Report of the 42nd Meeting of the
Coordinated Group for Meteorological Satellites

Parallel Working Group Sessions: WGIII Report

WG III REPORT

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WG III/0 Objectives

The objectives and goals of WG III were recalled, in line with the CGMS HLPP according to the proposed agenda.

WG III/1 Review of actions and recommendations from previous meetings

The meeting reviewed the status of actions from previous meetings. It noted that all seventeen actions were completed and closed, with the following exceptions:

- Action 38.40, related to atmospheric composition requirements, is in progress with the establishment of a dedicated task team by the Global Atmospheric Watch programme;
- Action 41.42, related to reformulation of the CGMS baseline, is underway with the contribution provided by **CGMS-42-WMO-WP-08**;
- Action 41.48, regarding the long term planning of active precipitation measurement, will be postponed to 2015 in order to best take into account the recent progress of the GPM-Core and CMA's plans for FY-3RM.

The Co-Chairs underlined the excellent progress made by the Working Group during the intersession period in completing these actions.

The meeting also reviewed the recommendations and agreed the following:

- Recommendation 41.14 on potential gaps should be closed and replaced by a new recommendation reflecting an updated risk assessment in light of the discussion of item III/2.2 ;
- Recommendations 41.16 and 41.17 can be closed, given the very good response received through the Early Morning Tiger Team;
- Recommendation 41.18 is addressed by an action in the HLPP and can be closed as a Recommendation.

The final status of the list of WG III actions and recommendations resulting from CGMS-41, following CGMS-42 deliberations is available here.

WG III/2 Status of implementation of the CGMS baseline

WG III/2.1 Mapping of planned missions against the baseline

CGMS-42 WMO-WP-08 reports on a study performed by WMO with the aim of providing a draft list of FCDRs that CGMS members could commit to provide (in response to CGMS Action 41.43) as a step towards the inventory of FCDRs requested by CGMS-41 (WG III Action 41.12) and a subsequent gap analysis at the FCDR level. The outcome of the study is two-fold:

(i) For each ECV, to produce a list of the FCDRs that can be generated from past, present and future satellite missions, with particular emphasis on CGMS baseline missions.

(ii) This list should include basic characteristics, and periods of availability of individual satellite missions which have the potential to produce these FCDRs, based on the programmatic and technical information recorded by WMO in OSCAR.

The potential to deliver FCDRs from past, present, and future missions is evaluated on the basis of sensor and orbit characteristics and mission launch and end dates. It was stressed, however, that sensor availability and adequacy are necessary but not sufficient conditions to deliver FCDRs. The availability of the FCDRs should be stated by the agencies responsible for ensuring data availability and overall maturity of the data records. Quality evaluation should take into account the compatibility with relevant heritage instruments. The report was completed in consultation with the Expert Team on Satellite Systems (ET-SAT) and presented at the first meeting of the CEOS-CGMS Joint Working Group on Climate (Darmstadt, Germany, 5-7 March 2014).

The Chairman of the Joint CEOS-CGMS Working Group on Climate (JWGClimate) explained the information flow and the processes involved in the processing of satellite measurements into climate data records, which sets the scene for the work of the JWGC. The JWGC is currently focusing on the inventory of ECV products and intends to perform a gap analysis from the user end.

It was realised that the JWGClimate and Working Group III were pursuing a common goal – to identify the gaps and provide guidance to strengthen the climate monitoring system –with two complementary perspectives, however: while the JWGC is focusing on the ECV product processing chain the Working Group III is putting emphasis on the long term planning of sensor missions. Both approaches have merits and drawbacks. There was consensus on the point that the approaches could feed each other and help focus the attention on missions or products that pose the most critical challenges in terms of continuity.

