MTG LI Level 2 Accumulated Products

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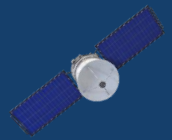
01
Introduction

Lightning

MET-12
-Flexible Combined Imager (FCI)

-Lightning Imager (LI)



02
Data and Prototype code

Accumulated Flash (AF)
Accumulated Flash Area (AFA)
Accumulated Flash Radiance (AFR)

Prototype Code:
-The organization of the source files
-The main functions used

03
Obtained Results

Software QGIS

04
ADAGUC Viewer Training

05
Conclusions and Future Aspects

Lightnings

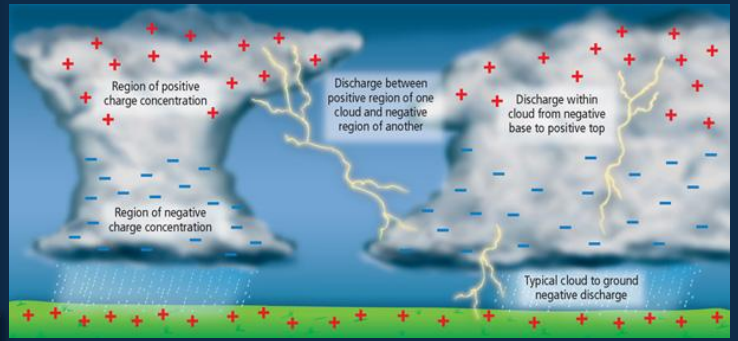


Figure 1. Charge distribution in storm clouds.

Lightning is the discharge of accumulated electrical charges between a cloud and the ground, between two clouds or even between two opposite charged areas of the same cloud. It appears when electrified clouds develop and it serves as their discharging mechanism. The lightning is accompanied by a mechanical disturbance of the air around it called thunder. Depending on the two endpoints of the lightning we can divide lightning in 3 main groups. The Cloud-to-Ground (CG) discharges where the lighting connects a charged area of a cloud with the ground, the Cloud-to-Cloud (CC) discharges where the lightning connects charged areas of two different clouds and the Intra-Cloud (IC) discharges where the lightning connects two charged areas of the same cloud.

E

D

C

B

With the advancement of technology and observation systems, forecasting intense lightning activity has become possible in meteorology. Nevertheless, it is impossible to predict every lightning strike, because these phenomena can be frequent, unpredictable, and widespread.

A

Lightnings

Natural phenomena observed under various extreme conditions, such as volcanic eruptions, blizzards, hurricanes, and thunderstorms.

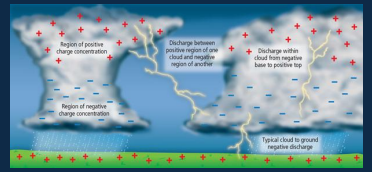


Figure 1. Charge distribution in storm clouds.

E

D

C

B

A

Because lightning is frequently associated with storms—which can bring extreme weather such as torrential rain, hail, strong winds, and tornadoes—it holds great importance in meteorology, offering insights into atmospheric chemistry, extreme-event prediction, climatic influence, atmospheric and electrical dynamics, and data for improving forecasts. și date pentru îmbunătățirea prognozei.

Lightnings

Natural phenomena observed under various extreme conditions, such as volcanic eruptions, blizzards, hurricanes, and thunderstorms.

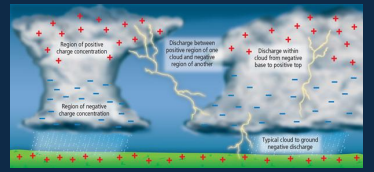


Figure 1. Charge distribution in storm clouds.

E

D

Understanding lightning can help assess its impact on atmospheric composition and pollution. Global nitrogen cycles can indirectly influence the climate.

C

B

A

Lightnings

Natural phenomena observed under various extreme conditions, such as volcanic eruptions, blizzards, hurricanes, and thunderstorms.

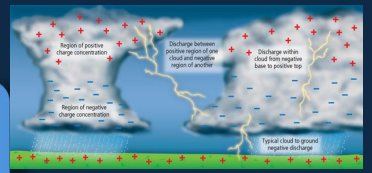


Figure 1. Charge distribution in storm clouds.

E

The production of nitrogen oxides (NOx) can contribute to ground-level ozone formation and affects air quality. Generating these oxides also promotes higher concentrations of greenhouse gases such as methane and ozone, which play an important role in climate change.

D

C

B

A

Lightnings

Natural phenomena observed under various extreme conditions, such as volcanic eruptions, blizzards, hurricanes, and thunderstorms.

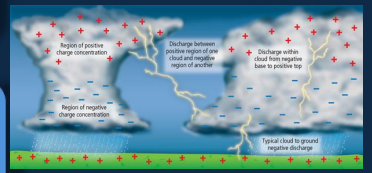
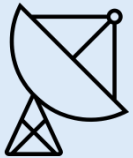
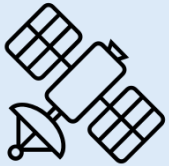


Figure 1. Charge distribution in storm clouds.





E

D

C

B

A

Lightnings

Natural phenomena observed under various extreme conditions, such as volcanic eruptions, blizzards, hurricanes, and thunderstorms.

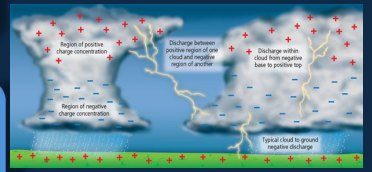


Figure 1. Charge distribution in storm clouds.

Lightning-detection systems supply near-real-time data that are then fed into weather-forecasting models. These data improve the accuracy of storm predictions and, at the same time, allow meteorologists to monitor the storm life cycle—from formation to dissipation.

MET-12 and its instruments

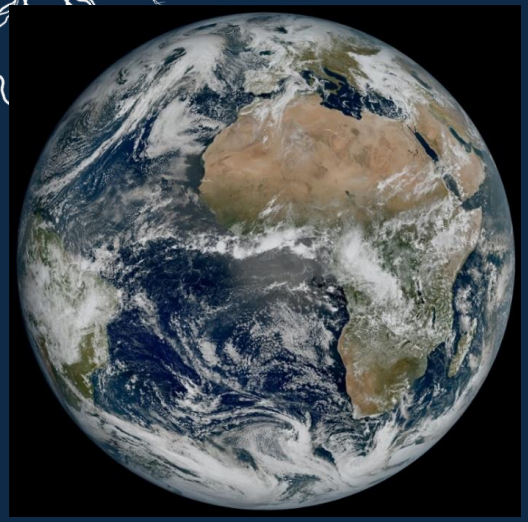


Figure 1. The first image of the complete Earth disk taken by MET-12.

1. Flexible Combined Imager (FCI)

- Has an essential role in providing more accurate information about fog, volcanic ash, air mass characteristics, clouds, aerosols, and wildfires;
- has channels over 16 spectral ranges covering visible to infrared wavelengths;
- The spectral channels VIS 0.6, NIR 2.2, IR 3.8 and IR 10.5 are delivered both in Normal Resolution (NR) and High Resolution (HR) spatial sampling configurations, Spatial Sampling Distance (SSD) at 1km and 0.5km (HR).

- Launch in 2022, located at 0° longitude; ability to monitor over Europe, Africa, the Middle East, and parts of South America, as well as the surrounding waters.

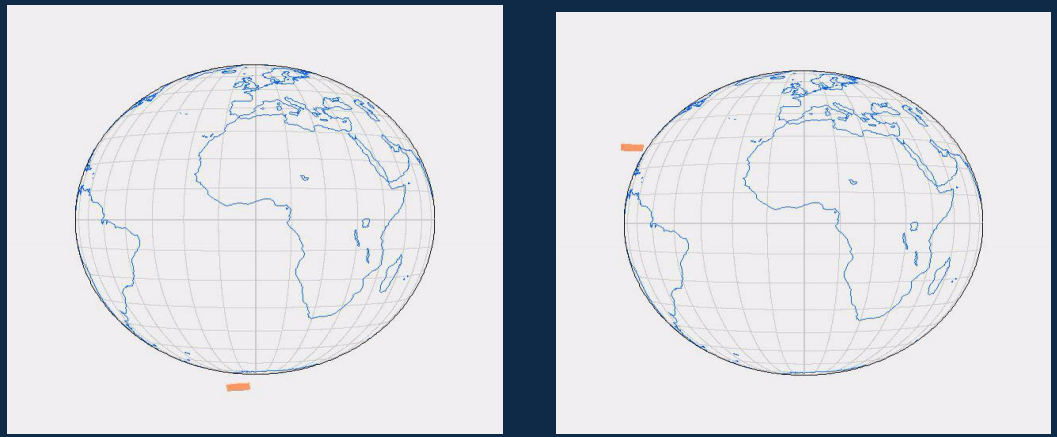


Figure 2. Animation of the FCI scanning patterns in support of the full disc service (FDSS) (left) and the rapid scanning service (RSS) (right).

2. Lightning Imager (LI)

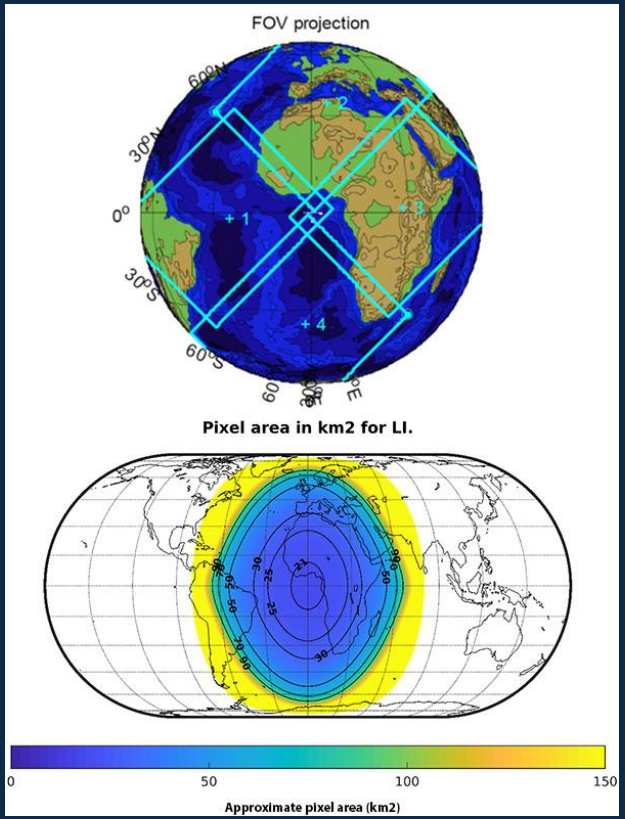
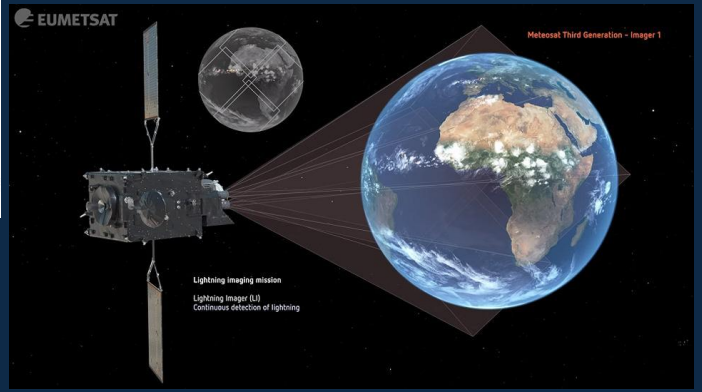
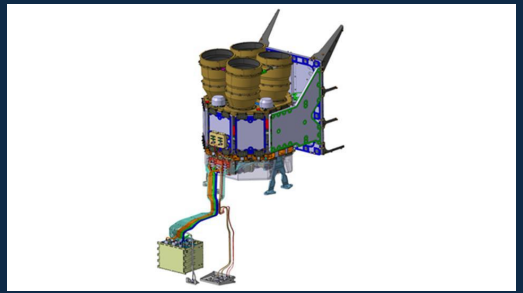


Figure 3. Shows how each optical camera observes a different portion of the Earth disc: the required FOV coverage for the mission is 84% of the Earth disc observable from the 0° longitude geostationary position, and 100% of the territories of all the EUMETSAT member states.

- is an imaging filter spectrometer with on-board data processing for detecting lightning by measuring the lightning optical pulse signal from the top of the atmosphere;
- The so-called LI Optical Head (LOH) includes four identical optical cameras (OC). Each OC is composed of a baffle for stray light, an optical system, a focal plane assembly with a 1000×1170 pixels CMOS detector and front-end electronics, including the real-time pixel processors for the on-board processing;
- Spectral band: narrowband filter centered over the neutral oxygen triplet at 777.4nm with 1.9nm bandwidth;
- Spatial sampling: the sampling at sub-satellite point is 4.5km, ie, smaller than typical dimensions of optical pulses expected from lightning activity, while over central Europe it is about 10km
- Temporal sampling: the integration time of 1ms period is comparable to the typical duration of pulses and twice the duration of the 'peak phase' (ie, about 0.5ms).





Figures 4, 5. A 3D representation of the Lightning Imager Instrument.

2. Data and Prototype code

Types of data level 2

- Lightning flashes-LFL
- Lightning groups-LGR
- Accumulated Flash Area (AFA)
  -provides information about the area covered by the optical emission of each lightning strike.
- Accumulated Flashes (AF)
  -it complements AFA by providing information about the variation in the number of events in an area of interest where lightning activity has been observed.
- Accumulated Flash Radiance (AFR)
  -it provides information about the pixel-by-pixel variation of accumulated optical emissions over a 30-second period.

AFA

AF

AFR

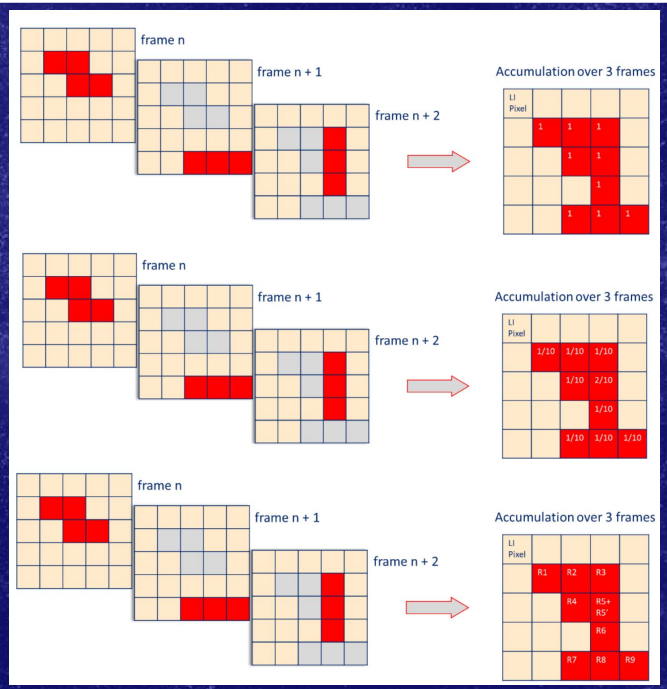


Figure 6,7,8. Graphical representation of the accumulation of lightning events, contributing to AFA, AF, and AFR. On the left, we have different groups that make up the lightning event and its representative acquisition frame, where the gray shows the accumulated events up to the accumulation degree, and the red indicates the events added to the accumulation at each frame. On the right, we have the final result of the accumulation.

Data Used

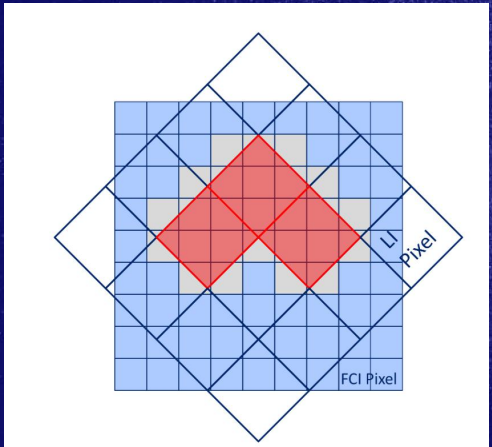


Figure 9. The diagram illustrates the reprojection of three accumulated LI pixels (red pixels within the grid tilted at 45º; pixel size 4.5 km) onto the FCI level 1c grid (gray pixels within the light blue-colored grid; pixel size 2 km).

- Lightning groups–Full Disc (LGR-FD): **61 files per cycle** (60 body chunks and one trail file)
- Lightning Flashes–Full Disc (LFL-FD): **61 files per cycle** (60 body chunks and one trail file)
- Accumulated Flash Radiance–Full Disc (AFR-FD): **21 files per cycle** (20 body chunks and one trail file)
- Accumulated Flashes–Full Disc (AF-FD): **21 files per cycle** (20 body chunks and one trail file)
- Accumulated Flash Area–Full Disc (AFA-FD): **21 files per cycle** (20 body chunks and one trail file)
- The developed code can also be used for all **LI Level 2 to accumulate products for 10 minutes**: Accumulated Flash Area (AFA), Accumulated Flashes (AF) and Accumulated Flash Radiance (AFR).

The prototype of the developed code in the C programming language.

Advantages

- Ensures increased control over the processed data.
-Allows efficient resource management and optimization of the workflow, which are essential aspects for achieving precise and effective results.

Disadvantages

- High complexity, strict requirements, and the need for a meticulous approach, as the programmer must have a deep understanding of both memory allocation and its manipulation.

Table 1. Main Stages of Program Execution

Nr.	Main Steps	Description
1.	Reading the configuration files	Reading the necessary information to identify the satellite's position as well as the bands used
2.	The initialization of variables	Allocating the necessary memory for matrices to ensure the proper execution of the program
3.	Reading input files	Reading satellite data over a configurable time period using the variables t_minus and t_plus, which represent the start and end times of the data of interest for processing.
4.	Data accumulation	Populating a common matrix set with all the data read in the previous step.
5.	Writing output files	Generating a NetCDF file that contains the final data.
6.	Free memory	In the C programming language, it is necessary to both allocate and free the used memory at the end of execution.

NWCLIB Library	Makefile	Result	Functionalities
NWCLIB is a specialized library developed as part of the EUMETSAT Nowcasting Satellite Application Facility (NWCSAF) initiative. It is designed to support nowcasting and very short-term forecasting activities using satellite data and is widely used in meteorological and atmospheric research, particularly with data from geostationary satellites.	Writing a **makefile** that contains rules and instructions for compiling the entire code, specifying the files that need to be included, and defining the dependencies between them. Using rules, the **makefile** helps in building the project more quickly and allows for easy modification of files for compilation, so that the project can be run more efficiently.	The result obtained is a NetCDF file containing data in the form of a 5568x5568 two-dimensional matrix with rows and columns. The obtained data contains positive values, greater than or equal to 0.	❖ Computing elements in linear and discrete domains for one-dimensional and two-dimensional data. ❖ Performing statistical calculations such as standard deviation, matrix arithmetic, and more.

```
safnwc: /home/safnwc/src/LIStack =>ls
ConfigRead.c   Initialise.o   makefile              ParallaxCorrection.o   run_exe_example   WriteLIProduct.c   WriteNcdf.o
ConfigRead.o   LIStack.c      ok3                   ReadData.c             WriteLIMetrics.c  WriteLIProduct.o
Initialise.c   LIStack.o      ParallaxCorrection.c  ReadData.o             WriteLIMetrics.o  WriteNcdf.c
```

The main functions used

Nr.	Function	Function description	Input Files
1.	***NwcTimeSetStr***	Set all elements of the Utc structure according the date/time provided in YYYYMMDDThhmmssZ format; A single Utc structure stores a single date in different formats, including: YYYYMMDDThhmmssZ , YYYY-MM-DDThh:mm:ssZ , seconds since 1JAN1970, Julian Date and struct tm .	"str": Input representing the date/time in the format: YYYYMMDDThhmmssZ.
2.	***NwcMemMallocF2D***	Allocates a 2D matrix of float.	"nlines": Number of rows. "ncols": Number of columns.
3.	***NwcRegionSet***	Initiates the processing region ; Returns an array of region structures for all 3 generic satellite resolutions (NR: Nominal = Low Resolution, HR: High Resolution, VHR: Very High Resolution) For example for SEVIRI, NR is VISIR and HR is HRVIS. VHR does not apply for SEVIRI. The regions defined in each satellite/band resolution perfectly match Each region structure stores information about the resolution and navigation coefficients.	"region_file": The name of the configuration file representing the region.
4.	***NwcNavGetLatLon***	Computes the latitude and longitude for each pixel in the processing region. Allocates and returns two 2D matrices storing the latitude and longitude of the center of each pixel in the processing region.	"region": A vector of processing regions (values initialized using the NwcRegionSet() function). "res": Required for the satellite resolution.
5.	***NwcAuxReadSatLIL2***	Receives LI Level 2 products: LFL and LGR. Taking into account the time and region constraints, this function outputs the number of lightning events and a vector containing information about them. Additionally, it supports reading products from MTG-LIL2 and GLM.	"region": A vector of structures describing the processing regions (for all resolutions). "slot": The timestamp for processing. "t_minus": The start time for reading data intended for processing, calculated in minutes as slot - t_minus. "t_plus": The stop time for reading data intended for processing, calculated in minutes as slot + t_plus. "product": Defines the type of lightning product to be read: { LFL, LGR }.
6.	***nwcAuxReadAccLIL2***	This is a generic function used to read lightning products including LFL and LGR. The function return the number of lightning data (nb_l) and the array with lightning data (l) read from LIL2 lightning products matching the time and region constrains. This function supports reading MTG-LIL2 and GLM data products.	"region": A vector of structures describing the processing regions (for all resolutions). "slot": The timestamp for processing. "t_minus": The start time for reading data intended for processing, calculated in minutes as slot - t_minus. "t_plus": The stop time for reading data intended for processing, calculated in minutes as slot + t_plus. "product": Defines the type of lightning product to be read: { AF, AFA, AFR }.
7.	***NwcMemFreeF2D***	Frees a 2D matrix of float.	I: Pointer to a two-dimensional matrix of type Float_32. O: NULL.

