

**WORLD METEOROLOGICAL ORGANIZATION**

---

---

**RA I DISSEMINATION EXPERT GROUP**

**EIGHTH MEETING**

**GENEVA, SWITZERLAND**

**1-2 NOVEMBER 2017**

**FINAL REPORT**



## **WMO General Regulations**

### **Regulation 43**

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

### **Regulation 44**

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

## 1. WELCOME

F. Belda, Director of Observing and Information Systems Department at WMO, opened the meeting on behalf of the Chair, Mariane Diop Kane. He was pleased to welcome participants to the 8th session of the RA I Dissemination Expert Group (RAIDEG-8) at the WMO Headquarters in Geneva, Switzerland, on 1-2 November 2017.

He noted that RAIDEG meeting will discuss:

- the needs of African users for satellite data and related products on the EUMETSAT EUMETCast-Africa service;
- explore new requirements;
- identify training needs related to the EUMETCast-Africa dissemination baseline; and
- discuss the requirements of African users for climate datasets, using input from the April 2017 joint meeting of RAIDEG and the RA-I Climate Services and Adaptation Working Group.

He especially welcomed the Chair of the RA-I Climate Services and Adaptation Working Group (RA-I WG CSA), Pascal Yaka, to this session. RAIDEG has been officially recognized by RA I at its 16th session in Praia, Cabo Verde, in February 2015, as part of the RA-I Working Group on Observations and Infrastructure. This confirms the importance of RAIDEG as the standing regional mechanism in RA I to identify and document user requirements for satellite and related data, and the user interface to the EUMETCast-Africa service.

RAIDEG was established as one of the Region-based WMO satellite user groups, as part of the strategy to improve satellite data accessibility and user awareness in developing countries.

The Terms of Reference of the RA I Dissemination Expert Group are:

- Collect, review and maintain requirements for access to meteorological and environmental data and products by NMHSs and partner organizations in Africa;
- Analyse the requirements for satellite-based products expressed by African NMHSs, Centres of Excellence, Training Institutes and other environmental monitoring organizations in Africa making use of EUMETCast and GTS dissemination services; and
- Make recommendations on the requirements for products and on the assignment of priorities, aiming at optimizing product dissemination through EUMETCast or the GTS.

He wished all participants a fruitful meeting.

J. Mukabana, Director, Offices for Africa and Least Developed Countries (AFLDC) and AMCOMET Secretariat at WMO, welcomed participants. He stressed the importance of the Group, since satellite-based observations were crucial for weather and climate services in Africa due to the sparseness of surface-based observatories. Forecasts depend on data, and satellite data have shown to improve forecasts, and of the monitoring of convective systems. PUMA stations have been a game-changer in Africa, enabling 6 regional centres and around 47 NMHSs to receive data and improve forecasts. The MESA Themis have proven of high value, and GMES-Africa is on the horizon within the African Union (AU). The African Space Programme is looking at African data needs, and RAIDEG plays a critical role in deciding which data are best suited to meet these needs.

The Chair M. Diop Kane thanked WMO and EUMETSAT for organizing the meeting, and RAIDEG members who were able to attend. She especially welcomed Pascal Yaka, Chair of RA I WG CSA.

A tour-de-table followed (list of participants provided in annex).

Documents and presentations of the session are posted online:

<http://www.wmo.int/pages/prog/sat/meetings/RAIDEG-8.php>

## 2. ADOPTION OF AGENDA

Some modifications were made to the timing of presentations, to accommodate participants' needs and remote presentations.

## 3. REVIEW OF ACTIONS FROM PREVIOUS MEETING

S. Wannop reviewed the Actions (Doc 3). Re Action 01/03, she stressed the need for RAIDEG representatives to collect requirements from users within all of their sub-region, and across application areas (not limited to weather forecasting, but also including marine requirements, for example). J. Mukabana suggested that RAIDEG members work through WMO Regional Offices (in Kenya, Nigeria) to improve connectivity. It was suggested to re-send the November 2015 WMO letter, including through WMO Regional Offices. EUMETSAT maintains a user database (station operators, forecasters, PRs) which could be used as well. N. Kroese noted that he worked through the MARSAs sub-regional office to connect to countries across Southern Africa, sometimes via phone.

**Action 08/01: WMO to send letter, including through WMO Regional Offices in RA-I, calling for the nomination of focal points to RAIDEG sub-regional members, to improve connectivity among users in each sub-region (re-use November 2015 letter which led to only one additional nomination).**

Action 07/01 (Surveying VLab CoEs in Africa) has not yet started.

No further upgrade of PUMA2015 and MESA software is envisaged, contract ends in mid-2018. The Group recognized the challenge to maintain software given new products coming along.

CSA/05: The April 2017 RAIDEG/RA-I CSA meeting report was transmitted to DG DEVCO and to consultants involved in the GFCS-ACP project formulation study; the development process is underway involving EUMETSAT, WMO, and the European Commission. Action CSA/01 can therefore be closed.

CSA/02: validation of the climate data gaps is expected to occur at RAIDEG-8 (see section 8 for details).

CSA/04: The task to distribute the EUMETSAT CMSAF solar radiation dataset to Senegal and Mauritius is used as a trial to validate the hosted processing concept by EUMETSAT (one of the data service pathfinders).

CSA/07 is still open.

The Group noted that the Synergie software (distributed by MFI as part of a consortium) used on PUMA stations is a "black box" that cannot be modified by users to adjust for filenames or file formats. This is mainly for commercial but also for reasons of stability and robustness of the system (icons to visualize certain data streams do not show on-screen). Only one software upgrade occurred, through EUMETSAT funding, not within the project. There may be a number of datasets and products that are received, but not displayed. In a next invitation to tender, open source software should be considered, although it generally requires a higher maintenance effort. What should the upgrade process look like, to accommodate improvements and changes? Such considerations should be recognized in future projects.

Synergie was funded through the European Development Fund; in the contract, it was not possible to procure maintenance service for stations; only a warranty was included. The procurement process has its intricacies that may not always allow for an “all-Africa, serviced station”.

R. Dhurmea informed about training on PUMA2015 terminals with colleagues from Seychelles, Comores, and Madagascar. The training event was a good opportunity to build a sub-regional network. He noted the difficulty within these countries to establish networks, i.e. to academic institutions or other user organizations of satellite data. The network should focus on each sub-region since these face similar weather patterns and geography. A concerted effort is required at a sub-regional level to identify and document specific requirements for satellite and related data.

#### 4. NOMINATION OF FOCAL POINTS TO RAIDEG

S. Bojinski informed about the November 2015 WMO letter to RA I, calling for nomination of focal points. It led to only one focal point nomination by Zimbabwe (see new Action 08/01).

#### 5. STATUS OF EUMETSAT OPERATIONAL SERVICES AND DISSEMINATION BASELINE UPDATE DOCUMENT EUMETCAST-AFRICA

S. Wannop updated on these topics. She gave an overview of the EUMETCast-Africa service and the service channels. **A new EUMETCast-Africa service** will start on 1 May 2018 – the existing service will terminate on 1 August 2018. The new service will have a dedicated uplink from Fucino (Italy) and no longer use the European turnaround. This has implications for Northern African users who were seeing the EUMETCast as well as the EUMETCast-Africa beam: these users would have to set up separate Ku and C-band based services and antennas, replacing a single receiving station. All other users in RA-I do not need to change their hardware, but must optimize their antenna pointing using guidance from EUMETSAT. Current bandwidth allocation for the new service is 9.9 Mbps (= 7.7 Mbps net). Communication has been sent to all registered users. A video has been produced, and a dedicated training event is envisaged.

More information is available:

[https://www.eumetsat.int/website/home/TechnicalBulletins/EUMETCast/DAT\\_3589215.html](https://www.eumetsat.int/website/home/TechnicalBulletins/EUMETCast/DAT_3589215.html)

The Baseline update furthermore includes:

- Meteosat-8 IODC image data and products
- EU Copernicus Products (mostly from Sentinel-3 and Land Service)
- Descoping of datasets

Meteosat Mission Swap in Q1/2018: Meteosat-11 is taking over as prime at 0° in February; Meteosat-10 to provide Rapid Scan Service over Europe.

