Institute of Meteorology and Water Management
National Research Institute

The use of Direct Broadcast Processing System in Poland

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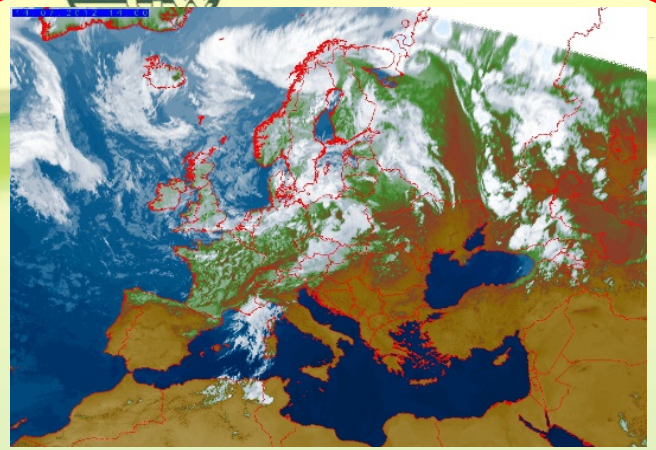
About IMWM-NRI - who we are and what we do

Institute of Meteorology and Water Management - National Research Institute (IMWM-NRI) is a research-development unit responsible for meteorological, hydrological public protection .

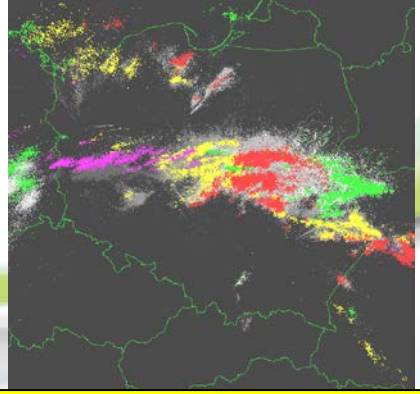
Its general tasks are:

- Making regular measurements and observations with the use of basic systems and measurement networks .
- Preparation and dissemination of meteorological and hydrological forecasts and warnings.
- Forecasting of water resources quality and air pollution.
- Elaboration of dams technical state and safety estimates.

IMWM-NRI ground observations system

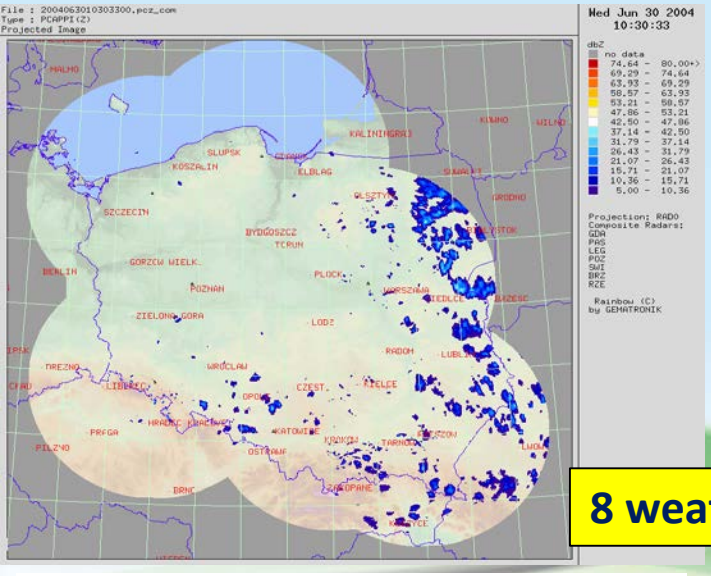


Satellite ground receiving station



Lightning detection and location network - PERUN

60 synoptic posts
152 climatological posts
978 rain gagues posts



8 weather radars

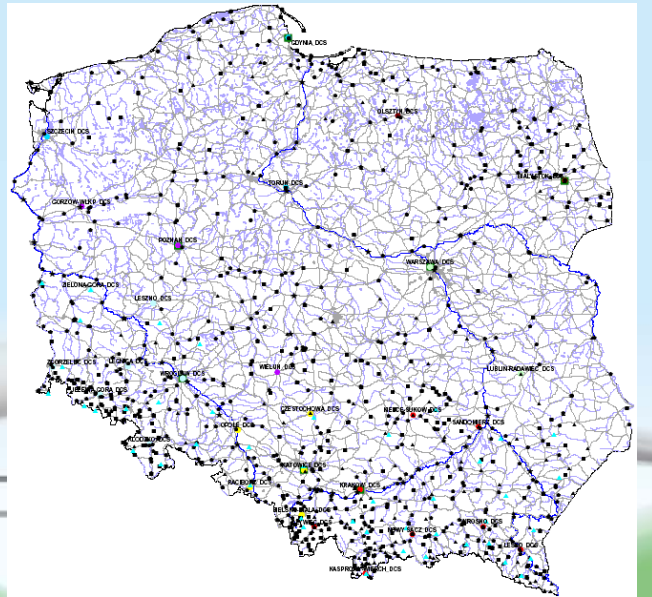
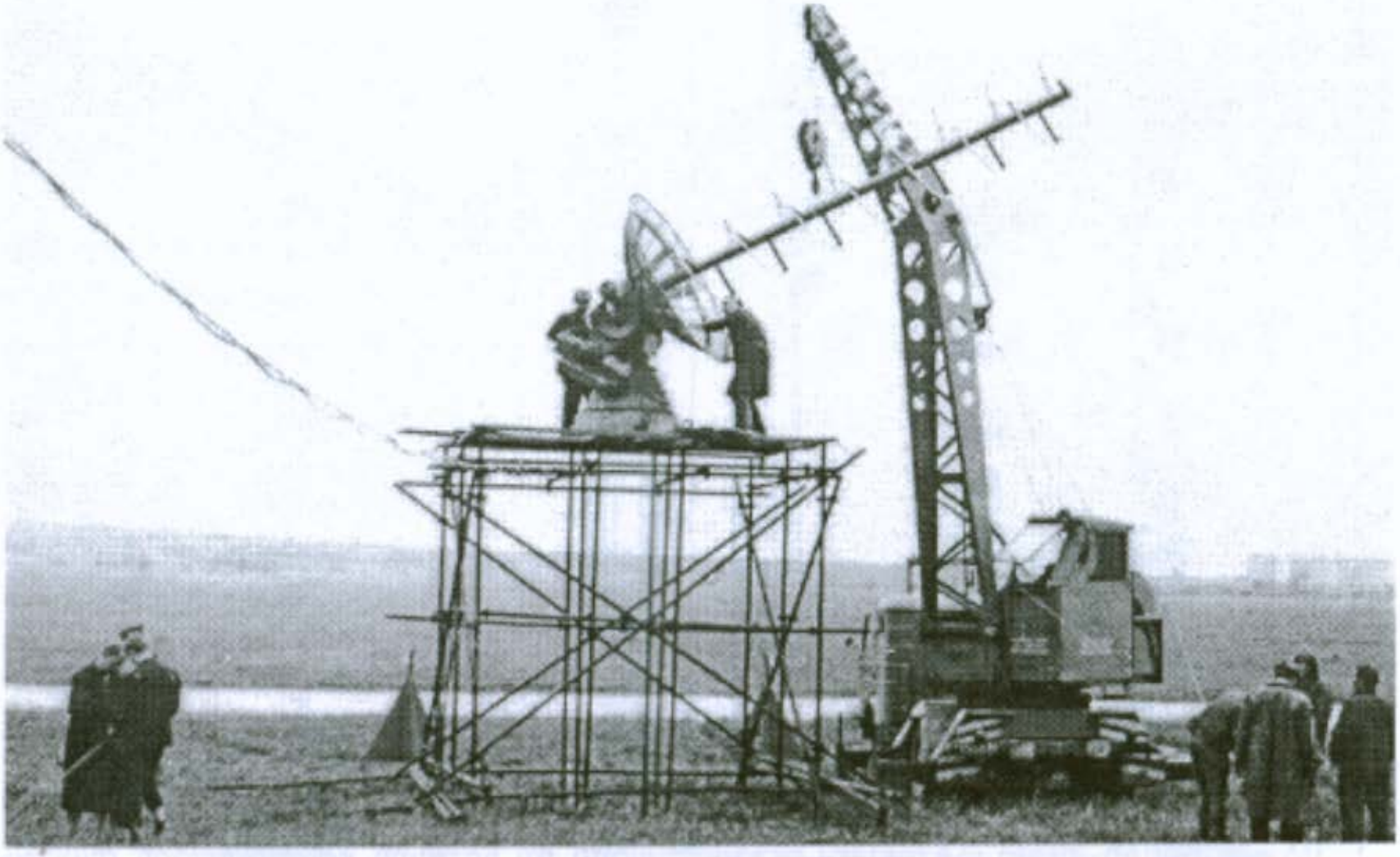


Fig. 28 - Composite image from all Polish radars.

IMWM Satellite ground receiving station

Since its beginning the DB receiving station has been located in the Krakow Branch of IMWM-NRI…

The story began in 1967



Montaż anteny do odbioru danych z satelitów meteorologicznych (Kraków-Czyżyny, r. 1967)

and continues through the late 60-ties

Pierwsza polska Stacja Odbioru Danych Satelitarnych w Krakowie-Czyżynach - antena kierunkowa /r. 1968/

ys.24. Aparatura odbiorcza i rejestrująca pierwszej polskiej Stacji Odbioru Danych Satelitarnych /r.1968/

The first Polish antenna for satellite data reception .

