EUMETSAT

Report of the 14th EUMETSAT User Forum in Africa

Online forum
28-29 September 2021 – Interactive session
6-7 October 2021 – Plenary session

Monitoring weather and climate from space

REPORT OF THE 14TH EUMETSAT USER FORUM IN AFRICA

Organised by EUMETSAT.

Online Forum :
28-29 September 2021 Interactive session
6-7 October 2021 : Plenary session

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EUM P.67
ISSN 1024-8587
ISBN 978-92-9110-111-5

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EXECUTIVE SUMMARY

INTRODUCTION

The 14th EUMETSAT User Forum in Africa was organised from 28 to 30 September and on 06 and 07 October 2021. This edition of the Forum has been organised in virtual mode due to COVID-19 pandemic. The purpose of the EUMETSAT User Forum in Africa is to sustain the well-established dialogue between EUMETSAT and the African user community, in particular the National Meteorological Services and their regional centres, and to provide a platform for these users to discuss about the exploitation of EUMETSAT and other satellite data in various applications areas. The overall objective is to facilitate the use of EUMETSAT satellite data throughout the continent, in support to sustainable development.

The forum was organised in two separate parts :

The first part (from 28 to 30 September) consisted of interactive group discussions. This part of the forum saw the participation (upon invitation) of 150 experts from about 50 African NMHSs.

The second part, the Plenary sessions of the Forum (06 and 07 October) was open to public and consisted of thematic sessions and discussions on the following themes: EUMETSAT programme, Report of the Interactive sessions, Transition to MTG and Status of Capacity programme. More than 300 hundred experts participated to this part of the forum. Presentations and video recordings of the plenary sessions are available online .

As a whole, the Forum was the opportunity to identify actions and initiatives that could be taken by EUMETSAT and its partners to meet the requirements of the African users. These actions are captured in fourteen recommendations, sorted out by topics (see Recommendations section).

PARTICIPANTS

The Forum was attended by representatives of African National Meteorological and Hydrological Services (NMHSs) and specialised regional institutions for Meteorology, Climate and Environment. Regional policy institutions were also represented at the Forum, notably representative of several Regional Economic Communities (RECs), from the African Union Commission (AUC) and the African Ministerial Conference on Meteorology (AMCOMET).

Finally, representatives of the various European and international institutions also took part of the Forum. This includes representatives from the European Commission (DG-INTPA, DG-DEFIS, JRC and EU Delegations in Africa), European NHMSs and the World Meteorological Organization (WMO). Research institutions from Africa and Europe were also also present.

OVERVIEW OF THE FORUM

The Interactive sessions consisted of one Introductory session and 5 Working groups sessions that allowed experts from African NMHS to exchange on topics of interest for climate and

weather services, including Data access and training, MTG, Climate monitoring, Nowcasting and Atmospheric composition. Participation to this Interactive sessions was upon invitation.

The Plenary sessions of the Forum consisted of an Opening Ceremony and 4 thematic sessions. During the Opening Ceremony, representatives of EUMETSAT, AUC, WMO, AMCOMET and EU/DG-INTPA delivered speeches.

The Plenary sessions allowed participants to get information, discuss and provide feedback on EUMETSAT programmes, data access (inc. PUMA 2015 stations) and training activities. A session was specifically dedicated to the transition to Meteosat Third Generation (MTG) and another one to Climate monitoring. One sessions informed on the status of implementation and results on the African Capacity Building Programme such as ClimSA, SAWIDRA and GMES&Africa.

A summary of all sessions and presentations is presented in this report. All presentations and speeches delivered during the Plenary sessions of the 14th EUMETSAT User Forum in Africa are included on the Forum website (https://ufa.eumetsat.int/).

The full programme of the Forum (Interactive and Plenary sessions) is presented in Annex.

MAIN OUTCOMES

The main outcomes of the Forum are captured in the recommendations listed in the next section. They are related either to EUMETSAT data access and training activities, to the transition to MTG, to thematic activities related to Climate, Nowcasting and Air pollution monitoring, to Capacity building programmes in Africa or more broadly to continental approach to foster Space and Earth observation.

The main outcomes are:

- The Forum discussed the status of implementation of the **Roadmap for the transition from MSG to MTG in Africa** endorsed during the 14th EUFA and supported politically through the Abidjan Declaration. It recommended that discussions continue owith the RAIDEG and the AUC in order to ensure deployment of MTG-ready PUMA (EUMETCast reception) station by 2023-2024 timeframe in order to achieve transition to MTG by the end of 2024;

- The Forum discussed the current status **PUMA 2015 and MESA stations** ; it recommended various actions to ensure maintenance of the station, notably through use of existing expertise at regional level and renewal of training courses for system administrators; it also suggested course of action for the upgrade of these stations in the years to come;

- The Forum discussed and provided recommendations in order to improve **Climate services, Nowcasting as well as Atmospheric composition** in NMHSs;

- The Forum provided comments on three continental project (SAWIDRA, GMES&Africa and intra-ACP ClimSA) and recommended ways **to ensure sustainability, cross-**

fertilization among programme in order to enhance impact and appropriation of these projects at national level;

- Finally, the Forum with the close contribution of the RAIDEG members discussed **data access and training needs** to support the exploitation of satellite data for various applications in Africa.

LIST OF RECOMMENDATIONS

Arranged as follows:

- Data access - recommendations #1 to #3
- Meteosat Third Generation – recommendations #4 to #8
- Training and RAIDEG – recommendations #9 to #11
- Climate / Nowcasting / Atmospheric composition – recommendations #12 and #17
- Capacity building programmes - recommendations #18 to #24

Data Access

Recommendation #1 - PUMA 2015 stations (MSG)

The Forum notes that the results of the various surveys performed on the operational status of the PUMA and MESA stations shows that there is a need of maintenance activities for several PUMA stations. The Forum recommended

- to AUC to proceed with the signature of the contract maintenance of PUMA and MESA stations and to provide resources in future programs to continue to support countries and regions to enable them to exercise their station maintenance responsibilities,
- to EUMETSAT to perform a software upgrade for Nowcasting RDT and CRR and Instability products,
- to NMHS to participate and fill-in the 2021 survey on status of PUMA stations as well as the forthcoming surveys and to EUMETSAT to communicate the results of the survey.

Recommendation #2 - Future PUMA-202X-MTG stations

The Forum notes the need to upgrade the satellite data reception infrastructure (namely the PUMA reception stations) in order to receive, display and process the MTG data. The Forum therefore very much welcomes and supports the plan presented by AUC to upgrade the PUMA stations in the 2023-2024 timeframe in the framework of intra-ACP ClimSA programme. When designing the technical specifications of the future PUMA-202X-MTG Stations, the Forum recommended to AUC, EUMETSAT and RAIDEG:

- to take into account PUMA-2015 lesson-learned,
- to consider the need for the future PUMA Stations to be both MTG and MSG compatible,
- to consider to have an increased data storage and processing capacity,
- to consider to be compatible with EUMETCast-C-Band Africa and EUMETCast TERRESTRIAL and other means to access data (e.g. NWC SAF Hubs),

- to clarify the scope of the PUMA-202X-MTG upgrade (SW + PCs, but not antennas and LNB),
- to clarify and communicate to all NMHSs the deployment schedule and list of beneficiaries.

Recommendation #3 - New data services:

The Forum notes and welcomes the new data services put recently in place by EUMETSAT in support to data access, processing as well as open knowledge repositories.

EUMETView is widely used as a back-up and in complement to PUMA. The Forum invited African NMHSs to try the new online data access services, new 'EUMETView'[1], Data Tailor and the Data Store,

Participants of the Forum expressed a great interest in Cloud computing. The Forum encouraged EUMETSAT to provide basic awareness&training, as some barrier to Cloud Computing were identified (e.g. need of a stable internet connectivity, or cost),

Several NMHS expressed interest in EUMETCast-Terrestrial as it might allow access to all MTG data&products. The Forum recommended to identify potential users, their NREN representative and to perform test connection.

The Forum encouraged NMHS to consult the EUMETSAT User Support Knowledge-Base[2] to get more acquainted with data and satellite services.

Meteosat Third Generation

Recommendation #4 - Transition Roadmap

The Forum notes and welcomes the updated roadmap for the transition from MSG to MTG presented by EUMETSAT. The Forum recommended to AUC and EUMETSAT to complete the deployment of the new PUMA 202X-MTG by mid-2024 as then the transition from MSG to MTG could be completed by end of 2024.

Recommendation #5 - MTG contribution to service improvements

The Forum notes the new capabilities of the FCI and LI MTG instruments, as well as the current list of MTG products prioritised by the RAIDEG for inclusion in the EUMETCast-Africa dataflow. The Forum recommended to NMHS are invited to consider potential improvement of their services based on FCI and LI instruments

Recommendation #6 - Support documentation for the transition to MTG

The Forum welcomes the various support documents that are made available by EUMETSAT in support to MTG transition notably the MTG Africa Products User Guide [AfricaPUG], the MTG Africa webinar organised in March 2021. The Forum encouraged all the MTG African

[1] http://view.eumetsat.int
[2] https://eumetsatspace.atlassian.net/wiki/spaces/EUM/overview

users and recommended all NMHSs experts to get more familiar with the new MTG products by:

- familiarizing with the MTG Africa Products User Guide [AfricaPUG][3],
- accessing and studying available on-line resources and,
- attending or re-watching on-line webinars on MTG[4].

Furthermore, the Forum recommended to EUMETSAT to create a repository of (technical) documents relevant to MTG in Africa (MTG-Africa data sets, PUMA related documentation, transition roadmap, calendar, … etc).

