Exercises: Using EUMETView Graphical User Interface / Satellite Principles

Sources:

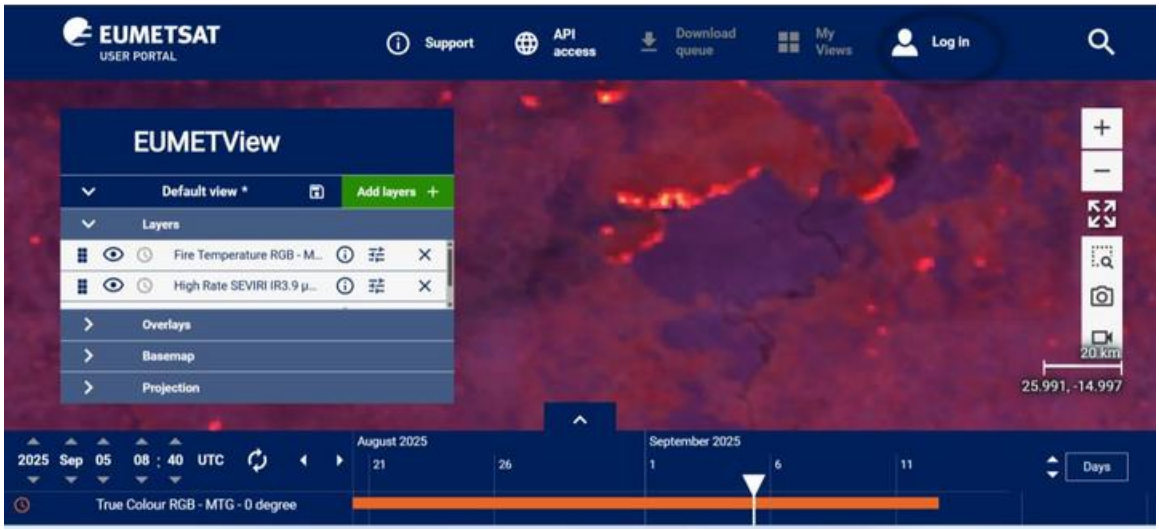
EUMETView:

WorldView

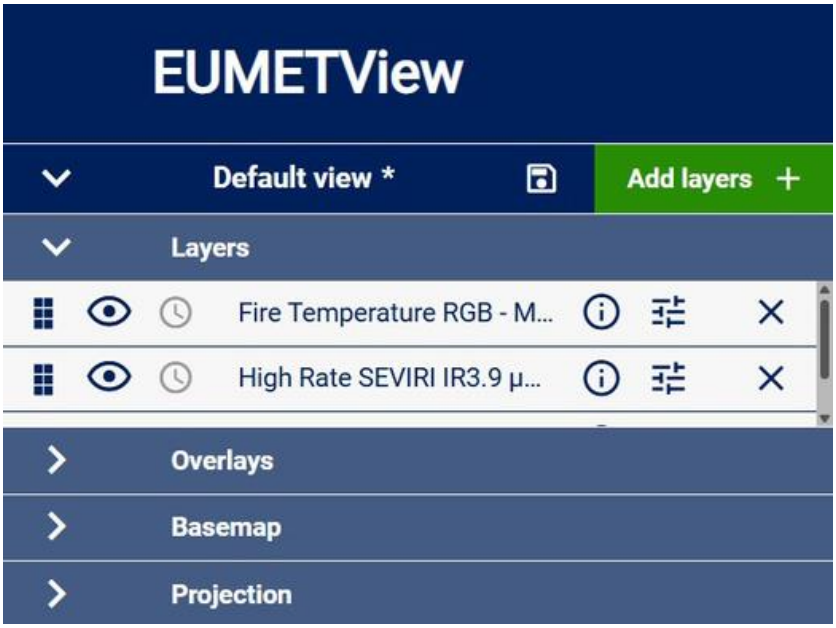
Exercise 1: Meteosat Satellite Coverage

1: Open EUMETView

2: **Log in** to EUMETView with your username and password. If you do not have one**, please register.**



3: By default, a view will open**. Remove the layers** by clicking on the crosses as shown in the figure below