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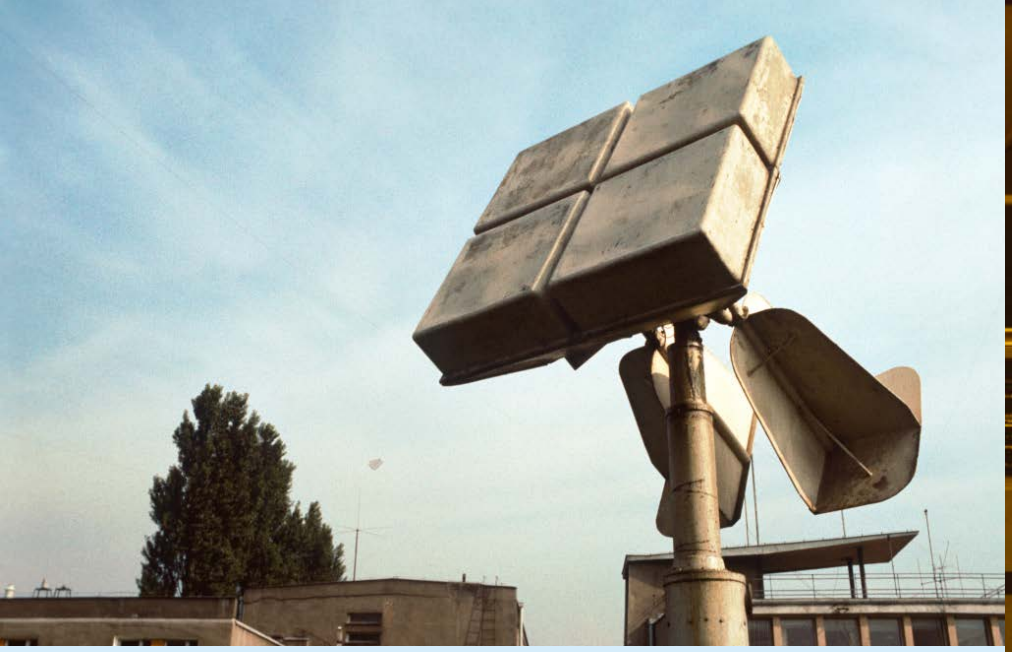
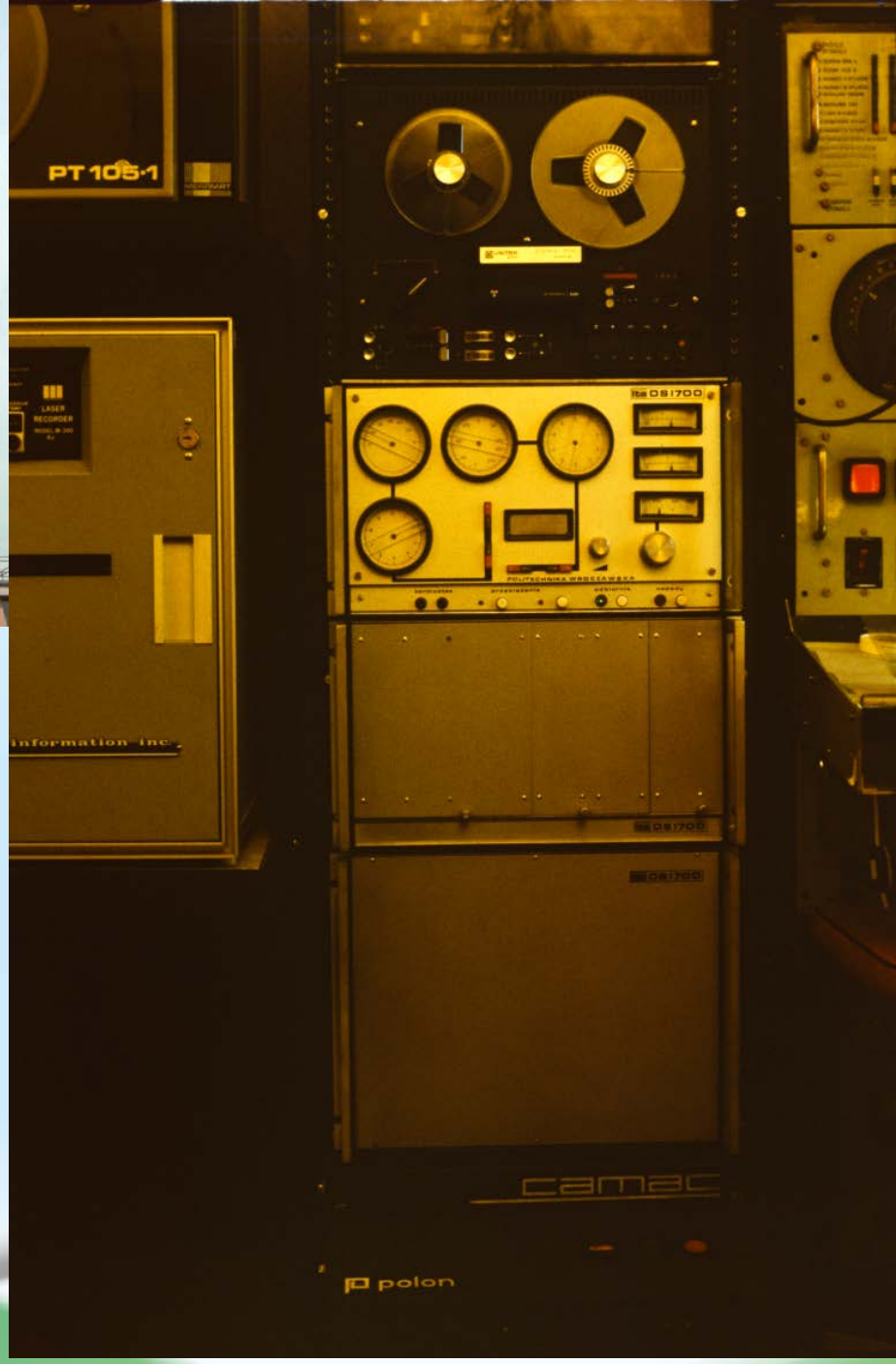




1979:

The first system for METEOSAT-WEFAX data reception in 1.7 GHz band

Built by Technical University in Wrocław

1985

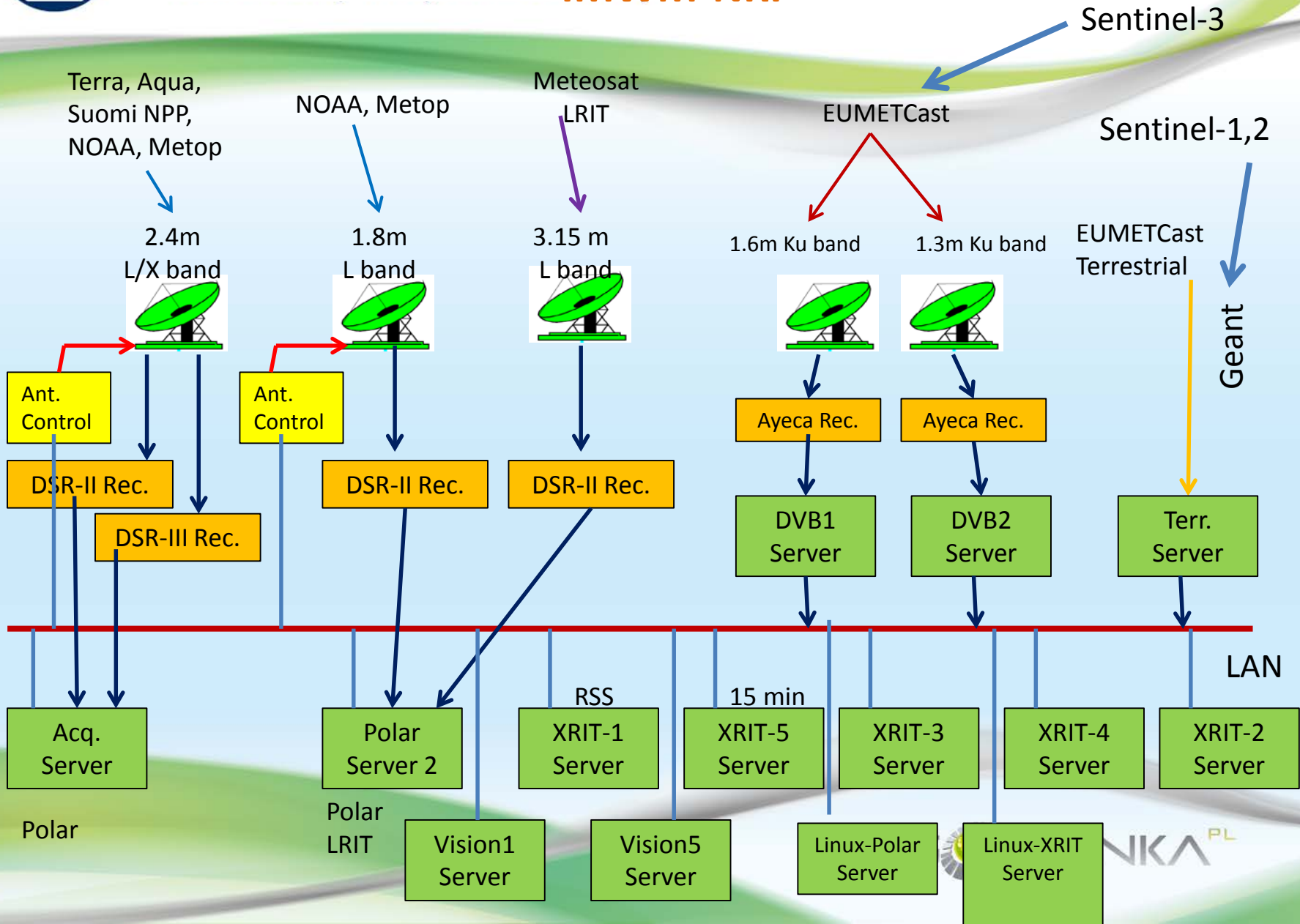
DB system for NOAA-HRPT

In 2017…

- DB satellite station operated by Satellite Remote Sensing Department is the only one such a station in Poland;

It works operationally, 7 days per week, providing data and products for statutory activities of IMWM.

