

# 2018 Convection Working Group Meeting

17-19 April 2018, Ljubljana, Slovenia



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## Recommendations

**6thCWG Recommendation 1:** The full operational access to the highest ground resolution data as well as RSS in future MTG FCI is very strongly supported within CWG. CWG recommends to learn from GOES-R experiences in relation to convection monitoring, especially on the following:

- a. Imagery is and should be used in both qualitative and quantitative ways by forecasters.
- b. The 500-m VIS band is excellent for monitoring clouds prior to convective initiation, and for assessing storm severity particularly in radar-free regions.
- c. Continue widespread use of RGBs.
- d. For new lightning-detecting instruments, allow plenty of time post-launch to test and adopt ground processing algorithm.
- e. Rapid scanning ( $\leq 2.5$  min) provides excellent value for convective storm analysis, including the pre-storm time frame.

## Actions

**6thCWG Action 1:** Satellite Convection Guidance template to be sent to all. The deadline for additional short submissions is end of July. (CWG CO-CHAIRS)

**6thCWG Action 2:** To ensure NWCSAF and RGB sessions will be included in the next full meeting agenda. (CWG CO-CHAIRS)

**6thCWG 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)

## Session Summary

### Opening Session

In the opening session Klemen Bergant, the Director of Meteorological and Hydrological Office, ARSO, stressed the importance of convection for Europe and also for Slovenia, and Joachim Saalmüller, Head of User Support and Climate Services, EUMETSAT, welcomed the participants for the sixth Convection Working Group meeting. Both stressed the importance convection and the quality of convective forecasts and techniques. A number of new instruments (MTG-I, MTG-S) supporting these goals will be available in the coming years.

Vesa Nietosvaara and Mateja Irsic Zibert, CWG Co-Chairs, welcomed the participants. A short update on CWG developments since last workshop was given, including the work done on Satellite Convection Guidance, available online from December 2017 at <https://www.essl.org/cwg-satellite-guidance/>

### Multi-sensor and integrated approaches

This session included twelve presentations on a wide range of new approaches and advances in Nowcasting and Convection monitoring. The presentations and related discussion reinforced the importance of using multiple data sources for better detection of severe convection. It was also demonstrated that multi-sensor approaches help to overcome deficiencies in single type approaches. Many case studies showing a combined use of satellite, radar and lightning data illustrated the benefits of integrated approaches.

Several talks have pointed out the existence of above-anvil cirrus plume, linked to cold-U or -ring signatures, at the time of significant severe weather events. Multi-sensor studies have showed that updrafts are strongest when plumes are present, relative to storms without plumes, and plumes are the strongest known indicator of a severe storm within visible and IR imagery. Due to their importance, development of automated plume detection algorithms is recommended.

The importance of time and spatial resolution was stressed in many presentations. For instance, having the 500m VIS resolution is key to picking up the details of convective developments. Rapid scanning ( $\leq 2.5$  min) provides excellent value for convective storm analysis, including the pre-storm time frame.

### MTG Updates

MTG Flexible Combined Imager (FCI) instruments will provide continuity to MSG SEVIRI and in addition improvements in several areas such as true colour images, daytime total column precipitable water, detection of very thin cirrus, cloud microphysics and convection detection in general because of increased spatial and temporal resolution. FCI can support two missions: full disk scanning service and rapid scan service.

In addition, the new Lightning Imager instrument will provide a new capability for continuous monitoring of lightning. The work is currently ongoing on LI processing techniques to ensure high detection of lightning whilst rejecting the false detections.

MTG-IRS will introduce a new capability of atmospheric profiles every 30 minutes in Europe. This capability will improve the early detection of unstable regions before the onset of convection.

In the discussion the participants raised a question about the dissemination of the much higher data volumes. Particularly the terrestrial dissemination, data compression, full resolution imagery and channel selection issues were discussed. Many participants voiced the importance of having the highest possible spatial and time resolution available for convective applications. Many new convection applications rely on such data.

### **Satellite Vertical Profiles**

Many speakers described the use of IASI L2 products for Nowcasting purposes. IASI L2 profiles are useful in convection nowcasting, but the accuracy of measurements near surface need to be taken into account. A comparison of IASI with aircraft measurements indicate that above inversion layer the IASI products are fairly good.

Comments stressed the fact that use of surface observations will be needed for blending in to the low-resolution near-ground data, if we want to get a reliable high resolution dataset that reflects near ground temperature and humidity.

Convection nowcasting products, such as NearCast, do benefit from including the microwave retrievals into the process.