Recommendation #7 - Training needs and transition to MTG

The Forum notes that an important training efforts are needed to accompany the transition to MTG. The Forum recommended to EUMETSAT and African VLab CoE to organise, support and perform additional training sessions to MTG African users on :

- Training on PUMA system administrator. These training should be organised in a more intense an regular basis,
- Training on use of new products (i.e. LI, and increased FCI resolution) for Nowcasting applications,
- Training on use of new PUMA-202X station for various applications.

Recommendation #8 - MTG and North Africa

The Forum notes the EUMETSAT to continue efforts in supporting NMHSs of North Africa into the transition to MTG. The Forum recommended to continue having specific meeting (and attending MTG-UP meetings), with a focus on specification for infrastructure upgrade

~~**Recommendation #9 - MTG open knowledge repository.**~~

~~The Forum noted the existence of a lot of existing documentation on transition to MTG in Africa. The Forum recommended to EUMETSAT to create a repository of (technical) documents relevant to MTG in Africa (MTG-Africa data sets, PUMA related documentation, transition roadmap, calendar, … etc).~~

[3] https://www.eumetsat.int/media/47571
[4] e.g MTG in Africa webinar: https://www.eventsforce.net/eumetsat/frontend/reg/tvenue.csp?pageID=10401&ef_sel_menu=177&eventID=24

RAIDEG and Training

Recommendation #9 - RAIDEG

The Forum recognizes the crucial role of the RAIDEG[5] on the optimization of data flows transmitted via EUMETCast, on the identification of needs in terms of data, functionalities of tools and training. The Forum notes, however, that RAIDEG can only fully exercise its mandate if proper communication is ensured between RAIDEG members and NMHSs as well as RCCs. The Forum therefore recommended to NMHS to designate a RAIDEG national contact person and liaise with the RAIDEG regional representative.

Recommendation #10 - Training needs on satellite meteorology

The Forum recognizes that the needs for training on satellite meteorology remains high. The Forum identified, through discussions and interactions among the experts, specific modules and thematic to be developed and proposed for training:

- modules related to new data access mechanism (EUMETView, Terrestrial and cloud computing),
- satellite meteorology combined with NWP,
- climate monitoring on use of satellite-based products for climate monitoring (e.g. TAMSAT and CM_SAF),
- use of some Nowcasting products, with priority focus on RDT and CRR and instability index.

Recommendation #11 - Online Training opportunities

The Forum welcomes the status of the African Satellite Meteorology training programme[6].
The Forum recommended to African users to seize on-line training opportunities, which have increased.

Climate / Nowcasting / Atmospheric composition

Climate monitoring

Recommendation #12 - Climate data

Participants of the Forum notes that EUMETSAT satellite data, products and tools could be used into the development of science-based climate services. The Forum recommended that awareness shall be increased on the use of satellite-data for climate monitoring in Africa, with

[5] https://community.wmo.int/activity-areas/wmo-space-programme-wsp/ra-i-dissemination-expert-group

[6] see https://asmet.africa/ and https://training.eumetsat.int/

focus on TAMSAT and CM-SAF (and other SAFs) data and their combined used with Climate Data Store.

Recommendation #13 - EUMETSAT Climate Data cube

Participants of the Forum expresses interest in the prototype EUMETSAT data cubes that allows notably to monitor drought and vegetation. The Forum recommended to EUMETSAT to extend its Climate Data-Cube on Africa and consequently to engage with African users for collaboration and demonstration of this tool.

Recommendation #14 - ClimSA JRC Climate Station

The Forum welcomes the new ClimSA-JRC Climate Station. Therefore the Forum recommended to NMHS to contribute to the JRC survey dedicated to the design of the C-Station and further to collaborate in its implementation.

Nowcasting

Recommendation #15 - Guidelines for Nowcasting applications in Africa

Participants of the Forum have been informed about recent and planned activities related to nowcasting through novel initiatives, techniques and data. Participants of the Forum expresses a large interest in using the products resulting from the NWC SAF (e.g. RDT and CRR). The Forum recommended, as some countries are willing to install the NWC SAF for local use, to share with all NMHSs the SWIFT experience and lesson-learnt in the form of a Guidelines for Nowcasting applications in Africa.

Recommendation #16 - African Hub(s) and NWC SAF products

The Forum notes that, due to EUMETCast C-Band limited bandwidth, it might be difficult to access all necessary MTG data to feed the NWC SAF software. The Forum recommended that in each NMHS could access via regional centre (e.g. RSMC South Africa) Hub concept for providing NWC SAF products. These hubs should be consolidated for the MTG era in each region and should be considered as precursor for an African Meteorological Satellite Application Facility (AMSAF).

Atmospheric composition

Recommendation #17 - Atmospheric composition monitoring

The Forum recognizes that Air pollution is an increasing issue in many African countries, and more specifically in cities, as it has an impact on the health of the inhabitants. The Forum notes also the contribution of meteorological satellites in the monitoring and forecast of the atmospheric composition. In particular, participants of the Forum has been informed about the current and future EUMETSAT and Copernicus missions and instruments dedicated to the monitoring of air pollution. The Forum recommended to Agencies and Institutions (e.g CAMS, AC-SAF consortium) that can provide data, products and services for Africa :

- to engage in coordinated awareness raising of their offer for service and science across Africa,

- to ensure ease of access and provide tools to support data access and manipulation to support service and science and support the exploration of the co-development of future regional products (in the context of the AMSAF).
- to engage in capacity development and training on integration and downscaling of in situ, satellite and model data, access to data and processing infrastructure as well as to coordinate on atmospheric composition science and services in their activities as a priority.

Capacity Building programmes

GMES&Africa

Recommendation #18 - Contract maintenance of PUMA and MESA stations

The Forum notes that the results of the various surveys performed on the operational status of the PUMA and MESA stations shows that there is a need of maintenance activities for several stations. The Forum recommended to AUC to proceed with the signature of the contract maintenance of PUMA and MESA stations.

Recommendation #19 - GMES & Africa Second Phase

The Forum welcomes the status of implementation of the GMES&Africa services by the 12 regional Consortia. The Forum recommended to consolidate and expand the successful services in the next Phase of the programme.

Recommendation #20 - Cross-fertilization with other Earth Observation Capacity Building Programme

The forum notes the important effort made by the GMES & Africa programme on Service Development and Capacity Building, Outreach and awareness raising among other aspects. Therefore, the Forum recommended to AUC and Regional Consortia to share GMES&Africa positive experience with other Earth Observation Capacity Building programmes.

ClimSA

The Forum notes the status of implementation of the Intra-ACP ClimSA programme in Africa and in the 5 regions (ECCAS, ECOWAS, IGAD, IOC and SADC).

Recommendation #21 : Involvement of North Africa in ClimSA

The Forum recommended to AUC to see how North Africa countries could join of benefit from ClimSA.

Recommendation #22 : Engagement of NMHSs with their RCCs

The Forum recommended Countries to continue engaging with their RCC (and reciprocally) to discuss the Climate services to be implemented within ClimSA.

SAWIDRA

The Forum welcomes the recent progresses achieved by the SAWIDRA projects, but also that most of the infrastructure were installed towards the end of the project, not allowing the projects to fully exploit it and start benefiting from it.

Recommendation #23 - SAWIDRA-Follow-on

In order to sustain the results achieved, the Forum recommended AfDB, with the support of EUMETSAT and the RCC, to start preparation for a second phase of the project and to mobilize resource for strengthening and continuing operations of RARS-Africa network.

Recommendation #24 - RARS-Africa network operationalization and GTS

In order to contribute to the enhancement of regional and global NWP, the Forum recommended to ACMAD, RCCs and Hosting Sites with the support of EUMETSAT and WMO to:

- operationalize the RARS-Africa network and ensure data sharing data through the WMO/GTS.

- build capacity for African scientists on satellite data assimilation in global and regional NWP

- support the development of NWP and other application based on the data collected by the RARS network of 4 stations (including the use of polar orbiting imagers instruments on NOAA, Metop satellites for vegetation, agriculture, drought monitoring, water management, etc).

INTERACTIVE SESSIONS REPORT

INTRODUCTORY SESSION

1. Session purpose and Content

This introductory session set the scene for the of the Interactive sessions of the 14th EUMETSAT Forum in Africa. It included presentation of the objectives and scope of the whole Forum as well as the status of implementation of the recommendations from the 13th EUFA and the report of the RAIDEG activities.

Objectives and programme of the 14th EUMETSAT User Forum in Africa Vincent Gabaglio, (EUMETSAT)

Vincent presented the main objectives of the Forum, which is to reinforce the dialogue between EUMETSAT and the African user communities in order to optimise the use of satellite data and products in Africa, and to provide a platform for the users to discuss and present achievement and challenges in the access and use of satellite data. Vincent then, presented the programme of the Forum and provided logistics information.

Status of implementation of the recommendations from the 13th EUFA, Hervé Trebossen, EUMETSAT)

Hervé provided an overview of the status of implementation of the recommendations raised during the 13th EUMETSAT User Forum in Africa (2018). After recalling, the major events since 2018, Hervé reviewed the main actions performed since the 13-EUFA under the 5 topics and past 16 recommendations.

Report of RAIDEG activities, Lee Ann Simpson (RAIDEG Chair)

Lee Ann, chairwoman of the RAIDEG, recalled that the RAIDEG is composed of one NHMS per region (representing the entire region), ACMAD, VLAB CoE and invited experts. This group meets regularly (at least once per year) and their members are in regular contact. Lee Ann recalled the role of the RAIDEG in advising EUMETSAT regarding access to data. She also explained the technical role played by RAIDEG in the preparation of the transition towards MTG. She presented the activities of the RAIDEG since the last Forum and commented on the high priority discussions among RAIDEG experts on EUMETCast-Africa baseline of products, the Development of Nowcasting guidelines, and the investigation of Terrestrial data feed in regions. of Copernicus data in EUMETCast and its impact on EUMETCast bandwidth. She finally concluded by highlighting the importance of the PUMA and MESA station, the need to plan for their upgrade in the coming years, and the importance in answering to continuous training needs, notably at the level of system administrators.

