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First version of NWC SAF GEO software package supporting MTG-I1 data and future plans of the NWC SAF

Pilar Rípodas - *NWC SAF Project Manager, AEMET*
& NWC SAF GEO team

EUMETSAT Conference. Lyon, 17 September 2025

Agenda



NWC SAF GEO-I v2025

First software version supporting MTG-I data

NWC SAF Future Plans-CDOP 4 for NWC SAF GEO-I

From now until February 2027

NWC SAF Future Plans-CDOP 5 for NWC SAF GEO-I

March 2027- February 2032

NWC SAF GEO-I v2025

- First version of the NWC SAF software supporting MTG-I data
- It has been released 4th July 2025
- It supports
  - MTG-I
  - MSG 0 degrees, MSG RSS, MSG IODC
  - Himawari 8/9
  - GOES-R series
- Already available patch NWC GEO-I v2025.1 supporting GOES-19

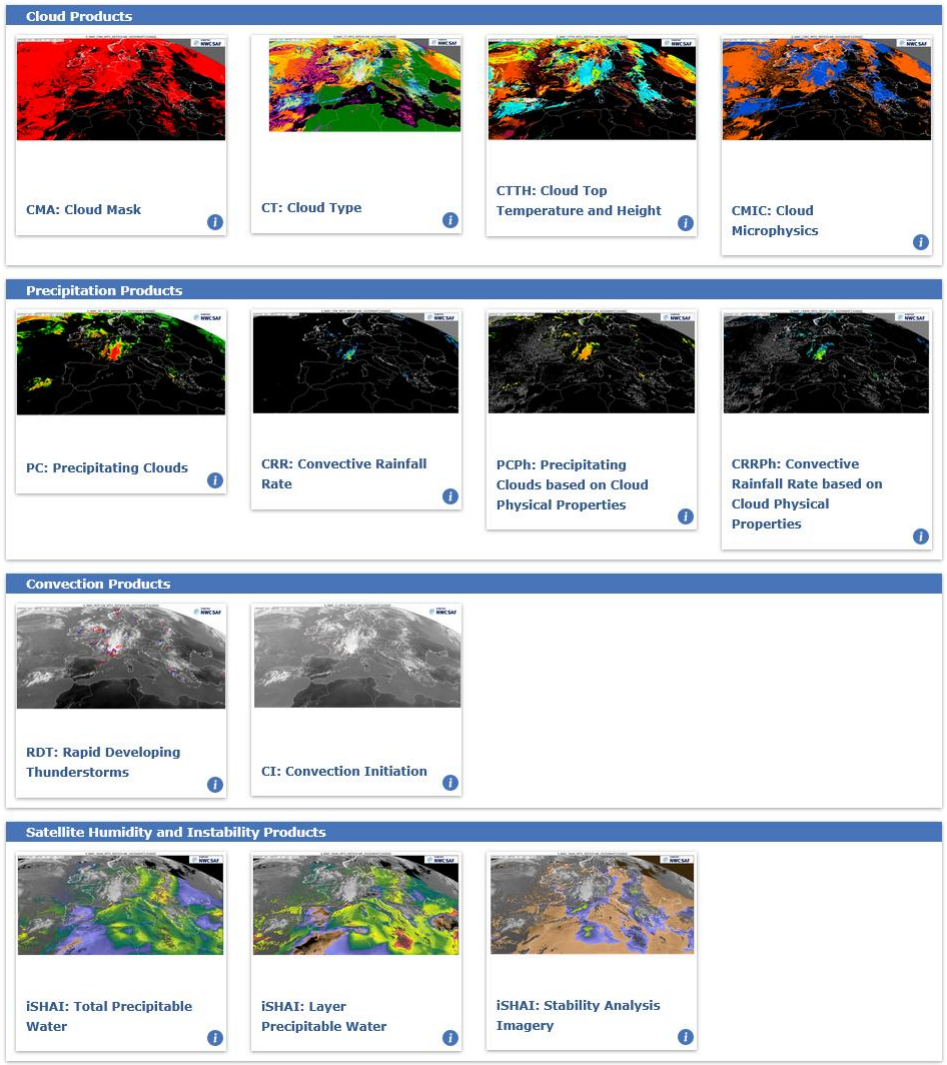
- Registered users can download the software package from our web site after log in
- Two production chains/Reference Systems are set in AEMET
  - GEO-I v2025 for MTG-I
  - GEO-I v2025 for MSG 0 degrees

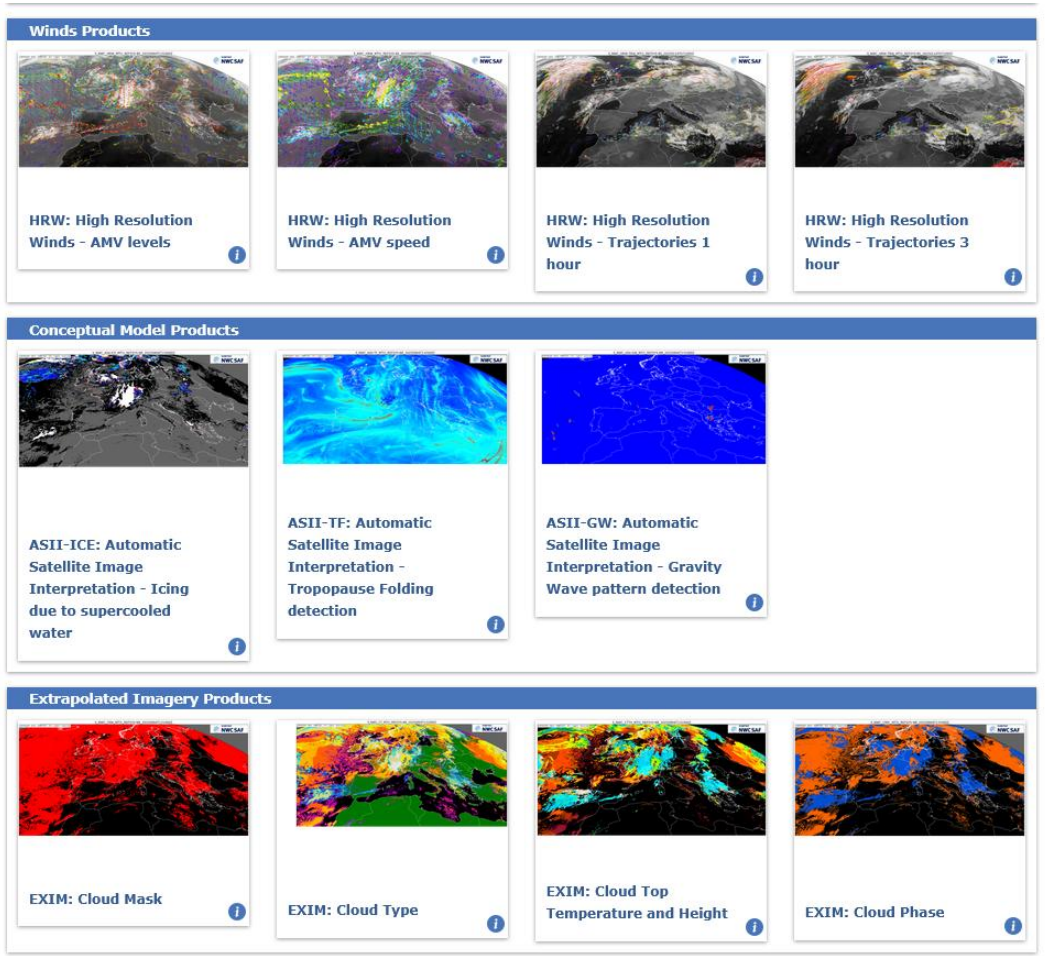
Images of both production chains are available in the website

