

Nowcasting Satellite Application Facility: software and products

Pilar Rípodas, Xavier Calbet

NWC SAF Project Manager

Webinar Nowcasting in Africa

15 March 2022

Meet the SAFs



AC SAF

Atmospheric Composition Monitoring

The AC SAF processes satellite data on ozone, other trace gases, aerosols and ultraviolet data.

[Learn more about AC SAF](#)



CM SAF

Climate Monitoring

The CM SAF generates and archives high-quality climate datasets.

[Learn more about CM SAF](#)



LSA SAF

Land Surface Analysis

The LSA SAF exploits remotely-sensed data on land, land-atmosphere interactions and biosphere applications.

[Learn more about LSA SAF](#)



OSI SAF

Ocean and Sea Ice

The OSI SAF provides comprehensive information on the ocean-atmosphere interface.

[Learn more about OSI SAF](#)



NWP SAF

Numerical Weather Prediction

The NWP SAF supports the interface between satellite data and European activities in NWP.

[Learn more about NWP SAF](#)



ROM SAF

Radio Occultation Meteorology

The ROM SAF generates and archives high-quality GNSS Radio Occultation (RO) data for NWP.

[Learn more about ROM SAF](#)



NWC SAF

Nowcasting and Very Short Range Forecasting

Nowcasting is a weather forecast for the next few hours, based on current information.

[Learn more about NWC SAF](#)



H SAF

Operational Hydrology and Water Management

The H SAF generates and archives datasets and products for operational hydrological applications.

[Learn more about H SAF](#)

EUMETSAT SAF Network

The eight EUMETSAT SAFs provide users with operational data and software products, each one for a dedicated user community and application area.

The SAFs are located within the National Meteorological Services (NMS) of EUMETSAT Member States, or other agreed entities linked to a user community.

<https://www.eumetsat.int/about-us/satellite-application-facilities-safs>

NWC SAF concept

- ✓ To ensure the optimum use of meteorological satellite data in Nowcasting and Very Short Range Forecasting
- ✓ The NWC SAF develops and maintains SW Packages (for GEOstationary and POLAR Satellites) freely distributed to registered users to generate satellite derived products with a direct application in Nowcasting
- ✓ User support
- ✓ Training

NWC SAF SW packages

Geostationary satellites

NWC SAF GEO v2018

- **MSG primary satellite**
- **MSG Rapid Scan Service** (Latitudes **15° N - 70° N**)
- **MSG IODC**
- Other satellites (Himawari 8, GOES-N and GOES-16)

Polar satellites

NWC SAF PPS v2018


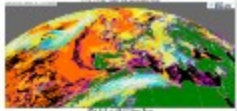
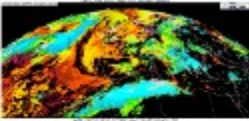
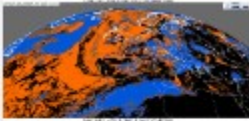
- Metop
- NOAA
- NPP
- JPSS
- EOS
- FY-3D

Current NWC SAF Products for Geostationary Satellites

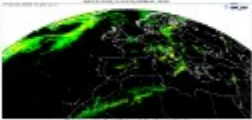
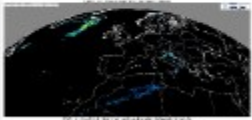
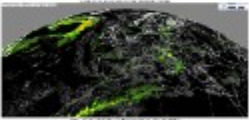
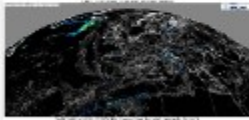
- **Cloud products:** CMA, CT, CTTH, CMIC (cloud phase, cloud optical thickness, liquid water path, ice water path, effective radius)
- **Precipitation Products:** Probability of Precipitation (PC and PC-Ph) and Convective Rainfall Rate (CRR and CRR-Ph)
- **Stability Product:** iSHAI (stability indices, Precipitable water in low, mid and high Layers, skin temperature, total ozone, differences with NWP)
- **Convection Products:** CI (probability of a cloud to become a convective cell) and RDT-CW (identification, characterization and tracking of convective cells)
- **Winds:** HRW (high resolution winds at various levels, trajectories)
- **Image Extrapolation:** EXIM (extrapolation of satellite images and NWCSAF products)
- **Automatic Image Interpretation:** ASII, ASII-TF (probability of presence of tropopause folding), ASII-GW (probability of presence of gravity waves)