Nr.	Function	Function description	Input Files
8.	***NwcLog***	Sends a Notification message. A parameter defines the type of message (Info, Debug, Warning, Error or Progress)	"type": Message type ('I'nfo, 'W'arning, 'E'rror, 'D'ebug, 'P'rogress)."sender": Notification sender (NWC/GEO module)."version": Sender version fmt": Message (formatted similarly to the printf ()
9.	***nc_def_dim***	Define a dimension in the NetCDF file (lat/lon).	"ncid": Identification number of a previously used file, associated with one of the functions nc_open(), nc_create(), nc_def_grp(), or nc_inq_ncid()."name": The name of the dimension to be created."len": The length of this dimension. Use the NC_UNLIMITED macro for unlimited dimensions."idp": A pointer to the memory location where the dimension ID will be stored.
10.	***nc_def_var***	Define the required variables.	"ncid": Identification number of a previously used file, associated with one of the functions nc_open(), nc_create(), nc_def_grp(), or nc_inq_ncid()."name": The name of the NetCDF variables."xtype": Data type of the variables."ndims": Number of dimensions for the variables. dimidsp": Array of dimension IDs (ndims) corresponding to the dimensions of the variables."varidp": A pointer to the memory location for the returned variable ID.
11.	***nc_put_att_float***	Function to write attributes.	int ncid, int varid, const char *name, nc_type xtype, size_t len, const float *value
12.	***nc_enddef***	Finalize the definition mode after all dimensions and variables have been declared in the file.	"ncid": Identification number of a previously used file, associated with one of the functions nc_open() or nc_create().
13.	***nc_put_var_float***	Write floating-point data to the memory location allocated for the specified variable.	"ncid": Identification number of a previously used file, associated with one of the functions nc_open(), nc_create(), nc_def_grp(), or nc_inq_ncid()."varid": The ID of the variable."op": A pointer to the memory location from which the data will be copied.
14.	***NwcProdWriteInit***	Initializes (creates) a NWC/GEO product to be further built using other NwcProdWrite* functions.	This function writes the common attributes and dimensions.
15.	***WriteLIMetrics***	Write products metrics to a NetCDF file	Float_32 *completeness – A pointer to a floating-point variable representing completeness .Float_32 *quality – A pointer to a floating-point variable representing quality.Float_32 **dataAFA – A 2D array of floating-point values, possibly related to a specific dataset .Float_32 **dataAF – Another 2D array, possibly storing "AF" metrics.Float_32 **dataAFR – Another 2D array, possibly storing "AFR" metrics.Float_32 **lat – A 2D array representing latitude values.Float_32 **lon – A 2D array representing longitude values.
16.	***nc_close***	Close the NetCDF file, save the changes, and release the allocated memory resources.	"ncid": Identification number of a previously used file, associated with one of the functions nc_open(), nc_create().
17.	***RotateMatrix180***	Rotate the matrix with 180 degree.	Float_32 **data – A pointer to a pointer representing a matrix of 32-bit floating-point numbers. Psing_region *region – A pointer to a Psing_region structure, which likely defines the region of the matrix to be rotated.

3.

Results

- Software QGIS

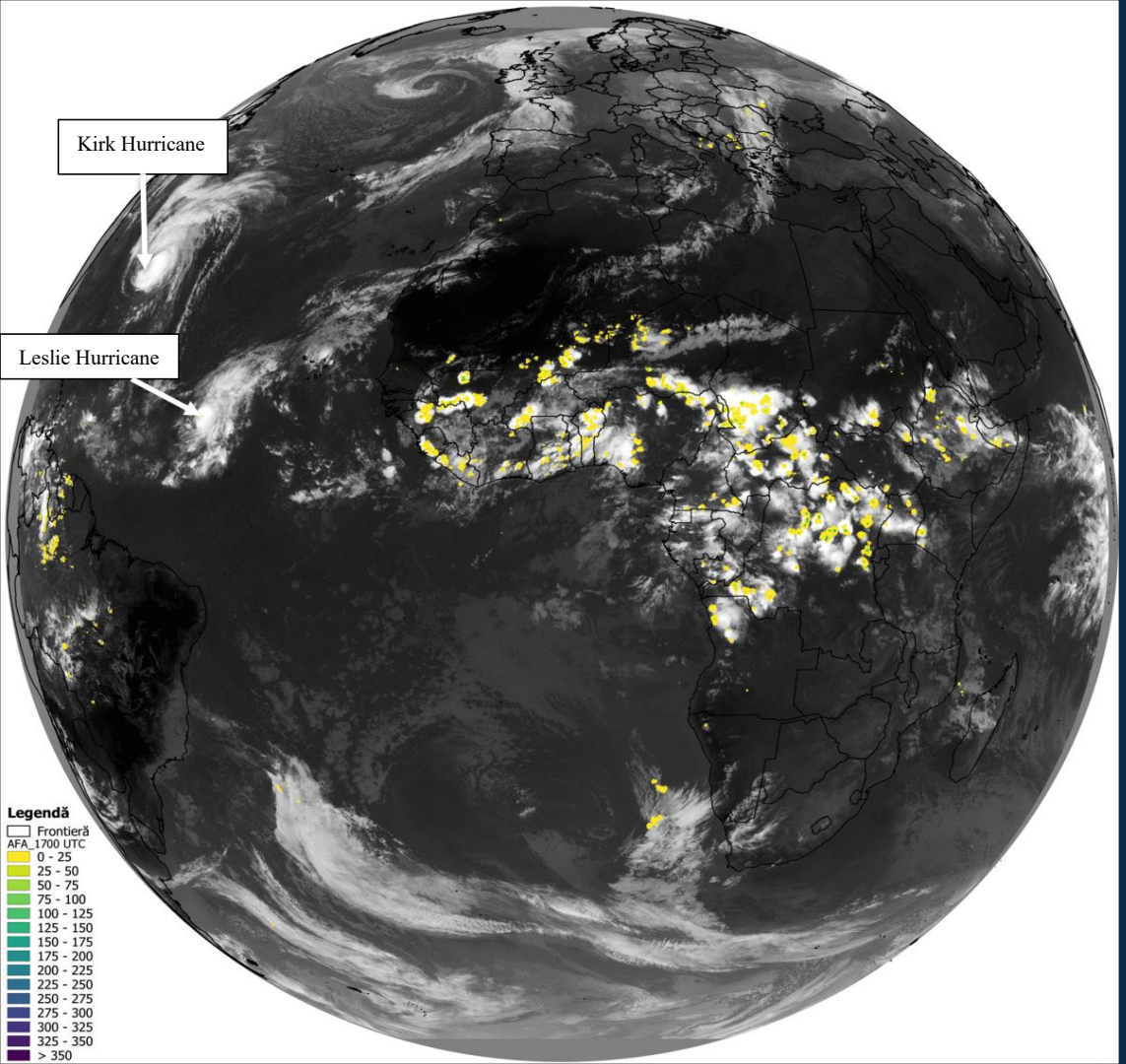


Figure 10. Animation over Europe, Africa, the Middle East, and parts of South America displaying the Level 2 LI Accumulated Flash Area (AFA) product for October 5, 2024, from 17:00 to 19:00 UTC. The base layer uses FCI HRFI IR 10.5 µm data from EUMETSAT. https://view.eumetsat.int/productviewer?v=default .

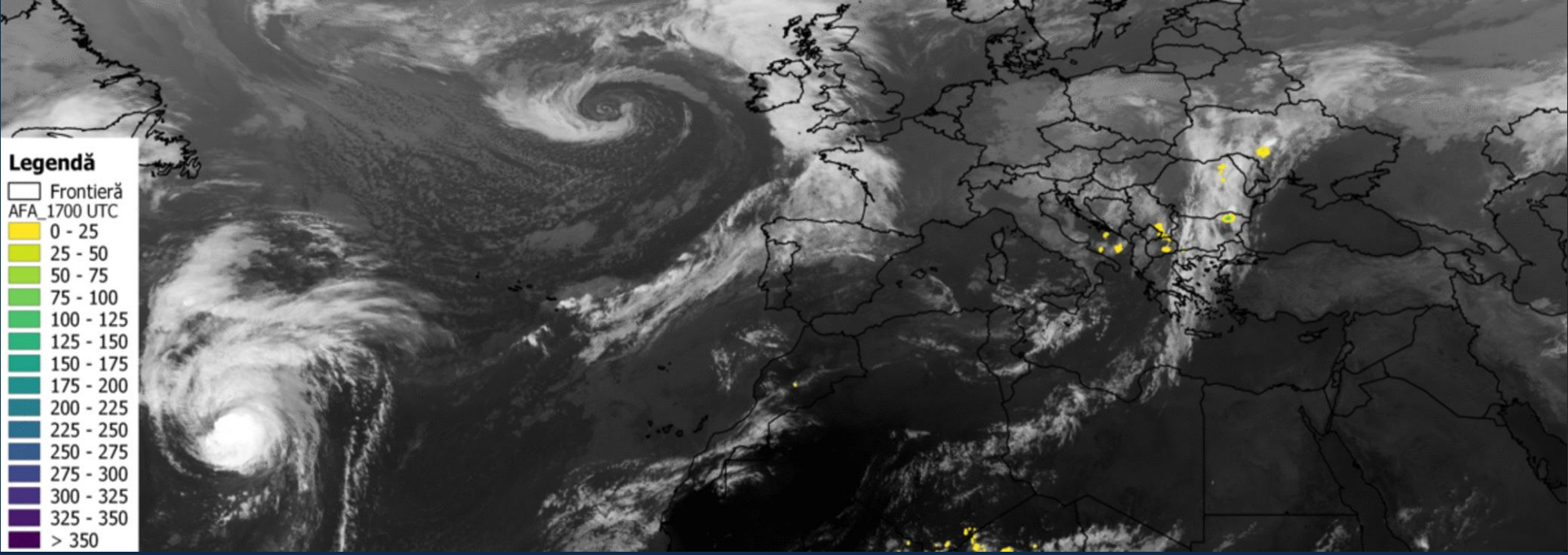


Figure 11. Animation over Europe and northern Africa displaying the Level 2 LI Accumulated Flash Area (AFA) product for October 5, 2024, from 17:00 to 19:00 UTC. The base layer uses FCI HRFI IR 10.5 µm data from EUMETSAT. https://view.eumetsat.int/productviewer?v=default .

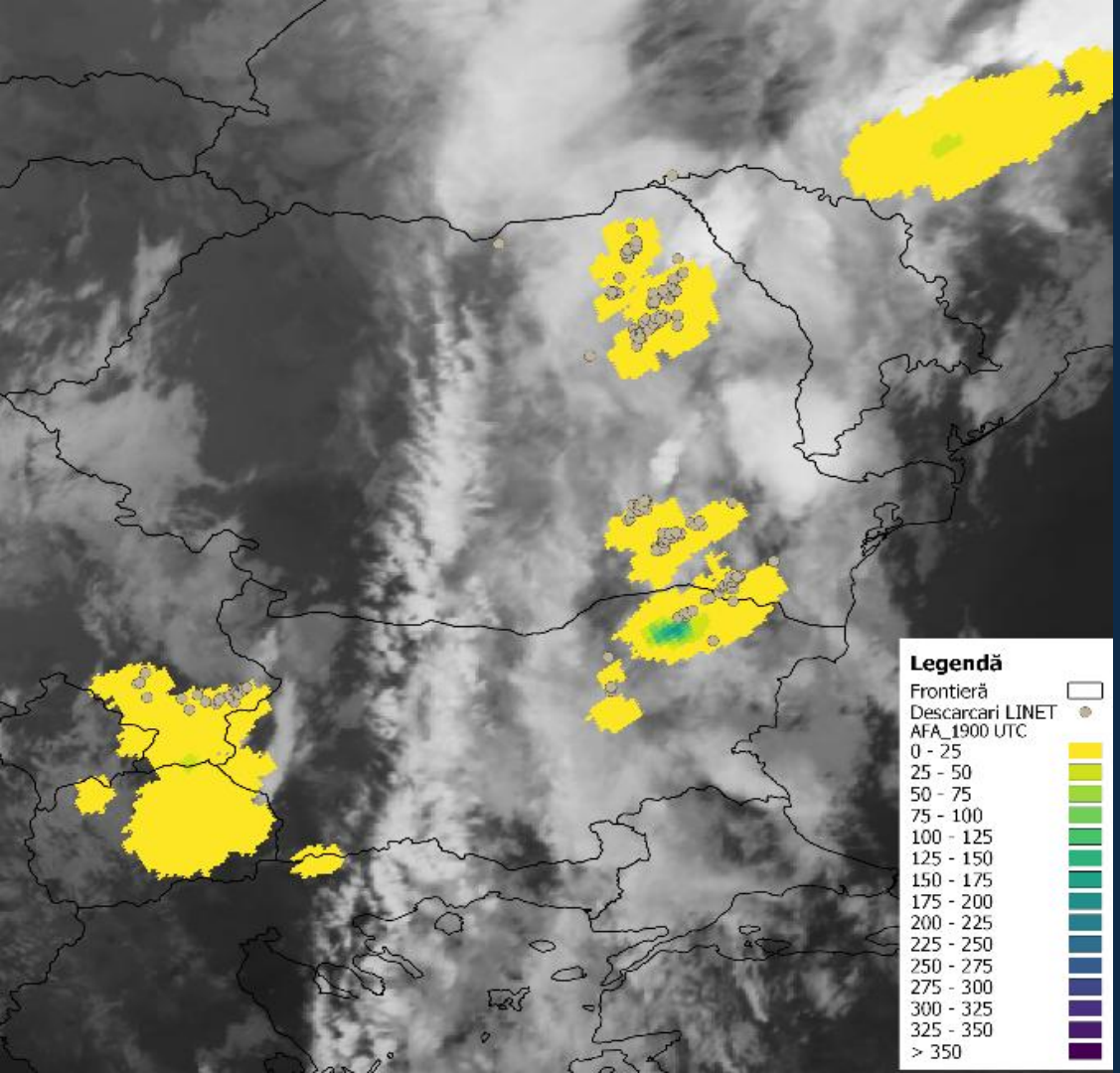
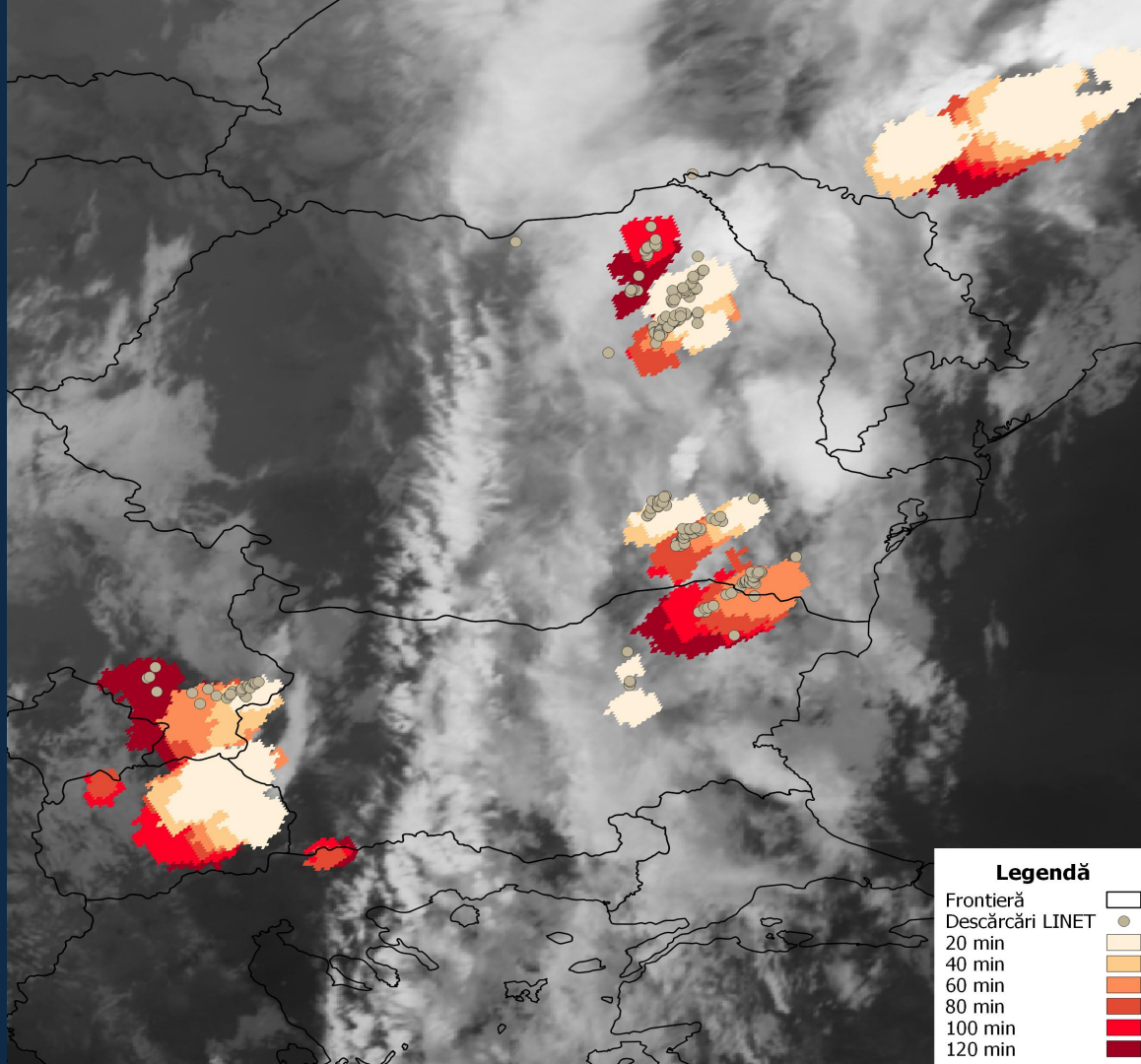


Figure 12. Comparison between the Level 2 LI Accumulated Flash Area (AFA) with data from the Romanian ground-based Lightning Location Network for October 5, 2024, from 17:00 to 19:00 UTC. The base layer uses FCI HRFI IR 10.5 µm data from EUMETSAT. https://view.eumetsat.int/productviewer?v=default

Figure 13. Another comparison between the Level 2 LI Accumulated Flash Area (AFA) with data from the Romanian ground-based Lightning Location Network for October 5, 2024, from 17:00 to 19:00 UTC. The base layer uses FCI HRFI IR 10.5 µm data from EUMETSAT. https://view.eumetsat.int/productviewer?v=default



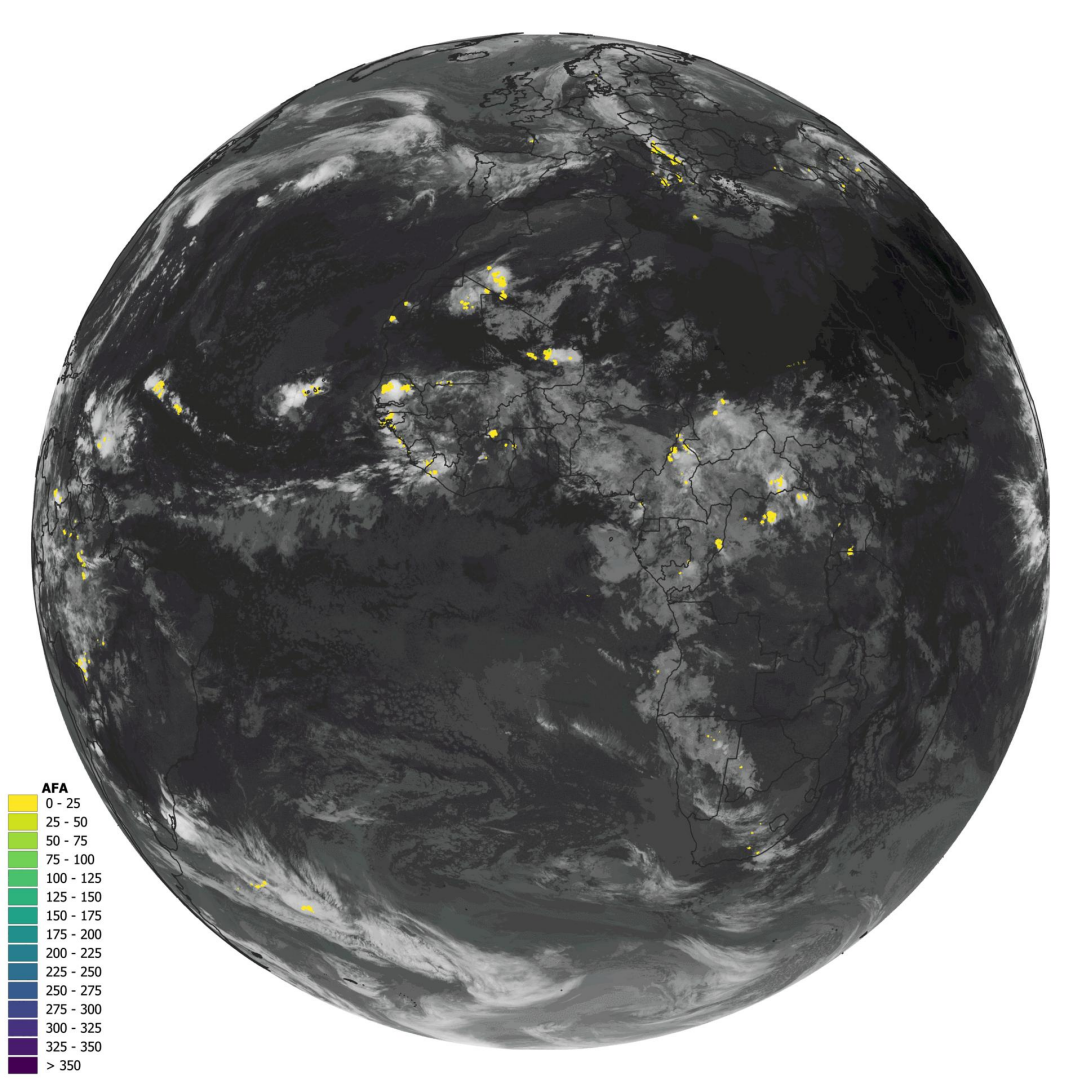


Figure 14. Animation over Europe, Africa, the Middle East, and parts of South America displaying the Level 2 LI Accumulated Flash Area (AFA) product for September 24, 2024, from 05:00 to 07:00 UTC. The base layer uses FCI HRFI IR 10.5 µm data from EUMETSAT. https://view.eumetsat.int/productviewer?v=default .

