2024 Convection Working Group Meeting

8-12 April 2024, Czechia, Prague

Minutes of the Meeting

Recommendations

9th CWG Recommendation 1: Consider validation of the RDT product using lightning data from the Moroccan network within the framework of a multilateral partnership between Météo France, DGM, and EUMETSAT.

9th CWG Recommendation 2: The Convection Working Group has acknowledged the usefulness of SIFT for MTG visualisation and encourages EUMETSAT to continue the development of SIFT in particularly the following areas:
- Making possible to export images in desired resolution,
- Developing tools to tune images,
- Making possible to export RGB recipe and tuning scheme and/or the whole session one is working on.

9th CWG Recommendation 3: Perform Radiative Transfer Model simulations of sensitivity of the 1.38 µm band to presence of humid layer above cloud tops of convective storms (attenuation of radiance backscattered by reflective anvil top, assuming presence of a gaseous moisture plume). Recommended conditions to start with are 2 km thick layer, at RH 95%, located just above anvil cloud top, at LS. If the radiance attenuation is significant to be detected by satellite sensors, test also lower RH and thinner moisture layer. Test this for both, GEO and LEO orbits (FCI, VIIRS and METimage) instruments, at various scanning angles. Goal of this is to verify if predicted (gaseous) above-anvil moisture plumes (AAMP) generated by storms can be detected in this band or not. Independently of this, perform RTM simulations of reflectivity of AACPs in all the NIR bands (1.38, 1.6, 2.2 and 3.8 µm) for various particle sizes (and crystal types, if possible), in order to evaluate (compare) sensitivity of these bands to presence of small ice particles in AACPs.

9th CWG Recommendation 4: The Working Group encourages EUMETSAT to make available the programs developed for comparing LI and ground-based lightning detection data. This would significantly help members comparing LI with local ground-based LI data thus improve the overall quality assessment and understanding of the new LI data.

9th CWG Recommendation 5: EUMETSAT is encouraged to make available look up tables and/or software for LI parallax correction.

9th CWG Recommendation 6: Given the current situation on FCI, EUMETSAT is encouraged to make available all reprocessed (with the newest IDPF) FCI data as soon as possible for scientific purposes. EUMETSAT is also encouraged to make a relatively longer (several days, possibly over Europe) LI data set available as soon as possible.

9th CWG Recommendation 7: Based on US experience Minimum flash area product from GLM is very useful. The CWG recommends to consider developing similar product from LI.

9th CWG Recommendation 8: The group recommends to look into the possibility for sharing Jan Kanak's MTG Proc software in the European Weather Cloud (EWC) for other users.

9th CWG Recommendation 9: It is recommended to use consistent terminology for products (including RGBs and LI products). Meaning if we have one established the same name should be used on all platforms and by all users.

9ᵗʰ CWG Recommendation 10: It is suggested to have one platform for hosting all RGB recipes.

9ᵗʰ CWG Recommendation 11: The group recommends to establish a guide on how to create new RGBs. Principles, known practices should be included and explained in it.

9ᵗʰ CWG Recommendation 12: It is recommended to gather ideas for new RGBs with 0.9 micron channel.

9ᵗʰ CWG Recommendation 13: The Best Practices document should contain comparisons of SEVIRI and FCI (or other new sensors) products so that the "historical" review is kept. Satellite guidance which is useful for the developers and users can be linked to it.

