

# 2016 Convection Working Group Workshop

4 - 8 April 2016, Florence, Italy



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## Recommendations

### **5thCWG Recommendation 1:**

CWG recommends that a way is found which would allow operational access to high quality NWC-SAF products based on the MTG-FCI Rapid Scanning Service (RSS) 2.5 min data. One possibility might be within one of the new “pathfinder projects”. If this cannot be met, operational users will have a reduction in some of the NWC-SAF product timeliness in the MTG era compared to what was available with MSG data already since 2006.

### **5thCWG Recommendation 2:**

CWG acknowledges that Meteosat-8 HRV data from IODC can substantially contribute to various convection-related studies, benefiting from stereoscopic view from the two MSG nominal locations, 0° and 41.5°E. However, CWG recommends that to fully benefit from such stereoscopic observations, the HRV upper window shift needs to follow the morning terminator as closely as possible, preferably taking into account the seasonal variations of daylight.

### **5thCWG Recommendation 3:**

CWG recommends a dissemination of the full OCA product every repeat cycle (i.e. every 15 minutes), based on the good findings in using the data in operational forecasting. It is understood that currently the product is processed every repeat cycle, but only disseminated once an hour, while the rest of the data are archived.

### **5thCWG Recommendation 4:**

CWG recommends the creation of a more condensed version of the “Recent concepts and practices” document, based on forecaster feedback. Such a document should be clearly limited in length (e.g. max. 10 pages) and aimed at operational forecasting severe convection by the use of satellite data.

### **5thCWG Recommendation 5:**

CWG recommends setting up dedicated sessions starting from the 6th CWG workshop in Ljubljana in 2018:

- a session for hyperspectral sounders especially in preparation for MTG-S,
- a session for NWC-SAF issues.

Other sessions will be defined during the CWG splinter meetings (September 2016 – at EUMETSAT Conference and/or September 2017- ECSS)

### **5thCWG Recommendation 6:**

Because forecasters need additional information about the changing horizontal and vertical distribution of moisture structures prior to convective development, and because it is doubtful that the total spectral information available over land from MTG-S (including line-by-line differences)

will be fully used in frequently updated regional analysis and NWP systems in the next 15-20 years, and because different forecast problems in different areas and across different seasons will require different diagnostic tools (e.g., different Stability Indices) and use different NWP models, CWG recommends:

That EUMETSAT provides full-resolution soundings of temperature and moisture (temperature from surface to 100 hPa and moisture from surface to 300 hPa) to users so that they can calculate a variety of forecasting parameters tailored to their particular needs, and that the EUMETSAT retrieval system (having in mind also NWC-SAF CDOP-4 plans) to be designed to be independent of any particular 'first guess' data source, thus allowing the potential for expansion to include different NWP systems and/or 'ensembling' of retrievals to include information of data confidence.

## **Actions**

### **5thCWG Action 1:**

CWG members to provide feedback on the MTG-FCI Rapid Scanning Service (RSS) channel selections, i.e. regarding their anticipated needs/applications for channels and in what resolution. The current HRFI mission (providing the RSS) has assumed a direct dissemination of four channels (VIS0.6, NIR2.2, IR3.8, IR10.5) at a double resolution compared to the full disk mission. The feedback is to be sent to Jochen Grandell, [Jochen.Grandell@eumetsat.int](mailto:Jochen.Grandell@eumetsat.int) by **30 June 2016**.

### **5thCWG Action 2:**

Since the document "Recent concepts and practices" published on CWG webpage will not be updated any more (and will be frozen at the current stage), the CWG co-chairs and the EUMETSAT secretariat are to identify a feasible solution for creating a new document in a more condensed format. The target audience for this document are the operational forecasters.

### **5thCWG Action 3:**

All CWG members are invited to share links to their most relevant scientific publications on convection, to be published on the CWG webpage.

## 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.

### 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.

## Agenda and Discussion Points

Monday, 04 April 2016

13:00 Registration

13:30 Welcome

Col. Stefano Bianca, COMet,  
Italian Air Force  
Meteorological Service

Joachim (on behalf of EUMETSAT) is strongly supporting the idea that CWG workshop should not formalize, to have a semi-informal shape, and in that sense should not expand the number of participants.

Joachim Saalmueller, Head  
of User Support and  
Climate Services,  
EUMETSAT

He welcomed new participants to the CWG workshop.

14:00-  
14:15 Adoption of the agenda, logistics

Vesa Nietosvaara,  
Mateja Iršič Žibert,  
Jochen Grandell,  
Davide Melfi

**14:15-  
17:00 Session: Pre-convective Environment**

**Session chair:  
Vesa Nietosvaara,  
EUMETSAT**

Background of various Convective Index options and how appropriate they are/will be for various sources of satellite soundings (e.g., SEVIRI vs. MTG-S vs. IASI).