MSG and MTG products can be compared (same software version, same geographical area)

Rolling archive (up to 2 years) with images for both productions chains is available in the website

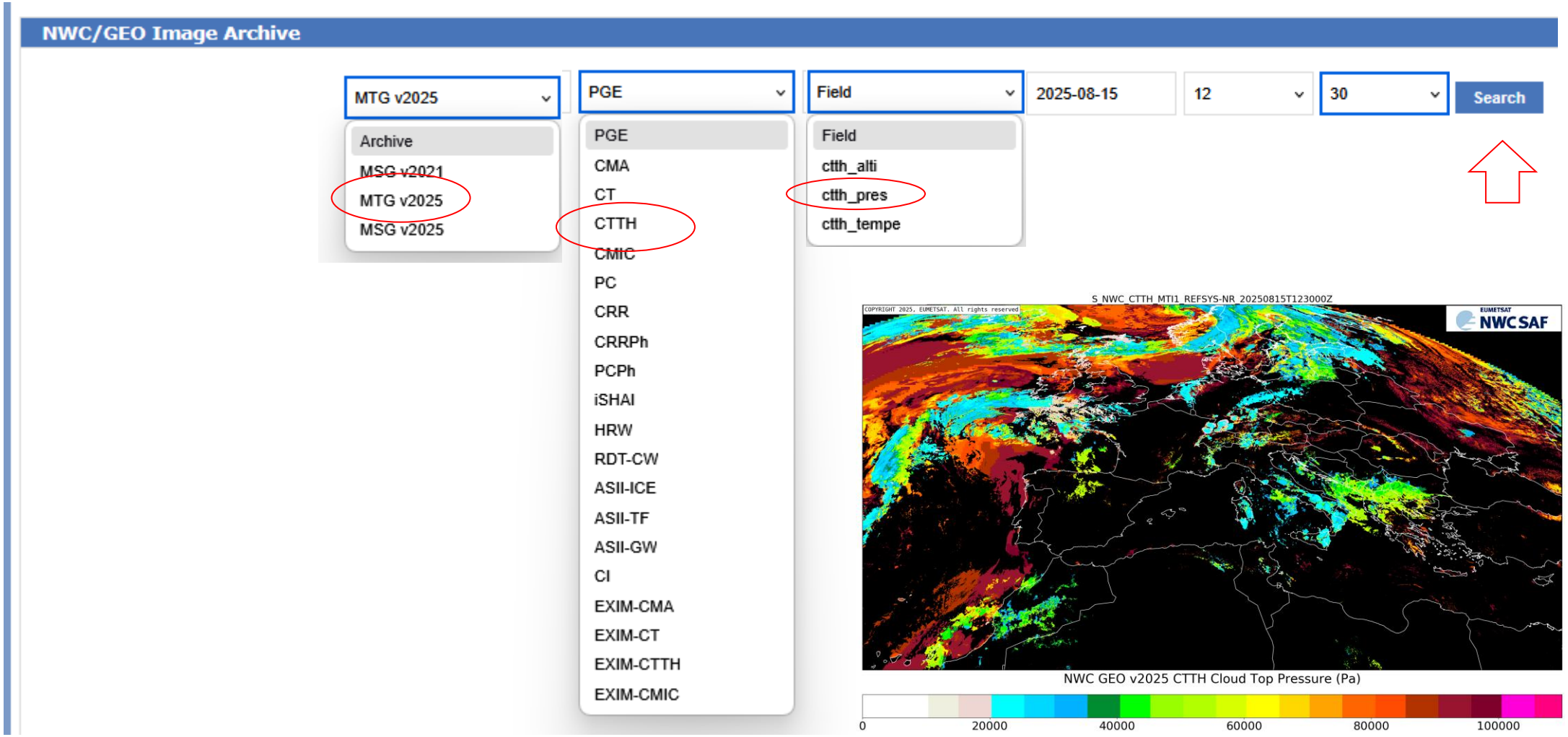
GEO-I v2025 MTG Reference System images in the website





(Up to) 2 years rolling archive (https://www.nwcsaf.org/web/guest/nec/geo-geostationary-archive)

MTG v2025 since October 2024 MSG v2025 since end July 2025



This version ensures the continuation of the NWC SAF services

Main changes with respect to GEO-I v2021

- Better spatial and temporal resolution. NWC SAF products will provide **more detailed and more frequent information**. This is the main improvement in this version.
- Some products **benefit from some of the new channels in MTG/FCI** thanks to NWC SAF experience with Himawari 8/9 and GOES-R satellites

