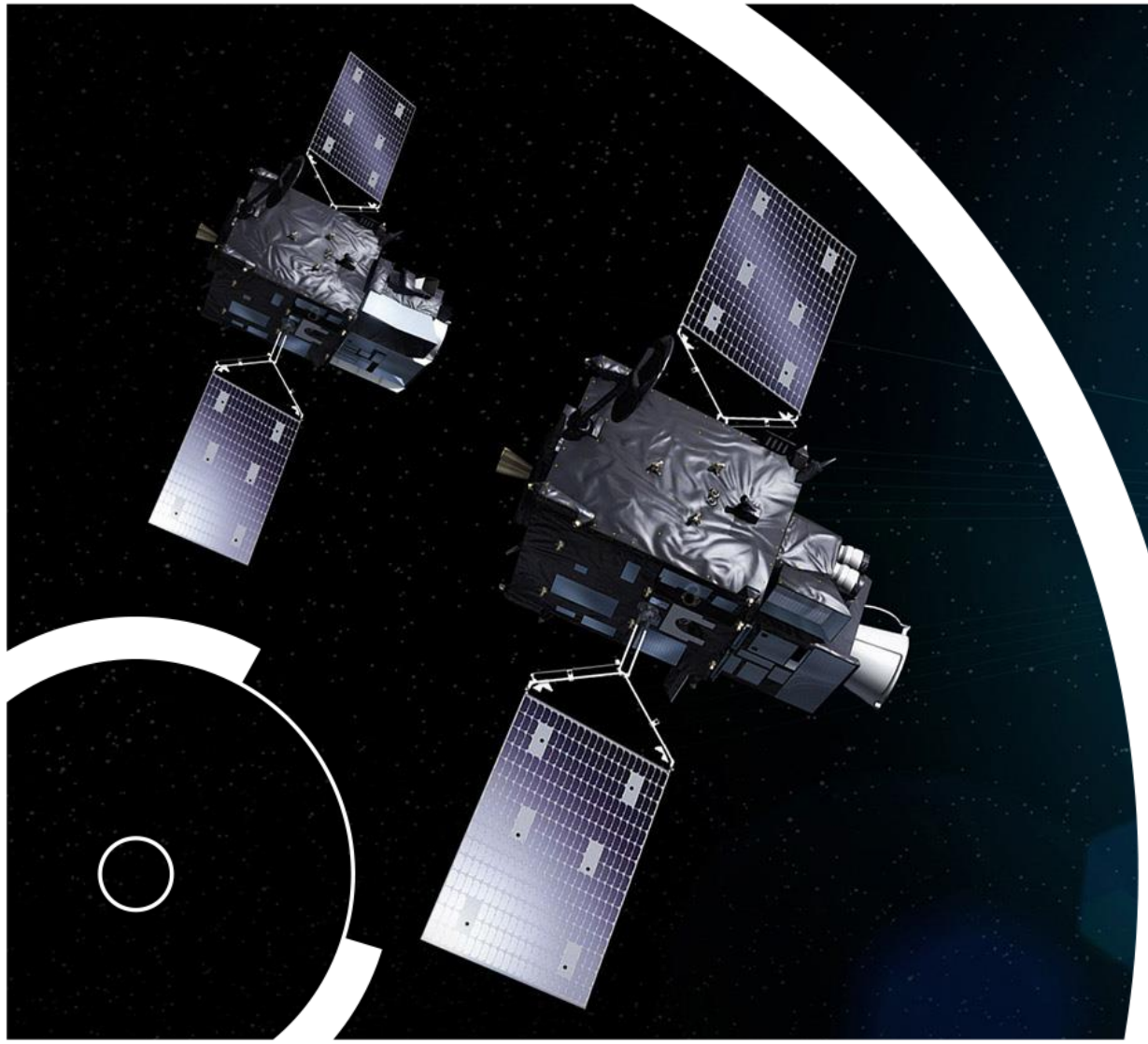
EUMETSAT



Introducing MTG FCI

Vesa Nietosvaara

With contributions from training team @ **EUMETSAT**
and examples by many others

Agenda this week

Time (UTC)	Monday, 23 June	Tuesday, 24 June	Wednesday, 25 June	Thursday, 26 June	Friday, 27 June
09:00 – 09:30	**Introducing MTG FCI** *Vesa Nietosvaara (EUMETSAT)*	**Level-2 EUMETSAT product** *Johan Strandgren (EUMETSAT)*	**MTG benefits for nowcasting severe convection** *Alois Holzer (ESSL)*	**LSA SAF MTG Improvements** *Isabel Trigo (LSA SAF)*	**H-SAF products** *Claudio Giorgi, Roberto Nicoletta, Semih Kuter (H-SAF)*
09:30 – 10:00	**Introducing MTG LI** *Sven-Erik Enno (EUMETSAT)*	**Low-level moisture** *HansPeter Roesli*	**Convection analysis with MTG FCI-I** *Roland Winkler (Austro Control GmbH)*		**Examples from the Middle-East** *Ibrahim Mohammed Al-Abdul Salam (Met Service Oman)*
Break	Break	Break	Break	Break	End of the Event Week
13:00 – 13:30	**Jupyter notebooks EUMETView Data store** *Carla Barroso (EUMETSAT)*	**Cloud Type RGB: a complete and nuanced product** *Roxane Desire (Météo-France)*	**Fire detection** *Andrea Meraner (EUMETSAT)*	**NWC SAF Convection products** *J.-M. Moisselin, E. Fontaine (Météo-France)*	
13:30 – 14:00	**Visualization of MTG data: Pytroll/Satpy** *Gerrit Holl (DWD)*	**New RGBs from FCI** *Andreas Wirth (GSA)*	**Dust and Aerosols** *Ivan Smiljanic (EUMETSAT)*	**NWC SAF products** *Xavier Calbet (AEMET)*	

Intro & technicalities	Products	Applications

A quick poll – add your tick to a right box

	I have some operational experience in using MTG products	I have no operational experience in using MTG products	I have no access to the MTG products	What is MTG?
Forecaster				
Research, training				
Other				

Current EUMETSAT satellites (10)

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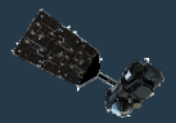
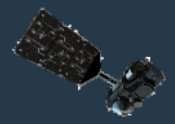
SENTINEL-3A & -3B (98.7° incl.)

Low Earth, sun-synchronous orbit

Copernicus satellites delivering marine data services from 814km altitude



Sentinel-3A



Sentinel-3B

JASON-3 (63° incl.)

Low Earth, non-synchronous orbit

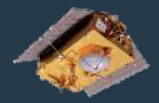
Copernicus ocean surface topography mission (shared with CNES, NOAA, NASA and Copernicus)

Jason-3

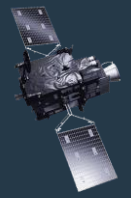
Sentinel-6 Michael Freilich (66° incl.)

Low Earth, non-synchronous orbit

Copernicus ocean surface topography mission (shared with NASA, NOAA, ESA and Copernicus with support from CNES)



Sentinel-6 Michael Freilich

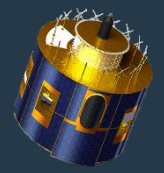


METEOSAT-12

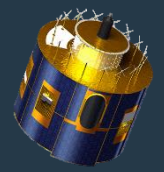
METEOSAT-12

Geostationary orbit

Meteosat Third Generation imaging mission, EUMETSAT prime satellite



Meteosat-10



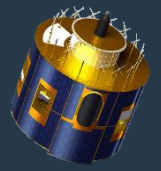
Meteosat-11

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))

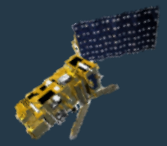


Meteosat-9

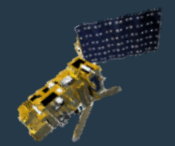
METEOSAT-9 (45.5° E)

Geostationary orbit

Meteosat Second Generation providing Indian Ocean data coverage



Metop-C



Metop-B

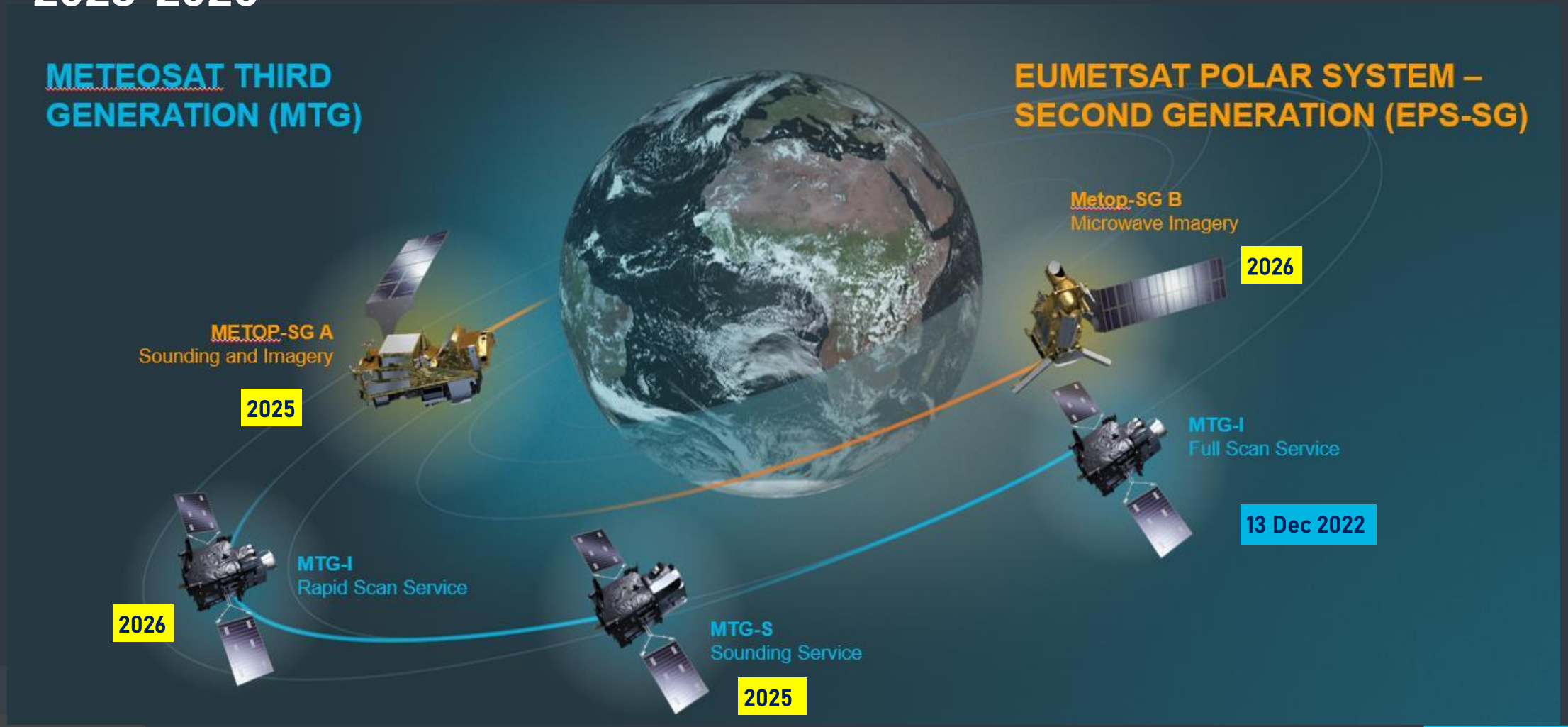
METOP-B & -C (98.7° incl.)

Low Earth, sun-synchronous orbit

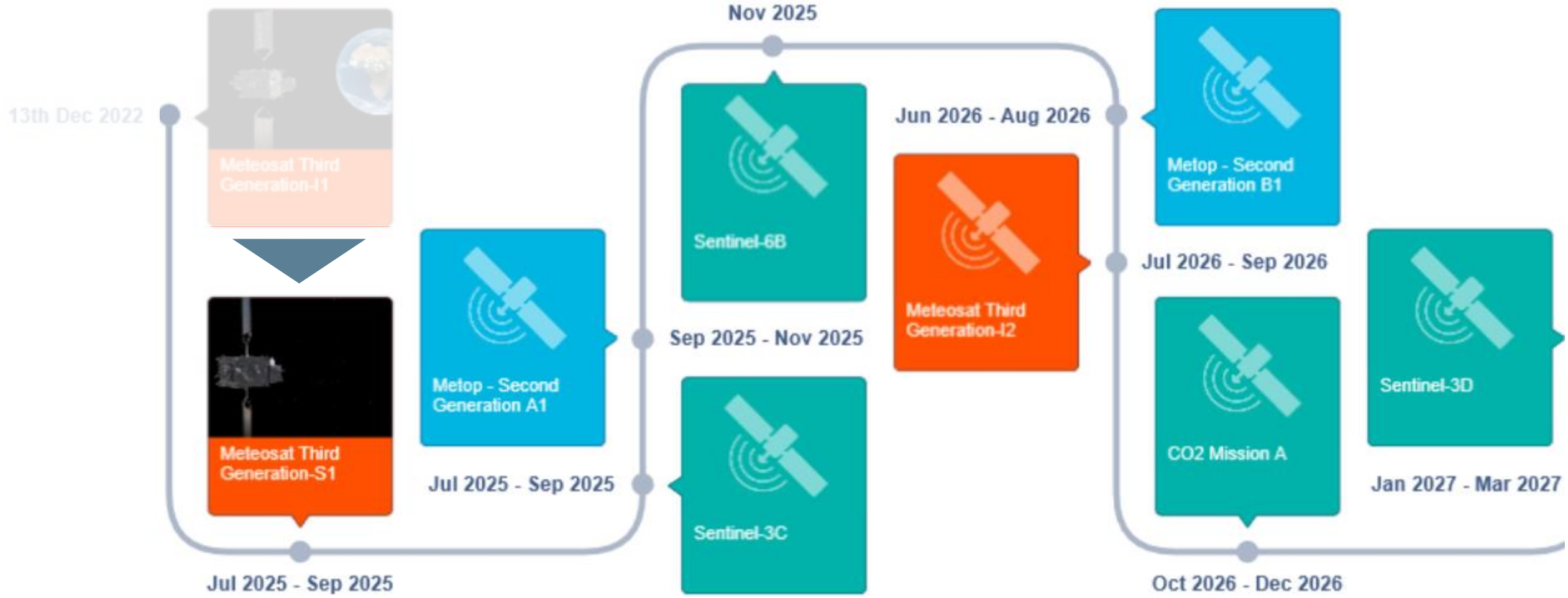
EUMETSAT Polar System (EPS)/ Initial Joint Polar System

