

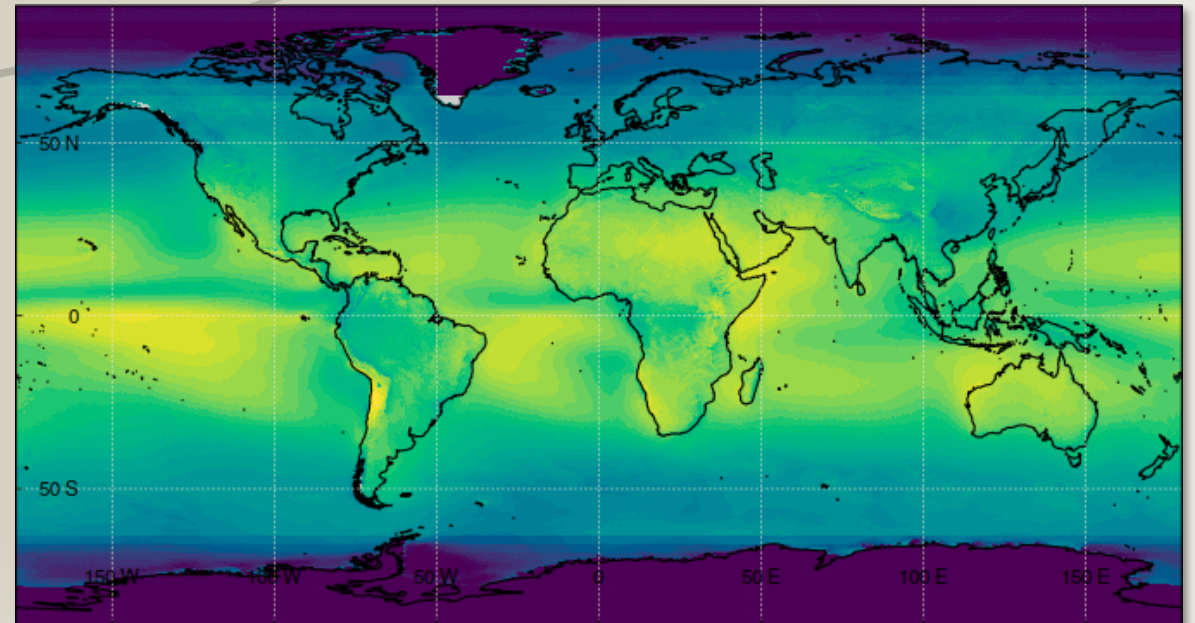
# Welcome to the CM SAF Short Course CLARA – A new Climate Data Record on Earth Radiation Budget

The session will start at 12:00 UTC



If you have **technical issues**, please  
send a message in the **zoom chat** box  
to **Support**.

For **Q&A**: go to [Slido.com](https://www.slido.com) – event  
code: **#EUMSC43**





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All **material** will be shared after the course on course page:

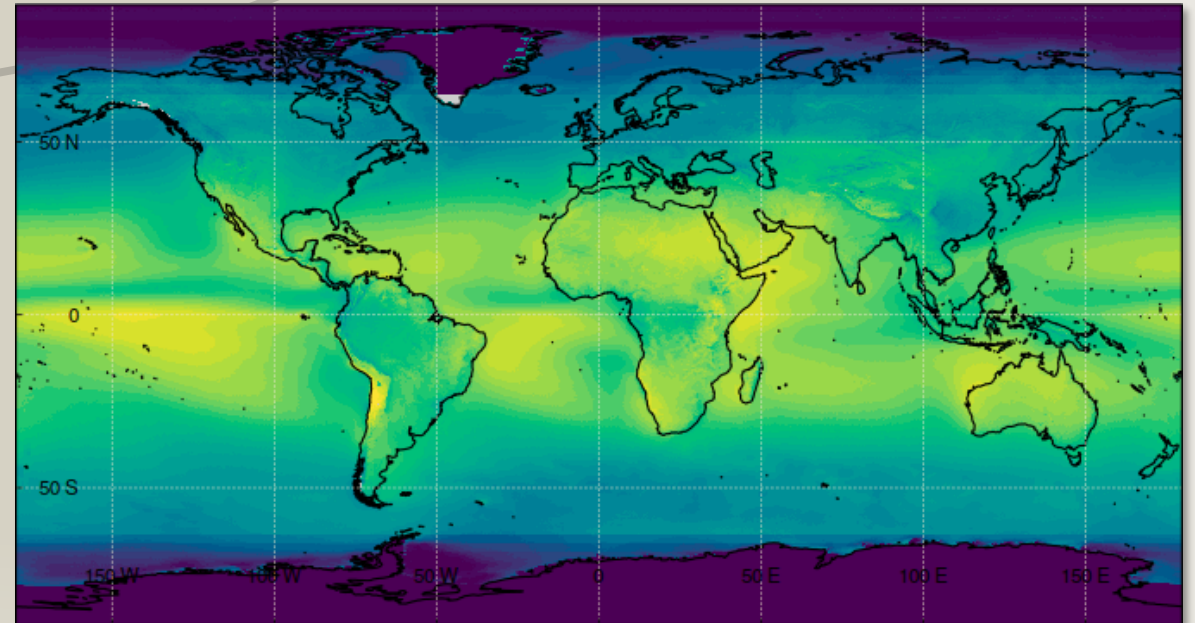
<https://training.eumetsat.int/course/view.php?id=488>

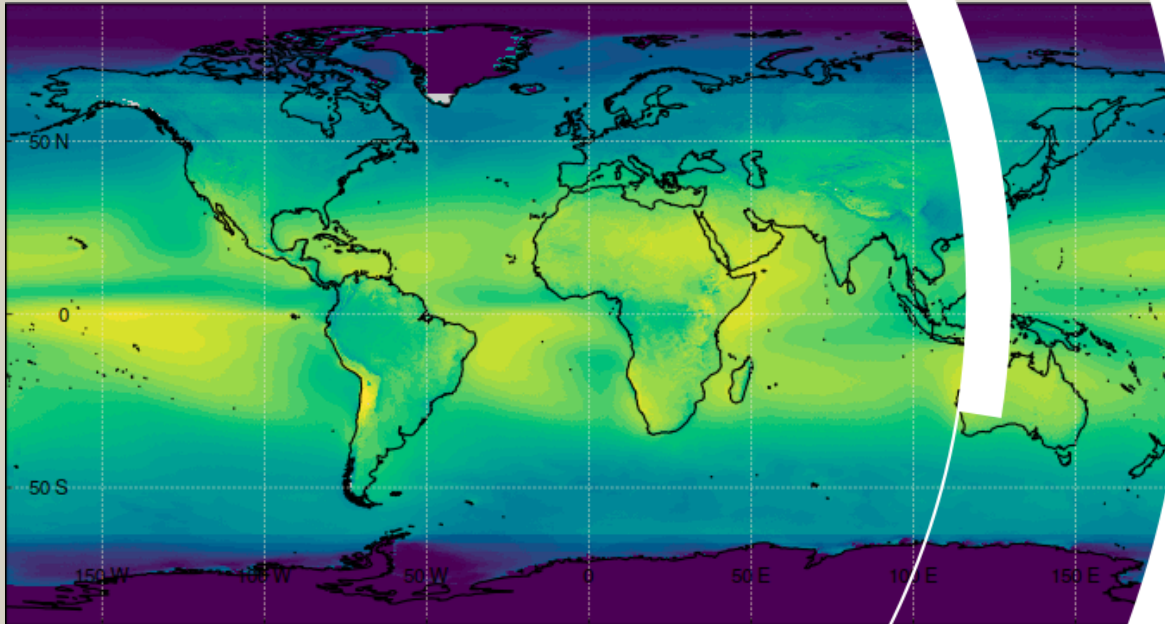
# Welcome to the CM SAF Short Course CLARA – An extended Data Record on Cloud and Radiation Properties



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## Welcome and Introduction

(Christine Träger-Chatterjee, EUMETSAT)

## The new version of the CLARA data record - Overview

(Karl-Göran Karlsson, CM SAF/SMHI)

Q&A

## Clouds

(Karl-Göran Karlsson, CM SAF/SMHI)