Actions

6ᵗʰ CWG Action 3: CWG members are invited to share links to their most relevant scientific publications on convection, to be published on the CWG webpage. [**ALL**]

7ᵗʰ CWG Action 3: Update the CWG Convection Guidance with new products. [**CWG Co-Chairs**]

9ᵗʰ CWG Action 1: Check on the NWCSAF Cloud Phase product tuning for FCI. [**NWCSAF**]

9ᵗʰ CWG Action 2: Check with EUMETSAT on the possibility to have the same RGB names on EUMETView as it is at EUMeTrain (and other platforms). [**Co-Chairs**]

9ᵗʰ CWG Action 3: Check with EUMETSAT and ESSL on the possibility (plans) on developing Minimum flash area product for LI. [**EUMETSAT**]

9ᵗʰ CWG Action 4: Make the current MTG Proc software visualization of RGBs in the EWC publicly available. [**Jan Kanak**]

9ᵗʰ CWG Action 5: Informing and making the RGB developers aware of 9ᵗʰ CWG Recommendation 9 and 10. **[Co-chairs]**

9ᵗʰ CWG Action 6: Checking and clarifying with EUMETSAT the displacement between FCI channels with different resolution. [**Co-Chairs**]

9ᵗʰ CWG Action 7: Provide reference papers if available for different RGBs (i.e. GeoColor RGB). [**ALL**]

9ᵗʰ CWG Action 8: Following up on the discussion on satellite image labelling, a questionnaire should be carried out on the needs, interest, etc. as a first step. [**Co-Chairs, Gerrit Holl, Benjamin Rösner, Jindrich Stastka, Kris Bedka**]

9ᵗʰ CWG Action 9: Make available FCI data conversion scripts for SNAP software. [**CHMI**]

9ᵗʰ CWG Action 10: CWG members are invited to share surface measurement data with Xavier Calbet on near stationary case study. **[ALL]**

9th CWG Action 11: Define the way forward for the Best Practice document, have a discussion at the next online meeting **[Co-Chairs]**

9th CWG Action 12: Best Practices document to be transferred to User Portal **[Co-Chairs]**

9th CWG Action 13: To create a glossary on the satellite-observed features atop storms **[Co-Chairs]**

Session summary

Opening session:

CWG Workshop was organized jointly with MTG 3Tworkshop for the second time. CWG part started on Tuesday morning with welcoming speeches from Mark Rieder, The General Director of CHMI, Joachim Saalmueller, The Head of User Services at EUMETSAT, and Martin Setvak from CHMI.

New Imagers

In the first presentation, Alessandro Burini has updated the group on the FCI commissioning status. Unfortunately, due non-readiness and delays of the IDPF, commissioning couldn't be done as it was planned. Some of the tasks had to be postponed. Radiometric performances and calibration were presented. First results show 2-3 % bias for VNIR channels except VIS0.9, NIR1.3 and NIR2.2 aligning with expectations. For IR channels, current results from GEO-GEO and GEO-LEO inter-calibration systems meet the 0.7K absolute radiometric accuracy requirement for IR channels. Longer time series of data are required to enhance analyses confidence. The first generation and assessment of L2 products had also been started.

Martin Setvak presented FCI observation of Sahel storms using commissioning data. Outflow boundaries were nicely seen in solar channels. Very clear distinction between outflow-water clouds with small particles and storm tops with ice particles. Normalised difference between VIS0.9 and VIS0.8 shows outflow generated by the storm which disappear later on the afternoon, probably due to evaporation of the vegetation.

Jochen Kerkmann showed case studies focusing on the new solar channels. Comparisons between NIR1.6 and IR3.9 channels were presented. Signal of small ice in NIR2.25 is much stronger than in 1.6 in some cases. He showed that ice and water clouds look very similar in NIR2.2 channel, distinguishing water and ice particles using only NIR2.2 is difficult.

Progress on the FCI VIS0.9 TCWV algorithm and first results was presented by Xavier Calbet instead of Jan El Kassar, who unfortunately could not be present at the meeting. Good advancement was made to adapt the algorithm for near-real time processing time. It is foreseen to make it even faster with the use of lookup tables. Until final calibration of FCI data products quality assessment cannot be done properly.

John Mecikalski showed a new Convective Updraft Algorithm which uses already existing products to estimate vertical updraft velocity. The algorithm has two components, based on the

nature of updrafts in convective clouds and storms: cumulus updrafts within pre-convection (mature storm) cumulus clouds (PreCnv) and cumulus updrafts within existing mature convective storms (ExtCnv).