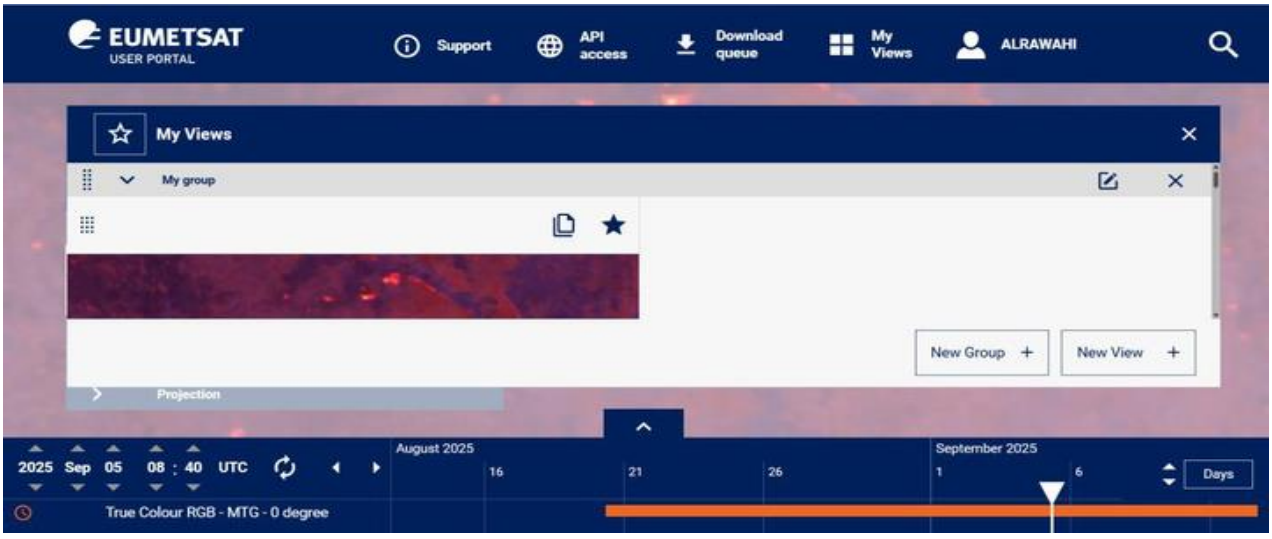


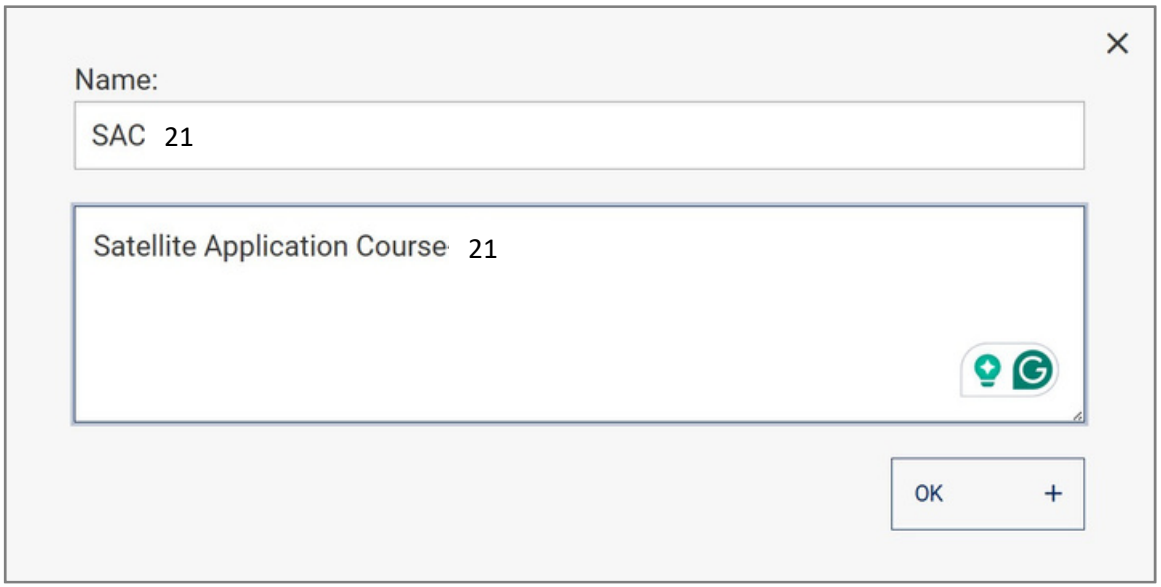
4: By exploring the menu, make sure the following map features are selected:

Projection: Geographic
Basemap: OSM Light

Overlays: Coastlines and Boundaries on (
All the others will need to be turned off (

5. Create new group for the workshop work: (My Views / New Group +/ Group name (SAC-21)





Exercise 1: Satellite Coverage?

