

Using ADAGUC for GEO NWCSAF products visualization at NMA

Romanian National Meteorological Administration | Presenter: Oana Nicola

Authors: Oana Nicola, Andrei Diamandi, Eduard Luca

Outline

- At National Meteorological Administration, satellite data and EUMETSAT SAF products are used in both operational weather forecasting and research. Data received through EUMETCast is further processed (e.g. by NWCSAF MSG and PPS software) and disseminated in near real time to the National and Regional Forecasting Centers and to other end users.
- Imagery data and satellite products are displayed in the NexReap meteorological visualization system – a quite outdated and proprietary system. A new visualization system will be implemented (COROBOR-MESSIR) until the end of 2020.
- A rolling image products archive of 3 months on an Intranet server is available through a web browser on the Intranet, while a subset is archived on the main storage system offering ftp access.
- There is a growing demand for satellite products in general and for NWCSAF products in particular, as well as for an easier and faster access to these data.

Requirements

Our group has been looking at a number of available visualization tools, which would:

- Be easy to implement in an operational environment.

- Allow visualization of data in hdf5/netCDF formats (thus eliminating the need for exporting data in other formats for visualization – e.g. tiff for nexReap).

- Permit overlaying the displayed images with meteorological fields (e.g. NWP data).

- Eliminate multiple automatic/manual ftp transfers to the visualization workstation – by accessing data directly from a single dedicated server.

- Allow intranet /extranet access.

ADAGUC presentation

In this respect, the ADAGUC (Atmospheric Data Access for the Geospatial User Community) system – developed by KNMI – has been selected and tested at NMA. This presentation describes our experience installing and using ADAGUC in an operational environment.

<http://adaguc.knmi.nl>



**Atmospheric data access for the geospatial
user community**

ADAGUC and NWCSAF GEO products

- ADAGUC can visualise a number of data types from data in NetCDF datafiles (NetCDF3 and NetCDF4). Data can also be read from some types of HDF5 files.
- With the great help of Llorenç Lliso (AEMET) the NWCSAF2ADAGUC suite (developed by AEMET) was installed and configured in order to read NWC GEO output products and convert them to be compatible with ADAGUC.

ADAGUC Viewer and NWCSAF GEO Cloud Mask

The screenshot displays the ADAGUC Viewer interface. The main map area shows a geographical map of Europe with a red overlay representing the cloud mask. A legend in the bottom right corner of the map area defines the cloud mask categories:

- 0) Cloud free
- 1) Cloud except thin ice over snow
- 2) Thin ice clouds over snow ice
- 3) Snow ice

The left sidebar shows the layer list with the following layers:

- Layer CMA_cma_cloudsnow
- (2/4) NWC GEO CMA Cloud and Snow Mask (cma_cloudsnow)
- (1/1) cma_cloudsnow/nearest

The right sidebar shows the service information for the 'CMA' dataset, including the WMS URL and OpenDAP links.

ADAGUC Viewer and NWCSAF GEO Cloud Type

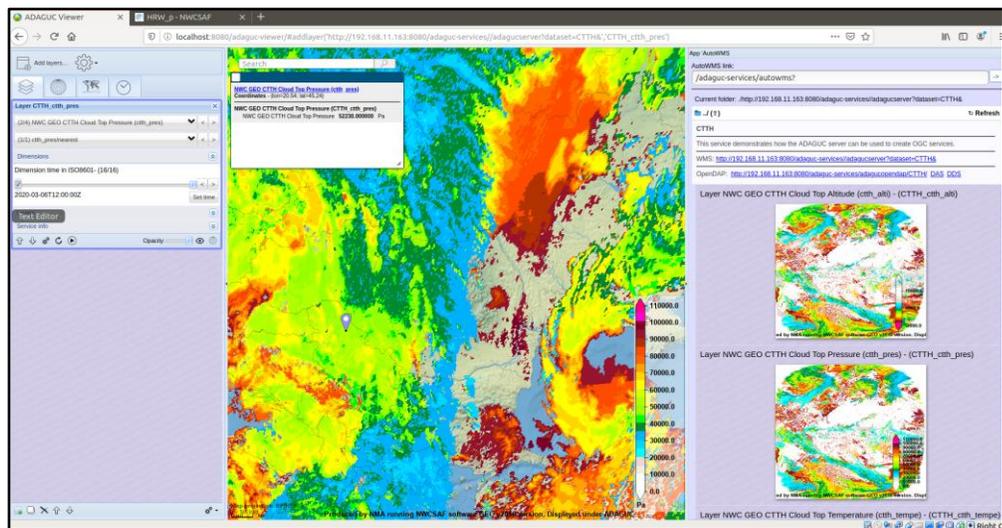
The screenshot displays the ADAGUC Viewer interface. The main map area shows a color-coded cloud type map. A legend in the bottom right corner lists 15 categories:

- 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 meanly thick clo
- 13) High semitransparent thick clouds
- 14) High semitransparent above low or me
- 15) High semitransparent above snow ice

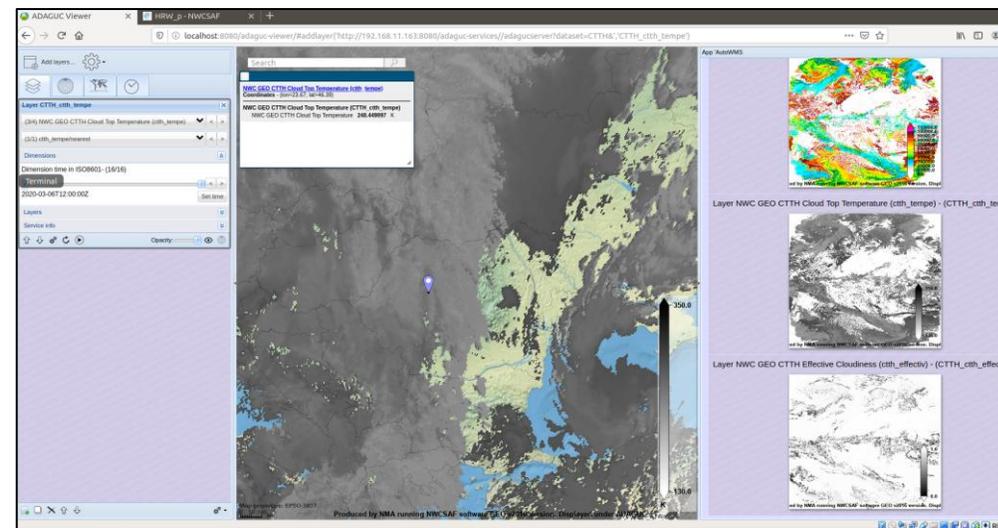
The interface includes a left sidebar with layer controls, a top navigation bar, and a right sidebar with metadata and service information. The metadata section shows the layer name 'Layer NWC GEO CT Cloud Type (ct) - (CT_ct)' and a thumbnail of the map. The service information section includes the WMS URL: <http://192.168.11.163:8080/adaguc-services/adagucserver?dataset=CT&>.

