Consolidated Report on 2010 Users' Survey and Workshop

SAF/NWC/IOP/INM/MGT/2010-US+WS, Issue 1, Rev. 1

21 June 2010

Prepared by NWC SAF Project Team

REPORT SIGNATURE TABLE

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DOCUMENT CHANGE RECORD

Version	Date	Pages	CHANGE(S)
1.1	15 May 2010	29	First draft
1.0	21 May 2010	29	First version
1.1	*21 June 2010*	29	Comments by partners added

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List of Tables and Figures

1. INTRODUCTION

1.1 PURPOSE

The purpose of the document is to report on 2010 User Survey and 2010 Users' Workshop for the CDOP-2 User Requirements Collection process.

1.2 SCOPE OF THE DOCUMENT

Document contains information compiled about the topics:

1) Current status of the project

2) Improvements for the next phase

It covers aspects related with both packages: MSG and PPS.

1.3 DEFINITIONS, ACRONYMS AND ABBREVIATIONS

See [RD.1]

1.4 REFERENCES

1.4.1 Applicable Documents

For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the document referred to applies.
Latest documentation can be found at SAFNWC *Help Desk* web [RD.2].

Reference	Title	Code
[AD. 1]		
[AD. 2]		

Table 1: List of Applicable Documents

1.4.2 Reference Documents

The reference documents contain useful information related to the subject of the project. This reference document complements the applicable documents. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the document referred to applies
Latest documentation can be found at SAFNWC *Help Desk* web [RD.2].

Reference	Title	Code
[RD.1]	The Nowcasting SAF Glossary	SAF/NWC/CDOP/INM/MGT/GLO
[RD.2]	NWC SAF Web Address (URL)	http://www.nwcsaf.org

Table 2: List of Referenced Documents

2. OVERVIEW OF THE CDOP-2 USER REQUIREMENT PROCESS

2.1 INTRODUCTION

A major control point within the NWC SAF CDOP project is the 2010 Users' Workshop supported by the 2010 Users' Survey. The objective of this landmark is to assess the current status of the project from the users' point of view and to collect user requirements for the next NWC SAF phase, CDOP-2.

2.2 2010 USERS' SURVEY

A Questionnaire Form based on the WEBROPOL Survey tool containing aspects related to MSG and PPS products and engineering, was prepared by the Project Team with the following objectives:

- Assess the current status of products and engineering
- Know the Nowcasting needs
- Collect new user requirements for CDOP2

2.3 2010 USERS' WORKSHOP

The first announcement of the Workshop was put in the NEWS page of the NWCSAF Help Desk [RD.2] on 30th October 2009. Second (1st February 2010) and third (31st March 2010) announcements were also provided and e-mail notification to all the users sent accordingly.

The workshop was held in Madrid on 26-28 April 2010 at the Hotel Zurbano.

The objectives of the Users' Workshop have been:

- To assess the current status of the project
- To assess the applicability and usefulness of the NWC SAF products in the current phase
- To revise the proposals for further developments
- To collect the user requirements for the next phase

Users were requested to provide presentations and actively collaborate in the workshop activities along the following 4 sessions:

Session I devoted to the current status of Services and to the preparations for CDOP-2.

Session II devoted to quality assessment of the products at CDOP and to advance CDOP2 products performance.

Session III had three main parts: Nowcasting from satellites out of MSG, Verification, Validation and Quality assessment techniques and NWC SAF products use and applications.

Session IV devoted to Summarise the User Requirements collection and to the Plenary Session and Conclusions.

In order to collect the User Requirements, 4 easels were disposed in the meeting room to allow users to write their interests on NWC SAF improvements for the next phase.

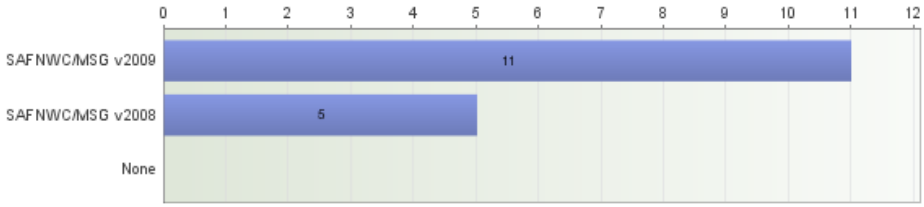
Both attendants and SUG were informed on the Workshop Presentations release at the NWC SAF Help Desk [RD.2] on 3 May 2010.

3. SURVEY RESULTS

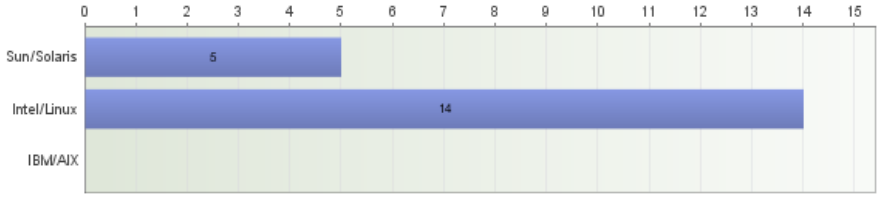
The Nowcasting SAF has 75 licensed users at the survey delivery time of which, 16 users answered the MSG part and 9 users the PPS part. The 2010 Users Survey has proved the good shape of the NWC SAF products at the current phase and users have provided a lot of suggestions for the CDOP-2, as shown below.