### **Deep convection – climate studies**

This topic included talks on storm top climatologies (Above Anvil Cirrus Plumes) and their simulations, as well as talks on hail swath, tornado and hurricane climatology studies.

### **NWC SAF**

Nowcasting SAF session included talks on the SAF Network generally and about its impact on convection phenomena, as well as talks explaining individual NWC SAF products, such as Rapidly Developing Thunderstorm (RDT), Convective Initiation (CI) and imaging Satellite Humidity And Instability product (iSHAI). The user feedback from the recent ESSL Testbed weeks was presented.

### **Satellite Convection Product Updates**

This session included an overview by speakers from USA, China and South Korea on new developments on convection products for GOES-16, Himawari, FY-4A and GEO-KOMPSAT-2A. The experiences from quantitative and qualitative GOES-16 convection products, and their implications for other new generation weather satellites, such as MTG. These findings are shown at the Recommendations (page 2).

All organizations are developing and improving new convection algorithms, for example Convection Initiation (CI) and Rapidly Developing Thunderstorm (RDT) products. EUMETSAT speakers showed examples of new RGB products using the channels on board new generation satellites. These include Cloud Phase RGB and Cloud Type RGB. The work is ongoing, but the results indicate that the new products will be useful in convection monitoring.

It was proposed to have a specific RGB session at the next full CWG meeting in 2020.

### **Concluding Session**

The opening session had included a short overview of the status of Satellite Convection Guidance (SCG). The discussion was opened at the concluding session in order to gather more feedback from the participants. The SCG is an entry point for browsing the operational products that are important for convection and available on-line for many users.

The current status was revised and the information on RGB's will be added as links to EUMeTrain webpage not to duplicate the work.

There were already some possible contributions spotted, on NearCast, CI, High Flight Level Liquid Water Content, IR enhancement, possibly also pre-operational LI data.

## List of Participants

FIRST NAME	FAMILY NAME	INSTITUTE	Country
Frank	Alsheimer	National Oceanic and Atmospheric Administration/National Weather Service	United States of America
Thomas	August	EUMETSAT	Germany
Humberto	Barbosa	Federal University of Alagoas (UFAL)	Brazil
Kristopher	Bedka	NASA Langley Research Center	United States of America
Margarida	Belo-Pereira	Instituto Português do Mar e da Atmosfera (IPMA)	Portugal
Klemen	Bergant	ARSO	Slovenia
Xavier	Calbet	AEMET	Spain
Jana	Campa	ARSO	Slovenia
Klemen	Četina	ARSO	Slovenia
Andrei	Diamandi	National Meteorological Administration	Romania
Jochen	Grandell	EUMETSAT	Germany
Veronika	Hladnik	ARSO	Slovenia
Alois M.	Holzer	ESSL	Austria
Regina	Hoefenmayer	EUMETSAT	Germany
Andrej	Hrabar	ARSO	Slovenia
Mateja	Iršič Žibert	ARSO	Slovenia
Jan	Kanak	Slovak Hydrometeorological Institute	Slovakia
Jochen	Kerkmann	EUMETSAT	Germany
Zsofia	Kocsis	OMSZ - Hungarian Meteorological Service	Hungary
Thomas	Krennert	ZAMG	Austria
Oleksii	Kryvobok	UHMI	Ukraine
Mounir	Lekouara	EUMETSAT	Germany
Stephan	Lenk	Leibniz Institute for Tropospheric Research	Germany
Dan	Lindsey	NOAA/NESDIS/GOES-R	United States of America
José Lorenzo	Lliso Valverde	AEMET	Spain
Tino	Manzato	OSMER - ARPA FVG	Italy
Cecilia	Marcos	AEMET	Spain
Miguel Angel	Martinez	AEMET	Spain
John	Mecikalski	Atmospheric Science Department, University of Alabama in Huntsville	United States of America
Davide	MELFI	COMet	Italy
Janko	Merše	ARSO	Slovenia
Jean-Marc	Moisselin	Météo-France	France
Bostjan	Muri	Slovenian Environment Agency	Slovenia
Vesa	Nietosvaara	EUMETSAT	Germany