Main changes with respect to GEO-I v2021

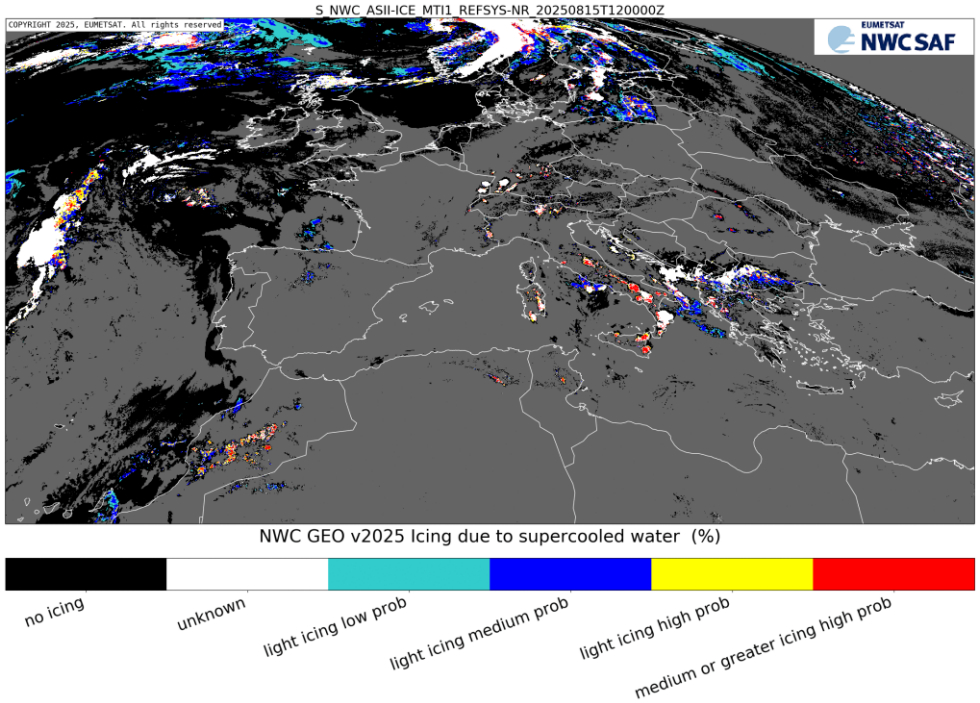
- **RDT-CW** product (detection, characterization and tracking of convective cells) **benefits from the use of MTG-LI data** : lightning jump calculation, characterization of severity, support to convection Yes/No decision. Ground-based lightning data are still used separately
- **New product** distributed as a demonstrational product: **ASII-ICE**
- **NetCDF output format CF compliance** to easy product visualization in standard tools

Main changes with respect to GEO-I v2021

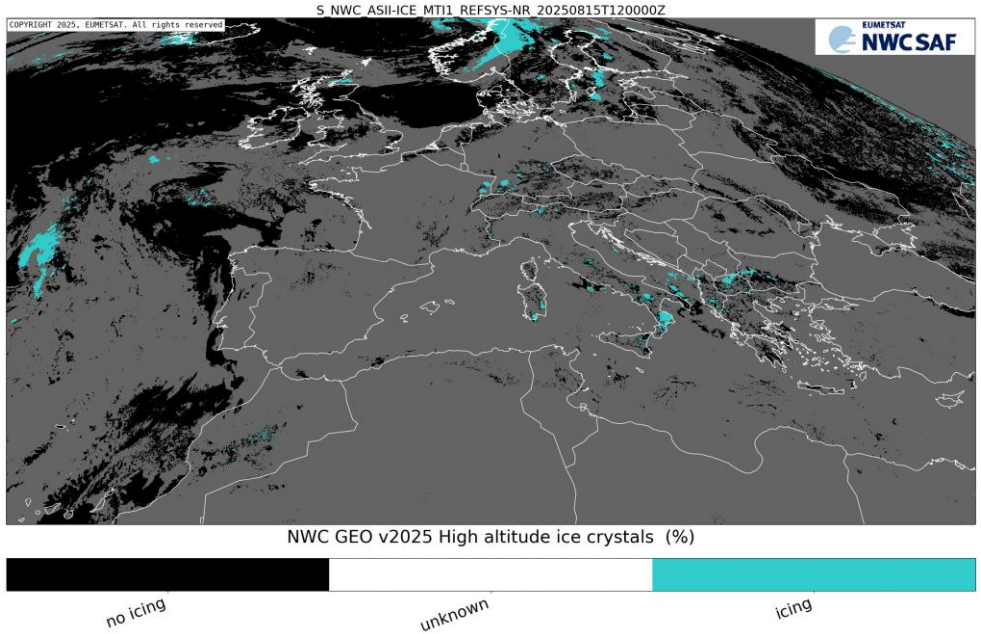
- Default configuration expects **NWP** grib file with **25 levels** (instead of 15 levels). **Important: if NWP files with 15 levels are used, the NWP configuration file MUST be changed!!!**
- Changes in L1SD output

New AII-ICE product (demonstrational)

Probability of icing due to supercooled water



Presence of high altitude ice crystals



15 August 2025 12:00 UTC

L1SD output

- Existing in previous versions, perhaps not very well known
- Provides selected FCI channels in different calibrations
  - Brightness Temperature and/or radiances for IR and WV channels
  - Radiances and/or reflectivities with different normalization options for solar channels
- For the selected geographical area and with the same format as the rest of the products

L1SD output

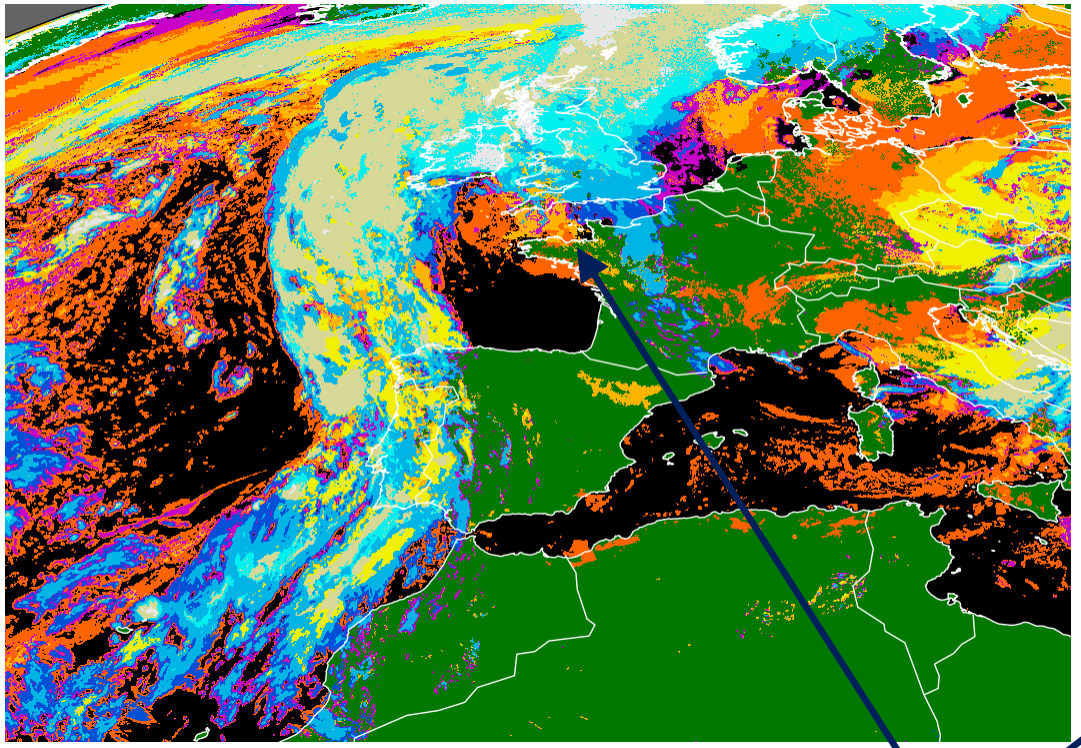
- Example of usage: we provide to AEMET NWP assimilation team L1SD output files for WV7.2 channel and Cloud Type output files for the same area and with the same format. This eases the assimilation of the WV channel at cloud free pixels.