ADAGUC Viewer and NWCSAF GEO CTTH

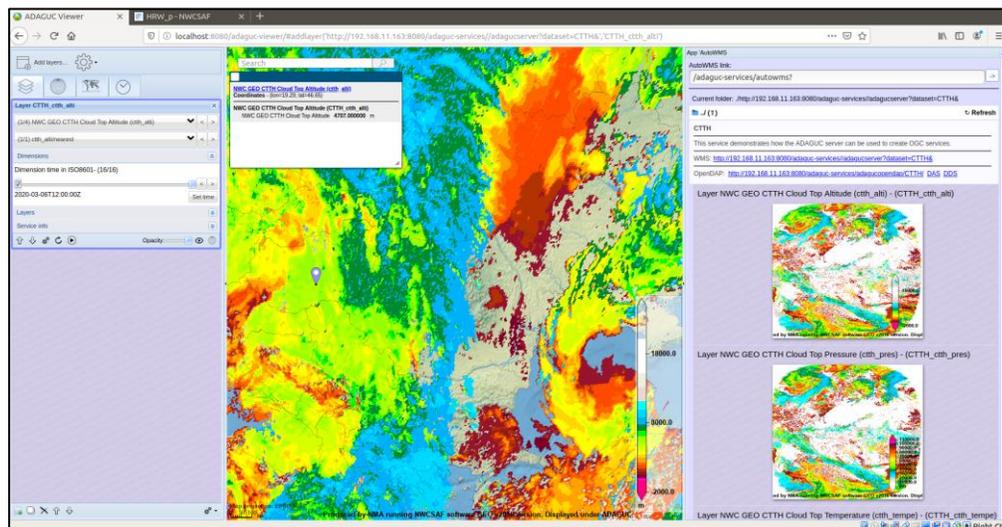
Cloud Top Pressure



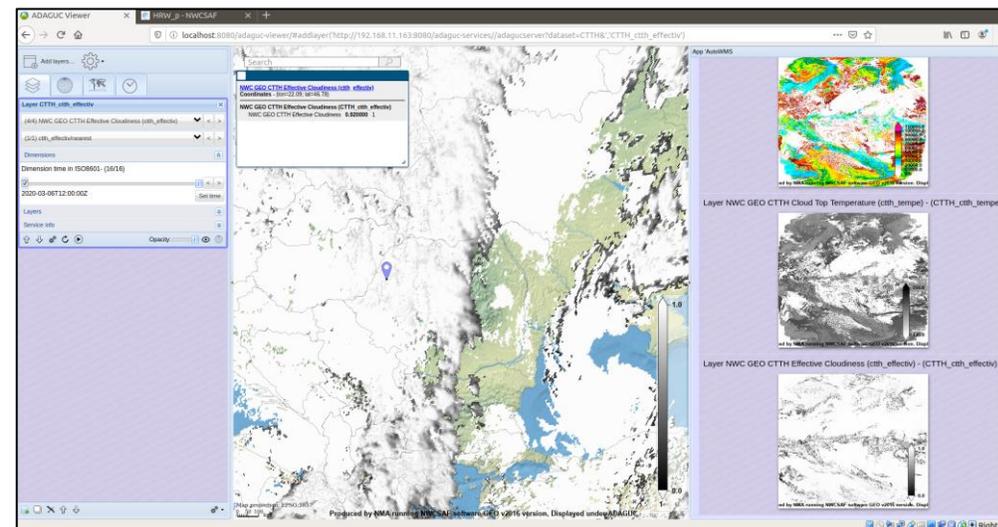
Cloud Top Temperature



Cloud Top Altitude



Cloud Top Effective Cloudiness



ADAGUC Viewer and NWCSAF GEO CRR Intensity

The screenshot displays the ADAGUC Viewer interface. The main map shows convective rainfall intensity over Romania, with a color scale ranging from 0.0 mm/h (blue) to 50.0 mm/h (red). A tooltip over the map indicates a value of 2.700000 mm/h at coordinates (lon=22.52; lat=45.93).

Left Sidebar (Layer CRR_crr_intensity):

- Layer: CRR_crr_intensity
- Dimensions: Dimension time in ISO8601- (3/3)
- Terminal: 2020-03-06T12:00:00Z
- Layers: (1/2) NWC GEO CRR Convective Rainfall Intensity (crr_intensity), (1/1) crr_intensity/nearest
- Service info: Opacity: [slider]

Right Sidebar (App 'AutoWMS'):

- AutoWMS link: /adaguc-services/autowms?
- Current folder: /http://192.168.11.163:8080/adaguc-services/adagucserver?dataset=CRR&
- WMS: <http://192.168.11.163:8080/adaguc-services/adagucserver?dataset=CRR&>
- OpenDAP: <http://192.168.11.163:8080/adaguc-services/adagucopendap/CRR/ DAS DDS>
- Layer NWC GEO CRR Convective Rainfall Intensity (crr_intensity) - (CRR_crr_intensity)

Preview Images:

- Top preview: Layer NWC GEO CRR Convective Rainfall Intensity (crr_intensity) - (CRR_crr_intensity). Includes a color scale from 0.0 to 50.0 mm/h.
- Bottom preview: Layer NWC GEO CRR Convective Rainfall Rate Class (crr) - (CRR_crr). Includes a legend with 13 discrete intensity classes.

Map Footer: Map projection: EPSG:3857. Produced by NMA running NWCSAF software GEO v2016 version. Displayed under ADAGUC.

ADAGUC Viewer and NWCSAF GEO CRR Class

The screenshot displays the ADAGUC Viewer web application. The browser address bar shows the URL: `localhost:8080/adaguc-viewer/#addlayer('http://192.168.11.163:8080/adaguc-services//adagucserver?dataset=CRR&','CRR_crr')`.

