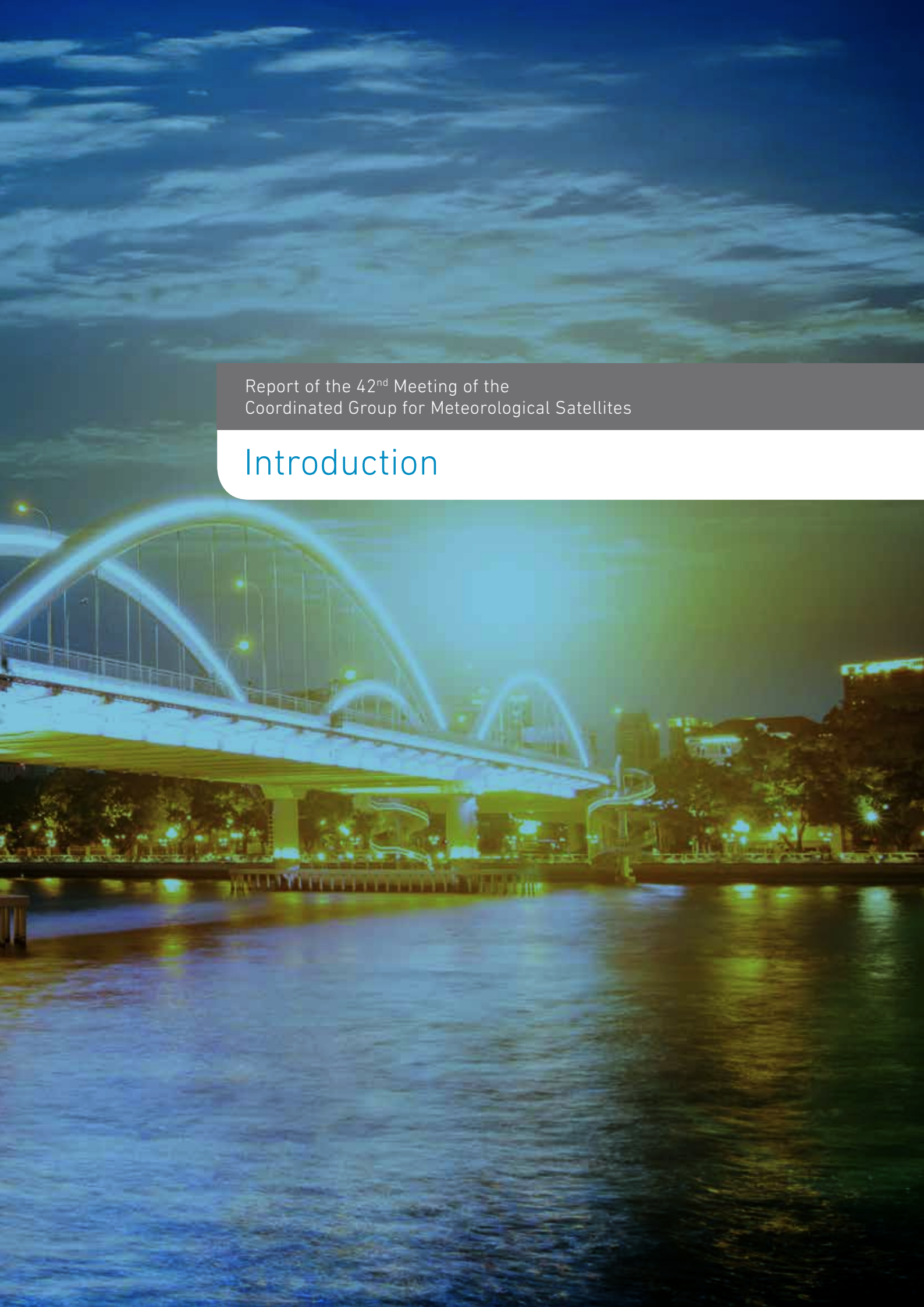
Introduction



INTRODUCTION

The 42nd plenary session of the Coordination Group for Meteorological Satellites (CGMS) was held on 22-23 May 2014 in Guangzhou, China. The meeting was hosted by China through the China Meteorological Administration (CMA) and the China National Space Administration (CNSA).

The plenary session was preceded by the four CGMS Working Groups (WG IWG I Global issues on satellite systems and telecommunication coordination, WG IWG II Satellite data and products, WG IWG III Operational continuity and contingency planning, and WG IWG IV Global data dissemination) as well as an ad-hoc meeting on space weather in the period 19-21 May 2014.

The meeting was co-chaired by Dr. Jun Yang, Director-General of the NMSC of CMA, Mr. Wenjian Zhang, Director of Space Programme, WMO, and Mr. Alain Ratier, EUMETSAT Director-General and Head of the CGMS Secretariat.

A OPENING SESSION (A)

Dr. Guoguang Zheng, Administrator, CMA, welcomed the participants to the 42nd CGMS plenary session which is the third time that China is hosting CGMS in addition to CGMS-21 in Beijing in 1993 and CGMS-34 in Shanghai in 2006. He added that CMA has been a CGMS member since 1989.