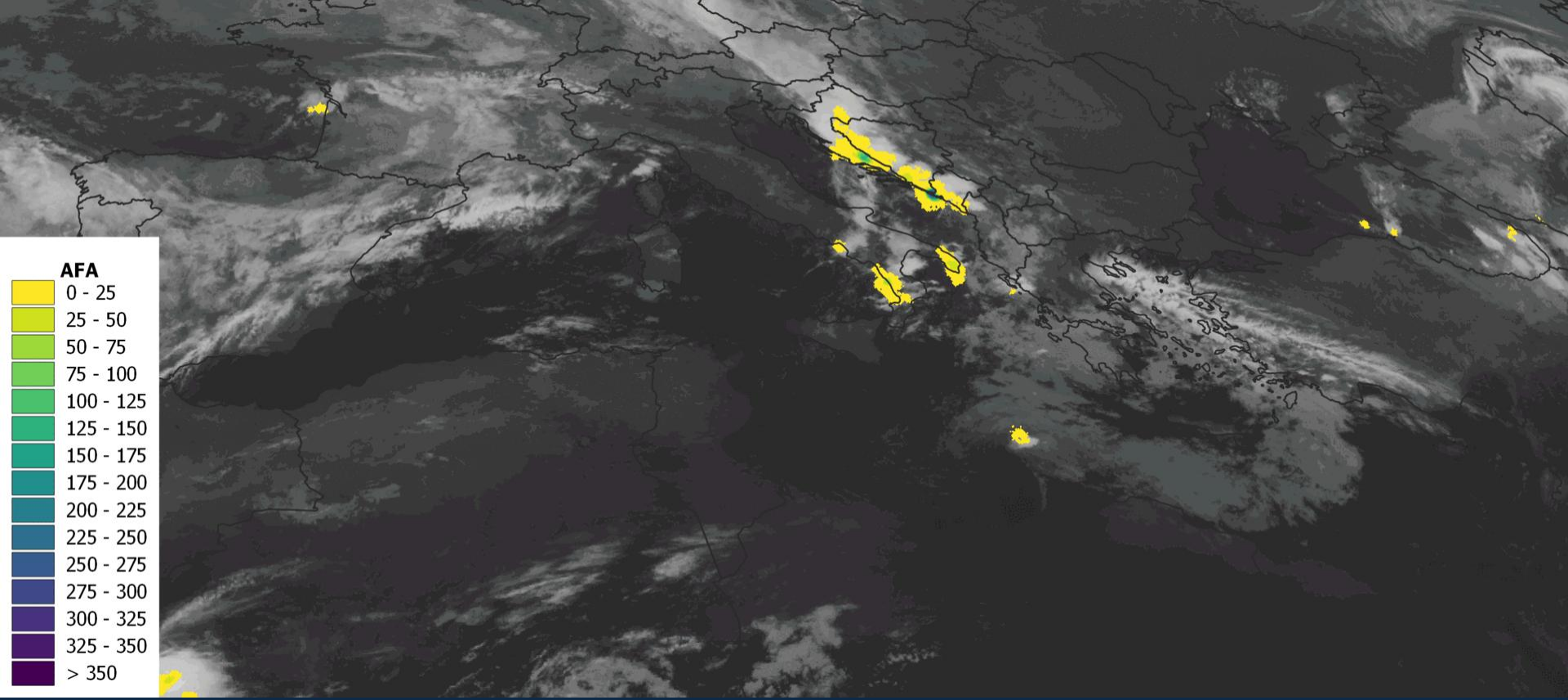
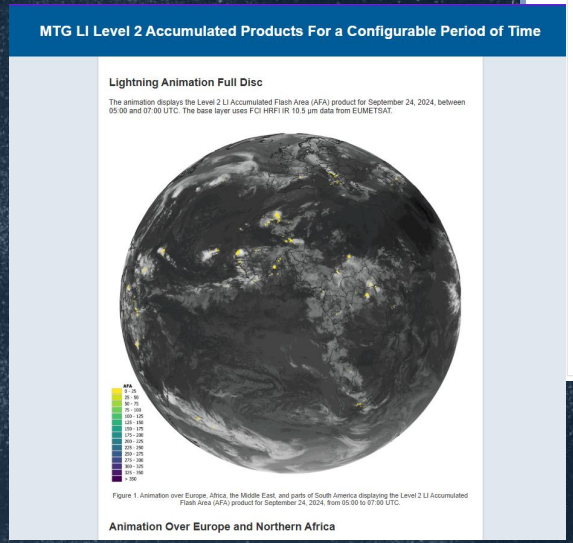
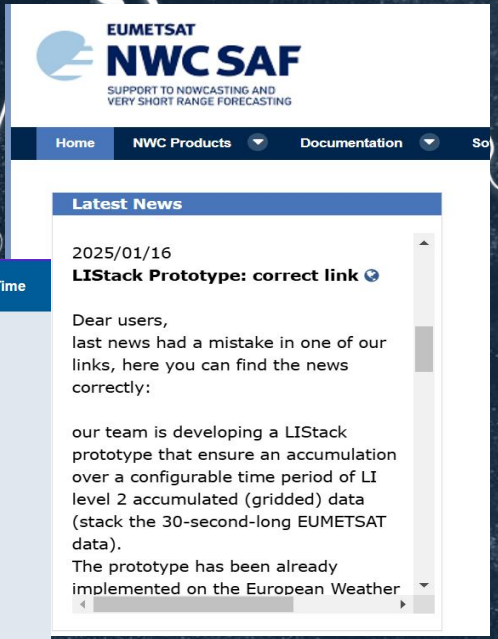


Figure 15. Animation over Europe and northern Africa displaying the Level 2 LI Accumulated Flash Area (AFA) product for September 24, 2024, from 05:00 to 07:00 UTC. The base layer uses FCI HRFI IR 10.5 μm data from EUMETSAT.

ADAGUC Viewer Training



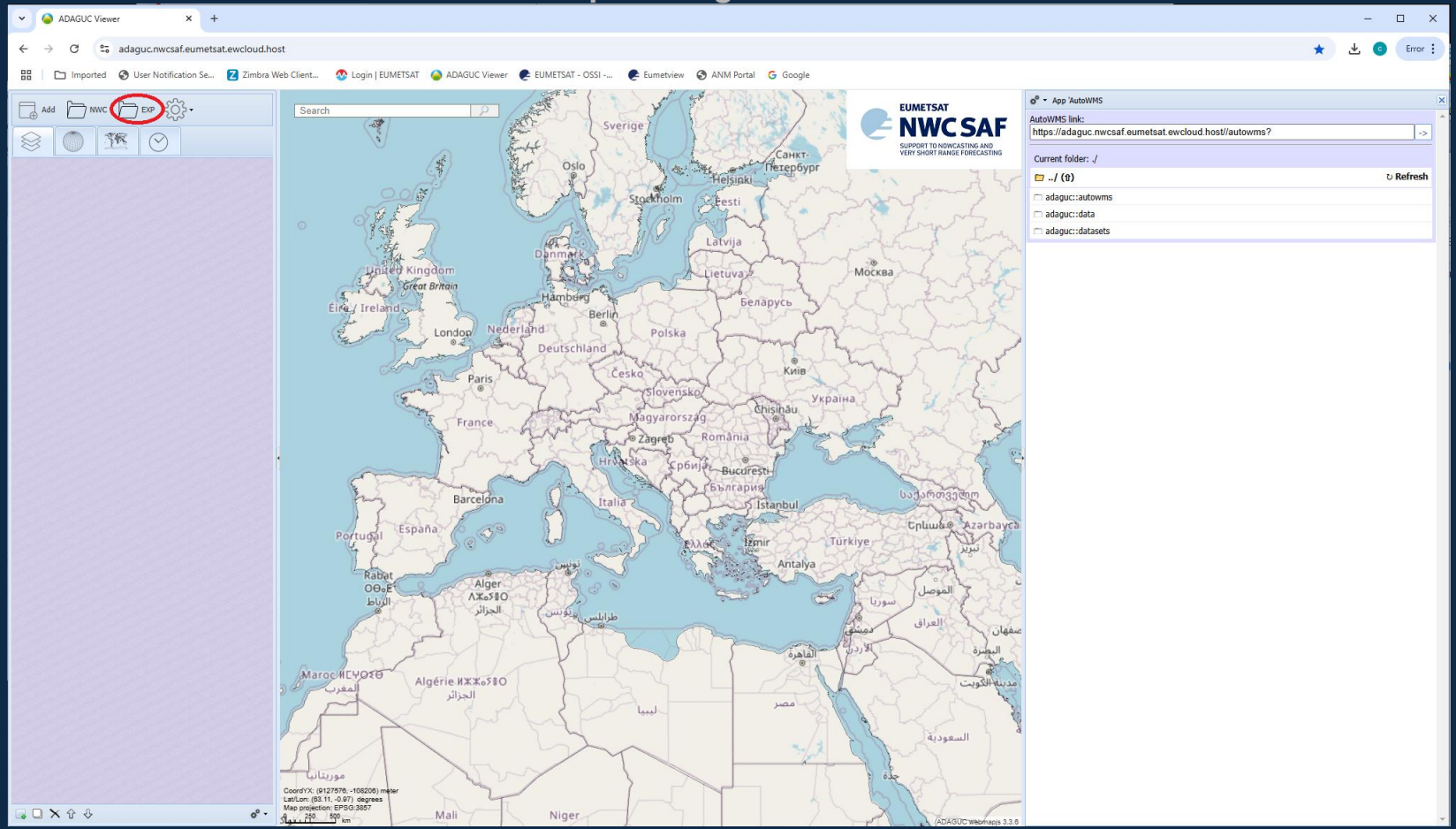


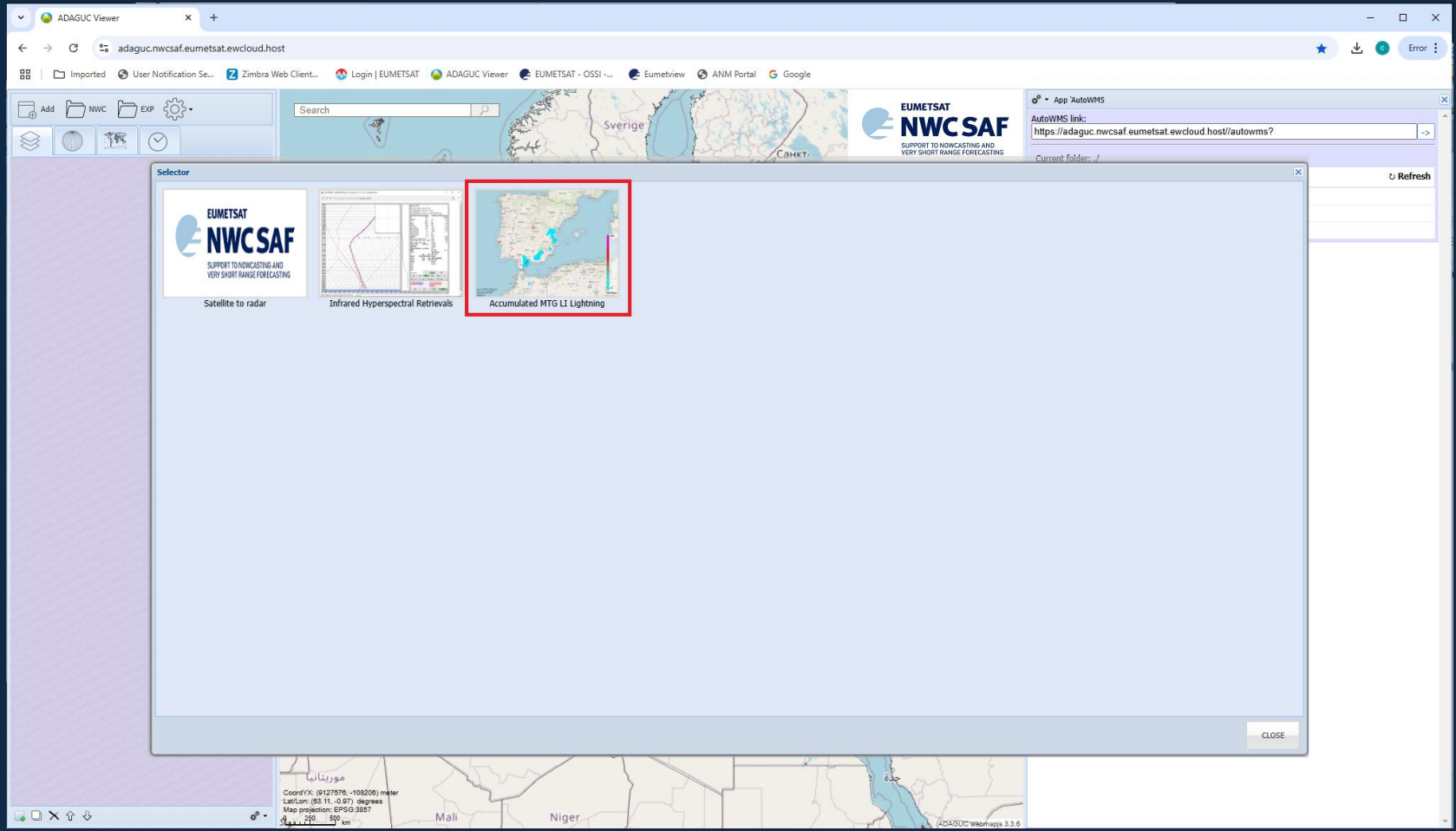
https://adaguc.nwcsaf.eumetsat.ewcloud.host/

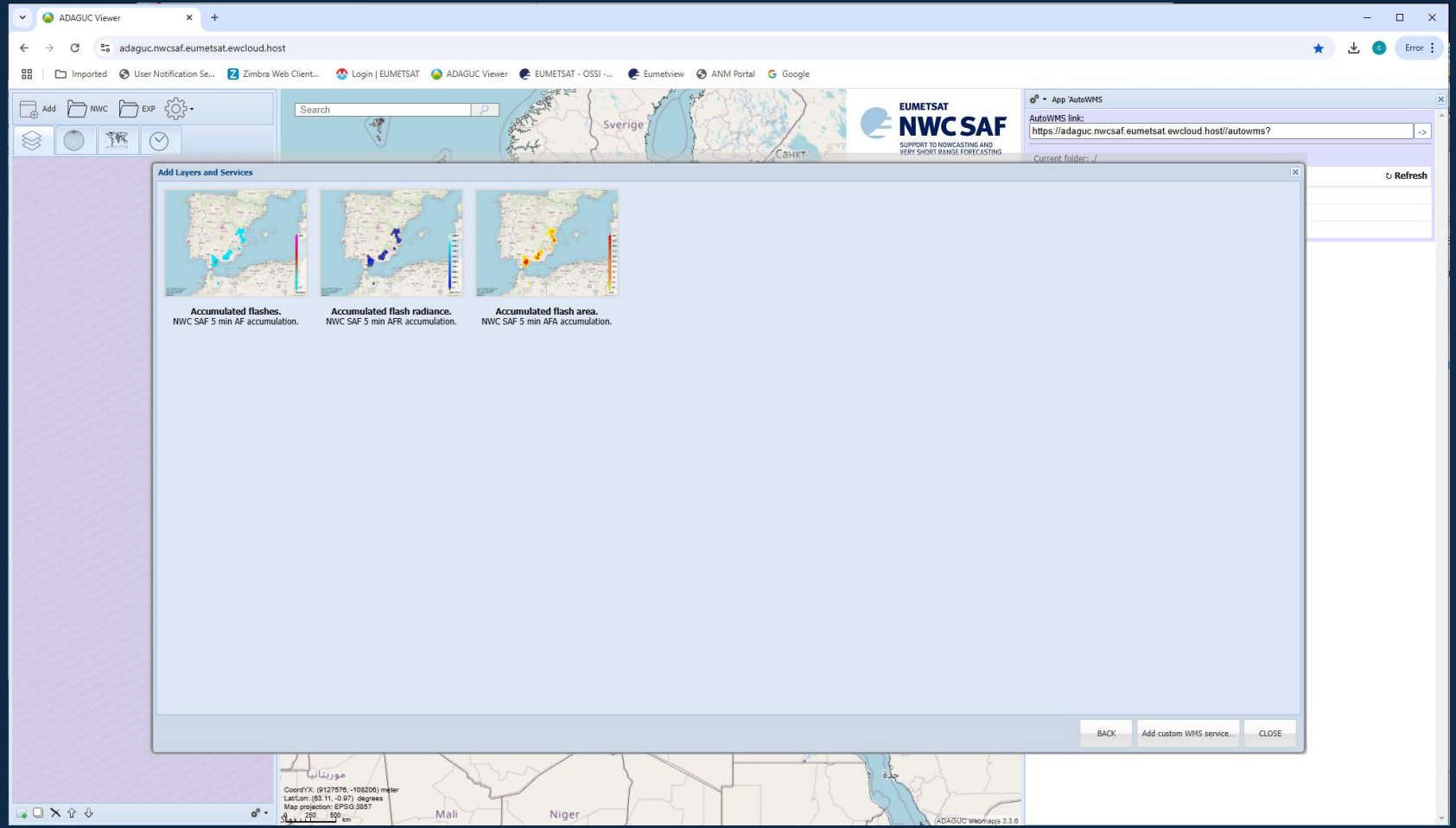
https://www.nwcsaf.org/AemetWebContents/listack/LI.html