- L1SD changes in v2025:
  - In v2021: individual output files for each selected channel
  - In v2025: two output files, one for all selected solar channels (HR, 1km) and another one for all selected IR and WV channels (NR, 2km)

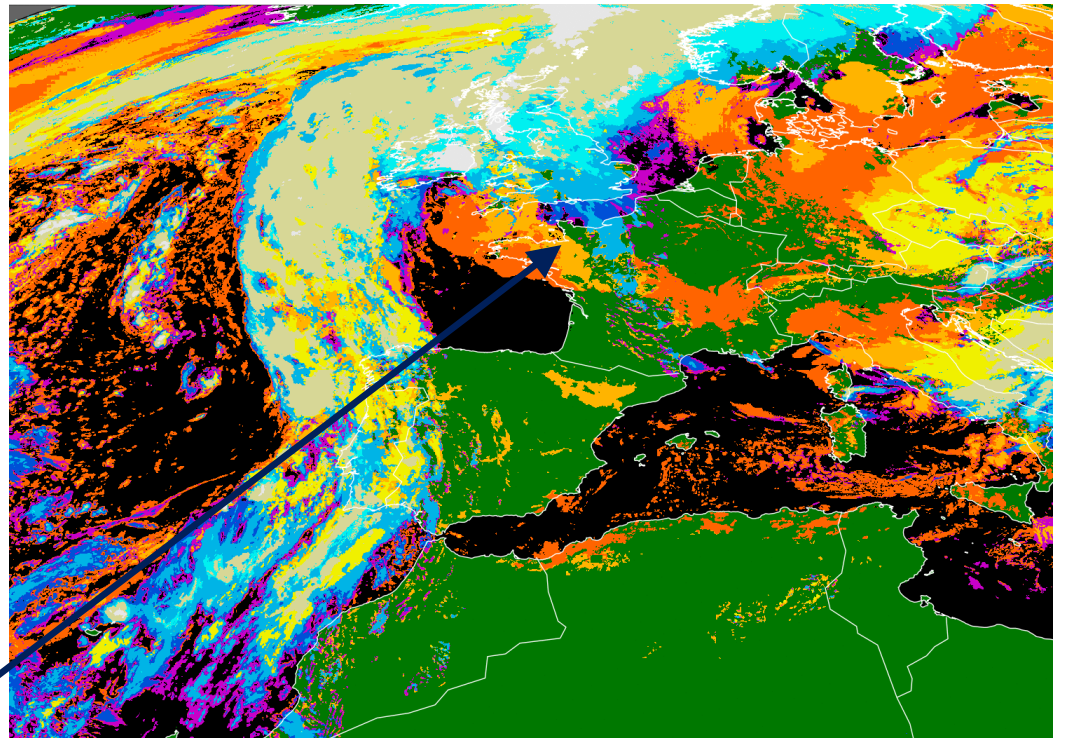
Example of improvement in CT. 20241129 at 00:00 UTC.

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nwc-saf.eumetsat.int



MSG v2021.1



MTG v2025

Source: Météo-France MTG Validation Report

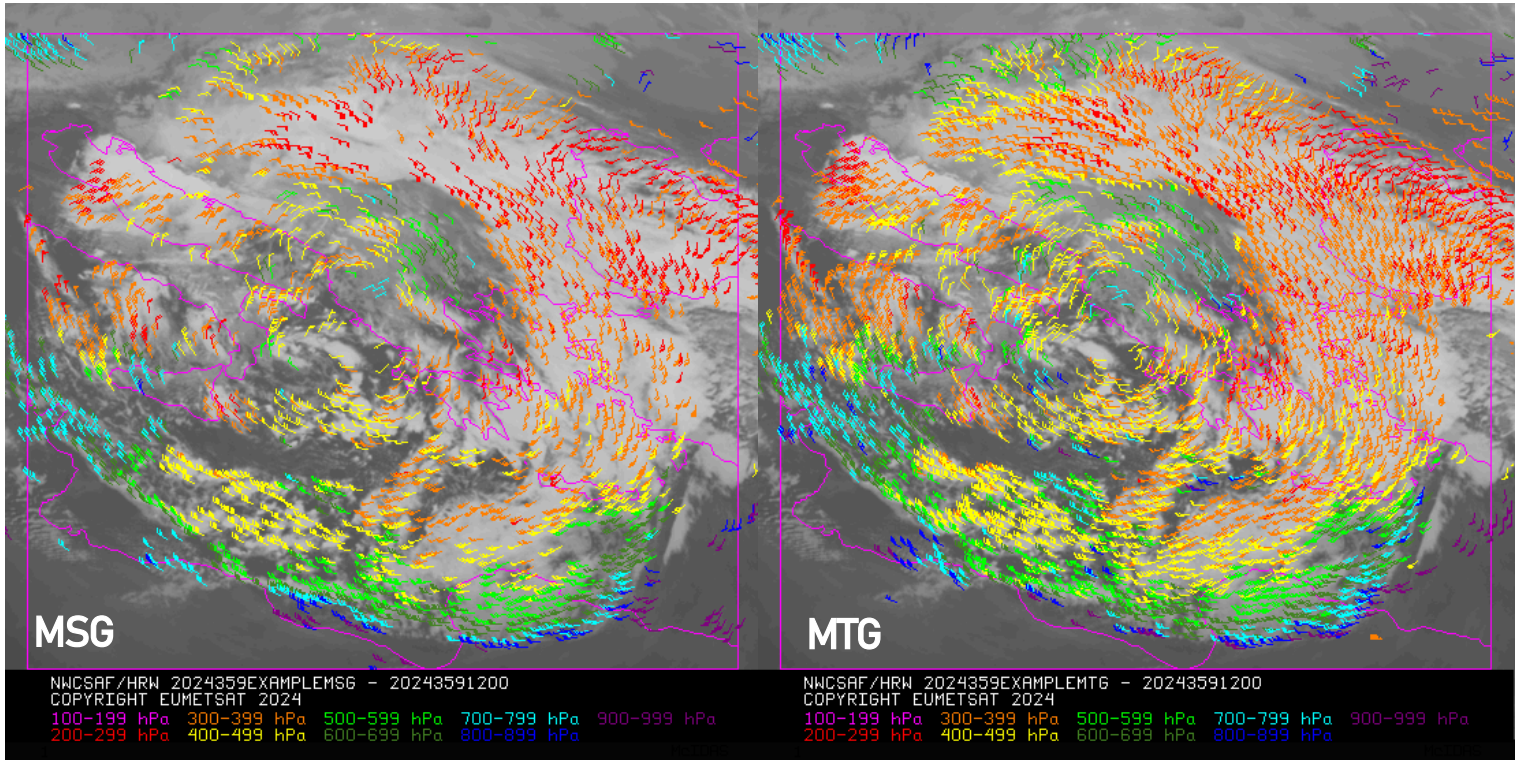
Left: Cloud classification from MSG3.Detections of very low clouds are missing over Brittany.
Right: Cloud Classification from MTG-I1. The very low clouds are detected (orange) over Brittany

The SYNOP messages from Brest, Nantes and Rennes indicate 8 octas of low clouds.