Dr. Zheng indicated that CGMS is a major international organisation coordinating Earth observation activities around the world. It facilitates international cooperation and coordination among CGMS members in a positive and pragmatic manner. He went on to say that CGMS attaches great importance to the continuity of satellite observations, coordinating different satellite systems, allowing users to have sustained and reliable access to satellite data including training on its usage. As a coordinating mechanism, CGMS has played a unique role in the use of frequencies, standardised data and product distribution, emergency response planning among others, and, in recent years, climate and space weather have been added to the portfolio.

He continued by saying that the Chinese government attaches great importance to modernising the meteorological infrastructure, and has invested huge resources in establishing China's own satellite observing and application systems. Since it began planning its satellite observing system, China has been a part of the international coordination framework. He also said that in the meantime, China has developed two series of satellite observing platforms consisting of geostationary and polar-orbiting satellites and it provides, through satellite broadcasting, satellite data, products and meteorological services directly to users in 22 countries and regions, and has become an integral part of GEONETCast and the WMO Information System. He added that in order to optimise the polar-orbiting satellite constellation and improve global Numerical Weather Prediction, CMA is currently making every effort to concretise the operation of an FY polar-orbiting satellite in the early morning orbit, urging the Chinese government to ratify the revised meteorological satellite development planning.

He concluded by wishing all participants a successful 42nd session of CGMS and a pleasant stay in Guangzhou.

Dr. Yulong Tian, Secretary-General of CNSA and co-host of CGMS-42, welcomed CGMS delegations on behalf of CNSA and its Administrator, Mr. Dazhe Xu.

He highlighted the importance of CGMS and the important role it has in the construction of the global observing system, the optimisation of space segments, and the standardisation of the global observing system and data services. He added that CGMS has been an invaluable communication platform between members and the user community, in particular WMO.

Dr. Tian stated that CNSA is committed to assure the stable transition of satellites from R&D to operations, and currently CNSA is preparing the China New generation Earth Observing System - CHEOS - one of China's major national science and technology projects. CNSA plans to promote an operational as well as an international service capability for CHEOS. He added that in future, CNSA together with CMA will work closely with CGMS and WMO in order to further enhance the capability of the global observing system.

Concluding his address, he wished all participants a successful meeting and an enjoyable stay in Guangzhou.

B INTRODUCTION TO THE MEETING (B)

The CGMS Secretariat presented the objectives of the meeting and the agenda was approved by all participants, with some changes in the order of the agenda items due to WebEx presentations.

The status of actions and recommendations resulting from CGMS-41 took were presented. At the start of the working groups of CGMS-42, 15 actions from CGMS-41 were still open, 11 of which were closed following working group discussions by the start of the plenary session. One action remained open from CGMS-40.

The final status of CGMS-41 plenary actions and recommendations resulting from CGMS-42 discussions is available here.

(The status of CGMS-42 actions and recommendations is maintained on the CGMS website under CGMS-42).

C WMO USER REQUIREMENTS (C)

C.1 Use of satellite data in WMO climate assessments

CGMS-42-WMO-WP-01 described how WMO has been active in assessing global and regional climate since the initiation of the World Climate Programme in 1979. The WMO annual statement on the 'Status of the Global Climate' has been published since 1993 in the six official languages. More recently WMO published a report on the climate during the decade 2001-2010. Interest in these publications has been increasing with time, including the interest of international agencies, policy makers, governments and the general public. A need for data completeness and quality is therefore of paramount importance to maintain a high standard of these assessments.

In this regard, there is a growing need for satellite products that should complement the poorly documented areas and topics that are currently based mainly on in-situ data. It is of particular

importance for WMO to further enhance its climate assessments using long-term homogenised data sets on tropical cyclones, satellite-based data to contribute to global temperature anomalies and trends, precipitation anomalies and climatology, estimated arctic sea ice volume, monthly northern hemisphere snow cover and anomalies.

Other products such as snow depth estimate and forest fire index, based on combined in-situ and satellite data, could also be envisioned as a contribution to regional climate watch demonstration projects.

The following recommendation was made following the presentation:

CGMS-42 recommendation – PLENARY						
Actionee	Rec	#	Description	Deadline	Status	HLPP ref
CGMS members	Plen C.1	R42.01	CGMS Members are encouraged to support regional climate watch demonstration projects.	CGMS-43	OPEN	HLPP# 5.1.4

CGMS-42-WMO-WP-03 provided an update on the progress of the GFCS initiative. In July 2013, the first session of the Intergovernmental Board on Climate Services (IBCS-1) approved the GFCS Implementation Plan with a compendium of initial GFCS projects for immediate implementation. It also established a Partners Advisory Committee (PAC) and the IBCS Management Committee. EUMETSAT, FAO, IFRC, IUGG, UNEP, WBCSD, WFP, and WMO have formally applied to the PAC, and the EU, World Bank, and UNDP have indicated their intention to join. The first PAC session is expected before IBCS-2 in November 2014. The GFCS has now entered the implementation phase. National and regional consultations are being conducted to identify gaps in the various components of the GFCS in the four priority areas. They are also preparing the development of guidelines for frameworks for climate services at national level. There are key gaps related to inadequate gathering of high quality data including:

- Shortcomings in atmospheric observations by climate stations;
- Coverage of oceanographic observations by moored buoys;
- Uncertainties regarding the continuity of satellite monitoring with microwave sensing;
- High precision altimetry, and LIDAR and SAR coverage of sea ice parameters;
- Gaps in terrestrial observing networks, and uncertainty regarding the continuity of land cover monitoring satellite missions;·
- Need for complementary biological, environmental, and socio-economic data;
- Data policies, data management, data rescue and access to historical data; and
- Need to improve monitoring systems, and perform re-analysis operationally.