INTERACTIVE SESSION 1 - EUMETSAT DATA ACCESS AND TRAINING

Chairperson : Lee-Ann Simpson, RAIDEG Chair

Rapporteur : Sally Wannop, EUMETSAT

1. Session purpose and Content

The first session was dedicated to the various systems operated by EUMETSAT to provide to users access to data and products and training. Within this session, the participants had the opportunity to discuss the use of EUMETCast and status of their PUMA stations, to learn more about EUMETCAST Terrestrial and cloud computing solution, and discuss how to access them and their experience and to to provide inputs to the WMO VLAB Training centers in Africa. The session consisted of two (2) presentations followed by five (5) splinter sessions.

2. Session contributions

EUMETSAT Data access, Erdem Erdi (EUMETSAT)

This presentation showcased the various systems operated by EUMETSAT to provide access to various data and products. The primary data access is based on the EUMETCast-Africa dissemination system. Erdem also presented the New online data access services which allow user to view, customise and download data (EUMETView, Data Store and Data Tailor). The presentation then focused on the WEkEOHosted processing service, which is one of the Copernicus Data & Information Access System, jointly developed with Mercator (Copernicus marine service) and ECMWF (Copernicus Atmosphere and Climate Change services). At last, EUMETCast Terrestrial, which allows NRT access to all EUMETSAT and 3rd-party satellite data was presented. It was also reminded that the EUMETSAT help desk service remains operational to support users, and that it can be reached through the email: ops@eumetsat.int .

EUMETSAT Training activities, Mark Higgins (EUMETSAT)

This presentation presented the various training activities and resources that are made available to users, either world-wide or more specifically in Africa. *Mark* recalled the strong cooperation between EUMETSAT and the four CGMS "VLab" Centre of Excellence for training on satellite meteorology, which are located in Casablanca, Nairobi, Niamey and Pretoria. It also updated the Forum on the latest developed ASMET (African Satellite Meteorology Education and Training) courses. Finally, he provided some more insight on the training methodology, more specifically on the student selection process, which is generally based on a self-learning stage (organised through online courses), as a pre-requisite to participate in classroom training. The courses are based on case studies and simulation. The common objective of all training courses is for students to be able to apply the acquired knowledge when they return to their institutions.

3. Outcomes of group discussions

After the plenary session, Group discussions were organized per theme to discuss about the Meteorological Satellite Interpretation Training needs (WG#1), the PUMA Stations (WG#2

and #3) and the EUMETCAST Terrestrial and Cloud Computing (WG#4 and #5). The following points have been raised:

WG#1 - Meteorological Satellite Interpretation

- The continued need for training on satellite meteorology remains high, with suggestions to combine it with training on NWP,
- On-line training opportunities have increased (see https://asmet.africa/ and https://training.eumetsat.int/) allowing for more participants to attend courses and access course material
- There is needs to improve the communication of up coming training event (see: https://trainingevents.eumetsat.int/)
- Specific requests for increased training on climate monitoring, preparing for MTG and on the use of SAF data.

WG#2 and #3 - PUMA Stations

- PUMA 2015 stations need maintenance : Survey on PUMA 2015 stations is currently ongoing and some countries are facing recurrent problems and report to EUMETSAT User Helpdesk, some others are not reporting. The pandemic has made it harder to maintain the stations. A small software update is being released in October to visualise some additional NWP data, some dust monitoring, nowcasting and CM SAF products,
- PUMA202X stations : NMHSs are looking forward to the new stations which come online from 2024. There is a need to improve the offer of PUMA system administrator training, including advanced administration as well as to improve the information provided on any future upgrades to assist NMHSs in ensuring they always run the latest version of the software,
- EUMETView is quite widely used as a back up / to complement data received via the PUMA station (e.g. to re-run past weather events)

WG#4 and #5 - EUMETCast Terrestrial and cloud computing

- EUMETCast Terrestrial: An interest in EUMETCast Terrestrial was expressed by some NMHS. However, there are concerned about the last mile costs which need to be paid by the connecting centre (NMHS). EUMETSAT recommends that interested NMHSs contact their NREN to establish costs EUMETSAT provides a volume calculator to assist in estimating total volume]
- Cloud computing: NNMHSs expressed an interest in cloud computing, however there is a need to learn more about the opportunities and how to connect to service providers. At present NMHSs are ‘feeling the water’ and there may be barriers to uptake, e.g. the need for stable internet connectivity. There may be opportunities to establish a pilot cloud computing project with AM-SAF. WEkEO, provides a basic free service and this could be an opportunity for some to access and utilise Copernicus data (Sentinels)Southern Africa (SADC-CSC).

The Session 1 contributed to recommendations #1 to #3.

INTERACTIVE SESSION 2 - METEOSAT THIRD GENERATION

Chairperson: Jolly Wasambo, AUC
Rapporteurs: Vincent Gabaglio, EUMETSAT

1. Session purpose and Content

As the successor of the current Meteosat Second Generation (MSG), Meteosat Third Generation (MTG) will provide observation over the entire African continent on a continuous and frequent basis (every 10 minutes) for the next two decades. MTG will also substantially increase the observation spectrum providing 20 times more real- time information on fast developing high-impact weather and ocean and surface parameters such as sea surface temperature, turbidity of coastal waters, wildfires and incoming solar energy.

This interactive session addressed the challenges related to the transition to MTG in Africa, collected feedbacks from the audience about priorities in terms of MTG datasets, interacted with the participants on the upgrade of PUMA 2015 stations as well as informed and discussed on the characteristics and new capabilities of the main instruments of MTG.

During the session Denis Gayard and Vincent Gabaglio, EUMETSAT, gave a presentation on MTG for Africa and the transition roadmap followed by 5 parallel thematic splinter sessions.

2. Session contributions

MTG for Africa and Transition roadmap, Denis Fayard and Vincent Gabaglio (EUMETSAT)

D. Fayard and V. Gabaglio, highlighted in their presentation the main products and the specifications of the instruments of MTG with emphasis on the Flexible Combined Imager and the new Lightening Imager. A comparison between MSG and MTG in terms of spectral, spatial, and temporal resolution was presented. They also presented the current Status of MTG spacecraft, which is planned to be launched during the last quarter of 2022. They also presented the Data set and priorities for Africa, the MTG Product User Guide for Africa and the Transition roadmap (including new PUMA stations). The presentation also explained the challenges for the introduction of MTG data in Africa, as the volume of expected data is about 25 times bigger than the current volume of MSG data. This means that more capacities in term of data dissemination, reception, processing and applications will be needed. This implies also the need to upgrade the PUMA-2015, through the Intra ACP-ClimSA Programme, to ensure that the MTG data can be received, processed and visualized operationally in the NMHS and without interruption with respect to MSG data.

3. Outcomes of group discussions

After the plenary session, Group discussions were organized per theme to discuss about the Flexible Combined Imager (WG#1), the Transition Roadmap and New PUMA stations (WG#2 and #3), the Lightning Imager (WG#4) and the MTG North Africa(MTG-Up) (WG#5). The following points have been raised:

WG#1 - Flexible Combined Imager

- Questions related to data access and training
- High interest in the new temporal resolution (for severe weather events)
- High interest in the new special resolution (for fire detection and Rapidly development thunderstorm)

WG#2 and #3 - Transition Roadmap and New PUMA stations

- Feedback on the current PUMA stations and notably the elements of the station to be improved
- Question on the timing and deadline of the transition to MTG

WG#4 - Lightning Imager

- Huge interest for the data of this new instrument
- Important input for Nowcasting of Severe Weather Events (Thunderstorm)
- Critical for safety of people and infrastructure and for aviation

WG#5 North Africa:

- Main discussion on the upgrade of the NMHS infrastructure to receive and process new MTG data

The Session 2 contributed to recommendations #4 to #8.

INTERACTIVE SESSION 3 - CLIMATE MONITORING / CLIMATE SERVICES

Chairperson: Dieudonné Nsadisa Faka (OACPS)

Rapporteur: Herve Trebossen (EUMETSAT)

1. Session purpose and Content

This session was dedicated to climate services and applications within the African continent to support climate monitoring activities. The session contributed to inform and allowed interactions with stakeholders on how EUMETSAT satellite data and products could be used into the development of science-based climate services.

This session included four (4) presentations combining institutional and scientific elements, related to the establishment of Climate Services in and for Africa and working group discussions on the status of the implementation of the intra-ACP ClimSA programme and Climate services per region.

2. Session contributions

EUMETSAT climate products, Christine Traeger Chatterjee and Marie Doutriaux Boucher (EUMETSAT)

Chrsitine and Marie informed the audience that EUMETSAT is providing users with a large variety of Climate Data Records based on long term cross-calibrated GEO and LEO measurements. These datasets are accessible through EUMETSAT product navigator/datastore as well as through SAF webpage. EUMETSAT is also prototyping of a Data Cube on Europe for Drought & Vegetation Monitoring. The idea is to bring data closer to the user with notably long term analysis ready data, common data format. EUMETSAT would also been interesting in extending its prototype to Africa. If interests are expressed by African potential users, dialogue will play a crucial role to understand better the tasks and related challenges of climate services and EUMETSAT would likely to collaborate on identifying those data that would be best suited to help solve a problem or a service.

Tamsat Climate Services, Ross Maidment (University of Reading)

Ross presented first an overview of TAMSAT operational satellite-based rainfall products. These estimates span the period 1983 to the delayed present (latency 2 days) and are currently used in a wide range of applications. Then Ross informed that TAMSAT has recently started to offer additional climate services, namely (1) TAMSAT-derived Africa-wide soil moisture estimates and (2) forecasts of agricultural drought. To support the uptake of TAMSAT climate services, we now offer periodic virtual training events. Details about our products and capacity building events can be found on our website (www.tamsat.org.uk).