NWC SAF GEO

Cloud Products

 <p>CMA: Cloud Mask</p>	 <p>CT: Cloud Type</p>	 <p>CTTH: Cloud Top Temperature and Height</p>	 <p>CMIC: Cloud Microphysics</p>
---	--	--	---

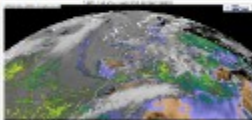

Precipitation Products

 <p>PC: Precipitating Clouds</p>	 <p>CRR: Convective Rainfall Rate</p>	 <p>PC-Ph: Precipitating Clouds based on Cloud Physical Properties</p>	 <p>CRR-Ph: Convective Rainfall Rate based on Cloud Physical Properties</p>
---	--	---	---

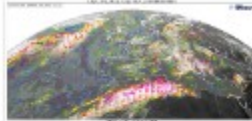
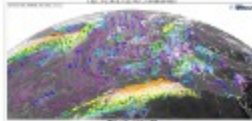

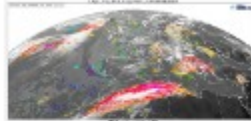
Convection Products

 <p>RDT: Rapid Developing Thunderstorms</p>	 <p>CI: Convection Initiation</p>
--	--

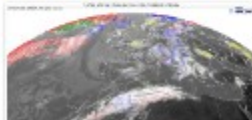
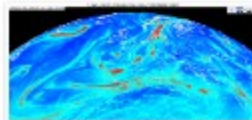
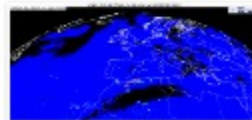
Satellite Humidity and Instability Products

 <p>ISHAI: Total Precipitable Water</p>	 <p>ISHAI: Layer Precipitable Water</p>	 <p>ISHAI: Stability Analysis Imagery</p>
--	--	--

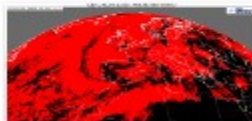
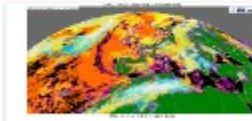
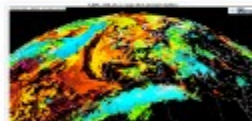
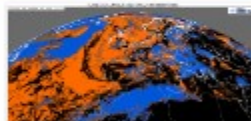
Winds Products

 <p>HRW: High Resolution Winds - AMV levels</p>	 <p>HRW: High Resolution Winds - AMV speed</p>	 <p>HRW: High Resolution Winds - Trajectories 1 hour</p>	 <p>HRW: High Resolution Winds - Trajectories 3 hour</p>
--	---	---	---

Conceptual Model Products

 <p>ASII: Automatic Satellite Image Interpretation</p>	 <p>ASII-TF: Automatic Satellite Image Interpretation - Tropopause Folding detection</p>	 <p>ASII-GW: Automatic Satellite Image Interpretation - Gravity Wave pattern detection</p>
---	---	---

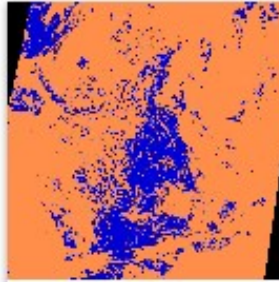
Extrapolated Imagery Products

 <p>EXIM: Cloud Mask</p>	 <p>EXIM: Cloud Type</p>	 <p>EXIM: Cloud Top Temperature and Height</p>	 <p>EXIM: Cloud Phase</p>
---	---	---	--

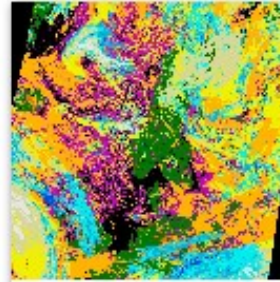
Available in NRT in nwc-saf.eumetsat.int
A two years rolling archive