Left Sidebar (Layer CRR_crr):

- Layers: (2/2) NWC GEO CRR Convective Rainfall Rate Class (crr), (1/1) crr/nearest
- Dimensions: Dimension time in ISO8601- (3/3)
- Terminal: 2020-03-06T12:00:00Z
- Layers and Service info sections are visible at the bottom.

Central Map:

The map shows a geographical view of Romania with convective rainfall rate classes overlaid. A legend in the bottom right corner of the map area provides the following scale:

0)	00 02 mm h
1)	02 1 mm h
2)	1 2 mm h
3)	2 3 mm h
4)	3 5 mm h
5)	5 7 mm h
6)	7 1 mm h
7)	10 15 mm h
8)	15 20 mm h
9)	20 30 mm h
10)	30 50 mm h
11)	50 mm h

Right Sidebar (App 'AutoWMS'):

- AutoWMS link: `/adaguc-services/autowms?`
- Current folder: `./http://192.168.11.163:8080/adaguc-services//adagucserver?dataset=CRR&`
- WMS: `http://192.168.11.163:8080/adaguc-services//adagucserver?dataset=CRR&`
- OpenDAP: `http://192.168.11.163:8080/adaguc-services/adagucopendap/CRR/ DAS DDS`
- Layer NWC GEO CRR Convective Rainfall Intensity (crr_intensity) - (CRR_crr_intensity)
- Layer NWC GEO CRR Convective Rainfall Rate Class (crr) - (CRR_crr)

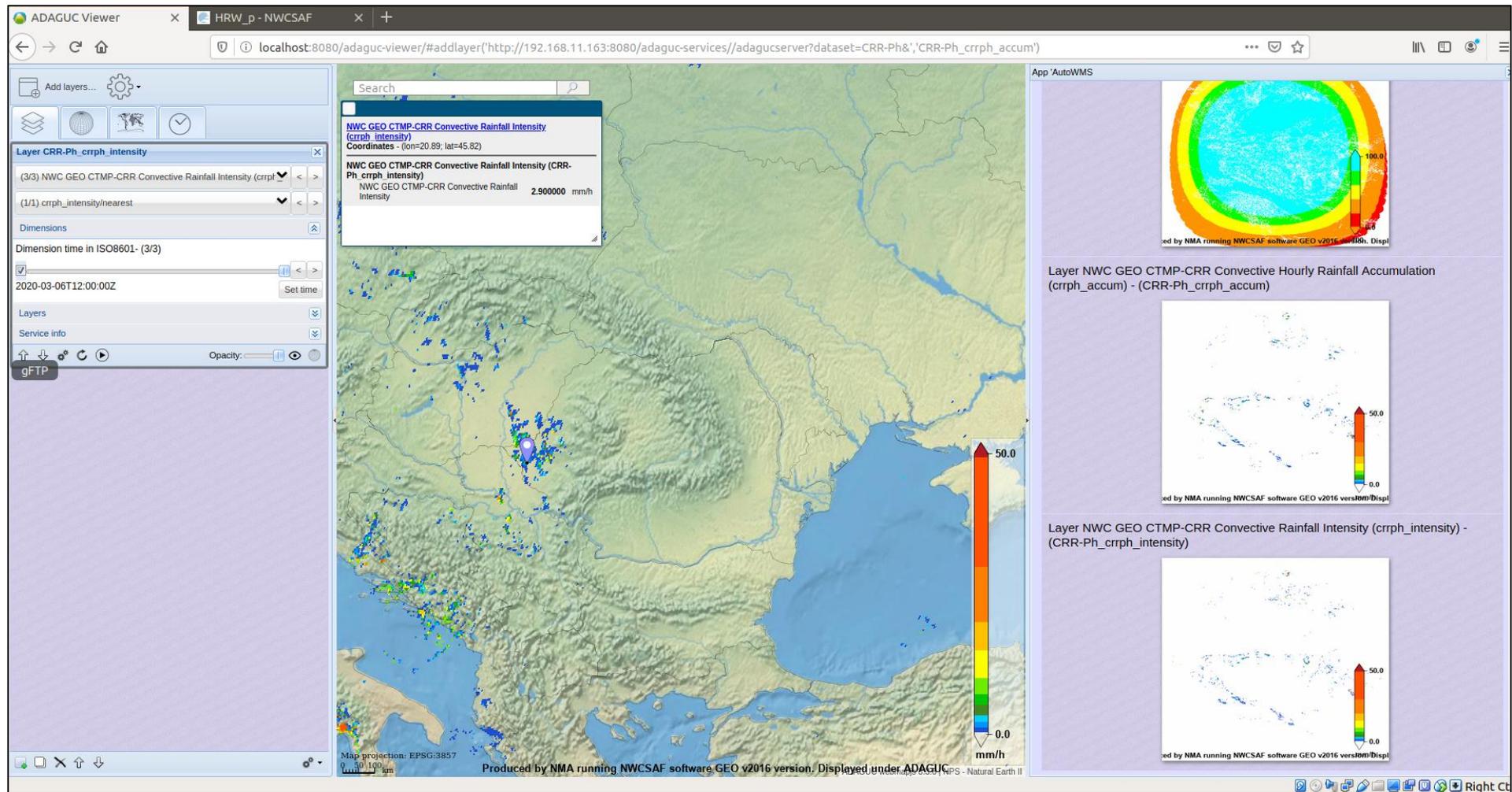
Two preview maps are shown in the right sidebar, each with its own legend. The top preview map shows rainfall intensity with a color scale from 0.0 to 50.0. The bottom preview map shows the rainfall rate class with a legend matching the central map's legend.