Date: 2025-Aug-07, 1500 UTC

Objective

Understand how the **longitude position of satellites** affects the field of view (FOV) and the suitability of different satellites for monitoring regional weather phenomena.

Steps:

1. **Turn off the auto-toggle button** next to the date: This freezes the imagery at a specific time for clearer comparison.
2. **Display full-disk products** from:

   - **MSG-IODC/ RGB composite / Dust RGB**
   - **MTG / RGB composite / True color RGB**
   - **MSG-0 / Dust RGB**

3. **Compare coverage** by switching between satellites:

   - Can you see how the satellite longitude position (0° vs 41.5°E) affects the field of view?

Which satellite gives the best coverage for tracking tropical cyclones in the Indian Ocean? Which satellite is best to detect African dust outbreaks?

Exercise 2/Part.1: Spatial Resolution

Target Area: Nile Delta, Egypt

Date: 2025 Aug 12

Objective: Apply the principle of **Spatial Resolution** to determine which satellite platform is best suited for identifying small-scale features.

Step 1: Data Collection (EUMETView & Worldview)

1. **EUMETView (GEO):** Load the **MSG-0 or MSG-IODC NCOL (Natural Color) RGB**. Focus on the green area of the Delta.
2. **EUMETView (GEO):** Load the **MTG True Color RGB**.
3. **NASA Worldview (LEO):** load **Aqua/MODIS True Color** and **Sentinel-2** .

Discussion: Based on your observations, arrange the satellites from **Lowest Detail (Coarsest)** to **Highest Detail (Finest)** and match them to their resolution:

Discussion.1 "If you are a forecaster in Cairo and a rapid convective storm starts over the Delta, you need to track its movement. Which satellite do you use? If you then need to report exactly which villages were flooded after the storm passes, which satellite do you switch to?"

- **Nowcasting:**
- **Damage Assessment (Verifications):**

Exercise 2/Part.2: Spatial Resolution

Objective

Understand how spatial resolution improvements from MSG to MTG help forecasters detect and monitor atmospheric features more clearly, and how resolution degrades away from the satellite nadir toward the limb.

Steps:

Date: 2025-Aug-07, 1500 UTC

1. Add **MTG / Single channel / VIS 0.6**
2. Add **MSG-0 / Single channel / VIS 0.6**
3. Zoom to **Morocco** and compare pixel size → observe the **3-fold improvement** in MTG spatial resolution (1 km vs 3 km at nadir).

    - ***Discussion Point:*** How does higher resolution enhance early detection of developing convective cells and storm growth?

4. Move to the east and examine convection over **Oman**. Change the time to 1200 UTC → compare how cloud detail looks over Morocco (closer to nadir) versus over Oman

    - ***Discussion Point:*** Why do clouds over Morocco look sharper in MTG imagery than those over Oman, even though both are captured by the same satellite?

    - **Discussion Point:** How can forecasters adapt to resolution changes across the disk when monitoring multiple regions?

5. *"Not only do pixels get larger at the edge, but tall clouds are also displaced (shifted) because of the viewing angle."*

    - Add MSG-0/Composite RGB/HRV RGB
    - Add MSG-IODC/Composite RGB/ HRV RGB
    - Change the date: **2023 Oct 26 1200-1300UTC** (reminder: Turn off the auto-toggle button)
    - Zoom over convection near the **coast of Oman** (east limb region).

- Identify the position of the cloud base relative to the coastline.
- **Compare the position of the convection at the coast of Oman** in different time steps and note any displacement of cloud tops.

Discussion Point: Why does the convection appear slightly **offshore** in the MSG-0 compared to the MSG-IODC position at the coastline?

Discussion Point: If you were issuing a thunderstorm warning, would you place it over land or sea?

Exercise 3: Spectral Resolution

Objective: Understand why one "filter" isn't enough.

Tool: EUMETView

Location: Iraq

Date: 2025 May 12 0900UTC

Action: Compare **VIS 0.6 µm** and the **Dust RGB** in **MSG-IODC**

In **VIS 0.6 µm**, notice how the dust looks almost identical to the ground.

Switch to **Dust RGB**.

Discussion: Why did the dust turn **bright magenta**?