Diagram of satellite receiving and processing system of IMWM-NRI



Meteorological satellites in operational use at IMWM-NRI

Geostationary satellites:

METEOSAT-10 – basic operational satellite, 15 min scanning, position 0 deg

METEOSAT-9 – back-up satellite, RapidScan 5 min mode, position 9.5 deg E

METEOSAT-8 – operational satellite , position 41.5 deg E (Indian Ocean)

Indirect access to the images from:

GOES-E (USA)

GOES-W (USA)

MTSAT-2 (Japan)

Himawari-8 (Japonia)

FY3 (China)

Low Earth Orbit satellites :

Direct reception:

American satellites **NOAA** (15, 18 ,19) and **Suomi NPP**

EUMETSAT satellites: **METOP-A and B**,

Environmental satellites: **TERRA andAQUA**

Access via EUMETCast:

Oceanographic satellite **Jason-2, Jason-3**

GCOM-W1 (Japan),

GPM (USA)

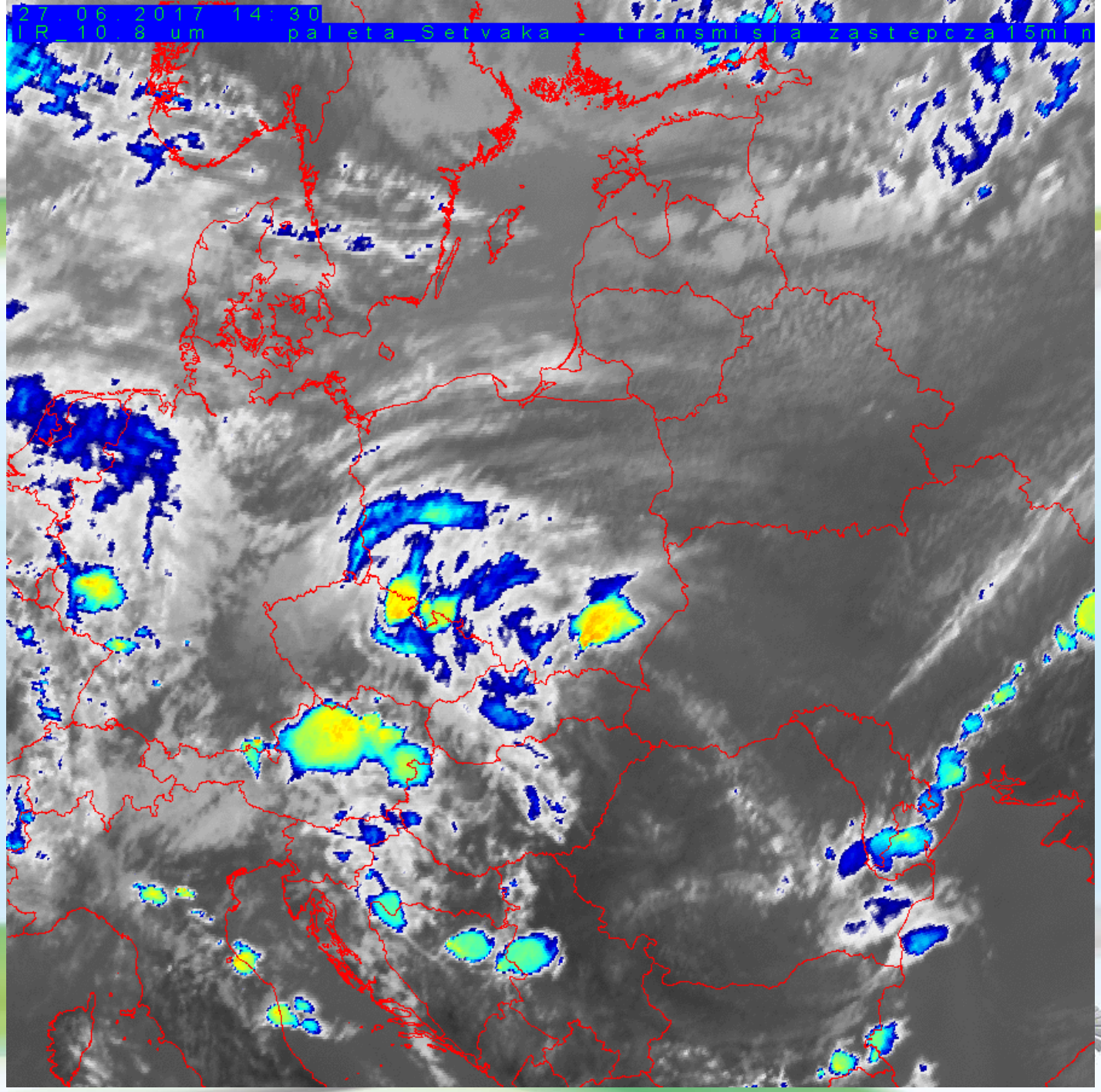
Sentinel-3

Via Geant:

Sentinel-1, Sentinel-2

Software packages used in DB receiving and porcessing system

- SCISYS *2met!*
- *IMAPP*
- *NWC SAF software*
- *Satsignal*
- *MSG Proc - J. Kanak*
- *Tools (HDF, NetCDF, BUFR, GRIB etc.)*
- *Home made software*
- *Direct Broadcast Processing System*


27.06.2017 14:30
IR_10.8 um paleta_Setvaka - transmisja zastepcza 15min

Satellite data applications at IMWM-NRI

Taking into account the needs of the main user, the highest priority has been put the geostationary satellites data processing and dissemination;

Polar orbiting satellite data were used in a very limited extent mostly because of lack of processing packages working operationally and level-2 products;

Operational implementation of the Direct Broadcast Processing System (courtesy of SSEC and Liam Gumley) allowed for better use of polar orbiting satellites data.

Direct Broadcast Processing System – Polish installation

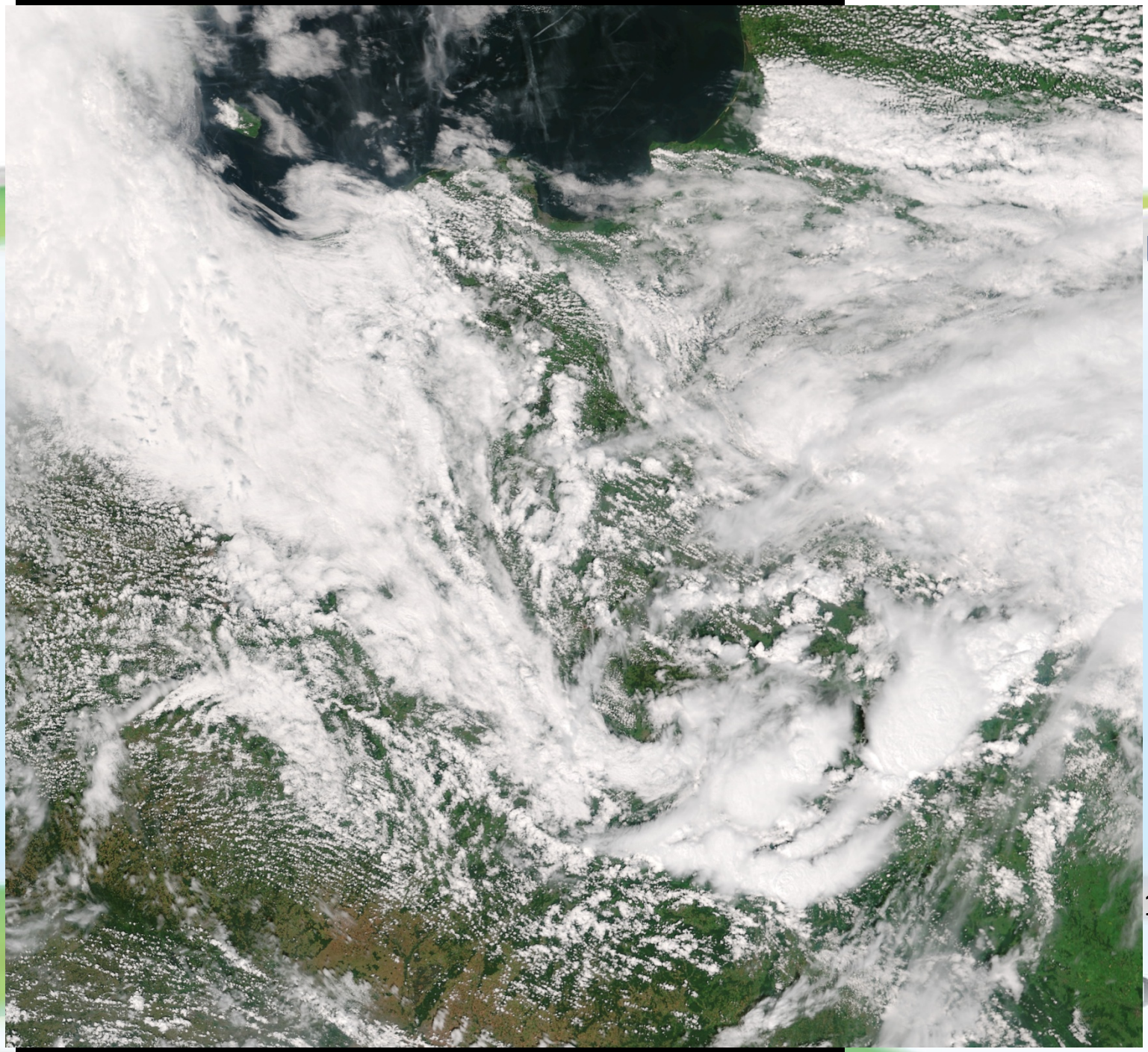
Installed in 2016 on the virtual machine;

Satellites operationally processed: NOAA-18 and 19, S-NPP, Metop-A/B, Terra, Aqua

Packages included:

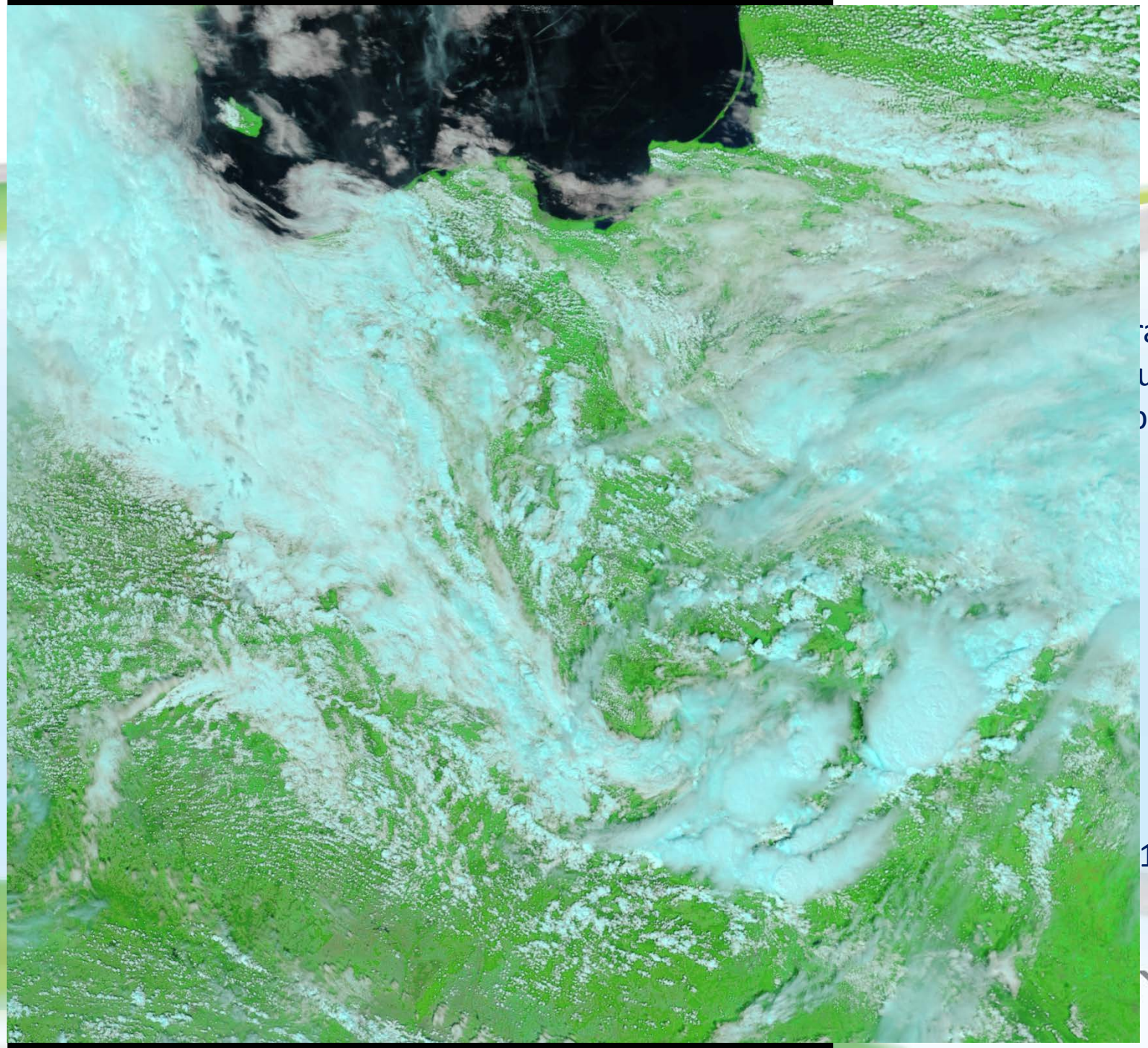
- CSPP (for Suomi NPP),
- IMAPP (for Terra and Aqua),
- AAPP (for Metop-A/B and NOAA-18/19),
- NASA DRL (for MODIS),
- Polar2Grid for creating mapped images,
- other supporting software packages, like SeaDAS.

Level-1 nad level-2 products are operationally produced.



preferred by

1:48 UTC



ral colors) RGB:
used as it
phase

1:48 UTC

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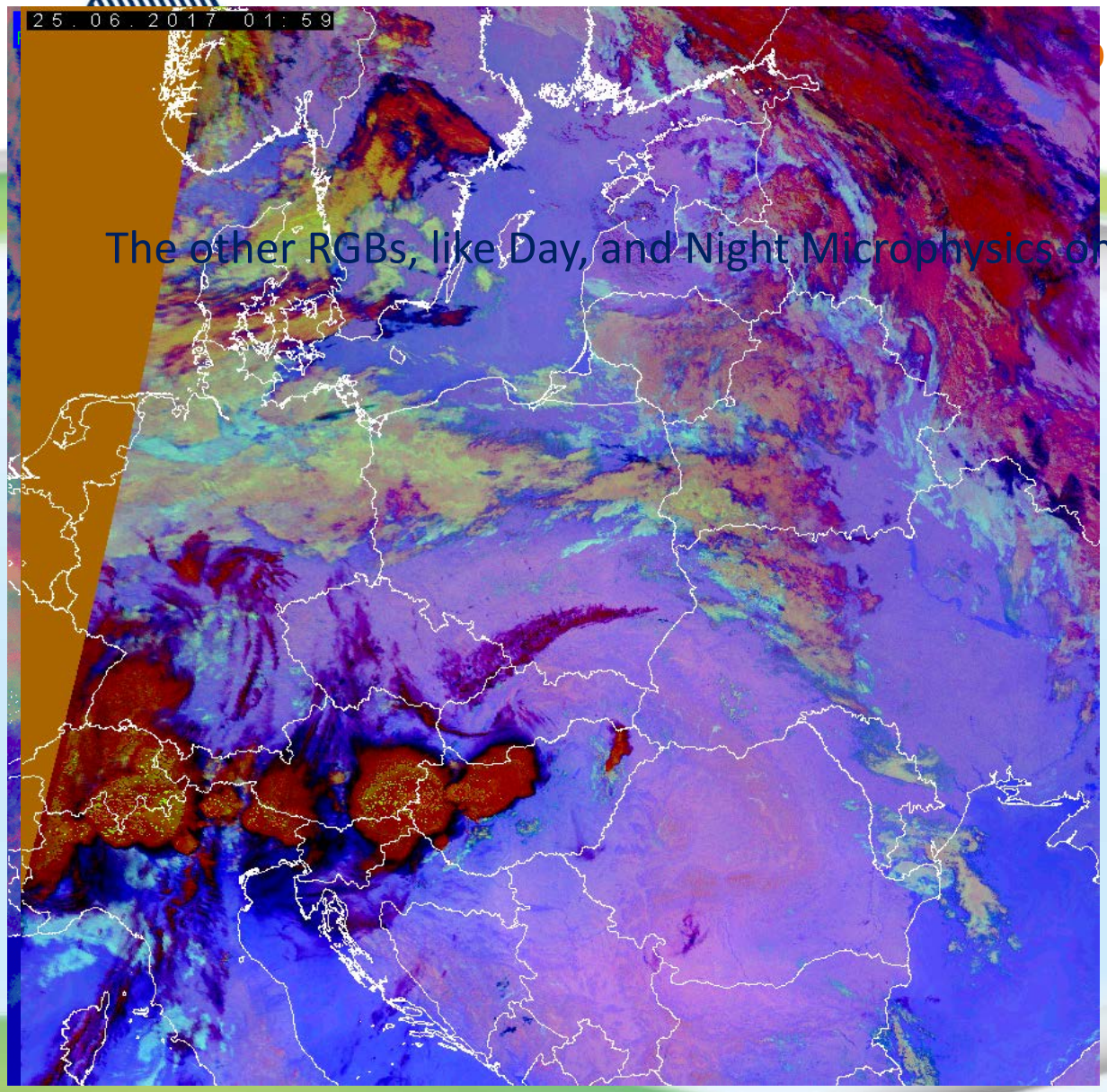


The other RGBs, like Day, and Night Microphysics ones, are to be included.

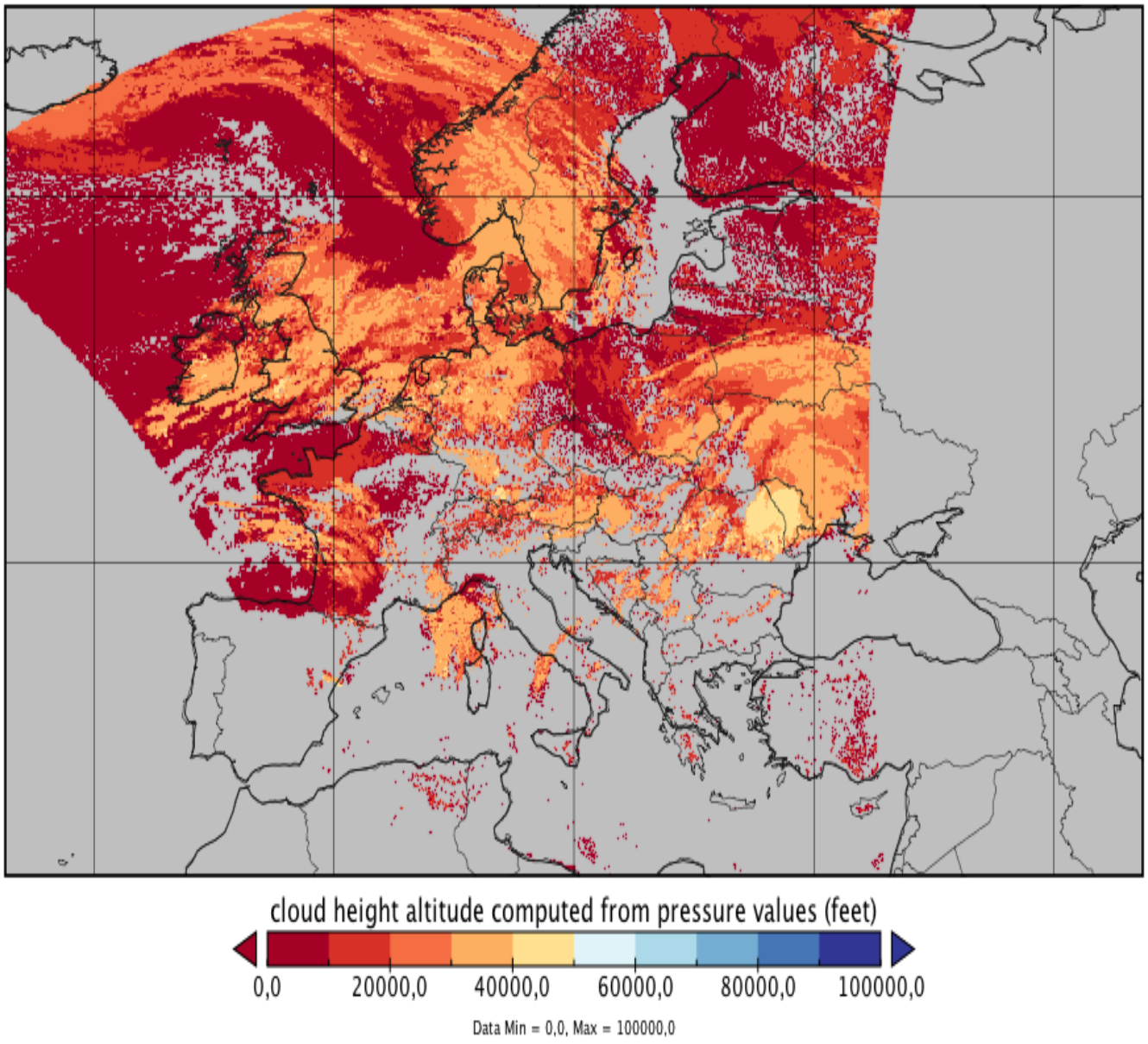
RGB Day Microphysics (0.8/3.9 r/10.8)