EUMETSAT

COMPLETE UPGRADE OF EUROPEAN METEOROLOGICAL SATELLITE FLEET 2023-2026



Upcoming launches



MTG Mission Objectives

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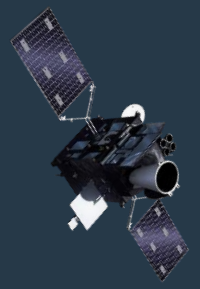
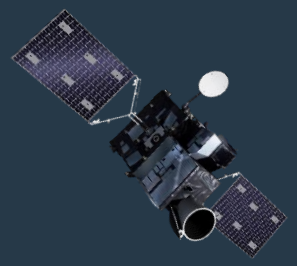


MTG-I

Full Disc image service

- 16 spectral channels over Europe and Africa every 10 minutes
- Lightning Imager



MTG-S

Full Disc sounding service

- Hyperspectral Infrared Sounder
- Copernicus Sentinel-4 UVN

MTG-I

Rapid Scanning Service

- 16 spectral channels over Europe every 2.5 minutes

Primary mission:

- **Support Nowcasting/ Short Range Forecasting of high impact weather**
  - This is achieved through:
    - Continuity and enhancement of MSG imagery
    - Addition of a new lightning imaging capability
    - New, innovative infrared hyper-spectral sounding

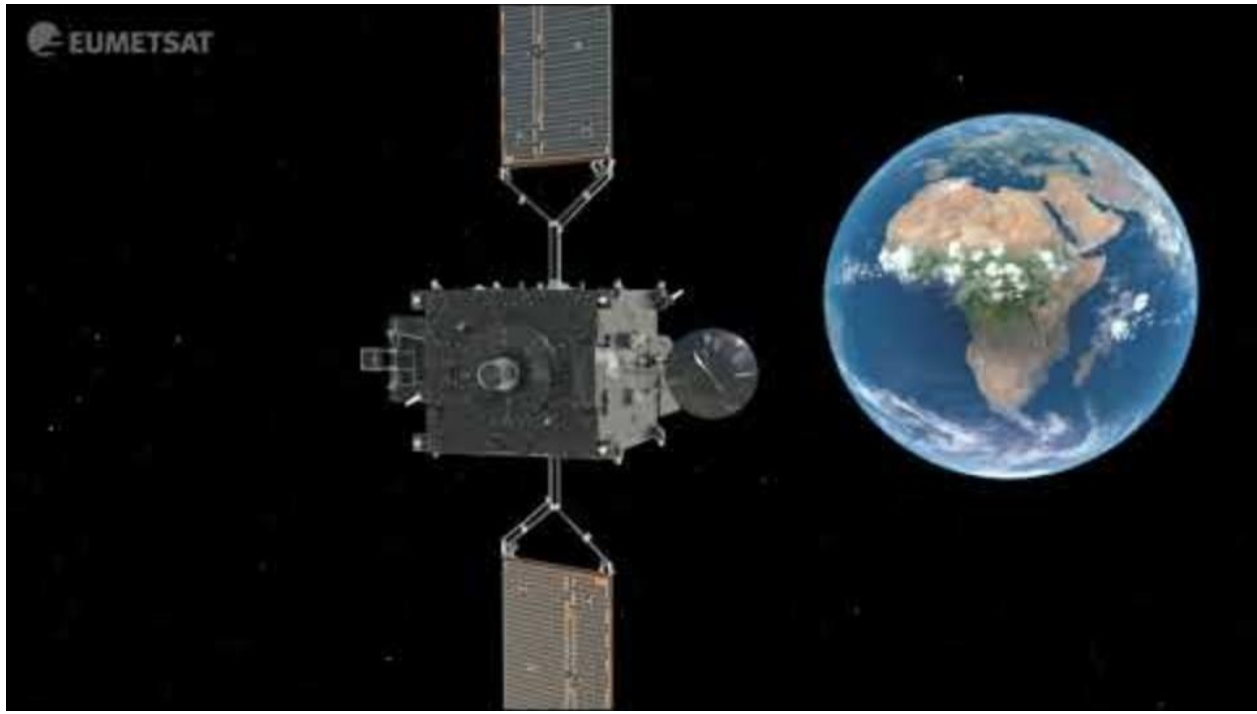
Secondary mission:

- **Air quality monitoring over Europe**
  - This is achieved through:
    - Synergy between Sentinel-4, Infrared Sounder and Imagery

Meteosat Third Generation (MTG)

The complete constellation of Meteosat Third Generation (MTG) consists of three spacecraft:

- two imaging satellites and one sounding satellite.
- The first imaging satellite, MTG-I1 is now operational under the name Meteosat-12, and it has been declared EUMETSAT Prime Satellite just a week ago.
- The satellite carries two important instruments:
  - – Flexible Combined Imager (FCI), a successor of SEVIRI on MSG, and
  - - Lightning Imager (LI), the first space-based instrument monitoring lightning occurrence over Europe, Africa and South America from geostationary orbit.
- The sounding satellite will be launched in July 2025.

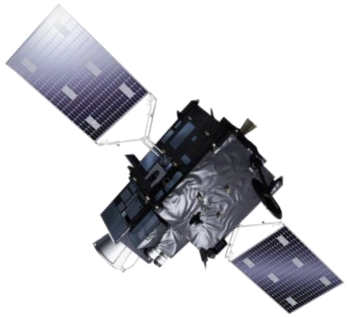


Forecasters will now be able to track the development of storms in near-real time with better accuracy, issue more precise and timely warnings about severe and dangerous weather events but also monitor fog development and dissipation, dust outbreaks, forest fires and many other features.

At this EUMeTrain Event week first talk, we will focus on the FCI and how it can help monitoring the weather and improving nowcasting.

MTG vs MSG (FCI vs SEVIRI)

- What's new? – RESOLUTION:



Spatial

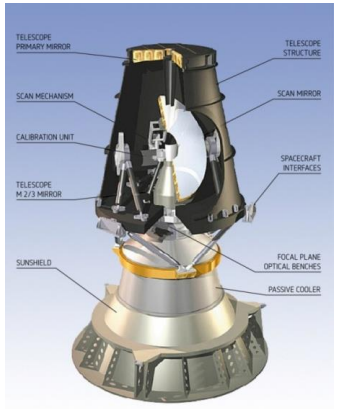
Temporal

Spectral

Radiometric

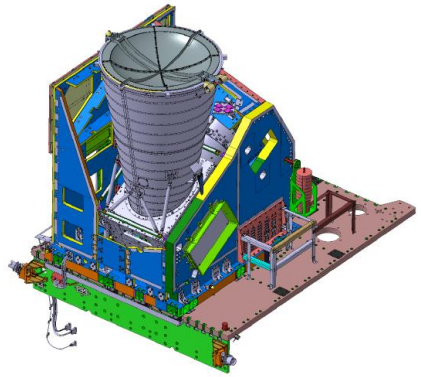
Performance Enhancements of Spectral Imager

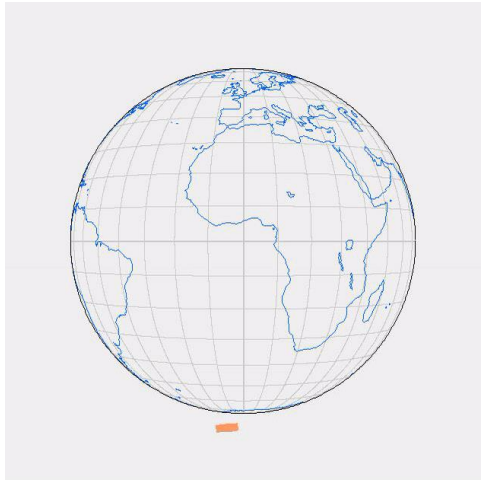
SEVIRI



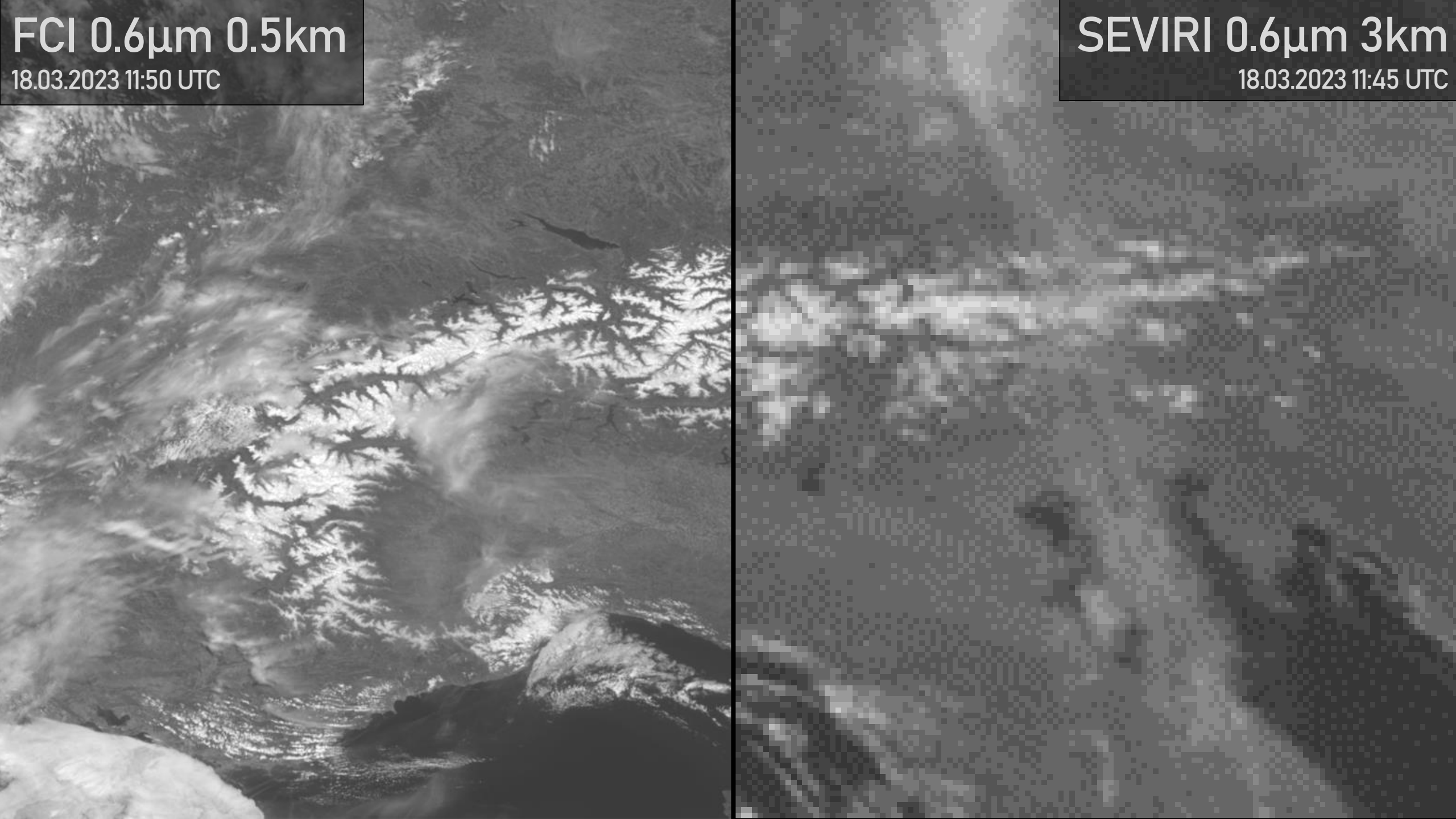
SEVIRI on Meteosat Second Generation satellites	FCI on Meteosat Third Generation satellites
15 min full disc repeat cycle	10 min full disc repeat cycle
IR3.9 up to 335K	IR3.8 up to 450K
11 x 3.0 km non-HRV channels	Normal resolution (FDHSI): • 8 x 1.0 km channels • 8 x 2.0 km channels
1.0 km High-Resolution Visible channel (HRV)	High resolution (HRFI): • 2 x 0.5 km channels • 2 x 1 km channels
	New channels • VIS0.4 • VIS0.5 • VIS0.9 • NIR1.3 • NIR2.2