Pilar Ripodas presented the status of the NWCSAF MTG products. The MTG Day 1 software is ready. Some of the products are need to be finetuned, which is not possible without good calibration. NWC SAF User workshop will be 25-27 February 2025, Madrid, Spain.

Ronan Houël presented a new object-based approach the convective initiation product. Moving from CI pixels to CI objects gives a reduction of uncertainties in spatial and temporal co-location between satellite and radar data.

Michael Claudon has presented the first comparisons between MTG-RDT and MSG-RDT. The contours for MTG and MSG look coherent. There are differences between minimum temperature of cold cloud systems, MTG is warmer than MSG and GOES16. Detections of cloud top features are planned to be included in the software for MTG.

GeoXO satellites were described by Dan Lindsey. The constellation will exist of 3 satellites: GEO Central will be added to GEO East and West. GXI will have additional channels for humidity detection, channels 5.15 and 0.9 µm. GXS will be similar to IRS. More information on the instruments can be found in [BAMS](#).

Microphysical evolution of above anvil Cirrus plums was presented by John Mecikalski. AACP RGB was also introduced. The group commented that the red component in the RGB should be better tuned.

Jochen Kerkmann compared BTDs for cloud phase detection available on different GEO satellites. He found that IR10.4-IR8.6 on Ahi is not so useful for cloud phase detection, IR10.5-IR8.7 may give slightly better result.

Overview of the ESSL-EUMETSAT workshops and testbeds was presented by Tomas Pucik. Eight workshops were organised. Tomas focused on the mature storms in his talk.

Olexii Kryvobok presented a system for operational detection of severe weather using satellite and lightning data in Ukraine.

Lightning

Bartolomeo Viticchie presented the current status of LI Level 1b and Level 2 performances. The quality of LI Level 0 data is very high, false lightning events due to noise have very limited impact and their nature is well understood. Fine tuning of Level 1b and Level 2 filtering are foreseen in the future. Achieving the stability of the LI end-to-end processing chain is needed before data can be delivered to users.

Natasa Strelec Mahovic and Tomas Pucik hosted a longer discussion on possible lightning products which has been tested at the ESSL-EUMETSAT LI expert workshop. The group found it hard to comment on the usefulness of product without knowing how they are derived.

Imagers

Anezka Dolezalova presented their development of automatic overshooting top detection using neural networks. Jan Kanak OT database were used in the development which is crucial for the good results they achieved.

A longer discussion was hosted by Ivan Smiljanic on RGBs. FCI is more evolution than revolution, not much more info compared to SEVIRI. It is still open how 0.9 µm channels will/should be used in RGBs. The group discussed the need for harmonization on the naming of RGBs.

Martin Setvak talked color versus greyscale enhancement for storm tops. In most cases, strong greyscale enhancement can show more details of storm cloud top (morphology, features) than the color enhancement but it can only be useful for case studies, not for daily operational use. The group discussed the choice of colormap for the color enhancement.

Research to Operations

Pao Wang presented how satellite-observed phenomena of severe storms can be explained by model simulations.

Blanka Piskala Gvozdikova compared storm top features with GEO and LEO satellites with different resolutions. Going from coarser to very fine resolutions makes it more challenging to identify certain storm top features, such as overshooting tops, which could affect the accuracy of feature labelling.

Climatology of indices derived from radio sounding data was presented by Tino Manzato. Sounding-derived indices show a huge increase of moisture, potential instability and shear. The statistical relationships between RDS-indices and observed storms (e.g. between day-of year CAPE and lightning density) seem to be not climate-change invariant.

Multisensor and integrated approaches

Fabian Senf presented his work in joint typing and tracking of marine clouds in satellite observations and convection-permitting simulations. Chaining different utilities seems to be very promising for improved evaluation of cloud-resolving models but reaching realistic levels of convective organization seems to be a challenge even for ICON runs with finer resolution.