NWC SAF PPS Products

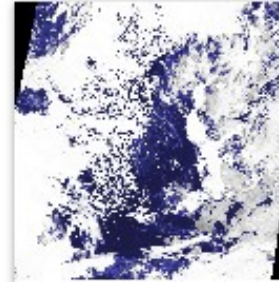
Cloud Products



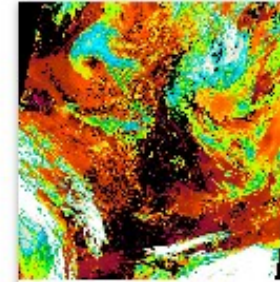
**CMA: Cloud
Mask**



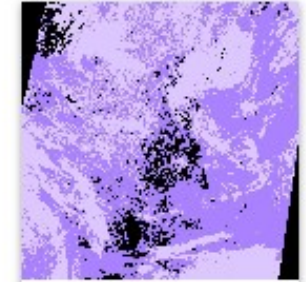
**CT: Cloud
Type**



**CMA-prob:
Cloud
Probability**



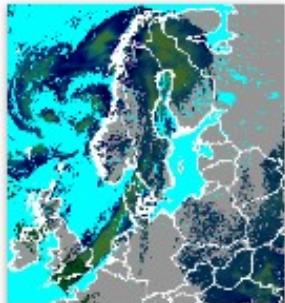
**CTTH: Cloud
Top
Temperature
and Height**



**CPP: Cloud
Physical
Properties**



Precipitation Products



**PC:
Precipitating
Clouds**



Available in NRT in nwc-saf.eumetsat.int

NWC SAF services. (nwc-saf.eumetsat.int)

EUMETSAT NWCSAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING

Home NWC Products **Actions** Tickets Documentation Software SPR/SMR

Tickets List

Sender Date From Date To Package Item Type

Tags Subject

Show 10 entries

Sender	Date	Subject	Pack
psdnmi	2021/08/26	Looking for CMA prob product	PPS
btdwd	2021/08/18	CT: old HDF5 format possible?	GEO
			GEO
			GEO
			GEO
			PPS
			GEO
			GEO
			GEO
			GEO

EUMETSAT NWCSAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING

Home NWC Products Documentation Software Science Forecasting About NWC SAF Contact Us

The NWCSAF AVIATION GUIDE

- Introduction
- Fog
- Icing
- Dust & Volcanic ash
- Storm & Convection
- Turbulence
- Wind

EUMETSAT NWCSAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING

Home NWC Products **Actions** Tickets Documentation Software SPR/SMR Science Forecasting

NWCSAF Software Downloads

Welcome to the NWCSAF SW packages and patches page!

Please click in the links below to access to the GEO or PPS SW and related documentation:

- NWCSAF/GEO Software Package
- NWCSAF/PPS Software Package

Foreseen dates for SW packages release can be consulted in section "CDOP-3 Objectives & Planning" in this [link](#).

Thanks for your cooperation.

EUMETSAT NWCSAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING

Home NWC Products Documentation Software Science Forecasting About NWC SAF Contact Us

Guide to Forecasters

Practical Guide to Forecasters (Extended Version)

Practical Guide to Forecasters (Shortened Version)