Luca	Nisi	MeteoSwiss + University of Bern	Switzerland
Monika	Pajek	Institute of Meteorology and Water Management - National Research Institute (IMGW-PIB)	Poland
Hye-In	Park	National Meteorological Satellite Center(NMSC) / Korea Meteorological Administration(KMA)	South Korea
Ki-Hong	Park	National Meteorological Satellite Center(NMSC) / Korea Meteorological Administration(KMA)	South Korea
Ralph	Petersen	University of Wisconsin-Madison/SSEC/CIMSS	United States of America
Aleš	Poredoš	ARSO	Slovenia
Simon	Proud	University of Oxford	United Kingdom
Mária	Putsay	Hungarian Meteorological Service	Hungary
Danyu	Qin	National Satellite Meteorological Center/CMA	China
Jenni	Rauhala	Finnish Meteorological Institute	Finland
Luka	Ravnik	ARSO	Slovenia
Joachim	Saalmüller	EUMETSAT	Germany
Lothar	Schüller	EUMETSAT	Germany
Fabian	Senf	Leibniz Institute for Tropospheric Research	Germany
Martin	Setvak	Czech Hydrometeorological Institute, Satellite Department	Czech Republic
Gregor	Skok	University of Ljubljana	Slovenia
Ivan	Smiljanic	EUMETSAT	Germany
Blaž	Šter	ARSO	Slovenia
Uros	Strajnar	ARSO	Slovenia
Natasa	Strelec Mahovic	Meteorological and hydrological service	Croatia
Piotr	Struzik	Institute of Meteorology and Water Management - NRI	Poland
Michaela	Valachová	Czech Hydrometeorological Institute / Charles University, Department of Atmospheric Physics	Czech Republic
Bartolomeo	Viticchie	EUMETSAT	Germany
Pao	Wang	University of Wisconsin-Madison	United States of America
Kathrin	Wapler	Deutscher Wetterdienst	Germany

# Agenda

Tuesday, 17 April 2018

08:00-09:00	Registration	
09:00	Opening	Klemen Bergant, Director of Meteorological and Hydrological Office, ARSO Joachim Saalmueller, Head of User Support and Climate Services, EUMETSAT
09:30	Status of Satellite Convection Product Guidance	Vesa Nietosvaara, EUMETSAT
<b>Session: Multi-sensor and integrated approaches</b>		<b>Session chair: Mateja Iršič Žibert, ARSO</b>
10:00	New Approaches for Automated Detection and Analysis of Hazardous Thunderstorms at NASA Langley Research Center	Kristopher Bedka, NASA Langley Research Center
10:30	Coffee Break	
11:00	Recent advances, current activities and challenges in Nowcasting: summary of the 2nd European Nowcasting Conference	Kathrin Wapler, Deutscher Wetterdienst
11:15	Multi-sensor observations of gravity waves generated by convective storms	Martin Setvak, Czech Hydrometeorological Institute, Satellite Department
11:30	Confronting high-resolution simulations of deep convective growth with Meteosat observations	Fabian Senf, Leibniz Institute for Tropospheric Research
12:00	On the sensitivity of nowcasting algorithms for convective initiation in satellite images to automatic tracking techniques	Stephan Lenk, Leibniz Institute for Tropospheric Research
12:15	Storm Severity Estimation: Nowcasting by Remote Sensing in Central Europe	Michaela Valachová, Czech Hydrometeorological Institute / Charles University, Department of Atmospheric Physics
12:30	Lunch Break	
14:00	Case studies of various types of storms using remote sensing (satellite, radar, lightning), in-situ and NWP data	Mária Putsay, Hungarian Meteorological Service
<b>Session: Satellite Vertical Profiles</b>		<b>Session Chair: Jochen Grandell, EUMETSAT</b>
14:30	EUMETSAT hyperspectral sounding products: the IASI L2 operational service, preparing MTG-IRS	Thomas August, EUMETSAT
15:00	Possible Usage of IASI L2 Profiles in Nowcasting	Zsafia Kocsis, OMSZ - Hungarian Meteorological Service
15:15	Validation and use of IASI level2 data in various weather situations	Jana Campa, ARSO
15:30	Coffee Break	
16:00	Combining SEVIRI and IASI profiles in a short-range, "all-weather" forecasting tool	Ralph Petersen, University of WisconsinMadison/SSEC/CIMSS
<b>MTG Updates</b>		
16:15	MTG FCI instrument and services	Mounir Lekouara, EUMETSAT
16:30	Lightning Imager (LI) end to end prototype processor	Bartolomeo Viticchie, EUMETSAT
16:45	Temporal and spatial distribution of total lightning densities in severe thunderstorms	Kathrin Wapler, Deutscher Wetterdienst
17:00 – 17:30	Discussion	
19:00	Meeting at the hotel, a short walk to the dinner	
20:00	Workshop Dinner at Ljubljana Castle	