RGB Night Microphysics (12.0-10.8/10.8-3.7 /10.8)

NOAA-19, 25 June2017, 01:59 UTC

Metop-A, 22 April 2017, 09:00 UTC

cloud height altitude computed from pressure values



ud detection

23 June 2017, 11:48 UTC

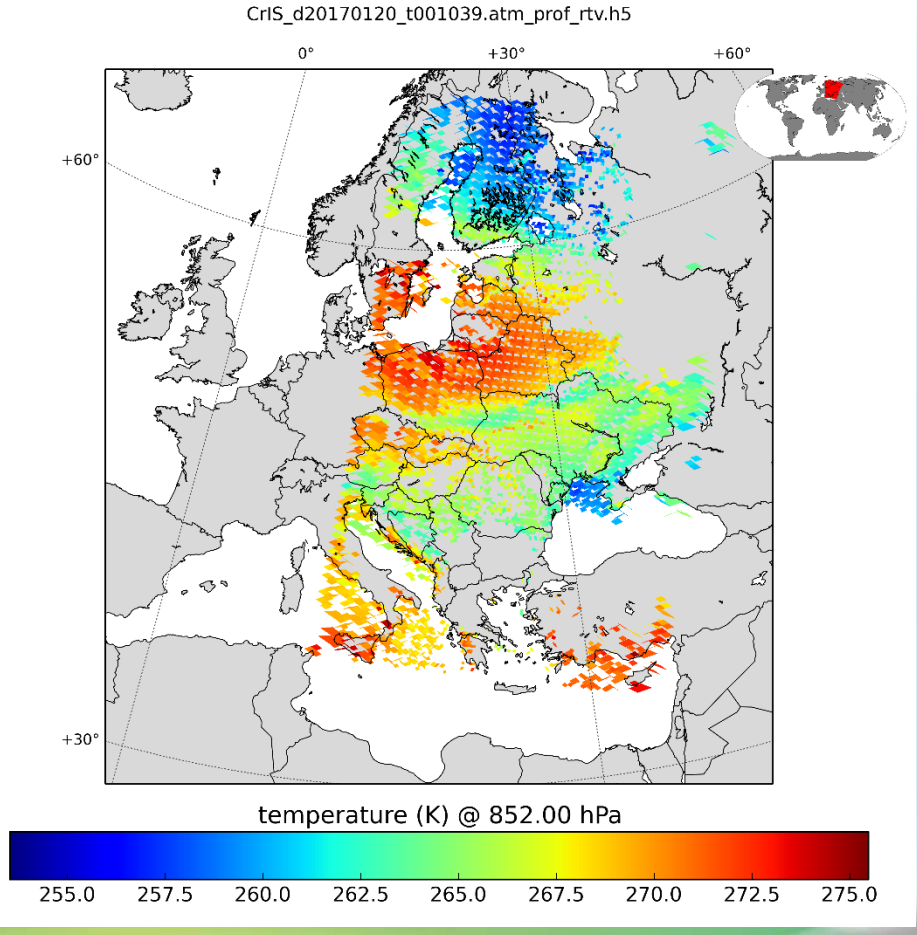
DBPS products application

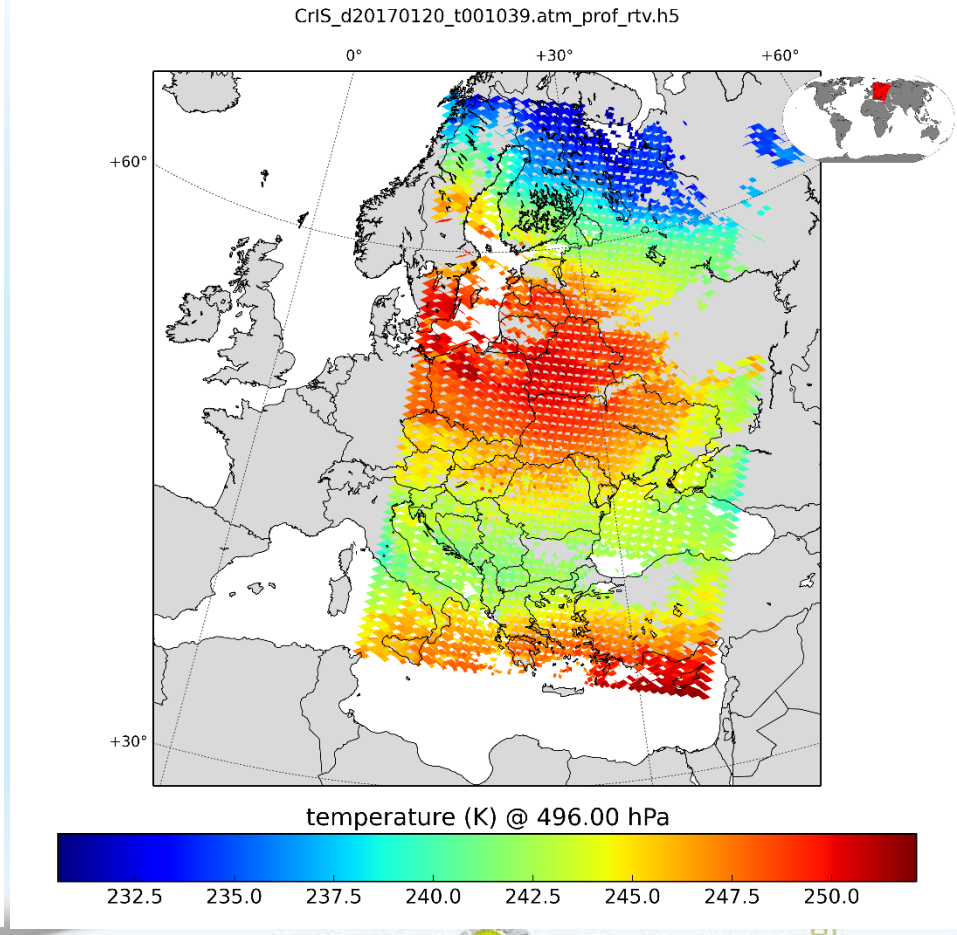
Atmosphere stratification monitoring – temperature and moisture profiles were recognized as the one of the most important satellite products for meteorological forecasts.

Atmospheric temperature distribution at 850hPa, 500hPa and 300hPa are produced along with the temperature and dew point profiles for selected localizations (Polish SYNOP stations).