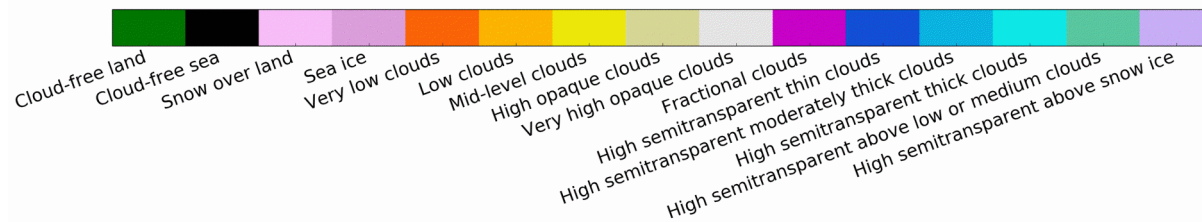
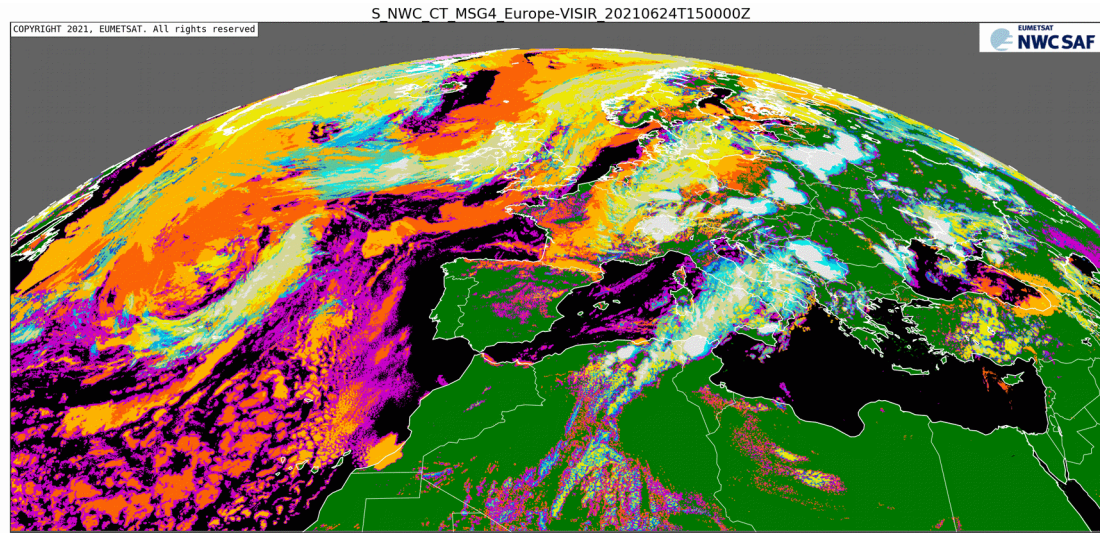
How to run NWC SAF GEO SW at your site

- Register as a user (it is free and can be done online)
- Download the software from the web site (nwc-saf.eumetsat.int)
- Install the software
- Set the configuration of your interest
 - Satellite to be used
 - Products to be generated
 - Geographical area where to generate the products
- Input data needed
 - Satellite data (HRIT MSG files)
 - A numerical model (ECMWF or GFS for example)