The 'Executive Council Task Team on WMO Policy for International Exchange of Climate Data and Products to Support the Implementation of the GFCS' developed a draft resolution complementing resolutions 40 (Cg-XII) and 25 (Cg-XIII) and identifying a set of data and products to be exchanged in a free and unrestricted manner. Data rescue activities are underway in several countries. Early efforts to showcase partnerships in the development and application of climate services are taking

place through specific activities. Various actors or stakeholders can contribute to these by: (a) contributing resources to the GFCS Trust Fund; (b) selecting activities of their interest from the implementation plan and the compendium of initial GFCS projects; and (c) designating activities they are implementing as contributing to the GFCS. The action below was raised as a result of the presentation:

CGMS-42 actions - PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CGMS space agencies	Plen C.1	A42.01	CGMS Members who are willing to contribute satellite-based products to the annual WMO climate assessment shall nominate a point of contact to liaise with the future Commission on Climatology (CCl) Task Team on the Use of Satellite Data for Climate Monitoring in order to jointly define the specifications of these products, including validation and verification issues.	15 Jun 2014	OPEN	HLPP# 5

C.2 Emergency satellite support to disaster risk reduction

The use of data and products from meteorological satellites of CGMS Members has a direct societal impact in terms of protection of life and property in disaster situations. It is also an opportunity for CGMS satellite operators to give a visible demonstration of the relevance of satellite programmes and their benefit to society. **CGMS-42-WMO-WP-04** pointed out that effort should be made to ensure that National Meteorological and Hydrological Services (NMHSs) can make the best possible use of meteorological satellite capabilities in case of disaster emergencies, including but not limited to, severe weather events such as tropical cyclones. The International Charter Space and Major Disasters, which organises acquisition of Earth Observation data in emergency mode for disaster management authorities, is typically suited to the provision of high-resolution imagery products. The utilisation scenario of meteorological satellites is notably different since NMHSs generally use satellite data and products in routine operations, and most meteorological satellite data or products are systematically generated and disseminated. Therefore, provision of extraordinary support in emergency situations can be thought of in terms of "enhancing" routine operations rather than implementing totally new functions. For some disaster types such as tropical cyclones, or volcanic ash clouds, roles and responsibilities are organised at the international level, with well identified regional centres and alert procedures. It is important to maintain an active dialogue between these regional centres and the satellite community to ensure that advantage is taken of the latest satellite capabilities. For other disaster types for which no organisation is formalised at the international level, best practices should be defined to ensure that key satellite data and products are available when needed in critical situations.

The following recommendation was raised following the presentation:

CGMS-42 recommendation – PLENARY						
Actionee	Rec	#	Description	Deadline	Status	HLPP ref
CGMS members	Plen C.2	R42.02	CGMS Members are encouraged to • Support a review of meteorological satellite data use by RSMCs and other NMHSs in DRR – with DRR and Tropical Cyclone Programmes • Explore possibility to provide on-demand additional data/products in certain emergency situations – Procedures to be specified, identified points of contacts (ref CGMS-42-WMO-WP-04)	CGMS-43	OPEN	HLPP# 2.4

C.3 Use of satellite data in emergency situations in China

In **CGMS-42-CMA-02-PPT** CMA presented the use of satellite data in emergency situations in China. Examples were given of emergency situations in which meteorological data and products were used to support the emergency response. These included Typhoon Fitow (2013), a grass land fire in Mongolia (in 2012), the flood in Heilongjiang province (2013), the mudslide in Zhouqu county in western China (in 2010), Typhoon Haiyan (2013) and the recent disappearance of Malaysian airlines flight 370 (in 2014).

Following the presentations in C.2 and C.3, it was noted that with the upcoming generations of geostationary meteorological satellites, rapid scanning observations will become standard. Users should therefore be prepared for to handle this type of data for emergency situation management.

The presentations also demonstrated that specific sets of products are needed to support emergency management. EUMETSAT indicated that WMO might help in gathering requirements for such products so space agencies can better prepare their responses. In this respect, ISRO added that regarding the International Charter Space and Major Disasters, it would be beneficial to establish a feedback mechanism from users to space agencies.

JMA thanked CMA for the presentation and the support it has provided for typhoon monitoring. JMA informed CGMS that MTSAT 10-minute rapid scans incidentally captured the Kelud Volcano eruption in Indonesia, and Himawari-8/9 will provide observational 10-minute full disk scans by default. JMA also confirmed that such high-frequency full disk scanning will in the near future be a normal measure for supporting emergency situations, so that it is important to develop the usage of high-frequency data for disaster risk reduction in cooperation with Regional Specialized Meteorological Centres (RSMCs) and Volcanic Ash Advisory Centres (VAACs).