DBPS products application

Atmospheric temperature from CrIS/SNPP (HSRTV), 20.01.2017, 00:10 UTC

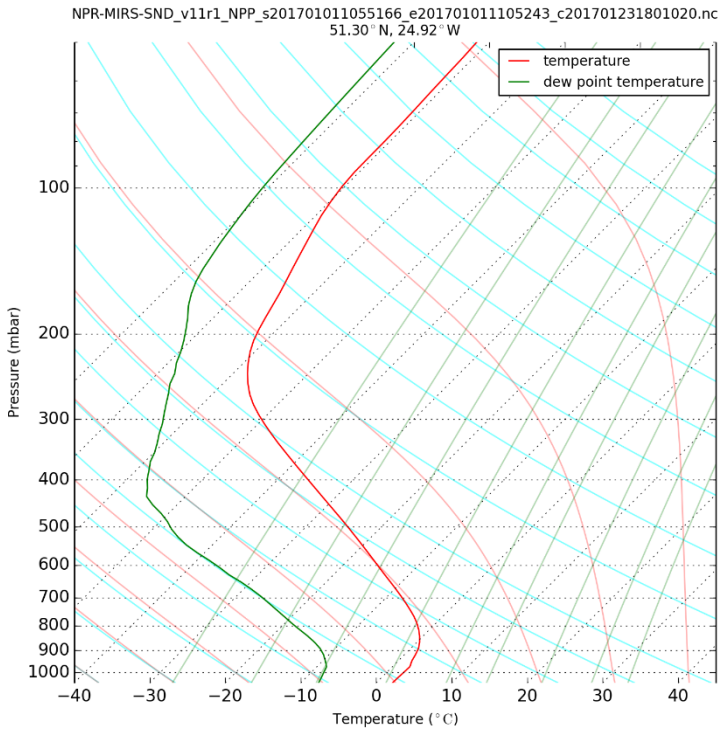




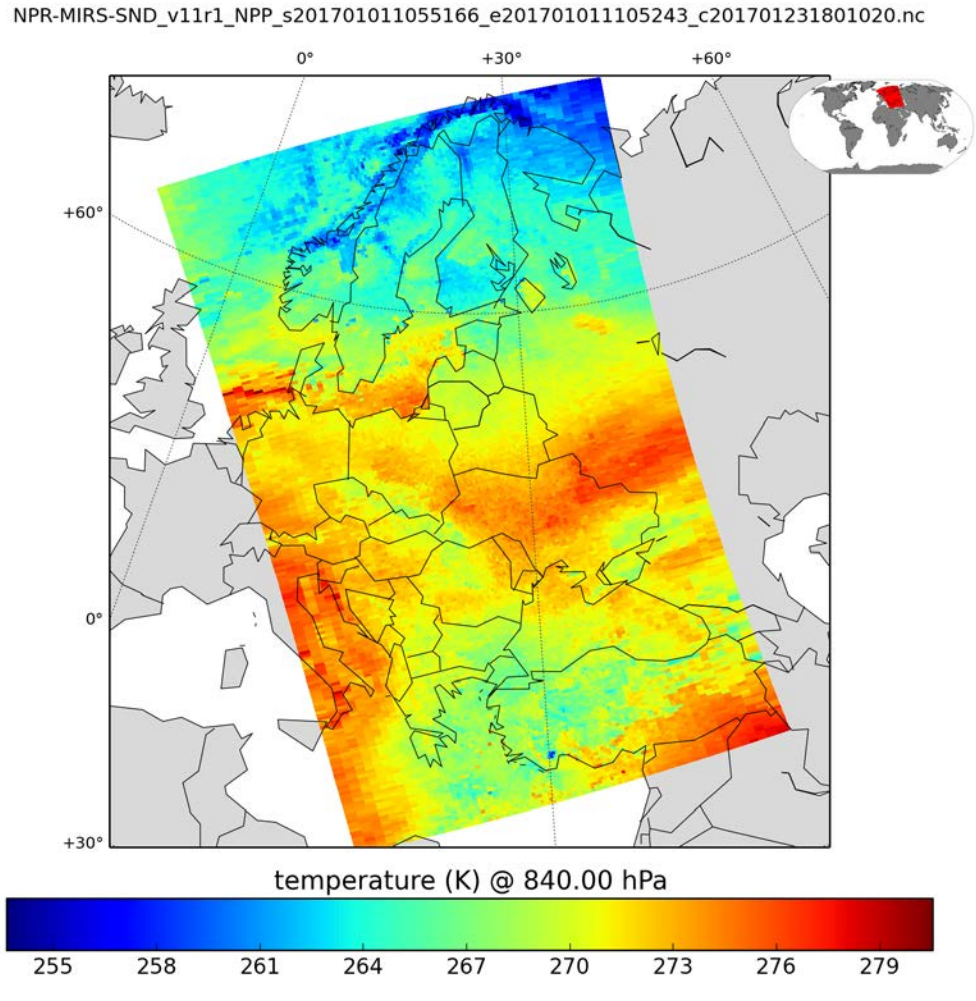
CSPP Sounder QL package

DBPS products application

Temperature and dew point temperature profiles from SNPP ATMS (MIRS) for selected localization



Temperature distribution at 840 hPa level from ATMS/SNPP (MIRS)



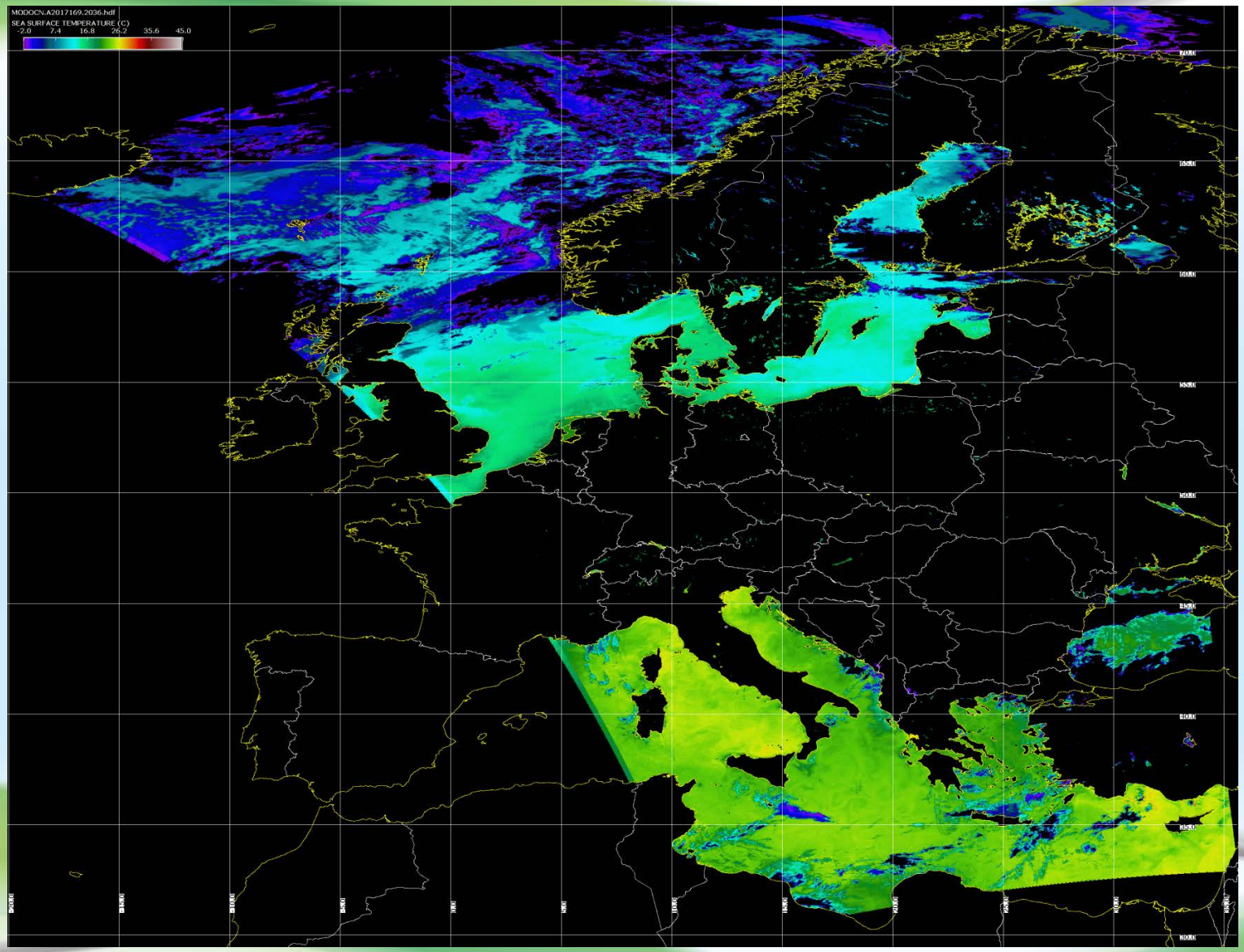
CSPP Sounder QL package

DBPS products application – the Baltic Sea

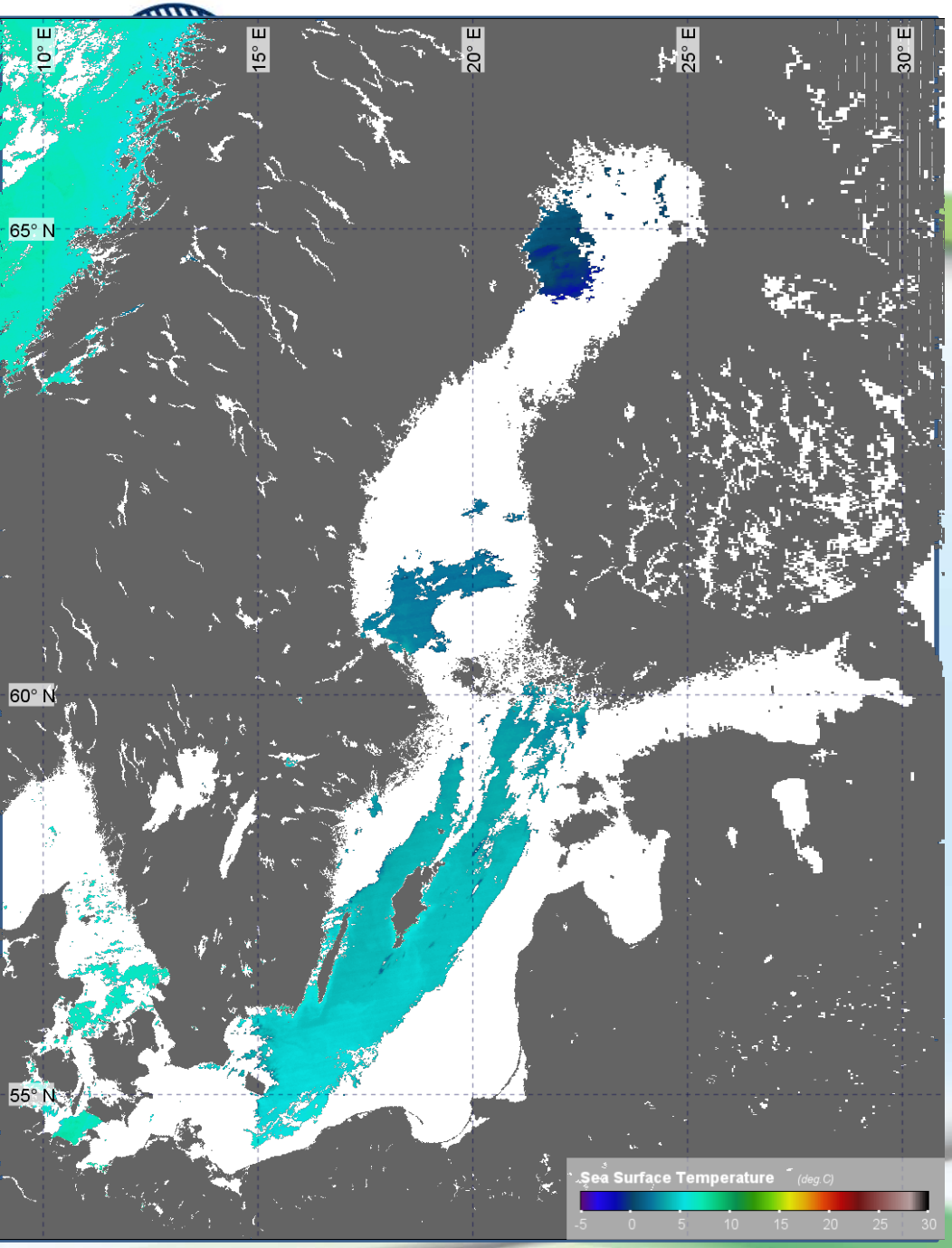
Baltic Sea environment monitoring – sea surface temperature, chlorophyll-a, suspended matter, photo-synthetically active radiation, aerosols optical depth, etc. – at the initial phase.