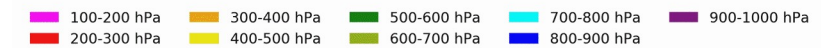
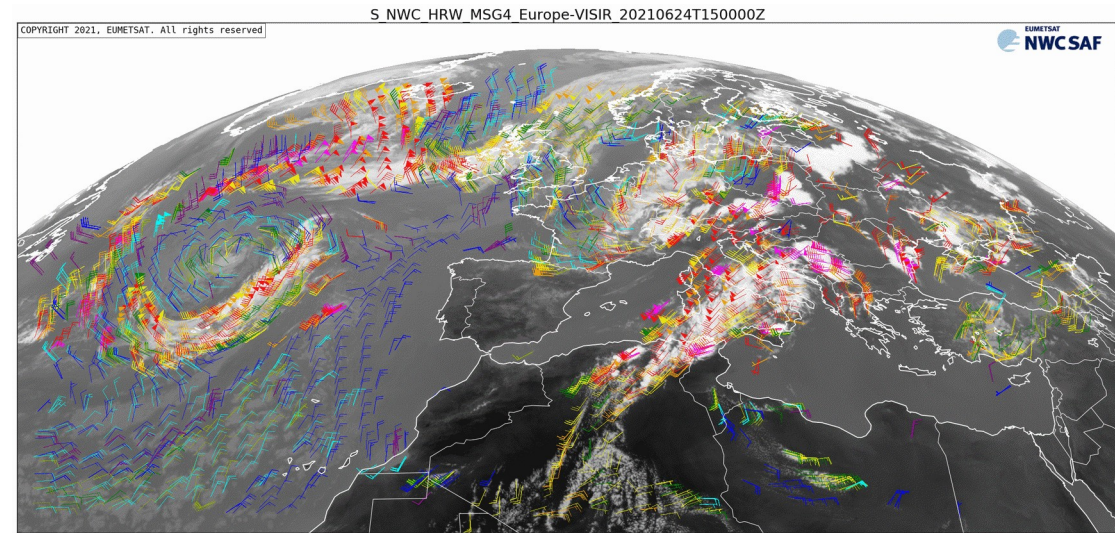
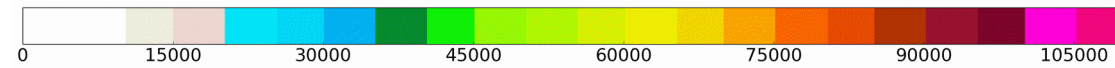
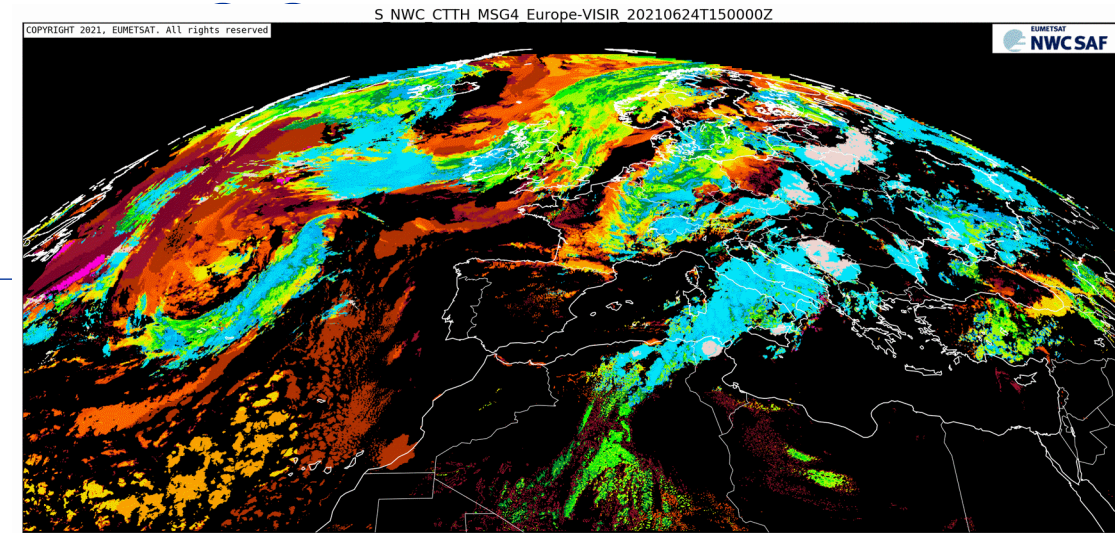
The NWC SAF Team offers support if you encounter any problem

The software is meant to be run in **NRT operationally** but also allows the generation of products in **offline mode**.