FCI

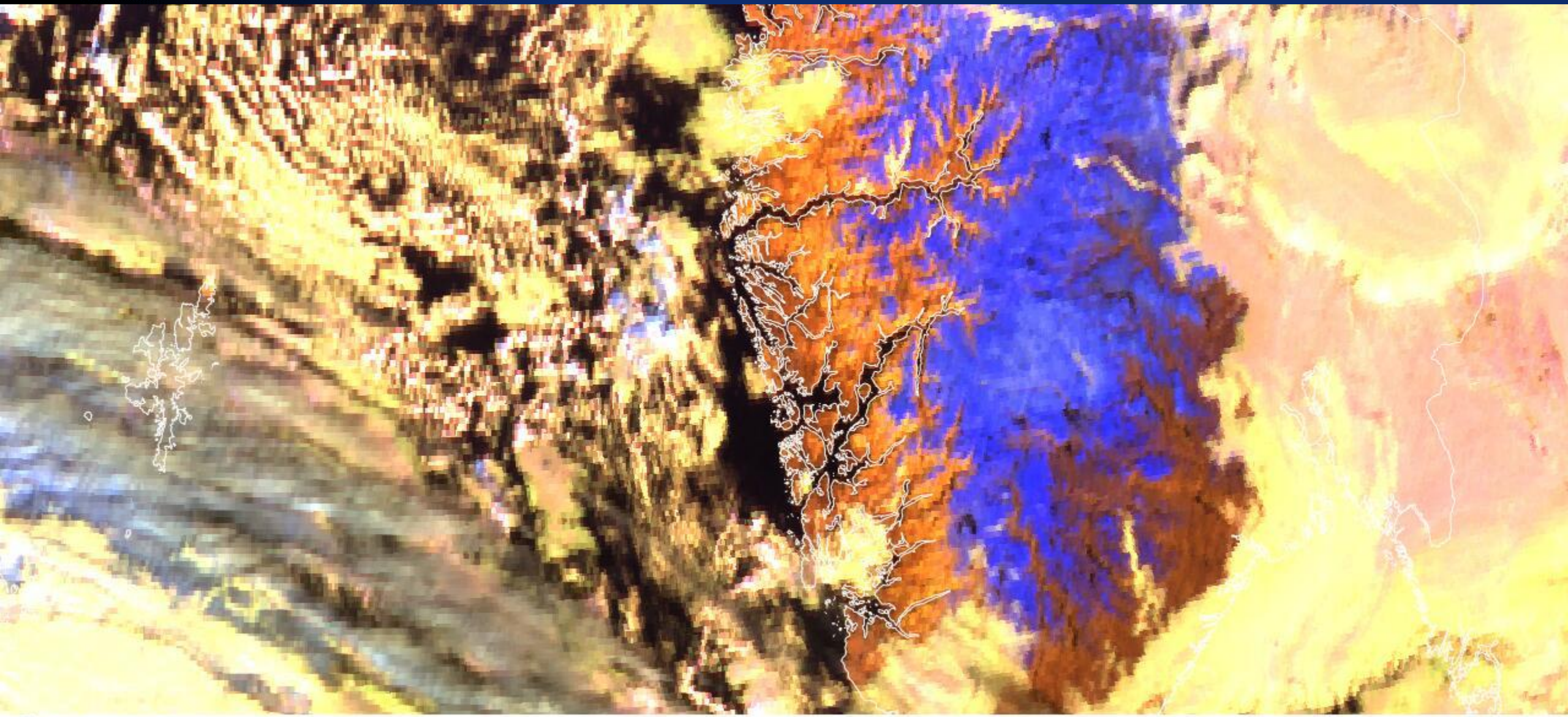




Full Disc Scanning Service (FDSS)


FCI 0.6µm 0.5km
18.03.2023 11:50 UTC
SEVIRI 0.6µm 3km
18.03.2023 11:45 UTC

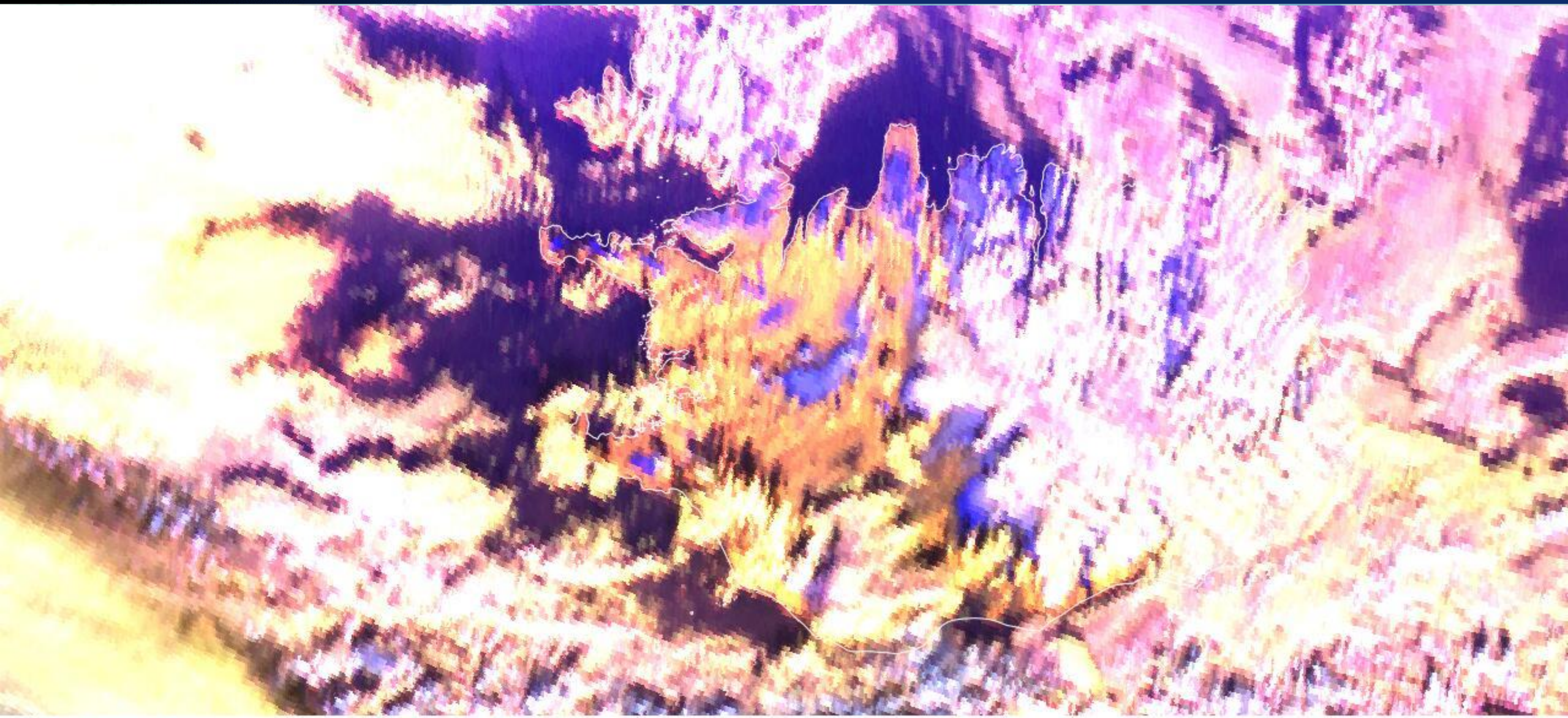
Example 3. 08.11.2023 11 UTC - Zoom Norwegian Coast.
MSG Day Natural Colour RGB vs MTG Cloud Phase RGB



EUMETSAT

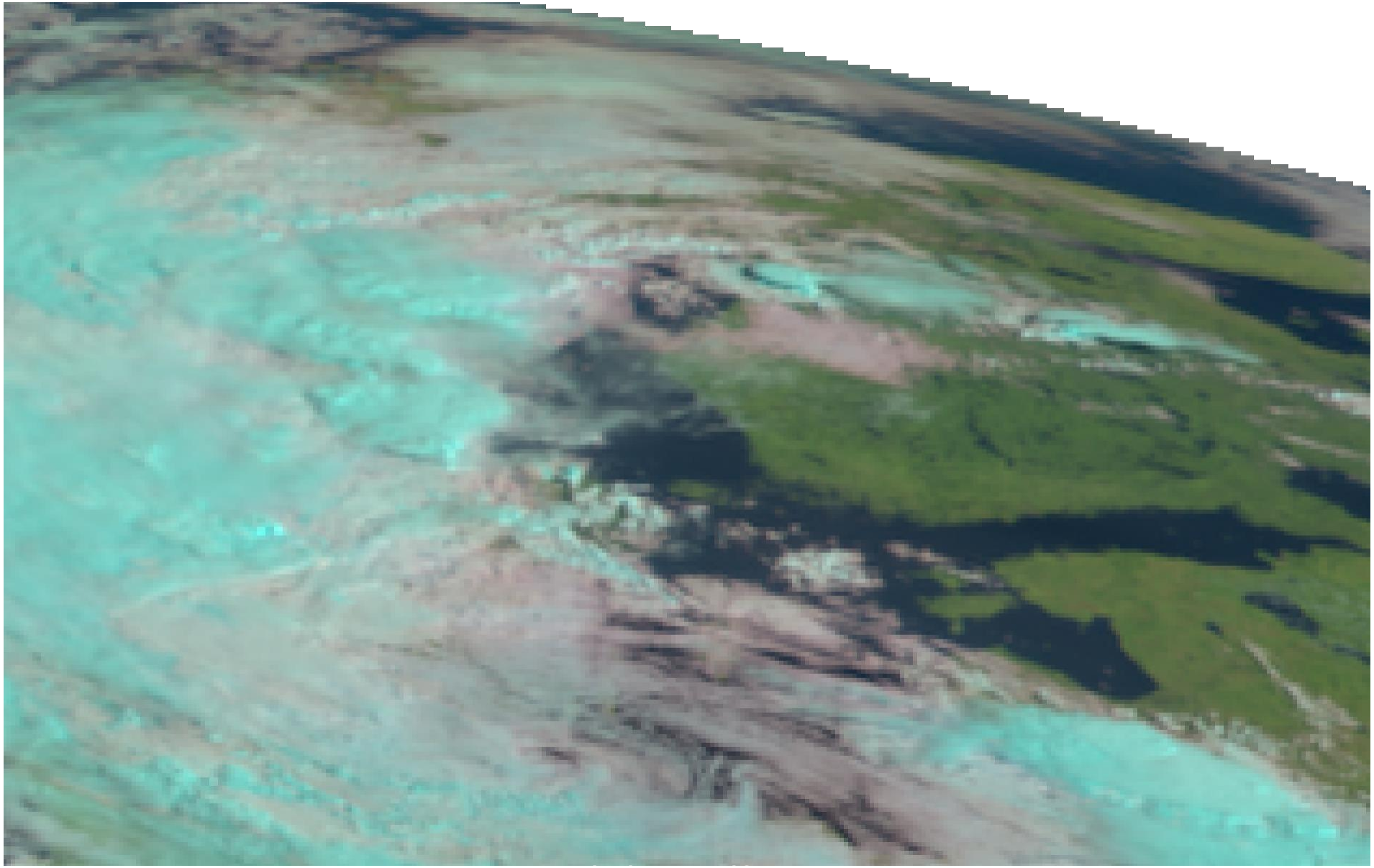
2023-11-08 11:00:00 UTC

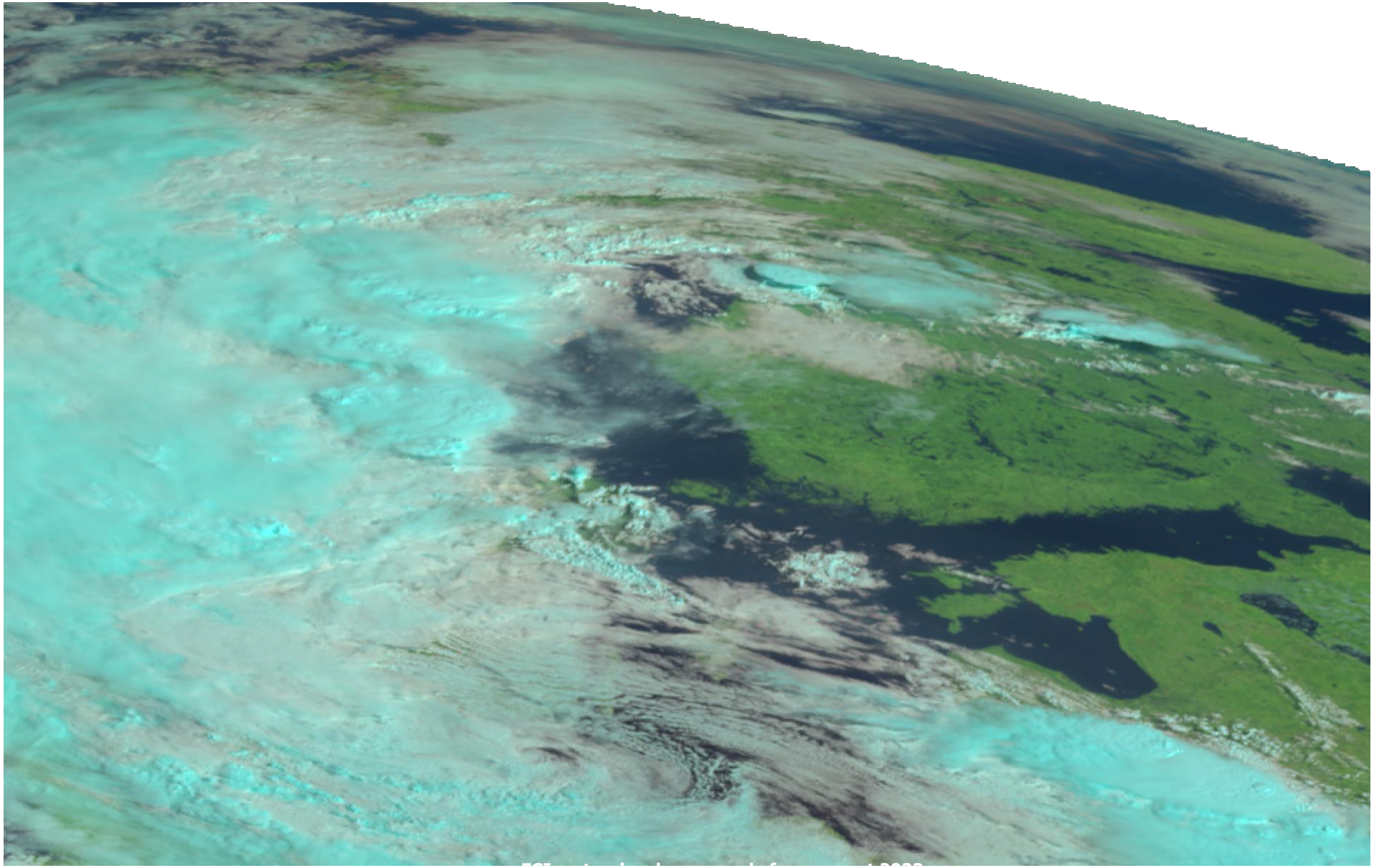
Example 4. 08.11.2023 11 UTC - Zoom to Iceland.
MSG Day Natural Colour RGB vs MTG Cloud Phase RGB