LRIT Direct Dissemination Service from Meteosat 0° service is to be terminated in March 2018. She mentioned the Meteosat Level 1.5 SEVIRI Georeference Offset Correction.

She further gave an update on the Copernicus Data Access (CODA) mechanism, and the EUMETView service (Sentinel-3 products).

EUMETSAT is using pathfinder projects to explore new data access routes, to be confirmed in December 2018 based on user feedback and validation / viability considerations:

- PF1: Online data access
- PF2: EUMETCast terrestrial
- PF3: Licensed webmapping service
- PF4: Product customization toolbox (thinning, conversion, blending etc.)
- PF5: Hosted processing

A question was raised how to engage RAIDEG in validating these pathfinders?

Validation is currently focused on EUMETSAT member states; once they have commented on the pathfinders, RAIDEG may have a chance to participate in the validation. Regarding hosted processing, it is intended to have Senegal and Mauritius participate, to demonstrate that also small institutions can derive value of this novel approach of generating and accessing processed data.

**Action 08/02: S. Wannop agreed to keep RAIDEG involved in opportunities to participate in the validation of the pathfinders, as appropriate.**

A. Abani mentioned the RANET initiative, funded by USAID and the WorldSpace foundation, to make climate and weather-related information more accessible for rural areas.

N. Kroese enquired on compatibility of GHRSSST format with Synergie; can software vendors be asked to cater for different format flavours?

Requirements for Copernicus Services by African countries would have to be identified in a Copernicus User Forum-type setting for Africa.

RAIDEG high-level software specifications should be introduced in the MESA follow-up project, to avoid retrofitting problems with software maintenance.

## **6. WMO SURVEY ON THE USE OF SATELLITE DATA**

S. Bojinski briefed on key results of the WMO 2016 survey for RA-I. He noted the strong participation by RA-I in the survey compared to other WMO Regions (56 responses received from 36 Members in RA-I). Generally access to satellite data is not a major issue, however support and training in the processing and interpretation of (mainly) Meteosat satellite data and derived products remains a priority. Awareness of the transition to MTG in the early 2020s exists.

## **7. REPORT FROM EACH REGION**

### **Indian Ocean Region**

R. Dhurmea participated remotely and provided a report from the Indian Ocean Region. He raised some issues:

- No RGB products with Meteosat-8 (only for Meteosat-10) – these are in high demand
- No buoy data available
- Some functionalities absent in PUMA2015

RGBs are generated by the Synergie software locally, not distributed by EUMETSAT (only L1.5). Displaying RGBs from Meteosat-8 would require an upgrade to the software.

He provided details on the situation in:

- Madagascar: operational, no major issues; two participants (IT administrator, climatologist) joined the training carried out in Mauritius
- Mauritius: operational; some hard disk issues (full) which were reported to MFI; no possibility of cleaning the hard disk in v1.2; Synergie had to be retrograded to an earlier version for PUMA to be functional.
- Seychelles: PUMA station down with current version of Synergie due to hard disk getting full within 24 hours; no support received from Telespazio, EUMETSAT
- Comoros: operational; some delays ; wave model data required

H. Hamidou asked a question on Synergie versioning – is it 1.2 or 1.0.2? - Probably 1.0.2 – with upgrade to 1.1.0, some problems should be resolved. Sluggishness of system is a general problem, since data resolution high.

S. Wannop asked about buoy data information – it is available on a full Synergie version purchased by Mauritius. However, no option is available in PUMA 2015 to display buoy data – which is important in near real-time to countries in the Indian Ocean region, because of the dearth of observations over the sea. Raw data can be accessed.

H. Hamidou informed about housekeeping software that normally automatically sweeps the hard disk. How does this software perform in case of power failures? Is a patch needed, or can it be expected from administrators to manually clean a hard drive? Telespazio responds to user requests via Tulip, a user helpdesk. EUMETSAT sees users' requests to Telespazio but cannot commit acting on it. Latest software version and installation DVDs and documentation are required – does Telespazio need to be contacted again?

**Action 08/03: EUMETSAT to contact Telespazio to provide full documentation and latest software version of Synergie (on a DVD)**

The e-station user manual is available in French since the start of the deployment and can be downloaded from an EC JRC site:

<http://estation.jrc.ec.europa.eu/eStation2/?lang=fra>

(under the “aide” tab).

## JCOMM

Prof George Wiafe apologized for not being able to attend, mainly due to his participation in the closure of the MESA project. He presented on behalf of the oceanography and marine meteorology community in Africa. He addressed:

- Operational services on Ocean weather, Coastal ecosystems/habitat mapping, oil slick detection and shoreline vulnerability assessment
- Marine operational services based on the MESA programme, and though the services are focussed in Western Africa and the Indian Ocean, they are common to all coastal states of Africa
- Outlook on present activities and future expectations in line with GMES and Africa programme

University of Ghana and Mauritius Oceanography Institute are primarily responsible for supporting dissemination of marine products via EUMETCast-Africa. Use of marine data varies from country to country, slowly making progress across the Continent with many new graduates entering the field.

Challenges to data reception mainly occur at the client end, rather than with EUMETCast-Africa. On-site training and trouble-shooting event held for 14 countries in West Africa to help them in receiving and visualizing data using MESA and PUMA stations. Dissemination and uptake of coastal marine products is used for fisheries (in Potential Fishing Zones - PFZ). MESA partners were advised to liaise with NMHSs on this matter. To facilitate further, the Ghana Met Agency coordinates with all NMHSs in West Africa.

Training sessions are held in various forms: RIC of MESA and PUMA stations, regional training, national training events.

He provided an outlook on data needs:

- SAR imagery (Sentinel 1 A/B) for oil slick detection
- Sentinel 3 - OLCI (algal pigment concentration, PAR, CDOM, TSM), SRAL products (altimetry) for fisheries application
- ECMWF high resolution wind forecasts
- The following will need further discussion as to their feasibility:
  - TerraSAR-X: high resolution (1.25 m) wind and wave heights
  - TanDEM-X: high resolution (3m) DEM
  - SPOT-5 archive missions and SPOT 6 & 7 current imagery

Pending data availability, training on Sentinel-1/2/3 data and derived products would be needed. Modules on Sentinel-3 products will be required at beginners, intermediate, advanced levels.

It will be necessary to bring together users and practitioners of marine and meteorological data together for cross-fertilization and cross-collaboration across the Continent (role of the EUMETSAT User Forum Africa?).

E. Afiesimama asked about capacity in countries affected by war, such as Liberia and Sierra Leone. A WMO fact finding mission in these countries is under way. Nigeria currently provides daily forecasts to Sierra Leone, but this cannot be sustained. There are PUMA stations in Cape Verde and Sao Tome, and G. Wiafe informed that he was in touch with these countries, to provide assistance. Issues of radio interference in Liberia make data reception difficult.

J. Mukabana commented that AMCOMET ministers showed interest in aviation and marine services, especially for cost recovery. RA-I considers putting a working group on marine services in place.

V. Gabaglio enquired about feedback on Sentinel-3 products currently disseminated.

- G. Wiafe informed that they have improve productivity through better maps for PFZs; he pointed to a training event on Sentinel-3 marine data use organized by EUMETSAT and University of Ghana in the following week

S. Wannop summarized:

- Whether there were open needs from Sentinel-3
- Whether ECMWF high-resolution wind forecasts were required
- How will operational data be made available to countries and institutions that do not have access via PUMA2015 and MESA stations?

She further noted that all data are also available via the online Sentinel hub.

Regarding Sentinel-1 data for oil slick detection, discussions are ongoing with PML – this is not an immediate requirement.

V. Gabaglio noted that the official route to communicate requirements of African users for Sentinel data is to the European Commission via the African Union Commission. This dialogue also encompasses the Copernicus core services (CAMS, CMEMS, Emergency) which could benefit the RICs.