3.1 MSG PART

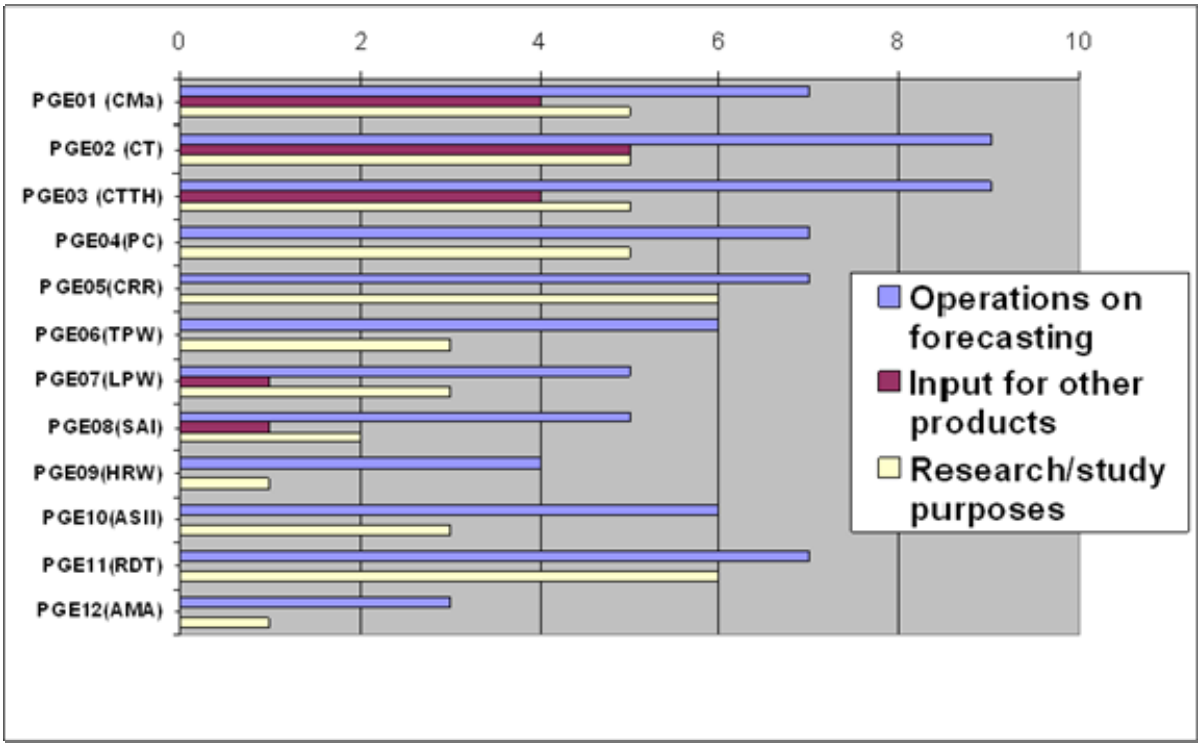
Which SAFNWC/MSG version is currently running in your site? (16)



Application environment (16)



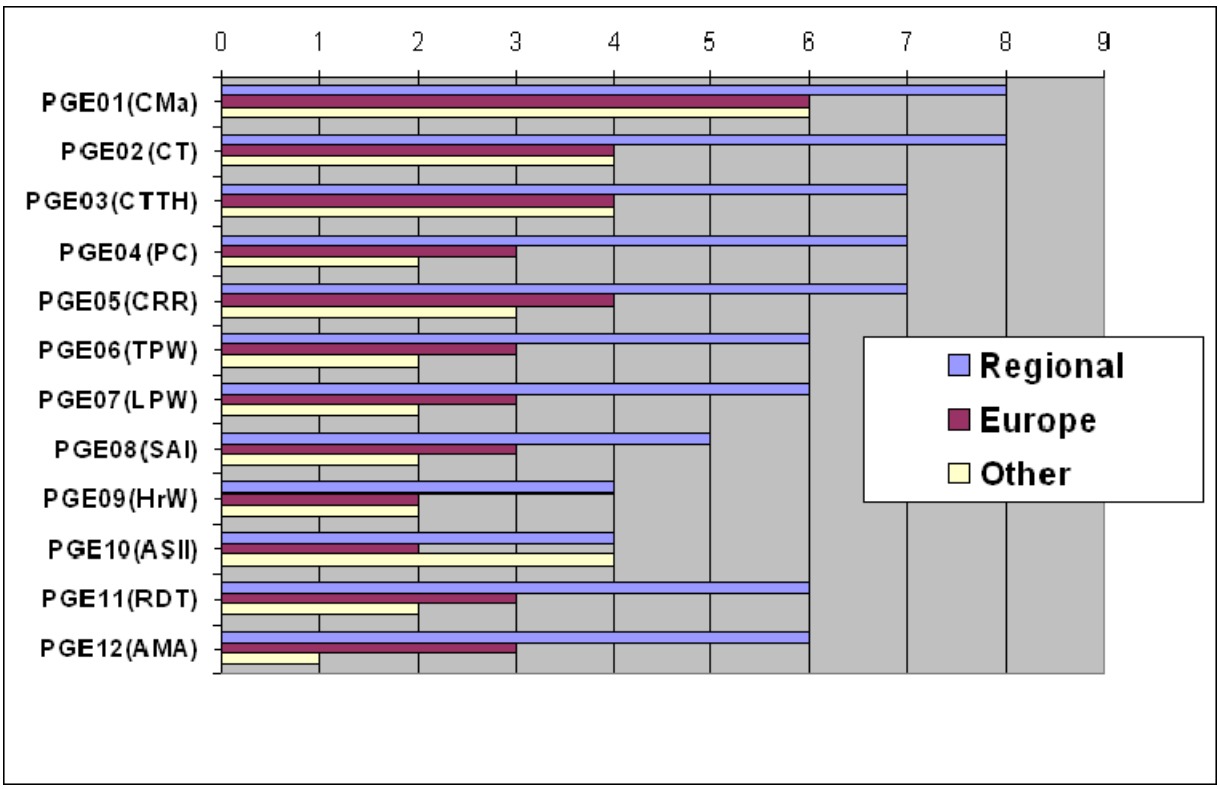
Which are the applications of the SAFNWC/MSG products in your Organization? (16)



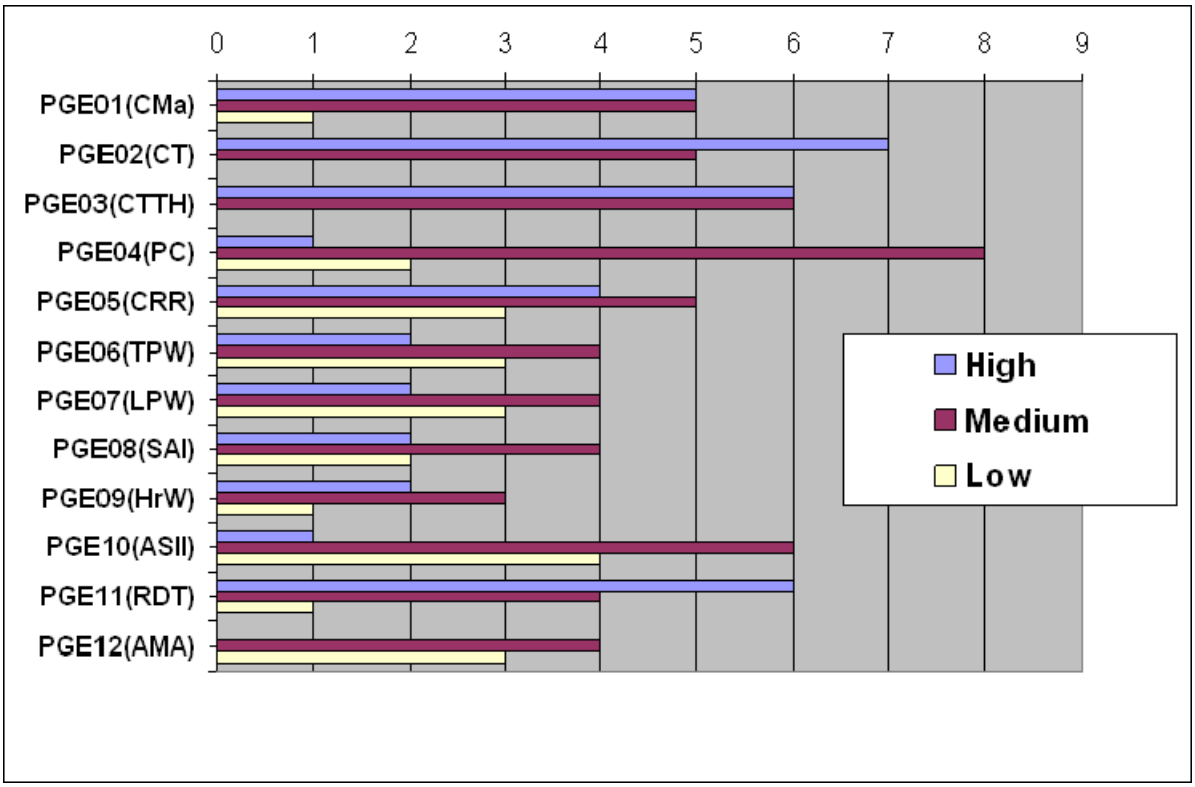
Do you plan other applications in the future? (11)