WG III/2.2 Continuity issues, risk analysis

CGMS-42 WMO-WP-13 contains a review of the status of critical missions identified at CGMS-41 in the implementation of the CGMS baseline, as well as other potential gaps identified by different user communities. This was used as a guideline by WG III to update its assessment of risks and gaps. It was agreed that continuity was deemed to be ensured when a mission was operating successfully with planned follow-on (or firmly planned with a mature technology, for future missions), and the data were available in near-real time.

(a) Geostationary coverage over Indian Ocean

The current and planned missions of IMD/ISRO, ROSHYDROMET and CMA together have the potential to ensure robust coverage of the Indian Ocean. There is, however, a need to analyse how these plans supplement each other, what contingency arrangements can be established, what is the actual status of the missions, and to confirm that full resolution data are or will actually be available in near real-time. This was the reason for CGMS Action 41.38 calling for a medium-term strategy for ensuring Indian Ocean coverage with advanced geostationary imagery.

CGMS-42 CMA-WP-03 provided an update on Indian Ocean data coverage by Fengyun geostationary satellites. The Working Group noted the commitment of CMA to share openly all “essential data” with reference to WMO Resolution 40 (Cg-12) and discussed which data should be considered

"essential". It recalled that Resolution 40 sees as essential "Those data and products from operational meteorological satellites that are agreed between WMO and satellite operators. (These should include data and products necessary for operations regarding severe weather warnings and tropical cyclone warnings)". WMO was asked to provide guidance in this respect.

CGMS-42 actions - WG III						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
WMO, CMA, EUM, ROSH, ISRO	WG III/2.2	A42.01	WMO to initiate a dialogue with Indian Ocean satellite operators and clarify which data are essential in the sense of Resolution 40, in view of the meteorological requirements in the region.	CGMS-43	OPEN	HLPP# 1.1.6

CGMS-42 ROSHYDROMET-WP-04 presents the status of Electro-L satellites for Indian Ocean coverage. Electro-L N1 is currently not fully functional. Electro-L N2 is planned for launch at the end of 2014 and will be located at 77.8°E.

CGMS-42 IMD-WP-01 presents the status of INSAT-3D, clarifying that the spacecraft was designed for five years of operation and that the plans included a follow-on.

CGMS-42 EUMETSAT-WP-26 presents a synthesis of the satellite capabilities available and planned in the near to medium-term and proposes a roadmap for the future provision of IODC (India Ocean Data Coverage) services. IMD confirmed its agreement to share the full resolution data from INSAT-3D and make them openly available via FTP in near-real time, but needs assistance for onward dissemination to the users. IMD therefore required the assistance of EUMETSAT to ensure dissemination. EUMETSAT agreed to work with IMD towards ensuring dissemination to EUMETCast users, which would be a significant first step. CMA indicated its readiness to relocate a spare FY-2 satellite (i.e. FY-2E) westwards after the successful launch and commissioning of FY-2G. It was further agreed that ROSHYDROMET could contribute to the regional capabilities supporting the DCS system.

CGMS-42 actions - WG III						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
EUM, ISRO	WG III/2.2	A42.02	EUMETSAT and ISRO will address the technical issues to accommodate high-resolution half-hourly data from INSAT-3D on dissemination means.	CGMS-43	OPEN	HLPP# 1.1.6
WMO	WG III/2.2	A42.03	WMO to consider sending a request to CMA for moving FY-2D over the Indian Ocean after successful launch and commissioning of FY-2G.	CGMS-43	OPEN	HLPP# 1.1.6

(b) Geostationary coverage of Central and South America

The Working Group noted with appreciation that, in response to Action 41.39, NOAA had implemented an optimized scanning pattern on GOES-East as of May 2014, after consultation of the regional user community, as described in WMO-WP-09. During rapid scan events over the Continental United States, the optimised scanning pattern allowed two 2-minute windows to be accommodated every hour, covering most of the South American continent. Thanks to this mitigation scenario, the risk resulting from the termination of GOES-South America was considered closed. WMO thanked NOAA for its efforts to offer the best possible response to user needs.