Q&A

## Radiation at Top of Atmosphere

(Tom Akkermans, CM SAF/RMIB)

Q&A

## Surface Radiation

(Jörg Trentmann, CM SAF/DWD)

Q&A

## Surface Albedo

(Aku Riihelä, CM SAF/FMI)

## Ordering Data from CM SAF

(Steffen Kothe, CM SAF/DWD)

Q&A

## Using the data - CM SAF R Toolbox

(Steffen Kothe, CM SAF/DWD)

Q&A

## Using the data - Jupyter Notebooks

(Antonio Vecoli, EUMETSAT/MEE0)

Q&A

## Wrap up and closing (14:00 UTC)



## Tasks

- Develop, maintain, exploit European systems of meteorological satellites, taking into account as far as possible the recommendations of WMO.
- Contribute to operational climate monitoring and the detection of global climatic changes.



# Current EUMETSAT satellites

## 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 (0°))  
Rapid scan service over Europe (5 mins)  
(Meteosat-10 (9.5° E))

## METEOSAT-9 (45.5° E)

Geostationary orbit  
Meteosat Second Generation  
providing Indian Ocean data coverage

## METOP-B & -C (98.7° incl.)

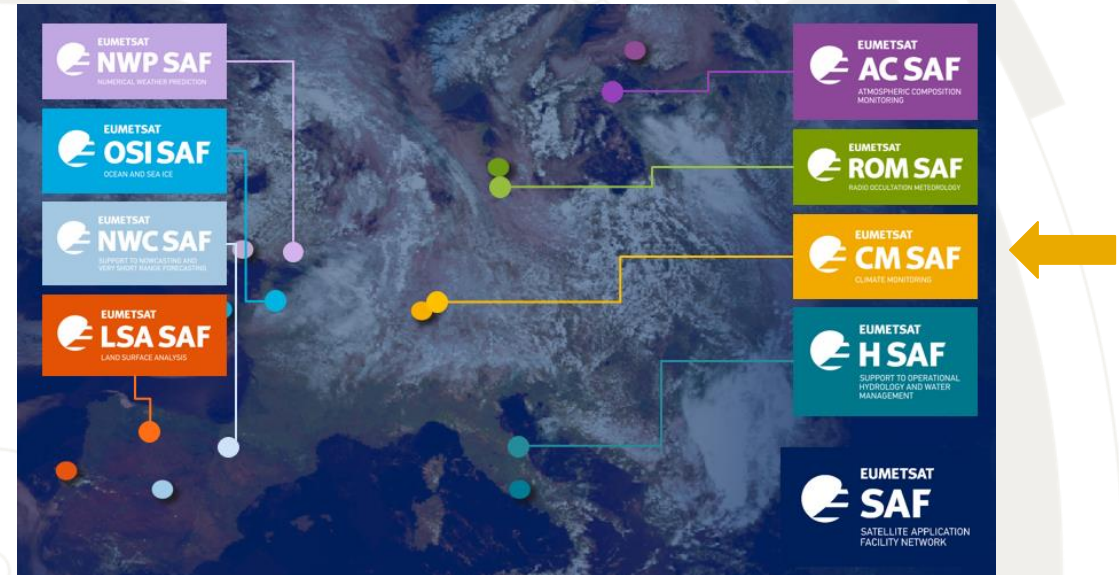
Low Earth, sun-synchronous orbit  
EUMETSAT Polar System (EPS)/  
Initial Joint Polar System

## MTG-I1

Geostationary orbit  
Meteosat Third Generation imaging mission,  
currently in commissioning phase



- EUMETSAT has a network of different Satellite Application Facilities (SAFs)
- SAFs are dedicated centres of excellence for processing satellite data
  - research, development and operational activities
  - each SAF focusses on specific user communities or application areas