### **Southern Africa (SADC)**

N. Kroese reported on the status of access to products and new needs and requirements, and status of data and product utilization, for Botswana, Lesotho, Malawi, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe, and Madagascar.



He noted that training of IT personnel and system administrators is a constant problem in many countries.

To re-set zoom area of Synergie, click on Icon “select site”, then select “Botswana”. Namibia had a request for transferring images to third parties. There is interest for new products in South Africa (climate data, data for assimilation in NWP models – derived from RARS Africa project, collaboration with SANSI). Strong focus in many countries on hydrological products for water management (H-SAF to extend their coverage to the Meteosat footprint; what exactly is required remains to be determined).

Recommendations include:

- More awareness to data and products required, including from the EUMETSAT Product Navigator
- Review current suite of products, to include those of highest relevance to forecasters
- Relevance of data from JMA, CMA and other international satellites

User preparedness for MTG - how to go about it in detail?

Air quality products to monitor pollution in large cities and effects of biomass burning is an important topic across SADC countries.

### **Eastern Africa (IGAD)**

J. Kagenyi reported remotely on the situation in this sub-region. Somalia, Eritrea, Djibouti, and South Sudan have needs for data reception and access. He welcomed termination of LRIT service, to be rational with the data amounts coming down. Status of data and products utilization: EUMETCast-Africa stream working fine; NWP products used; Jason and Saral data are applied in marine transport, forecasts for fisheries industry; LandSAF and vegetation products are used in agrometeorological bulletins.

He noted that the MESA-PUMA system with the new data stream (MSG Indian Ocean and MSG at 0deg) demands more hard-disk as new rate of 5.2 Mbit/s. At Training Centres, the HD of PC1 is full within 2 days (as compared to 5 days when data rate was 2.7 Mbit/s).

H. Hamidou explained that the main system is MESA, thus PC2 and PC3 reboot with MESA settings after a power failure; PC1 remains on PUMA and then it cannot communicate with PC2 and PC3, and the hard disk fills up.

More information is needed regarding the state of the meteorological service in Eritrea.

### **Western Africa**

M. Diop Kane reported. Establishing a sub-regional network of focal points is still difficult. MESA and upgraded PUMA installation has been completed. Mean sea level pressure now available with ECMWF model. The MESA FAT recommendations were not implemented (save to CD function; cut-off of West African sector should be further East).

Requirements for data and products have not significantly changed. Refresh rate of the ECMWF forecast should 6 hours rather than 24h.

Some staff were trained; joint NWP and satellite data interpretation training not yet done. More training on using satellite-based climate datasets is required to better address GFCS priorities.

She stressed that RAIDEG needed more visibility of the African Space Programme; better planning of AMCOMET activities; closer collaboration of EUMETSAT and WMO ETR Department.

H. Hamidou suggested a train-the-trainers approach regarding NWP-related capacity building by NWP centres (ECMWF, UKMO).

## **ACMAD**

A. Abani reported, with credit to Leon Guy Razafindrakoto who is member of RAIDEG. ACMAD is receiving data via PUMA2010 and PUMA2015 stations; some datasets cannot be displayed such as ECMWF essential data. MESA training occurred twice, and needs to continue. There is in-house training involving the use of satellite data.

Configuration of PUMA station different in training centres than in operational centres.

Recommendations to WMO and EUMETSAT:

- Have multi-users data channel activated such as RANET data channel
- Make PUMA2015 installation software available, to facilitate reinstallation and maintenance of stations when needed
- Solve the issue of data dispatcher on PUMA2015 as to facilitate free data dispatch from PUMA2015 to selected destinations
- Provide guidance in the transition to new EUMETCast-Africa service in 2018
- Facilitate implication of system administrators and thematic users at technical meetings such as RAIDEG

## **EAMAC**

H. Hamidou reported on training needs, and related data needs (MTG simulated data have been received). EAMAC organized:

- MESA-PUMA2015 system administration training, to ensure appropriate operation and monitoring of new stations under the MESA programme. Eight training sessions conducted in French for sysads.
- MESA-PUMA2015 system application training – how to use the system, not the products; about 12 training sessions conducted in French for forecasters, thematic leads, etc.

Many trainings and resources available on single channels and RGB interpretation and use. Few trainings organized on satellite-derived fields and products (RDT, CRR, fire monitoring), and more training on these is needed. Need correction of rogue lightning flashes. Have not organized any training at EAMAC over past 2 years due to severe shortage of staff.

Referred to WMO Guidelines on Satellite Skills and Knowledge for Operational Meteorologists; Skill 5 (knowledge about derived fields and products) currently not well addressed.

Training needs: only addresses about 20% of the products available on EUMETCast-Africa.

Other training needs include:

- NWP
- Climate applications
- Environment
- Hydrology
- Integration of satellite data with other data (NWP, in-situ)

A. Abani suggested that a team of IT support be established at a major centre.

S. Wannop regarded self-learning modules as the way to address a broader training audience, such as using ASMET modules, YouTube.

## Northern Africa

On behalf of Rachida Elouaraini (DMN Morocco), S. Bojinski presented status and key recommendations from that sub-region

She had received responses from Egypt and Tunisia to her request for RAIDEG-related information to countries in North Africa; provided an update on data access and related training. Morocco possesses two DVB-S satellite reception (Ku and C-band), Tunisia one Ku-band system.

Egypt expressed a requirement for precipitation products ,higher-resolution NWP model output, scatterometer and altimeter data, and a range of other data and products. Tunisia identified a requirement for satellite data for assimilation into NWP, CMSAF and NWCSAF products. Morocco identified new requirements related to NWP, nowcasting and short-range forecasting and vegetation mapping, soil moisture, snow, energy applications, precipitation.

New training requirements were identified by Morocco and Egypt.

More awareness and understanding of satellite data is a general recommendation to WMO and EUMETSAT.

She recommended that MTG data be disseminated at good temporal and spatial resolution.

WMO can make a webex facility available to support sub-regional discussions within RAIDEG.

## Central Africa

M. Kambi (RAIDEG member) provided a presentation after the session. It is available as RAIDEG-8\_Doc\_07\_CentralAfrica-Kambi.

## 8. CLIMATE DATA FOR RA-I

### 8.1 RAIDEG/RA-I Climate Services and Adaptation Working Group (CSA) Meeting April 2017 and Follow-Up

P. Yaka reported on results from this meeting<sup>1</sup>. A synthesis of results of a survey among RA-I members (NMHSs and Regional Climate Centres) was used as a basis, responding to the following questions:

- What are the key climate services that are already provided by RCC?
- What are the new services that are already identified as needed now?
- What are the key changes that will realistically happen over the next 4 years?
- New services being delivered – what service and to who?
- What input data are required now at regional level?
- What input data are required for the 4 year horizon?