- Accumulated snow product every 15 minutes making use of Cloud Mask Snow class
- Monitoring of low clouds/fog using Cloud type over specific areas and for LANDSAF input
- Cross-validation of wind and instability products with own products
- Input to INCA Nowcasting model.
- To learn some technique to apply the packages on different channels; we are using these products using MTSAT-1R (COMS in the future) for the very short range forecast and research.
- Preparation of warnings for Disaster risk reduction
- 6 hourly snow cover maps derived on CT
- Testing the automatic application of RDT in the Nowcasting system
- Clear Air products including NWP-relative differences for convection.
- Low cloud applications are under construction

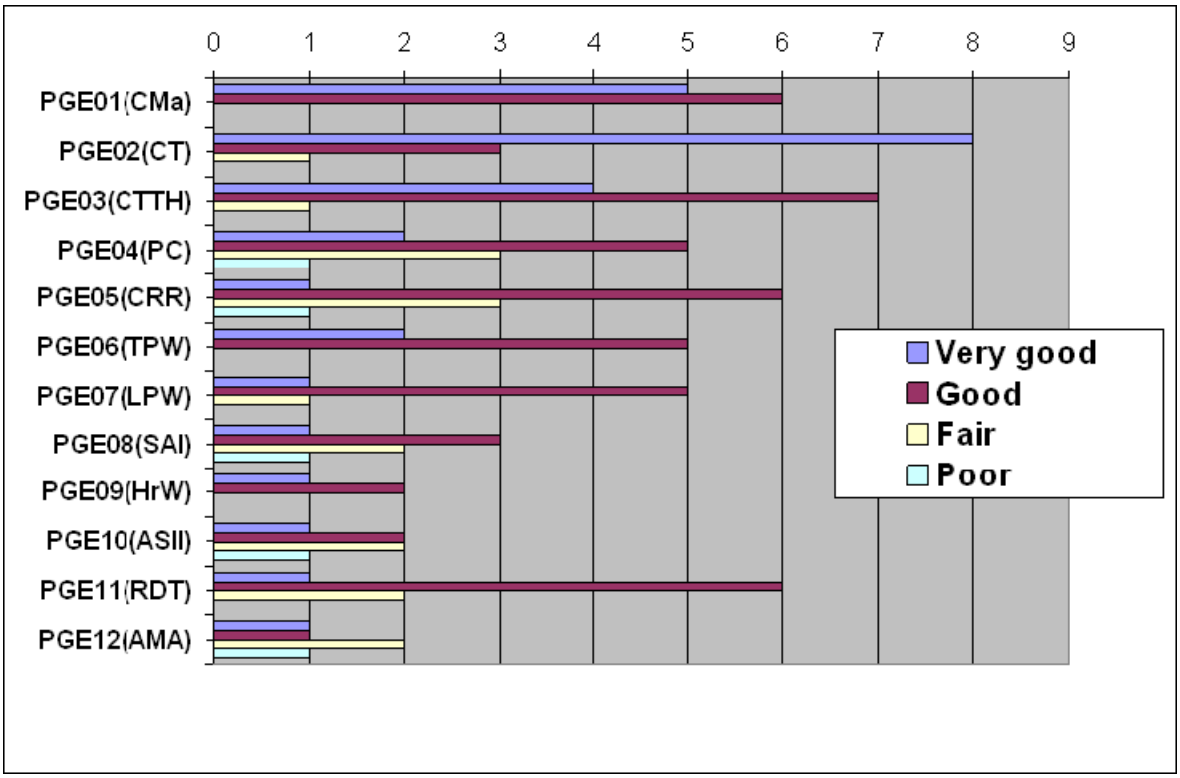
Which area are you processing? (15)



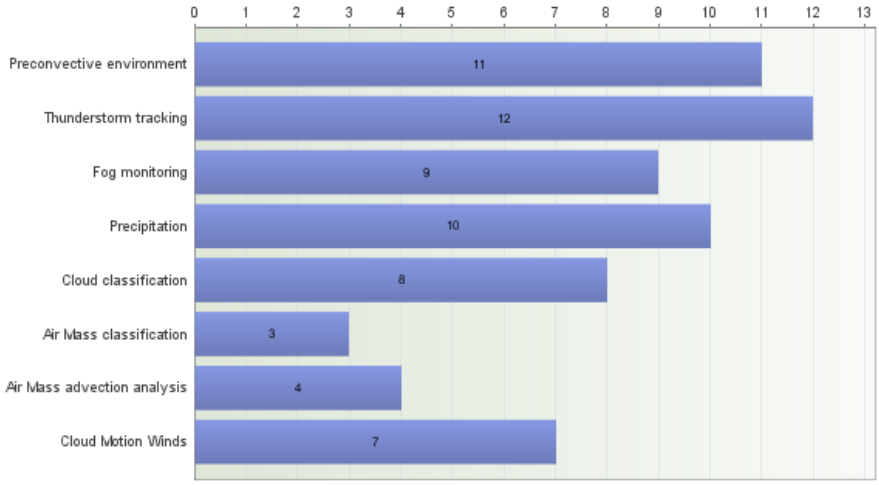
How critical/important are the SAFNWC/MSG products for your service? (15)



Please rate the overall quality of the products (13)