WMO added that disaster support is an important topic and the need for CGMS to support the user communities which should be addressed at future CGMS sessions.

The following two actions were raised as a result of the discussions:

CGMS-42 actions – PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
WMO	C.3	A42.02	WMO to establish a dialogue among CGMS satellite operators and the WMO Disaster Risk Reduction programme (DRR) to identify regional pilot actions for enhancing the use of satellites in support of DRR	CGMS-43	OPEN	HLPP# 2.4
CMA, JMA, KMA, BoM	C.3	A42.03	CMA, JMA, KMA and Bureau of Meteorology Australia to consider including a session on regional applications of satellites to Disaster Risk Reduction (DRR) in the programme of the 5th Asia Oceania Meteorological Satellite Users Conference.	30 Jun 2014	OPEN	HLPP# 2.4

C.4 Benefits of Infrared Sounding Missions for Nowcasting purposes

CGMS-42-EUMETSAT-WP-02 reported on the outcome of the Workshop on Nowcasting Applications using MTG-IRS, which was held at EUMETSAT, Darmstadt, on 25-26 July 2013. The objectives of the workshop were twofold: To provide the user community information on what was planned by the Meteosat Third Generation (MTG) programme, as the MTG Infrared Sounder (IRS) is a new instrument with relatively little heritage, and to explore with users the potential use and benefits of IRS data and products. Although development has progressed very well, several key elements are still open. The discussion during the workshop provided insight on a way forward to close selected open issues. It was noted that the launch of a hyperspectral infrared sounder in geostationary orbit by EUMETSAT fulfils a longstanding wish by many users and scientists and presents a significant step forward in geostationary satellite observation techniques. CGMS members were then invited to participate in the IRS demonstration projects.

WMO stated that it looked forward to the next generation geostationary spacecraft. There are clear WMO needs of which nowcasting is the most important operational application, with the difficulty lying in how to best present the data to users (humidity temperature profiles, stability issues, atmospheric composition, cloud properties, wind profiling, convergence, etc.). SCOPE NWC might support such work and CGMS was invited to consider this.

The following recommendation was also made following the presentation:

CGMS-42 recommendation – PLENARY						
Actionee	Rec	#	Description	Deadline	Status	HLPP ref
CGMS members	Plen C.4	R42.03	CGMS members are invited to capitalise on the experiences from EUMETSAT's IRS workshop to provide feedback to EUMETSAT on the available case studies (ref. CGMS-42-EUM-WP-02)	CGMS-43	OPEN	HLPP# 3.6.1

C.5 Satellite User Readiness Navigator (SATURN) web portal

The new generation of geostationary meteorological satellites being launched by CMA, EUMETSAT, ISRO, JMA, KMA, NOAA and ROSHYDROMET before the end of this decade will provide unprecedented capabilities for key weather applications and for a number of developing application areas, but will also present unprecedented challenges for users worldwide. A major challenge is the order-of-magnitude increase in the amount of data and products that will be generated from the advanced imagers and sounders on-board the satellites. In addition, novel data types drive the need for advanced interpretation and assimilation techniques and implementing these new techniques into operational schemes. At CGMS-41, CGMS established the following High-Level Priority cross-cutting area: "5.3 Prepare operational users for new generation of geostationary meteorological satellites through user readiness programmes, with coordinated contributions from CGMS members" (see also CGMS-41 plenary actions 41.05 and 41.06). In response to this priority, the WMO Space Programme, with the support of CGMS member agencies, is developing the online portal SATURN (SATellite User Readiness Navigator), to provide a single point of access for all information pertinent to the global user community preparations for the new generation of satellites. The support of CGMS members to achieve this goal is essential, and therefore CGMS has established a task team of agency focal points to provide content for the portal. Access to the portal was planned to be opened in June 2014. A key element of the portal is a Reference User Readiness Project, which is intended as a "best practice" guiding CGMS members to provide content for the SATURN portal. The draft scope and timeline of this project was provided for review by CGMS satellite operators in **CGMS-42-WMO-WP-20**.

Following the presentation, ISRO stated that it would like to integrate INSAT-3D in this portal, and the WG IV rapporteur indicated that WG IV had taken an action to follow this matter up.

C.6 CGMS Baseline in the WIGOS Regulatory Material

The Manual on the WMO Integrated Global Observing Systems (WIGOS Manual) is part of the WMO Regulatory Material approved by WMO Members at Congress. It has to comply with certain drafting standards, highlighting the obligations of WMO Members ("The members shall...") as opposed to the recommendations ("Members should..."), while background information is provided in "Notes" or "Annexes".

Chapter 4 of the Manual is dedicated to "Common attributes specific to the space-based sub-system of WIGOS". In order to reflect the agreement reached among CGMS satellite operators to ensure continuity of the space-based observing system, the decision was made to include the text of the CGMS Baseline as an Annex to this chapter, with the understanding that subsequent updates of the CGMS Baseline would be implemented in further updates of the WIGOS Manual as appropriate.