Map projection: EPSG:3857
 Produced by NMA running NWCSAF software GEO v2016 version. Displayed under ADAGUC

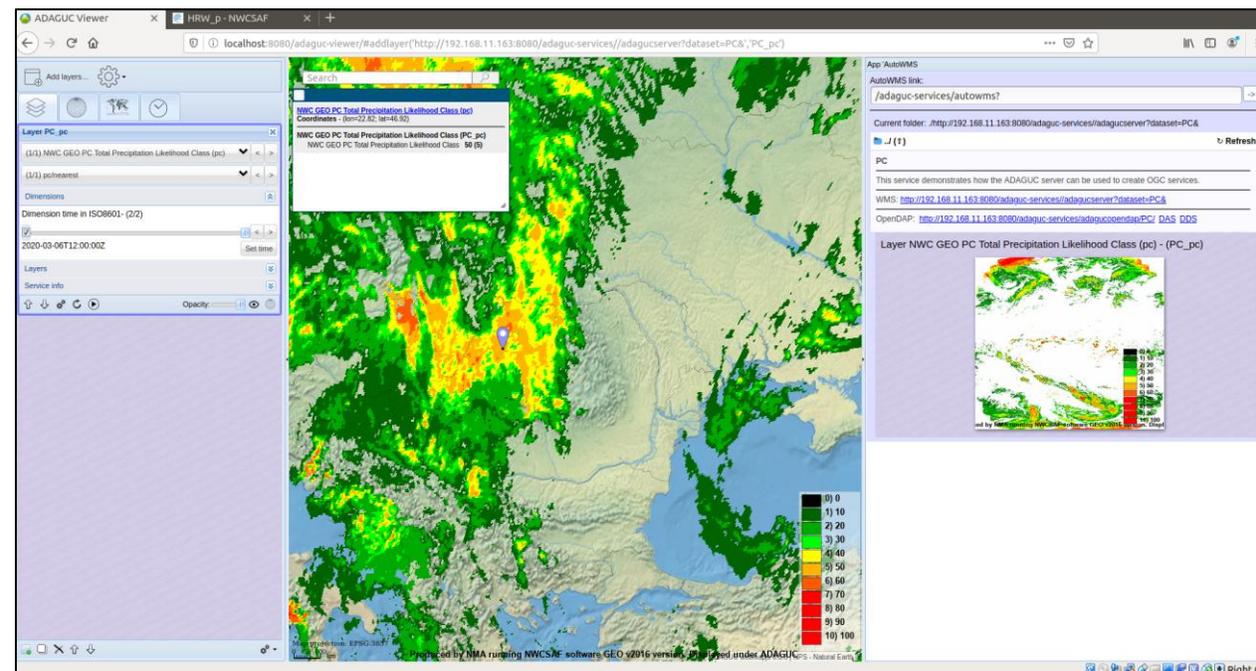
ADAGUC Viewer and NWCSAF GEO CRR-Ph Intensity