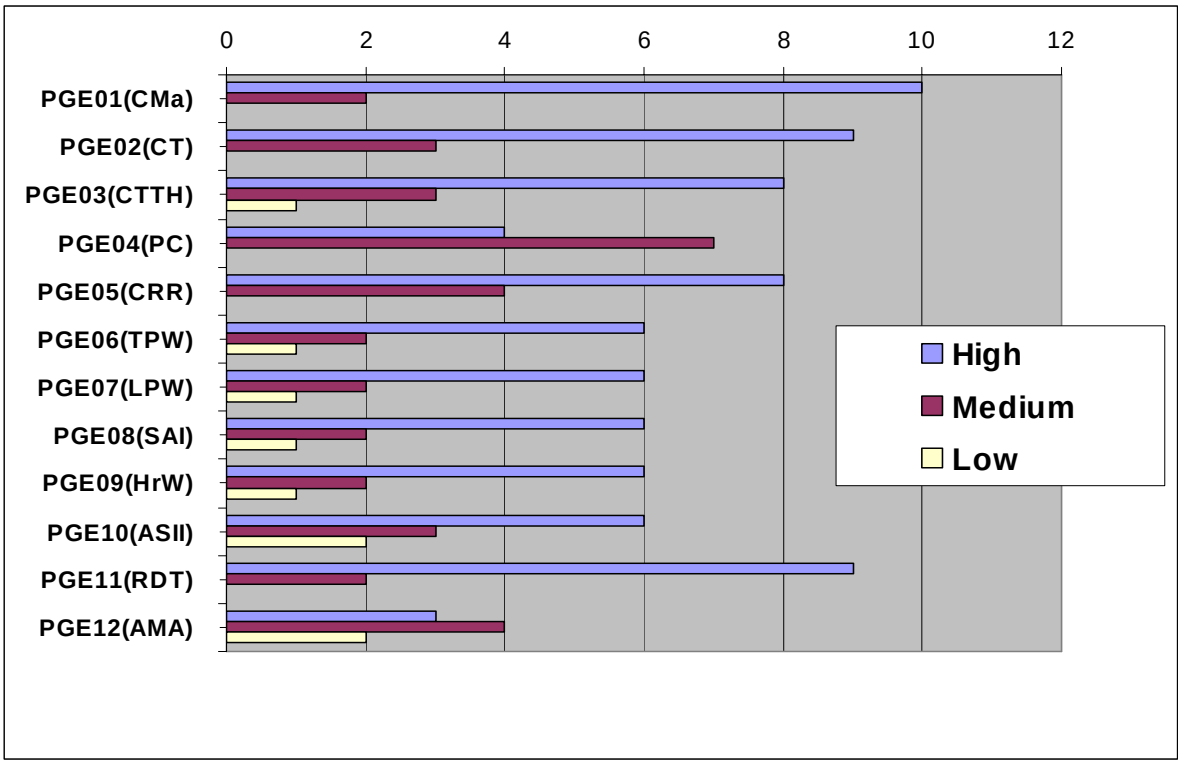
Can you specify your future needs in Nowcasting? (13)



Which new Nowcasting products to be codified at NWC SAF could cover your needs? (13)

- AMV extrapolated SAF products
- Tropopause height evaluation
- Predicted IR images up to 24 hours
- Cloud divergence, convergence, vertical mass transport
- Lifted index for "mixed very low-level layer"
- Convection initiation (and lightning initiation) product
- Increased use of temporal analysis

How critical/important will be the adaptation to MTG of SAFNWC/MSG products for your service? (15)

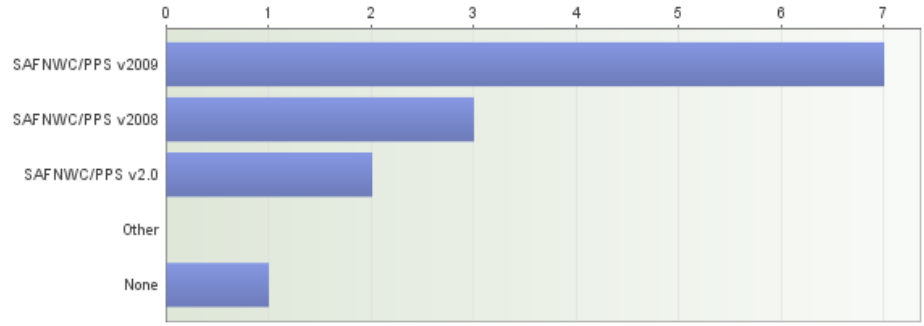


Which new products MTG based can be of interest for your service? (5)

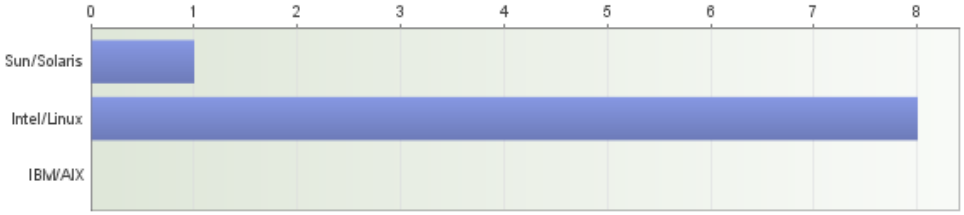
- Products using lightning data
- Atmospheric soundings
- Soft transition MSG to MTG
- To consider comparing/combining products
- To consider mixed PPS and GEO cloud and precipitation products

3.2 PPS PART

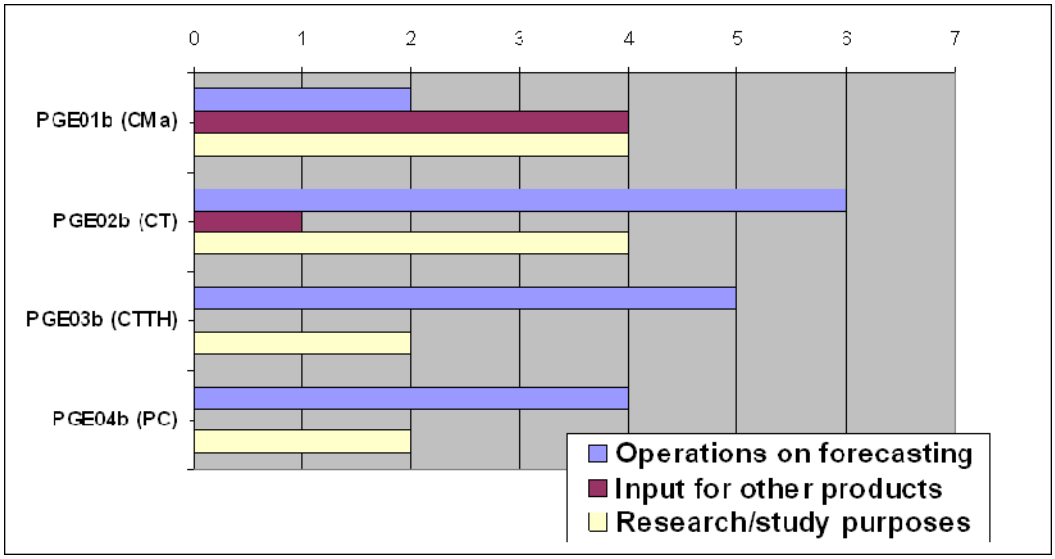
Which SAFNWC/MSG version is currently running in your site? (10)