(c) Transition to GOES-R in South America

WMO reported that users in South America were unlikely to be equipped with GRB stations in time given the uncertainties regarding the location (GOES-West or GOES-East) and the date (after storage or not) of the operational start of GOES-R. Users may not be able to plan an heavy investments without knowing when it will be required. There is thus a risk that the switch to GOES-R or GOES-S will result in a temporary disruption of the operational service for these users, instead of being a big step forward. WMO therefore invited NOAA to consider disseminating a subset of GOES-R data by a different means such as GEONETCast-America as a risk reduction measure for the users. (Note: this was also addressed in WG IV)

WMO also underlined NOAA's "Proving Ground" project as a remarkable initiative to prepare the use of a new generation satellite well ahead of its launch. WMO however echoed the concern of users about the possibility that the new GOES-R be put in storage after its commissioning, thus delaying significantly the realization of the benefits of this new system. It was therefore suggested that the acquisition of images and the dissemination of some data on a pre-operational basis be considered during an extended check-out period after commissioning, until the satellite is put in operation. The RA-III/RA-IV Coordination Group on Satellite Data Requirements could advise on the most relevant subset of data to be transmitted.

CGMS-42 actions - WG III						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
NOAA	WG III/2.2	A42.04	NOAA to report at the first WG III Intersession meeting on its plans regarding the possibility of pre-operational dissemination of GOES-R data via e.g. GEONETCast-Americas both as a risk reduction measure and as a way to reap the earliest benefit of the new system.	30 Nov 2014	OPEN	HLPP# 1.1.6

(d) Geostationary infrared hyper-spectral sounding

There have been promising simulations of the use of geostationary hyper-spectral data for nowcasting. Some simulation experiments of NWP impact are also planned. However, there will be a

stronger case for the operational benefit of such novel sensors once FY-4A/GIIRS and MTG/IRS are demonstrated. Following the planned demonstration of hyper-spectral sensors on FY-4 and MTG-S, the implementation of such sensors remains an objective for the other geostationary sectors.

(e) Imagery and sounding on early morning orbit

CMA confirmed that substantial progress had been made to establish the feasibility to fly FY-3E and follow-on spacecraft on a 6:00 ECT orbit, tentatively in 2017, with a comprehensive sounding package. The decision for such a deployment of the FY-3 programme cannot be confirmed yet. Working Group III remained hopeful about this development which would be a major achievement towards a global, robust constellation of core meteorological missions

(f) Continuity of afternoon orbit primary missions

Continuity is normally ensured by NOAA on the afternoon orbit with the Suomi NPP mission, to be followed by JPSS-1/-2 on a 13:30 ECT orbit. NOAA indicated at earlier CGMS meetings a risk of a gap in transitioning from Suomi NPP to JPSS, and is investigating mitigation scenarios which include extending as much as possible the lifetime of Suomi NPP to avoid a gap and launching DMSP-20 on an afternoon orbit. The Working Group also recalled that CMA operates FY-3B, to be followed by other FY-3 spacecraft, nominally on a 14:00 orbit.

The Working Group agreed that the situation should be closely monitored to ensure a seamless transition.

(g) Radio-occultation

CGMS-42 EUMETSAT-WP-34 reports on the preliminary results of a study being performed by EUMETSAT through ECMWF on radio occultation/saturation. It was noted that it would be a significant benefit to NWP to ensure at least 16,000 globally distributed, occultations per day.

ISRO noted that a ROSA instrument is flying on Megha-Tropiques and Oceansat-2. It was also noted that issues with ROSA data processing were being addressed.