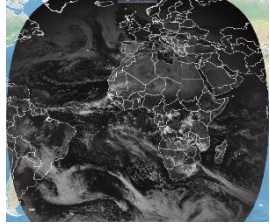


- Each SAF is a consortium of entities from EUMETSAT member states



# Space based Climate Monitoring – Challenges

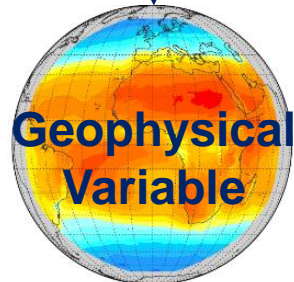
Satellite  
Data



Retrieval

## Near Real Time Data

- generated on a regular basis
- First-order satellite calibration
- *Most recent algorithm and input data (i.e. not homogeneous over time)*



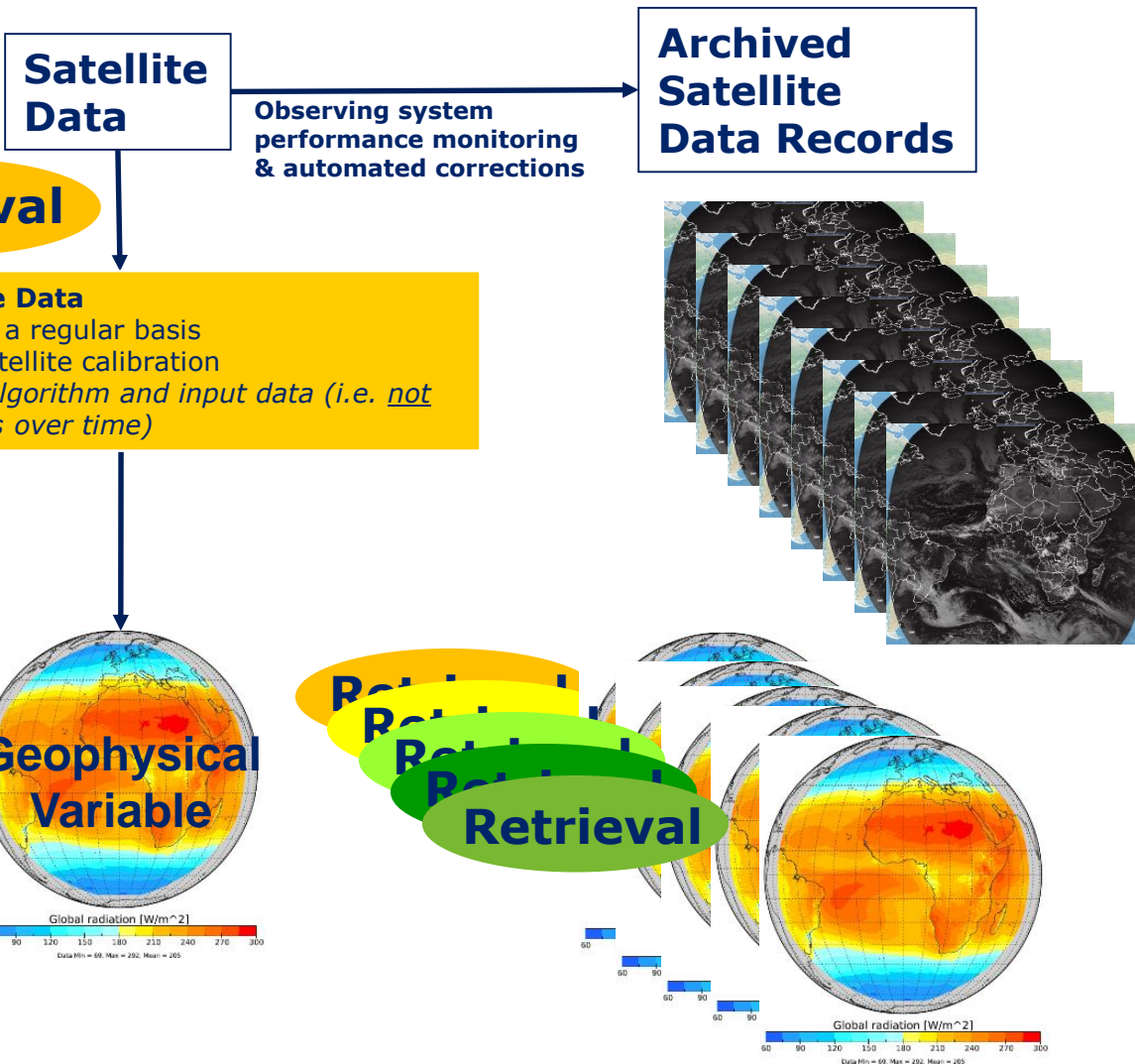
Geophysical  
Variable

Can be used for  
Near Real Time  
Monitoring  
**Shall not** be used for  
Longer term climate  
variability or trend  
assessment.