Key climate services that are already provided by the NMHS or responsible organisations include:

- Daily temperature and rainfall charts
- Seasonal temperature and rainfall
- Monthly outlook of climatology bulletin
- 10-days agro-hydro-meteorological bulletin for crops fields management

---

<sup>1</sup> The meeting report is available :

[http://www.wmo.int/pages/prog/sat/documents/RA-1-DEG-CSA\\_Final-Report-Apr2017.pdf](http://www.wmo.int/pages/prog/sat/documents/RA-1-DEG-CSA_Final-Report-Apr2017.pdf) (English),  
[http://www.wmo.int/pages/prog/sat/documents/RA-1-DEG-CSA\\_Final-Report-Apr2017-fr.pdf](http://www.wmo.int/pages/prog/sat/documents/RA-1-DEG-CSA_Final-Report-Apr2017-fr.pdf) (French)

- Onset- mid- and end crops yield assessment bulletin
- Marine forecast for fisheries
- Daily technical assistance to end users for climate sensitive sectors
- Climate data for research and education
- Climate information for media
- Solar radiation, potential ET and dry spell periods
- Early warnings (alert) of extreme weather events

New products that are needed now but not yet available

- Rainfall estimation
- Cloudiness
- Short- and long-wave radiation
- ET and water balance
- Vegetation status (NDVI, SAVAT)
- Forest fire risk indexes
- Soil moisture
- Cloud mask

|   |  |
|---|--|
| <p>Data required by NMHSs include:</p> <ul style="list-style-type: none"> <li>• Lightning</li> <li>• Fog and haze</li> <li>• Wind velocity and direction</li> <li>• Rainfall intensity and frequency</li> <li>• Humidity and temperature</li> <li>• Solar radiation</li> <li>• Air pollution</li> <li>• Extreme weather forecasts.</li> </ul> | <p>Data required by RCCs include:</p> <ul style="list-style-type: none"> <li>• Dataset of in-situ precipitation, temperature and wind</li> <li>• Gridded dataset from satellites</li> <li>• Climate scenarios</li> <li>• Crop and cropping area data</li> <li>• Soil and ET data</li> <li>• Temperature and rainfall at 25km resolution</li> <li>• Bias corrected precipitation forecast at 3hr time resolution and 10 days lead time</li> </ul> |
|---|--|

The April 2017 meeting report provides a more detailed, initial list of climate data requirements for different societal sectors. Some requirements require further definition (“soil moisture” – what spatial scale, timescale?). Some requirements that are stated precisely are also aspirational.

When asked, P. Yaka confirmed that the presentation to RAIDEG did not represent a prioritization of the needs identified in April 2017.

A. Abani asked to what extent end user needs were captured, and in what way the data are improving existing services.

It was suggested to establish a sub-group to analyse results and define a timeline for achievable data delivery.

**Action 08/04: The task team to analyse results of the April 2017 RAIDEG/RA-I WG CSA meeting and to define a timeline for achievable data delivery should analyse the list of requirements, and identify possible solutions (be it using African data sources, or C3S or other); it should convene by mid-January 2018 to discuss results and way forward. The task team includes: Ali Ahmed Abani (ACMAD), Pascal Yaka (RA-I WG CSA Chair), Sally Wannop (EUMETSAT), Jean-Noël Thépaut (ECMWF and C3S), Mariane Diop Kane (RAIDEG Chair)..**

## 8.2 European Copernicus Climate Change Service (C3S)

J.-N. Thépaut informed about the European Commission Copernicus Programme and its Climate Change Service (C3S). ECMWF is entrusted to run two services: Atmosphere and Climate Change. Main questions to be addressed by C3S are: (i) how is the climate changing? (ii) how will it change in the future? (iii) how will it impact society?

The scope of the Services goes much beyond using Sentinel data and products, although these provide an increasingly important component.

The Climate Data Store of C3S includes: Observations, Climate reanalyses, Model output (SIA, centennial). Data from many suppliers is brokered; through adaptors, common data model, tools, workflows. From petabytes to kilobytes - access by internet, with hosted processing enabled, thus no large bandwidth needed.

The current ERA5 global reanalysis is petabytes large. Regional reanalysis activity is only done for Europe and the Arctic. C3S issues contracts for the generation of ECV data records from various sources, and for data rescue.

C3S seasonal forecasts consist of global multi-model ensembles, at 1x1 deg, for sea-level pressure, geopotential height, precipitation, and air temperature. These require training to interpret..

Climate projections are providing users with timely access to climate change scenarios produced with state-of-the-art climate models (CMIP, CORDEX).

The C3S Sectoral information system consists of proof-of-concepts of climate services value chains with end-to-end demonstrators, indicators, and tools. These include the climate indicators agreed by WMO and GCOS. C3S intends to become an enabler of downstream services, rather than to cover the whole end-to-end chain for all sectors regions.

J.-N. Thépaut looked at the requirements identified in the April 2017 RAIDEG/RA-I CSA meeting, and provided an initial analysis on which requirements could be met or partially met by Copernicus, for further discussion and co-development in the task team (**see Action 08/04**). Small standardized datasets could be disseminated via EUMETCast-Africa, through well-established workflows; others should be generated by hosted processing using the Climate Data Store.

Commission intends to make data from all core services and from Sentinels available through the Data and Information Access System (DIAS), a “super Climate Data Store”.

There will be a training need for hosted processing services. Training is part of the C3S, at least production of e-training material and best practices.

## 9. UPDATE ON MTG AND MESA

V. Gabaglio presented the recent MESA updates and the status of discussions on the MTG MAPS project for WMO RA-I since the 12th User Forum for Africa in Kigali, Rwanda.

He informed the Group that the MESA project ended in Sep 2017. The final evaluation still to be conducted with report available by the beginning of 2018. He recalled to the Group the purpose of MESA project with the most pertinent areas to RAIDEG being the expanding of access to EO data and enhancing capacity building. From September 2017 there is a 3yr warranty on the station hardware and 1 year on the software (includes bug fixes and failures, but excludes enhancements). His presentation included a section on the Training feedback provided by the Project Technical representatives and lessons learned. The lessons learned include:

- Start onsite trainings after deployment of receiving stations and installation at the Training Centres,
- Closely work with national focal points (NFP) in nominating training participants in addition to the RICs/CIC.
- Training resources need to be properly documented and archived for future uses, the case of transition from AMESD to MESA
- Allocate sufficient financial resources to respond to the acute demand for trainings.
- Understand in advance country specific visa requirements by the Government of Kenya and South Africa, and plan training accordingly.
- Closely work with Universities and Regional Training centres for sustainability of EO Training service.

Looking to the future, the potential enhancements and follow-on activities being discussed include the following :

- GMES & Africa: additional approx. 20 stations (mainly N. Africa and e-stations) which are pending AUC agreement and selection of RIC in 2017;
- GFCS ACP programme: to be funded by 11th EDF to start in 2018 for sub-Saharan Africa
  - Upgrade of the e-station and PUMA 2015 is being proposed - further information is expected at the next RAIDEG and UFA meetings. The outline schedule includes a requirements phase starting in 2019, followed by procurement, with the expected deployment in 2022/23. The funding will be coordinated by the AUC.
- These stations are just one example of the support being offered to NMHSs in Africa, with other national projects, e.g., World Bank, either ongoing or upcoming.

The Group noted the importance of involving of RAIDEG members in the requirements and acceptance phases of any future station upgrade.

**Action 08/05: RAIDEG to provide feedback on the lessons learned from MESA to EUMETSAT (to Vincent Gabaglio)**

Concerning the MTG Africa Preparation Study (MAPS), the preliminary assessment on user needs and prioritization has taken place resulting the baseline which was presented at the 12<sup>th</sup> UFA meeting. The current baseline comprises:

- MSG like service, i.e. MTG data with spatial resolution like MSG, plus the addition of LI data as a pseudo radar service.
- Transition scenario needs to be carefully managed noting that the specification for a future PUMAx station comes before the availability of MTG-I data. It may be difficult for manufacturers to take on board MTG processing software requirements based solely upon available test data. A potential upgrade may be needed to complete the transition of the processing software to make it both MSG and MTG compliant.

E. de Coning asked about the overall impression of MESA by funders. V. Gabaglio informed that funders have access to the existing evaluation reports produced by the project team with some example implementations being closely evaluated. The EC/AUC understand the limitations in some areas, but overall the project has been a success.

A. Abani remarked that the MTG transition period needs to take into account the other activities (not just a PUMA replacement) and what users are doing through their own initiative with data received through EUMETCast.

J. Mukabana noted that it is important to promote training in such projects (MESA). RAIDEG should discuss the needs to promote the success of PUMA2015 and encourage the training of trainers and developing regional experts to support users in the longer term.

EUMETSAT will keep RAIDEG informed about the evolution of user preparation activities with its Member State NMHSs (MTGUP!) and share any beneficial information or initiatives with RAIDEG.

EUMETSAT encourages RAIDEG members to explore other satellite data processing software opportunities such as open source options, e.g. Pytroll, which can complement current and future funded solutions.