CGMS-42 actions - WG III						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
ISRO	WG III/2.2	A42.05	ISRO to report at CGMS-43 on its progress on radio-occultation processing of ROSA on Oceansat-2 and Megha-Tropiques, and on the possibility of near-real time access to ROSA data acquired at a high latitude station such as Svalbard.	CGMS-43	OPEN	HLPP# 1.1.4
EUM	WG III/2.2	A42.06	EUMETSAT to review the schedule of its ECMWF radio-occultation study with the aim to deliver advanced results on the specific impact of the high-latitude COSMIC-2 constellation.	CGMS-43	OPEN	HLPP# 1.1.4

(h) Altimetry

As concerns the reference mission on high-precision orbit, Jason-2 will be followed by Jason-3 is planned for launch in March or April 2015. Sentinel-3A (22:00 ECT) is also planned for launch in 2015, followed by Sentinel-3B. The ISRO-CNES research mission Altika is operating successfully. When considering also the HY-2 series (6:00 ECT) of China's State Oceanic Administration (SOA), an operational constellation would be nominal as planned in the CGMS baseline, provided that HY-2 data can be globally available in near-real time.

Working Group III invited NOAA to give an update on the launch date of Jason-3 at the next inter-sessional meeting. It also encouraged EUMETSAT and SOA to pursue their high level dialogue to collaborate on the near real-time dissemination of HY-2 data. (See action in section (i) below).

(i) Active ocean surface wind measurement

CGMS-42-CEOS-WP-01 reviews the status of the scatterometer constellation, with a focus on sustainability of observations and timely access to data. It recalls the successful operation of OSCAT on Oceansat-2 until early 2014 and the great benefit to the user community of OSCAT data being available in near real-time through collaboration between ISRO and EUMETSAT. It however highlights that, following the loss of OSCAT, only ASCAT data from Metop-A and -B are currently available in near real-time. Since both Metop satellites are on the same orbit, there is now a lack of scatterometer data on a well separated orbital plane.

ISRO indicated that a fast-track project had been set up to launch a gap filler scatterometer named ScatSat.

CMA recalled that FY-3E (tentatively foreseen in 2017 on a 06:00 orbit) and FY-3F (tentatively foreseen in 2018 on an afternoon orbit) will fly a scatterometer.

EUMETSAT also recalled the ongoing high-level dialogue between EUMETSAT and SOA towards collaboration on the near real-time availability of HY-2 data, including scatterometer data.

CGMS-42 actions - WG III						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CNSA, EUM	WG III/2.2	A42.07	EUMETSAT and CNSA to report at CGMS-43 on the progress of EUMETSAT-SOA collaboration on the dissemination of HY-2 data in near real time.	CGMS-43	OPEN	HLPP# 1.1.3
EUM, ISRO	WG III/2.2	A42.08	ISRO and EUMETSAT to report at CGMS-43 on their discussions on data dissemination collaboration for SCATSAT data.	CGMS-43	OPEN	HLPP# 1.1.3

(j) Active global precipitation measurement

Working Group III commended NASA and JAXA for the successful launch and early in-orbit testing of the GPM-core observatory. It also looked forward to the Fengyun-3 Rain Monitoring (FY-3 RM) mission planned by CMA. With these developments in mind, active precipitation measurement could be considered as a possible candidate for the CGMS Baseline in the future.

The Working Group agreed to **maintain Action 41.18** (WG III to investigate the long-term planning of space based observation for global precipitation measurements and liaise as appropriate with the CEOS Precipitation Constellation) with a new deadline set for CGMS-43.

(k) Earth Radiation Budget

The Working Group noted the progress of ERB measurement missions within the Suomi NPP, JPSS, FY-3, Megha-Tropiques and Electro-L/-M programmes. It supported the view that a detailed review would be needed to confirm the comparability of planned sensors (for both broadband upward component and solar irradiance) with heritage sensors.

(l) Limb sounding

The need was identified in previous meetings of limb sounding missions to provide high-vertical resolution of temperature, humidity, wind, aerosol, ozone and other trace gas observations in the stratosphere and mesosphere. A gap is anticipated with the unavoidable termination of several R&D missions (EOS/AURA, SCISAT, TIMED, ODIN) in the coming years. OMPS-limb is on Suomi NPP and foreseen on JPSS-2 but not JPSS-1.