Climate Station, Christophe Lavaysse (JRC)

Christophe presented the Climate Station that forms the JRC main contribution to Intra-ACP ClimSA programme. The Climate Station is a free software designed based on dialogue with RCCs and users that will establish/Improve access to the CSIS in operational context. C-Station has been designed based on existing and past EU investments such as Copernicus, AMESD-MESA-GMES&Africa. This Software is a single entry point of the different datasets of Climate Data. Required functionalities and application embedded. It integrates in a seamless way CDR coming from different sources (EUMETCAST, Internet, cloud computing)
A prototype version has been distributed to some RCCs and to be distributed in 2022 at national level (NHMS). Trainings / workshops ob the Climate-Station will be organized soon.

ClimSA overview, Dieudonne Nsadisa Faka (OACPS)

Dieudonné Nsadisa Faka gave an overview of the EU-Funded Intra-ACP ClimSA programme which is in support of the implementation of the Global Framework for Climate Services in the ACP region. The objective of the ClimSA programme is to strengthen the climate services value chain through building the capacities of decision-makers at all levels to make effective use of climate information and services. The Intra-ACP ClimSA programme is supporting, among others, the improvement of Decision Support System for Policy Development for sensitive key socio economic sectors (Agriculture & Food Security, Energy, Health, Water and Disaster Risk Reduction), the Certification of RCCs as WMO RCC compliance (ACMAD

(Niger), AGRHYMET (Niger), ICPAC (Kenya), SADC-CSC (Botswana), CAPC-CA (Cameroun), Indian Ocean Network (Mauritius)) as well as the Sustainable Development & Climate Resilience Society.

3. Outcomes of group discussions

After the plenary session, Group discussions were organized per region to discuss about the Intra-ACP Climate Services and related applications programme. More specifically, for each region (i.e: ECCAS/CEMAC, ECOWAS, IGAD, IOC and SADC), the objectives of the WGs were to inform countries about the on-going grant preparation and to collect feedback from country representatives. The following points have been raised:

ClimSA programme :

- The ClimSA implementation status were provided to NMHSs by RCCs as well as planned activities (West, Central and East Africa),
- Queries from NMHSs about ClimSA activities at National Level including support to National Framework for Climate Services implementation were raised,
- NMHSs from North Africa expressed interests to benefit of ClimSA. This queries will be raised at AUC level (Continental coordination).

Climate Station : JRC provided some clarifications on the Design and functionalities of the Climate Stations and on the main differences between Climate and eStations

Awareness of satellite data for Climate monitoring and services:

- The status differs between countries : C3S, CM-SAFs and/or TAMSAT are already in use or of strong interest to be used for implementation of Climate Services,
- Some countries reports difficulties in accessing the data,
- NMHSs expressed specific interest on Data Cube style distribution system for Africa,
- The NMHSs expressed training needs on the use of these various data.

The Session 3 contributed to recommendations #12 to #14.

INTERACTIVE SESSION 4 - NOWCASTING

Chairperson: M. Diop Kane, WMO

Rapporteurs: Natasa Strelec Mahovic, EUMETSAT

1. Session purpose and Content

The frequency of natural disasters due to severe weather conditions in Africa is increasing and leading to high economic and human losses. Some of the world's most vulnerable groups are facing some of the worst effects of these disasters. Improving the accuracy of nowcasting is therefore critical for people's safety as well as for key economic sectors such as aviation, agriculture, energy, water and emergency response. The aim of this interactive session was to showcase recent and planned activities related to nowcasting through novel initiatives, techniques and data. The discussions during the working groups aimed at sharing experiences and at discussing about requirements to improve NWC activities in Africa.

2. Session contributions

Nowcasting Satellite Application Facility : software and products, Pilar Ripodas (AEMET, NWC SAF)

Pilar, in her presentation, detailed the activities of the Nowcasting-SAF. The NWC-SAF develops software packages for geostationary and polar-orbiting satellites to support users making nowcasting in near real-time locally. Products are available in Near Real Time also on the NWCSAF web page (only with European Coverage) at https://www.nwcsaf.org/. It is foreseen that improved and new products will be available with MTG. A selection of products is generated at EUMETSAT Headquarter and distributed via EUMETCast Africa (CMA, CT, CTTH, CRR, RDT-CW). Furthermore, PUMA stations are being upgraded to visualize these NWC prodcuts

The SWIFT programme, John Marsham (University of Leeds)

John Marsham presented the SWIFT programme implemented at University of Leeds. Satellite data are particularly critical in Africa for Nowcasting of Severe Weather Events due to problems with obtaining or maintaining meteorological ground RADAR infrastructure. SWIFT aimed at increasing the use of automated NWC products in Sub-Saharan Africa. SWIFT worked with African centres to generate NWCSAF products locally (Ghana, Nigeria, Senegal, Kenya and ACMAD) and involved universities and Met Services. Then, John gave the main findings from the SWIFT implementation: Convective Rainfall Rate and Rapid Development Thunderstorms products are providing high value for forecast up to 5 hours and MTG – LI will be very important. At last, John outlined that there is a vision to build on AMSAF to enhance nowcasting services in Africa.

SAWIDRA and RARS Africa for NWP, Leon Guy Razafindrakoto (ACMAD)

Leon Guy Razafindrakoto presented the main outcomes of the SAWIDRA project, funded through the AfDB (Climdev Special Fund) under the ACP-EU's DRR programme (10th EDF). The project has been closed in 2021. Leon recalled the objective of SAWIDRA and detailed the activities under the 4 main components of the project (i) capacity building of the NMHSs to meet the need of disaster management agencies, (ii) establishment of capacity for NWP

and provision of satellite data for NWP, (iii) continental-level capacity to deal with natural disasters. Leon described the network of RARS-Africa station that has been recently installed ant that gives direct access to Meteorological Polar Orbiting satellites. In his conclusions, Leon highlighted the challenges that remain in getting the infrastructure up and running so that it can contribute to improved NWP at global, regional and local levels.

3. Outcomes of group discussions

Following the three presentations in plenary six splinter groups per region discussed about experiences and about requirements to improve NWC activities in Africa. The following points were raised :

- Main weather phenomena subject to Nowcasting are extreme rainfall events, floods, convective storms with hail and lightning, waterspouts (Lake Victoria), marine events, dust & fog,
- The current tools for Nowcasting in used are : satellite data (via PUMA station or EUMETView), ground based observations, NWP model outputs, some ground-based lightning, radar data (a few radar exist in Africa),
- NWC SAF are installed in some countries (e.g. SWIFT countries + SAWS + North Africa),
- Experience was shared during the WG discussion. Support received from the NWC SAF Helpdesk and good user guide,
- More personnel capacity and skills would be needed to be able to implement the NWC SAF SW locally in other services,
- As Regional Specialized Meteorological Centres (RSMCs), SAWS share NWC SAF Products with the region[7]. NMHSs from SADC region expressed interest in having more training for the region to benefit from these products,
- NMHSs stated that the most useful NWC SAF products are CRR and RDT. Combining RDT with ground based lightning data enhanced the value of the product,
- In MTG era, NWC can be improved greatly, but it will be harder for NMHSs to run the software without access to the full FCI data (need for a EUMETCast-Terrestrial connection),
- EUMETSAT informed NMHSs that visualisation of NWC-SAF products via EUMETView is planned for 2022
- SAWIDRA was key in supporting Regional centre (e.g. CAPC-AC in Central Africa) and SAWIDRA products are not yet used by NMHS due to lack of distribution of RARS-Africa products via GTS.

Session 4 contributed to recommendations #15 and #16

[7] http://rsmc.weathersa.co.za/login.php

INTERACTIVE SESSION 5 - ATMOSPHERIC COMPOSITION

Chairperson: André kamga, ACMAD
Rapporteurs: Mark Higgins, EUMETSAT

1. Session purpose and Content

The last Interactive Session was dedicated to Atmospheric composition and in particular Air pollution which is an increasing issue in many African countries, and more specifically in cities, as it has an impact on the health of the inhabitants. This last Interactive Session was dedicated to the contribution of meteorological satellites in the monitoring and forecast of the atmospheric composition. In particular, this session informed the participants about the current and future EUMETSAT and Copernicus missions instruments dedicated to the monitoring of air pollution, as well as on the way to access and use the data. This session also collected through discussions in working groups feedback from the audience about existing experience and needs in Africa for the monitoring of Atmospheric Composition.

2. Session contributions

Monitoring atmospheric composition in Africa from satellites, Federico Fierli (EUMETSAT)

Federico outlines the core atmospheric processes and constituents that can be observed with the current and near future mission from EUMETSAT and Copernicus programmes. Among them he outlined within his presentation that long-term, homogeneous and reliable observations are needed for monitoring the environmental impact on a longer term (e.g. Health, Human Exposure, CO2), monitoring events (e.g. Dust, Wildfires) as well as for early warning (e.g. Meningitis, Fire risk ...). Current and upcoming Copernicus and EUMETSAT instruments acquisition will form an unique set of existing and upcoming data to monitor atmospheric composition notably with MTG, EPS-SG and Sentinel-5 missions.

Copernicus Atmospheric Monitoring Service, Vincent Henri Puech (CAMS)

Vincent-Henri presented the core Copernicus Atmospheric Monitoring Service and the possibilities for Africa from the CAMS offer. CAMS provides open and free information products based on Earth Observation about past, current and near-future (forecasts) global atmospheric composition, the ozone layer, European air quality, emissions and surface fluxes of key pollutants and greenhouse gases, solar radiation, climate radiative forcing, thanks notably to the Sentinal-5P/Tropomi instrument. Then Vincent-Henri illustrated his presentation with some examples (e.g CO2 emissions from shipping activities, Ozone hole monitoring). He presented the Atmospheric Data Store (ADS) from CAMS. At last, he concluded that CAMS is pen to collaborations (setting up national-level forecasts, downscaling applications, evaluation of products...) and that joint EUMETSAT-ESA-ECMWF training opportunities are available.