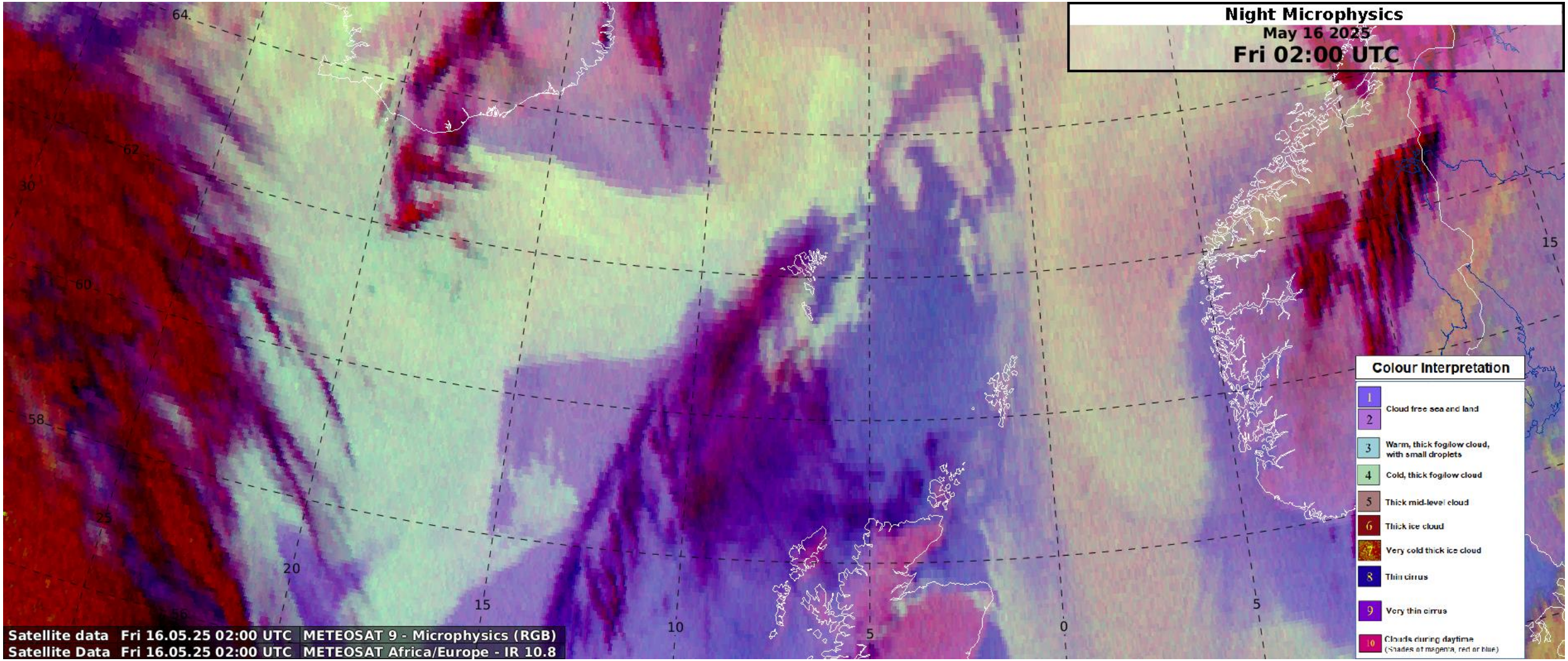


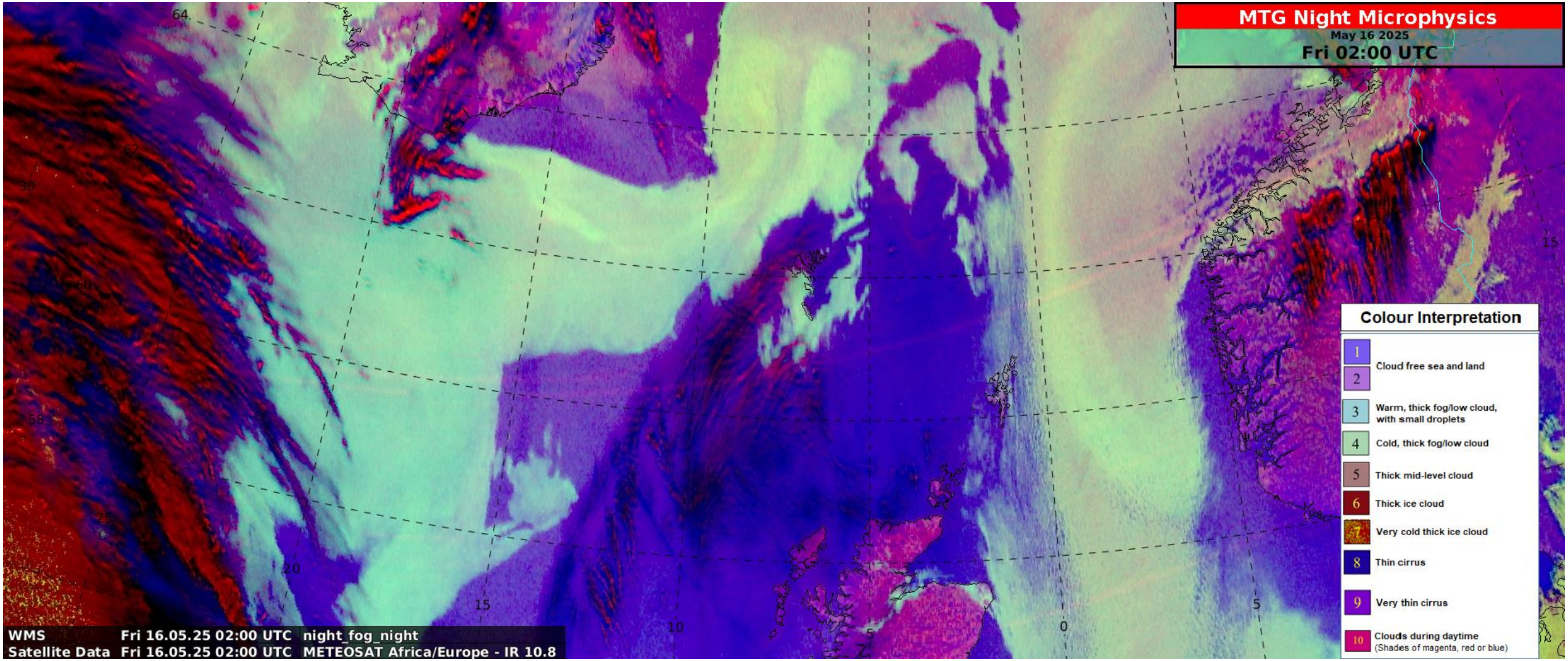
EUMETSAT

2023-11-08 11:00:00 UTC






Night Microphysics
May 16 2025
Fri 02:00 UTC
Colour Interpretation
1
2
Cloud free sea and land
3
Warm, thick fogllow cloud, with small droplets
4
Cold, thick fogllow cloud
5
Thick mid-level cloud
6
Thick ice cloud
7
Very cold thick ice cloud
8
Thin cirrus
9
Very thin cirrus
10
Clouds during daytime (Shades of magenta, red or blue)
Satellite data Fri 16.05.25 02:00 UTC METEOSAT 9 - Microphysics (RGB)
Satellite Data Fri 16.05.25 02:00 UTC METEOSAT Africa/Europe - IR 10.8


MTG Night Microphysics
May 16 2025
Fri 02:00 UTC
Colour Interpretation
1
2
Cloud free sea and land
3
Warm, thick fog/low cloud, with small droplets
4
Cold, thick fog/low cloud
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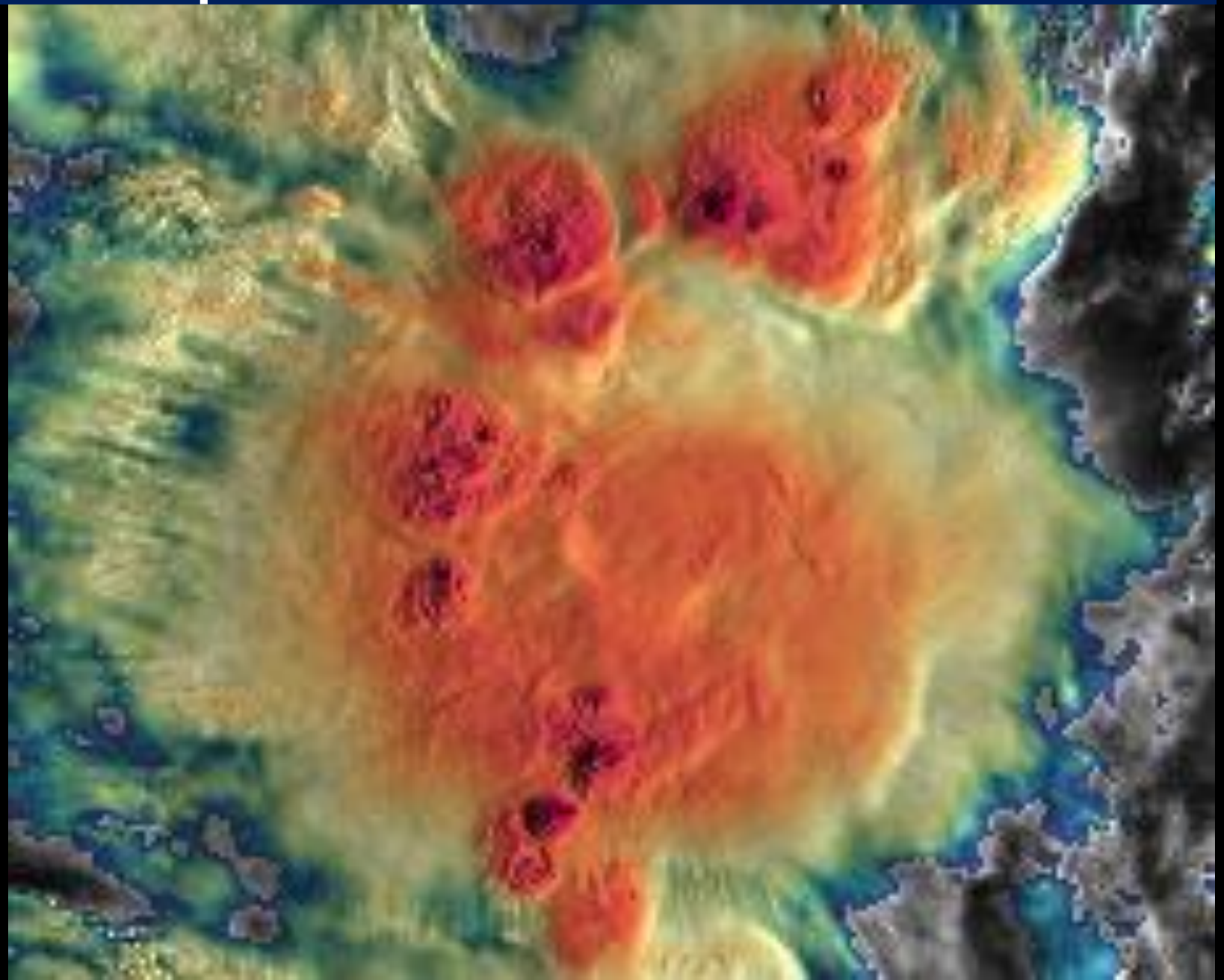
Thick mid-level cloud
6
Thick ice cloud
7
Very cold thick ice cloud
8
Thin cirrus
9
Very thin cirrus
10
Clouds during daytime (Shades of magenta, red or blue)
WMS Fri 16.05.25 02:00 UTC night_fog_night
Satellite Data Fri 16.05.25 02:00 UTC METEOSAT Africa/Europe - IR 10.8