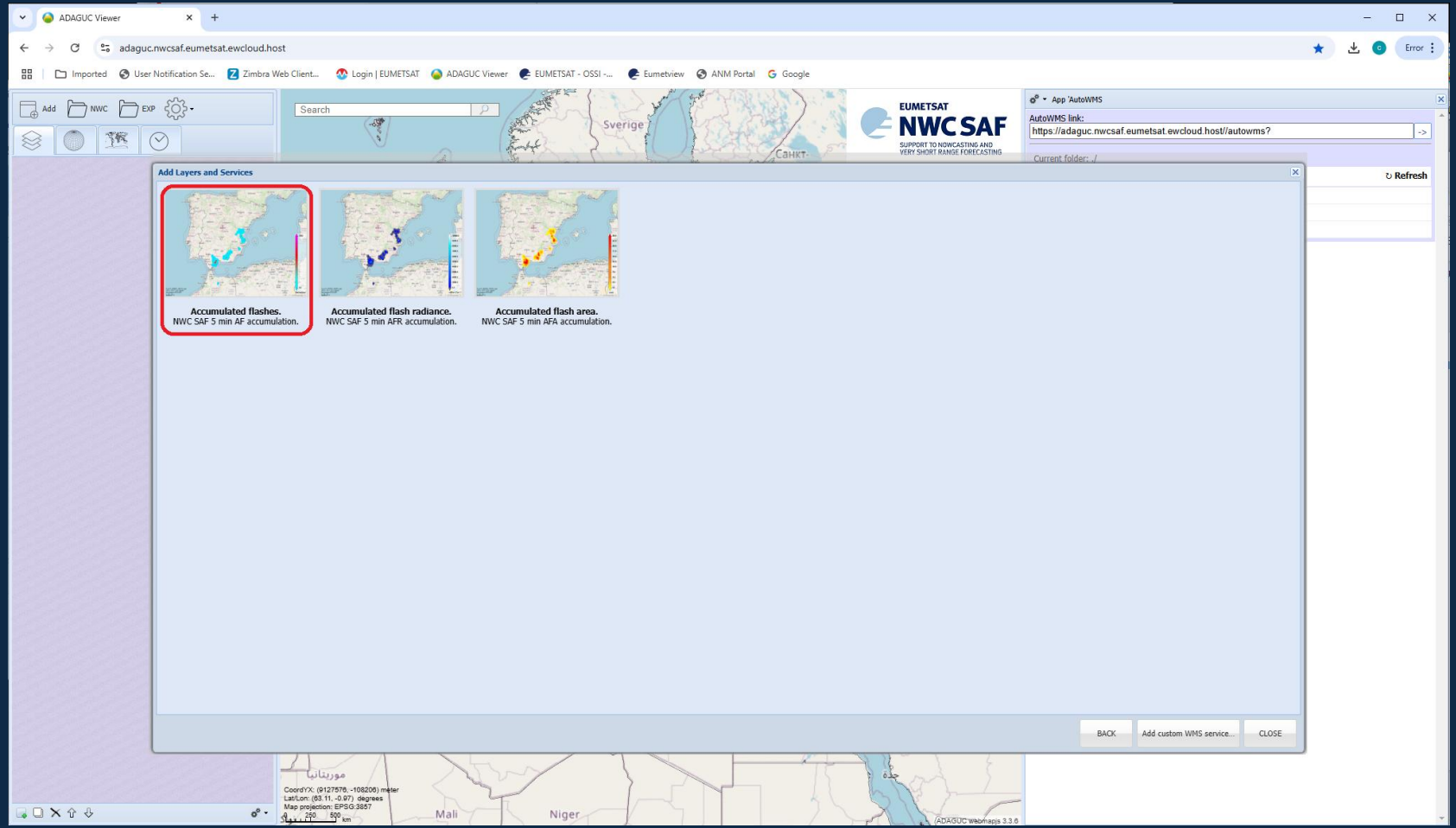
https://www.nwcsaf.org/web/guest/listack

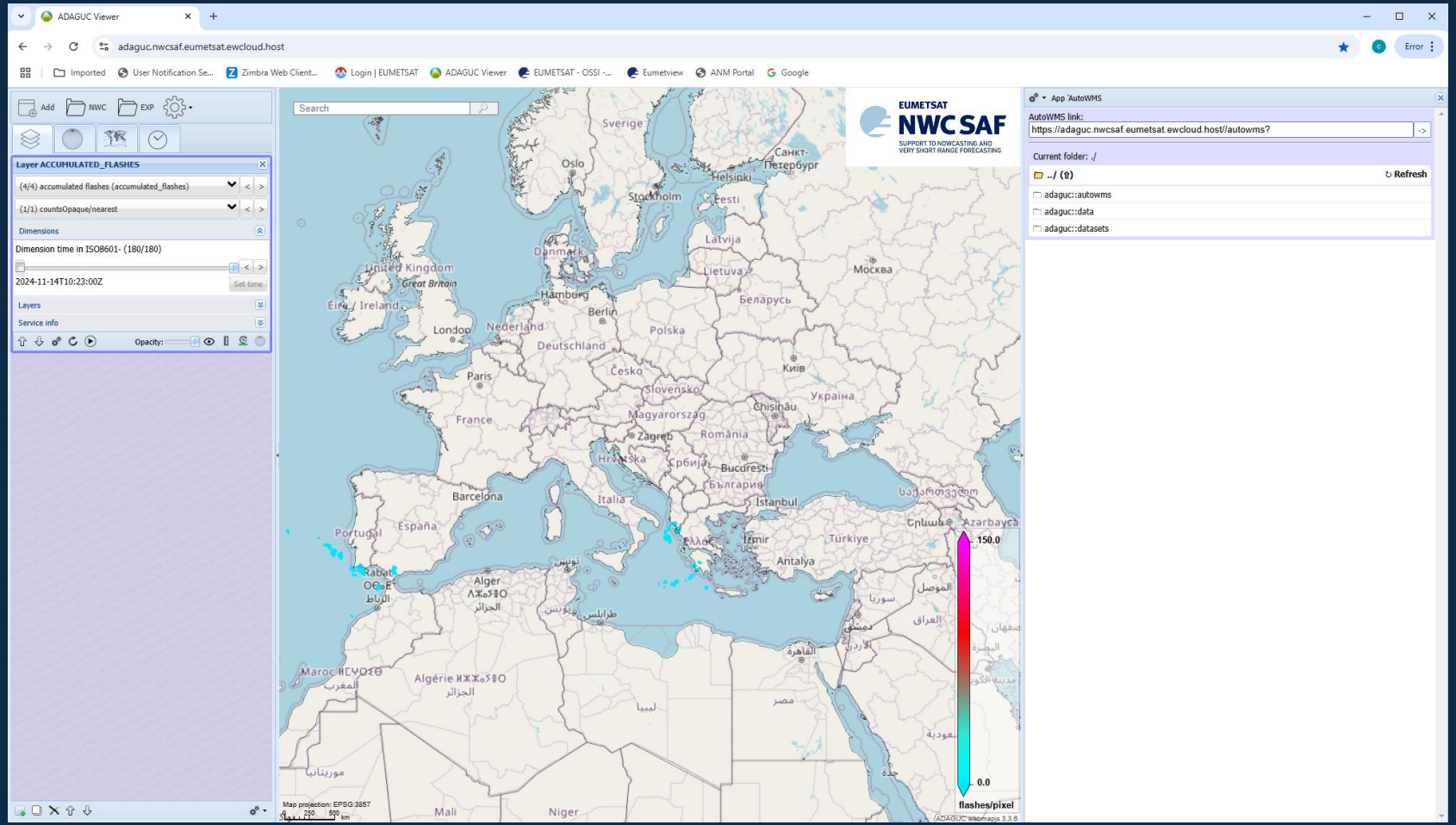
A Python prototype has been already implemented on the European Weather Cloud (EWC) and its results (for the last 3 hours, 10 minutes accumulations) are available by accessing ADAGUC Viewer: https://adaguc.nwcsaf.eumetsat.ewcloud.host/

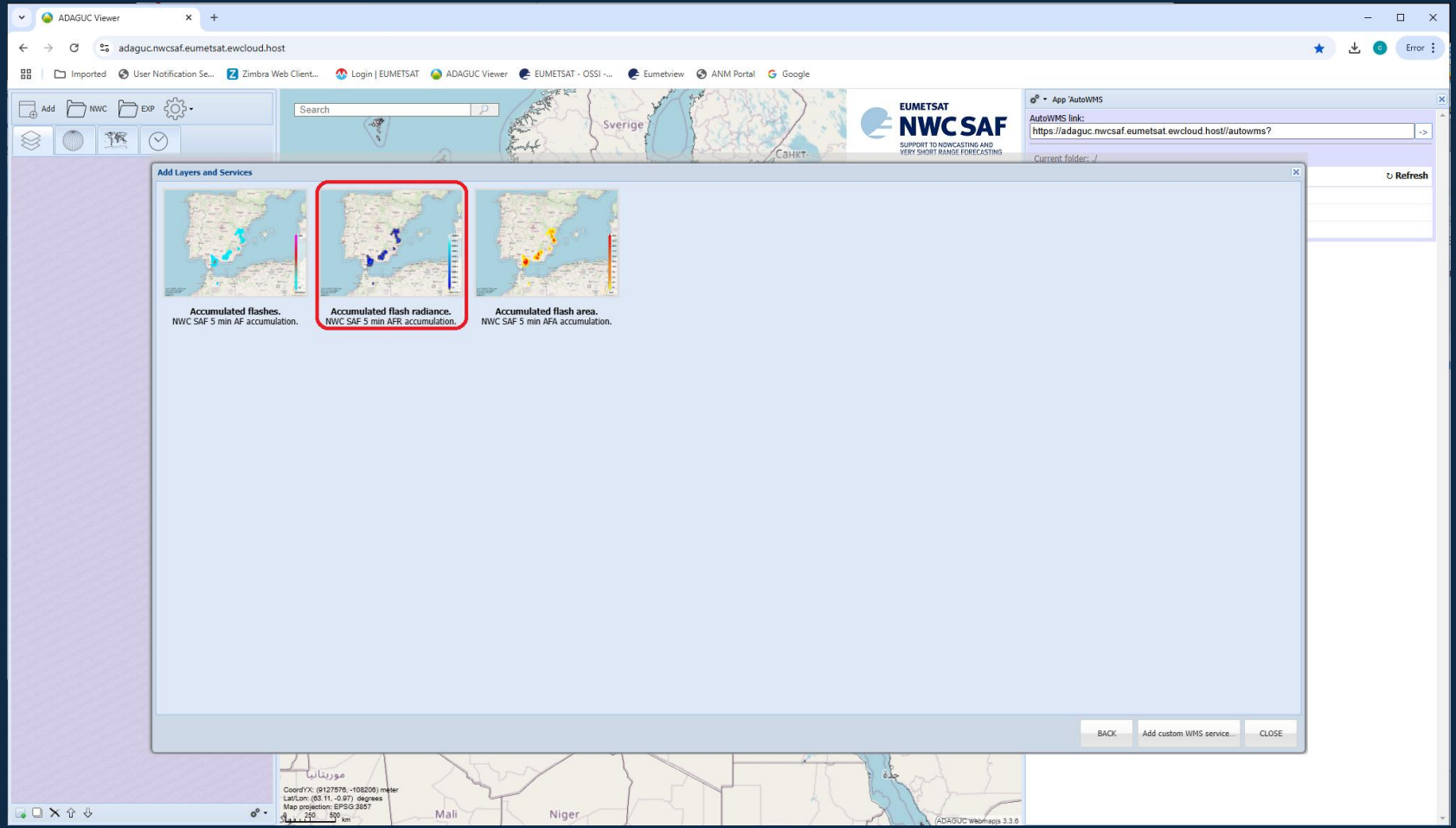


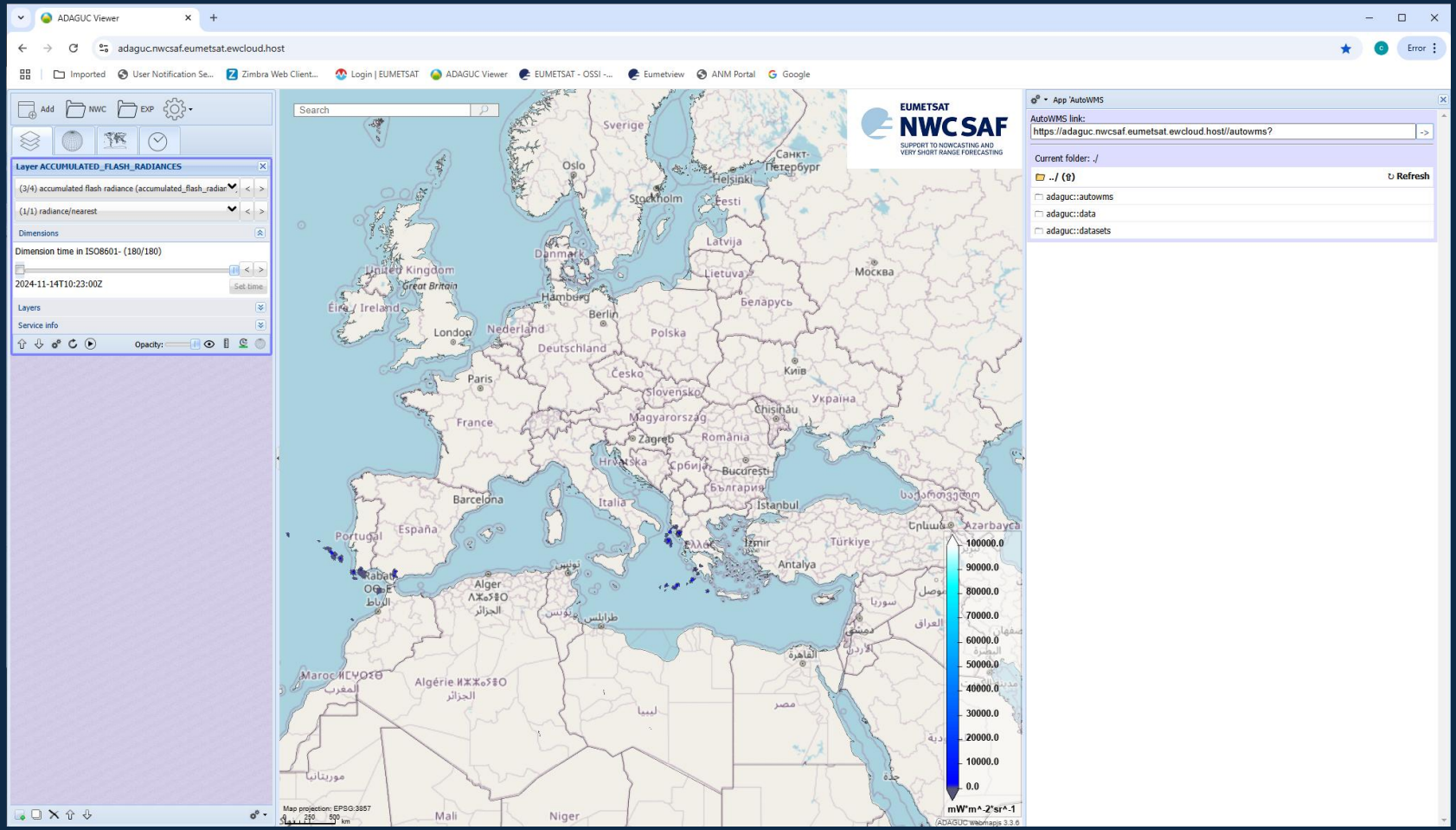

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Imported
User Notification Se...
Zimbra Web Client...
Login | EUMETSAT
ADAGUC Viewer
EUMETSAT - OSSI -...
Eumetview
ANM Portal
Google
Error
Add
NWC
EXP
Search
Sverige
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Current folder: ./
Refresh
Selector
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
Satellite to radar
Infrared Hyperspectral Retrievals
Accumulated MTG LI Lightning
CLOSE
CoordYX: (9127576, -108206) meter
Lat/Lon: (63.11, -0.97) degrees
Map projection: EPSG:3857
Mali
Niger
ADAGUC Webmaps 3.3.6

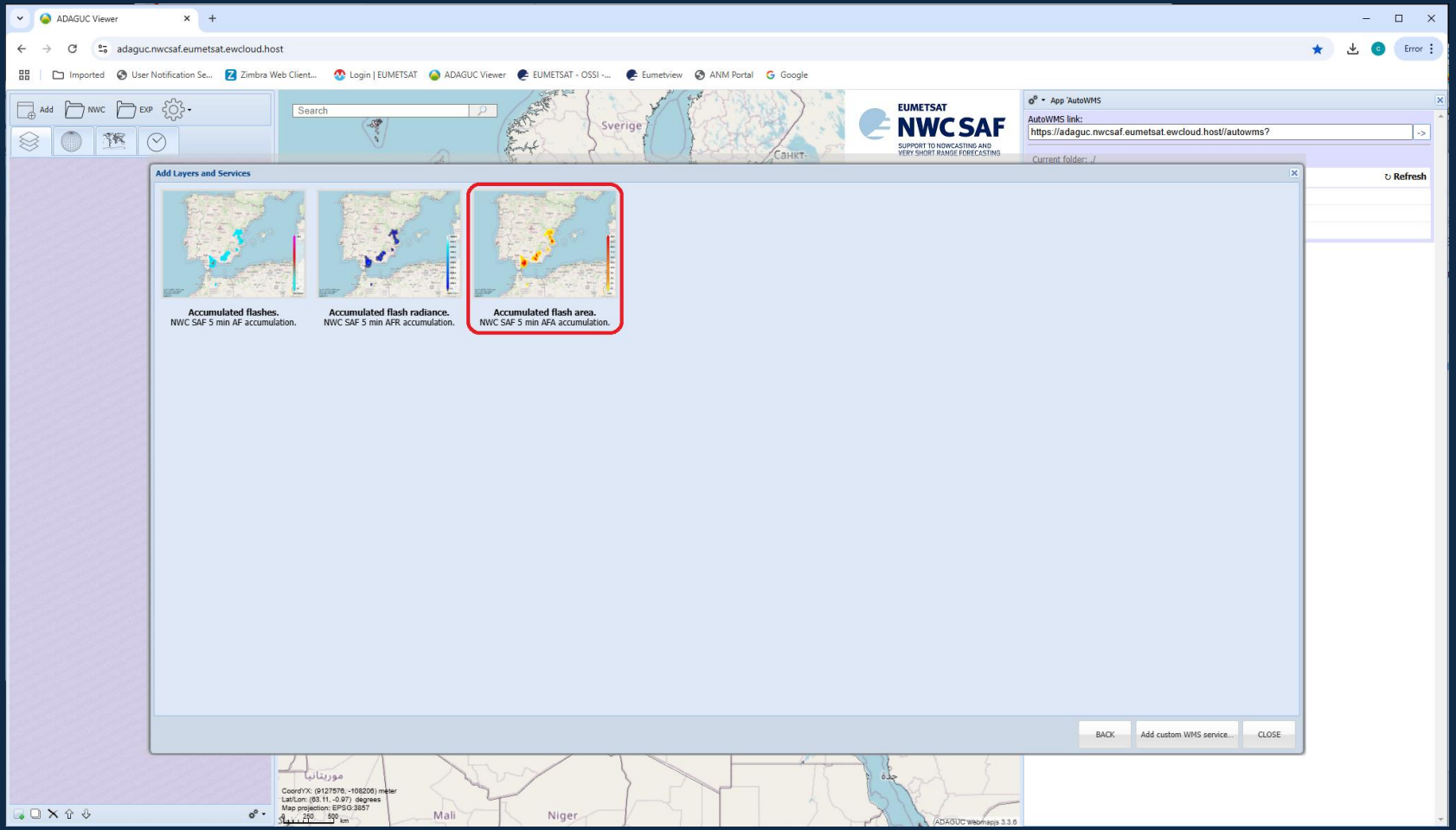

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Imported
User Notification Se...
Zimbra Web Client...
Login | EUMETSAT
ADAGUC Viewer
EUMETSAT - OSSI -...
Eumetview
ANM Portal
Google
Error
Add
NWC
EXP
Search
Sverige
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
->
Current folder: ./
Refresh
Add Layers and Services
Accumulated flashes.
NWC SAF 5 min AF accumulation.
Accumulated flash radiance.
NWC SAF 5 min AFR accumulation.
Accumulated flash area.
NWC SAF 5 min AFA accumulation.
BACK
Add custom WMS service...
CLOSE
Mali
Niger
ADAGUC Webmaps 3.3.6