Ralph Petersen, CIMSS,  
Univ. Wis., Madison

There were remarks made about how appropriate stability indexes are in the MTG IRS era. The full vertical profiles are needed, and needs to be available to the users, since they contain the full atmospheric information, which is not the case for Instability indexes.

15:00-  
15:30 Coffee Break

Impact of Background Model to the MSG Global Instability Indices (GII) Processing

Zsofia Kocsis, OMSZ

Zsofia examined 3 models: ECMWF, ALADIN and AROME. Test cases were selected. Seems that the RMS threshold defined for the MPEF GII (presently value is 1.5) is too high for correction of a first guess model to happen. She had many values less than 1. Overall satellite correction is rather small.

An extended perspective for DMC - Initiation in the Alpine Region Thomas Krennert, ZAMG

Relocation of Meteosat-8

Jochen Grandell,  
EUMETSAT

There was a longer discussion on this topics and recommendation  
**(5thCWG Recommendation 2)** was formulated on the last  
day.

End of the session at 17h.

17:00 Icebreaker

Sponsored by the Italian  
Met Service

Tuesday, 05 April 2016

**09:00-  
12:30** **Session: Early detection**

**Session chair:  
Mateja Iršič Žibert**

Met Office's Satellite Applications work on detection of  
convection using satellite imagery

Lorenzo Labrador, MetOffice

OTs and high ice-water content clouds and their importance for  
aviation were discussed.

Updates to convective initiation (CI) nowcasting, using cloud  
properties (e.g., effective radius data), along with enhancements  
for early nowcasting of severe storms

John Mecikalski,  
University of Alabama in  
Huntsville

Discussion on the statistical approach followed the presentation.

Meteosat-based Characterization of the Initiation and Growth of  
Severe Convective Storms over Central Europe

Fabian Senf, Leibniz Institute  
for Tropospheric Research

Introduction of FY-4 Developing Convection Product

Danyu Qin,  
Institute of Satellite  
Meteorology, NSMC/CMA

Virtual BT IR high res imagery (VIR) produced by statistical  
relationship out of lower res IR and high res VIS imagery.

Detection of rapidly developing cumulus areas from Himawari-8  
data

Hiroshi Suzue, MSC/JMA

Discussion about usefulness of lightning verification.

10:30-  
11:00 Coffee Break

Use of rapid scan datasets when understanding CI and other  
processes

John Mecikalski, University  
of Alabama in Huntsville

Question: Are the 4 selected channels used during RSS optimal?  
Action **(5thCWG Action 1)** was formulated.

12:30 - Lunch break  
14:00

14:00- Discussion on Update of Terms of References  
14:30

CWG Co-chairs

Joachim Saalmüller presented updates, see final version of ToR within the Minutes.  
There was a discussion on future shape of Current Concepts and Practices document (see **5thCWG Recommendation 4**, **5thCWG Action 2** and **5thCWG Action 3** ). EUMETRAIN webpage can also give the platform to publish cases.

There was an idea on Terminology of basic terms like OT and it will be discussed more on next CWG.

At the end of the session Martin Setvak announced that he will step out from co- chair position. Joachim and the whole group thanked him for a great work he had done in the last years!

**14:30- Session: Mature phase and RSS – part 1**  
**17:15**

**Session chair:**  
**Jochen Grandell,**  
**EUMETSAT**

Physics of Satellite-observed features on top of severe storms

Pao Wang, Department of Atmospheric and Oceanic Sciences

The group agreed that Pao Wang's contribution is very important for the understanding of the physical processes, also for future modelling and nowcasting processes.

15:30- Coffee Break  
16:00

Benefits of RSS over Slovenia

Mateja Iršič Žibert, Slovenian Environment Agency

New advances in automated hazardous storm detection and analysis of storms in super rapid scan imagery

Kristopher Bedka, NASA

End of session at 18:00.

Wednesday, 06 April 2016

**09:00- Session: Mature phase and RSS – Part 2**  
**12:30**

**Session chair: Jochen Grandell, EUMETSAT**

Overshooting top detection using MSG 2.5-minute rapid scan data

Michaela Radova, CHMI

Results strongly depend on what we see as OT, how you define pixels or areas (like Bedka) of OTs in the training database. Not all