DBPS products application –the Baltic Sea

Sea surface temperature from MODIS, 18.06.2017, 20:36 UTC



DBPS products application – the Baltic Sea



Sea surface temperature from MODIS
25.04.2017, 1148 UTC

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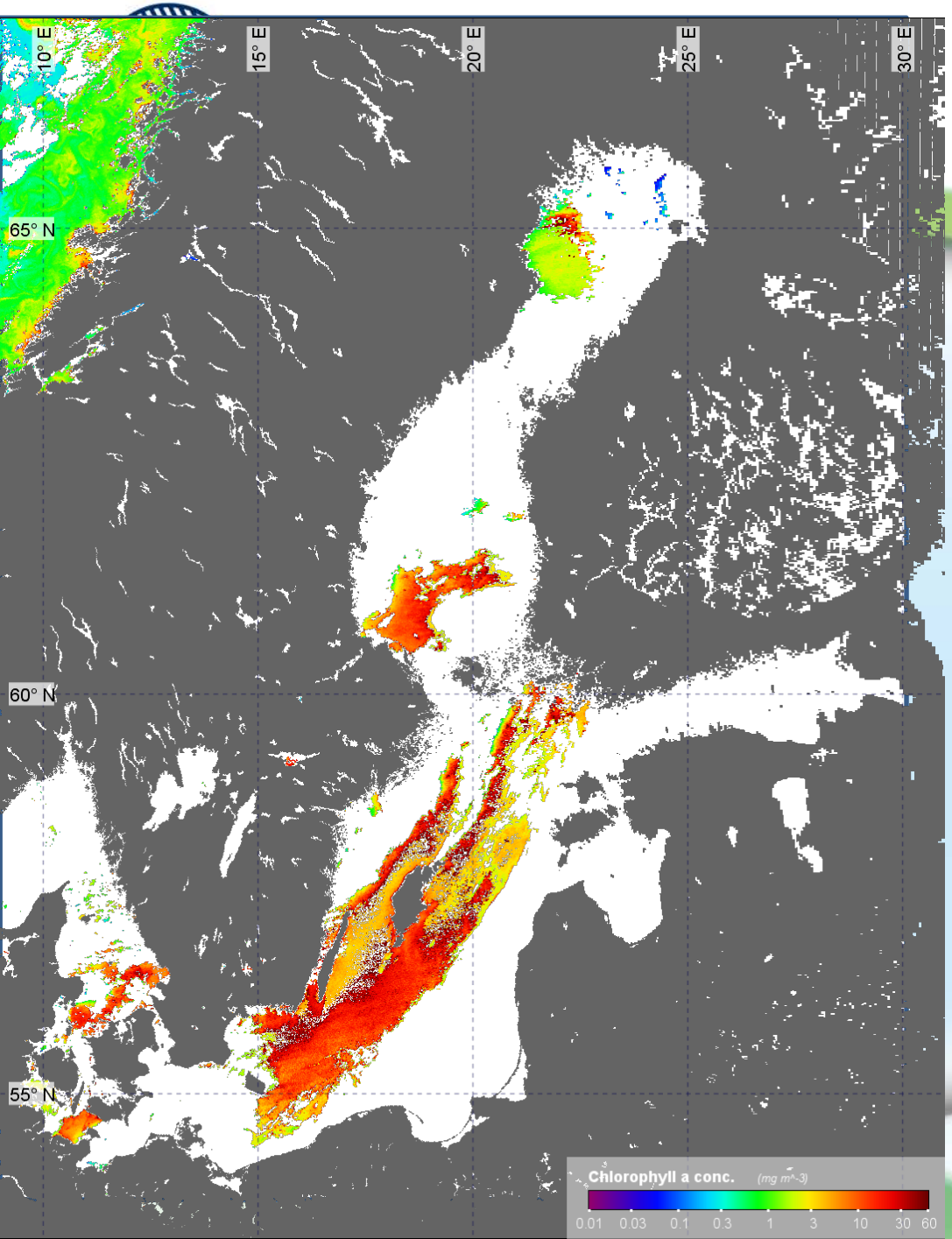
DBPS products application – the Baltic Sea



Chlorophyll concentration from MODIS 25.04.2017, 1148 UTC

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DBPS products application – the Baltic Sea