Chapter 4 is contained in pages 50-56 of the draft Manual on WIGOS, followed by the CGMS Baseline on pages 57-59. These pages were reproduced in **CGMS-42-WMO-WP-06** for information and comments.

Following the presentation, GEO commented that it is now working on how to tackle all high level issues and to adequately represent WIGOS in GEO post 2015.

D REPORTS FROM THE SPACE AGENCIES (D)

D.1 Reports on the status of current and future satellite systems by Members (operational agencies)

CMA reported on the status of its current and future satellite systems in **CGMS-42-CMA-WP-01** providing an overview of the current and future FY polar-orbiting and geostationary systems. Observations from polar orbit are carried out by FY-3A in an AM orbit and FY-3B in a PM orbit. FY-3C was launched in September 2013 and operations were planned to commence in June 2014. It is the first satellite in the series to carry the GNSS Radio-Occultation Sounder instrument, the first satellite in the series to do so. FY-2G will be launched in 2014 as the FY-2C and -2D services are coming to an end. FY-2F will be moved from in-orbit storage to become operational at 86.5°E. CMA is currently developing FY-4, its next generation of geostationary meteorological satellites, with the launch of the first spacecraft scheduled for 2016.

Following an enquiry from IOC-UNESCO, CMA clarified that a wind radar with two microwave frequencies very similar to a scatterometer onboard FY-3E in the 2017/2018 period is under consideration.

A summary of the status of EUMETSAT's current and future LEO and GEO satellite systems was provided in paper **CGMS-42-EUMETSAT-WP-03**. EUMETSAT operates a fleet of meteorological satellites, and their related ground systems, to deliver reliable and cost-efficient data, images and products. These, in turn, serve requirements for weather and climate monitoring of the national meteorological services in the 30 Member and one Cooperating States, and of global partners. The present system includes two generations of geostationary Meteosat satellites. Their global view is complemented by the detailed observations provided by the Metop polar-orbiting satellite and the marine observer, Jason-2 - a joint project of space agencies in Europe and the United States.

MSG-4, the last satellite in the current MSG second generation geostationary series, will be launched in 2015, with the first of the Meteosat Third Generation (MTG) series planned for launch in 2019. The last Metop-C polar-orbiting satellite will be launched in 2018. It is expected that the follow-on EPS-SG programme will be approved by the end of 2014 by EUMETSAT's Council. Jason-3 (in cooperation with NOAA, CNES and NASA) is planned for launch in 2015. EUMETSAT will also operate the Copernicus Sentinel-3 satellite commencing in 2016, following commissioning by ESA.

Following the presentation, IMD thanked EUMETSAT for the provision of the Indian Ocean Data Coverage (IODC) service and requested EUMETSAT to continue fulfilling this position after the end of Meteosat-7 (end of 2016). EUMETSAT recalled that as previously discussed in WG III, there is no replacement planned in the context of the transition to MTG. EUMETSAT will therefore continue to work with CGMS partners (IMD, CMA and ROSHYDROMET in particular) to explore the best possible approach to ensure the continuity of the IODC service based on assets of CGMS Members with a view to making image data, products and data collection services from the IODC region available to users for assessment and where appropriate operational use. A roadmap had been proposed in WG III to this purpose.

In **CGMS-42-IMD-WP-01**, IMD informed CGMS that currently three Indian meteorological satellites are in operation: KALPANA-1, INSAT-3A and INSAT-3D. With the help of these three satellites, IMD is able to monitor several phenomena like, cyclones, western disturbances, thunderstorms, etc., and provide early warnings to the affected areas. A recent major upgrade in observations from a geostationary platform is the INSAT-3D satellite. It was launched on 26 July 2013 and is an exclusive meteorological satellite carrying advanced meteorological payloads, viz. a six-channel imager and a 19-channel sounder.

The imager is a multi-spectral (optical radiometer) capable of generating the images of the Earth in six wavelength bands significant for meteorological observations, namely, visible, shortwave infrared, middle infrared, water vapour and two bands in thermal infrared regions of the Earth disk every 26 minutes. It provides information on various parameters, namely, outgoing long-wave radiation, quantitative precipitation estimation, sea surface temperature, snow cover, cloud motion winds, etc. The imager payload is an improved version of VHRR flown on the INSAT-3A and Kalpana-1 satellites, with significant improvements in spatial resolution, number of spectral channels and functionality.

The sounder provides data for the retrieval of vertical profiles of temperature and humidity over the clear sky region of the data-sparse Indian Ocean at a 10 km spatial resolution. INSAT-3D images and products are available through the dedicated web sites www.imd.gov.in and www.mosdac.gov.in on a near real-time basis.

INSAT-3DR (INSAT-3D Repeat) is planned for launch in 2015-2016 and an on-orbit spare, INSAT-3DS, is also planned. These will have similar payloads to INSAT-3D for the continuation of the operational service. The GISAT (Geo-stationary Imaging Satellite) next generation geostationary imaging satellite will provide continuous imaging of the Earth disc or regions of interest with higher spatial resolution and hyper spectral resolution. It consists of a High resolution Multi-spectral VNIR (HRMX-VNIR) <100 m resolution, Hyper spectral VNIR with less than 500 metre resolution, Hyper spectral SWIR (HySI-SWIR) with less than 300 metre resolution and a High resolution Multi-spectral (HRMX-TIR) with less than two-kilometre resolution and is planned for launch in 2017-2018.