Use of satellite product for Air pollution in Central Africa, Médard Obiang Ebanega(Omar Bongo University)

Dr Médard Obiang Ebanega presented an overview of the current situation and state of the art in air pollution monitoring in the City of Libreville in Gabon. He recalled the context of air

pollution in Libreville and the ground based observation network (1 station) put in place for this study. He spatialized PM 2,5 data from ground observation based on surface temperature, and vegetation indices. In order to scale-up this initial study, a 3 years project entitled SQALE have been elaborated notably in order to measure population exposure to pollution, to strengthen local capacities (University, NGOs) in air quality data collection and processing and to develop an air quality data exchange platform.

3. Discussions and Recommendations

Following the three presentations in plenary six splinter groups per region discussed about feedback from the audience about existing experience and needs in Africa for the monitoring of Atmospheric Composition. The following points were raised :

- Most of these data and products are covering Africa and can be valuable for the institutions in charge of atmospheric composition monitoring (E.g. Air Quality, Volcanic Ashes, etc)
- Responsibility for atmospheric composition services provision varies from country to country, and there is wide interest in additional atmospheric composition products from ozone monitoring to ash to pollutants and particulates.
- The level of awareness, at this time, of what is available from the international institutions and what is possible needs to be strengthened. Information is available in many places but not consistent.
- Most services are using ground sensors, some the (new) space sensors
- Some service undertake their own modelling, a few more use the output form the international centres
- Applications areas include:
    - Health, air transport and Agriculture are priority applications areas
    - Dust and fire/smoke monitoring
    - Particulates (PM2.5,PM10) monitoring
    - Surface gas concentrations (NOx, NO2, SO2, CO ....)
    - Upper air concentrations (O3, ...)
- There is a strong need for information and training on data integration (in situ, satellite and model), data access and processing
- There is interest in co-designing regional products

Session 5 contributed to recommendation #17

CONCLUDING REMARKS

In its concluding remarks, Vincent Gabaglio from EUMETSAT thanks all the participants for the very fruitful discussions that occurred during the last three years. He presented an overview of the recommendations raised during the 5 interactive sessions. He concluded his speech informing the audience that around 150 participants from ~50 African NMHS attended the event and the Interactive sessions represented more than 12 hours of direct interactions with users through 28 Working Groups.

PLENARY SESSIONS REPORT

OPENING CEREMONY

The Opening ceremony of the Plenary sessions of the 14th EUMETSAT User Forum in Africa saw speeches from *Phil Evans*, Director General of EUMETSAT, *Josefa Sacko*, Commissioner for Rural Economy and Agriculture of the African Union Commission, *Petteri Taalas*, WMO Secretary General, *Jean Ernest Masséna Ngallè Bibéhè*, AMCOMET Chair, Ministry of Transport of the Republic of Cameroon and *Hans-Christian Strausboll*, Head of Unit in charge of Regional and Multi-country Programs for Africa, DG INTP, European Commission.

Phil Evans, in his opening speech welcomed the participants to the Plenary session of the 14th EUMETSAT User Forum in Africa. He recalled the commitment of EUMETSAT to expand its cooperation with Africa within the framework of the new EUMETSAT Destination 2030 Strategy. He recalled the willingness of EUMETSAT to support the implementation of the Abidjan Declaration and to support African users in the transition to MTG by 2024 and the to contribute to the achievements of the AU Agenda 2063, the Joint Africa Europe Partnership as well as the WMO regional plan. He also thanks the EU to have supported and support to the serie of African Capacity programme (PUMA, AMESD, MESA, GMES&Africa and ClimSA).

Josepha Sacko of the African Union Commission highlighted that Climate change is having a growing impact on the African continent. She recalled the full support of the AUC to the implementation of the Abidjan Declaration adopted during the 13th EUMETSAT User Forum in Africa. At last she called for synergy with the African DRR WG and the Great Green Wall initiative.

Petteri Taalas celebrates the fruitful cooperation between EC, AUC, EUMETSAT and WMO in support to the Meteorological community in Africa. He recalled that data gaps in the Global Basic Observing Network are observed notably in LDCs and SIDs countries, this is why WMO is coordinating the new Systematic Observation Financing Facility. This initiative aims to support countries in generate and exchange basic surface-based observational data critical for improved weather forecasts and climate services. This will also play play a vital role for calibration and validation of satellite weather data.

Jean Ernest Masséna Ngallè Bibéhè acknowledged the contribution of EUMETSAT, among other partners, in the delivery of meteorological satellite infrastructure. He informed the audience that the revised Integrated African Strategy on Meteorology has been approved in March 2021. This strategy will contribute notably to deliver enhanced weather and climate services to the end-users. He noted that the EUMETSAT Strategy 2030 emphasises cooperation with Africa. He encouraged funding partners to support Africa in the transition to Meteosat Third Generation.

Hans-Christian Strausboll recalled that data and information coming from Earth Observation are extremely important to monitor development indicators in multiple fields. He thanked EUMETSAT and Copernicus programme to give an easier access to EO data to African users. He recalled that EU/INTPA is funding the on-going GMES&Africa and ClimSA programme for a global envelope of more that 130 million Euros. He informed the audience that Digital and

Green Transition are important priorities for the on-going programming for Sub Saharan Africa under the new Neighbourhood, Development and International Cooperation Instrument - Global Europe which will mobilized 29 billion euros for the next seven years for SSA. EU will push the Science Technology and Innovation capacities in public health and green sectors in collaboration with public and private sectors and academia, the use of EO in these areas are foreseen in line with the EU-AU Policy Dialogue on STI.

SESSION 1 - OVERVIEW OF EUMETSAT PROGRAMME

Rapporteurs: V. Gasbaglio, EUMETSAT

1. Session purpose and Content

The first session was dedicated to the presentation of the status of the various EUMETSAT programme and activities: MSG, EPS, Jason, MTG, EPS-SG, SAFs. It also included presentations related to training and access to EUMETSAT data (including EUMETCast). This session was complemented by the report of the RAIDEG activities.

2. Session contributions

The session consisted of four (4) presentations followed by a Q&A session.

Status of EUMETSAT programme, Phil Evans (EUMETSAT)

This presentation provided the status of the current generation of EUMETSAT geostationary and polar-orbiting satellites (MSG, METOP and Jason) and explained various applications and their impact on weather forecasting. The focus was then also on the new generation of satellite: the Meteosat Third Generation and the EUMETSAT Polar System - Second Generation (EPS-SG), explaining the status of development and the expected date of operation as of 2022 and until 2040. The role of EUMETSAT in the Copernicus program, which include the operation of Sentinels-3, 4 and 5 in support to marine, atmosphere as well as climate services.

EUMETSAT Data access and User services, Sally Wannop (EUMETSAT)

This presentation showcased the various systems operated by EUMETSAT to provide access to various data and products. The primary data access is based on the EUMETCast-Africa dissemination system, which has been recently improved in terms of bandwidth, technology (from DVB to DVB-S2) and dissociated operation with respect to the EUMETCast-Europe service. Sally also presented the web & internet access services that are currently available or under development, including for the access to archived data. The presentation then focused on the new WEkEO portal, which is one of the Copernicus Data & Information Access System, jointly developed with Mercator (Copernicus marine service) and ECMWF (Copernicus Atmosphere and Climate Change services). It was then reminded that the EUMETSAT help desk service remains operational to support users, and that it can be reached through the email: ops@eumetsat.int .

EUMETSAT Training activities, Vesa Nietosvaara (EUMETSAT)

This presentation presented the various training activities and resources that are made available to users, either world-wide or more specifically in Africa. Vesa recalled the strong cooperation between EUMETSAT and the CGMS "VLab" Centre of Excellence for training on satellite meteorology, which are located in Casablanca (DMN) and Niamey (EAMAC) for French speaking countries, Nairobi (IMTR) and Pretoria (SAWS) for English speaking countries and Oman for Arabic speaking countries. Vesa also updated the Forum on the new programmes with some core new applications such as the atmospheric composition. He also outlined the importance of the taining centres as well as the EUFA and RAIDEG in identifying the training needs from the user community. He recalled the participants that all the training opportunities can be found @ http://trainingevents.eumetsat.int. Then, he concluded his presentation by the identified training issues such as the sufficient internet reliability to attend online courses, information timeliness on training events.

Report of RAIDEG activities, Lee Ann Simpson (SAWS, RAIDEG Chair)

Lee Ann, chairwoman of the RAIDEG, recalled that the RAIDEG is composed of one NHMS per region (representing the entire region), ACMAD, VLAB CoE and invited experts. This group meets regularly (at least once per year physically, with virtual meeting happening also) and their members are in regular contact. Lee Ann recalled the role of the RAIDEG in advising EUMETSAT regarding access to meteorological and climatological data. She also explained the technical role played by RAIDEG in the preparation of the transition towards MTG. She presented the activities of the RAIDEG since the last Forum and commented on the recent inclusion of Copernicus data in EUMETCast and its impact on EUMETCast bandwidth. She finally concluded by highlighting the importance of the PUMA and MESA station, the need to plan for their upgrade in the coming years, and the importance in answering to continuous training needs, notably at the level of system administrators.

