# EUMeTrain Event Week on MTG-I

# 25-29 September 2023

| | Monday 25.09 | Tuesday 26.09 | Wednesday 27.09 | Thursday 28.09 | Friday 29.09 |
|---|---|---|---|---|---|
| 08-09 UTC | | **True Colour RGB** Johan Strandgren or Alessandro Burini(EUMETSAT) **Dust and Aerosol detection** Federico Fierli (EUMETSAT) | **Cloud Phase RGB** – Maria Putsay (former OMSZ) **Low level Moisture** Ivan Smiljanic (EUMETSAT) | **Lightning Imager** Bartolomeo Vittiche (EUMETSAT) **Comparison of ground based lightning with ISS LIS** Nicolau Pineda (Meteocat) | **MTG-I data format, data access** Erdem Erdi (EUMETSAT) **Pytroll** – Martin Raspaud (SMHI) **Jupiter notebooks** Carla Barroso (EUMETSAT) – ***Finishing at 09:30 UTC*** |
| 12-13 UTC | **Overview of MTG and status** - Jochen Grandell (EUMETSAT) **Benefits of the improved resolution** Martin Setvak (CHMI) | **Fire RGB** Andrea Meraner (EUMETSAT) **Cloud Type RGB –** Carl Jones (NOAA) | **Fire Detection** – LSASAF **Improved NWCSAF products with MTG-I** Pilar Ripodas (AEMET) | **Application of GLM at KNMI** Jos de Laat (KNMI) **Application of GLM at Meteo France** Sylvain Le Moal (Meteo France) | |

## *To join the Event Week:*

***Meeting link:*** https://knmi.webex.com/knmi/j.php?MTID=mb307a04dfc2241ff2da1d67b17132126

***Meeting password:*** c3fBxmcDv92

**Jochen Grandell: MTG Status update**

Meteosat Third Generation is a system consisting of 4 MTG-I and 2 MTG-S satellites. This presentation provides on outlook into what MTG is, what commissioning of a satellite system means, the schedule for data product releases, and how MTG-I and MTG-S eventually will work together.

**Martin Setvak: Comparison of FCI, SEVIRI and VIIRS imagery, with focus on convective storms**

The presentation will address preliminary comparison of the MTG-I1 FCI imagery (based on FCI commissioning data) with MSG SEVIRI and NPP/JPSS VIIRS data, with focus on convective storms.

**Johan Strandgren:FCI True Colour Imagery: Development and Applications**

The Flexible Combined Imager (FCI) on-board MTG-i1 introduces a unique capability: generating geostationary true colour imagery over Europe and Africa. This is typically achieved by combining data from three channels centred at red, green and blue wavelengths. However, FCI's green channel (0.51 microns) partially misses the spectral reflectance peak of chlorophyll around 0.55 microns, leading to inaccurate depiction of vegetation and barren surfaces.
To address this limitation, a novel green band correction technique using the normalized difference vegetation index has been developed and utilized for the first release of true colour images from FCI. The new FCI true colour composite is also the corner stone for the ongoing development of the FCI GeoColor RGB composite. This composite incorporates the elements from the ABI GeoColor composite, by blending true colour imagery with night-time infrared imagery and city lights, as well as other relevant features such as wildfires and LI lightning events.

**Frederico Fierli: Observe aerosol from satellite**

Aerosol particles are a key component of weather and climate atmospheric system. Satellite offer the unique advantage to provide a global view with a long-term continuity. We will explore the methods to retrieve aerosol burden with the associated uncertainties for several cases as dust plumes and wildfire emissions. The presentation addresses the data chain from retrieval using different orbital geometries, spectral regions and geophysical products to advanced products as Climate Data Records to the assimilation process.

**Andrea Meraner: Detecting and visualising wildfires with MTG-FCI: instrument capabilities and first case studies**

The Flexible Combined Imager (FCI) instrument on-board the Meteosat Third Generation (MTG) satellite introduces unprecedented detection capabilities for wildfires from geostationary orbit. This presentation offers an overview of the instrument, focusing on characteristics relevant for identifying hotspots. We will then present the first case studies of wildfire and smoke observations across Europe and Africa. These examples are based on preliminary commissioning data collected during the extreme events of Summer 2023. We will explore visualisations utilising RGBs such as Fire Temperature and True Colour, leveraging the new FCI channels.

**Carl Jones: Exploring Convective Applications Using the Day Cloud Type RGB**

The Day Cloud Type RGB (1.38, 0.64, 1.61) is a multispectral imagery product made with the original intent of more easily observing cirrus clouds. However, it has shown utility in monitoring convection, particularly through the use of the 1.38 μm channel. This presentation will explore potential convection applications offered by the Day Cloud Type RGB as seen by the Advanced Baseline Imager (ABI).

**Mária Putsay: Cloud Phase RGB – a new RGB to monitor cloud top microphysics**

The presentation is about the Cloud Phase RGB, a new product for European users of GEO satellite data, which can be constructed using data from the Flexible Combined Imager (FCI) on the Meteosat Third Generation (MTG) satellite system.
The aim of this RGB is to provide improved microphysical information about the cloud tops. This is achieved by using two near-infrared microphysical channels together. It is a daytime RGB and can be used in low-, mid- and high-latitude regions. The main application areas of the Cloud Phase RGB are in cloud analysis: convective clouds, fog and low clouds; aerosol-cloud interaction.
The main characteristics of this RGB are demonstrated using proxy data from Japanese and American satellites: Himawari/AHI, GOES/ABI, NPP and NOAA-20/VIIRS.