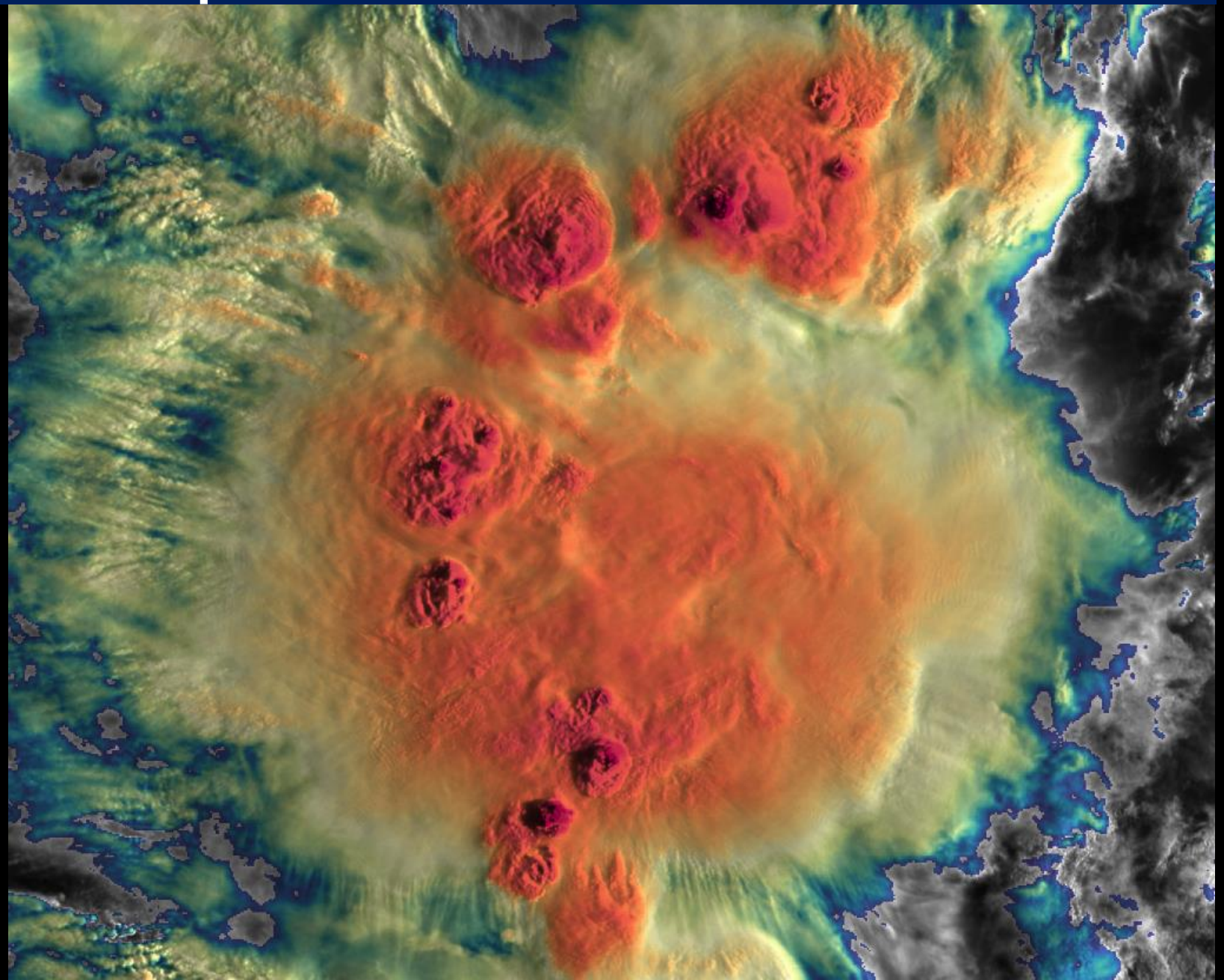
Improvements – Spatial resolution

SEVIRI

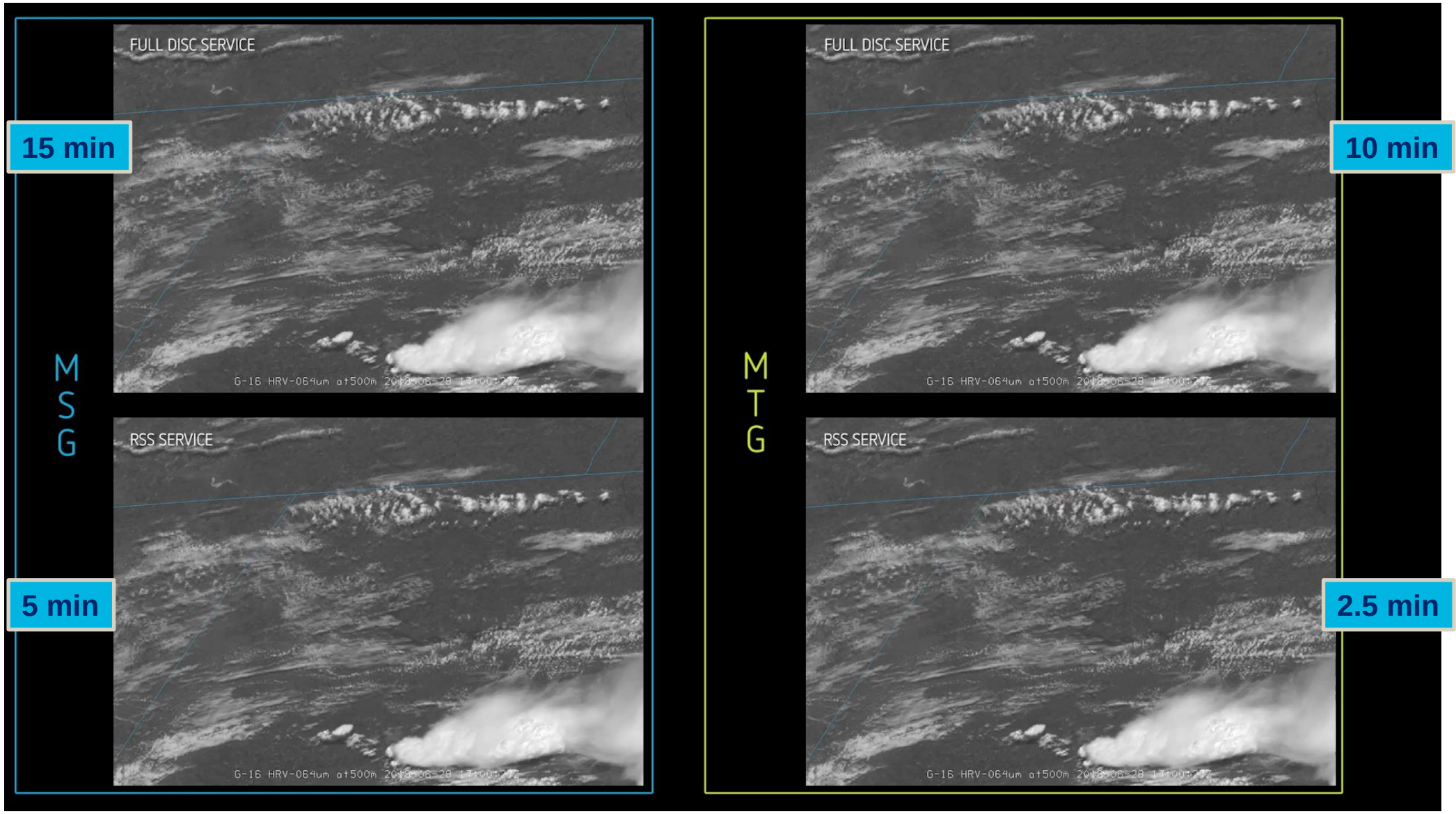


Improvements – Spatial resolution

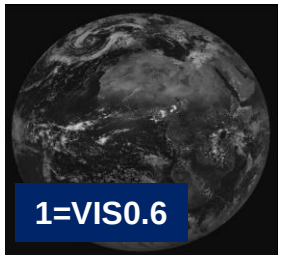
FCI



Temporal resolution improvements

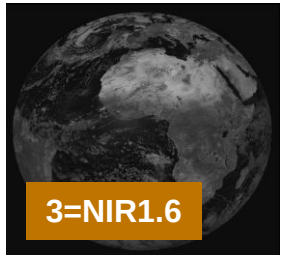


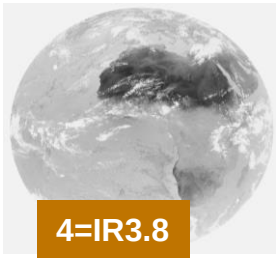
Spectral resolution …

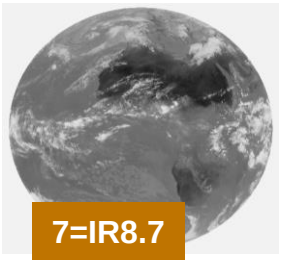


HRV channel provided at 1.0 km resolution.

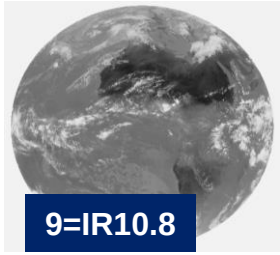
Narrow-band channels provided at 3.0 km resolution.

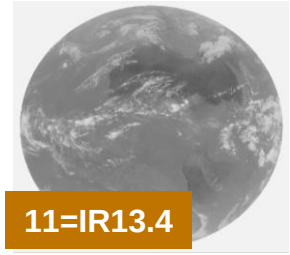




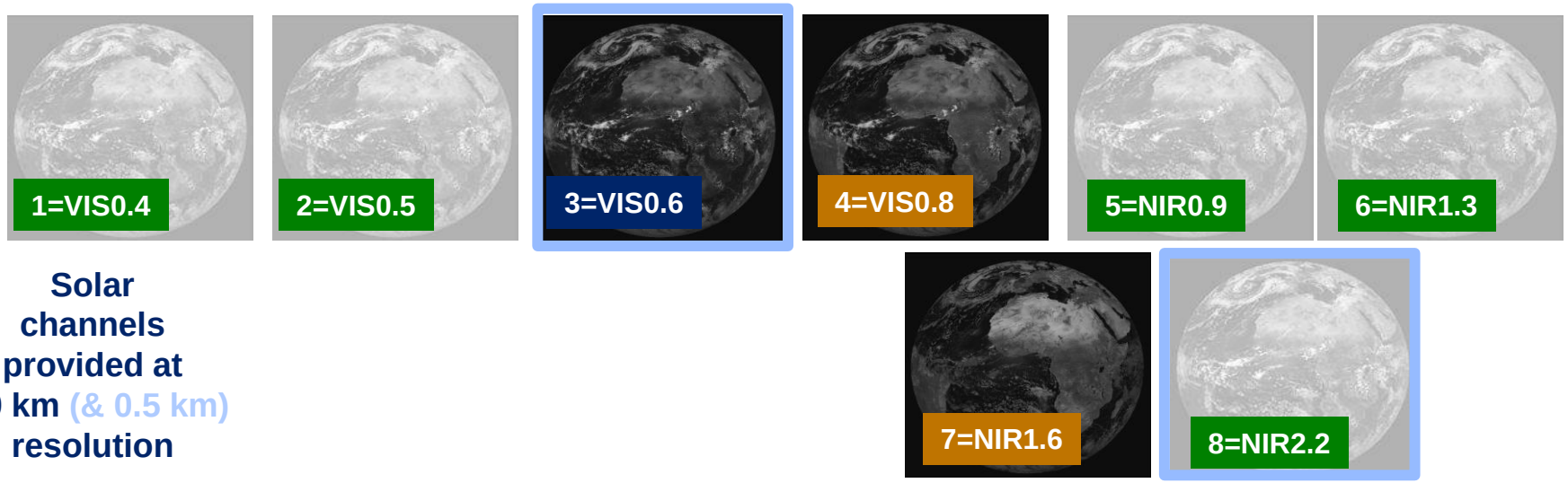


SEVIRI

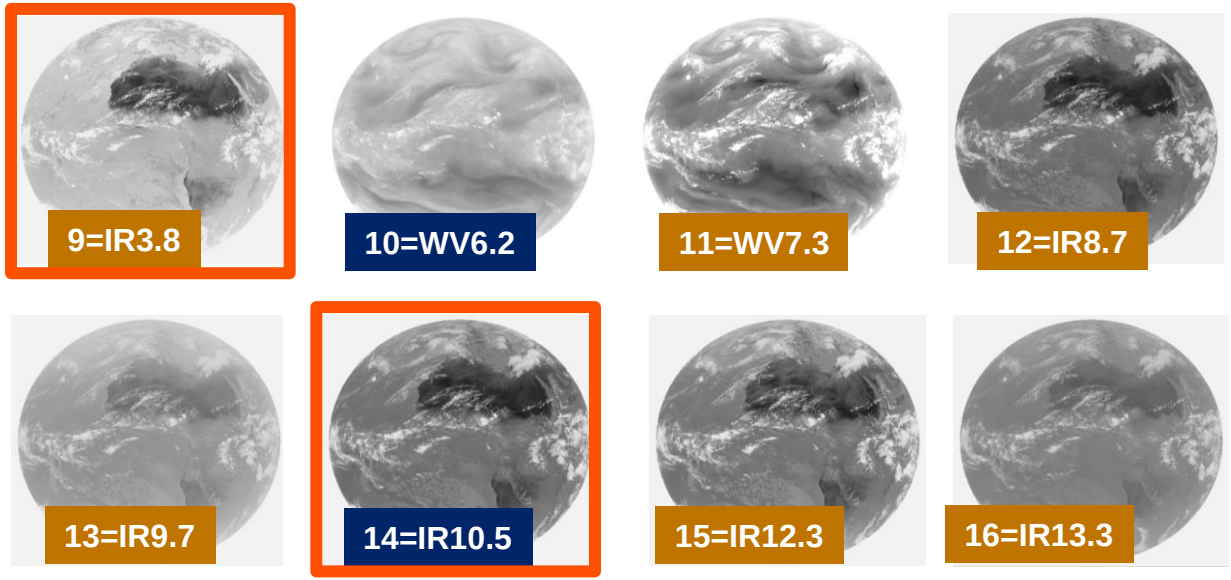




Spectral resolution … improvements



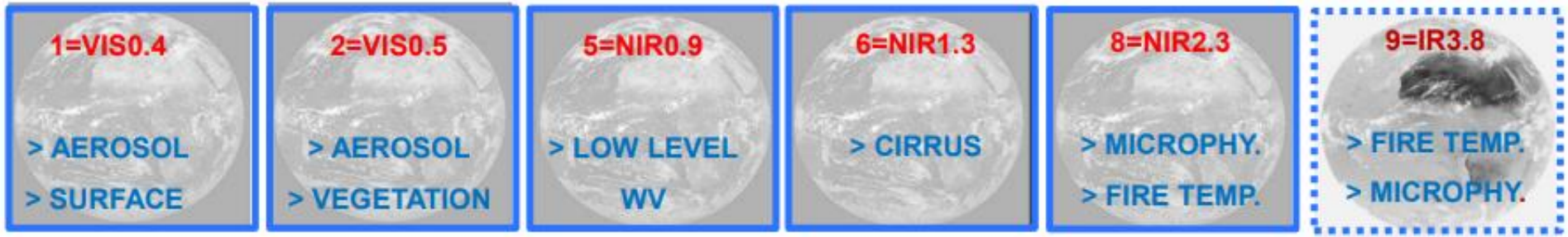
Solar channels provided at 1.0 km (& 0.5 km) resolution