MTG Better detection of low clouds over land at night time

NWCSAF/High Resolution Winds for MTG-I

24 December 2024 12:00Z; Italy & the Balkans



Source:
J. García-Pereda, AEMET

NWC/GEO-HRW-v7.0 AMVs Validation in the European region against Radiosounding winds at 12:00Z (9 Oct 2024 – 8 Feb 2025)		MSG-3 satellite	MTG-I1 satellite
NC		414774	1089246
SPD [m/s]		17.24	20.09
NBIAS	(ALL LAYERS)	-0.05	-0.01
NMVD	(100-1000 hPa)	0.31	0.28
NRMSVD		0.40	0.37

- The number of AMVs is around 2.5 times higher with MTG-I
  - Increment more significant in high & medium layer
- Considering validation statistics for MTG-I:
  - Bias especially less negative
  - Root mean square vector difference slightly better.
- For all satellites (also Himawari-8/9 & GOES-R) validation inside “Target accuracies”.

NWC SAF Future Plans- CDOP 4

New GEO-I software version at the end of CDOP 4 (Q1 2027):

- New and specific MTG-I LI based products.
- Extended validations of the products for MTG-I.
- New machine learning based Cloud products.
- Improvements in Precipitation products by the used of LI data.
- Upgrade of in-flight icing product to operational status.
- Extension of HRW Wind product to night time 3.8 µm channel AMVs.
- Fine full-disk tuning of RDT-CW Convection product thanks to LI, and improvement of Cloud Top Features (for the existing overshooting top, for new cold ring or U/V shape) towards a better assessment of severity.
- Improvement of CI convection product thanks to clear-sky instability products before the upcoming of small convective clouds, and definition of object outputs additionally to current pixel outputs.
- Acceleration of ASII-GW gravity wave analysis through pre-screening of the satellite image to exclude large areas without any brightness fluctuations; release of a tool that allows the users to tune the algorithmic parameters.
- Add a ridge line analysis as a compressed/cleaner description of the significant tropopause folding patterns in the ASII-TF product.

NWC SAF Future Plans- CDOP 4. LI products

Specific MTG-I LI products are planned by the end of CDOP 4

- LiStack : Accumulation of EUMETSAT L2 LI gridded products in the user´s defined time period and region (with option of parallax correction). To monitor the lightning activity.

- LiJump: Lightning Jump detection (Image like product).

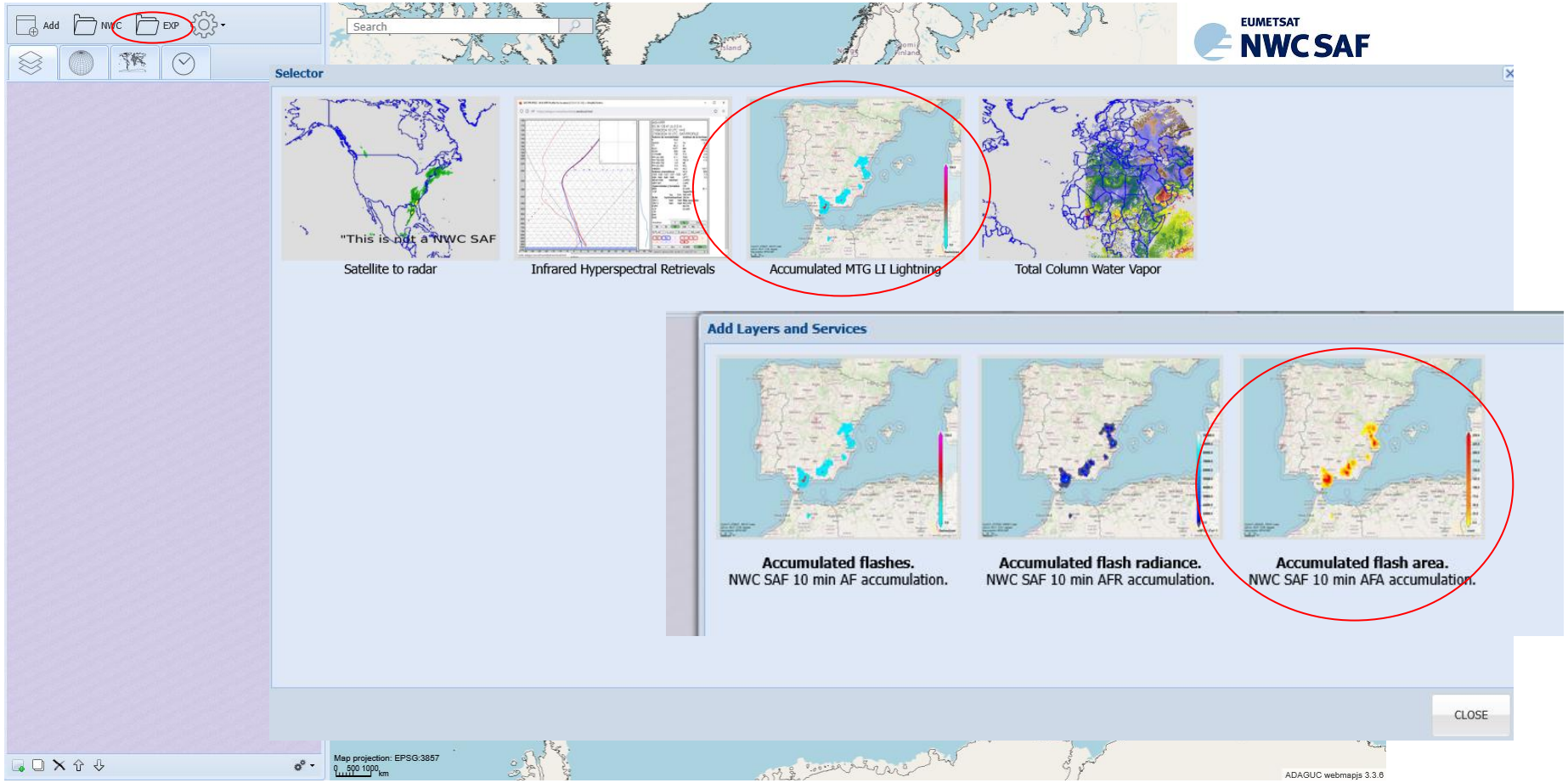
Developed by NWC SAF team in Romania - NMA