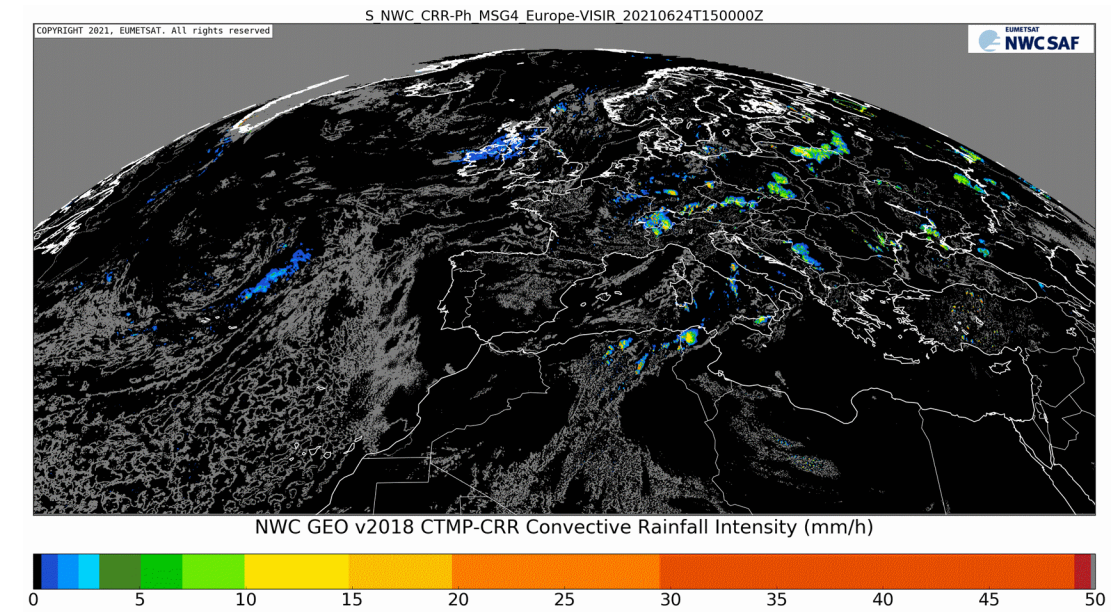
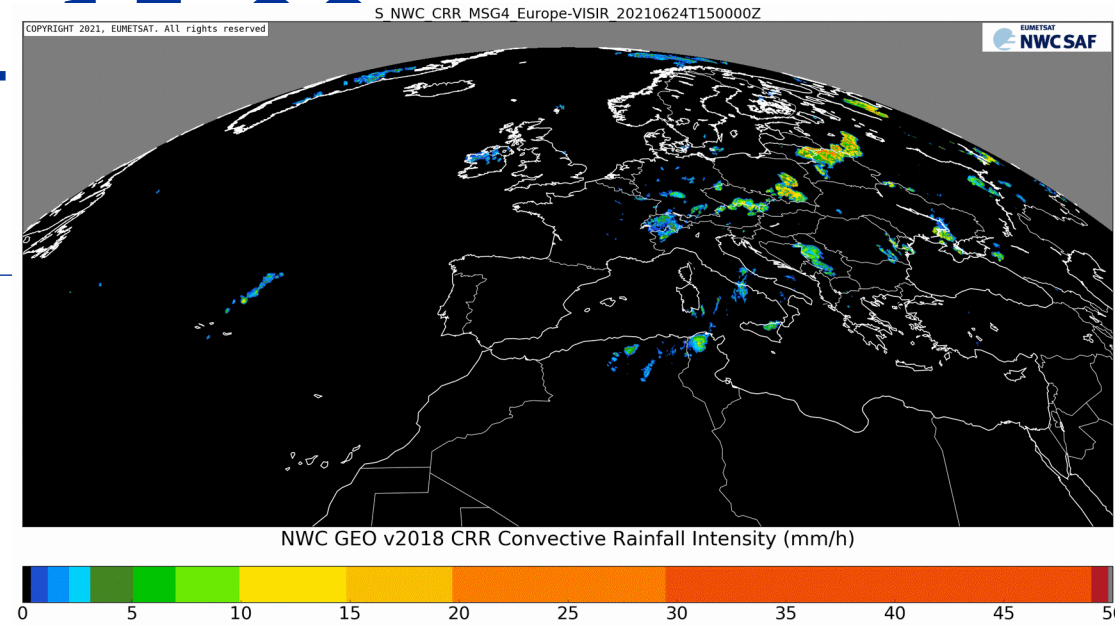