Thermal channels provided at 2 km (& 1 km) resolution

FCI

New channels – new RGB combinations

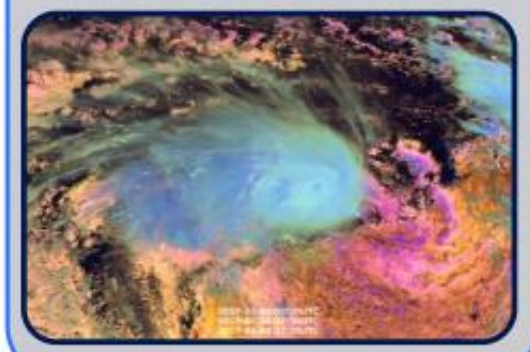


True Colour RGB

R VIS0.6
G VIS0.5
B VIS0.4

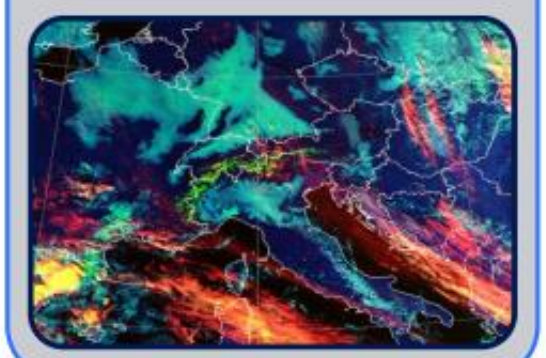
Cloud Phase RGB

R NIR1.6
G NIR2.3
B VIS0.5/VIS0.6



Cloud Type RGB

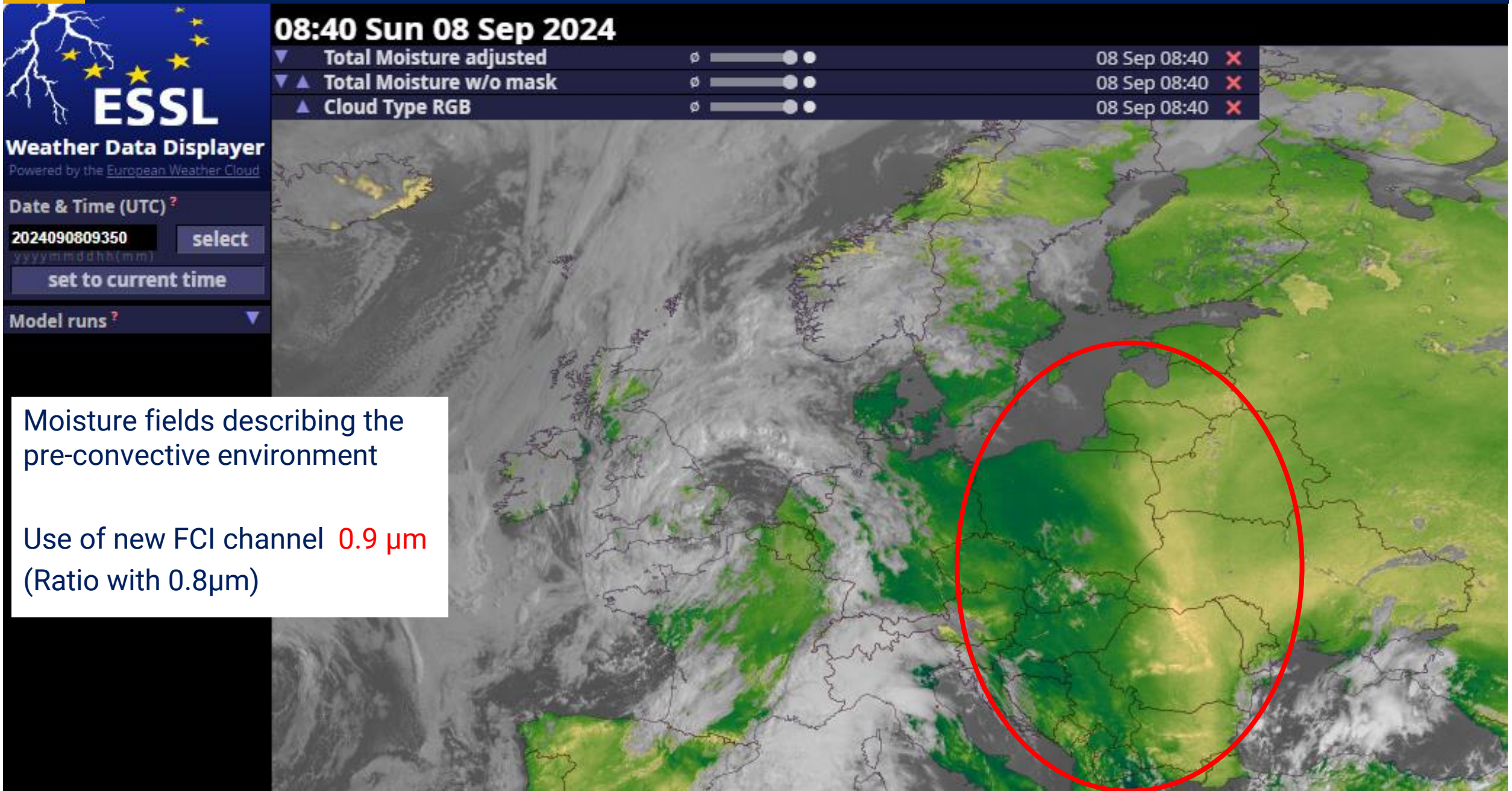
R NIR1.3
G VIS0.8
B VIS1.6



Fire Temp. RGB

R IR3.9
G NIR2.3
B NIR1.6

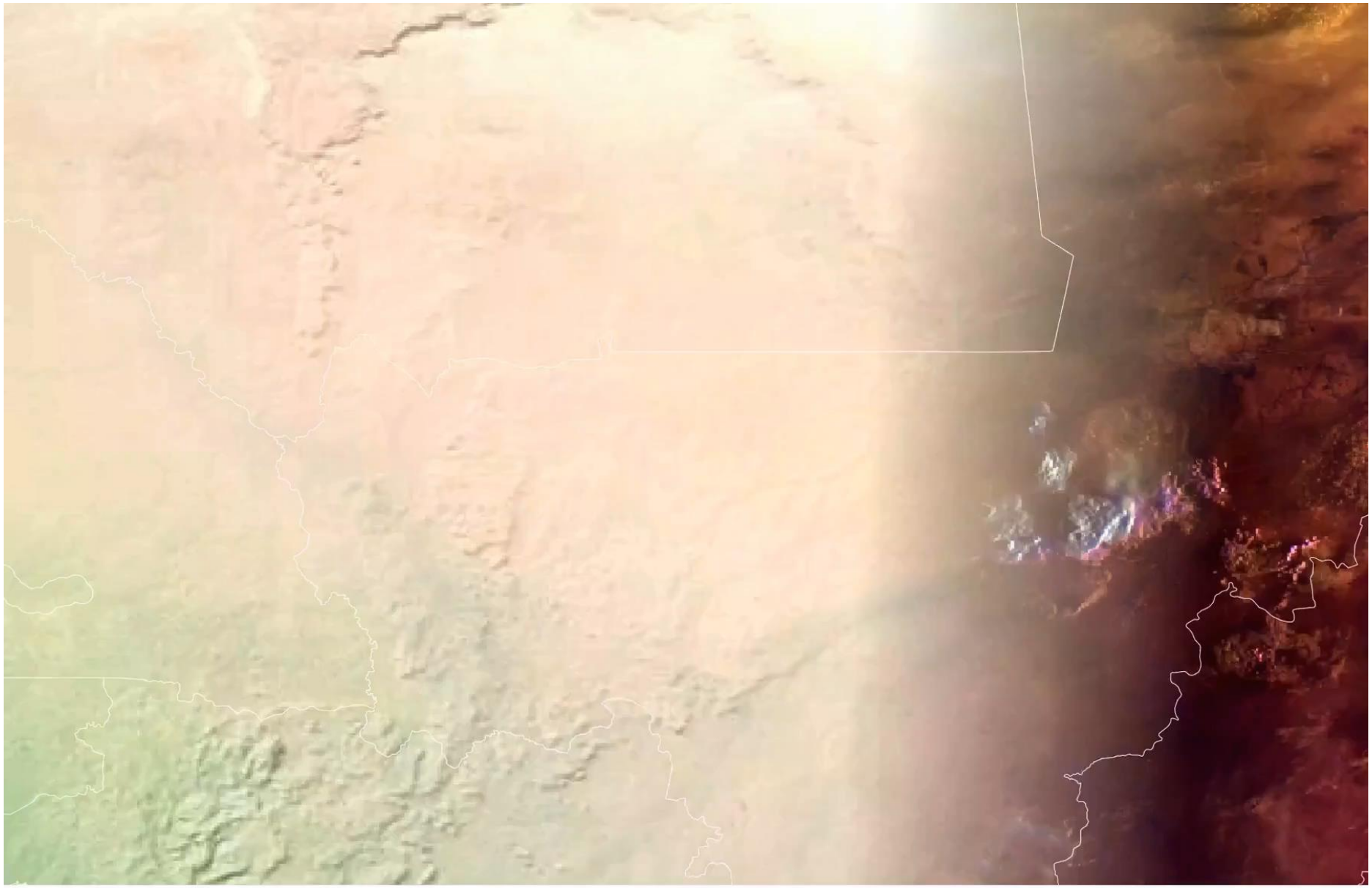
Detecting moisture fields using the new 0.9 micron channel



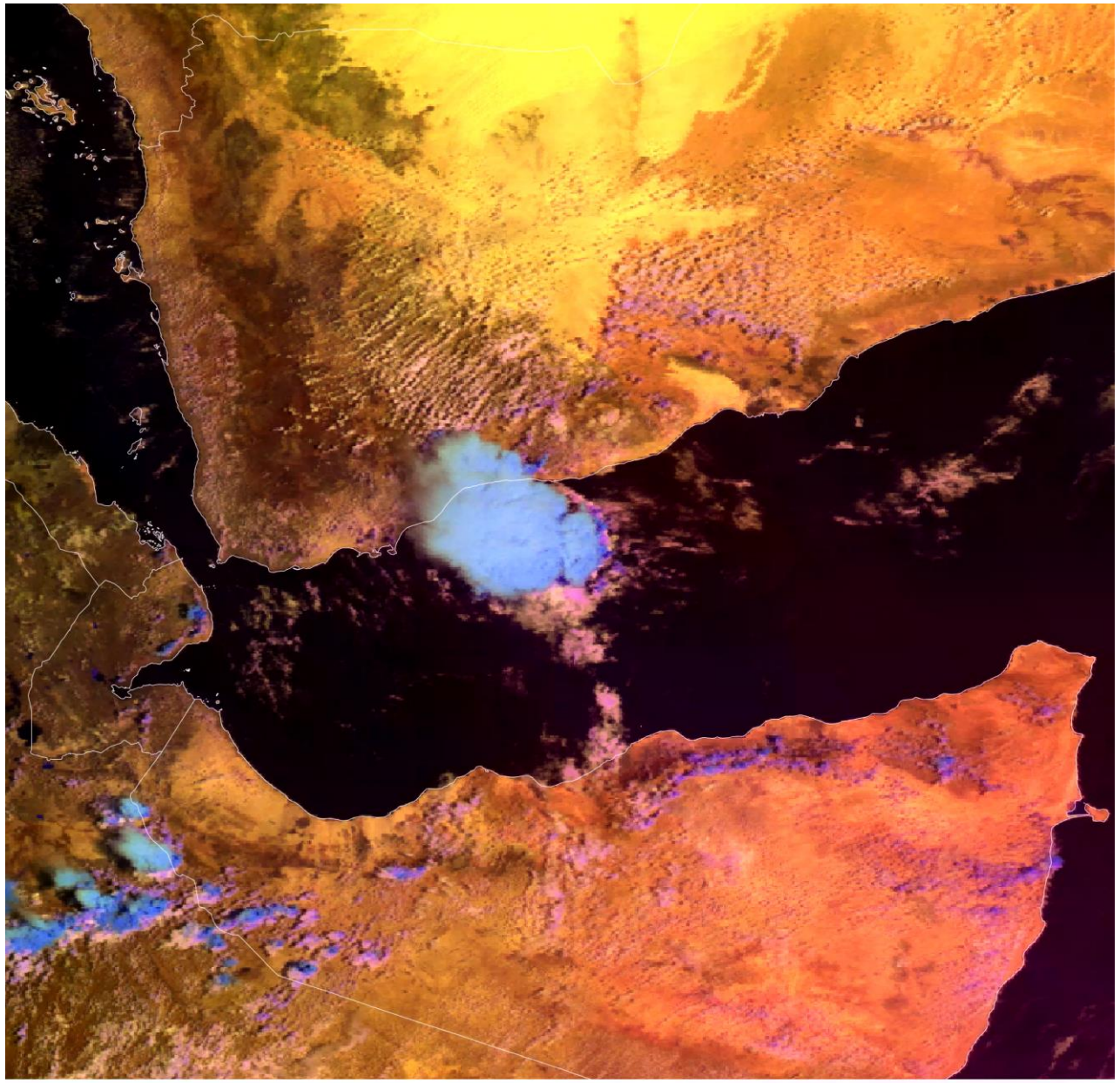
Moisture fields describing the pre-convective environment