The following three satellites, Oceansat-2 (Ocean Colour, SCAT and ROSA), RISAT-1 and SARAL-ALTIKA are Indian operational polar-orbiting space missions and Megha-Tropiques in low inclination orbit for atmospheric and oceanic science studies. Oceansat-2 is a three-axis body stabilised spacecraft placed into a near circular sun synchronous orbit, at an altitude of 720 km, with an equatorial crossing time of around 12:00 launched on 23 September 2009 at an inclination of 98.280 degrees. The Oceansat-2 scatterometer is unavailable since February 2014. The Megha-Tropiques satellite (MADRAS, SAPHIR, SCARAB and ROSA), an ISRO-CNES joint collaboration, was successfully placed into a non-sun synchronous orbit at an altitude of 867 km with an inclination of 20 degrees to the equator on 12 October 2011 with the objective of studying the water cycle and energy exchanges in the tropics. The Radar Imaging Satellite (RISAT-1), launched on 26 April 2012, placed in a polar sun-synchronous orbit of 536 km height carries a multimode C-band (5.35 GHz) Synthetic Aperture Radar (SAR) payload for wide applicability in flood mapping, agriculture and crop monitoring, generic vegetation, forestry, soil moisture, geology, sea ice and coastal processes, etc. The satellite with ARGOS and ALTIKA (SARAL) is a joint Indo-French satellite mission for

oceanographic studies. SARAL will perform altimetry measurements designed to study ocean circulation and sea surface elevation. It was successfully launched on 25 February 2013 into a 781 km sun-synchronous polar orbit at 98.538 degrees.

Following the presentation, WMO thanked IMD (and ISRO) for their comprehensive web site of data and products, an added value for data application.

JMA provided an update on the status of its current and future programmes in the paper **CGMS-42-JMA-WP-02**. JMA operates the GEO stationary MTSAT/Himawari satellite system. MTSAT-2 (145°E) is currently operational imaging over the Western Pacific region with backup from MTSAT-1R (140°E), which has continued to perform imagery dissemination and data collection services even after its imaging function was switched over to MTSAT-2 on 1 July 2010. Its Data Collection System (DCS) has functioned properly since the satellite began its operations. JMA plans to launch its next generation geostationary satellite Himawari-8 in 2014 and commence its operation in mid 2015, when MTSAT-2 is scheduled to complete its period of operation. Himawari-9 will follow in 2016. The Pre-Shipment Review (PSR) of the Advanced Himawari Imager (AHI) for Himawari-8 was successfully completed in August 2013, and Himawari-8's manufacture is now in the final test phase. The PSR of the AHI for Himawari-9 is also scheduled to take place in a few months. All Himawari-8 and -9 imagery will be delivered via an Internet cloud service, and primary sets of imagery will also be disseminated via the HimawariCast service using a communication satellite. JMA maintains updated web pages with information on Himawari-8 and -9 at http://mscweb.kishou.go.jp/himawari89/ and http://www.jma.go.jp/jma/jmaeng/satellite/

CGMS-42-KMA-WP-01 provided an update on the COMS MI satellite which is currently operational at 128.2°E. Data are distributed via landline and satellite over the Western Pacific region and COMS GOCI over the East Asia region. The development of GEO-KOMPSAT-2A (meteorological mission) and -2B (ocean and environmental mission) is progressing well, and they are scheduled to be launched in May and December 2018, respectively.

In **CGMS-42-NOAA-WP-02-PPT** NOAA reported on the status of its current and future programmes. NOAA manages a constellation of three geostationary nine polar-orbiting meteorological spacecraft, including four Defense Meteorological Satellite Program (DMSP) satellites, and Jason-2 from the Satellite Operations Control Center (SOCC) in Suitland, Maryland. These satellites provide continuous observations of weather conditions and environmental features of the western hemisphere, monitor global climate change, verify ozone depletion and land surface change, monitor the critical space environmental parameters, and support search and rescue efforts across the globe. The paper included an update on the progress of preparation of GOES-R. The status of the JPSS programme was also detailed. SNPP is operating well and the next satellites in the series (JPSS-1 and -2) will be launched in 2017 and 2022. It was noted that the DISCOVR satellite (solar winds) and Jason-3 (NOAA, CNES, EUMETSAT, and NASA partnership) will both be launched in 2015. CGMS was informed on the next generation COSMIC mission, COSMIC-2, which is under preparation in collaboration with NSPO, Taiwan, to provide Global Navigation Satellite System (GNSS) Radio Occultation (RO) data. It will replace COSMIC-1 which is operating beyond the end of its mission design life.