F. Belda noted:

- Need to have the feedback from the beneficiaries and to make recommendations for the future funded stations
- Need to look at the transition and to understand the risks
- Funding is a significant issue and we need to explore potential funding options
- Open source may be useful, but only if it comes with good documentation

**Action 08/06 – EUMETSAT to engage RAIDEG in preparing the requirements and in the acceptance phases of any future station upgrade arising from the GFCS-ACP project.**

In view of the experience in executing this project, the Group suggested for Monitoring and Evaluation (M&E) to ensure all deliverables are delivered. To also include 10% retainership fee, such that if the required deliverables are not provided, that percentage of the money is not paid out.

V. Gabaglio proposed a recommendation that RAIDEG could sum-up feedbacks and lesson learnt regarding the PUMA 2015 overall implementation/approach to inform future project/implementation (through AUC). However, this recommendation was not well received by the Group in view of the previous recommendation.

Related to MTG, the following action points were proposed:

**Action 08/07: EUMETSAT to pursue discussion with RAIDEG on data set priorities with a 3.5 Mbps bandwidth available (pending outcomes of the EUMETCast Africa tender process)**

**Action 08/08: An MTG transition roadmap will be prepared by EUMETSAT to be presented at next RAIDEG. The transition scenario MSG -> MTG (Rapid scan / full scan) will include also considerations of the user segment**

**Action 08/09: EUMETSAT to inform RAIDEG about optimized FCI spatial resolution: internal study started at EUMETSAT**

**Action 08/10: Pursue mobilization of funds for the transition programme to support users to upgrade their capacity (station, training, etc.) for MTG**

## **10. BRIEFINGS BY NWP CENTRES**

### **10.1 MetOffice, UK**

S. Manktelow, Met Office, UK, provided the latest updates to their model output data and other related services for African users. These included:

- Latest updates from 17km global model and the 4km extended East Africa model
- It was noted that as a result of an interim update, the resolution of the global model is at 10km, with the 10km data fitted to a 17km grid
- Model data are also available via the webserver from Met Office - Africa Web Viewer - which combines satellite data, ATDnet lightning data and model output
- Met Office are providing NWP data to the SWFDP
- The largest gap is the limited opportunity for training – Met Office will look at exploring integrated training with the EUMETSAT training team
- New developments are the use of NWP for significant weather impacts and impact based forecasting

- Met Office are planning a tropical configurations for the global model and this will result in replacing the East Africa model with a new tropical model which looks to have improved performance
- The new Global Hazard Map service - estimates of extremes with associated vulnerability data – is a future service which may be openly available via the website (tbc)

#### **The changing use of NWP:**

- More focus on ensemble forecasting and probabilistic techniques at all forecast lead times;
- More emphasis on using NWP to forecast weather impacts. Access to vulnerability and more general environmental data is becoming important; and
- More research effort going into forecasting tropical convection and the larger scale tropical features: MJO, AEW, IOD etc.

It was noted that the improved Tropical model will likely require a PUMA2015 upgrade to allow for processing and use by NMHSs.

The interest in air quality models was raised and it was noted that running such processing requires significant computing power. There could be the potential for inclusion of such model outputs on EUMETCast - requirements need to be discussed further by RAIDEG.

**Recommendation that all RAIDEG members look at the enhancements being made to web services provided by Met Office to complement the access to the data services provided through EUMETCast.**

## **10.2 DWD, Germany**

D. Rieger, DWD, presented remotely the COSMO and ICON model and other activities of potential relevance to African NMHSs. COSMO is used by several countries around the world including Africa (need boundary and initial conditions supplied by DWD). DWD provides:

- NWP usage, forecasting of aerosols and trace gases and climate applications
- DWD offers COSMO training each year (March 2018 is next opportunity)
- Scientific usage and use by NMHSs in developing countries is free of charge
- Boundary conditions are transferred via Internet through remote access (up to 8 GB per day) some issues with access in some African countries
- What would it cost to provide our data via EUMETCast (ICON forecasts)
  - 70 layers for Africa (88 file per day 4 times per day) - 22.9GB per day
- Open Data server provides an alternate access to the model information
- Data from all deterministic model output ICON and COSMO
- Provide remote support for installation of the COSMO model
- COSMO model **training courses** (incl. financial support)

**Two ways** of data distribution to user communities

- **Direct data transfer** of ICON LBC to local computer
- **DWD Open Data** products freely available online

E. Afiesimama remarked that he had used COSMO in the past but usage in Africa has not expanded too much - how could more people get trained in Africa?

DWD are continually training new people in COSMO - perhaps this is not widely advertised. The WMO fund some participants to attend the COSMO courses and these trainings cover knowledge on installation and support tools as well as model dynamics.

**Recommendation that all RAIDEG members look at the training opportunities provided by DWD on the COSMO model and if applicable consider attendance at the national level.**



### 10.3 ECMWF

U. Modigliani presented the recent updates to the ECMWF's NWP contribution to African NMHSs. These include:

- Model enhancements for the general forecast and wave model
- Additional parameters will be made available to WMO members now that ECMWF has been designated a World Meteorological Centre, these additional data will come online in 2018 and include:
  - New levels will be provided with 0.5x0.5 degree resolution
  - Additional products, e.g. precipitation, will be offered too
  - Need to discuss with EUMETSAT the bandwidth impact and approval for inclusion on EUMETCast
- ECMWF will also be supporting the planned SWFDP for West Africa in addition to other SWFDP projects already supported
- It was noted that ECMWF provide other datasets which are freely available via the website - TIGGE, Seasonal forecast, CAMS atmospheric composition data, ERA5 data and global floods forecast service
- A reduction in the licence for web access has resulted in an increased uptake by NMHSs
- Improvements to the website including the view service have been implemented
- OpenIFS service facilitates scientific research and is open to all centres wishing to establish projects using NWP model data.
- Outreach and training events are available via online livestreams covering all aspects of NWP model usage and data assimilation
- In addition there is subscription mailing list service (providing information and support) available and ECMWF could provide a specific list for RA-I members if needed.

N. Kroese noted that given NWP centres' efforts and resources in generating 'free' data for all NMHSs of the WMO, African NMHSs should consider increasing their contribution to enhancing these models through providing in-situ observations, which are currently very sparse from the African continent.

Recommendation that all RAIDEG members look at the available training opportunities from ECMWF and promote the availability of these training opportunities within their region.

Recommendation that all RAIDEG members register as applicable to the information mailing lists provided by ECMWF to keep themselves informed of enhancements and ongoing developments.

The Group thanked all the NWP centres for their continued commitment in providing data to African NMHSs, including their contributions to the SWFDP.

### 11. VLAB CENTRES OF EXCELLENCE TRAINING REQUIREMENTS

There were reports from RTC Pretoria, Casablanca and Nairobi (via the Regional representative presentation) and EAMAC.

## **RTC Pretoria**

N. Kroese presented the status of training activities on behalf of RTC staff (see Doc RAIDEG\_Doc\_07\_SADC).

These updates included:

- Contributions to PUMA2015 training and EUMETSAT annual satellite workshop
- Continuous professional development training for SAWS employees
- Online weather briefing contributions from the SADC region
- The identified new training requirements
  - RGB training
  - NWP interpretation
  - Basic satellite interpretation (ASMET 9 & 10)
  - Impact based forecasting, SAWS has started a training activity with UK Met Office

Recommendation for VLab CoEs to consider opportunities for the integration the NWP and satellite data training, taking into account the SWFDP training opportunities.

## **IGAD / RTC Nairobi**

J. Kagenyi presented training assessment and needs.

NAIROBI-MESA-PUMA Training in the period March 2016 – July 2017 had the following participation: Kenya (48), Somali (1) in SAWS, Eritrea (1), South Sudan (8), Ethiopia (15), Sudan (5), Rwanda(7), Burundi(1), Uganda(12), Djibouti(7), Tanzania(10)

For any country with less than 6 trained personnel in use of MESA-PUMA system, further training should be provided in system administration (both MESA and PUMA2015), MESA applications, PUMA2015 applications for meteorologists and forecasters.