	cases used in this study might be classical OTs. It is important to distinguish between daytime and night-time detections. Comparison OT brightness temperatures detected by MSG and AVHRR IR imagery - selected OT cases	Jan Kanak, SHMU
	BTD difference between MSG and AVHRR systematically about 5K, because of different spatial resolution.	
	Deep convection processes analysed by MSG Optimal Cloud Analysis (OCA) products	Piotr Struzik, IMGW – NRI
	There was a clear need of dissemination every 15 minutes (see <b>5thCWG Recommendation 3</b> )	
	Nefodina 2.0: the evolution of the Nefodina model within the HSAF framework	Michele de Rosa, Geo-K s.r.l.
10:30-11:00	Coffee Break	
	Weather and emergency services applied to management and disaster reduction supported by MTG in Brazil	Humberto Barbosa, LAPIS
	New approaches for Nowcasting Techniques over Brazilian Territory	Daniel Vila, Centro de Previsão de Tempo e Estudos Climáticos
	Current status of convective cloud monitoring at NMSC/KMA	Eunha Sohn, NMSC/KMA
12:30-14:00	Lunch Break	
14:00-17:00	<b>Session: Multi sensor approach – Part 1</b>	<b>Session chair: Nataša Strelec Mahovic, DHMZ</b>
	Characterisation of hail storms using a multi-data Approach	KathrinWapler, DWD
	From the discussion it was clear that absolute lightning numbers depend on the type of lightning network, so with the interpretation we need to be careful with absolute thresholds for lightning frequencies.	
	From Pao Wang comment it was clear that it is not surprising that lightning is correlated with hail, but if in addition VIL or total liquid is included, that is a really good predictor for hail.	
	Hailstorm distribution over the Alpine region using radar and	Luca Nisi, MeteoSwiss

NWP data

Analysing Convective Events in Switzerland using MSG, Radar and Lightning Observations (COALITION Second Generation) Ulrich Hamann, MeteoSwiss

A convective event analysed with satellite, radar and lightning data Mária Putsay, Hungarian Meteorological Service

15:30-  
16:00 Coffee Break

Status of MTG Lightning group work

Jochen Grandell, EUMETSAT

Test data for the lightning data will be provided. Approach based on optical emissions ("pulses"), different compared to ground-based systems.

End of session at 17:00.

17:15 Social Event: guided walking tour in Florence followed by a dinner

Day 4 – Thursday 07 April 2016

**09:00-  
11:00 Session: Multi sensor approach – Part 2**

**Session chair:  
Nataša Strelec Mahovic,  
DHMZ**

Multi sensor approach to storm detection

John Mecikalski,  
University of Alabama in  
Huntsville

Questions regarding the details and importance of the input variables are answered. The output needs to be computed faster in order to be operationally useful, this work is ongoing. Method should work well in most parts of Europe. Learning feature selection should be repeated for each region of application (different training databases). This would optimize the most important variables.

It is mainly foreseen to be used in the summer time.

Dual pol radar for nowcasting lightning and intense rainfall event, cloud tracking using satellite and radar (propagation)

Luiz Machado, INPE

Operational nowcasting products for storm detection over Ukraine

Oleksii Kryvobok,  
Ukrainian  
Hydrometeorological  
Institute

Severe storm nowcasting: satellite and lightning data combination

Michaela Valachová, CHMI

RSS data for 2.5 mins seems to be noisy, but if you increase temporal resolution to 1 min or less, you will see, that this is a real signal for individual updraft and intensification pulses. When talking about plumes, it is important to distinguish between plumes directly connected to an OT (actively fed) or ones just advected and still visually present over the anvil.

ESWD reports are not in real time available, but are later on ( after many days) updated for specific cases.

Intense lightning is connected to active updrafts.

11:00-  
11:30

Coffee Break

**11:30-  
13:00**

**Session: NWCSAF**

**Session chair:  
Piotr Struzik, IMGW**

NWCSAF status and future plans CDOP-3

Pilar Rípodas, AEMET

The group was very much grateful to the NWC SAF presentations and welcomed the idea that NWC SAF item would be present at each CWG meeting in future.

The end users are interested to be in the position to run NWCSAF software based on RSS data (2.5 min) in high quality, see **5thCWG Recommendation 1** and **5thCWG Action 1**.

NWCSAF future plans for MTG-IRS

Xavier Calbet, AEMET

The importance of quick product availability was acknowledged. Ralph: Addition of ground based data – in US it is critical to use surface observations for any retrieval over land, much better retrieval skill, is valuable anchor, more or less essential. It was noted that it is important to have access of level 2 temperature and humidity data, see **5thCWG Recommendation 6**. In 2018 CWG meeting a special topic should be dedicated to this topic, (**5thCWG Recommendation 5**).

Instability indices and water content in clear air NWCSAF product

Miguel Angel Martínez,  
AEMET

Convection Initiation and RDT in NWCSAF

Jean-Marc Moisselin,  
Météo-France

In the new v2016 NWCSAF version there will be CI (Convection Initiation) product included. It was mentioned that in OT detection automatic algorithm which is already implemented inside NWCSAF RDT product HRV should be used. Now HRV is used only for verification purposes and VIS0.6 is used as input data. It could be done in future releases (v2018).