Official release of both products in Q1 2027

NWC SAF Future Plans- CDOP 4. LI products

A prototype of LiStack Product is running NRT in the EWC and its visualization is open to the general public:

https://adaguc.nwcsaf.eumetsat.ewcloud.host/



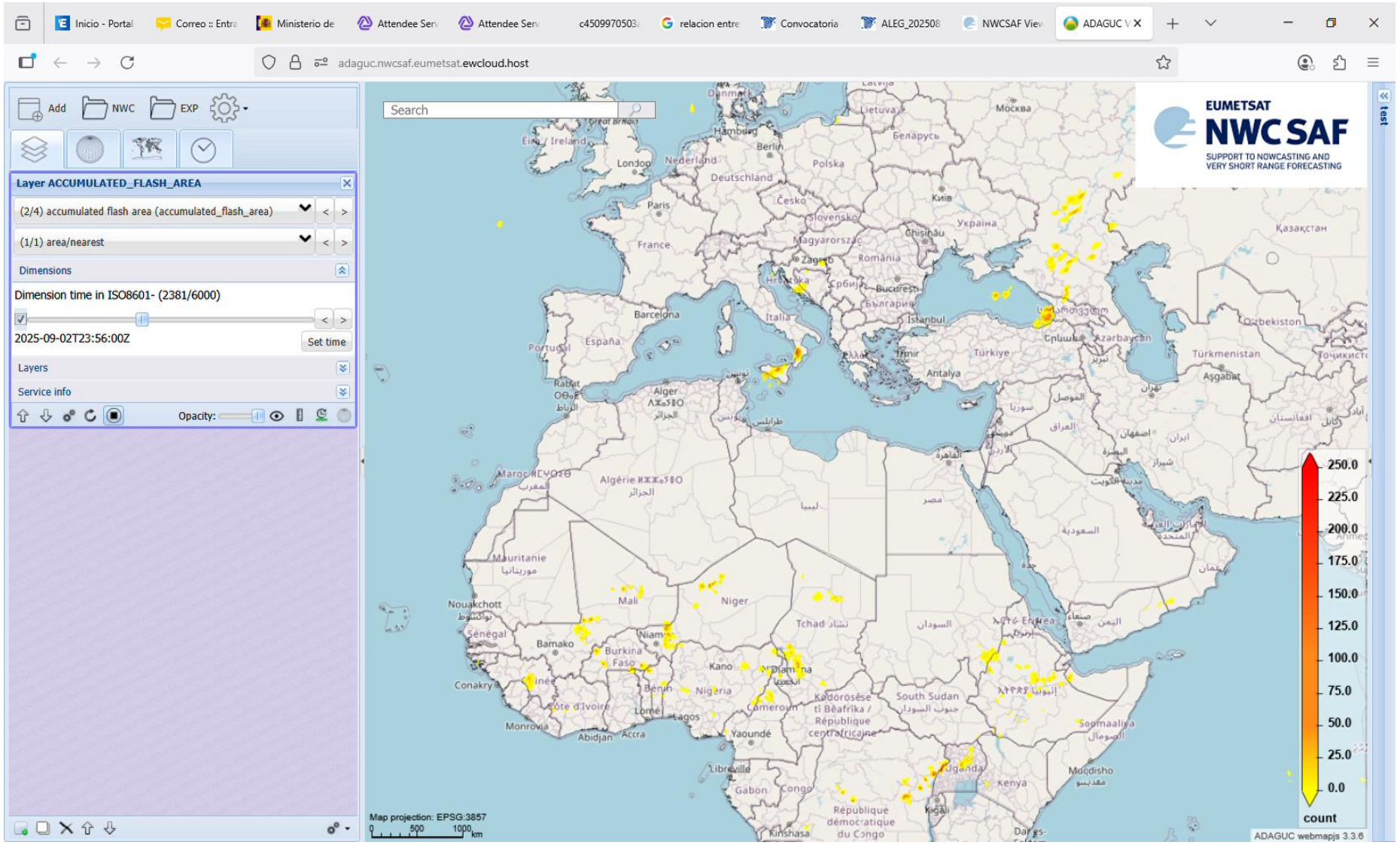
NMA:
Accumulation of 10 minutes EUMETSAT L2 LI gridded products AF, AFR, AFA.

Updated each minute

LiStack prototype visualization in EWC - ADAGUC

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AFA 10 minutes acccumulation
Refreshed every minute
3 Sep 2025
Develpment of LiStack: by NMA

NWC SAF Future Plans- CDOP 4. Training

We plan a short online event in collaboration with EUMeTrain (https://www.eumetrain.org/)

Date not yet defined. Expected date: second half of November.

Content:

NWC SAF GEO-I v2025: presentation of the version, scientific and technical changes with respect to v2021. Case studies for Clouds and Convection products

Listack product: presentation of the product and the prototype in EWC

Future Plans – CDOP 5 - Products

Future Plans for GEO-I with respect to products

- Improvements in all existing GEO-I products
- New Artificial Intelligence-based (AI-based) Cloud products coexisting with current ones
- New AI–based EXIM product coexisting with current EXIM
- New AI-based products to forecast lightning activity in the next minutes
- New product Alerts
- New product TCWV09 (Total Column Water Vapour from 0.9 µm channel)

Alerts product

To be developed by a new partner (since 2027) in NWC SAF Consortium:
NOA – National Observatory of Athens.