New training modules are needed, on the use of Sentinel data for marine applications; high need on the Continent since many countries have access to sea. The ASMET project is developing a training module on application of different NWP products, as well as on integrating satellite imagery and products with NWP output in forecasting. An ongoing blended training runs on a yearly basis to address MSG applications.

Continental target to train 1000 personnel achieved to 60% within MESA training.

As recommendations, Eritrea, Burundi, and Somalia need training for 4 persons in each country, to be at par with other IGAD countries. Sentinel-based data and applications training modules should be integrated in a curriculum that can be implemented at WMO RTCs. Concern about large data volumes coming down through MESA-PUMA, causing PC1 to crash at training centres within 2 days.

Some loopholes were identified by participants in communication about training events.

**The VLab/EUMETSAT training calendar is available at: <http://trainingevents.eumetsat.int/> .**

## **EAMAC**

H. Hamidou presented the status of training activities at EAMAC that included the recent PUMA22015 training. In addition to his earlier regional report, he emphasized the need to continue

onsite training, in particular for system administrators of station software and associated with this the need to build up regional experts.

## **VLab CoE Casablanca**

Rachida Elouaraini (DMN Morocco) had provided slides to the session on training activities organized by the Centre for francophone countries in North and West Africa. The Centre also contributed to several online training courses. A Marine Forecaster Workshop using altimetry and scatterometric data is coming up on 4-8 December 2017. She provided an outlook on planned activities by the Centre in 2018-2019. Training needs were identified for Egypt, Tunisia, and Morocco.

In the concluding discussions, the Group agreed that there is a need to consider integrated training (training on satellite data and the use of NWP model output data), to further enhance the forecasting skills of African NMHSs.

**Action 08/11: The VLab to advertise the VLab training calendar to NWP centres who presented to RAIDEG-8, to consider the inclusion of all training opportunities in the VLab training calendar.**

## **12. WMO PROGRAMME UPDATES**

### **12.1 Global Framework for Climate Services**

V. Grasso provided an overview of GFCS activities and recent achievements. She showed the status of national climate service development in Africa. She also presented the Climate Services Toolkit, which comprises:

- Data portal in public domain for access to and analysis of observations;
- Data management system for quality control and simple management of data; and
- Climate monitoring tools for calculation of anomalies, percentiles, return periods
- Software tools for conducting climate analyses, making predictions, and assessing projections

Guidance, procedures, and instructions serve as a starting point for climate services development and a reference tool.

These products are accompanied by training materials specifically designated to support the generation and use of climate information and prediction products dedicated to user-target

N. Kroese commented on how the climate services toolkit was expected to work, whether it provided both data and tools. It was reported that the toolkit will include the data and tools for use by the end users, however the interface and support to the users will be through the helpdesk service.

A. Abani commented that the map of Africa showed limited engagement by African countries. It was reported that to date the activities have started based upon interests expressed at the national level and as funds become available other countries are being approached.

### **12.2 CREWS in Africa**

No presentation.

### **12.3 SWFDP**

A. Harou presented the rationale for Severe Weather Forecasting Demonstration Project (SWFDP). He stated that SWFDP has provided

- Dramatic developments in weather forecasting science over the past two decades – advances in monitoring and NWP and Ensemble Prediction Systems (EPS), and
- Improved alerting of weather hazards, at increased lead-times of warnings

Developing countries, LDCs, saw little progress due to limited budgets, failing infrastructure, inadequate guidance and expertise, increasing gap in application of advanced technology (NWP, EPS) in early warnings.

WMO SWFDP attempts to close this gap by increasing availability, and developing capacity to use existing NWP and EPS in countries where it is not effectively used. It applies the 'Cascading Forecasting Process' (global to regional to national to users) through regional frameworks (where a regional centre provides forecast guidance to a group of like-countries in a geographical region, with the supported by global centres).

The Nowcasting products include:

- Generally, satellite based information and SCOPE NWC precipitation products. In Southern Africa additional products including RDT, CRR, etc. are available;
- Global and regional NWP products, and RSMC/RFSC Guidance for Short-range forecast (for day 1 and 2) and Medium-range forecast (day 3 to 5)

Noting the success of the SWFDP initiatives, the Group looked forward to the kick-off of the West Africa project in the coming months. Funding continuation needs to be established to ensure the ongoing training for the SWFDP initiatives, including for Western Africa.

### **12.4 WCRP CORDEX**

M. Rixen presented an overview of the World Climate Research Programme (WCRP) including the Coupled Model Intercomparison Project (CMIP) and the Coordinated Regional climate Downscaling Experiment (CORDEX). CORDEX provides multi-climate-model data for 14 domains with a resolution of 0.44° (approx. 50x50km<sup>2</sup>), including for Africa.

Some discussion was held about the potential links and overlaps with C3S. It was explained that C3S has committed funding to support CORDEX data simulations for Europe and now dialogues are beginning to broaden this scope.

### **12.5 WWRP**

E. de Coning presented the status of the interdisciplinary research within the World Weather Research Project (WWRP) from process understanding to developing applications. She focused on the Lake Victoria 'Highway' project which include the use of NWP and satellite products. The project amongst other things will validate these products for simple forecasting output taking into consideration high impact weather events.

It was noted that through the project, a contribution will be made towards validating the NWC SAF RDT and CRR products for use in Tropical regions. RDT has already been validated in South Africa against radar data and the CRR has been validated against rain gauges. The RDT and CRR products will run using the UK Met Office East Africa model as input. The Group welcomed this exciting project and look forward to hearing the results.

It was noted that ACMAD now have a tool to visualize the RDT product which is downloadable through their website. A copy of the documentation is with the WMO Secretariat and will be made available to the Group.

**Action 08/12: WMO Secretariat (WWRP) to share the documentation of the RDT and download link with RAIDEG members.**

### **12.6 AMCOMET and African Space Programme (DRA/AFLDC)**

J. Mukabana presented the five (5) Thematic Areas of the African Space Programme:

- Earth Observations
- Navigation and Positioning
- Satellite Communications
- Space Physics
- Astronomy

Accessing space services require

- Using existing space infrastructure
- Promoting capacity building for accessing space services
- Adopting a data sharing framework
- Developing and increase our asset base
- Establishing regional and sub-regional centres of excellence

Presentation noted, no comments.

### **12.7 WMO Education and Training Programme (ETR)**

A presentation with preliminary results on a survey on the status of human resources with NMHSs in RA-I was made available offline and is available as Doc. RAIDEG-8\_Doc\_12-07\_ETR. No presentation or discussion in-session.

### **12.8 WIGOS**

L. Nuns presented. The WMO Integrated Global Observing System (WIGOS) is a global framework for integrating all WMO and co-sponsored observing systems under a common regulatory and management umbrella:

- Purpose is to help WMO Members provide and gain access to more observational data at reduced cost by taking an integrated approach
- Regulatory material and technical systems to facilitate has been implemented by WMO and is still undergoing further development
- Strong involvement from Members is necessary and is beginning to happen
- Regional WIGOS Centres to provide important support functions for Members

The Group noted that for the regional WIGOS centres, interest from Morocco and Tanzania have been received and that the WMO Secretariat is seeking donor funds to support activities. The expectations is that there will be 5 centres established on the continent supported by individual countries.

## **13. REVIEW OF INPUT TO THE EUMETCAST-AFRICA BASELINE**

During the review of the baseline it was noted that there are relatively few changes to be made to the existing table of requirements. The following updates were noted:

- Completion of the NWP data request to Met Office and ECWMF;

- SAWS will review their existing offer to provide NWP output data in light of the future UK enhancements to the Tropical model;
- The importance of having the NWC RDT and CRR products on EUMETCast were reiterated;
- Any new requirements arising for the work of the task team on climate applications will be added to the table in due course.