## Short and Intermediate Term

## Longterm



Can be used for Near Real Time Monitoring  
Shall not be used for Longer term climate variability or trend assessment.

## Short and Intermediate Term

## Longterm

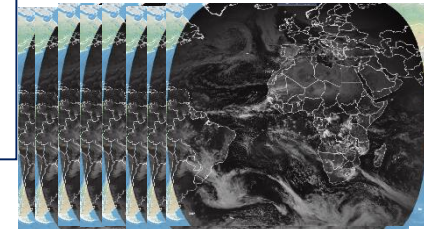
Satellite Data

Observing system performance monitoring & automated corrections

Archived Satellite Data Records

Re-calibration & Inter-calibration

Fundamental Climate Data Records



Retrieval

Retrieval

Reprocessing

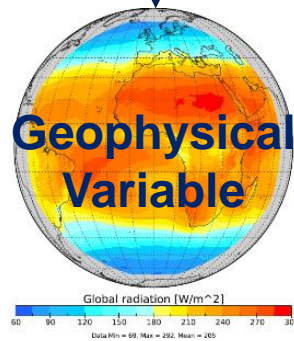
### Near Real Time Data

- generated on a regular basis
- First-order satellite calibration
- *Most recent algorithm and input data (i.e. not homogeneous over time)*

### Climate Data Record

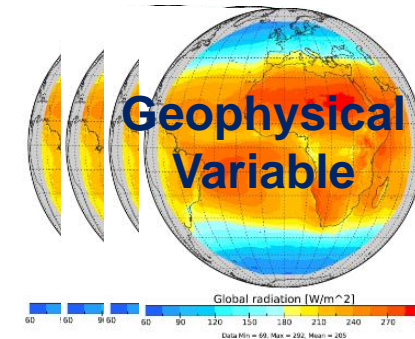
- Generated on an irregular basis, i.e. every few years
- Calibrated and homogenized satellite data
- Algorithm and auxiliary input data homogeneous over time
- Resulting time series fully applicable for climate monitoring purposes, including trend estimation

Can be used for Near Real Time Monitoring  
Shall **not** be used for Longer term climate variability or trend assessment.



Geophysical Variable

Suited for longer term climate variability & climate change analysis as other applications.



Geophysical Variable



# Space based Climate Monitoring - Challenges

## Short and Intermediate Term

## Longterm

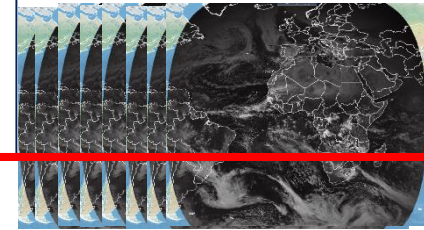
Satellite Data

Observing system performance monitoring & automated corrections

Archived Satellite Data Records

Re-calibration & Inter-calibration

Fundamental Climate Data Records



Retrieval

### Near Real Time Data

- generated on a regular basis
- First-order satellite calibration
- *Most recent algorithm and input data (i.e. not homogeneous over time)*

Retrieval

### Interim Climate Data Record

- Generated on a regular basis
- First-order satellite calibration
- Same algorithm and auxiliary input data as for current TCDR
- Fill the gap between end of CDR and present.