Objective: support the forecaster/nowcaster to issue warnings
Based in NWC SAF products + NWP model + satellite data

- First version for precipitation: detect risk of high precipitation/accumulation in user defined areas (for example municipalities)
- First version for lightning: detect risk of lightning jump/intense lightning activity in user defined areas (for example municipalities)

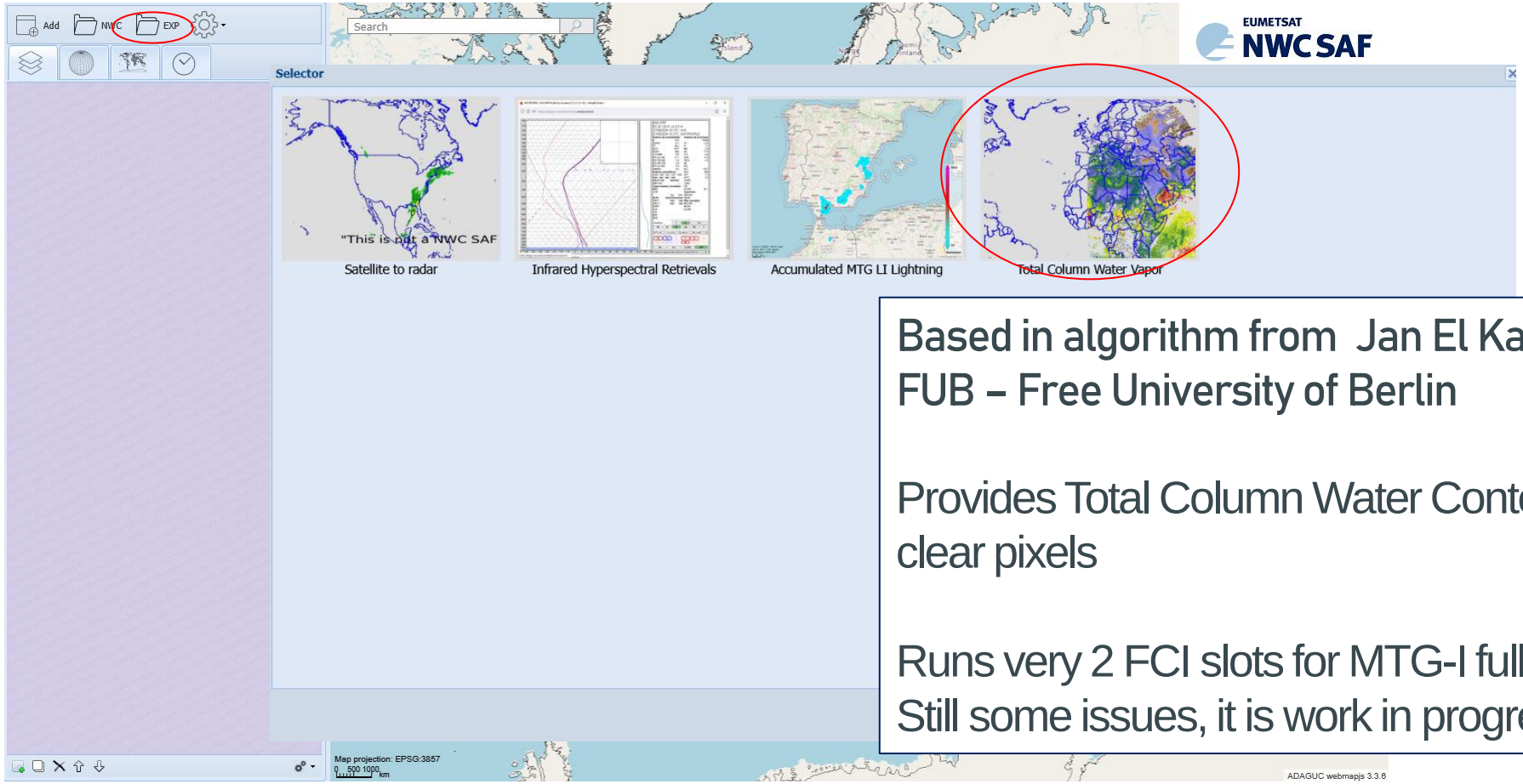
Evolution of the product: include other potential risks/transition to very-short range forecasting
Developer: A. Karagiannidis, NOA

Feedback welcome about interest on this product. Contact: pripodasa@aemet.es, safnwchd@aemet.es

Total Column Water Content from 0.9 µm channel

A prototype of TCWV09 is running NRT in the EWC and its visualization is open to the general public:

https://adaguc.nwcsaf.eumetsat.ewcloud.host/



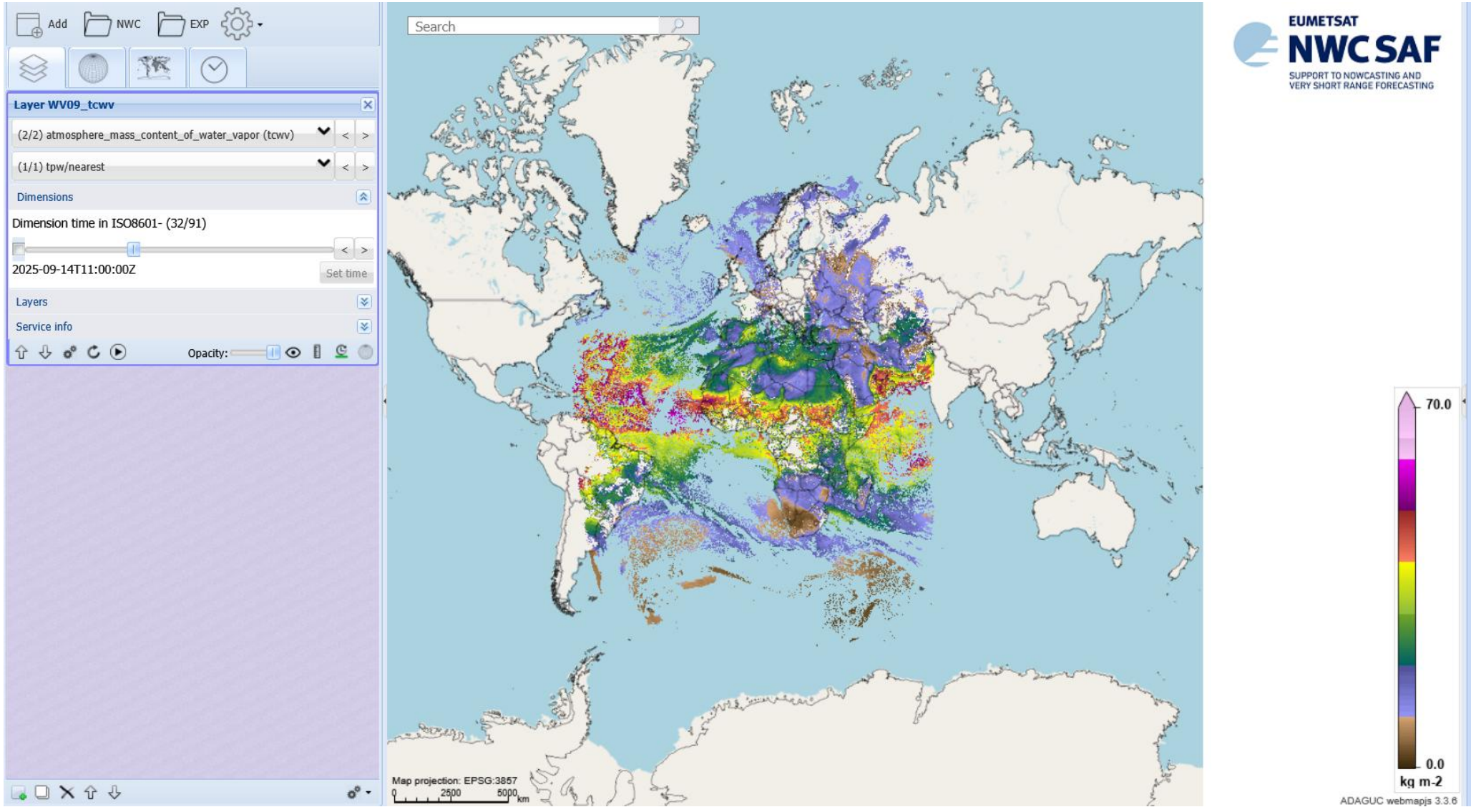
Based in algorithm from Jan El Kassar et al.
FUB – Free University of Berlin