Application environment (9)



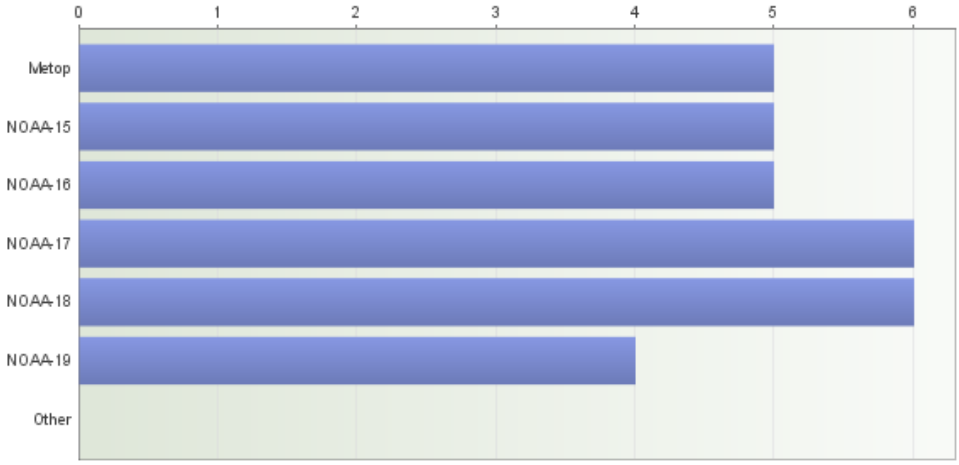
Which are the applications of the SAFNWC/MSG products in your Organization? (9)



Do you plan other applications in the future? (11)

- Better integration of products into software used by operational forecasters
- Low cloud applications are under construction.

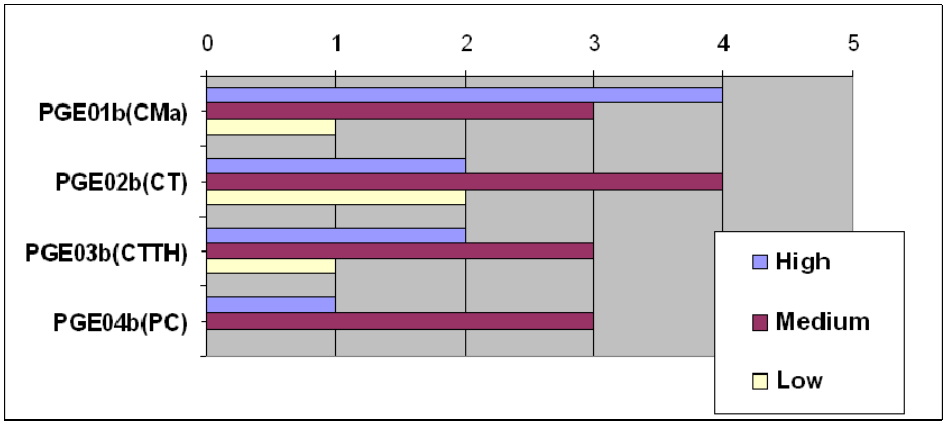
Which satellites are you processing? (9)



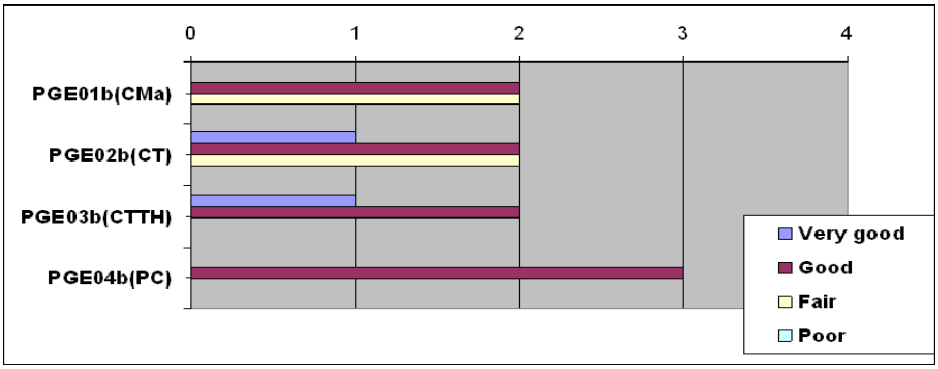
Which area are you processing? (8)

- Parts of Europe, Turkey and its around (one area)
- Global
- Tests done with data from Maspalomas
- Germany, other areas are planned
- Austria
- Adriatic Sea
- A series of regional areas ranging from Denmark to Greenland. Global Metop data is processed for the northern hemisphere
- Scandinavia.

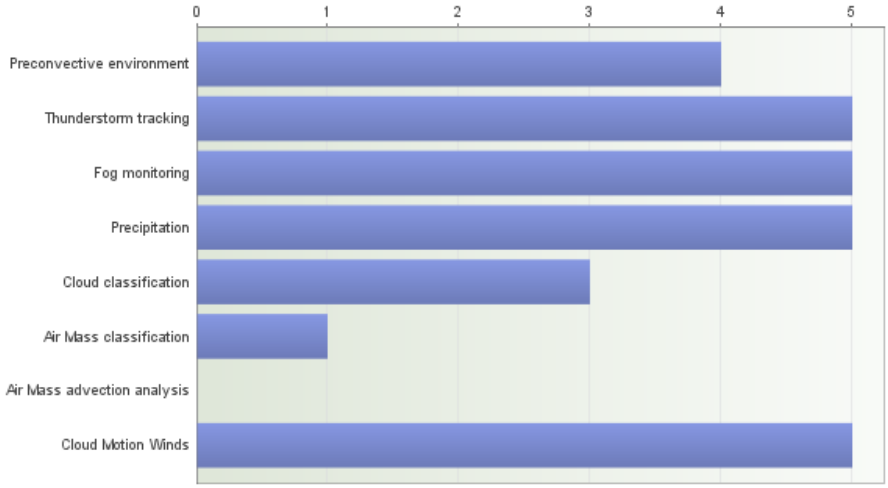
How critical/important are the SAFNWC/PPS products for your service? (9)