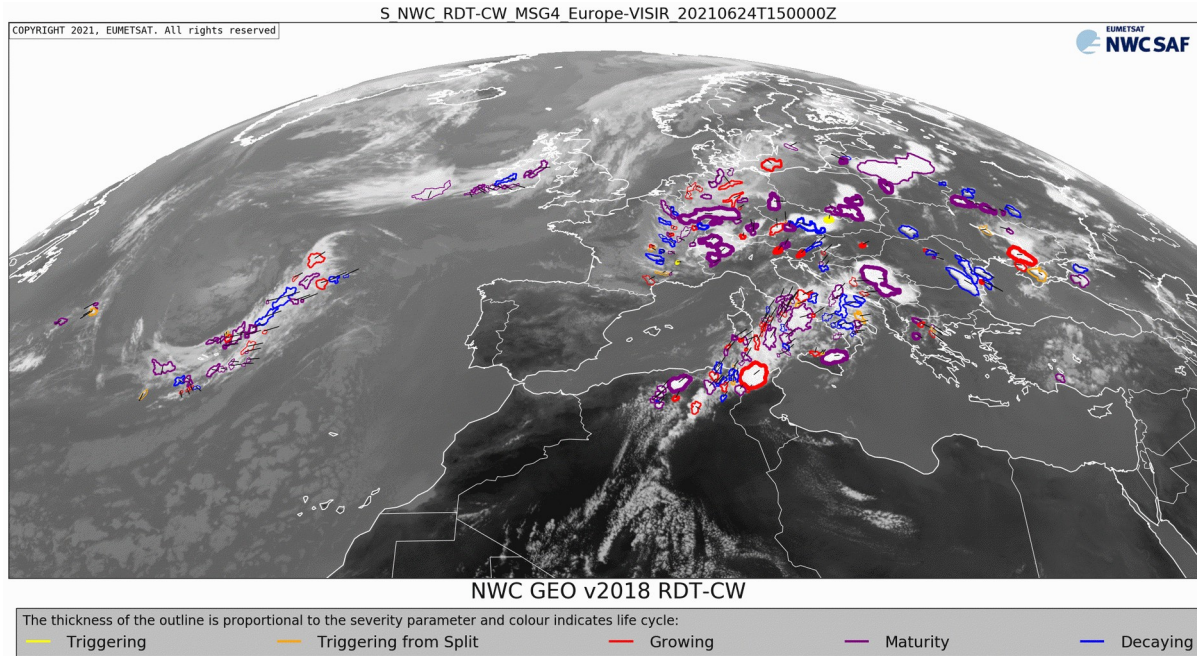
Example 24 June 2021