Use of new FCI channel 0.9 µm (Ratio with 0.8µm)

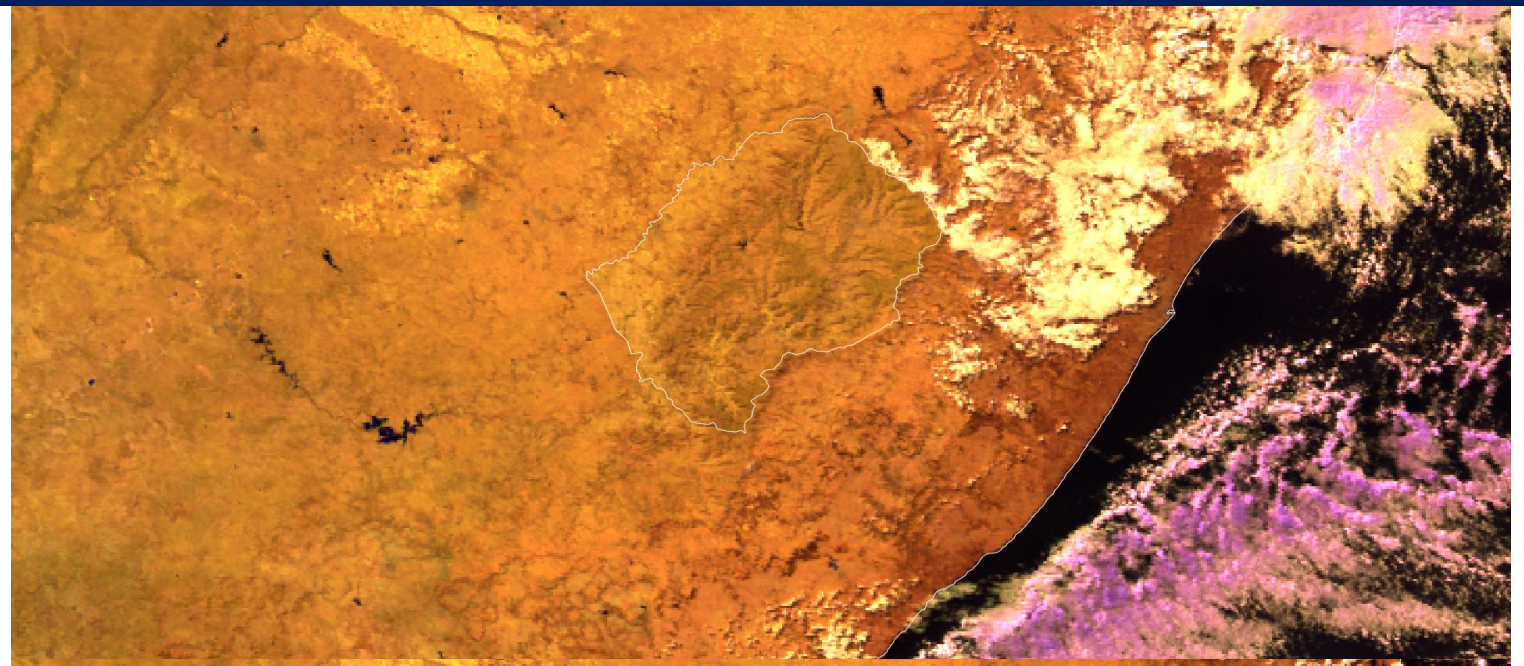
Advecting MCS seen in Cloud Phase RGB



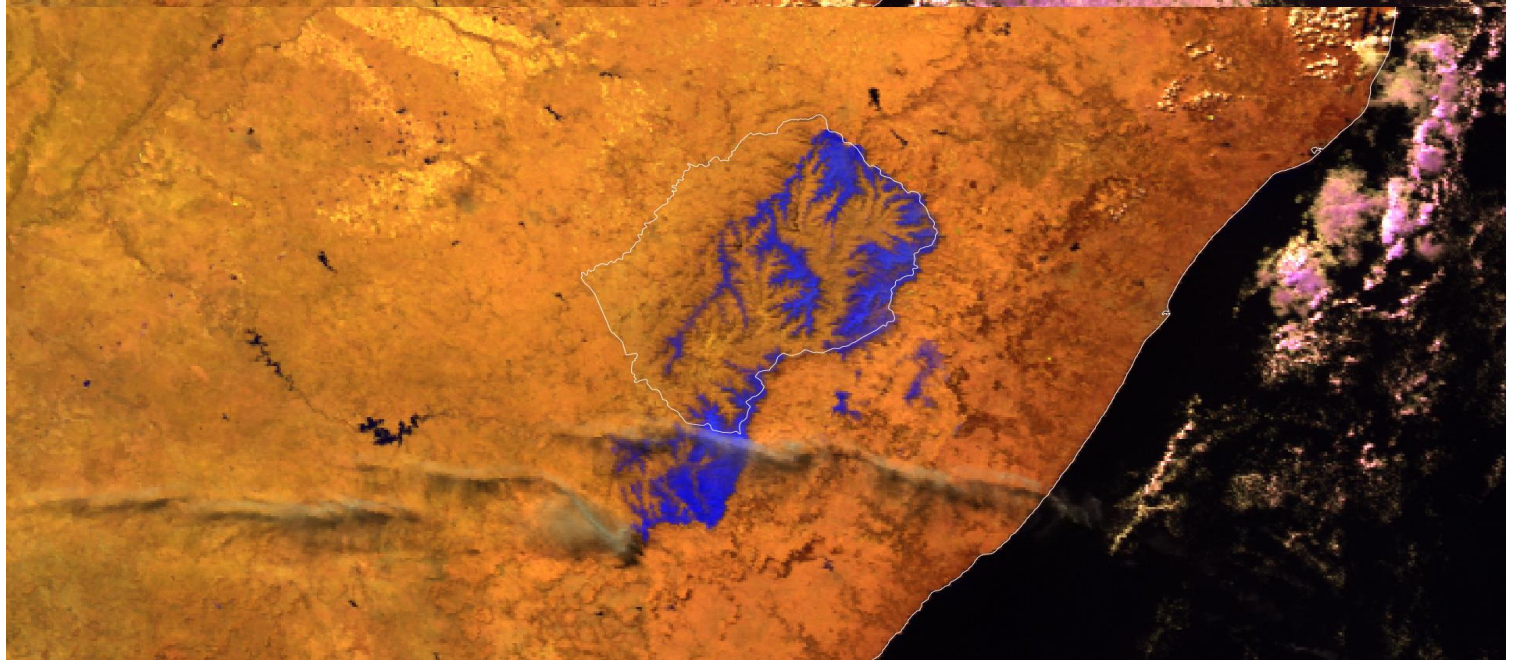
Convective outflow, convection growth / Gulf of Aden



First snow in Lesotho



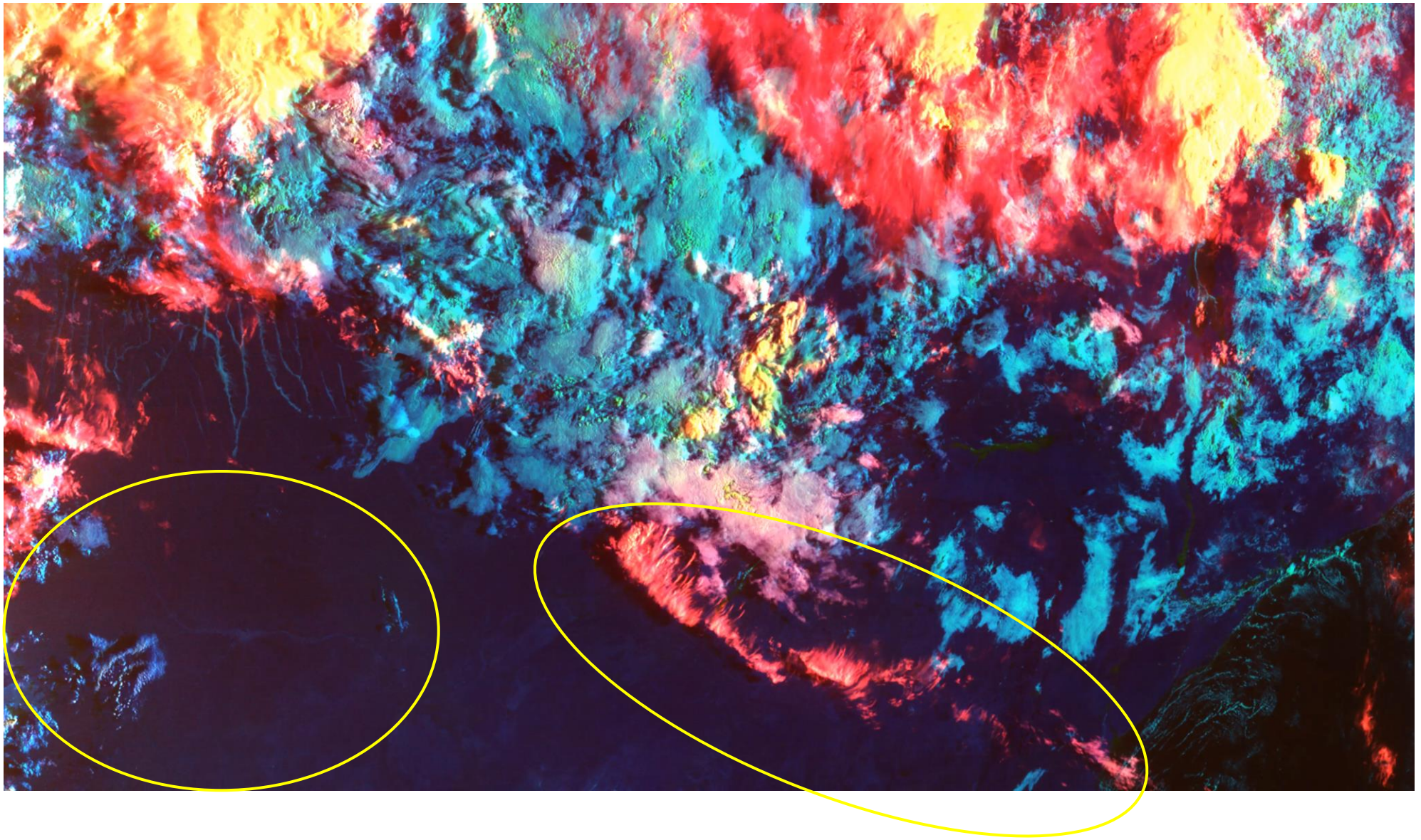
4 June



12 June

Cloud analysis

Southern Africa (Angola-Zambia-Mozambique)19 March 2023, 05.10–11.50 UTC



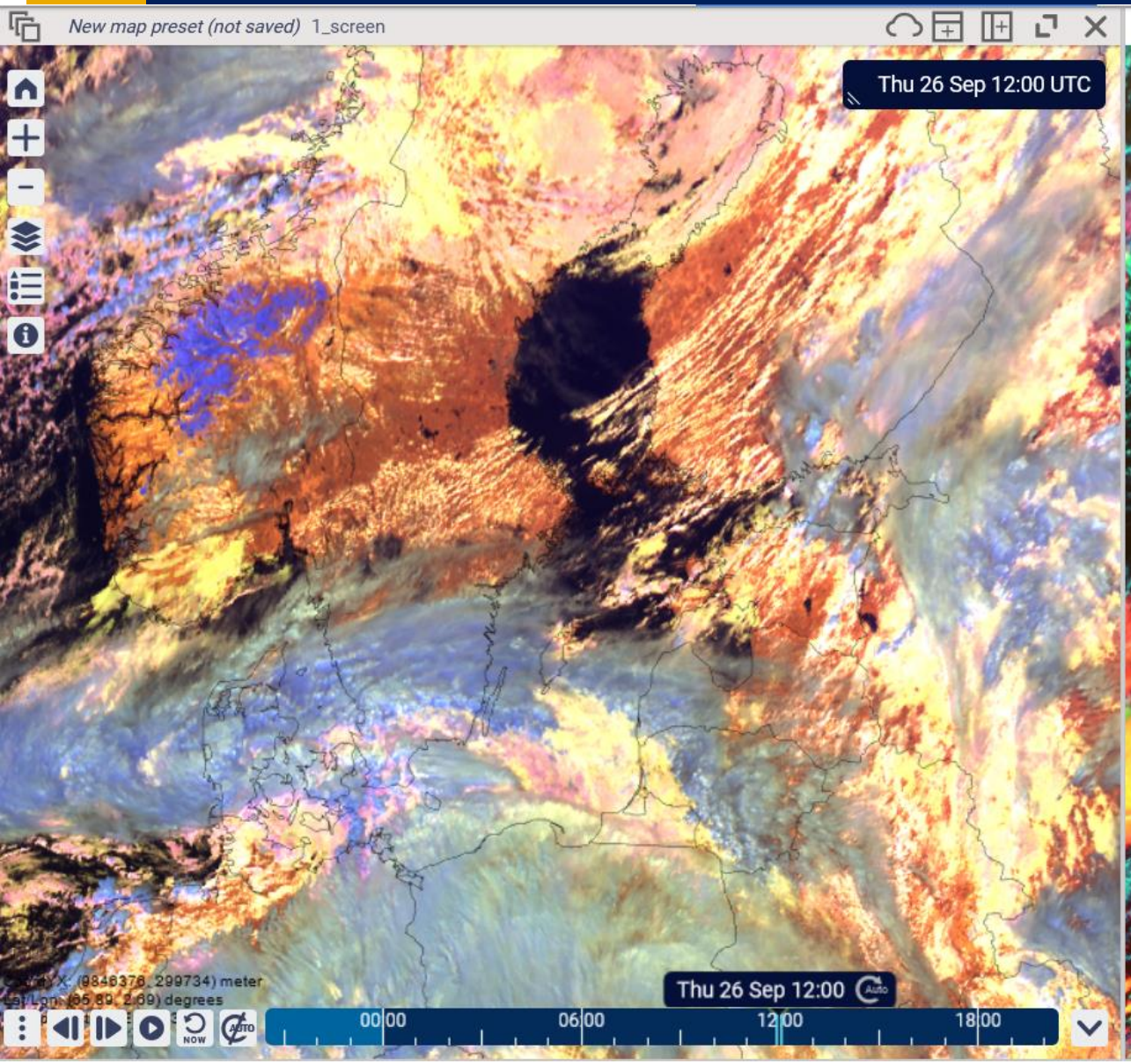
Cloud Type RGB – Best RGB to see thin cirrus clouds due to 1.3 micron