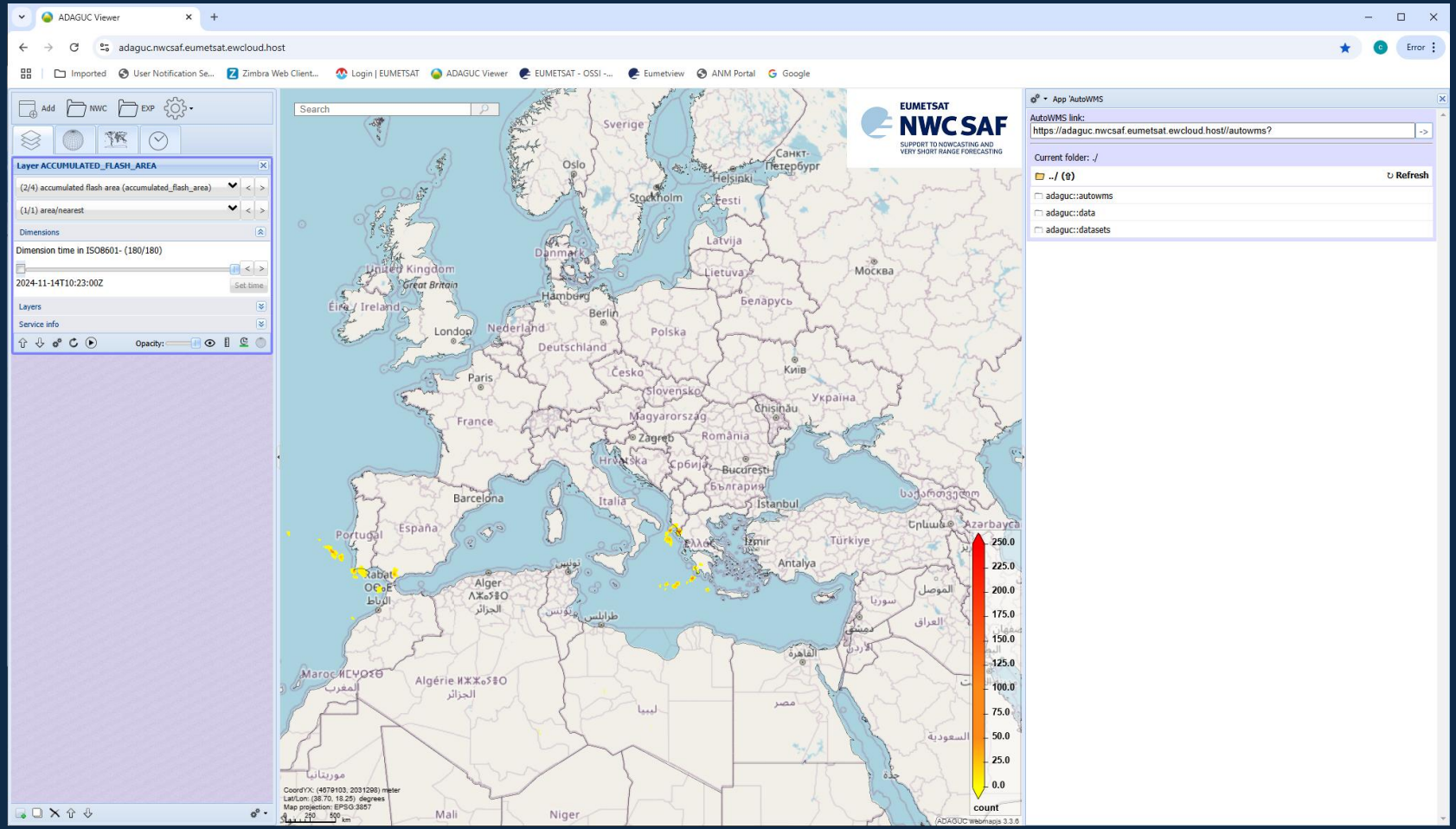

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Refresh
Add Layers and Services
Accumulated flashes.
NWC SAF 5 min AF accumulation.
Accumulated flash radiance.
NWC SAF 5 min AFR accumulation.
Accumulated flash area.
NWC SAF 5 min AFA accumulation.
BACK
Add custom WMS service...
CLOSE
Mali
Niger

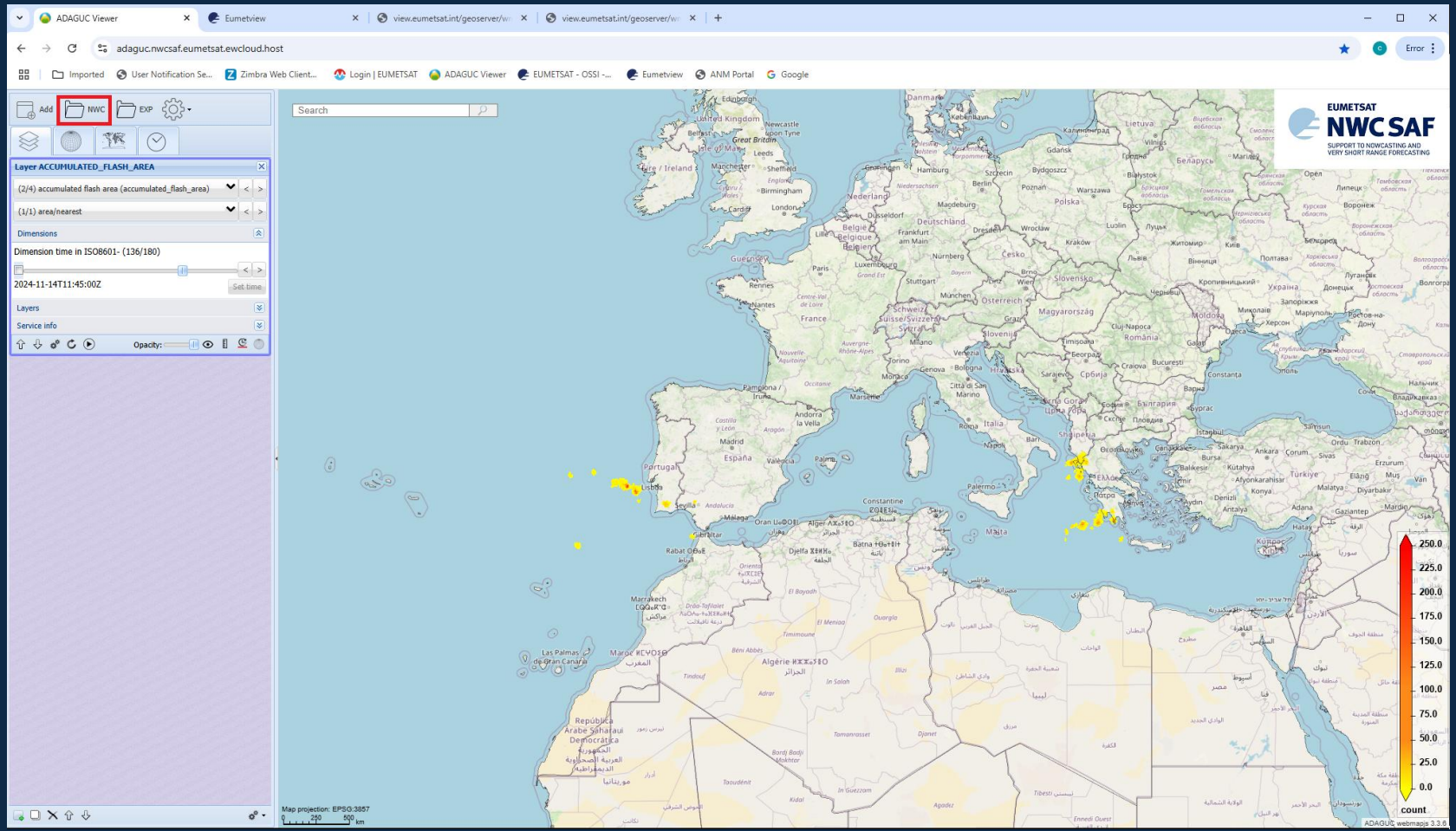

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Imported
User Notification Se...
Zimba Web Client...
Login | EUMETSAT
ADAGUC Viewer
EUMETSAT - OSSI -...
Eumetview
ANM Portal
Google
Add
NWC
EXP
Layer ACCUMULATED_FLASHES
(4/4) accumulated flashes (accumulated_flashes)
(1/1) countsOpaque/nearest
Dimensions
Dimension time in ISO8601- (180/180)
2024-11-14T10:23:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Current folder: ./
../ (↑)
Refresh
adaguc::autowms
adaguc::data
adaguc::datasets
150.0
0.0
flashes/pixel
Map projection: EPSG:3857
ADAGUC Webmapjs 3.3.6

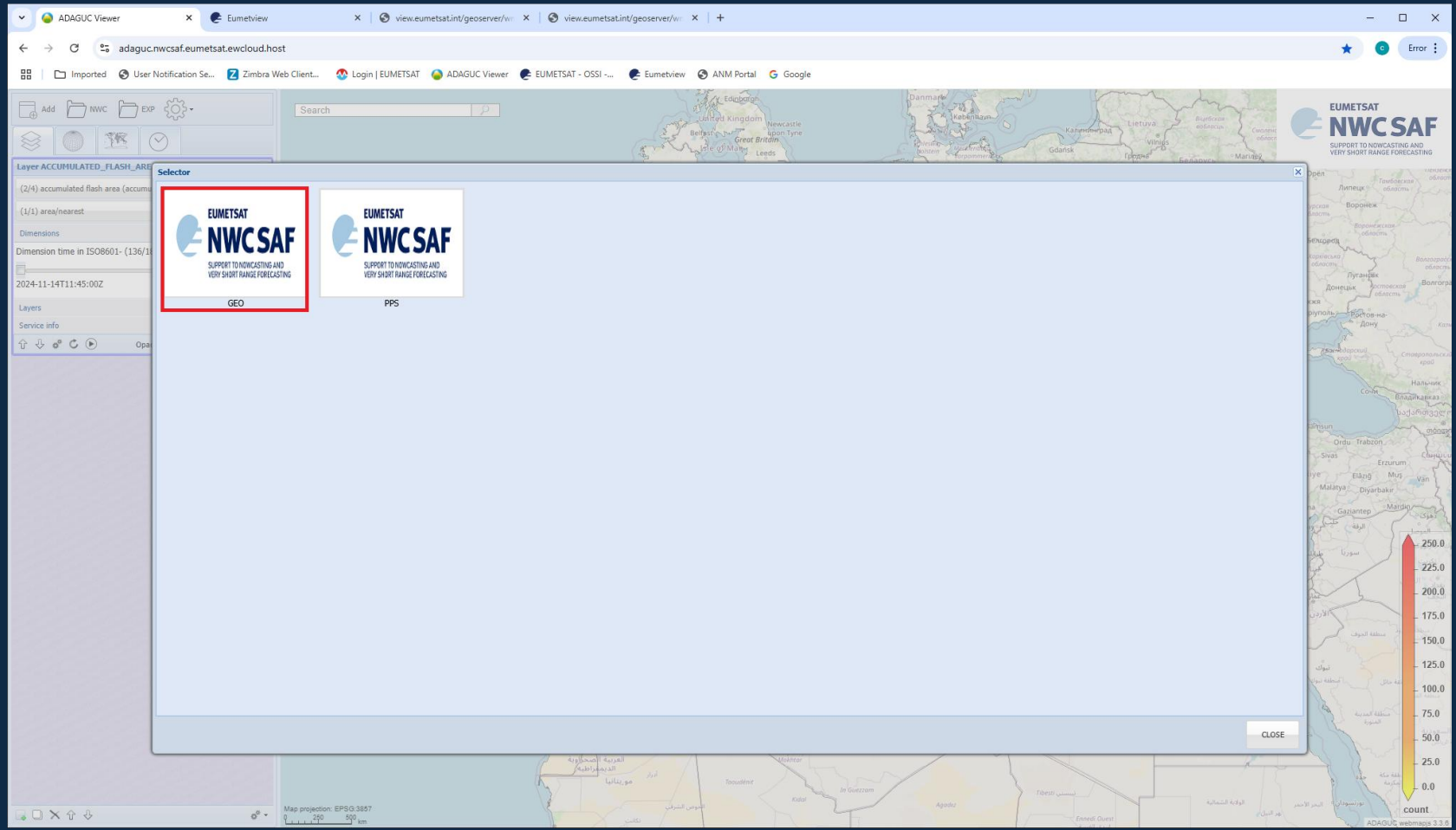

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Add Layers and Services
Accumulated flashes.
NWC SAF 5 min AF accumulation.
Accumulated flash radiance.
NWC SAF 5 min AFR accumulation.
Accumulated flash area.
NWC SAF 5 min AFA accumulation.
BACK
Add custom WMS service...
CLOSE
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Refresh
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING

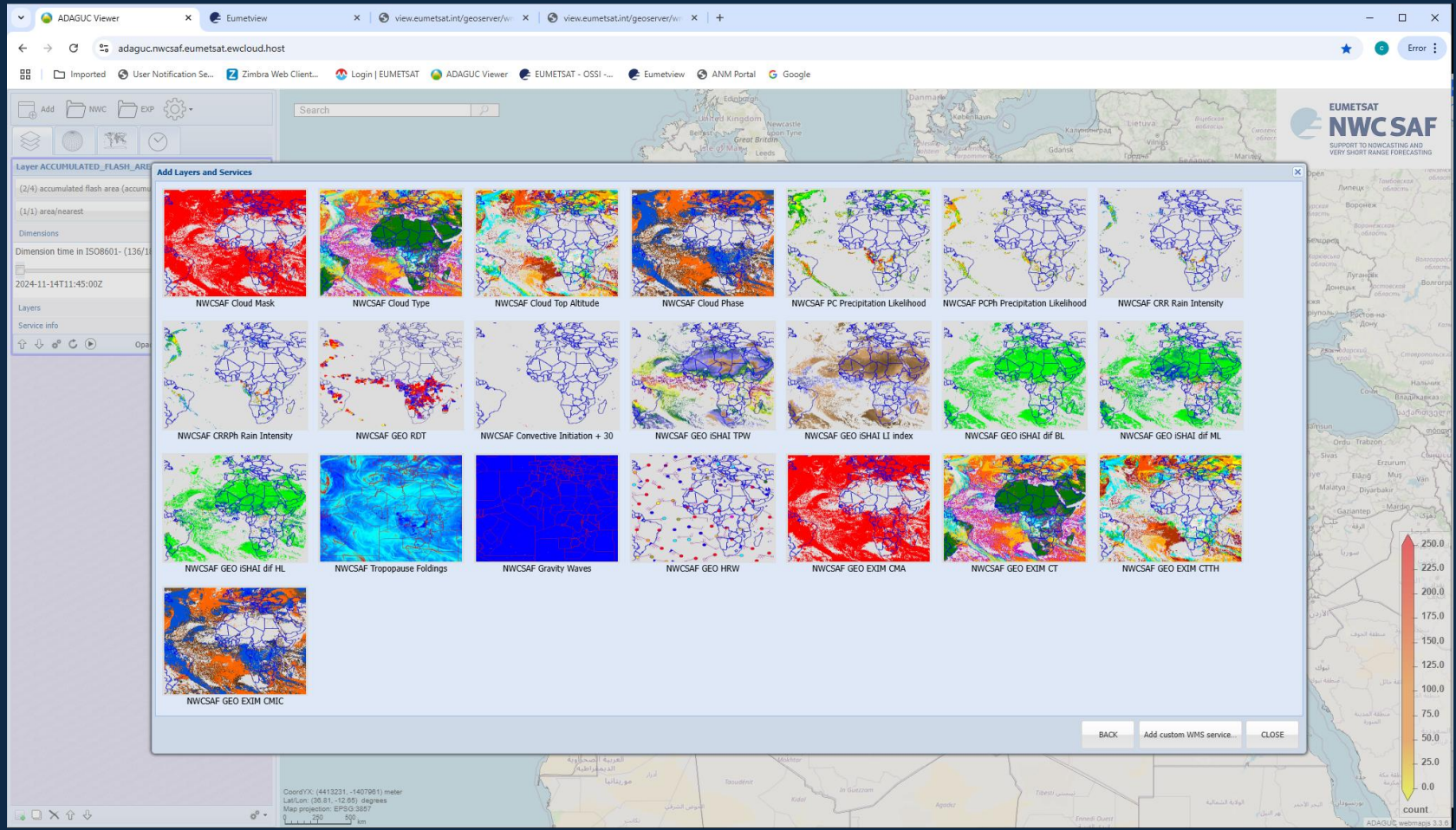

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Imported
User Notification Se...
Zimba Web Client...
Login | EUMETSAT
ADAGUC Viewer
EUMETSAT - OSSI -...
Eumetview
ANM Portal
Google
Add
NWC
EXP
Layer ACCUMULATED_FLASH_RADIANCES
(3/4) accumulated flash radiance (accumulated_flash_radiar
(1/1) radiance/nearest
Dimensions
Dimension time in ISO8601- (180/180)
2024-11-14T10:23:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Current folder: ./
../ (0)
Refresh
adaguc::autowms
adaguc::data
adaguc::datasets
100000.0
90000.0
80000.0
70000.0
60000.0
50000.0
40000.0
30000.0
20000.0
10000.0
0.0
mW'm^-2'sr^-1
Map projection: EPSG:3857
ADAGUC WebMapJS 3.3.6

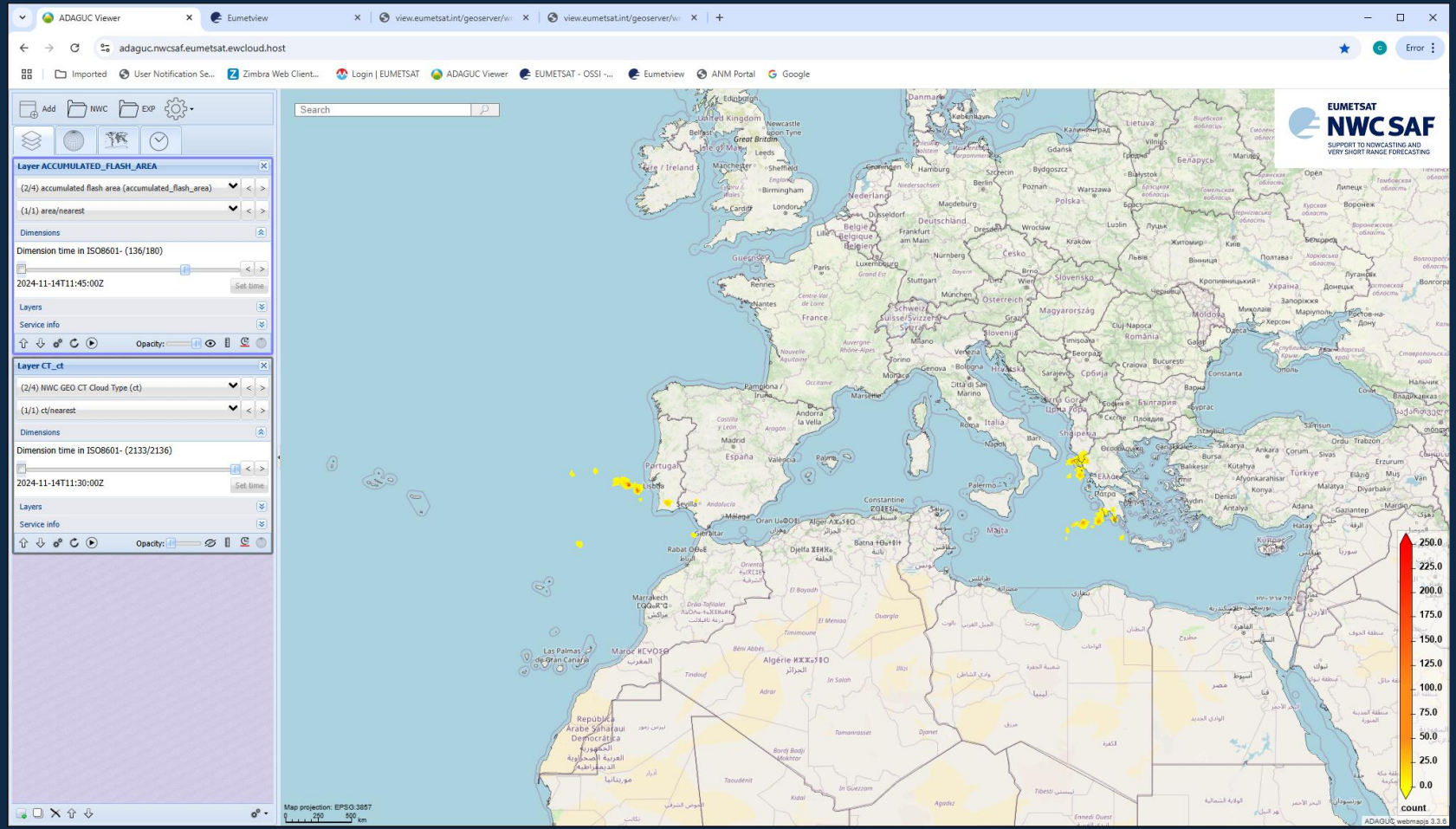

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Search
Sverige
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS'
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Current folder: ./
Refresh
Add Layers and Services
Accumulated flashes.
NWC SAF 5 min AF accumulation.
Accumulated flash radiance.
NWC SAF 5 min AFR accumulation.
Accumulated flash area.
NWC SAF 5 min AFA accumulation.
BACK
Add custom WMS service...
CLOSE
Mali
Niger
ADAGUC webmapjs 3.3.6