Provides Total Column Water Content day-time in cloud clear pixels

Runs very 2 FCI slots for MTG-I full disk
Still some issues, it is work in progress

TCWV09 Water vapour from 0.9 µm channel

Based in algorithm from Jan El Kassar et al (FUB-Free University of Berlin)



Future Plans – CDOP 5 - Services

Continuation of current services

A new planned service is highlighted in this presentation:

- Commitment to generate full disk MTG-I NWC SAF products in the EWC, close to 24/7 service
- Visualization of these products in a WMS web viewer (currently ADAGUC)
- Distribution of the data products NRT via EUMETCast Terrestrial
- Storage of these data in EUMETSAT Data Store and/or in buckets in EWC (TBC)

This is an extension/upgrade of current service in EWC for MSG

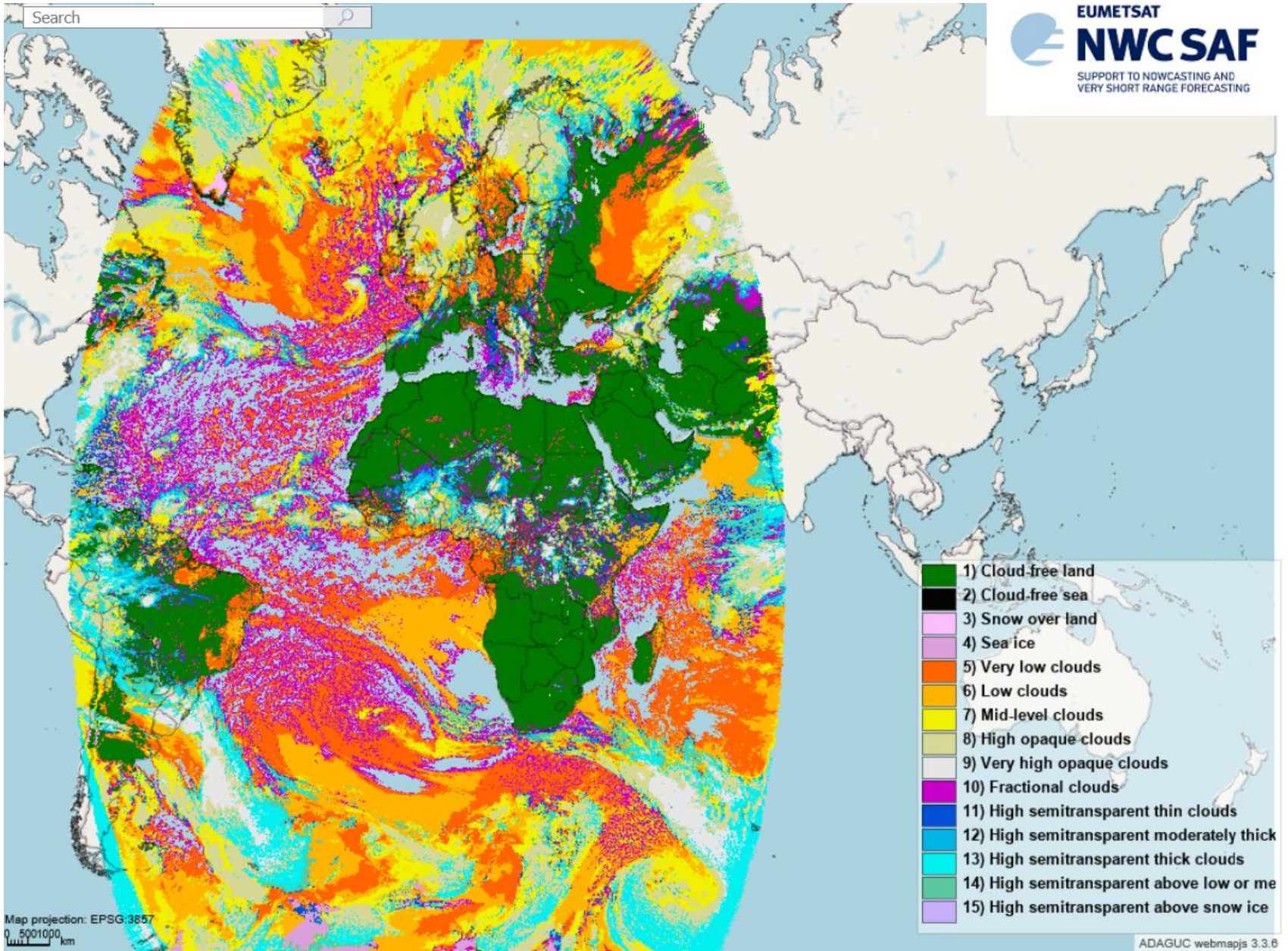
NWC SAF Future Plans Services

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Currently MSG Full disk production in EWC +

Visualization in ADAGUC



Commitment for MTG (24/7)

+

Distribution of NetCDF files via EUMETCast Terrestrial and storage of products

Future Plans – CDOP 5 - Products

WE NEED YOUR FEEDBACK about your interest in this service

We have sent a very short survey to contacts we have in EUMETSAT Member States.

If you have received it, please answer to it (it is a couple of minutes) or pass it to the relevant person in your institution

If not, give as your email and we can send it to you. Also if you do not belong to a EUMETSAT Member State.

Contact: pripodasa@emet.es safnwchd@emet.es



Thank you!

Questions are welcome.

NWC SAF GEO Team

AEMET: P. Rípodas, J.A. Lahuerta, J. García-Pereda, M.A. Martínez, X. Calbet , Ll. Lliso, N. Peinado-Galán, A. Pascual, I. Bueno

Météo-France: E. Fontaine, G. Kerdraon, T. Le Bastard, J.M. Moisselin, M. Claudon, R. Houël

Geosphere Austria: A. Jann, A. Wirth, P. Schmederer

NMA: A. Mihai, E. Mihulet, R. Stefan

GMV: O. Alonso, L. Guijarro, I. Vázquez