Danyu Qin introduced the Fengyun satellites and also showed how they monitor convection with extreme rainfall.

Ioannis Matsangouras presented a case study on Storm Daniel with extreme precipitation. They were satisfied with HSAF H61 product.

Byungchan Oh talked about development of convective cloud prediction technology that causes extreme rain on satellite-based stationary front. A flowchart of 6 points were presented. When more than four conditions are satisfied, extreme rain occurs from convective clouds.

Jan Kanak demonstrated GEOProc/MTGProc software and its capabilities. It is installed at the EWC, it can be used for training purposes and capable of processing of all ABI/AHI/FCI data.

Gerrit Holl and Benjamin Rösner hosted a longer discussion about a joint effort for a cloud-top features database from FCI. The group welcomed the idea of such effort. The next steps toward this is to carry out a survey on what is needed for the labelling tool and who would be interested in participating in it.

Training

Vesa Nietosvaara talked about his experiences in the use of EUMETView and NWC-SAF (and other) viewers for hands-on training.

IDEaL-ESDA: International Digital Education and Learning - Education platform for Satellite Data processing and Application was presented by Humberto Barbosa. The goal of the project is to establish a digital education and learning platform for joint international education of students from Brazil and Germany focusing on satellite data processing.

Pavel Hampl demonstrated the usefulness of ESA SNAP software for MTG FCI visualisation.

Hyperspectral

Xavier Calbet talked about complementing satellite derived stability indices with ground station data.

Ralph Petersen presented his work in validation and error reduction in geostationary EUMETSAT temperature/moisture retrievals in pre-convective environments. The usefulness and added information of AMDAR data was demonstrated. As this was probably the last workshop Ralph had attended the group thanked Ralph all his support, innovation, ideas and discussion.

Closure

The group has discussed the Best Practises Document. It was agreed some form of living document would be the best way forward, it should be useful for both product developers and users. The co-chairs will present possible ways toward this goal in the nest online meeting.

List of participants

First Name	Last Name	Country
Markéta	AUGUSTINOVÁ	Czech Republic
Vojtech	BLIZNAK	Czech Republic
Tobias	BÖLLE	Germany
Mustapha	BOUHOU	Morocco
Alessandro	BURINI	Germany
Xavier	CALBET	Spain
Michaël	CLAUDON	France
Rudy	COSTE	France
Roxane	DESIRE	France
Anežka	DOLEŽALOVÁ	Czech Republic
Djordje	GENCIC	Serbia
Marie	GLOFAKOVÁ	Czech Republic
Pavel	HAMPL	Czech Republic
Jean-Baptiste	HERNANDEZ	France
Gerrit	HOLL	Germany
Ronan	HOUEL	France
Barbosa	HUMBERTO	Brazil
Ján	KAŇÁK	Slovakia
Tadas	KANTAUTAS	Lithuania
Jochen	KERKMANN	Germany
Zsofia	KOCSIS	Hungary
Thomas	KRENNERT	Austria
Oleksii	KRYVOBOK	Ukraine
Robert	KVAK	Czech Republic
Hana	KYZNAROVA	Czech Republic
Dan	LINDSEY	United States of America
Agostino	MANZATO	Italy
Ioannis	MATSANGOURAS	Greece
John	MECIKALSKI	United States of America
Ondřej	NEDĚLČEV	Czech Republic
Vesa	NIETOSVAARA	Germany
Petr	NOVÁK	Czech Republic
Tereza	NOVAKOVA	Czech Republic
Byung Chan	OH	South Korea
Monika	PAJEK	Poland
Alexandros	PARASKEVAS	Greece
Petr	PESICE	Czech Republic
Ralph	PETERSEN	United States of America
Blanka	PISKALA GVOŽDÍKOVÁ	Czech Republic
Simona	PROCHÁZKOVÁ	Czech Republic
Tomáš	PÚČIK	Austria
Maria	PUTSAY	Hungary