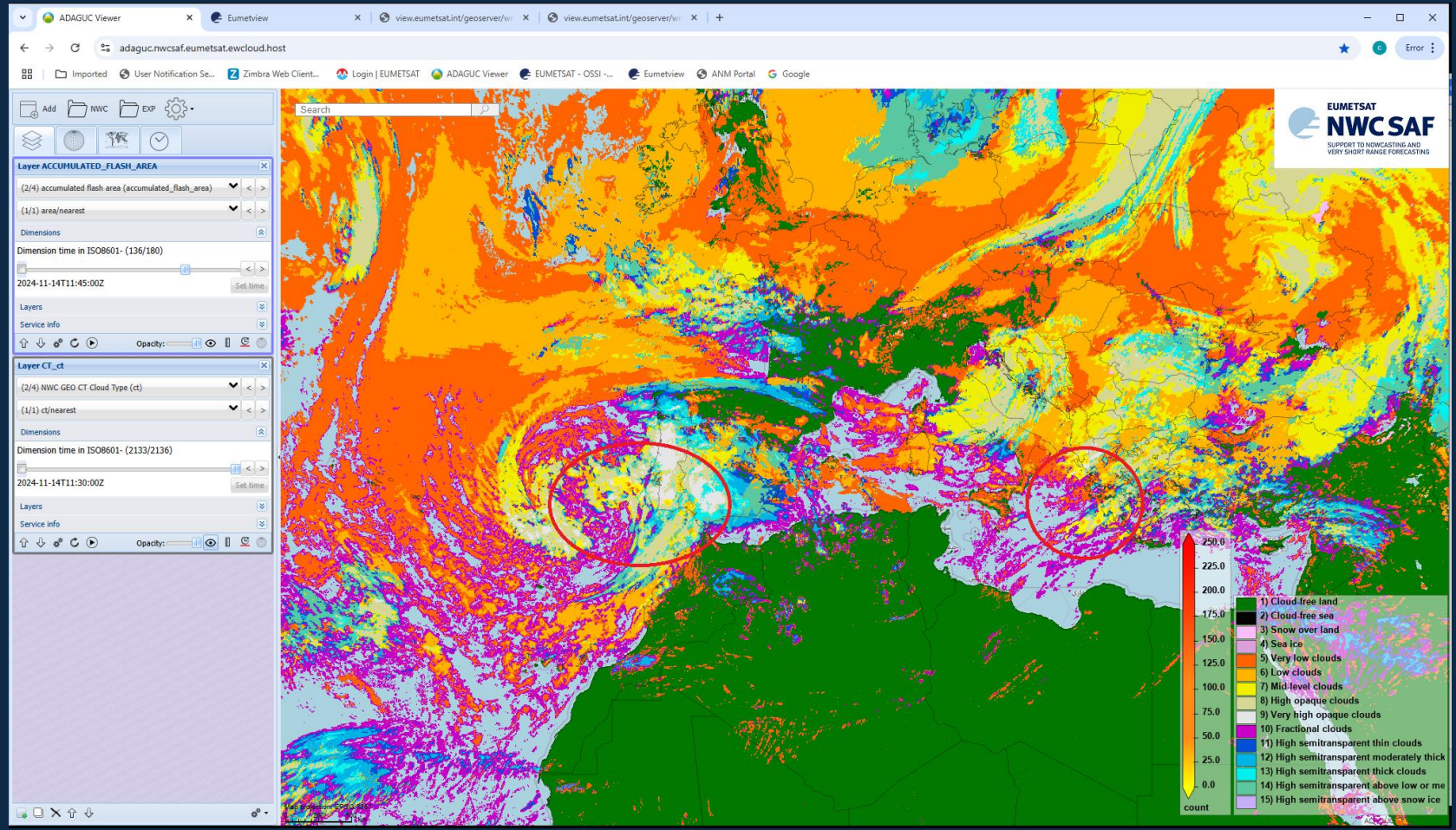

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (180/180)
2024-11-14T10:23:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Current folder: ./
../ (↑)
Refresh
adaguc::autowms
adaguc::data
adaguc::datasets
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count
CoordYX: (4679103, 2031298) meter
Lat/Lon: (38.70, 18.25) degrees
Map projection: EPSG:3857
ADAGUC Webmapjs 3.3.6

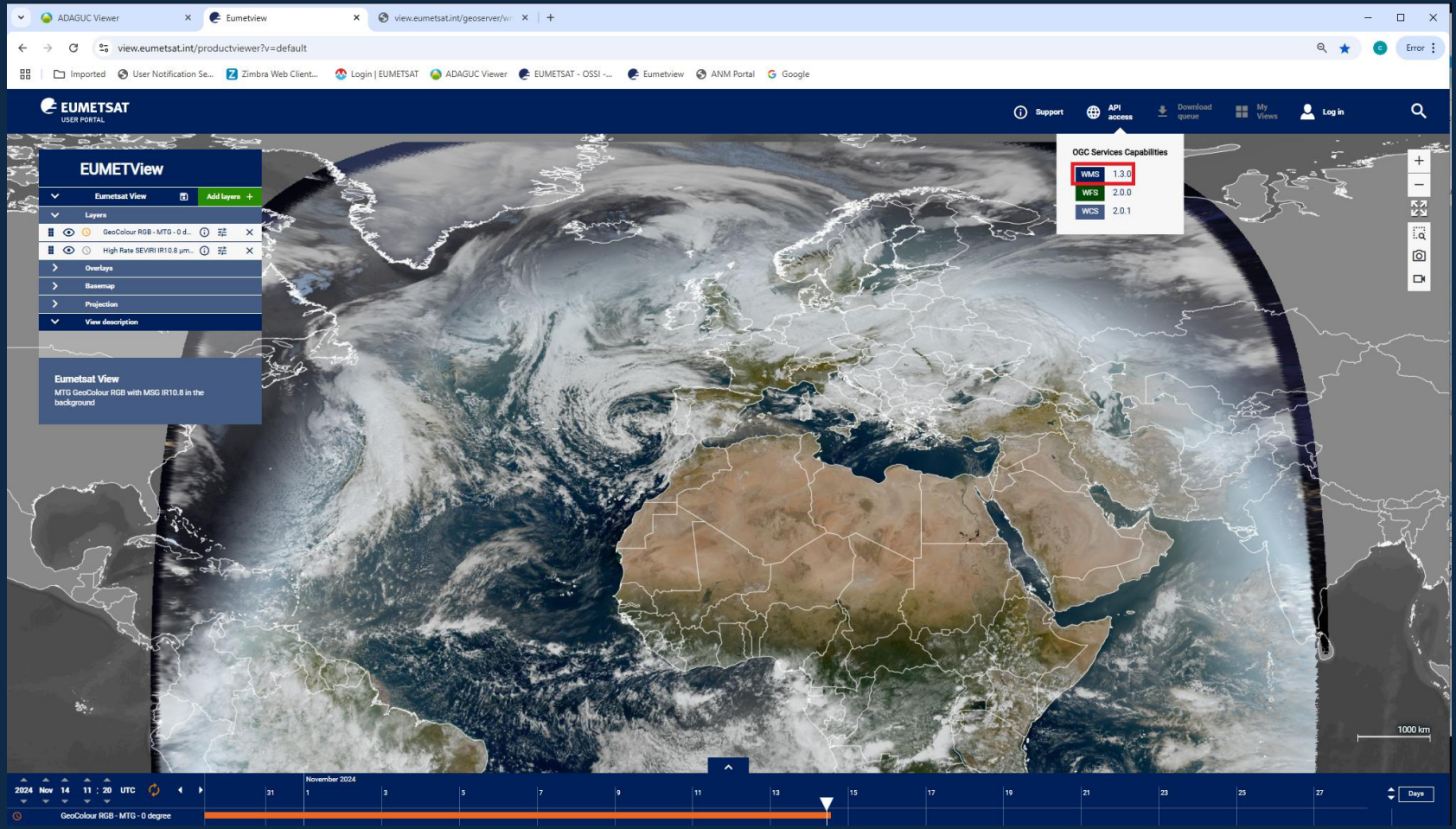

ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (136/180)
2024-11-14T11:45:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count
Map projection: EPSG:3857
ADAGUC webmapjs 3.3.6

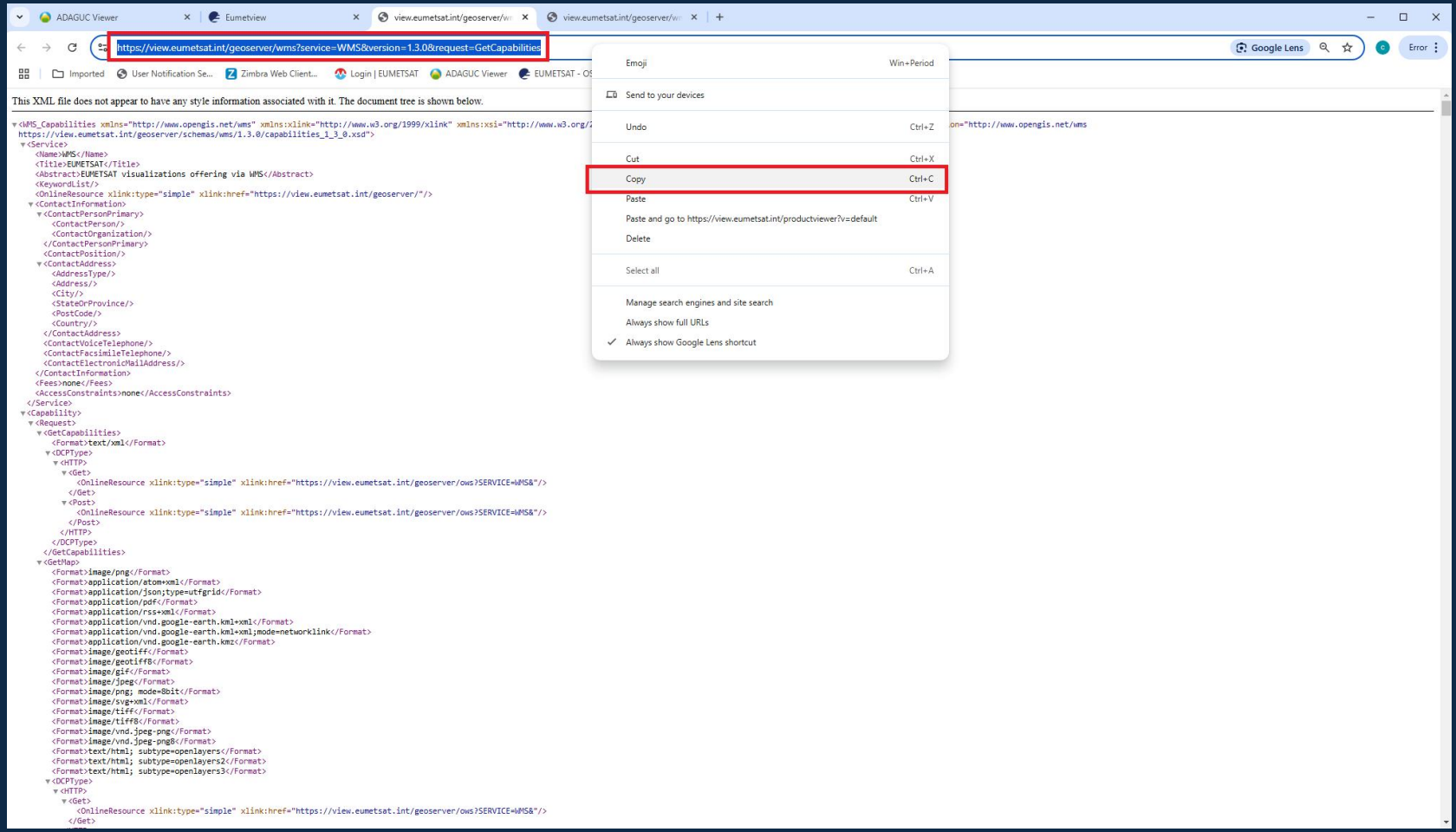

ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Selector
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
GEO
PPS
CLOSE
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count

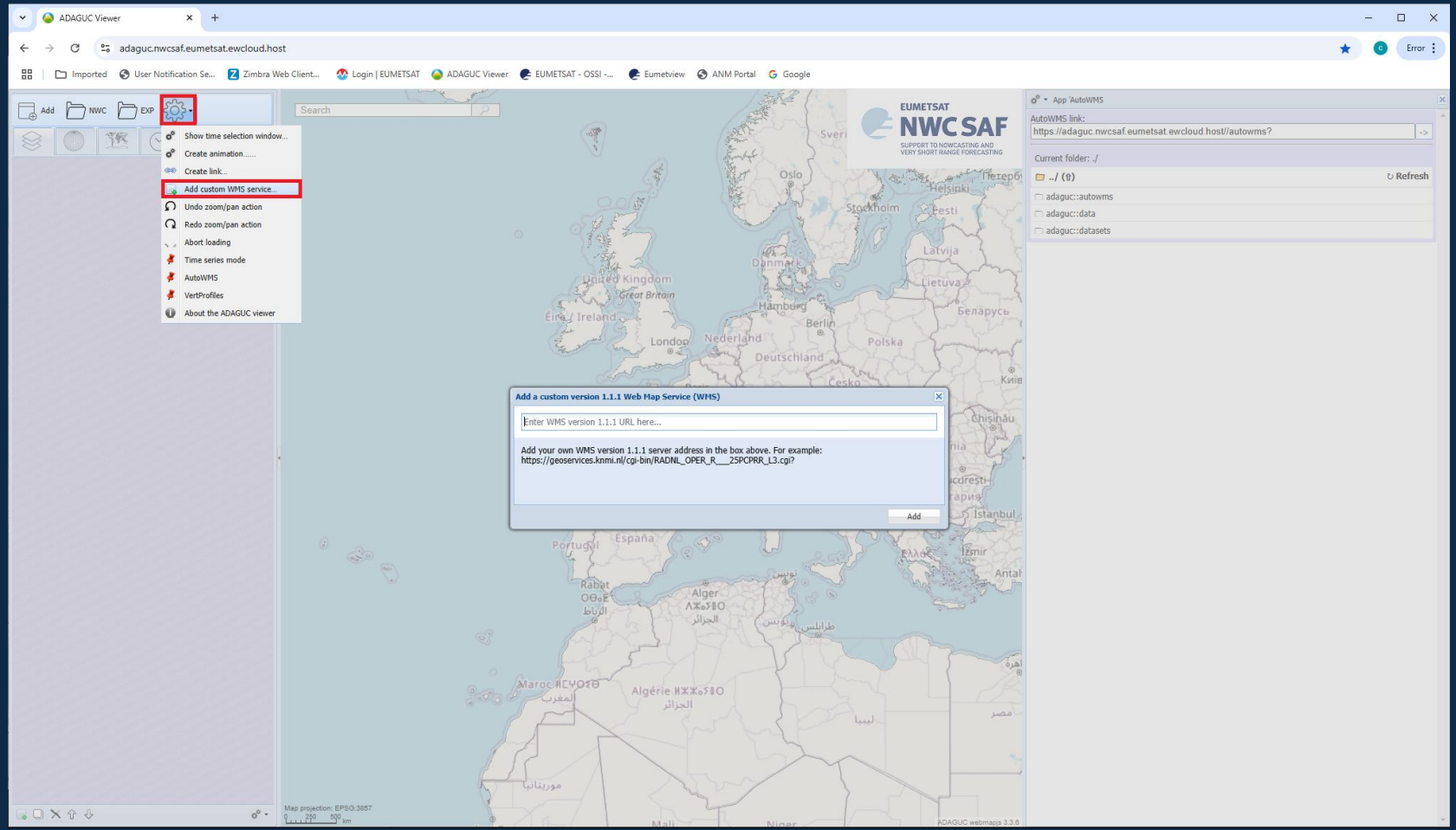

ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add Layers and Services
NWCSAF Cloud Mask
NWCSAF Cloud Type
NWCSAF Cloud Top Altitude
NWCSAF Cloud Phase
NWCSAF PC Precipitation Likelihood
NWCSAF PCPh Precipitation Likelihood
NWCSAF CRR Rain Intensity
NWCSAF CRRPh Rain Intensity
NWCSAF GEO RDT
NWCSAF Convective Initiation + 30
NWCSAF GEO iSHAI TPW
NWCSAF GEO iSHAI LI index
NWCSAF GEO iSHAI dif BL
NWCSAF GEO iSHAI dif ML
NWCSAF GEO iSHAI dif HL
NWCSAF Tropopause Foldings
NWCSAF Gravity Waves
NWCSAF GEO HRW
NWCSAF GEO EXIM CMA
NWCSAF GEO EXIM CT
NWCSAF GEO EXIM CTTH
NWCSAF GEO EXIM CMIC
BACK
Add custom WMS service...
CLOSE
EUMETSAT
NWC SAF
count

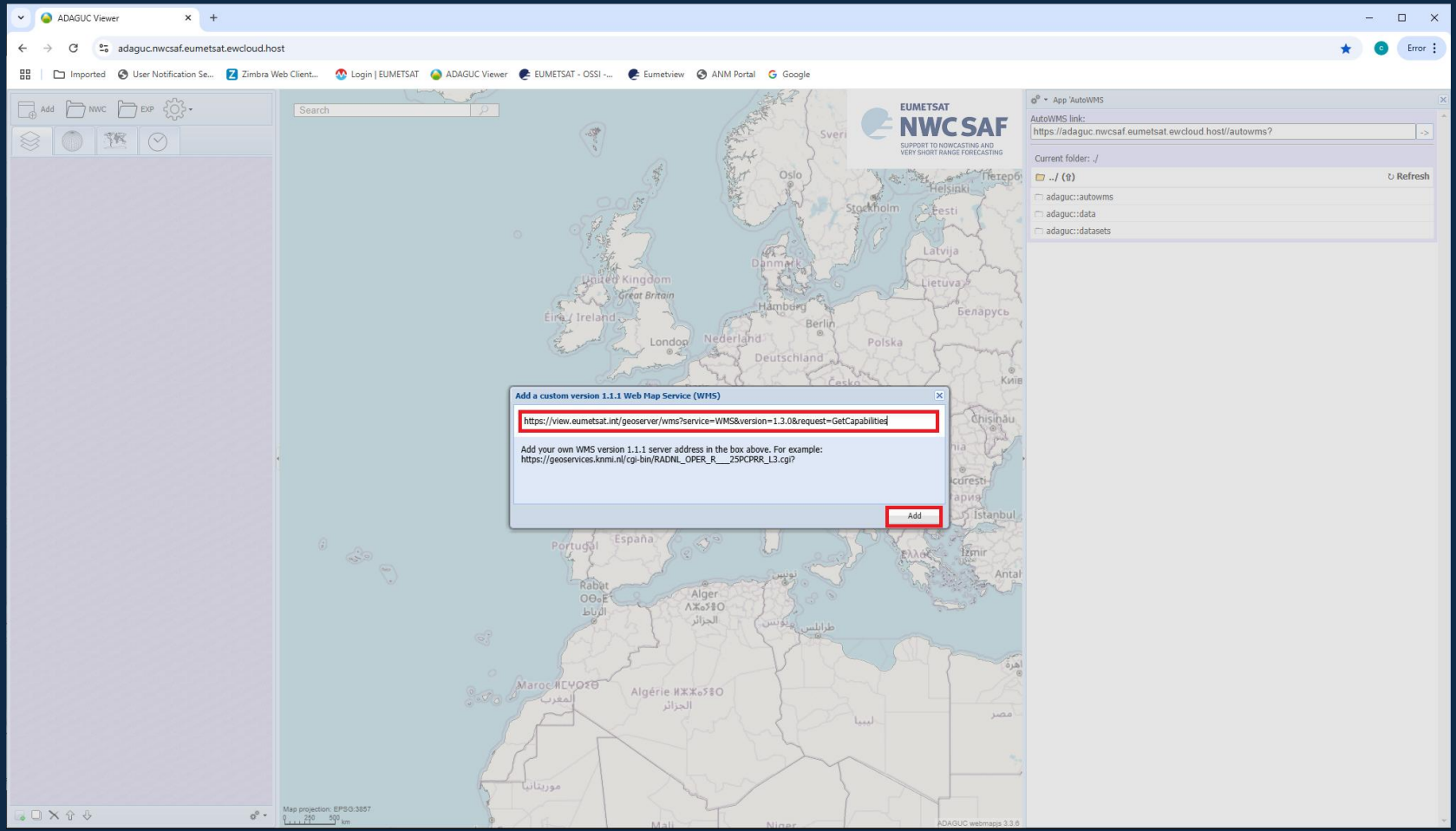

ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (136/180)
2024-11-14T11:45:00Z
Set time
Layers
Service info
Opacity:
Layer CT_ct
(2/4) NWC GEO CT Cloud Type (ct)
(1/1) ct/nearest
Dimensions
Dimension time in ISO8601- (2133/2136)
2024-11-14T11:30:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count
Map projection: EPSG:3857
ADAGUC webmapjs 3.3.6