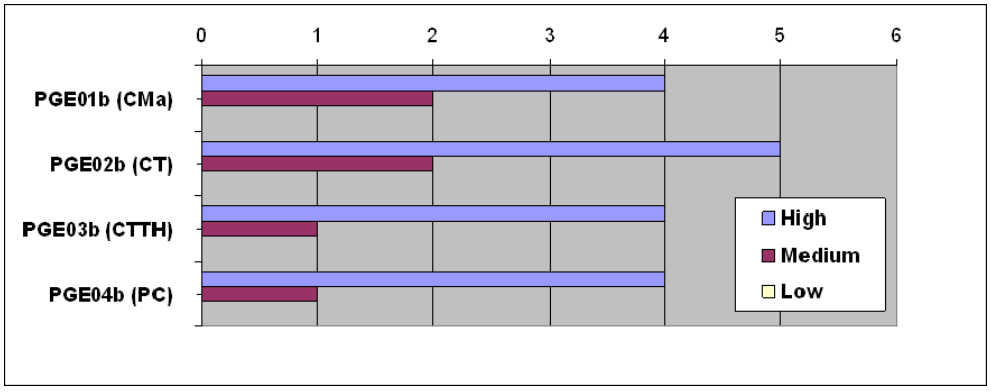
Please rate the overall quality of the products (5)



Can you specify your future needs in Nowcasting? (6)



How critical/important will be the adaptation to NPP/NPOESS of SAFNWC/PPS products for your service? (7)



Which new products NPP/NPOESS based can be of interest for your service? (1)

- A cloud phase and/or other cloud microphysical product would be most interesting and useful

Which developments in PPS would you see as desirable (software and products) (6)

- Easier installation and configuration
- Integrated module for generating HTML files and images for the web

- The third party software is partly on very old versions not compatible with standard installations coming with modern LINUX distributions.
- Integration of the software packages into one package
- Standalone libraries to utilise the products in another environment.
- Cleaner python API
- Full test data set for testing installation with none or minimal user configuration
- Improved tools for checking user-contributed NWP fields during pre-processing.

3.3 REQUESTED IMPROVEMENTS (MSG & PPS)

3.3.1 PGE01 (CMa) Cloud Mask

- Improve quality in higher latitudes with low solar angles
- Smoke as a separate 'flag'
- To reduce snow false alarms
- To improve information on atmospheric dust
- Temporal analysis to be applied to snow contaminated pixels correction

3.3.2 PGE02 (CT) Cloud Type

- Cold land surfaces
- To improve the detection of small cloudiness and allow for additional parameters in broken cloudiness (HRV analysis)
- To use MTG NIR1.3 channel data to better discriminate thin cirrus clouds.
- Cumuliform/stratiform distinction
- Solid/liquid phase distinction
- Other microphysical properties as effective particle radius and cloud liquid path.
- To create snow covered by thin cirrus class as well.
- To make more use of HRV data at 1km resolution
- To use LI data with MTG to create a convective cloud class within the (very) high cloud class
- In case of multilayer class identified, it would be very useful to get more detailed information.

3.3.3 PGE03 (CTTH) Cloud Top Temperature & Height

- Reduction of "boxes" when showing semitransparent cloudiness
- To improve low-level cloud height assignment in case of inversion.
- To improve vertical resolution near tropopause (mature convection)
- To indicate somehow that the cloud top height may be wrong for cold U or cold ring shape clouds. To fill in the ring?
- CTTH could provide useful information to PGE11(RDT)

3.3.4 PGE04 (PC) Precipitating Clouds

- More focus on severe weather areas maybe combining with other sources
- To limit sun dependence
- Better tuning the method for low solar elevation cases
- To take into account the cloud top microphysical information more directly
- To include parallax corrections
- Quality information easier to use
- To include some microwave information from polar satellites for strong fronts and at night
- To integrate some recent/close PPS rain product information in the product itself (updated recalibration), or in form of quality indicators (indication on real confidence on the calibration).
- To allow introducing local corrections in the SW from current/recent radar or gauge data.
- To rethink product or product use considering similar developments and specified needs.
- To consider also internal contrast/comparison/merging to other products (e.g. PGE05-CRR)

3.3.5 PGE05 (CRR) Convective Rainfall Rate

- Information on confidence or probability in each rain intensity.
- Better selection between convective and not convective cases.
- To use more channel data.
- Take into account some microphysical info.
- To use lightning information with MTG.
- To add MW info from a polar satellite.
- To study reduced number of classes.
- Reconsider alternative calibration for "warm tops"

3.3.6 PGE06-07-08 (TPW, LPW, SAI) Clear Air Products

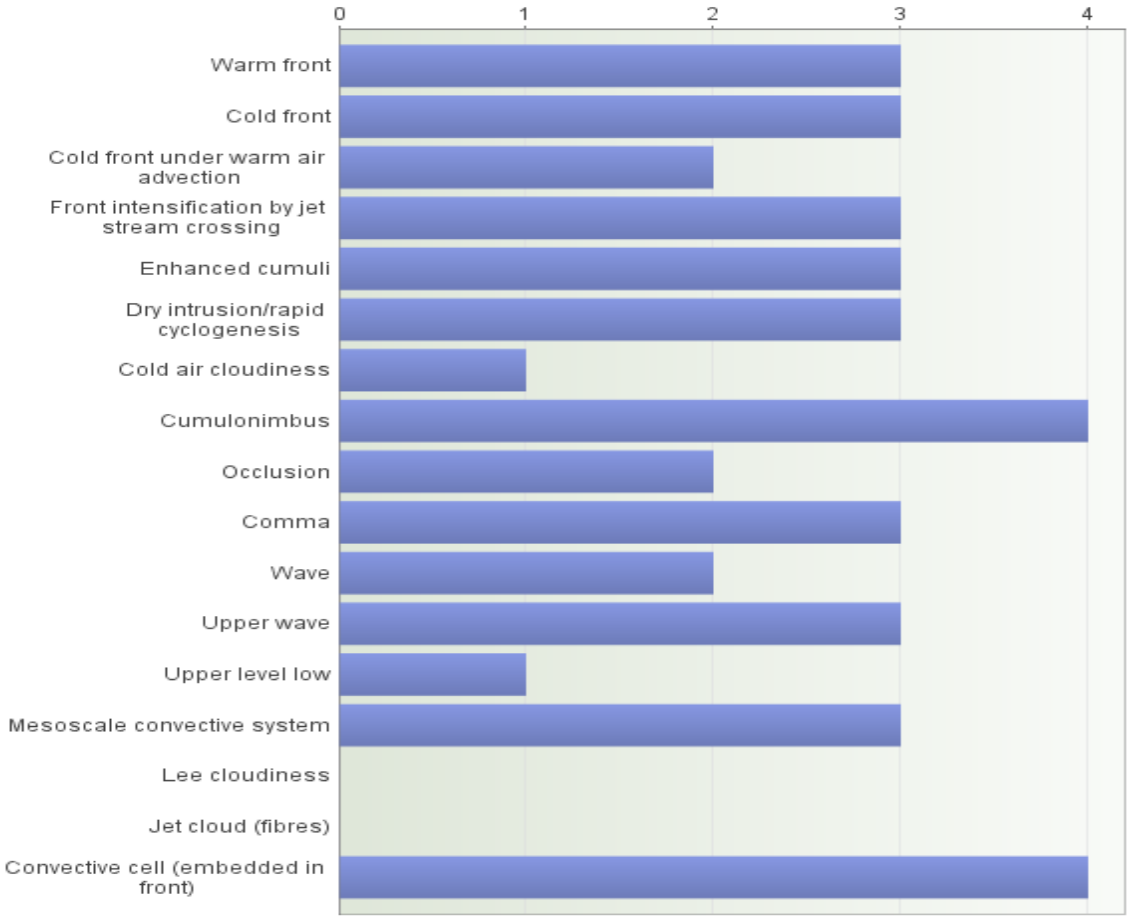
- PGE08 (SAI) only reacted to very unstable events
- Underestimation of instability compared to model fields (and Regional Instability Index RII)
- PGE08 (SAI) product quality is too much variable (dependent on air mass and ground characteristics) to be actually useful and used.
- PGE08 (SAI) to be substituted by equivalent simulated Lifted Index product.
- PGE08 (SAI) equivalent products less ground-dependent