CGMS-42-ROSHYDROMET-WP-01 addressed the current status of the Meteor-M №1 polar-orbiting meteorological satellite launched in 2009 and the Electro-L №1 geostationary meteorological satellite launched in 2011. The future Russian geostationary meteorological constellation will consist of three Electro-L satellites. The location of Electro-L satellites in orbit will be 14.5°W, 76°E and 166°E. The mission objectives, payload and ground segment details were provided in the paper. An overview was given of the future Meteor-M polar-orbiting satellite system, which will include three meteorological and one oceanographic satellite, and also the forthcoming series of Meteor-MP satellites. The Arctica-M constellation of highly elliptical orbit satellites is now under development and the system will include two spacecraft. The mission objective is to provide continuous observations over the Arctic region and the launch is scheduled for 2015–2016. An overview of the mission objectives, payload and ground segment matters were also presented.

ROSHYDROMET confirmed that it will follow the CGMS recommendation and Electro-L №2 will be positioned at 77.8°E to support IODC observations. The spacecraft is expected to be launched in December 2014.

Following the presentation, JMA highlighted that in future, DCS frequency coordination is essential in view of Himawari-8 and a future Electro-L spacecraft planned for positioning at 166°E.

At the request of WMO, ROSHYDROMET agreed to provide a point of contact for capturing the ROSHYDROMET data in the SATURN portal.

D.2 Reports on the status of current and future satellite systems by Members (R&D agencies)

An update was given in **CGMS-42-CNES-WP-01-PPT** on CNES atmospheric monitoring missions: Megha-Tropiques, a CNES-ISRO collaboration, studying water and energy cycles in the tropical hemispheres; Calipso, a NASA, CNES collaboration, and Parasol (A-train) which measure the properties of clouds and aerosols; Merlin, a CNES-DLR collaboration, to measure methane and will be launched in 2019; IASI, a CNES-EUMETSAT collaboration on an infrared sounder instrument; and Microcarb which will measure CO2 column.

CNES climate related ocean missions include: Jason-2 and -3, a EUMETSAT, NOAA, CNES, and NASA collaboration on high precision ocean altimetry; SARAL, a CNES-ISRO radar altimetry mission, launched in 2013; and CFOSAT, a CNSA-CNES collaboration on sea wave spectrum and sea surface wind. Climate related land missions include VEGETATION, a CNES, BFSPO, ASI, SNSB, and JRC cooperation on land cover data; SMOS an ESA, CNES, CDTI cooperation on soil moisture and ocean salinity measurements; and SWOT a NASA-CNES cooperation on an altimetry mission covering oceans as well as lakes and rivers.

An update was also provided on CNES's partnership with several French climate data centres and its involvement in European climate activities such as the ESA CCI programme, EUMETSAT Climate SAF and GMES core services.

Following the presentation and regarding SMOS, IMD would like to see the continuation of this R&D mission in view of it having been operated since 2009. IOC-UNESCO added it would like near real-time data to be made available through GEONETCast as far as is possible.

CGMS-42-CNSA-WP-01 provided details of China's current and future satellite systems. The presentation included an update on the FY operational satellite system and four R&D satellite systems including the HY, HJ, ZY, and GF satellite series. China plans to launch several satellite systems in the near future, including the China High-Resolution Earth Observation System – CHEOS – which was officially initiated in May 2010. The Earth Observation System and Data Center of China National Space Administration (EOSDC-CNSA) is responsible for its construction. An overview of CHEOS and its current status were also presented.

CGMS-42-CSA/EC-WP-01 outlined a mission concept to support Canadian interests in the arctic, known as the "Polar Communications and Weather Mission" (PWC). It has been developed by the Canadian Space Agency (CSA) in partnership with Environment Canada (EC) and the Department of National Defence (DND). This will cover weather imaging, space weather and civil and military communications. The concept requires government approval in order to proceed. A request for information was released to industry at the end of 2013, with around 20 respondents including several proposing end to end solutions. The next steps rely on government consideration, which is anticipated in autumn 2014. Environment Canada also confirmed the compatibility of the mission with WMO requirements for which WMO was thankful.

Following an enquiry by CMA, Environment Canada confirmed that a space weather instrument is identified as one of the core missions on PCW. However, the focus might change somewhat since there are discussions on moving away from a pure molnya orbit in view of the spacecraft lifetime. This will ultimately depend on the final configuration of the spacecraft and was still under debate by the Canadian government. CMA added that a molnya orbit would be very beneficial for GSICS activities.

CGMS was informed of the status of the current European Space Agency Earth observation missions in **CGMS-42-ESA-WP-01.** Two of them, MSG and Metop are in co-operation with EUMETSAT. The Gravity field and steady-state Ocean Circulation Explorer, GOCE, the first Explorer satellite launched on 17 March 2009, ended its mission in November 2013, exceeding its predicted lifetime. The SMOS satellite was launched on 2 November 2009. All reprocessed level 1 and 2 data have been available from the ESA Cal/Val portal since mid-March 2012. The CryoSat-2 satellite was launched on 8 April 2010. The release of systematic CryoSat products (level 1b and 2) to the scientific community is ongoing. The Proba-V small satellite was launched on 7 May 2013 and its coarse resolution imager continues the data acquisition of the vegetation payload on-board SPOT-4 and 5. The Swarm satellites were launched on 22 November 2013.