Danyu	QIN	China
Pilar	RÍPODAS	Spain
HansPeter	ROESLI	Switzerland
Benjamin	RÖSNER	Germany
Dominik	RUKAVINA	Croatia
David	RÝVA	Czech Republic
Joachim	SAALMÜLLER	Germany
Matic	ŠAVLI	Slovenia
Andrea	SCOCCIONE	Italy
Jakub	SEIDL	Czech Republic
Fabian	SENF	Germany
Martin	SETVÁK	Czech Republic
Ivan	SMILJANIC	Croatia
Filip	SMOLA	Czech Republic
Eunha	SOHN	South Korea
Tareq	SOUBAI	Morocco
Jindrich	STASTKA	Czech Republic
Natasa	STRELEC MAHOVIC	Germany
Radek	TOMŠŮ	Czech Republic
Renata	UHLÍKOVÁ	Czech Republic
Michaela	VALACHOVÁ	Czech Republic
Bartolomeo	VITICCHIE	Germany
Kateřina	VODIČKOVÁ	Czech Republic
Pao	WANG	Taiwan
Ondrej	ZACEK	Czech Republic
Petr	ZACHAROV	Czech Republic

CWG Workshop Agenda, 2024

Time (CEST)	Monday	Time (CEST)	Tuesday	Wednesday	Thursday	Friday
		09:00-10:45	**Opening of the Joint CWG – 3T** Joachim **Saalmueller** , CHMI representatitve: opening words **New Imagers** Alessandro **Burini:** FCI Commissioning Update Martin **Setvak:** FCI observations of Sahel storms Discussion	**New Imagers** John **Mecikalski**: Above Anvil Cirrus Plume microphysical evolution using GOES-16 channel data Jochen **Kerkmann**: Cloud phase detection in FCI IR channels Tomáš **Púčik**: Some findings of the ESSL-EUMETSAT workshops and Testbeds Olexii **Kryvobok**: System for operational detection of severe weather using satellite and lightning data Discussion	**Research to Operations** Pao **Wang**: Model interpretation of satellite-observed phenomena related to deep convective storms Blanka Piskala **Gvoždíková**: Stormchasing with Landsat and the future of MTG Tino **Manzato**: Are the relationships between environmental parameters and storm observations climate-change invariant? Discussion	Pavel **Hampl:** Using ESA SNAP software for MTG data visualisation - *Application demo* **Hyperspectral** Xavier **Calbet**: Complementing satellite derived stability indices with ground station data Ralph **Petersen**: Validation and Error Reduction in current EUMETSAT Temperature and Moisture Retrievals Discussion
		10:45-11:15	**break**	**break**	**break**	**break**

		11:15-13:00	**New Imagers** Jochen **Kerkmann**: Case study hailstorm Texas, May 2020 Jan **El Kassar**: MTG-FCI Near-Infrared Total Column Water Vapour Retrievals for Improved Characterization of Pre-convective Environments John **Mecikalsk**i: An overview of an FCI-focused Convective Updraft Detection algorithm Discussion	**Lightning** Bartolomeo **Viticchie**: Current status of LI Level 1b and Level 2 performances Natasa **Strelec Mahovic**: Lightning Imager - products for forecasters – *longer discussion* Discussion	**Multisensor and integrated appoaches** Fabian **Senf**: Joint typing and tracking of marine clouds in satellite observations and convection-permitting simulations Danyu **Qin**: Beijing 7.30 – 8.01 Extreme Precipitation and Forecasting: A Bird View from FengYun Satellites Ioannis **Matsangouras**: Remote Sensing: The evolution of Daniel Storm Byung Chan **Oh**: Development of convection cloud prediction technology that cause extreme rain on satellite-based stationary front Discussion	CWG administration Closing
12:00-13:00	Lunch	13:00-14:30	Lunch	Lunch	Lunch	Lunch