3.3.7 PGE09 (HrW) High Resolution Winds

- The product is useful for convergences/divergences, wind over mountains or offshore
- Include in the product information fields on displacements/trajectories
- To allow for detailed wind computations for specific CT classes as additional option
- QI threshold variable

3.3.8 PGE10-12 (ASII, AMA) Automatic Satellite Image Interpretation & Air Mass Analysis

Which conceptual models do you consider most desirable to be objectively diagnosed?



3.3.9 PGE11 (RDT) Rapid Developing Thunderstorms

- To avoid identifying some Cs/Ci structures as convective.
- Identification of Mesoscale Convective System (or even Mesoscale Convective Complex)
- Earlier detection of convective clouds - almost all detected clouds are in mature phase
- To add severity info better discrimination between convective and not convective clouds (fronts!)
- Contours are sometimes too loose
- Some tendency to detect too large structures, Cs/Ci but also merging sometimes several cells. CRR and other products could be useful in these cases.

4. WORKSHOP OUTCOME ON USER REQUIREMENTS

Provided that User Survey and Workshop are part of the same process and are aimed to the same objective, it has been considered appropriate to present the workshop outcomes also taking into account the survey proposals for improvements.

4.1 ENGINEERING

4.1.1 Engineering GEO + LEO

Improvements

- Alternative format (netCDF proposal).
- Integrated module for generating HTML files and images for the web.
- Full possibility to apply own users' parameters for radiance and brightness temperatures intercalibration and homogenisation before product processing.
- Possibility to handle different NWP models with the same instance of the SAFNWC
- To increase the level of detail for the requirements on the NWP input data in the user documentation.
- To handle hybrid NWP models

Discussion

"Merge" GEO and LEO or "interoperability"?

4.1.2 Engineering GEO

Improvements

- BUFR output: user friendly output formats are requested (OGC standards : GML (Geography Markup Language) for all vector products)
- Possibility to use the SAFNWC software with other GEO satellites

Discussion

4.1.3 Engineering LEO

Improvements

- Easier installation and configuration
- Request for Auto installing version (example ./configure (checking for python, hdf5lib, AAPP,RTTOV…) ./make
- Integration of the software packages into one package
- Full test data set for testing installation with none or minimal user configuration.
- Standalone libraries to utilise the products in another environment.
- Cleaner python API
- Improved tools for checking user-contributed NWP fields during pre-processing.
- Task Manager

Discussion

The third party software is partly on very old versions not compatible with standard installations coming with modern LINUX distributions

JPSS + post EPS (VIIRS) + MW

Adaptation to FY-3. MWIRI, VIRR, MERSI (0.25-1km)

Molnyia orbit: 15 minutes images in northern latitudes. Potential launch within CDOP-2

CDOP-2 HQ masking, improve aerosol flagging

4.2 CLOUD

This section applies both to MSG and PPS; consistency/comparison between PPS and MSG cloud outputs was requested.

4.2.1 Cloud detection

Improvements

- To improve quality in higher latitudes with low solar angles
- Cold land surfaces discriminated from cloud mask
- To improve the detection of small cloudiness and allow for additional parameters in broken cloudiness (HRV analysis)
- Improvement of night time separation of cloud-free and cloudy pixels over snowy areas

Discussion

Temporal analysis could be applied to snow contaminated pixels correction

4.2.2 Cloud classification

Improvements

- To use MTG NIR1.3 channel data to better discriminate thin cirrus clouds
- To use MTG LI data to create a convective cloud class within the (very) high cloud class
- In case of multilayer class identified, it would be very useful to get more detailed information
- To create snow covered by thin cirrus class

Discussion

The use of MTG can not only improve the spatial resolution but also, using the NIR1.3 channel, the detection of very thin cirrus and the separation between the very thin semitransparent clouds and fractional clouds can be highly benefited.

With better very thin cirrus detection more pixels will be in the very thin Cirrus CT class. However, there is some possibility to see surface/lower level cloud features through very thin semitransparent clouds. It would be nice not to loose this information.

4.2.3 Cloud top

Improvements

- Reduction of "boxes" when showing semitransparent cloudiness
- To improve low-level cloud height assignment in case of inversion.
- To improve vertical resolution near tropopause (mature convection) or to indicate somehow that the cloud top height may be wrong for cold U or cold ring shape clouds

Discussion

The new channel NIR2.2 will help to retrieve even more accurate effective cloud top particle size values

To recommend officially the users to use the NWP model up to 100 hPa: it would give more accurate results for CTTH

In the storms penetrating into the tropopause, lower stratosphere, cloud top may be not in thermal equilibrium with the environment. On the overshooting top (very cold due to adiabatic cooling) and the warm spots inside the cold ring, cold U/V features are warmer so, it is difficult to estimate the cloud top height/pressure using only the profile (T, z/p) of the environment.

Through the brightness temperature the feature could also be seen in CRR, PC (More often seen in CRR then in PC, CRR seems to depend more strongly on IR10.8 TB than PC day)

What to do with the mistaken cloud top products? To detect the ring and fill in the cloud top height?

4.2.4 Smoke/dust

Improvements

- Smoke as a separate 'flag'
- To improve information on atmospheric dust

Discussion

Improve the dust and volcanic ash flags by using the new visible and NIR channels on MTG

4.2.5 Snow

Improvements

- To reduce snow false alarms

Discussion

Snow is not a Nowcasting product but provides additional information to interpret the image. It is important as input as other snow sources are not available in real time.

No observation data from higher places and snow product is used for avalanche warnings. Precipitation phase if possible is better.

Shadows with very low sun can be a false alarm.

