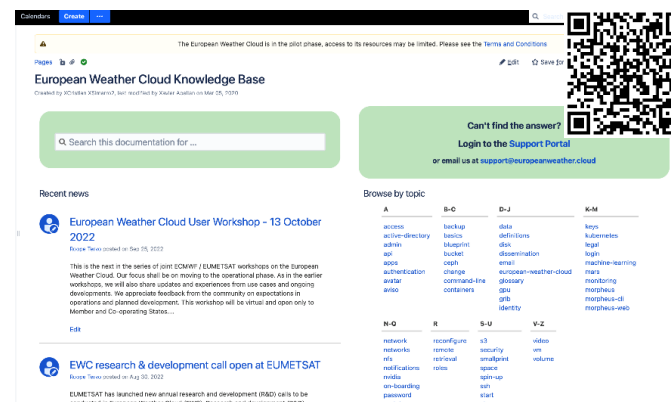
Questions and comments are welcome

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[joerg.schulz@eumetsat.int](mailto:joerg.schulz@eumetsat.int)

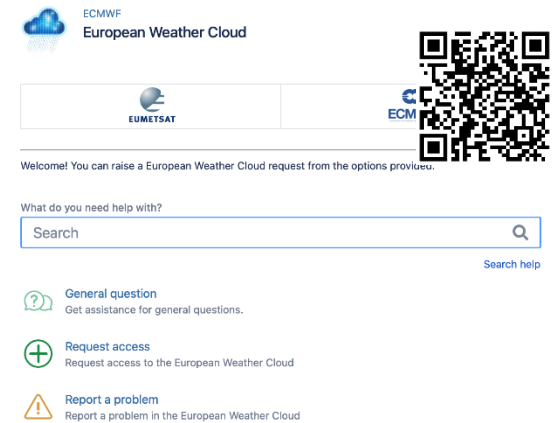
[support@europeanweather.cloud](mailto:support@europeanweather.cloud)



<https://chat.europeanweather.cloud>



Knowledge Base



User Support