"Cheat Sheet"

Channel / Math	Purpose	Effect on Dust RGB
IR12.0 - IR10.8	Detects Dust Thickness	Controls **RED** (More dust = More Red)
IR10.8 - IR8.7	Detects Particle Type	Controls **GREEN** (Dust = Low Green)
IR10.8	Detects Temperature	Controls **BLUE** (Hot Land = More Blue)

Exercise 4: Temporal Resolution (How often do you get updates)

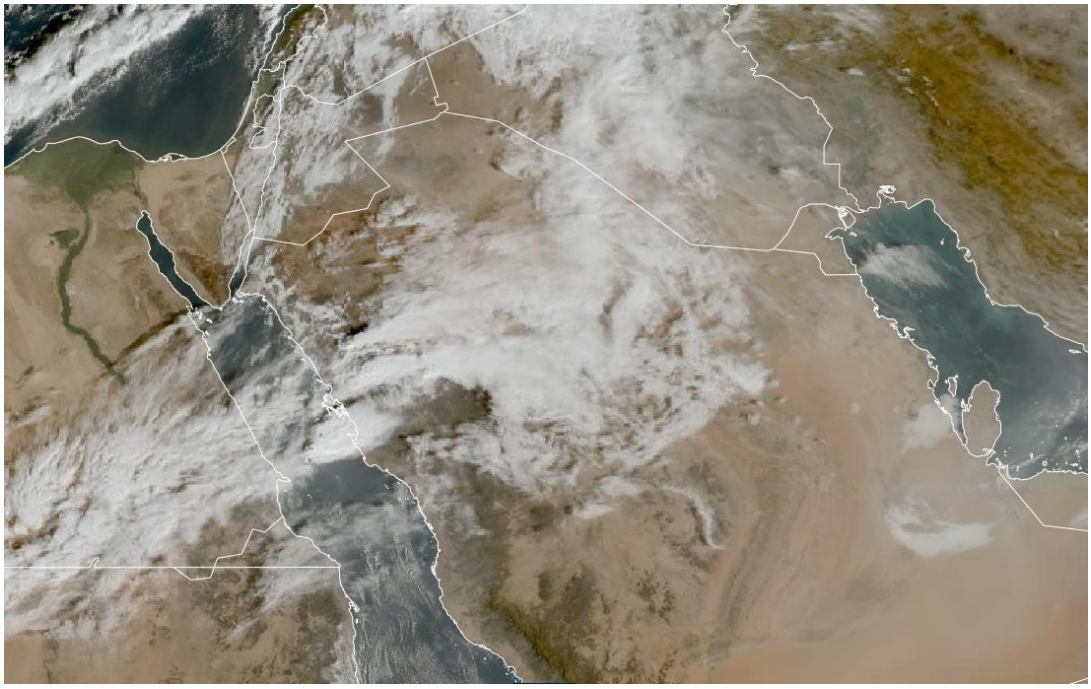
Tool: EUMETView

Location: Central & Western Saudi Arabia (KSA)

Date: 07 December 2025, 13:30 UTC

Objective: Show how improved temporal resolution (refresh rate) in MTG enables earlier detection and tracking of rapidly evolving storms compared to MSG.

- **MSG-IODC:** Provides a new image every **15 minutes**.
- **MTG (FCI-RSS):** Provides a new image every **5 minutes**
- **Action:** Create animation (07:00 to 13:30 UTC) for both.



5. Play them side by side and compare the evolution of convective cells.

6. When did you first recognize convective initiation in MSG? In MTG?"

- The "Convection Test": Watch a cloud tower as it grows vertically.
- MSG (15 mins): You see 4 "frames per hour
- MTG (5 mins): You see 12 "frames per hour

Discussion: How does higher temporal resolution improve warning lead time?

Discussion: Which features are easier to identify in MTG compared to MSG?

Exercise 4: Radiometric Resolution: Sensitivity to the Extremes

Target Case: KSA/Red Sea Convection

Date: 07 December 2025, 13:30 UTC (As shown in your case study image)

Objective: Evaluate the impact of moving from a **10-bit** (MSG) to a **12-bit** (MTG) sensor on temperature precision and cloud detection.

1. **Open EUMETView.**
2. **Layer 1:** Load **MSG-0** (or MSG-IODC) / **IR 10.8 µm**.
3. **Layer 2:** Load **MTG** / **IR 10.5 µm**.
4. **Action:** Zoom into the high-altitude cloud tops (the cold, white areas) over the **Red Sea** or the **Asir Mountains**.

Discussion Points

Discussion Point A: Cloud-Top Cooling & Gradients

Question: What is the main difference in how cloud-top cooling is shown between MSG 10.8 and MTG 10.5?

- **The Physics:** MSG uses a **10-bit** sensor (1,024 levels of intensity), while MTG uses a **12-bit** sensor (4,096 levels).