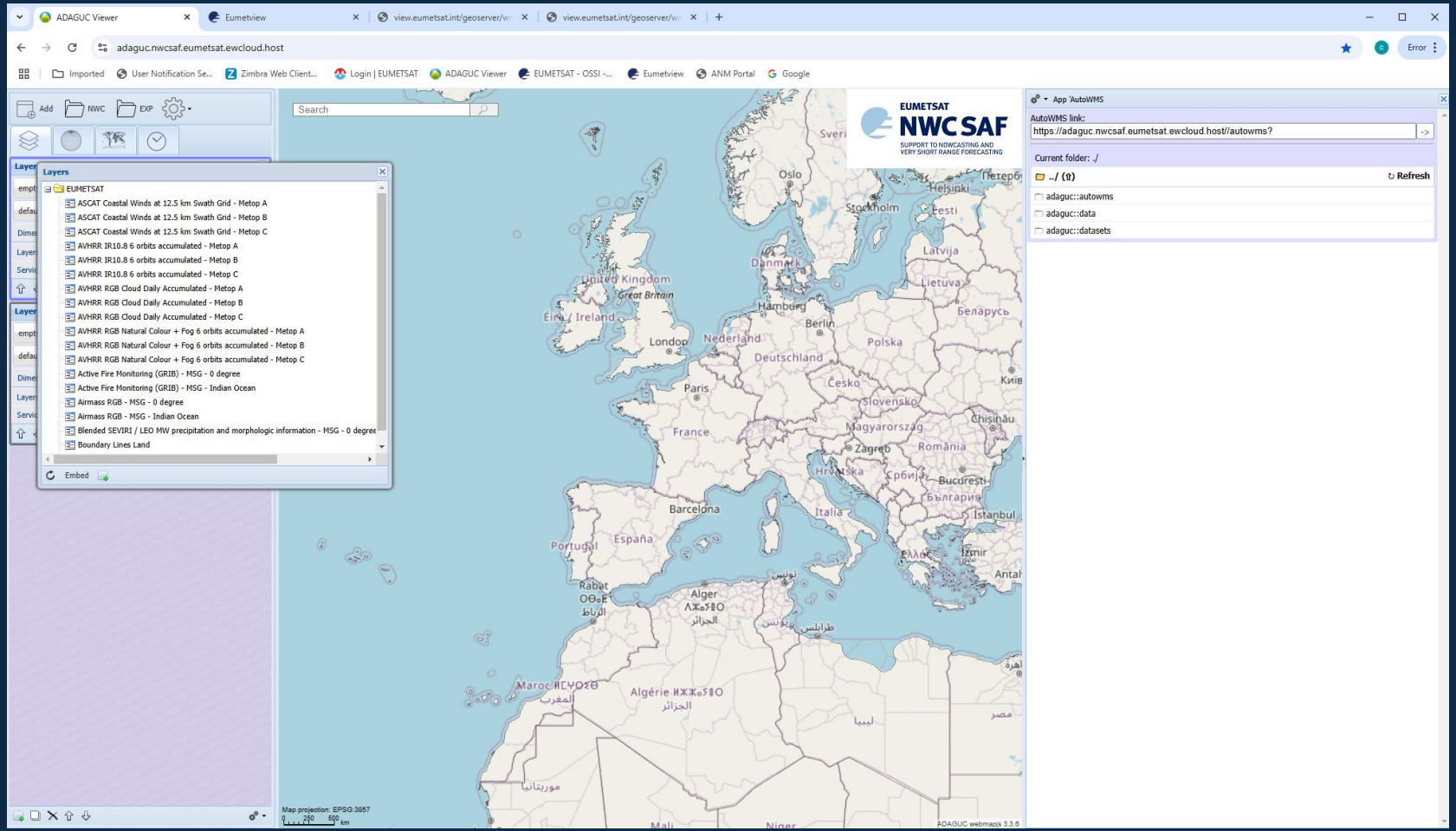

ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (136/180)
2024-11-14T11:45:00Z
Set time
Layers
Service info
Opacity:
Layer CT_ct
(2/4) NWC GEO CT Cloud Type (ct)
(1/1) ct/nearest
Dimensions
Dimension time in ISO8601- (2133/2136)
2024-11-14T11:30:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count
1) Cloud-free land
2) Cloud-free sea
3) Snow over land
4) Sea ice
5) Very low clouds
6) Low clouds
7) Mid-level clouds
8) High opaque clouds
9) Very high opaque clouds
10) Fractional clouds
11) High semitransparent thin clouds
12) High semitransparent moderately thick
13) High semitransparent thick clouds
14) High semitransparent above low or me
15) High semitransparent above snow ice

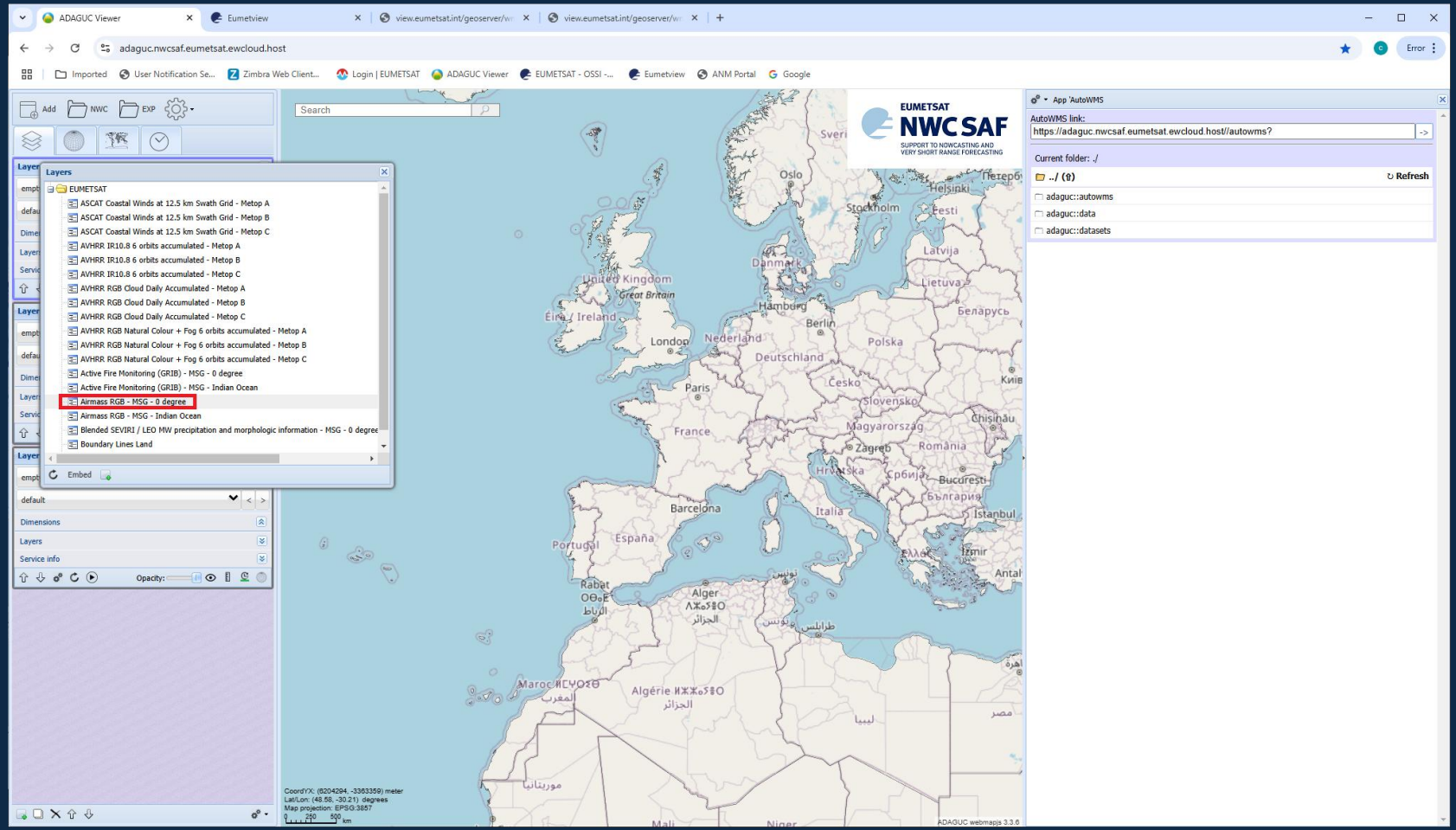

ADAGUC Viewer
Eumetview
view.eumetsat.int/geoserver/ww
view.eumetsat.int/productviewer?v=default
Error
Imported
User Notification Se...
Zimbra Web Client...
Login | EUMETSAT
ADAGUC Viewer
EUMETSAT - OSSI -...
Eumetview
ANM Portal
Google
EUMETSAT
USER PORTAL
Support
API access
Download queue
My Views
Log in
EUMETView
Eumetsat View
Add layers +
Layers
GeoColour RGB - MTG - 0 d...
High Rate SEVIRI IR10.8 µm...
Overlays
Basemap
Projection
View description
Eumetsat View
MTG GeoColour RGB with MSG IR10.8 in the background
OGC Services Capabilities
WMS 1.3.0
WFS 2.0.0
WCS 2.0.1
1000 km
2024 Nov 14 11 : 20 UTC
November 2024
Days
GeoColour RGB - MTG - 0 degree

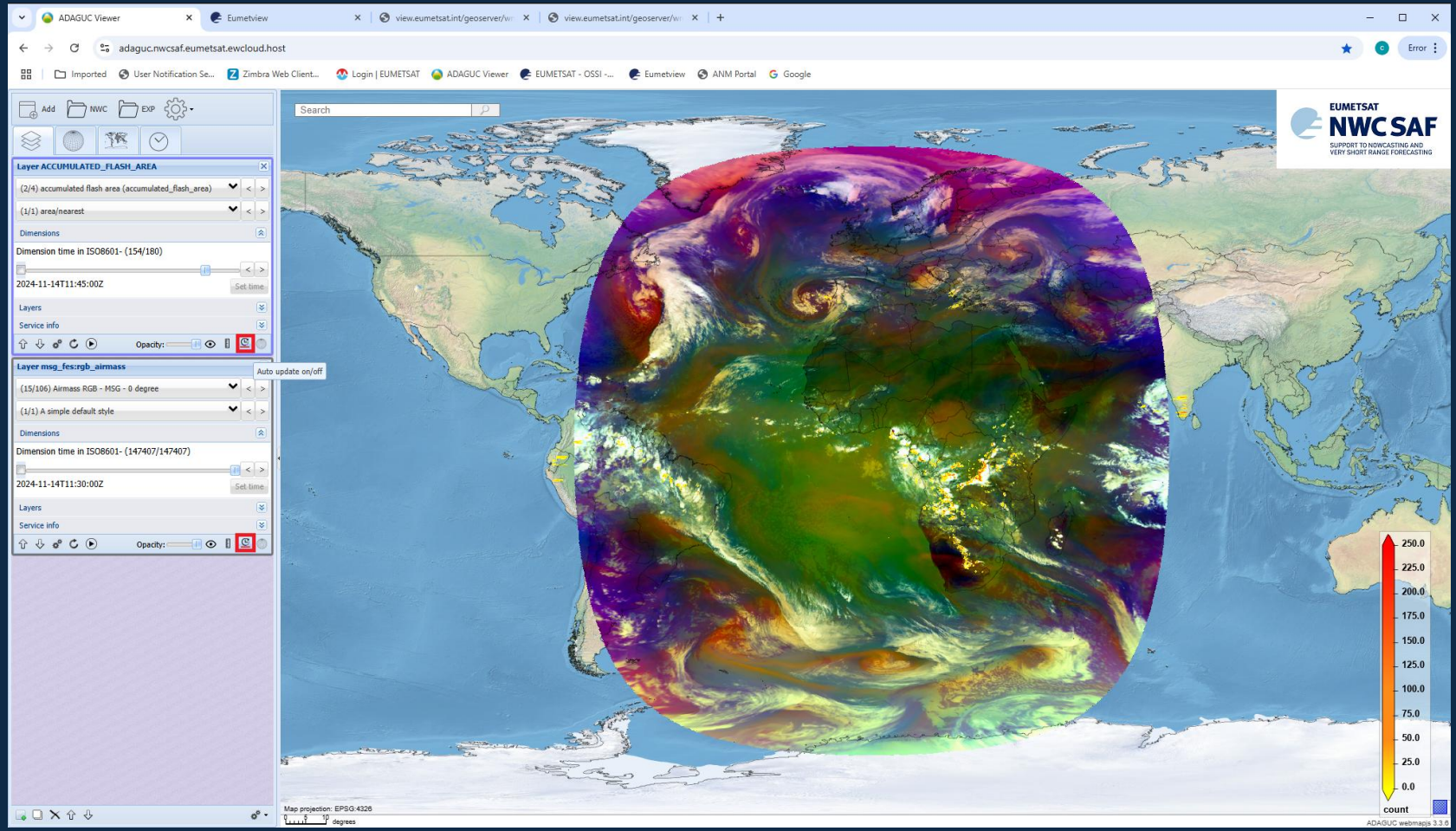

ADAGUC Viewer
Eumetview
view.eumetsat.int/geoserver/wms
https://view.eumetsat.int/geoserver/wms?service=WMS&version=1.3.0&request=GetCapabilities
Google Lens
Error
Imported
User Notification Se...
Zimbra Web Client...
Login | EUMETSAT
ADAGUC Viewer
EUMETSAT - OS
This XML file does not appear to have any style information associated with it. The document tree is shown below.
Emoji Win+Period
Send to your devices
Undo Ctrl+Z
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Paste and go to https://view.eumetsat.int/productviewer?v=default
Delete
Select all Ctrl+A
Manage search engines and site search
Always show full URLs
Always show Google Lens shortcut

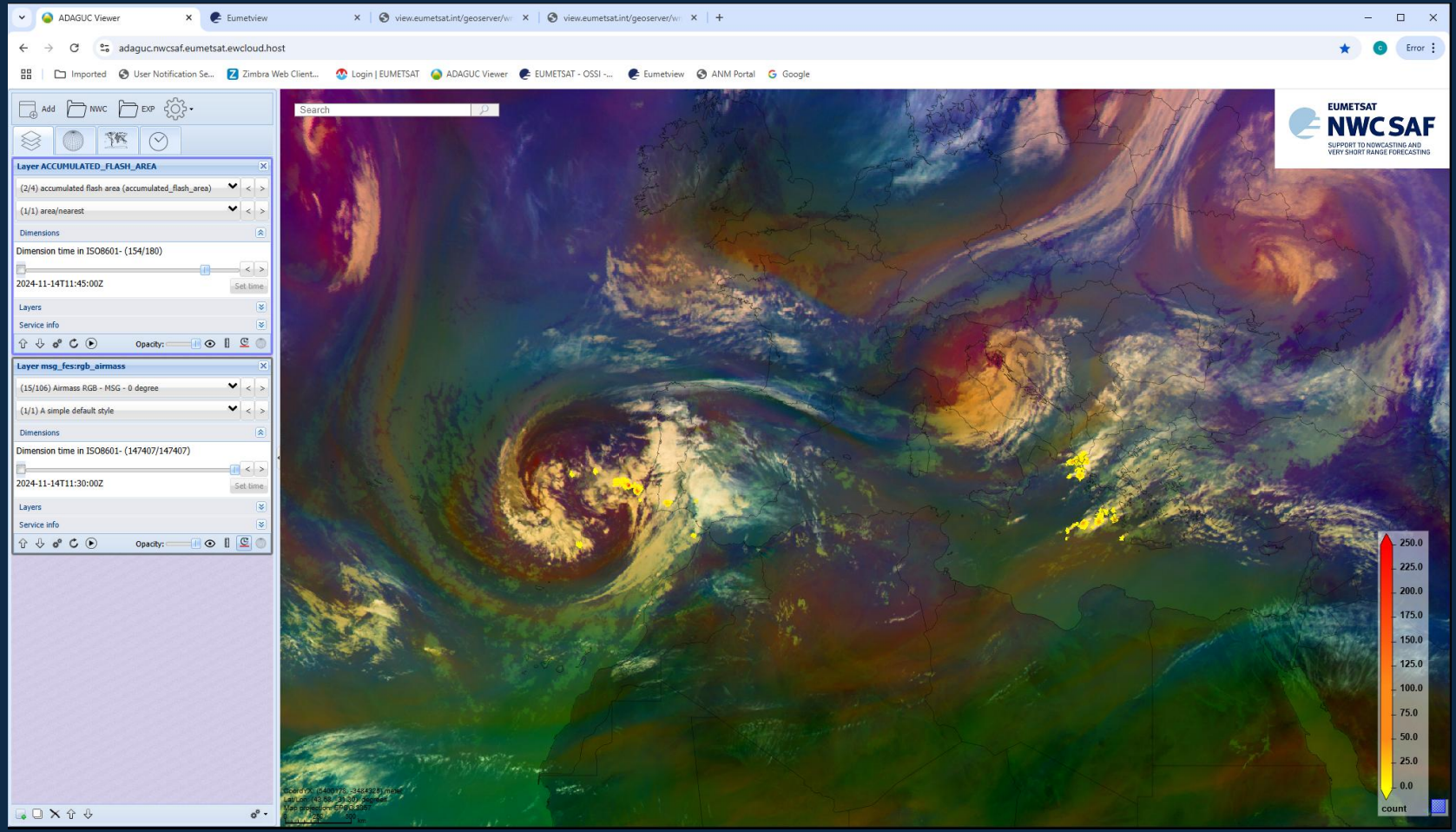

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Show time selection window...
Create animation.....
Create link...
Add custom WMS service...
Undo zoom/pan action
Redo zoom/pan action
Abort loading
Time series mode
AutoWMS
VertProfiles
About the ADAGUC viewer
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS'
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host/autowms?
Current folder: ./
../ (↑)
Refresh
adaguc::autowms
adaguc::data
adaguc::datasets
Add a custom version 1.1.1 Web Map Service (WMS)
Enter WMS version 1.1.1 URL here...
Add your own WMS version 1.1.1 server address in the box above. For example:
https://geoservices.knmi.nl/cgi-bin/RADNL_OPER_R___25PCPRR_L3.cgi?
Add