**Ivan Smiljanic: Detecting low level moister with FCI**

This talk will provide insights into how FCI instrument can be used to detect moisture in the layers close to the surface. Up until the introduction of FCI instrument, the concept of low-level moisture estimation, using solely data from imagers on board GEO satellites was to high degree limited to so-called split window difference (e.g. SEVIRI BTD12.0-10.8). Perhaps the biggest down side of this approach is the fact that BT difference relies heavily on the vertical temperature profiles of the atmosphere (the temperature of moisture level). With introduction of water-vapour absorption channel in the NIR spectral region this dependency is avoided. Hence the novel NIR0.91 FCI channels is seen as one of the crucial tools for nowcasting of severe storms, i.e. assessment of pre-conditions and moisture feeding dynamics of convective systems.

**Pilar Rípodas: Improved NWCSAF products with MTG-I**

The Nowcasting SAF (NWC SAF) develops and distributes software packages to generate satellite derived products with application in nowcasting.
Cloud products, precipitation products, stability product, wind product, convection products, products related to turbulence and extrapolation imagery are current products in the NWC SAF portfolio.
A version of the NWC SAF software that supports the new EUMETSAT satellite MTG-I is been developed by the NWC SAF team. The first version (MTG day-1) is expected to be released early 2024. The improvements expected in the NWC SAF products in this version are presented. Some preliminary products with MTG-I data can be presented depending on the availability of data.
A full exploitation of the new capabilities of MTG-I to improve the current NWC SAF products and to develop new ones will come in the following versions. The plans in this respect are presented.

**Nicolau Pineda: Evaluation of Lightning Imaging Sensor (ISS-LIS) with Lightning Mapping Array, a VHF ground-based lightning location system**

The Meteosat Third Generation Lightning Imager (MTG-LI) is now providing continuous optical observations from the lightning occurring in Europe and Africa. Prior to the MTG-LI, the Lightning Imaging Sensor (LIS) onboard the International Space Station (ISS) offered a unique opportunity helping to prepare for the MTG-LI, since it has a similar detection principle. Whereas optical imagers like the ISS-LIS or and the MTG-LI use a narrow spectral infrared emission (777.4 nm) associated with hot lightning intra-cloud channels, commercial ground-based Lightning Location Systems (LLS) detect radio emissions in the low / very low frequency range to locate cloud-to-ground lightning. Therefore, differences between sensors and location techniques must be kept in mind when comparing lightning measurements from different systems. In this regard, the Lightning Mapping Array (LMA), which mostly detects intra-cloud discharges in the VHF range, is best suited for Calibration-Validation purposes.

**Sylvain Le Moal: Lightning data valorisation for forecasters, medias and NWP.**

Meteo-France already has experience processing data for French overseas territories from next-generation satellites currently in operation, such as United States' geostationary satellites. The Goes series weather satellites (Goes-16, -17 and -18), and the on-board Geostationary Lightning Mapper (GLM), have now been operational for several years. The GLM detects and maps total lightning – in-cloud, cloud-to-cloud, and cloud-to-ground – continuously over the Americas and adjacent ocean regions. The performance of the GLM, the application and use of its data can be produced for forecasters, medias, and numerical weather prediction models.

**Jos de Laat: Application of GLM data at KNMI**

About five years ago KNMI started its first exploratory steps towards working with American NOAA/GOESGLM data. Originally initiated as a way to prepare for the MTG-LI mission, the activities naturally developed, expanded while perspectives broadened. I will discuss this path from the first exploratory steps all the way to where we currently are and the – sometimes unexpected – spin-off activities. These include:

- volcano: early warning, KNMI GEOWEB and the BES dashboard
- operational monitoring: data exploration/handling/visualization
- near-real-time probabilistic lightning prediction: artificial intelligence
- airport: auto-METAR
- network activities

As KNMI is very much a hybrid institute build around operational weather forecasting on the one hand and scientific geophysical research on the other hand there are some interesting observations and lessons I have learned that I will share at the end of the presentation.

**Erdem Erdi: MTG Data Access and Data Format**

MTG satellites will revolutionize the weather forecasting and nowcasting abilities over Europe by not only improving the legacy sensors but also introducing new ones. However, the data volume to be received and processed by the end-users will be much higher in order of magnitude with regards to the current MSG satellite data. In this presentation, the main access methods to the near real-time MTG data will be covered along with data format highlights.

**Martin Raspaud: Pytroll for MTG-I1**

Developed jointly by professional software developers and experts in the remote sensing field, pytroll is a collection of free and open source python library for working with remotely sensed earth-observation data.
MTG-I1, with its novel instruments, brings new information at a higher temporal and spatial resolution. While this is a challenge for data exploitation, the Pytroll team has been working hard to support the new data formats to allow working seamlessly with the new data and providing it with standard tools, both when working locally or in the cloud. Having EUMETSAT experts involved ensures state-of-the-art quality of the data. In this presentation, we will show how pytroll works and how it can be used for the exploitation of the MTG-I1 data as a seamless continuation of SEVIRI, both in operations and research.

**Carla Barroso: Jupiter Notebooks for MTG**

To prepare users for the data from the MTG (Meteosat Third Generation) mission instruments, in particular the Flexible Combined Imager (FCI) and the Lightning Imager (LI), EUMETSAT has developed a series of Jupyter notebooks designed to demonstrate the capabilities of MTG instruments for weather applications. Some of these notebooks use proxy data from sources such as MODIS and GLM to allow users to familiarise themselves with the expected capabilities of MTG instruments, and there is a specific notebook focused on familiarising users with the FCI data format. These notebooks are available in the EUMETSAT GitLab repository https://gitlab.eumetsat.int/.