The screenshot displays the ADAGUC Viewer interface. The main map shows a satellite-style view of Africa with a purple location pin in West Africa. A legend on the left lists layers, including 'Layer CRR-Ph_crrph_intensity'. A tooltip over the map provides details for 'NWC GEO CTMP-CRR Convective Rainfall Intensity (crrph_intensity)', showing coordinates (lon=21.59, lat=-2.73) and a value of 0.500000 mm/h. The bottom of the map area includes map projection information (EPSG:4326) and a scale bar. On the right, an 'App AutoWMS' panel contains three inset maps: a circular rainfall intensity map with a 100.0 mm/h scale, and two maps of hourly rainfall accumulation (crrph_accum) with a 50.0 mm/h scale. The text 'Produced by NMA running NWCSAF software GEO v2016 version. Displayed under ADAGUC' is visible at the bottom of the map area.

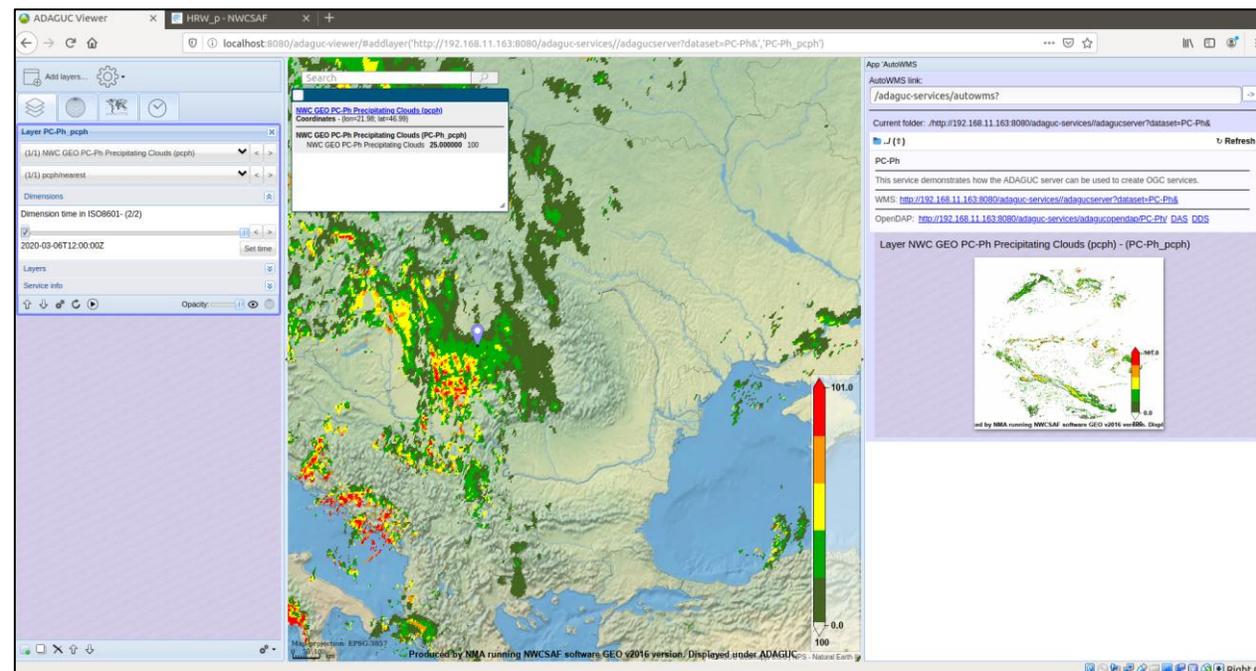
ADAGUC Viewer and NWCSAF GEO CRR-Ph Intensity