A future objective should be to implement and maintain limb sounding missions in various spectral bands (UV, VIS, IR, MW). The newly created task team on atmospheric composition requirements is expected to provide guidance in this respect.

Concluding the discussions of agenda item WG III/2.2, it was decided to amend CGMS-41 Recommendation 41.14 as follows:

CGMS-42 recommendations - WG III						
Actionee	Rec	#	Description	Deadline	Status	HLPP ref
CGMS satellite operators	(WG III/2.1 CGMS-41) WG III/2.2	R41.14	CGMS Satellite Operators to address the anticipated or potential gaps identified by WG III, in particular: • infrared and microwave sounding on the early morning orbit, • geostationary coverage of Indian Ocean • hyperspectral sounding missing in some geostationary sectors • ocean surface wind by scatterometry • long-term follow-on of radio-occultation constellation, • global precipitation measurement	(CGMS-43)	OPEN	HLPP#1.1

			precipitation radar follow-on mission, • long-term Earth Radiation Budget monitoring • limb sounding for high-vertical resolution observations in the stratosphere and mesosphere (of temperature, humidity, wind, aerosol, ozone and other trace gases).			

WG III/3 Space-based observing system review and optimisation

In response to an action from CGMS-41, NOAA provided the CGMS-41-NOAA-WP-27 paper on the benefits of the VIIRS Day Night Band (DNB). The low-light sensor is carried on the Suomi NPP mission and will be on future JPSS satellites. The DNB leverages reflected moonlight to sense clouds, fog and surface features as well as artificially emitted light from cities, fires and other sources such as fishing boats. The benefits of the DNB include the ability to observe environmental phenomena at night; obtain better resolution than existing IR and microwave capability, thus offering more detail on applications such as sea ice analysis; provision of imagery during polar winters; and better performance than legacy capability offered on DMSP satellites (i.e., OLS) in terms of resolution, stability and accuracy. Other practical applications include detection of fog and volcanic ash to support the transportation sector, snow fields, and storm tracking. The DNB is now a critical observation and NWS has requested that it become a key performance parameter.

NOAA was commended on the development of the practical usage of products from the DNB.

In a remote presentation of **CGMS-42-CEOS-WP-02**, Gary Corlett, Coordinator of the Group for High Resolution Sea Surface Temperature (GHRSST), provided a status report on the SST constellation. He pointed out that observing capabilities should be strengthened in particular as concerns microwave imagery (only provided by GCOM-W/AMSR-2 in the low frequency band) and multi-angle viewing infrared radiometry (following the loss of ENVISAT/AATSR). He also stressed the requirement of the GHRSST community to adopt netcdf CF convention formats for Level 2 SST data and invited actual or potential providers of such data to join the Working Groups where this is discussed.

CGMS-42 actions - WG III						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CMA, ROSH	WG III/3	A42.09	CMA and ROSHYDROMET to provide points of contact for possible participation in GHRSST.	31 Aug 2014	OPEN	-

In a remote presentation of **CGMS-42-CEOS-WP-03**, Stewart Bernard, Chair of the International Ocean Colour Coordinating Group (IOCCG), provided a report on the Ocean Colour Radiometry Virtual Constellation (OCR-VC). He emphasised that the IOCCG was aiming at ocean colour measurement continuity, consistency and at the development of operational services.

Working Group III noted that the CGMS baseline did not specify in detail what capabilities should be maintained to monitor ocean colour. Therefore the needs raised by the OCR-VC are therefore not identified as a gap in implementing the baseline, but should rather be considered as an input for a possible update of this baseline.