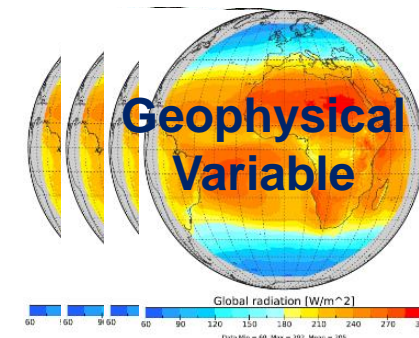
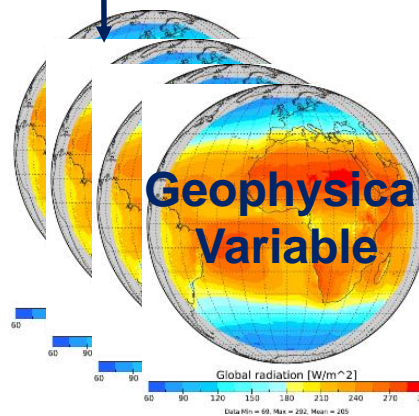
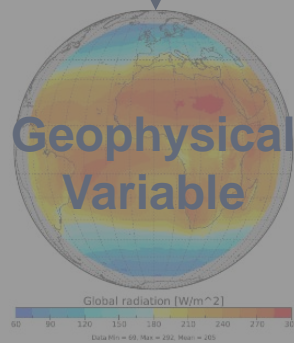
Retrieval

Reprocessing

### Climate Data Record

- Generated on an irregular basis, i.e. every few years
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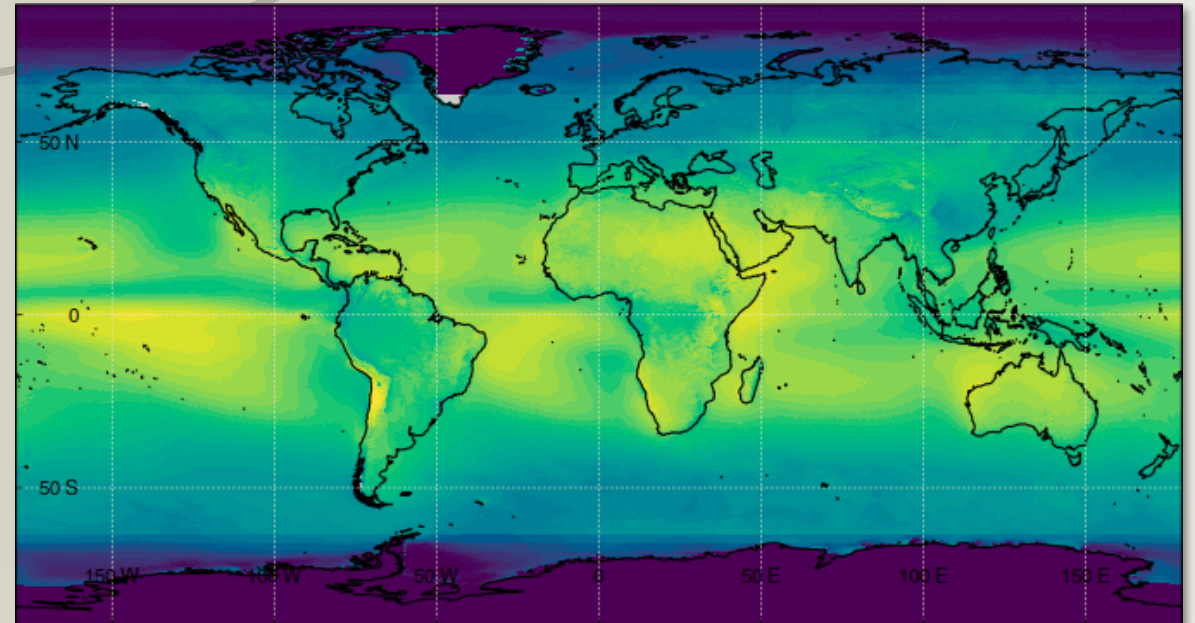
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slido.com #EUMSC43 (poll)**

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for more in-depth courses**



# Upcoming Short Courses

- **12 Oct - 16 Nov (every Thursday) different times - Data Access Services - Customise products to your needs with EUMETSAT Data Tailor**
- **18 Oct 2023      12 UTC - Data Access Services - How to use the Jupyter Notebooks from the EUMETSAT Data Access Services \***
- **23 Nov 2023      12 UTC - Data Access Services - How to use the EUMETSAT Data Access Client (EUMDAC) through Command Line Interface and as a Python library\***

**\* 30 minutes webinar**

<https://training.eumetsat.int/>

→ Events → Short Courses