ADAGUC Viewer and NWCSAF GEO Precipitating Clouds

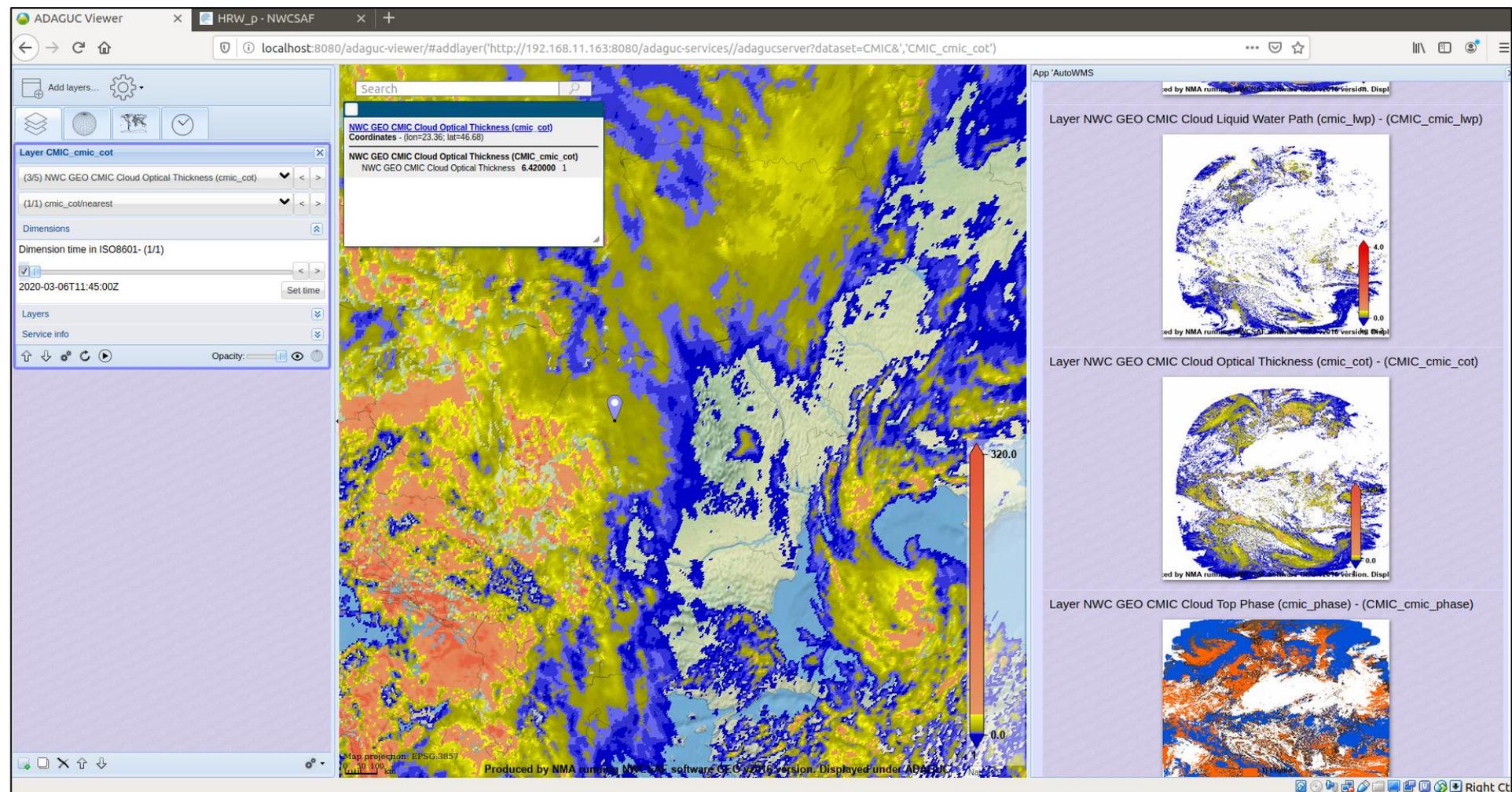


Precipitating Clouds



Precipitating Clouds based on Cloud Physical Properties

ADAGUC Viewer and NWCSAF GEO CMIC Cloud Optical Thickness



ADAGUC Viewer and NWCSAF GEO CMIC Cloud Top Phase

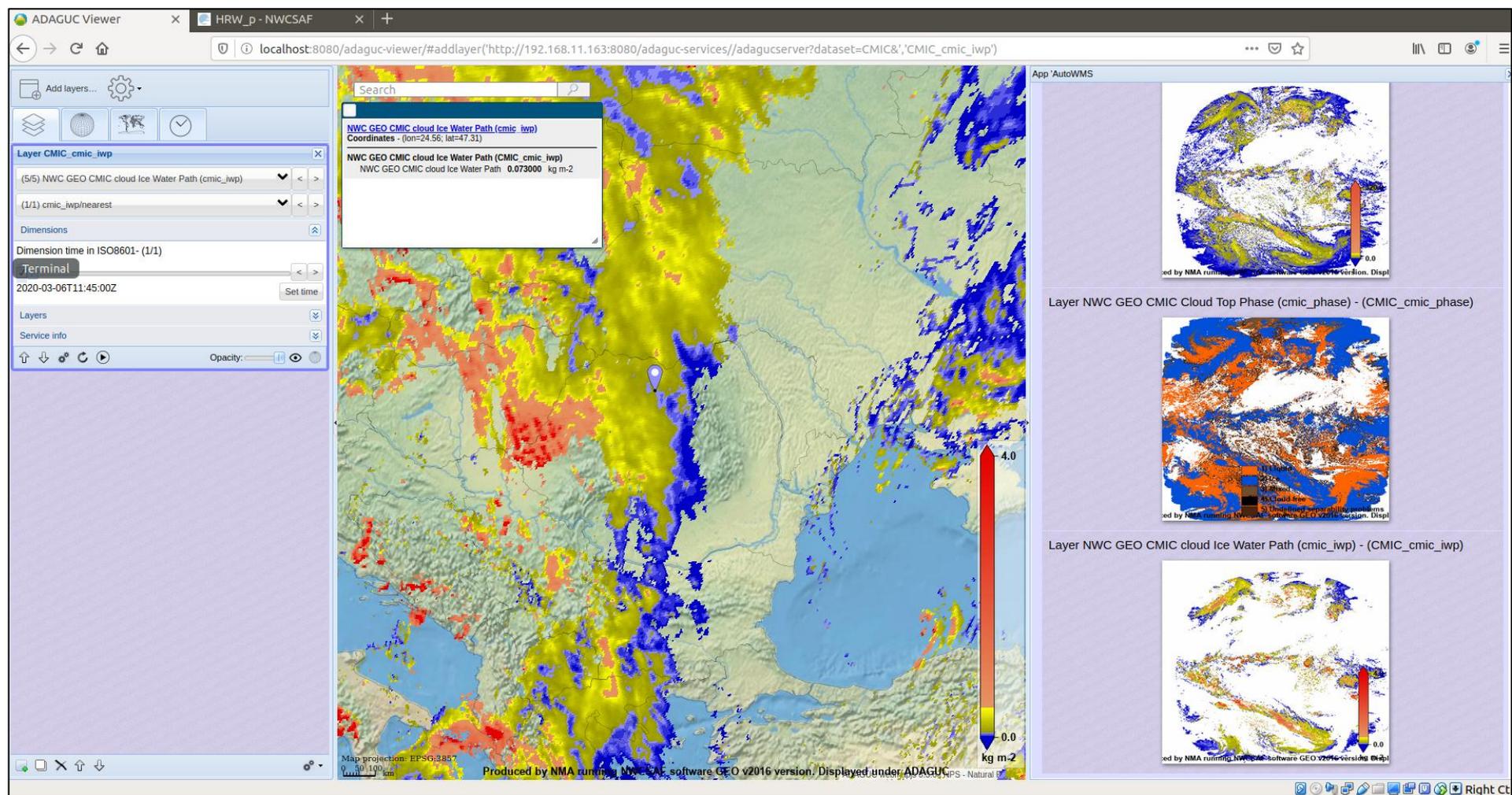
The screenshot displays the ADAGUC Viewer interface. The main map area shows a color-coded cloud top phase over a geographical region. A legend in the bottom right corner identifies the phases:

- 1) Liquid (Orange)
- 2) Ice (Blue)
- 3) Mixed (Light Green)
- 4) Cloud-free (Dark Blue)
- 5) Undefined separability problems (Black)

The interface includes a left sidebar with layer controls, a top navigation bar, and a right sidebar with three preview windows. The top preview window shows a global view of the cloud top phase. The middle preview window shows a zoomed-in view of the cloud top phase. The bottom preview window shows a zoomed-in view of the cloud ice water path.

Map projection: EPSG:31466
 Produced by NMA running NWCSAF software GEO v2016 version. Displayed under ADAGUC v2.1.1

ADAGUC Viewer and NWCSAF GEO CMIC Cloud Ice Water Path



Conclusions

- ADAGUC server and viewer were easy to install and configure
- NWCSAF2ADAGUC suite was also easy to install/configure/run
- ADAGUC Server/Viewer eliminate multiple automatic/manual ftp transfers to the visualization workstation – positive feedback from our forecasters.

Thank you for your attention!