3. Discussions and Recommendations

After the presentations there were a number of points that were discussed in plenary including:

Questions on EUMETSAT data access and services (EUMETView, available api)

Discussions around planned webinars on EPS instruments, on MTG for African Users and within the MTG-Up programme,

The organisation of a webinar dedicated to Land products has also been requested by the audience

Session 1 contributed to recommendation #3, #7, #8 and #11

SESSION 2 - REPORT FROM THE INTERACTIVE SESSION (WORKING GROUPS)

Rapporteur: D. Fayard, EUMETSAT

1. Session purpose and Content

This session was dedicated to the report of the 5 interactive sessions that were organised from 26 to 28 September projects and initiatives for Land (natural resources and water management).

2. Session contributions

Vincent Gabaglio from EUMETSAT gave an introductory presentation outlining the content of the Interactive sessions that took place from 26 to 28 September. These sessions were attended by about 150 experts coming mainly from NMHSs from 50 African countries. The Interactive sessions were organised around 5 thematic sessions namely (i) EUMETSAT data access and training, (ii) Meteosat Third Generation, (iii) Climate monitoring and services, (iv) Nowcsating and (v) Atmospheric composition. Sixteen keynote presentation were given and 28 Working Groups were organised by theme or by African region. During these 3 days, more than 12 hours of cumulated interactions took place between the experts.

The Chairpersons of the five Interactive Sessions then shared their reports to the audience :

#1 EUMETSAT data access and training, Leee Ann Simpson - RAIDEG Chair, SAWS

#2 Meteosat Third Generation - Jolly Wasambo - AUC

#3 Climate monitoring and services - Dieudonné Nsadisa Faka - OACPS

#4 Nowcasting - Mariane Diop Kane, WMO

#5 Atmospheric composition - André Kamga - ACMAD

More information on the outcomes of these Interactive Sessions can be found in the section related to the report of the Interactive sessions.

SESSION 3 - MTG AFRICA AND AMSAF

Rapporteur: S. Wannop, EUMETSAT

1. Session purpose and Content

This Third Session was dedicated to the Meteosat Third Generation (MTG) programme and its benefit for Africa. It allowed the participant to discuss priorities in terms of MTG data sets to be made available in near real time to Africa, as wells as transition roadmap from MSG to MTG. The Session also discussed the current plans for upgrading the PUMA-2015 stations in order to receive and visualise the prioritised MTG data.

2. Session contributions

MTG programme overview - Denis Fayard and Vincent Gabaglio (EUMETSAT)

The session began with two presentations on MTG. EUMETSAT, Denis Fayard and Vincent Gabaglio presented an overview of the new observations to be expected with MTG from the new imaging instrument FCI and the lightning imager LI. The advent of MTG is expected to bring significant benefit to the African user community. The ongoing MASEIS, MTG and EPS-SG African Socio-Economic Impact Study is exploring ways to strengthen the institutional, human and technology capacity in the application areas of aviation forecasting, disaster risk reduction and agro-meteorology.

MTG is not without challenges: volume of data, need for new reception station equipment and data processing software, re-training of personnel etc., and the MTG transition needs to be planned carefully. EUMETSAT outlined the timeline for the transition from MSG to MTG, starting with the commissioning and validation of the satellite and the products, a one-year activity, to the start of operational data disseminated through EUMETCast Africa and finally the close-out of the MSG 0 degree service expected by end 2024. EUMETSAT is committed to contribute to solutions for the technical challenges and to continue to support training in the use of satellite data. At the local level, NMHSs need to commit to the mobilisation of their resources to realise the benefits of MTG.

MTG data for Africa products – Current baseline - Lee Ann Simpson (RAIDEG Chair)

Session continued with an overview of the current baseline for MTG Africa, presented by Lee-Ann Simpson. The move from second to the third generation of data will bring new opportunities to evolve and enhance skills in using satellite data whilst ensuring that the operational services continue to run with the transition. In preparing for MTG, the WMO RAIDEG group has been discussing the baseline, with the aim of achieving a balance between the needs of African user with the limitations on bandwidth. In short, the outcome is a reduction in coverage of some of the channels and the development of centrally generated RGBs.

Report of the Abidjan Declaration Joint Working Group - Jolly Wasambo (AUC)

Jolly Wasambo recalled the main objectives of the Abidjan Declaration which aims to strengthen African capacities at continental, regional and national (NMHSs) levels to ensure a smooth transition from MSG to MTG and continued access and exploitation of satellite data and products (MTG Programme) and to strengthen the African capacities in satellite meteorology by developing and establishing an African Meteorological Satellite Application Facility (AMSAF) to enable generation of Africa-tailored satellite products on weather and climate services (AMSAF Programme)strength African capacities towards a smooth transition from MSG to MTG and to develop an African SAF (AMSAF). He also recalled that this Abidjan Declaration is supported by the Cairo Ministerial Declaration in February 2019. The JWG started its activities in 2019, developed a roadmap, identified regional priorities, elaborated a MTG-AMSAF concept note, prepared a draft resources mobilisation framework and engaged with the EU.

MTG Transition plan (MTG AMSAF concept, Upgrade of PUMA stations) - Mariane Diop Kane (WMO / AMCOMET Secretariat)

Mariane Diop Kane explained that the project is built upon the very good partnership between EUMETSAT, African stakeholders and user communities. The project includes seven outputs:

securing data access, facilitating improved data processing, development of an AM SAF, facilitating downstream services for socio-economic sectors, development of new policy framework and knowledge sharing, capacity building and fostering R&D. The AM-SAF once established will develop products needed for African user community, by the African community. The core activities are expected start by end 2024, after ClimSA programme implementation period.

3. Discussion and recommendations

The Q&A session addressed topics such as future expectations on data access, the anticipated value and use of LI data, future use of nowcasting products and training needs and evolution, data processing and future opportunities of AMSAF.

During the discussions African NMHSs were encouraged to complete the ongoing survey on the status of their PUMA2015 reception station. The information provided will help to formulate decisions to be taken with respect to PUMA202X station procurement.

African NMHSs focal points were encouraged to engage with their RAIDEG representative to support the continued evolution of the MTG baseline. At the present time, focal points are encouraged to provide their requirements for SAF products in the MTG era.

Session 3 contributed to recommendation #1 and #9

SESSION 4 - STATUS OF CAPACITY PROGRAMME

Rapporteur: H. Trebossen, EUMETSAT

1. Session purpose and Content

The fourth Session was dedicated to the status of implementation and outcomes of Capacity programme implemented in Africa, namely GMES&Africa, the Satellite and Weather Information for Disaster Resilience in Africa programme (SAWIDRA) and the Intra-ACP ClimSA programme.

2. Session contributions

GMES&Africa Support Programme - Tidiane Ouattara (AUC)

Tidiane Ouattara highlighted within his presentation the main outcomes of the first phase of the GMES&Africa Support Programme (2017-2021). He notably gave an overview of the various services that are implemented within the 12 regional consortia of African institutions. Among those services, eight were developed targeting Marine and Coastal applications, and eleven targeting water and land services. The development of such operational applications involved122 African institutions. Furthermore, GMES&Africa developed and performed more than 67 different training courses for more than 2,630 trainees. This significant effort is sustained by a GMES&Africa Network of Universities.

SAWIDRA - André Kamga (ACMAD)

André Kamga from ACMAD gave a presentation focused on the main results of the Satellite and Weather Information for Disaster Resilience in Africa programme (SAWIDRA) funded through AfDB by the 10th EDF ACP-EU Programme on Building disaster resilience to natural

hazards in Sub-Saharian African Regions, Countries and Communities. He highlighted that 4 RARS stations has been recently installed and are operational for data collection and retransmission from meteorological polar orbiting satellites. Other results have been achioeved such as the installation of HPC, forecasts production and dissemination and training of forecasters and DRR experts. At last, André gave some recommendations for the follow-on of SAWIDRA notably that inclusion of RARS-Africa in the WMO Broadcast Network should be supported in order to improve the development of NWP at global, regional and local scales.

ClimSA programme - Dieudonné Nsadisa Faka (OACPS)

Dieudonné Nsadisa Faka gave an overview of the EU-Funded Intra-ACP ClimSA programme which is in support of the implementation of the GFCS in the ACP region. The objective of the ClimSA programme is to strengthen the climate services value chain through building the capacities of decision-makers at all levels to make effective use of climate information and services. The Intra-ACP ClimSA programme is supporting, among others, the improvement of Decision Support System for Policy Development for sensitive key socio economic sectors (Agriculture & Food Security, Energy, Health, Water and Disaster Risk Reduction), the Certification of RCCs as WMO RCC compliance (ACMAD (Niger), AGRHYMET (Niger), ICPAC (Kenya), SADC-CSC (Botswana), CAPC-CA (Cameroon), Indian Ocean Network (Mauritius)) as well as the Sustainable Development & Climate Resilience Society.

3. Discussion and recommendations

Following the presentation, during the Q&A session the following points were raised:

The priorities of building capacity on EO in Africa : The answers from the participants on the live poll and the discussions with the panelists allowed to identify some top priorities in terms of capacity building actions :

- Nowcasting have been outlined as a top priority in terms of Capacity building need notably in terms of application for Severe Weather events and related Early Warning Systems.

- Impact and usage of Climate and environmental services: The panelists highlighted the need for the service providers to be better capacitated to deliver sector tailored products and also to sercice impact at user level;

- Build Institutional capacity to support African NMHSs in making their mandate and organisation evolving in order to integrate new approach, new products (e.g Atmospheric composition monitoring) and adapt mandate.

- Need for cross-fertilization and interlinkages with other Earth Observation Capacity Building Programme : The forum notes the important effort made by the GMES & Africa programme on Service Development and Capacity Building, Outreach and awareness raising among other aspects. Therefore, OACPS, AUC and Regional Consortia and Institutions should work together to discuss and share GMES&Africa positive experience among Earth Observation Capacity Building programmes in order to find opportunities for synergy.