## Wednesday, 18 April 2018

<b>Session: Deep convection – climate studies</b>		<b>Session Chair: Davide Melfi, COMET</b>
09:00	Storm top processes seen from concurrent satellite and aircraft observations	Pao Wang, University of Wisconsin-Madison
09:30	Hail swaths analysis in the Alps using radar data between 2002 and 2016	Luca Nisi, MeteoSwiss + University of Bern
09:45	Tornadic storms in Portugal	Margarida Belo-Pereira, IPMA
10:00	Meteosat-10 and ozone mapping as an index to cyclone intensity in tropical North Atlantic	Humberto Barbosa, Federal University of Alagoas (UFAL)
10:30	Coffee Break	
<b>Session: NWC SAF</b>		<b>Session Chair: Natasa Strelec Mahovic</b>
11:00	The EUMETSAT SAF Network and its portfolio related to convection	Lothar Schüller, EUMETSAT
11:15	NWC SAF Software and Products: future developments	Xavier Calbet, AEMET
11:30	The upcoming version v2018 of RDT-CW and CI	Jean-Marc Moisselin, Météo-France
11:45	iSHAI and PGE00 as key tools in pre-convection	Miguel Angel Martinez, AEMET
12:00	NWC SAF MTG LI Prototype Products	Andrei Diamandi, NMA, Romania
12:15	NWC-SAF products at the ESSL Testbed, what users like most	Alois M. Holzer, ESSL
12:30	Discussion	
12:45	Lunch Break	
<b>Session: Multi-sensor and integrated approaches</b>		<b>Session Chair: Piotr Struzik</b>
14:15	Nowcasting Deep Convection in the Southeastern United States	Frank Alsheimer, National Oceanic and Atmospheric Administration/National Weather Service
14:45	An Integrated use of 1-min resolution GOES, Radar and Lightning data to Understand and Predict Severe Convection	John Mecikalski, Atmospheric Science Department, University of Alabama in Huntsville
15:15	Updraft width in severe thunderstorms – observations of significant hail producing storms in Finland	Jenni Rauhala, Finnish Meteorological Institute
15:30	Coffee Break	
16:00-17:00	Discussion	

## Thursday, 19 April 2018

<b>Session: Multi-sensor and integrated approaches</b>		<b>Session Chair: Jenni Rauhala</b>
09:00	Use of Meteosat stereographic view for more complete, 2-dimensional, parallax corrected images	Piotr Struzik, Institute of Meteorology and Water Management - NRI
09:15	Can dual satellite observations improve information about convection?	Jan Kanak, Slovak Hydrometeorological Institute
09:30	The relation between cloud parameters and storm severity based on lightning and satellite data	Oleksii Kryvobok, UHMI
<b>Session: Satellite Convection Product Updates</b>		<b>Session Chair: Vesa Nietosvaara</b>
09:45	Observations of convection using both qualitative and quantitative products from GOES-16	Dan Lindsey, NOAA/NESDIS/GOES-R
10:15	Observing Convection with FengYun-4A satellite	Danyu Qin, National Satellite Meteorological Center/CMA



10:30	Coffee Break	
11:00	Cloud property retrieval on multiple layers, monitoring convective storms under cirrus	Simon Proud, University of Oxford
11:15	Discrimination of Convective Clouds using Himawari-8 data with Logistic Regression over Korea	Ki-Hong Park, National Meteorological Satellite Center (NMSC) / Korea Meteorological Administration(KMA)
11:30	Development of Convective Initiation Algorithm for GEO-KOMPSAT-2A	Hye-In Park, National Meteorological Satellite Center (NMSC) / Korea Meteorological Administration(KMA)
11:45	New Cloud Phase and Cloud Type RGBs + some rapid scan cases	Jochen Kerkmann, EUMETSAT
12:00	Exploring the new satellite generation capabilities through case studies	Ivan Smiljanic, EUMETSAT
12:15	Discussion	
12:30	Lunch Break	
<b>Concluding Session</b>		
14:00	Satellite Convection Product Guidance document – way forward	Co-Chairs
14:30	General Discussion, Recommendations, Conclusions	Vesa Nietosvaara Mateja Iršič Žibert Jochen Grandell
17:00	End of workshop	

## Location and Time of Next Meetings

Splinter meeting at EUMETSAT conference in Tallinn, Estonia, 18 September 2018.

Splinter meeting at ECSS in Krakow, Poland, 4-8 November 2019.

Next full meeting in 2020 in Hungary, organized by the Hungarian Meteorological Service.

# 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.