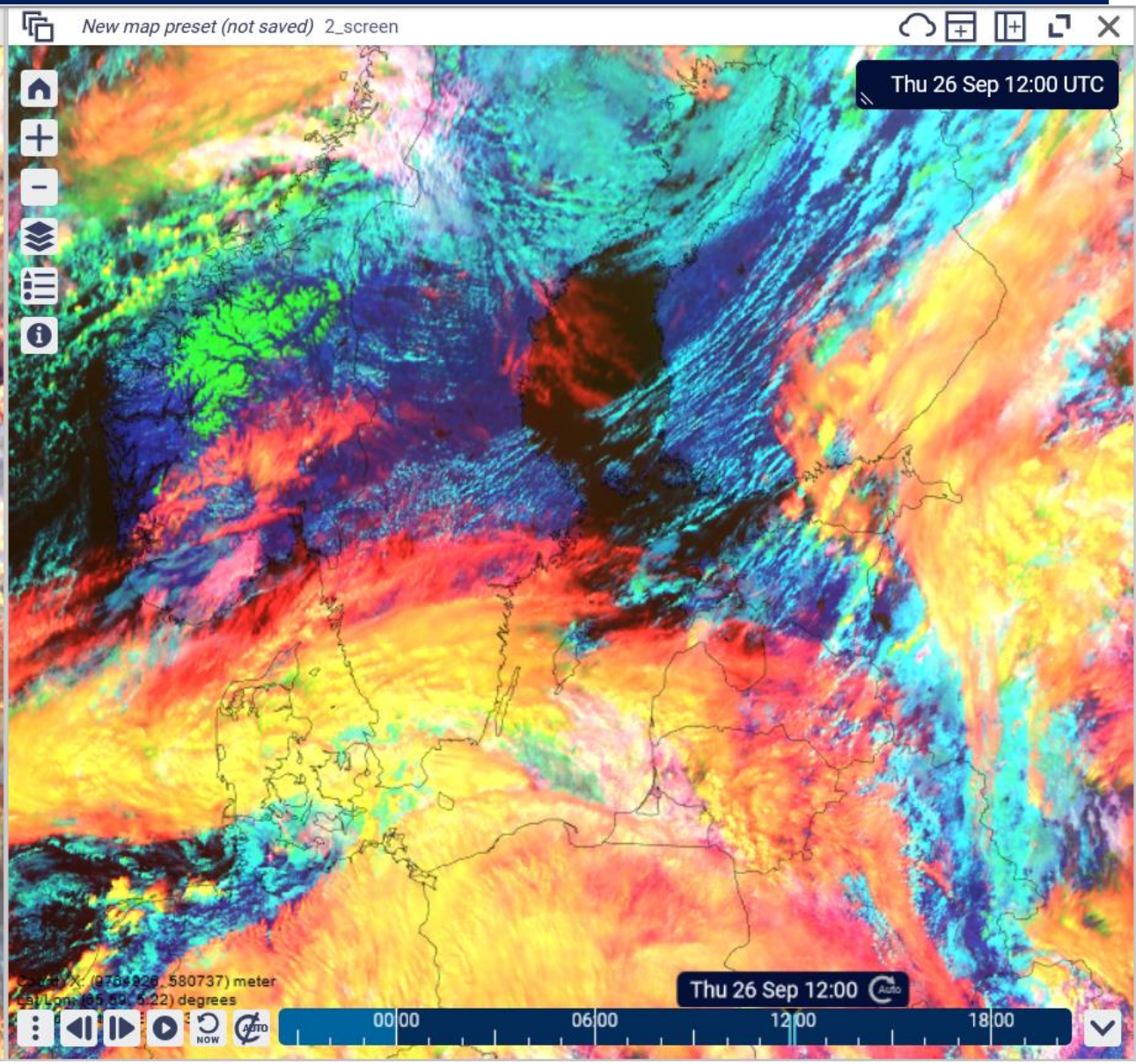
- in bright red

Clear distinction of low level water clouds

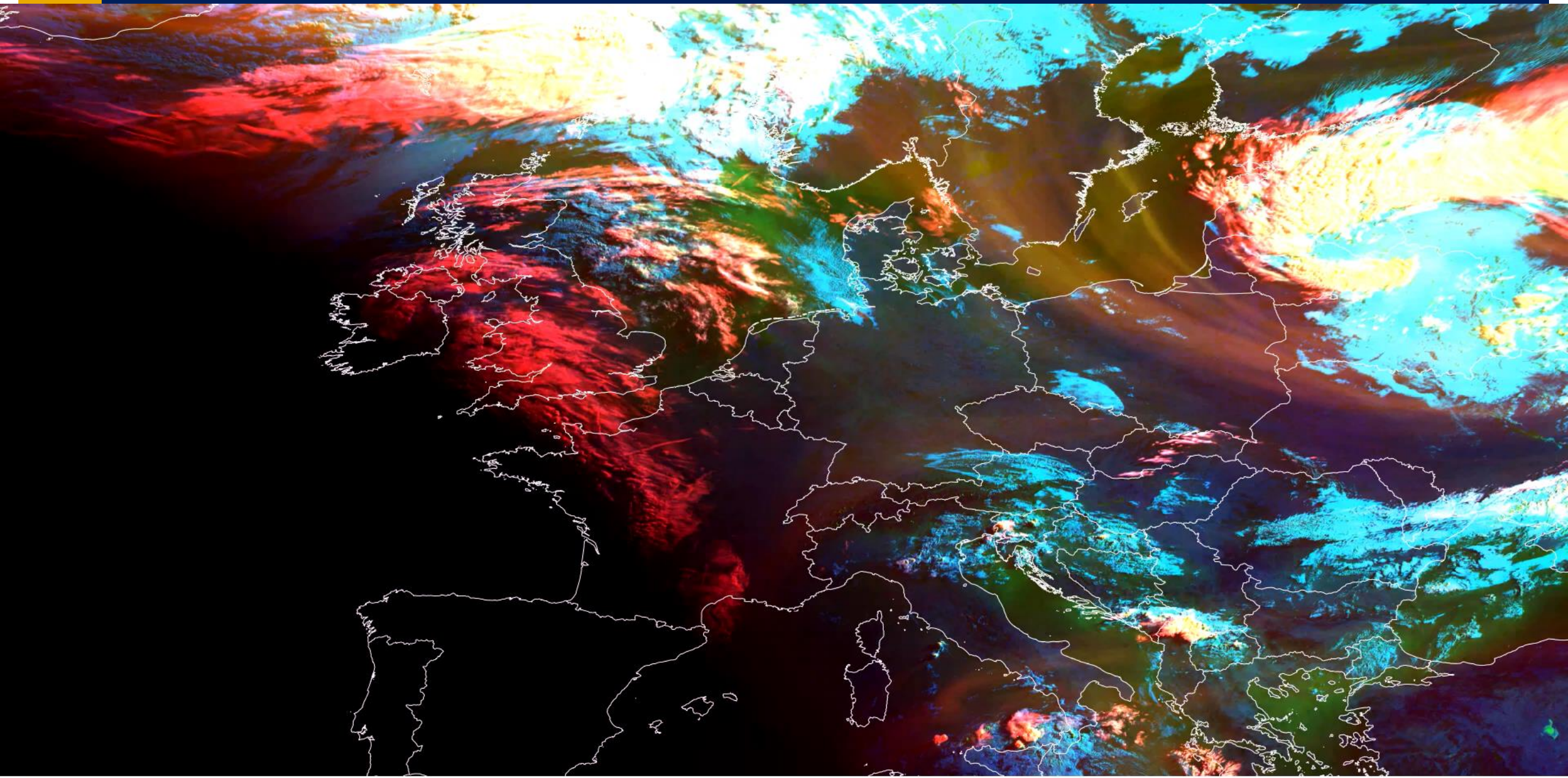
- in cyan colour

Frontal analysis and new RGBs





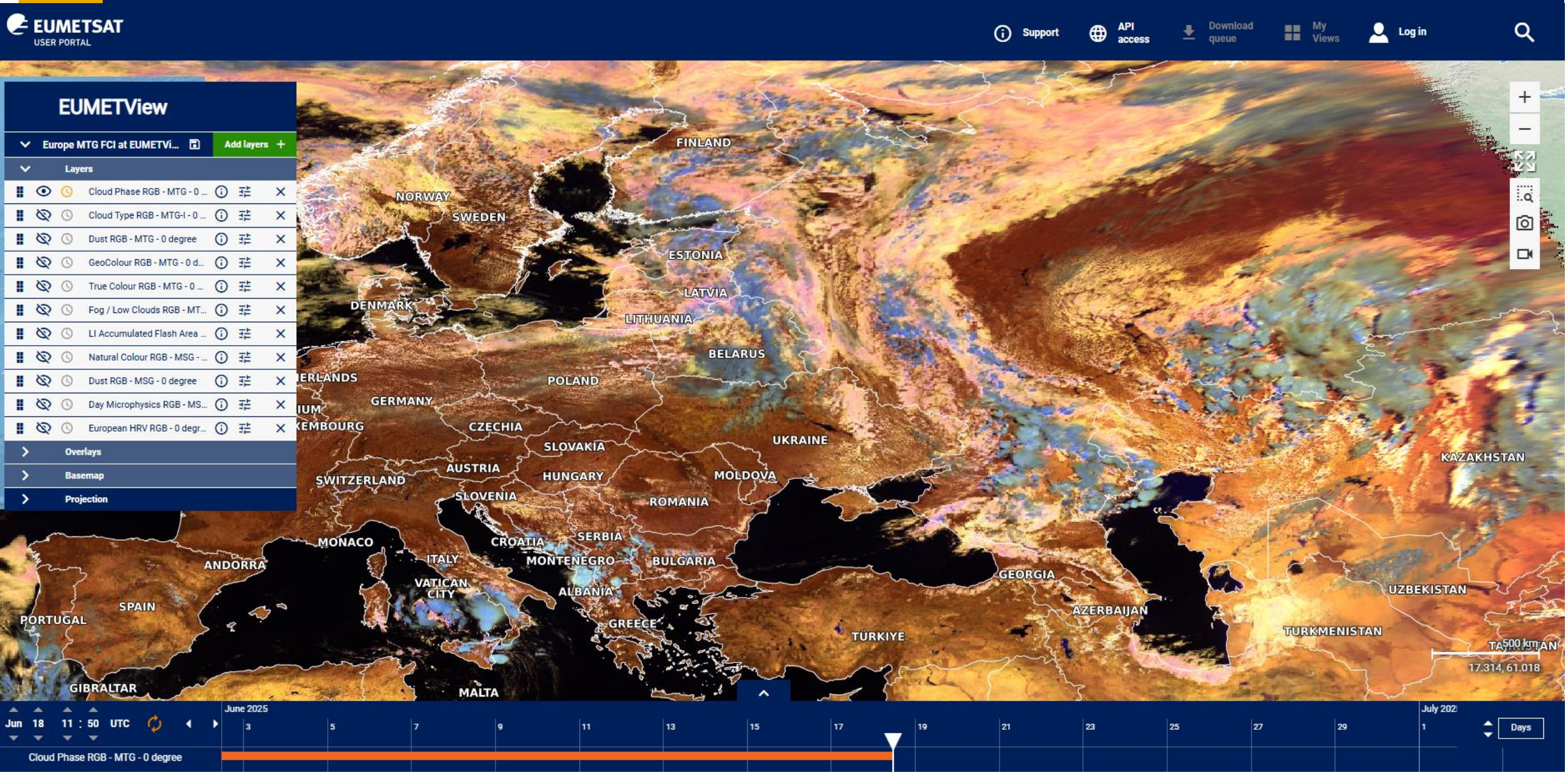
Cloud type and warm front in France 20 June



EUMETSAT

2025-06-20 04:20:00 UTC

NRT FCI imagery – try it yourself at EUMETView



Thank you and.... Whats the feature over the Indian Ocean?