13:00-14:30	**Opening of 3T** Ivan **Smiljanic**: housekeeping Djordje **Gencic**: FCI Dust Detection Maria **Putsay**: Cloud type RGB Discussion	14:30-15:45	**New Imagers** Pilar **Ripodas**: NWC SAF products Ronan **Houel**: A new object based approach for the NWC SAF CI product validation and application to first MTG data Discussion	**Imagers** Anežka **Doležalová**: Automatic detection of overshooting tops and their properties using Neural Networks Ivan **Smiljanic**: Validation of new FCI RGB composites – *longer discussion*	Jan **Kanak**: Status of development the GEOProc/MTGProc Training Environment at European Weather Cloud - *Application demonstration* Gerrit **Holl:** A joint effort for a cloud-top features database from FCI – *longer discussion*	
14:30-15:00	**break**	15:45-16:15	**break**	**break**	**break**	
15:00-16:30	HansPeter **Roesli**: Case studies exploring low-level moisture detection with FCI Jean-Babtiste **Hernandez**: MTG training to trainers plan in Meteo-France Dominik **Rukavina**: Training activities related to MTG and use of data Discussion	16:15-17:30	**New Imagers** Michaël **Claudon**: Benefits of upcoming MTG data to NWC SAF RDT-CW product Dan **Lindsey**: NOAA Satellite Update - GOES-R and GeoXO Discussion	Martin **Setvak**: Storm tops - color versus greyscale enhancements **CWG Chairs**: CWG Best Practices Document Discussion *Social Event*	**Training** Vesa **Nietosvaara**: Experience of the use of EUMETView and NWC-SAF Viewer for hands-on training Humberto **Barbosa**: IDEaL-ESDA: International Digital Education and Learning - Education platform for Satellite Monika **Pajek**: Preliminary remarks and analysis on the operational processing of MTG data at the Satellite Research Department/IMGW-PIB	

Location and time of the next meetings

Online meeting in June.

Splinter Meeting at EUMETSAT Conference in Würzburg, 1 October 2024.

Next workshop is foreseen in 2026, location is still under discussion, possibility to be in Spain.

Terms of Reference of the Convection Working Group

Purpose

The main purpose of the Convection Working Group is to stimulate efficient utilization of satellite data in operational meteorology for detection, analysis and prediction of deep moist convection and associated phenomena.

Objectives

Developing a body of knowledge in monitoring convection through satellite observations.

Offering a meeting point for researchers, developers and operational users, for exchanging experiences and feedback on practices and operational and experimental applications aimed at convection processes in the atmosphere.

Activities

Coordination of development and enhancement of techniques for early detection and prediction of convective storms.

Stimulation of research activities for better understanding and description of processes in the convective environment and their footprints on satellite data.

Support to development of training materials and fostering the technology transfer necessary for introduction of newly developed methods and techniques into operational meteorology.

Exchange of information on an international level for leading scientist and experts in satellite meteorology, active in development and operations of nowcasting techniques.

Fostering the use of satellite data in conjunction with other available data (NWP / Radar etc.) for detection, analysis and prediction of deep moist convection and associated phenomena.

Cooperation with the specialised institutions, such as storm laboratories, which have a particular role in contributing to the CWG and robustly testing new products and algorithms for operational application. ESSL has a particular role in facilitating this in Europe.

Promote collaboration with similarly aimed groups, organizations or individuals worldwide. Therefore, CWG is open to all interested parties – individuals and organisation. No formal membership is required to attend CWG events (workshops and meetings) or to use various material available on the CWG website.

The coordination of the group will be done by co-chairing the CWG by representative(s) of EUMETSAT and appointed specialist(s). To facilitate CWG activities, a CWG secretary (individual or institution) will be appointed by EUMETSAT.

The CWG will aim to hold meetings every two years for planning and reporting on progress, in between the group will interact via Internet and teleconference and at splinter meetings, when suitable.

The CWG will maintain a web site for efficient information exchange and provision of documentation. For the exchange of information and documentation the web site should be operated under guidance of the secretary of the CWG.