CGMS-42 actions - WG III						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CEOS OCR-VC	WG III/3	A42.10	OCR-VC Chair to provide feedback on the CGMS Baseline, and suggest more specific provisions addressing the needs of ocean colour monitoring, if relevant, for consideration by CGMS.	CGMS-43	OPEN	HLPP# 1.1.6

WG III/4 Integration of R&D missions (research to operations transition)

In **CGMS-42-NOAA-WP-28**, NOAA responds to the request from CGMS-41 to report on its activities towards transitioning mature R&D missions to an operational status. NOAA summarises the operational and research satellites used by NOAA in Numerical Weather Prediction models. NOAA uses the Joint Center for Satellite Data Assimilation as its primary test bed for developing new science for taking advantage of new research satellite data. In addition to preparing for the latest advancements in NOAA satellites, the Joint Center is preparing to take advantage of the latest research satellite capabilities expected to have a major impact on Numerical Weather Prediction. NOAA highlights its highest priorities for research satellite data and then touches on the hurdles to overcome when new types of data are assimilated into weather models. Lastly NOAA is incorporating new research data into weather models, warnings and forecasts to benefit society through reduced loss of life and property, improved understanding of short-term and long-term climate change and contributions to better planning and decision making.

Working Group III acknowledged that promoting the operational use of advanced sensor data, and communicating on the operational benefit of such new missions, was an important aspect of the transition phase from R&D to operations.

WG III/5 Socio-economic benefits of space missions

In **CGMS-42-NOAA-WP-19**, Charles Wooldridge of NOAA provides a status report on the activities of the CGMS Socioeconomic Benefits Tiger Team (SETT). In the first year of the Tiger Team, three of the seven milestones/activities in its Terms of Reference were fully completed *(Tiger Team has been established; relevant studies and activities compiled; expertise identified and a first workshop held to identify and discuss key applications and case studies).* WG III was briefed on the results of the April 2014 workshop and the future work plan of activities. According to the work plan, SETT will finalise the workshop report and develop a 2-to-3 page information paper to provide to CGMS members. SETT will also work to develop an example of the macro approach on weather satellites and drill down to the micro case study to demonstrate a focused concrete example of the value of information. For the longer term, SETT will identify opportunities to incorporate best practices and integrate these into additional or subsequent member studies. Finally, prior to CGMS-43 SETT will prepare a recommendation for future activities and plan a keynote on Socio-economic benefits at

CGMS-43. Mr. Wooldridge noted that he will give a report on SETT to the June 21 2014 WMO Consultative Meeting on High-level Policy on Satellite Matters. SETT plans to hold its next workshop in autumn 2014 in the Washington DC area.

CGMS-42 actions - WG III						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
NOAA	WG III/5	A42.11	NOAA to communicate to WG III the link to the information material collected by the Tiger Team.	31 Aug 2014	OPEN	HLPP# 4.1.1
NOAA	WG III/5	A42.12	NOAA to report at the first inter-sessional web meeting of WG III on the progress of the SETT.	30 Nov 2014	OPEN	HLPP# 4.1.1
NOAA	WG III/5	A42.13	NOAA to circulate to WG III the 2-3 page report on socio-economic benefit to be produced by the SETT.	30 Apr 2015	OPEN	HLPP# 4.1.1

WG III/6 Review and updating of the HLPP

With respect to **CGMS-42-CGMS-WP-07**, Working Group III agreed on a rewording of the first objective of the CGMS High Level Priority Plan 2014-2018, with the aim of giving greater visibility to the three-orbit core meteorological constellation.

WG III/7 Any other business

No other business was raised.

WG III/8 Planning of inter-sessional activities/meetings

The Working Group agreed to schedule two inter-sessional web meetings at dates still to be determined:

- Q4 2014
- Q1 2015

It was strongly recommended that all CGMS members nominate a representative who will participate in the inter-sessional working group meetings.

WG III/9 Review of actions, conclusions, preparation of WG report for the plenary

The final list of WG III actions and recommendations resulting from CGMS-42 deliberations is available here.