CT, CTTH and HRW



Example 24 June 2021

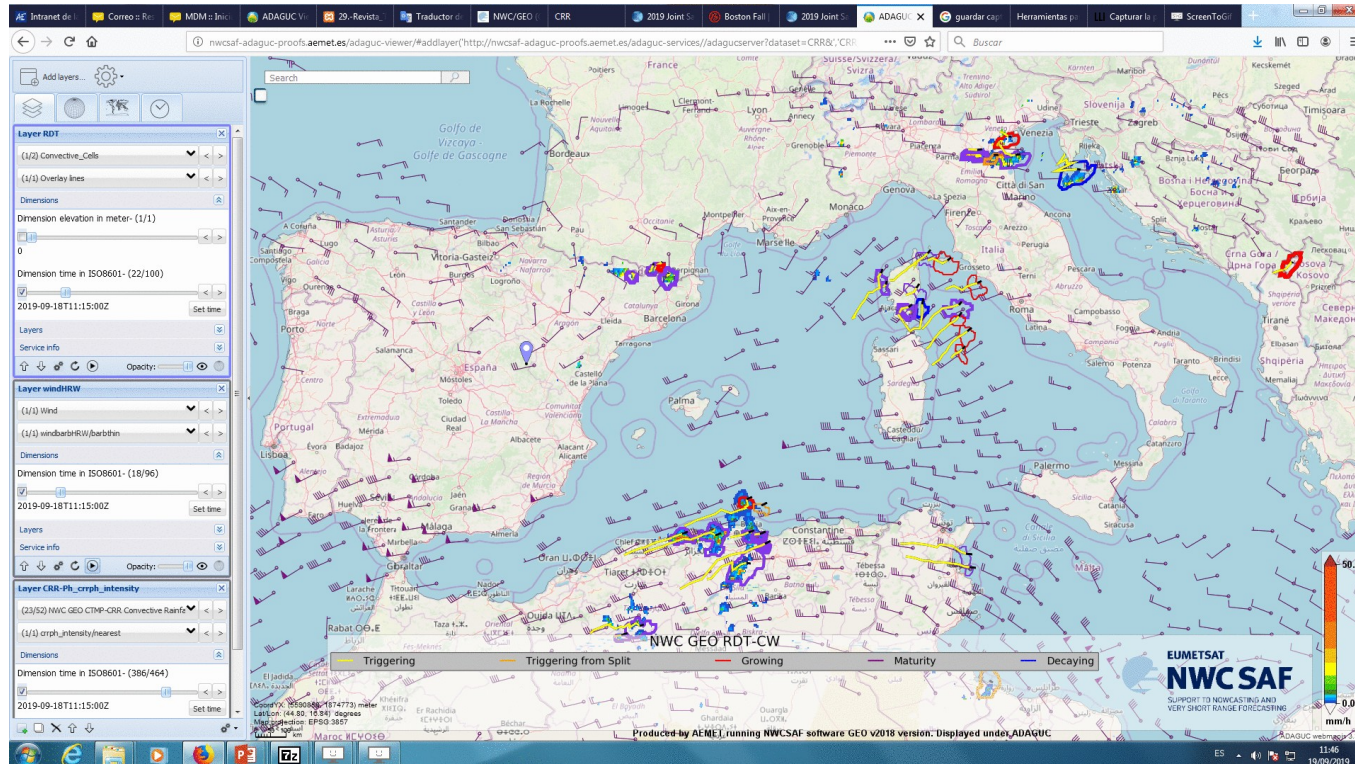


RDT-CW (left), CRR(top right) and CRRPh (bottom right)

Visualization of the products

We provide:

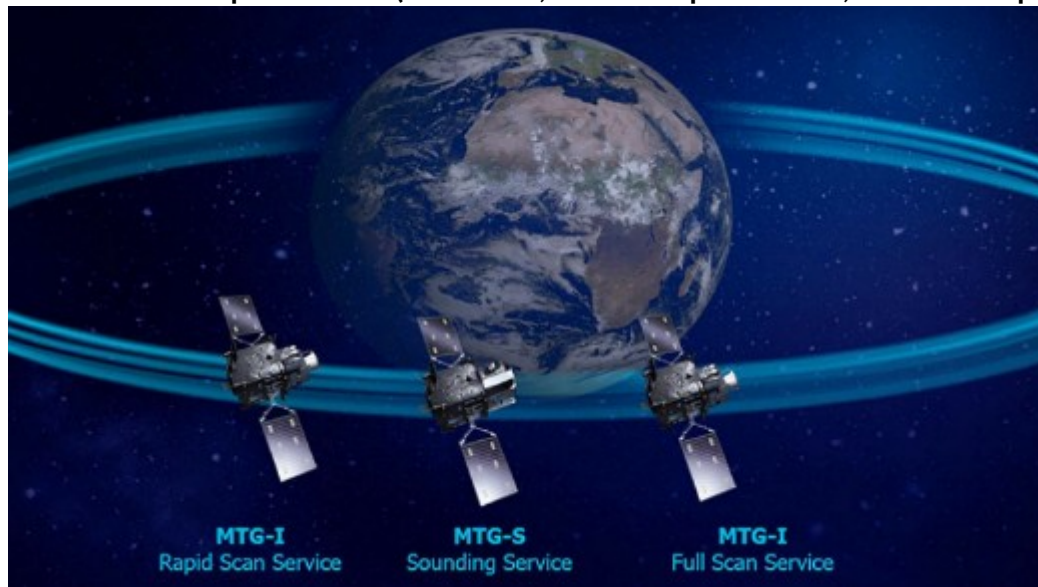
- Python script (nwcpy) to generate images from the NetCDF output file
- A software suite that makes possible the connection between NWCSAF and ADAGUC. We can provide support to install it.



ADAGUC example of NWCSAF software outputs: geolocalized, zoomable, several products simultaneously (CRR, RDT, HRW), data picker.

Future Plans

- Adapt the products to the new era EUMETSAT Satellites (MTG-I, MTG-S, EPS-SG A, EPS-SG B) ensuring continuity
- Full exploitation of the capabilities of the new satellites:
 - improve current products
 - new products (ASII-ICE, MTG LI products, MTG IRS products, EPS SW MW products)



MTG-I and MTG-S Satellites, EUMETSAT



EPS-SG A and EPS SG B Satellites, EUMETSAT

Africa Dissemination

The baseline now for MTG is that there will be TWO ways to obtain the NWC SAF products (netCDF4 files):

- **ALL NWC SAF** products: they can be generated locally receiving MTG L1 data via EUMETCast Africa Terrestrial
- **ONLY CMA, CT, CTTH, CRR, RDT-CW**: available via EUMETCast Africa Satellite. Also precipitation rain estimates from the H SAF (**H03B**).

Thank you very much for your attention!

More information in www.nwcsaf.org

You can contact us at

pripodasa@aemet.es or safnwchd@aemet.es