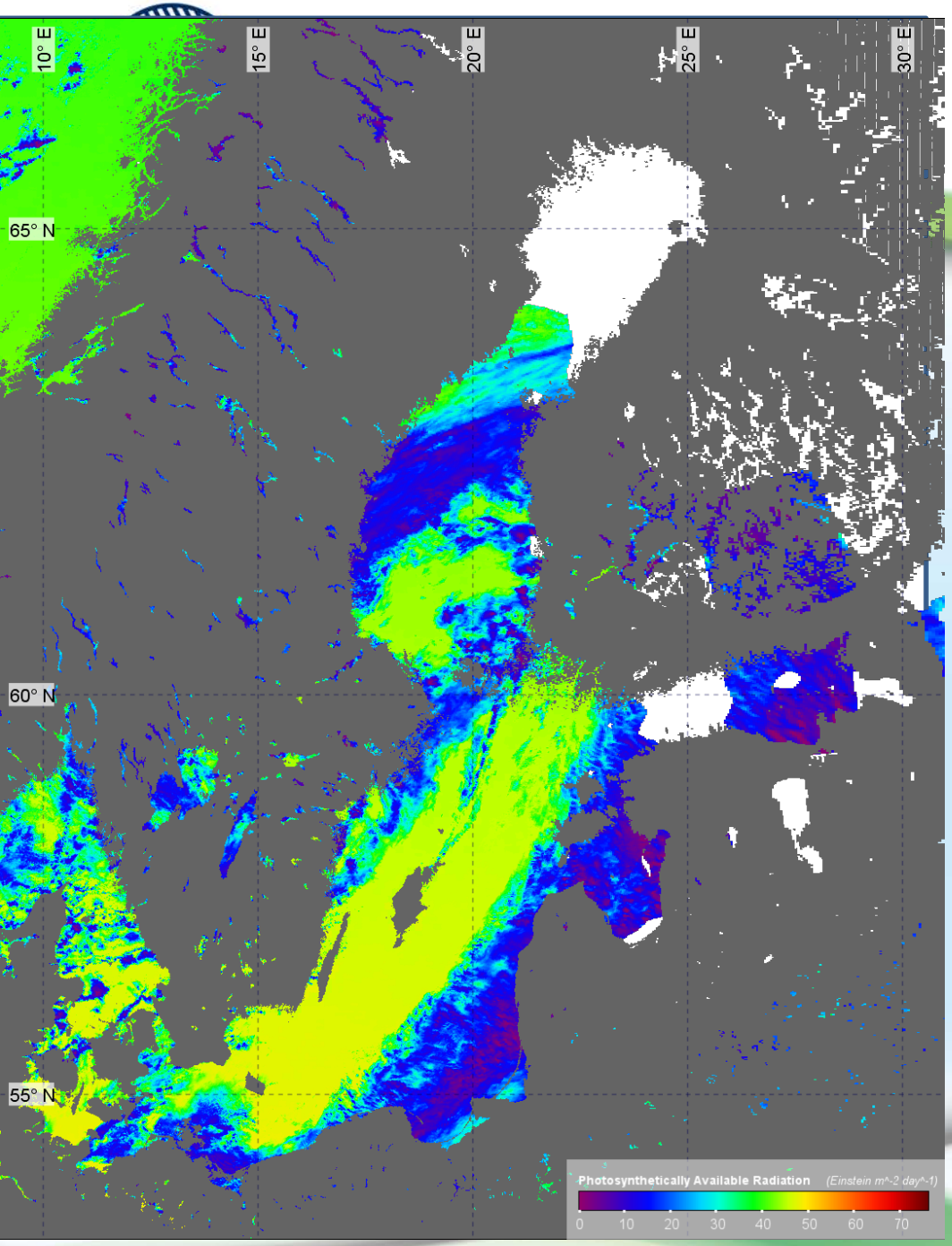

Photo-synthetically active radiation from MODIS, 25.04.2017, 1148 UTC

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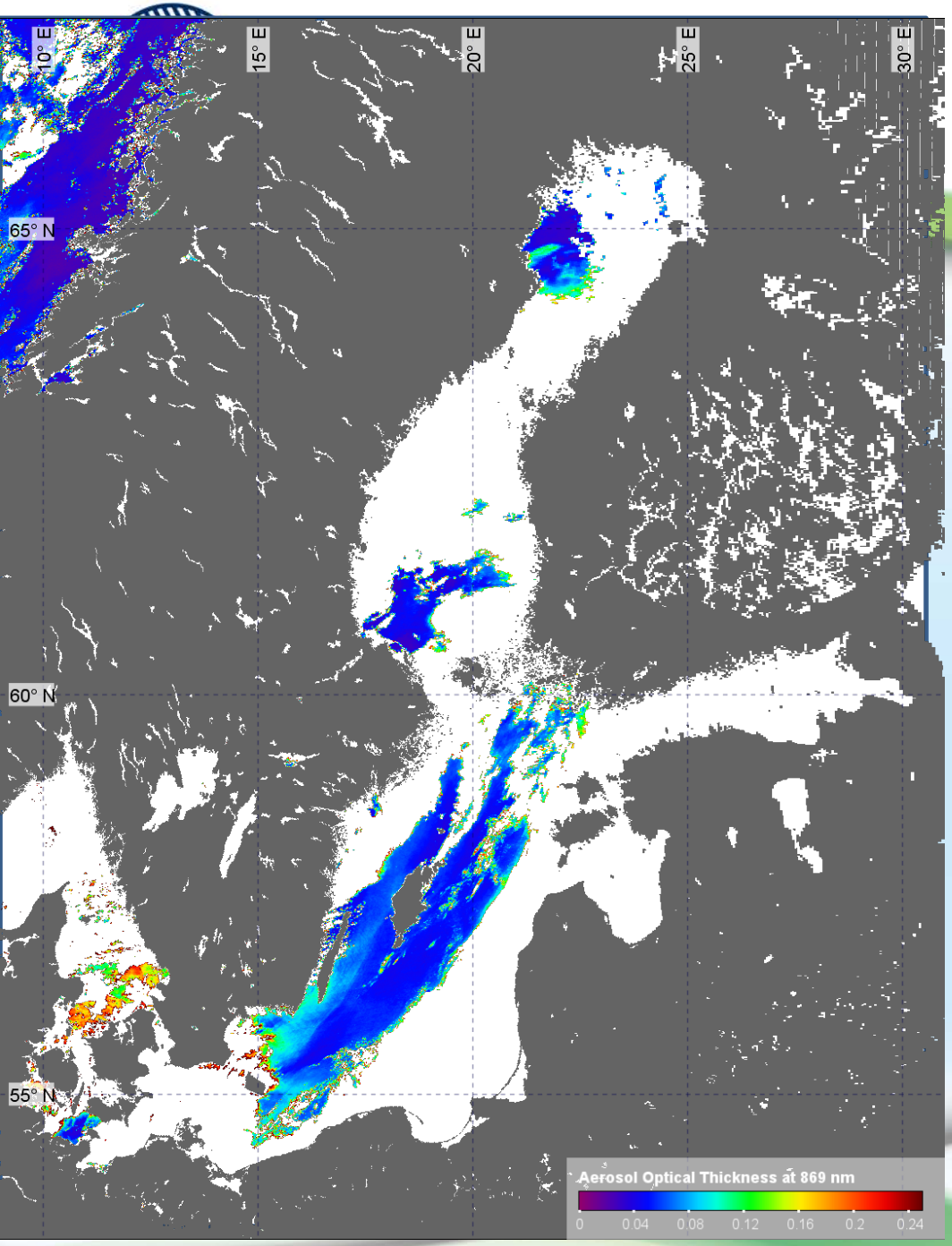
DBPS products application – the Baltic Sea



Aerosols optical depth at 889 nm from MODIS
25.04.2017, 1148 UTC

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DBPS products application – the Baltic Sea

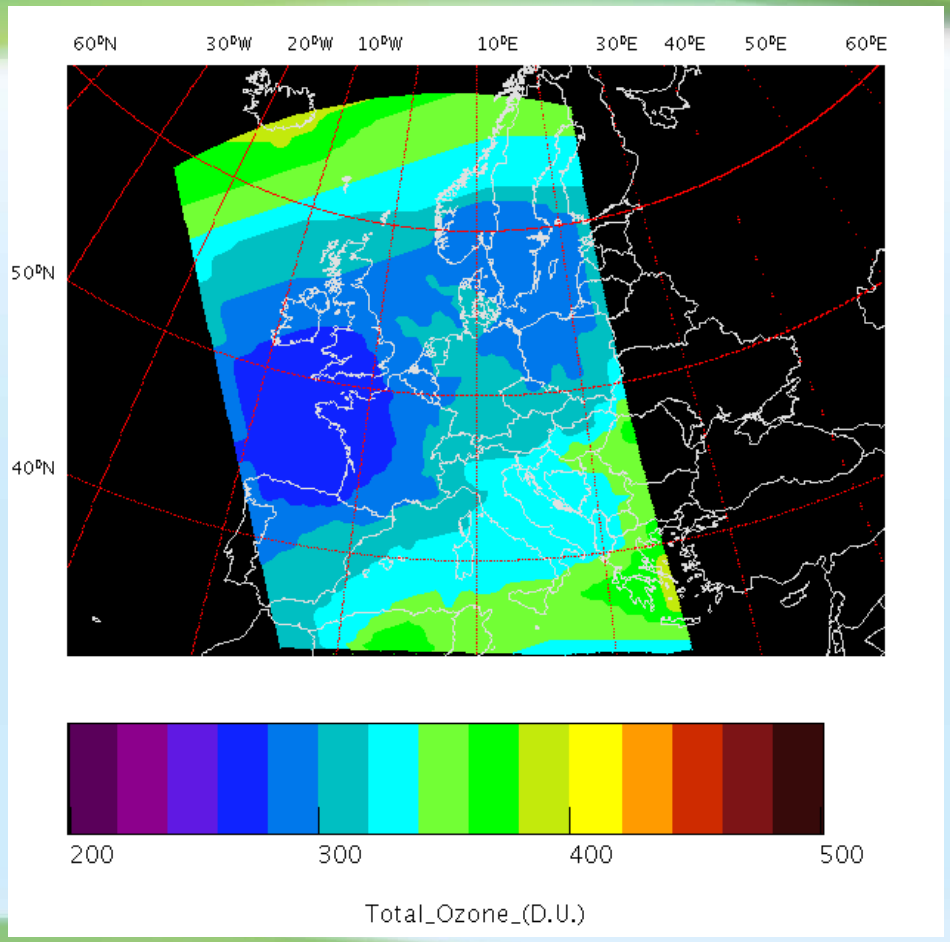
DBPS ocean color and water quality dedicated products need to be validated as it is known that in the most cases global algorithms do not work properly over the Baltic Sea.

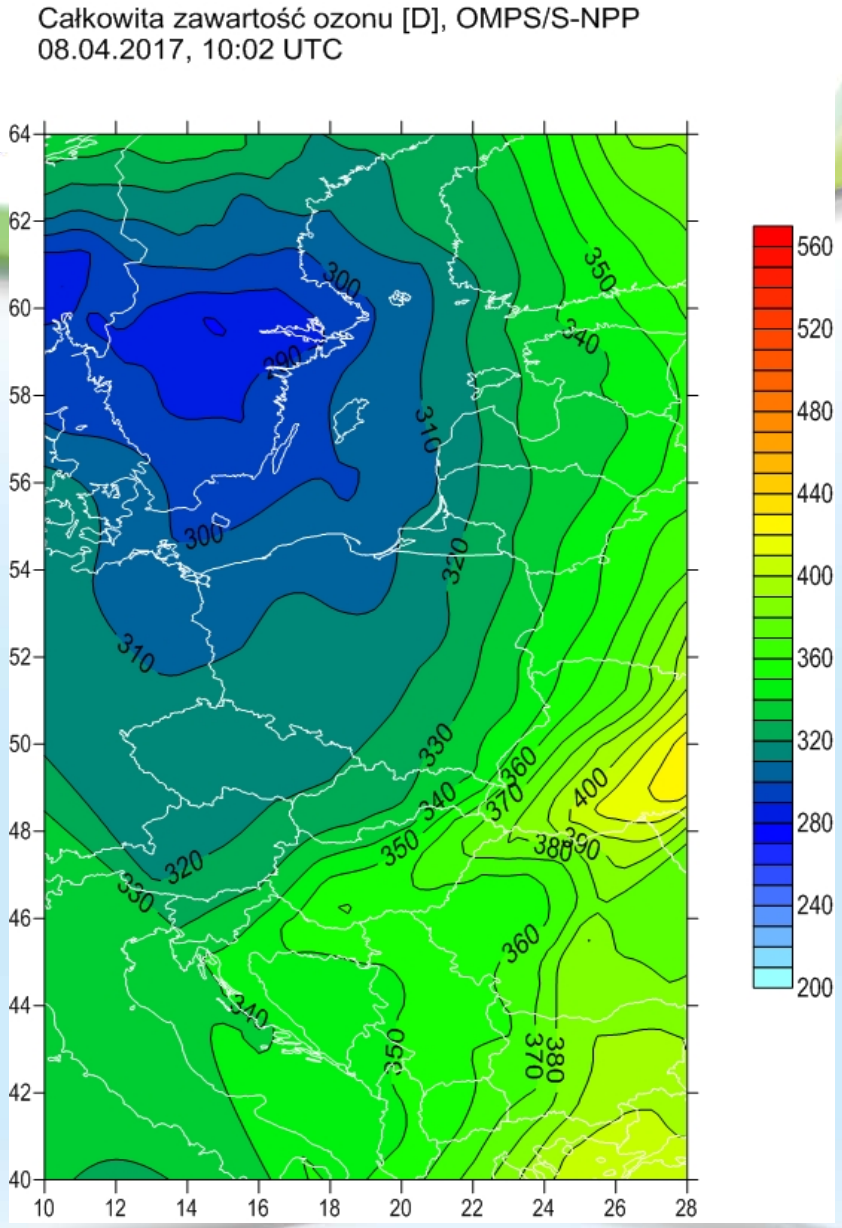
Total ozone amount monitoring

Total ozone amount distribution over Central Europe has been operationally derived from TOVS data (IAPP) for more then 20 years;

The ozone maps are daily produced for General Inspectorate for Environment Protection in Poland.

Since 2016, the OPMS data are being used for that purpose using OMPS_SPA software.





Total ozone amount distribution from OMPS/S-NPP

08 April 2017, 10:02 UTC

Summary

- Satellite data from meteorological and environmental satellites are operationally used to support the IMWM-NRI mandatory activities.
- DBPS implementation in the Satellite Remote Sensing Department allowed for better usage of polar orbiting satellite data in the IMWM-NRI.
- At the moment, DBPS outputs are mainly used to support meteorological forecasts (RGB images, vertical profiles, and clouds products), however, the works aimed at application of DPS products in the monitoring of the Baltic Sea environment have been started.
- There is growing interest in DBPS products from other research institutes in Poland (Forestry, Air quality) so, the new applications should appear in the future.

Thank you for your attention