During the discussions with the audience other points have raised such as the level of use o the MESA stations in Africa and the status of the African regional capacities to maintain and train experts on the infrastructure, software and applications.

This session contributed to recommendations #19, #20

MAIN RECOMMENDATIONS AND CLOSURE

The 14th EUMETSAT User Forum in Africa ended with a review of the recommendations from the Interactive and Plenary Sessions of the Forum (see list of recommendations) and closing remarks, which included interventions of Vincent Gabaglio and Paul Counet from EUMETSAT.

M. Counet thanked all the speakers, organizers and participants for their commitment and contribution throughout the various sessions of the 14th EUMETSAT User Forum in Africa and first online Forum.

He assured participants that EUMETSAT will have a close look at all recommendations and take actions in order to facilitate and follow-up their implementation in the coming year before the 15th Forum that will take place in September 2022, likely in physical in Tanzania to be organised in cooperation with the Tanzanian Meteorology Authority.

EUMETSAT POINT OF CONTACT

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LIST OF ABBREVIATIONS

AC-SAF	Satellite Application Facility on Atmospheric Composition Monitoring
ACMAD	African Centre for Meteorological Application for Development
ACP	African, Caribbean and Pacific Group of States
AfDB	African Development Bank
AGRHYMET	Centre Régional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle
AIS	Automatic Identification System
AMCOMET	African Ministerial Conference on Meteorology
AMESD	African Monitoring of the Environment for Sustainable Development
AMSAF	African Meteorological Satellite Application Facility
ASCAT	Advanced Scatterometer
ASECNA	Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar
ASMET	African Satellite Meteorology Education and Training
AUC	African Union Commission
AWGDRR	Africa Working Group on Disaster Risk Reduction
C3S	Copernicus Climate Change Service
CAMS	Copernicus Atmosphere Monitoring Service
CAPC-AC	Climate Application and Prediction Centre of Central Africa
CDSF	ClimDev Africa Special Fund
CGMS	Coordination Group for Meteorological Satellites
CICOS	Commission Internationale du bassin Congo-Oubangi-Sangha
ClimDev	Climate Information for Development in Africa
CM-SAF	Climate Monitoring SAF
CRR	Convective Rain Rate
DIAS	Data Information Access Service
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DVB	Digital Video Broadcasting
DWD	German Weather Service (Deutscher Wetterdienst)
EAMAC	Ecole Africaine de la Météorologie et de l'Aviation Civile
EC	European Commission
ECCAS	Economic Community of the Central Africa States
ECMWF	European Centre for Medium-Range Weather Forecasts
ECOWAS	Economic Community Of Western African States
EDF	European Development Fund
EO	Earth Observation
EPS	EUMETSAT Polar System
EPS-SG	EUMETSAT Polar System – Second Generation
ESA	European Space Agency
EU	European Union
EUMETCast	EUMETSAT's Broadcast System for Environmental Data
EWS	Early Warning System
FCI	Flexible Combined Imager

GBON	Global Basic Observation Network
GEO	Group on Earth Observation
GEOGLAM	Global Agricultural Geo-Monitoring
GEOSS	Global Earth Observation System of Systems
GFCS	Global Framework for Climate Services
GFS	Global Forecast System
GHACOF	Greater Horn of Africa Climate Outlook Forums
GIS	Geographical Information System
GMES	Global Monitoring of the Environment and Security
GTS	Global Telecommunication System
HPC	High Performance Computing
ICPAC	IGAD Climate Prediction and Applications Centre
IGAD	Intergovernmental Authority on Development
IMTR	Institute for Meteorological Training and Research
INTPA	Department for International Partnerships (DG INTPA)
IOC	Indian Ocean Commission
IODC	Indian Ocean Data Coverage
IPCC	Intergovernmental Panel on Climate Change
JRC	Joint Research Centre, European Commission
JWG	Joint Working Group
LDC	Least Developed Countries
LI	Lightning Imager
LNB	Low Noise Block
MESA	Monitoring of Environment and Security in Africa programme
MOI	Mauritius Oceanographic Institute
MOOC	Massive Open Online Courses
MSG	Meteosat Second Generation
MTG	Meteosat Third Generation
NDICI	Neighbourhood, Development and International Cooperation Instrument
NFCS	National Framework for Climate Services
NMHS	National Meteorological and Hydrological Service
NWC	Nowcasting
NWP	Numerical Weather Prediction
OACPS	Organisation of African, Caribbean and Pacific States
PR	Permanent Representative
PUMA	Preparation for the Utilisation of Meteosat Second Generation in Africa
RA-I	Regional Association One (WMO)
RAIDEG	RA-I Dissemination Expert Group
RARS	Regional Advanced Retransmission Services
RCC	Regional Climate Centre
RCOF	Regional Climate Outlook Forums
RDT	Rapid Development Thunderstorm
RECs	Regional Economic Communities
SADC-CSC	Southern African Development Community – Climate Services Centre
SAF	Satellite Application Facility
SAWIDRA	Satellite and Weather Information for Disaster Resilience in Africa programme

SIDS	Small Island Developing States
SOFF	Systematic Observation Financing Facility
SSA	Sub-Saharan Africa
STI	Science Technology and Innovation
TAMSAT	Tropical Applications of Meteorology using SATellite data and ground-based observations
UPS	Uninterruptible Power Supply
VLab	Virtual Laboratory (WMO)
WEkEO	
WIS	WMO Information System
WMO	World Meteorological Organization
WRF	Weather Research and Forecast

ANNEXES

PROGRAMME OF THE FORUM

INTERACTIVE SESSIONS

	Day 1 : 28th September		
	Introductory session		
	Chairperson	Vincent Gabaglio	EUMETSAT
8:00	Opening remarks (15')	Vincent Gabaglio	EUMETSAT
8:15	Objectives and scope of the Forum (WG and Plenary) (15')	Paul Counet	EUMETSAT
8:30	Introduction to the Interactive sessions and splinter groups (15')	Vincent Gabaglio	EUMETSAT
8:45	Review of the recommendation from the last Forum (15')	Herve Trebossen	EUMETSAT
	Report of RAIDEG activities	Lee Ann Simpson	RAIDEG Chair
9:00	Q&A (30')	Secretariat	EUMETSAT
9:30	Allocation of participants to the various splinter sessions (15')		
9:45	Technical test for the splinter room (15') – Forum Secretariat		
	BREAK		

	#1 EUMETSAT data access and training			
	Chairperson		Lee Ann Simpson	SAWS
	Rapporteur		Sally Wannop	EUMETSAT
12:00	EUMETSAT Data access		Erdem Erdi	EUMETSAT
12:15	Training plans for Africa (ASMET)		Mark Higgins	EUMETSAT
12:30	**Splinter sessions (WG) - Parallel (from 12:30 to 13:45)**	WG #1 Meteorological Satellite Interpretation Training needs (ENG/FR)	Nicholas Maingui	KMD
			Mark Higgins	EUMETSAT
		WG #2 : PUMA stations (ENG) (Co-moderator)	Bennet Foli	University of Ghana
			Erdem Erdi	EUMETSAT
		WG #3 : PUMA stations (FR)	Maixent Kambi	DMN Congo Brazzavile
			Herve Trebossen	EUMETSAT
		WG #4 : EUMETCAST Terrestrial and Cloud Computing (FR)	Tareq Soubai	Meteo Maroc
			Vincent Gabaglio	EUMETSAT
		WG #5 EUMETCast Terrestrial and Clould computing (ENG)	Nico Kroese	SAWS
			Sally Wannop	EUMETSAT
13:45	Report of the Working Group #1 to #5		Rapporteurs from WG #1 to #5	
14:00	End of the Session			

	Day 2 : 29th September			
	#2 Meteosat Third Generation			
	Chairperson		Jolly Wasambo	AUC (DARBE)
	Rapporteur		Vincent Gabaglio	EUMETSAT
8:00	MTG for Africa and Transition roadmap		Denis Fayard	EUMETSAT
8:15			Vincent Gabaglio	EUMETSAT
8:30	**Splinter session (WG) - Parallel (08:30 - 09:30)**	WG #1 :MTG-I : Flexible Combined Imager (FCI) (ENG/FR)	Ram Kumar Dhurmea	Mauritius Meteorological Services
			Natasa Strelec Mahovic	EUMETSAT
8:45		WG #2 : Transition Roadmap and New PUMA stations (FR)	Kodjo Edoh	EAMAC
			Denis Fayard	EUMETSAT
9:00		WG #3 : Transition Roadmap and New PUMA stations (ENG)	Joseph Kagenyi	Independent expert
			Katja Hungershoefer / Erdem Erdi	EUMETSAT
9:15		WG #4 : MTG-I : Lightning Imager (LI) (ENG)	Lee-Ann Simpson	SAWS
			Vesa Nietosvaara	EUMETSAT
		WG #5 : MTG North Africa(MTG-Up) (FR and Arabic)	Tareq Soubai	Meteo Maroc
			Herve Trebossen	EUMETSAT
9:30	Report of the Working Group #1 to #5		Rapporteurs from WG #1 to #5	
	BREAK			