#### **14. CONCLUSIONS OF MEETING & REVIEW OF ACTIONS**

In the concluding remarks, the following key points arising from the meeting were highlighted:

- The need to assess and learn from the issues arising from the operation of the PUMA2015 stations and to take these into consideration when preparing the new specification for future meteorological workstations. In addition, the importance of good and clear documentation in all relevant languages (English, French and Portuguese) to support the use and end user configuration of meteorological workstations and the importance of training of trainers, developing a support network of regional technical expert and repeat training sessions to ensure that knowledge on how to operate these stations is transferred to new users;
- RAIDEG and EUMETSAT commit to the continuation of the work already started through the MAPS project (MTG) and will continue the dialogue on the preparation of the African NMHSs for the next generation of Meteosat satellites;
- Continued need for, and appreciation by NMHSs in Africa of, the NWP data provided by the NWP centres in Europe. Efforts towards exploring possibilities for integrated training on satellite and NWP data is most appreciated by the Group;
- When preparing requirements for new data whether for weather forecasting or climate services the Group appreciated the need to refine these requirements, e.g. identifying specific parameters, timestamps and assigning priorities.

#### **15. CLOSURE**

The Chair and WMO Secretariat thanked the participants and presenters for their work towards making the meeting a success.

It was noted that the next face-to-face meeting of the Group will be co-located with the 13<sup>th</sup> UFA scheduled to take place in Abidjan, Ivory Coast, 24-28 September 2018. The RAIDEG meeting would likely take place before the UFA session on 22-23 September 2018 and would be hosted by EUMETSAT.

To support the ongoing work of the group, a mid-term on-line meeting will be arranged by the WMO Secretariat.

APPENDIX I

APPENDIX I: AGENDA

WORLD METEOROLOGICAL ORGANIZATION  
 RA I DISSEMINATION EXPERT GROUP, 8<sup>th</sup> MEETING  
 GENEVA, SWITZERLAND, 1-2 NOVEMBER 2017

RAIDEG-8/Doc. 2  
 (25.X.2017)

PROVISIONAL AGENDA

Documents available at: <http://www.wmo.int/pages/proq/sat/meetings/RAIDEG-8.php>  
 (*doc X*) indicates availability of a document or a presentation)

| 1 NOVEMBER 2017 |  |  |
|-----------------|--|--|
| 8:30            | <i>Registration in ROOM 8 JURA, WMO HQ</i>   |  |
| 9:00            | <b>1. Welcome</b>  | Fernando Belda (D/OBS),<br>Joseph Mukabana (D/AFLDC)                           |
| 9:15            | <b>2. Adoption of Agenda</b> [ <i>doc 2</i> ]  | Mariane Diop Kane (Chair)  |
| 9:30            | <b>3. Review of Actions from Previous Meeting</b> [ <i>doc 3</i> ]   | Sally Wannop (EUMETSAT)  |
| 10:00           | <b>4. Nomination of focal points to RAIDEG</b>   | Stephan Bojinski (WMO)   |
| 10:10           | <b>5. Status of EUMETSAT Operational Services &amp; Dissemination Baseline Update Document EUMETCast-Africa</b> [ <i>doc 5</i> ]   | Sally Wannop (EUMETSAT)  |
| 10:30           | <i>Break</i>   |  |
| 11:00           | <b>5. Status of EUMETSAT Operational Services &amp; Dissemination Baseline Update Document EUMETCast-Africa (cont'd)</b>   | Sally Wannop (EUMETSAT)  |
| 11:30           | <b>6. WMO 2016 Survey on the Use of Satellite Data</b> [ <i>doc 6</i> ]  | Stephan Bojinski (WMO)   |
| 12:00           | <b>7. Report from each region (15 mins per region)</b> [ <i>doc 7.X</i> ]<br>Recommended structure of report:<br>1. Status of access to products and training, as well as new needs and requirements (incl upgrade to PUMAS2015 at MESA stations)<br>2. Status of data and products utilization, as well as new requirements<br>3. Training (including activities organized in the inter-session period, and identified new requirements, including recommendations for new training modules (all above 3 items should be detailed to the countries within each sub-region)<br>4. Recommendations to WMO (RA I Management Group, D/AFLCP, and Space Programme, ETR, etc), EUMETSAT, AMCOMET) | All sub-regional<br>representatives, ACMAD,<br>EAMAC, JCOMM                    |
| 12:30           | <i>Lunch Break</i>   |  |
| 13:30           | <b>7. Report from each region (cont'd)</b>   |  |
| 15:00           | <b>8. Climate Data for RA-I</b><br>8.1 RAIDEG/RA-I Climate Services and Adaptation Working Group (CSA) Meeting April 2017 and Follow-Up [ <i>doc 8.1.1, doc 8.1.2</i> ]  | Pascal Yaka (Chair of RA-I<br>Climate Service and<br>Adaptation Working Group) |

APPENDIX I

RAIDEG-8, Doc. 2, p. 2

|       |  |   |
|-------|--|---|
| 16:00 | <i>Break</i>   |   |
| 16:30 | <b>8. Climate Data for RA-I (cont'd)</b>                                 |   |
|       | 8.2 European Copernicus Climate Change Service (C3S)<br><i>[doc 8.2]</i> | Jean-Noel Thépaut (C3S)                   |
| 17:00 | <b>9. Update on MTG and MESA</b> <i>[doc 9]</i>                          | Vincent Gabaglio, Sally Wannop (EUMETSAT) |
| 17:30 | <i>Adjourn for Day 1</i>   |   |

|                        |   |  |
|------------------------|---|--|
| <b>2 NOVEMBER 2017</b> |   |  |
| 9:00                   | <b>10. Briefings by NWP Centres (20 mins per Centre)</b>  |  |
|                        | 10.1 Met Office, UK <i>[doc 10.1]</i>   | Steve Manktelow  |
|                        | 10.2 DWD, Germany <i>[doc 10.2]</i>   | Daniel Rieger (remote)   |
|                        | 10.3 ECMWF <i>[doc 10.3]</i>  | Umberto Modigliani   |
| 10:30                  | <i>Break</i>  |  |
| 11:00                  | <b>11. VLab Centres of Excellence Training Requirements arising from the Dissemination Baseline (15 mins per CoE)</b> <i>[doc 11.X]</i> | All four CoEs concerned  |
| 12:00                  | <i>Lunch Break</i>  |  |
| 13:30                  | <b>12. WMO Programme Updates (15 min each)</b> <i>[doc 12.X]</i>  |  |
|                        | 12.1 Global Framework for Climate Services  | Veronica Grasso  |
|                        | 12.2 CREWS in Africa  | John Harding   |
|                        | 12.3 SWFDP  | Abdoulaye Harou  |
|                        | 12.4 WCRP CORDEX  | Michel Rixen   |
|                        | 12.5 WWRP   | Estelle de Coning  |
|                        | 12.6 DRA/AFLDC  | Joseph Mukabana  |
|                        | 12.7 ETR (Training)   | Mustafa Adiguzel   |
|                        | 12.8 WIGOS  | Lars Peter Riishojgaard  |
| 15:30                  | <b>13. Follow-up discussion (if needed)</b>   |  |
| 15:45                  | <i>Break</i>  |  |
| 16:00                  | <b>14. Review of new inputs to the EUMETCast-Africa Baseline</b>  | Sally Wannop (EUMETSAT)  |
| 16:45                  | <b>15. Conclusions of Meeting &amp; Review of Actions</b>   | Mariane Diop Kane (Chair),<br>Fernando Belda (WMO),<br>Joseph Mukabana (WMO) |
| 17:00                  | <b>16. Closure of the Meeting</b>   |  |