It would be nice to add a partial snowy land class, to detect the snowy forests using land use map + different thresholds for forested areas + looking the neighbourhood??

Snow detection can be improved by using NIR2.2 channel of MTG

Possible collaborations:

- Contributions of NMS already operationally running snow maps over central Europe. Collaboration with other SAFs developing snow cover products. Validation? Cross validation? (Land SAF, HSAF) To know which is the best product LSA, H- , NWC. REQ on land SAF to provide 6 hours images.

4.2.6 Fog

Improvements

- To consider a fog class

Discussion

This product cannot be derived from satellite data as most important information comes from other sources. Satellite information is only useful to reduce the area. It does not meet the commitments.

Proposal: separation cumuliform-stratiform

4.2.7 Microphysics

Improvements

- Cumuliform/stratiform distinction
- Solid/liquid phase distinction
- Other microphysical properties as effective particle radius and cloud liquid path.

Discussion

What are the "real" requirements for these products for NWC and other applications?

Aerosol products interest: air quality and cloud development.

Drop size distribution

Besides the cloud top phase, the effective radius of the cloud top particles also can hold useful information for forecasters/researchers, for example on storm severity, or for verification of the numerical simulation results.

Separation of cumuliform and stratiform clouds in the opaque cloud classes. It might be easier with the higher spatial resolution of MTG. The separation could be useful for example in case of dry convergence lines (with no radar signal, only satellite). The cumuliform pattern, its temporal evolution could refer to strong wind.

The new channel NIR2.2 will help to retrieve even more accurate effective cloud top particle size values

4.3 PRECIPITATION

4.3.1 Convective Precipitation

Improvements

- Real time calibration with ground based radar/rain gauge
- Information on confidence or probability in each rain intensity
- Better selection between convective and not convective cases
- To use more channel data
- To use lightning information with MTG
- To study reduced number of classes
- Reconsider alternative calibration for "warm tops"
- To take into account the cloud top microphysical information more directly

Discussion

It was recommended to improve the separation of convective precipitation from non-convective as well as to include more channel data by using channels containing some indirect information on cloud top microphysics. Microwave information from a polar satellite as additional data was also suggested and the use of MTG LI data.

CRR, PC, RDT to converge/combine considering issues as case, meteorological situation, day/night, etc

4.3.2 Probability of Precipitation (MSG & PPS)

Improvements

- More focus on severe weather areas maybe combining with other sources
- To limit sun dependence
- To include some microwave information from polar satellites for strong fronts and at night
- To integrate some recent/close PPS rain product information in the product itself (updated recalibration), or in form of quality indicators (indication on real confidence on the calibration).

Discussion

It was remarked the necessity to improve the PC day algorithm at low solar elevation as well as to include more directly the cloud top microphysics information. A physical based algorithm instead/beside the statistical one could also be considered. It was suggested to make use of the NIR2.2 MTG channel data and the LI

CRR, PC, RDT to converge/combine considering issues as case, meteorological situation, day/night, etc

To rethink product or product use considering similar developments and specified needs

4.4 CONVECTION & EARLY CONVECTION WARNING

Improvements

- To avoid identifying some Cs/Ci structures as convective.
- Identification of Mesoscale Convective System (or even Mesoscale Convective Complex)
- Earlier detection of convective clouds - almost all detected clouds are in mature phase
- Better discrimination between convective and not convective clouds (fronts!)
- Find a solution for getting smoother trajectories

Discussion

It was noted that the RDT product detects mainly mature phase convective clouds, so developing convective cells are more often missed as well as decaying phase convective clouds. It has also some tendency to detect too large structures, Cs/Ci but also merging sometimes several cells. CRR and other products could be useful in these cases.

It was also remarked that the performance is much better in 'pure' convective situation (Cbs, MCSs and no front) than in frontal situation: sometimes a huge part of a front is detected as convective.

Some high level Lee clouds are detected by RDT as convective. However their time stability was low.

CTTH could provide useful information

It was recommended running RDT with the optional lightning input if possible as developing convective cells are often missed without this input. It would be the best to use a synergetic method of satellite + lightning + radar data for tracking and characterizing the convective cloud systems. To use LI data from MTG.

It might be useful a 'Lifting velocity' (vertical speed of the cloud top height lifting in m/sec), important mainly in the developing phase. RDT provides cooling rate and the lifting speed could be given additionally: some forecasters feel it is more expressive.

RDT would be even more useful in 5 minute time steps.

We recommend improving the algorithm to get a contour not big for the cloud edge.

Cold ring, cold U/V features and overshooting tops: why are these features interesting? Why could be useful to detect them within the NWC SAF activity?

These features may be indicators of the storm severity (not always) -warning

Fields of research:

- relation of these features to storm severity
- relation between cloud top microphysics (phase, effective radius) and storm severity/precipitation

There are not yet ready methods for automatic applications –but in 7 years….Later -Use in RDT as possible severity indicator???

4.5 DISPLACEMENT FIELDS

Improvements

- To compute convergences/divergences
- To include information fields on displacements/trajectories
- To allow for detailed wind computations for specific CT classes as additional option
- QI threshold variable
- To produce 3D wind from the IRS of MTG
- To calculate wind shear from IRS profiles
- To combine IRS wind for cloud-free areas and 'traditional' wind for cloudy areas

Discussion

The product is useful for convergences/divergences, wind over mountains or offshore. For rapid scan cycle, trajectories products and tracer persistence can be considered.

It was noticed the improvement taking advantage of the better spatial resolution of MTG.

The need of producing wind at night was also requested.

4.6 CLEAR AIR

Improvements

- To retrieve more instability indices, not only the lifted index, like in GII product
- To include the information of the new VIS0.9 channel in MTG to retrieve humidity

Discussion

PGE08 (SAI) only reacted to very unstable events and instability in underestimated compared to model fields (and Regional Instability Index RII). Its quality is too much variable (dependent on air mass and ground characteristics) to be actually useful and used. It is expected to be substituted by equivalent simulated Clear Air product (PGE13).

As it is assumed that 3D temperature and humidity profiles from MTG-IRS are going to be computed at CAF as day-0 products, users could compute several instability indexes from these profiles. However it remains open the possibility to include the retrieval of these profiles locally according specific user requirements.

4.7 AIR MASS ANALYSIS

Improvements

- To include IASI L2 tropopause derivation in PPS package

Discussion

IASI L2 tropopause proved to be useful in MSG product tuning. As a consequence, the idea emerged to make PPS tropopause the AMA product (would work also in cloudy areas!!!!). Users voice a request to attempt blending with SEVIRI (most probably, WV7.3 would be used). Alternatively, one may envisage tropopause height derivation from MTG-S in a more distant future.

In case a user need can be identified, take ATOVS gradient zones and ridge lines onboard the PPS catalogue (Note: at the Workshop, no such user need could be detected).