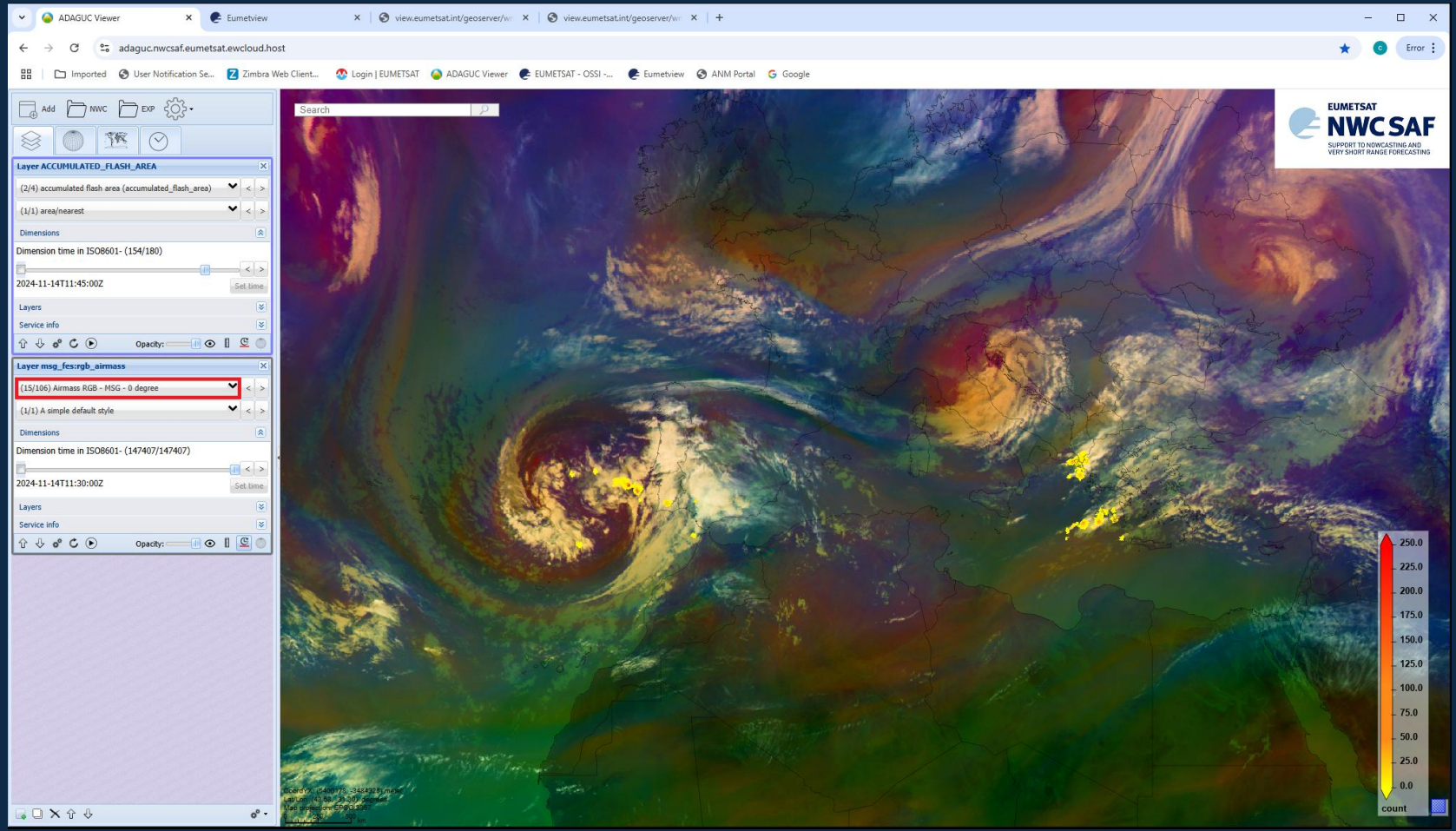

ADAGUC Viewer
adaguc.nwcsaf.eumetsat.ewcloud.host
Imported
User Notification Se...
Zimba Web Client...
Login | EUMETSAT
ADAGUC Viewer
EUMETSAT - OSSI -...
Eumetview
ANM Portal
Google
Error
Add
NWC
EXP
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS'
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Current folder: ./
../ (0)
Refresh
adaguc::autowms
adaguc::data
adaguc::datasets
Add a custom version 1.1.1 Web Map Service (WMS)
https://view.eumetsat.int/geoserver/wms?service=WMS&version=1.3.0&request=GetCapabilities
Add your own WMS version 1.1.1 server address in the box above. For example:
https://geoservices.knmi.nl/cgi-bin/RADNL_OPER_R___25PCPRR_L3.cgi?
Add
Oslo
Stockholm
Helsinki
Latvija
Lietuva
Беларусь
Danmark
United Kingdom
Great Britain
Éire / Ireland
London
Hamburg
Berlin
Nederland
Deutschland
Polska
Česko
Київ
Chișinău
București
Istanbul
España
Portugal
Rabat
Alger
Algérie
Maroc
Map projection: EPSG:3857
ADAGUC webmapjs 3.3.6

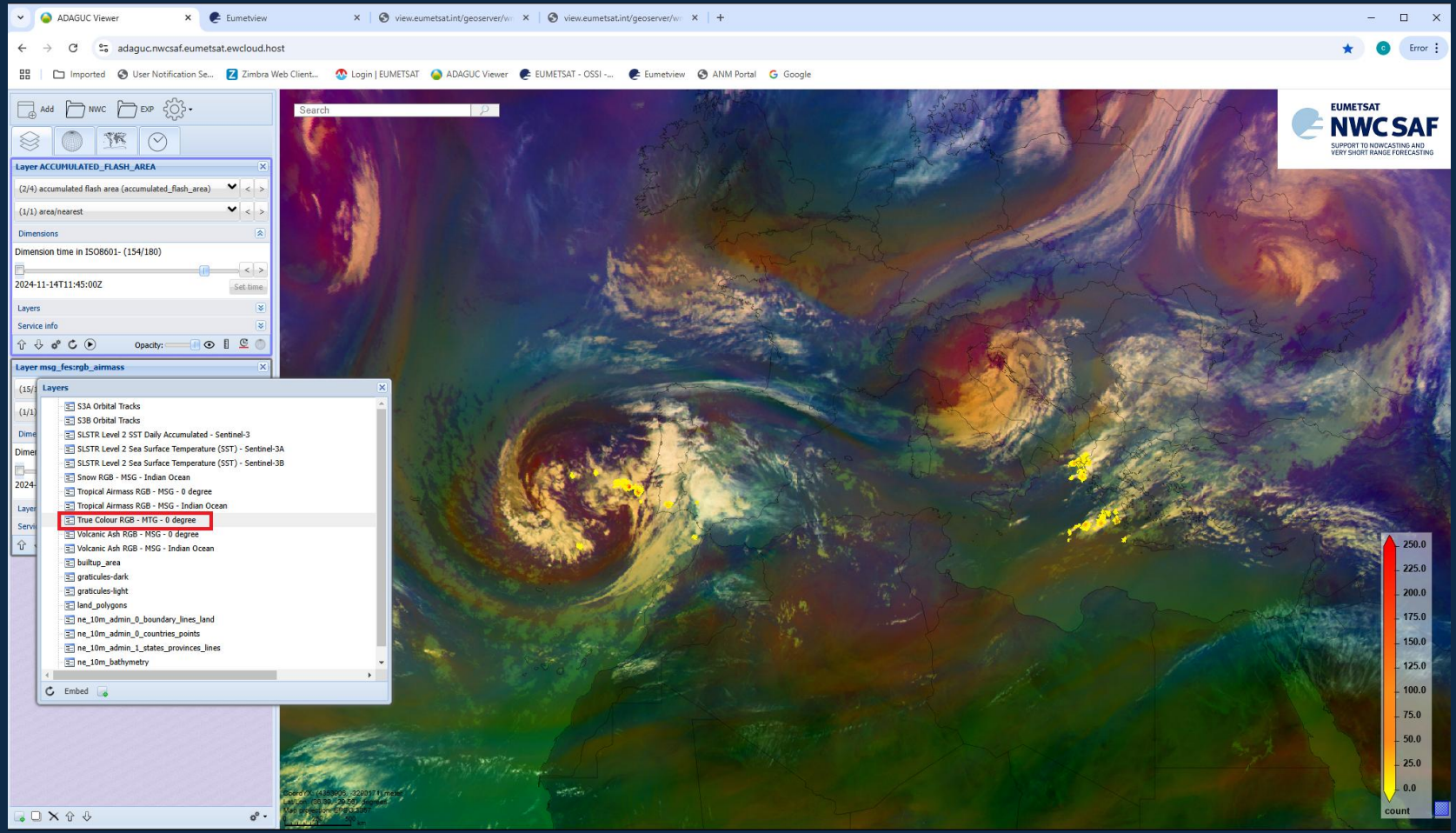

ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Search
Layers
EUMETSAT
ASCAT Coastal Winds at 12.5 km Swath Grid - Metop A
ASCAT Coastal Winds at 12.5 km Swath Grid - Metop B
ASCAT Coastal Winds at 12.5 km Swath Grid - Metop C
AVHRR IR10.8 6 orbits accumulated - Metop A
AVHRR IR10.8 6 orbits accumulated - Metop B
AVHRR IR10.8 6 orbits accumulated - Metop C
AVHRR RGB Cloud Daily Accumulated - Metop A
AVHRR RGB Cloud Daily Accumulated - Metop B
AVHRR RGB Cloud Daily Accumulated - Metop C
AVHRR RGB Natural Colour + Fog 6 orbits accumulated - Metop A
AVHRR RGB Natural Colour + Fog 6 orbits accumulated - Metop B
AVHRR RGB Natural Colour + Fog 6 orbits accumulated - Metop C
Active Fire Monitoring (GRIB) - MSG - 0 degree
Active Fire Monitoring (GRIB) - MSG - Indian Ocean
Airmass RGB - MSG - 0 degree
Airmass RGB - MSG - Indian Ocean
Blended SEVIRI / LEO MW precipitation and morphologic information - MSG - 0 degree
Boundary Lines Land
Embed
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS'
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Current folder: ./
../ (↑)
Refresh
adaguc::autowms
adaguc::data
adaguc::datasets
Map projection: EPSG:3857
ADAGUC webmapjs 3.3.6

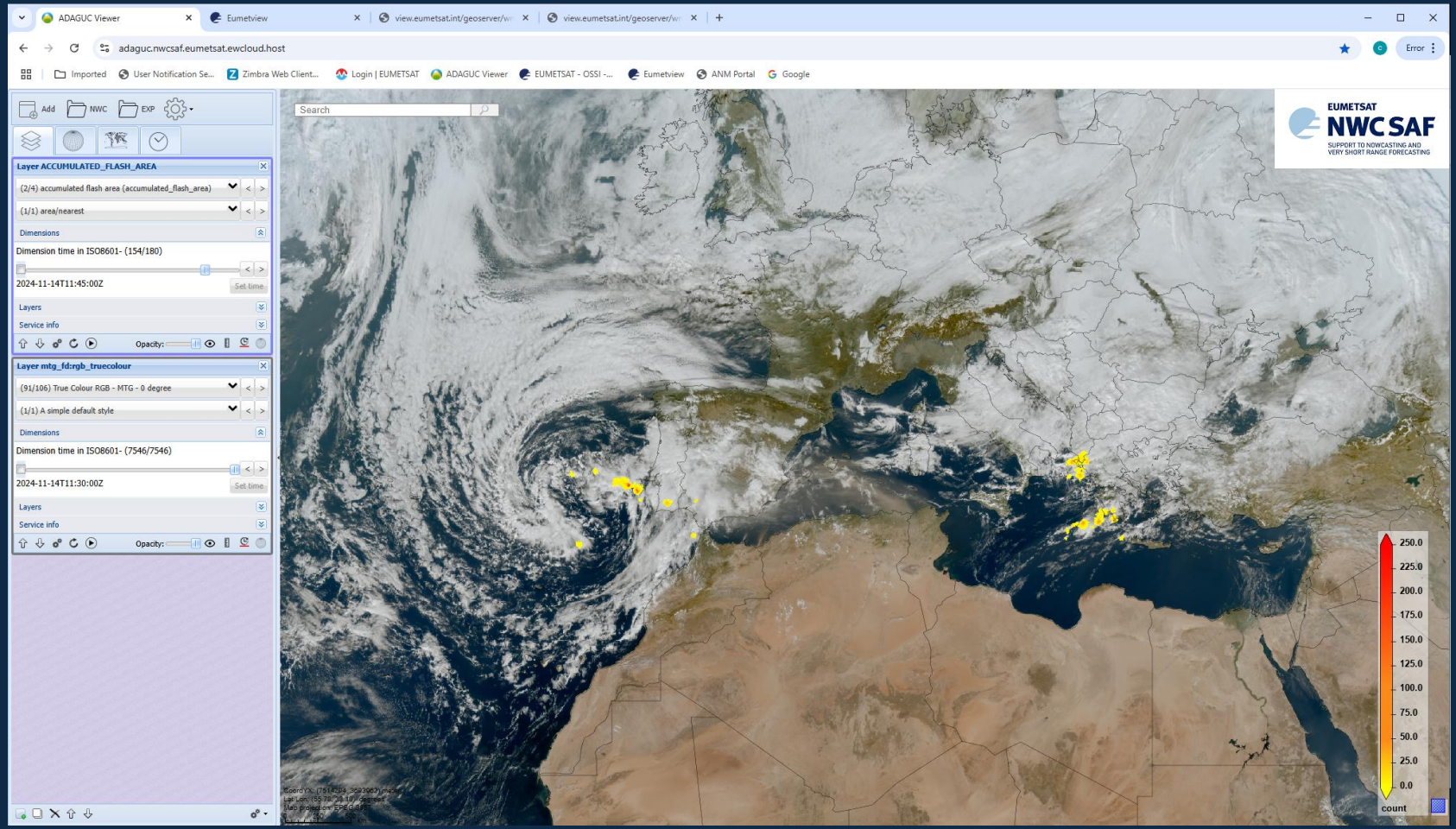

ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Search
Layers
EUMETSAT
ASCAT Coastal Winds at 12.5 km Swath Grid - Metop A
ASCAT Coastal Winds at 12.5 km Swath Grid - Metop B
ASCAT Coastal Winds at 12.5 km Swath Grid - Metop C
AVHRR IR10.8 6 orbits accumulated - Metop A
AVHRR IR10.8 6 orbits accumulated - Metop B
AVHRR IR10.8 6 orbits accumulated - Metop C
AVHRR RGB Cloud Daily Accumulated - Metop A
AVHRR RGB Cloud Daily Accumulated - Metop B
AVHRR RGB Cloud Daily Accumulated - Metop C
AVHRR RGB Natural Colour + Fog 6 orbits accumulated - Metop A
AVHRR RGB Natural Colour + Fog 6 orbits accumulated - Metop B
AVHRR RGB Natural Colour + Fog 6 orbits accumulated - Metop C
Active Fire Monitoring (GRIB) - MSG - 0 degree
Active Fire Monitoring (GRIB) - MSG - Indian Ocean
Airmass RGB - MSG - 0 degree
Airmass RGB - MSG - Indian Ocean
Blended SEVIRI / LEO MW precipitation and morphologic information - MSG - 0 degree
Boundary Lines Land
Embed
default
Dimensions
Layers
Service info
Opacity:
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
App 'AutoWMS'
AutoWMS link:
https://adaguc.nwcsaf.eumetsat.ewcloud.host//autowms?
Current folder: ./
../ (↑)
Refresh
adaguc::autowms
adaguc::data
adaguc::datasets
Oslo
Stockholm
Helsinki
Latvija
Lietuva
Беларусь
Danmark
United Kingdom
Great Britain
Éire / Ireland
Hamburg
Berlin
London
Nederland
Deutschland
Polska
Česko
Slovensko
Magyarország
Paris
France
Zagreb
Hrvatska
Србија
România
București
България
Barcelona
España
Portugal
Italia
Istanbul
İzmir
Rabat
Alger
الجزائر
Algérie
Maroc
المغرب
موريتانيا
ليبيا
مصر
Київ
Chișinău
Antal
CoordYX: (6204294, -3363359) meter
Lat/Lon: (48.58, -30.21) degrees
Map projection: EPSG:3857
ADAGUC webmapjs 3.3.6

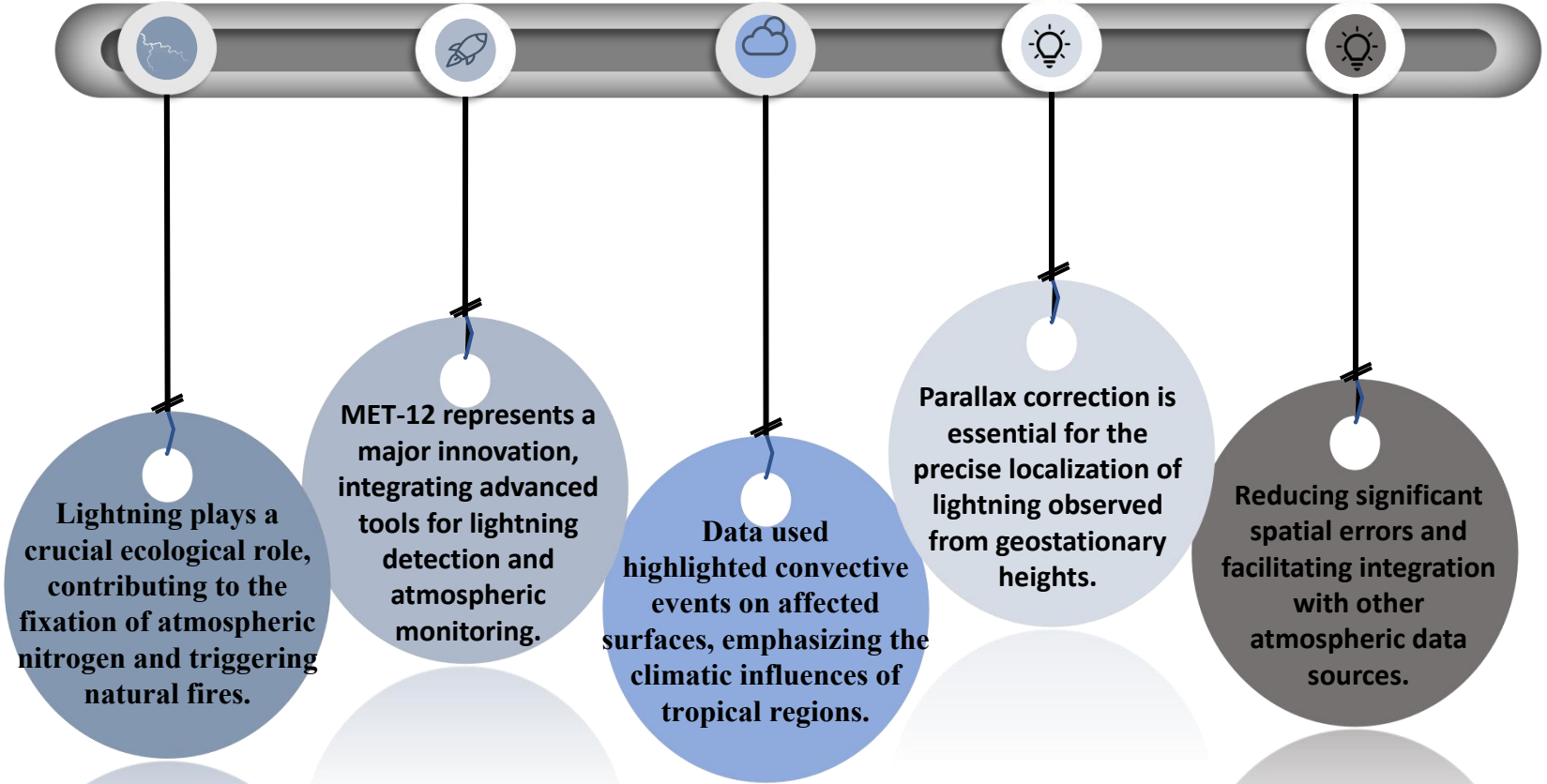

ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (154/180)
2024-11-14T11:45:00Z
Set time
Layers
Service info
Opacity:
Layer msg_fes:rgb_airmass
Auto update on/off
(15/106) Airmass RGB - MSG - 0 degree
(1/1) A simple default style
Dimensions
Dimension time in ISO8601- (147407/147407)
2024-11-14T11:30:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count
Map projection: EPSG:4326
degrees
ADAGUC webmapjs 3.3.6


ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (154/180)
2024-11-14T11:45:00Z
Set time
Layers
Service info
Opacity:
Layer msg_fes:rgb_airmass
(15/106) Airmass RGB - MSG - 0 degree
(1/1) A simple default style
Dimensions
Dimension time in ISO8601- (147407/147407)
2024-11-14T11:30:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count


ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (154/180)
2024-11-14T11:45:00Z
Set time
Layers
Service info
Opacity:
Layer msg_fes:rgb_airmass
(15/106) Airmass RGB - MSG - 0 degree
(1/1) A simple default style
Dimensions
Dimension time in ISO8601- (147407/147407)
2024-11-14T11:30:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count


ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (154/180)
2024-11-14T11:45:00Z
Set time
Layers
Service info
Opacity:
Layer msg_fes:rgb_airmass
Layers
S3A Orbital Tracks
S3B Orbital Tracks
SLSTR Level 2 SST Daily Accumulated - Sentinel-3
SLSTR Level 2 Sea Surface Temperature (SST) - Sentinel-3A
SLSTR Level 2 Sea Surface Temperature (SST) - Sentinel-3B
Snow RGB - MSG - Indian Ocean
Tropical Airmass RGB - MSG - 0 degree
Tropical Airmass RGB - MSG - Indian Ocean
True Colour RGB - MTG - 0 degree
Volcanic Ash RGB - MSG - 0 degree
Volcanic Ash RGB - MSG - Indian Ocean
builtup_area
graticules-dark
graticules-light
land_polygons
ne_10m_admin_0_boundary_lines_land
ne_10m_admin_0_countries_points
ne_10m_admin_1_states_provinces_lines
ne_10m_bathymetry
Embed
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count


ADAGUC Viewer
Eumetview
adaguc.nwcsaf.eumetsat.ewcloud.host
Add
NWC
EXP
Layer ACCUMULATED_FLASH_AREA
(2/4) accumulated flash area (accumulated_flash_area)
(1/1) area/nearest
Dimensions
Dimension time in ISO8601- (154/180)
2024-11-14T11:45:00Z
Set time
Layers
Service info
Opacity:
Layer mtg_fd:rgb_truecolour
(91/106) True Colour RGB - MTG - 0 degree
(1/1) A simple default style
Dimensions
Dimension time in ISO8601- (7546/7546)
2024-11-14T11:30:00Z
Set time
Layers
Service info
Opacity:
Search
EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND VERY SHORT RANGE FORECASTING
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
count



5. Conclusions and Future Aspects

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Photo: Bogdan Vasilescu

Thank you very much for your attention!

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