## APPENDIX II

## APPENDIX II: LIST OF PARTICIPANTS

| <b>RAIDEG Regional Representatives</b> |   |
|--|---|
| <b>DIOP KANE, Mariane (Chair)</b>      | <p>Agence Nationale de l'Aviation Civile et de la Météorologie – ANACIM<br/>           A.L.S.S. BP 8257<br/>           DAKAR-YOFF<br/>           Senegal<br/>           Tel.: +221 33 869 5335<br/>           Fax: +221 338 201 327<br/>           Email: <a href="mailto:riane_diopkane@yahoo.fr">riane_diopkane@yahoo.fr</a>,<br/> <a href="mailto:marianediopkane@gmail.com">marianediopkane@gmail.com</a></p> |
| <b>KAGENYI, Joseph (remote)</b>        | <p>Kenya Meteorological Department<br/>           Jamhuri<br/>           P. O. Box 30259 - 00100<br/>           Nairobi Kenya<br/>           Tel.: +254 722 985370<br/>           Email: <a href="mailto:kagenyjin@GMAIL.COM">kagenyjin@GMAIL.COM</a></p>   |
| <b>KROESE, Nico</b>                    | <p>South African Weather Service<br/>           442 Rigel Avenue South,<br/>           Erasmusrand, 0181<br/>           Private Bag X097<br/>           Pretoria 0001<br/>           South Africa<br/>           Tel: +27 12 367 6004<br/>           Email: <a href="mailto:nico.kroese@weathersa.co.za">nico.kroese@weathersa.co.za</a></p>  |
| <b>ALI ABANI, Ahmed</b>                | <p>African Centre of Meteorological Applications for Development (ACMAD)<br/>           85 Avenue des Ministères<br/>           NIAMEY<br/>           Niger<br/>           Tel.: +227 20 73 49 92<br/>           Fax: +227 20 72 36 27<br/>           Email: <a href="mailto:aabani@yahoo.com">aabani@yahoo.com</a></p>   |
| <b>WIAFE, George (remote)</b>          | <p>JCOMM<br/>           Dept. of Marine and Fisheries Science<br/>           University of Ghana<br/>           P. O. Box LG.99<br/>           Legon-Accra<br/>           Ghana<br/>           Tel.:<br/>           Email: <a href="mailto:wiafeg@ug.edu.gh">wiafeg@ug.edu.gh</a></p>   |

APPENDIX II

|  |  |
|--|--|
| <b>DHURMEA, Ram Kumar (remote)</b>                           | Mauritius Meteorological Services<br>St Paul Road<br>Vacoas<br>Mauritius<br>Tel: +230 6861031/32<br>Fax: +230 6861033<br><a href="mailto:sadrame75@gmail.com">sadrame75@gmail.com</a>  |
| <b>WMO Training Centres of Excellence</b>                    |  |
| <b>HAMIDOU, Hama</b>   | EAMAC (ASECNA)<br>Avenue du President Kalt Carsten<br>Niamey<br>Niger<br>Email: <a href="mailto:HAMAHam@asecna.org">HAMAHam@asecna.org</a>   |
| <b>RA-I Working Group on Climate Services and Adaptation</b> |  |
| <b>YAKA, Pascal (Chair)</b>                                  | Burkina Meteorological Department<br>Ouagadougou 01; 01 BP 4413<br>Burkina Faso<br>Email: <a href="mailto:pascal_yaka@yahoo.fr">pascal_yaka@yahoo.fr</a><br><a href="mailto:pascalyaka@gmail.com">pascalyaka@gmail.com</a><br>Tel.: +226 75 40 00 11 |

|                                |  |
|--------------------------------|--|
| <b>NWP Centres</b>             |  |
| <b>MANKTELOW, Steve</b>        | MetOffice<br>VCP<br>Exeter, United Kingdom<br>Tel.:<br>Email: <a href="mailto:steve.manktelow@metoffice.gov.uk">steve.manktelow@metoffice.gov.uk</a>   |
| <b>MODIGLIANI, Umberto</b>     | Head, User Support<br>Shinfield Park<br>Reading, Berkshire, RG2 9AX,<br>Tel. +44 118 949 9382<br>Fax +44 118 986 9450<br>Email: <a href="mailto:umberto.modigliani@ecmwf.int">umberto.modigliani@ecmwf.int</a> |
| <b>RIEGER, Daniel (remote)</b> | DWD<br>Offenbach<br>Germany<br>Tel.:<br>Email: <a href="mailto:daniel.rieger@dwd.de">daniel.rieger@dwd.de</a>  |

| <b>Copernicus Climate Change Service (C3S)</b> |   |
|--|---|
| <b>THEPAUT, Jean-Noël</b>                      | ECMWF<br>Shinfield Park<br>Reading, Berkshire, RG2 9AX,<br>United Kingdom<br>Tel. +44 118 949 9030<br>Fax +44 118 986 9450<br>Email: <a href="mailto:jean-noel.thepaut@ecmwf.int">jean-noel.thepaut@ecmwf.int</a> |
| <b>EUMETSAT</b>                                |   |
| <b>WANNOP, Sally</b>                           | User Relations Manger<br>Tel.: +49 6151 807 4400<br>Fax: +49 6151 807 3040<br>Email: <a href="mailto:sally.wannop@eumetsat.int">sally.wannop@eumetsat.int</a>   |
| <b>NIETOSVAARA, Vesa</b>                       | Training Officer<br>Tel.: +49 6151 807<br>Fax: +49 6151 807 3040<br>Email: <a href="mailto:vesa.nietosvaara@eumetsat.int">vesa.nietosvaara@eumetsat.int</a>   |
| <b>GABAGLIO, Vincent</b>                       | International Affairs Officer<br>Tel.: +49 6151 807 7360<br>Fax: +49 6151 807 3040<br>Email: <a href="mailto:vincent.gabaglio@eumetsat.int">vincent.gabaglio@eumetsat.int</a>                                     |

|                           |   |
|---------------------------|---|
| <b>WMO Secretariat</b>    | <b>7bis, avenue de la Paix<br/>CH-1211 Geneva 2<br/>Switzerland</b>   |
| <b>MUKABANA, Joseph</b>   | Director, Office for Africa and Least Developed Countries (AFLDC)<br>Tel.: +41 22 730 8339<br>Email: <a href="mailto:jmukabana@wmo.int">jmukabana@wmo.int</a> |
| <b>AFIESIMAMA, Ernest</b> | Office for Africa and Least Developed Countries (AFLDC)<br>Tel.: +41 22 730 8063<br>Email: <a href="mailto:eafiesimama@wmo.int">eafiesimama@wmo.int</a>       |
| <b>BOJINSKI, Stephan</b>  | Space Programme<br>Tel.: +41 22 730 8319<br>Email: <a href="mailto:sbojinski@wmo.int">sbojinski@wmo.int</a>   |
| <b>BELDA, Fernando</b>    | Director, Observing and Information Systems Department<br>Tel.: +41 22 730 8035<br>Email: <a href="mailto:fbelda@wmo.int">fbelda@wmo.int</a>                  |
| <b>GRASSO, Veronica</b>   | GFCS Office<br>Tel.: +41 22 730 8186<br>Email: <a href="mailto:vgrasso@wmo.int">vgrasso@wmo.int</a>   |

## APPENDIX II

|                           |   |
|---------------------------|---|
| <b>HAROU, Abdoulaye</b>   | Weather and Disaster Risk Reduction<br>Services Department<br>Tel.: +41 22 730 8231<br>Email: <a href="mailto:aharou@wmo.int">aharou@wmo.int</a>                |
| <b>DECONING, Estelle</b>  | World Weather Research Project<br>Research Department<br>Tel.: +41 22 730 8093<br>Email: <a href="mailto:edeconing@wmo.int">edeconing@wmo.int</a>               |
| <b>NUNES, Luis Felipe</b> | WIGOS Project Office<br>Observing and Information Systems<br>Department<br>Tel.: +41 22 730 8138<br>Email: <a href="mailto:lfnunes@wmo.int">lfnunes@wmo.int</a> |
| <b>RIXEN, Michel</b>      | WCRP Joint Planning Office<br>Research Department<br>Tel.: +41 22 730 8528<br>Email: <a href="mailto:mrixen@wmo.int">mrixen@wmo.int</a>                         |