13:00-  
14:30

Lunch break

**14:30-17:00**      **Session: New generations of satellite**

**Session chair:**  
**Davide Melfi, Italian Air Force Meteorological Service**

Progress on GOES-R/JPSS Convective Decision Support Research

Wayne Feltz, SSEC/CIMSS  
UW-Madison

Observing convection with the next generation of geostationary satellites: Himawari, GOES-R, and Meteosat Third Generation

Dan Lindsey,  
NOAA/NESDIS/STAR/RA  
MMB

Rayleigh correction could also be applied to MTG data.

**15:45-16:15**      **Coffee Break**

Climatological analyses of hazardous storms from GOES, MSG, MODIS, and AVHRR.  
Discussion on long term statistics

Kristopher Bedka, NASA

End of the session at 18h.

Day5 – Friday, 08 April 2016

**09:00-10:30**      **Session: User preparation and Other**

**Session chair:**  
**Vesa Nietosvaara, EUMETSAT**

EUMETRAIN plans till 2020

Nataša Strelec Mahovič,  
DHMZ

Congratulates to the the whole EUMeTrain Consortium was expressed.

Preparing users for the next generation of satellites

Ivan Smiljanic, DHMZ

The group appreciated that the CWG group and Eumetrain to work together in unformal level. Group also discussed about ways how to make CWG more visible and open.

Validation and documentation of methods presented in the CWG

Alois Holzer,  
ESSL

NWCSAF expressed general interest for NWCSAF products to be in future included in testbed.

**10:30-11:00**      **Coffee Break**

11:00- General Discussion, Recommendations,  
13:00 Conclusions

Vesa Nietosvaara  
Mateja Iršič Žibert

**13:00 End of the workshop**

## List of Participants

	<b>Name</b>	<b>Organization</b>
	Vesa Nietosvaara	EUMETSAT
	Mateja Iršič Žibert	ARSO, Slovenia
	Dr. Jochen Grandell	EUMETSAT
	Dr. Martin Setvak (partly on-line)	CHMI, Czeck Republic
	Thomas Krennert	ZAMG, Austria
	Dr. Daniel Vila	IMPE, Brasil
	Dr. Humberto Barbosa	UFAL, Brasil
	Dr. Luiz Machado	INPE, Brasil
	Ivan Smiljanic	DHMZ, Croatia
	Dr. Nataša Strelec Mahovic	DHMZ, Croatia
	Petra Mikus Jurkovic	DHMZ, Croatia
	Dr. Michaela Radova	CHMI, Czech Republic
	Michaela Valachova	CHMI, Czech Republic
	Dr. Jean-Marc Moisselin	Meteo France, France
	Dr. Kathrin Wapler	DWD, Germany
	Dr. Joachim Saalmüller	EUMETSAT
	Dr. Fabian Senf	Leibniz Institute for Tropospheric Research, Germany
	Dr. Ioannis Matsangouras	HNMS, Greece
	Zsofia Kocsis	OMSZ, Hungary
	Dr. Mária Putsay	OMSZ, Hungary
	Maj. Davide Melfi	COMet, Italian Air Force Meteorological Service, Italy
	Dr. Agostino Manzato	ARPA FVG, Italy
	Dr. Michele De Rosa	Geo-K s.r.l., Italy
	Dr. Hiroshi Suzue	MSC/JMA, Japan
	Dr. Eunha Sohn	NMSC/KMA, Korea
	Dr. Danyu Qin	Institute of Satellite Meteorology NSMC/CMA, P.R. of China
	Samantha Melani	LAMMA, Italy
	Francesco Pasi	LAMMA, Italy
	Massimo Enrico Ferrario	ARPA Veneto, Italy
	Monika Pajek	IMGW, Poland
	Dr. Piotr Struzik	IMGW, Poland
	Dr. Jan Kanak	SHMU, Slovakia
	Dr. Xavier Calbet	AEMET, Spain
	Dr. Miguel Angel Martinez	AEMET, Spain

	Dr. Pilar Rípodas	AEMET, Spain
	Dr. Cecilia Marcos	AEMET, Spain
	Dr. Luca Nisi	MeteoSwiss, Switzerland
	Dr. Ulrich Hamann	MeteoSwiss, Switzerland
	Dr. Lorenzo Labrador	MetOffice, UK
	Dr. Oleksii Kryvobok	UHMI, Ukraine
	Dr. John Mecikalski	UAH, USA
	Dr. Dan Lindsey	NOAA, USA
	Dr. Wayne Feltz	Uni. Of Wisc.,
	Dr. Kristopher Bedka	NASA, USA
	Dr. Ralph Petersen	Univ. of Wisc., USA
	Dr. Pao Wang	Univ. of Wisc., USA
Secretary		
	Alois M. Holzer	ESSL

## Location and Time of Next Meetings

Next splitter meeting will be on 27 September 2016 at EUMETSAT Conference in Darmstadt, Germany and at ECSS 2017. Next CWG workshop will be held in Ljubljana, Slovenia in April 2018.