	#3: Climate monitoring / Climate services			
	Chairperson		Dieudonne Nsadisa Faka	OACPS
	Rapporteur		Hervé Trebossen	EUMETSAT
12:00	EUMETSAT climate products (10')		Christine Traeger Chatterjee and Marie Doutriaux Boucher	EUMETSAT
12:15	Tamsat Climate Services (10')		Ross Maidment	University of Reading
12:30	ClimSA overview (10')		Dieudonne Nsadisa Faka	OACPS
	Climate Station (10')		Christophe Lavaysse	JRC
	Splinter Sessions (WG) - Parallel (from 12:45 to 13:45)	WG #1 Western Africa (ENG/FR)	Seydou Traore	AGRHYMET
			Hervé Trebossen	EUMETSAT
		WG #2 Central Africa (FR)	Pascal Moudi	CAPC-AC
			Marie Doutriaux Boucher	EUMETSAT
		WG #3 Southern Africa (ENG)	Prithiviraj Booneeady	SADC-CSC
			Denis Fayard	EUMETSAT
		WG #4 Eastern Africa (ENG)	Zachari Atheru	ICPAC
			Christine Traeger Chatterjee	EUMETSAT
		WG #5 Indian Ocean (FR)	Jean Baptiste Migraine	WMO/CREWS
			Lisa-Anne Jepsen	WMO
		WG #6 North Africa (Arabic/ENG)		
			Vincent Gabaglio	EUMETSAT
13:45	Report of the Working Group #1 to #6		Rapporteurs from WG #1 to #6	
14:00	End of the Session			

	Day 3 : 30th Sep			
	#4: Nowcasting			
	Chairperson		Mariane Diop Kane	WMO / AM COMET Secretariat
	Rapporteur		Natasa Strelec Mahovic	EUMETSAT
8:00	Nowcasting Satellite Application Facility : software and products (10')		Pilar Ripodas	NWC-SAF
8:10	Nowcasting challenges by the SWIFT programme (10')		John Marsham	University of Leeds
8:20	SAWIDRA and RARS Africa for NWP (10')		Leon Guy Razafindrakoto	ACMAD
8:30	**Splinter session (WG) - Parallel (08:30 - 09:30)**	WG #1 Western Africa (ENG/FR)	Bennet Foli	University of Ghana
			Herve Trebossen	EUMETSAT
8:45		WG #2 Central Africa (FR)	Maixent Kambi	DMN Congo Brazzavile
			Vincent Gabaglio	EUMETSAT
		WG #3 Southern Africa (ENG)	Nico Kroese	SAWS
			Sally Wannop	EUMETSAT
9:00		WG #4 Eastern Africa (ENG)	Joseph Kagenyi	Independent expert
			Vesa Nietosvaara	EUMETSAT
9:15		WG #5 Indian Ocean (FR)	Ram Kumar Dhurmea	Mauritius Meteorological Services
			Mark Higgins	EUMETSAT
		WG #6 North Africa (ENG)	Ahmed Hmam	INM Tunisia
			Erdem Erdi	EUMETSAT
9:30	Report of the Working Group #1 to #6		Rapporteurs from WG #1 to #6	
9:45				
	BREAK			

	#5: Atmospheric Composition			
	Chairperson		André Kamga	ACMAD
	Rapporteur		Mark Higgins	EUMETSAT
12:00	Monitoring atmospheric composition in Africa from satellites		Federico Fierli	EUMETSAT
12:15	Copernicus Atmospheric Monitoring Service		Vincent-Henri Peuch	CAMS
12:30	Use of satellite product for Air pollution in Central Africa		Dr Médard Obiang Ebanega	Omar Bongo University
	Splinter Sessions (WG)- 12:45 - 13:15	WG #1 Western Africa (ENG/FR)	Mouhamadou Kamara	ANACIM Senegal
			Hervé Trebossen	EUMETSAT
		WG #2 Centra Africa (FR)	Pascal Moudi	CAPC-AC
			Federico Fierli	EUMETSAT
		WG #3 Southern Africa (ENG)	Prithiviraj Booneeady	SADC-CSC
			Christine Traeger Chatterjee	EUMETSAT
		WG #4 Eastern Africa (ENG)	Zachari Atheru	ICPAC
			Sally Wannop	EUMETSAT
		WG #5 Indian Ocean (FR)	Gina Bonne	IOC
			Vincent Gabaglio	EUMETSAT
		WG #6 North Africa (Arabic/ENG)		
			Natasa Strelec Mahovic	EUMETSAT
	Short summary from each splinter session		Rapporteurs from WG #1 to #6	
	Closing session /concluding remarks			
	Main outcomes of the Interactive sessions		Vincent Gabaglio	EUMETSAT
13:45	Presentation of the plenary sessions of the 14-EUFA (06 & 07th October)		Vincent Gabaglio	EUMETSAT
14:00	End of the Interactive Sessions			

PLENARY SESSIONS

	Day 1 : 06th Oct		
Time (UTC)	**101 - Opening ceremony**		
8:00	Opening Ceremony	Phil Evans	EUMETSAT
		Josefa Sacko	AUC Commissioner DARBE
		Petteri Taalas	WMO Secretary General
		AMCOMET Chair	Min of Cameroon
		Hans Christina Stausboll	European Union
	102 - Overview of EUMETSAT programme		
	Rapporteur	*Vincent Gabaglio*	*EUMETSAT*
8:30	102 -1 - Status of EUMETSAT programme	Phil Evans	EUMETSAT
8:50	102 - 2 - EUMETSAT Data access and User services	Sally Wannop	EUMETSAT
9:10	102 - 3 - EUMETSAT Training activities	Vesa Nietosvaara	EUMETSAT
9:30	102 - 4 - Report of RAIDEG activities	Lee Ann Simpson	SAWS
9:40	Q&A	Moderator	EUMETSAT
	103 - Report form the interactive session (working groups) :		
	Rapporteur	*Denis Fayard*	*EUMETSAT*
12:00	103 - 1 - Introduction	Vincent Gabaglio	*EUMETSAT*
12:10	103 - 2 - EUMETSAT data access and training	Lee Ann Simpson	SAWS
12:25	103 - 3 - Meteosat Third Generation	Jolly Wasambo	AUC (DARBE)
12:40	103 - 4 - Climate monitoring and services	Dieudonne Nsadisa Faka	OACPS
12:55	Q&A (15')	Moderator	
13:10	103 - 5 - Nowcasting	Mariane Diop Kane	WMO / AM COMET Secretariat
13:25	103 - 6 - Atmospheric composition	André Kamga	ACMAD
13:40	Q&A (30')	Moderator	
13:55	End of Day 1 / programme overview of Day #2	Moderator	

	Day 2 : 07th Oct		
Time (UTC)	**104 - MTG Africa and AMSAF**		
	Rapporteur	Sally Wannop	EUMETSAT
	104 - 1 - MTG programme overview	Denis Fayard / Vincent Gabaglio	EUMETSAT
	104 - 2 - MTG data for Africa products – Current baseline	Lee-Ann Simpson	RAIDEG Chair
8:40	Q&A	Moderator	
9:00	104 - 3- Report of the Joint Working Group	Jolly Wasambo	AUC
9:10	104 - 4- MTG Transition plan (MTG AMSAF concept, Upgrade of PUMA stations)	Mariane Diop Kane	WMO / AMCOMET Secretariat
9:30	**Q&A**		
10:00	**BREAK**		
	105 - Status of Capacity Programme		
	Rapporteur	Hervé Trebossen	EUMETSAT
12:00	105 - 1 - GMES&Africa Support Programme	Tidiane Ouattara	AUC/ESTI
12:20	105 - 2 - SAWIDRA	André Kamga	ACMAD
12:40	105 - 3 - ClimSA programme	Dieudonné Nsadisa Faka	OACPS
13:00	Q&A	Moderator	
	106 - Main recommendations and closure		
13:30	106 - 1 - Review of the main recommendations	Vincent Gabaglio	EUMETSAT
13:50	Closure	Paul Counet	EUMETSAT

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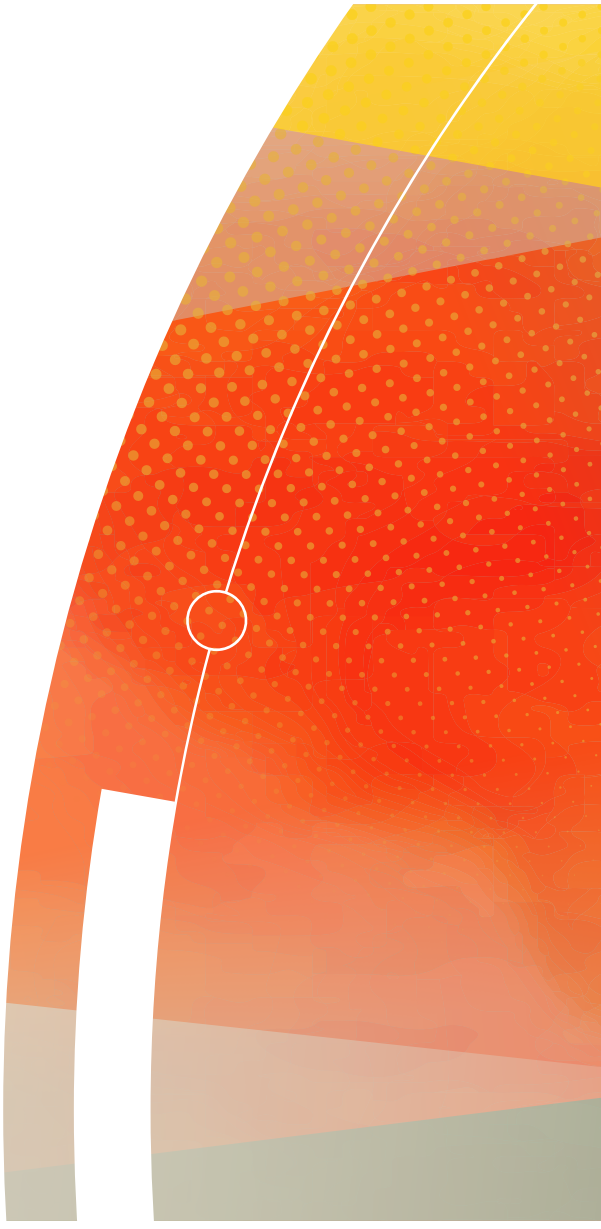

EUM P.67,
ISSN: 1024-8587
ISBN: 978-92-9110-111-5