About 4,000 data user projects worldwide use data from the ESA EO missions and this number is increasing. The total volume of ESA EO mission data exceeds 100 terabytes per year.

CGMS was further informed of the status of development of future European Space Agency Earth observation missions. Two of them, MTG and EPS SG, are co-funded with EUMETSAT, and will be operated by EUMETSAT. The Living Planet Programme has three lines of implementation: Earth Explorer satellites, Earth Watch satellites plus services and applications demonstration. Progress in the preparation of the forthcoming Explorer missions ADM-Aeolus, EarthCARE and BIOMASS is described.

Copernicus (formerly GMES) represents the major new initiative of European efforts in Earth Observation. Copernicus pre-operational services started in 2008, with the provision of the relevant data. The first Copernicus dedicated satellite (Sentinel-1A) was launched on 3 April 2014, and other Sentinels will follow starting in 2015. Related activities are under way at all stages within ESA, the European Commission (EC) and at Member State level.

ESA further informed CGMS on the status of the Earth Watch Programme Element, Global Monitoring of Essential Climate Variables (also known as the ESA Climate Change Initiative or CCI). The CCI Programme has continued to progress well. The 13 existing project teams have made significant progress on algorithm development and on specifying a future operational system. The programme achieved its phase 1 objectives at the end of 2013 and continued phase 2 early 2014.

Concluding the presentation, ESA also recommended that space agencies urge the protection of C-band sensing frequencies to assure mission continuity.

ISRO presented its current and future geostationary and polar orbiting Earth observation programmes in **CGMS-42-ISRO-WP-01**. An overview of the geo-portal web services (MOSDAC and BHUVAN) was given, including provision of open data download services, weather forecasting, 2D/3D data visualisation, value added land products and climate products services. The presentation also covered the calibration and validation initiatives undertaken by ISRO with the development of many theme oriented calibration sites, and also with the participation of international calibration teams through the CEOS Working Group for Cal-Val (WGCV).

Following the presentation, EUMETSAT thanked ISRO for the provision of Oceansat-2 data and said the user community very much looks forward to the ScatSat and Oceansat-3 missions.

CGMS-42-JAXA-WP-01 provided an update on JAXA's Earth observation programmes. GPM/DPR was successfully launched from Tanegashima Space Center on 27 February 2014 and initial calibration and check out of the DPR was ongoing. The TRMM/PR is still functioning well. JAXA currently operates GOSAT, Ibuki and GCOM-W1, Shizuku. The GOSAT data products are distributed through the GOSAT User Interface Gateway (GUIG), a web site for GOSAT data distribution. The AMSR2 products are available at the GCOM-W1 Data Providing Service web site.

The developments of ALOS-2, EarthCARE/CPR and GCOM-C are under way with launches planned in May 2014 for the former, and in JFY2016 for the latter two. The GOSAT-2 project was officially initiated in April 2014 as a GOSAT, Ibuki follow-on, for which the target launch date is in 2017.

WMO thanked JAXA for the presentation, and recalling the current difficult economic climate, WMO also encouraged CGMS to share and display the socio-economic benefits resulting from CGMS missions which would provide evidence for the needs of such missions.

In **CGMS-42-NASA-WP-01** NASA provided updates on the 17 Earth Science missions it currently operates. Although all missions were conceived as research missions, it has turned out that the efficiency of the communications and ground data handling systems has supported operational and near real-time applications. All missions are currently producing data, but several also show signs of ageing. Except for Suomi-NPP (October 2011), SACD/ Aquarius (June 2011), LDCM/Landsat-8

(February 2013), and GPM Core (February 2014), all missions have passed their nominal design life, and are currently in extended operations. NASA's Earth Science Program ($1.8 billion budget) is implementing a balanced and robust plan to accomplish a broad set of critical Earth observation measurements from space. The programme advances knowledge of the integrated Earth system, the global atmosphere, oceans (including sea ice), land surfaces, ecosystems, and interactions between all elements, including the impacts of humans. A balance of satellite measurements, science research, technology development and applications is needed to address a complex global Earth system. NASA's plans include the launch of 13 missions and seven instruments (on host missions) in the future.

Concluding sessions D.1 and D.2, WMO thanked all CGMS space agencies for the positive outlook and concrete future roadmap with very comprehensive missions, data and products. As such, CGMS can contribute more to the user community and this in turn can facilitate receiving further support from users, governments and financial contributors. WMO added that it would also be beneficial to communicate these benefits at high level events.

E WORKING GROUP REPORTS (E)

E.1 Global issues on satellite systems and telecommunication (WG I)

E.1.1 Harmonisation of global Data Collection Systems (DCS)

The presentation and proposals delivered in **CGMS-42-EUMETSAT-WP-04-PPT**, on work towards harmonisation of the global Data Collection Systems (DCSs) were agreed. CGMS plenary also agreed to the proposal to support the SATCOM Forum meeting in 2015 and to prepare for it via specific inter-sessional meetings, as proposed by WG I, and to support the appointed CGMS representative, Mr. Sean Burns of EUMETSAT, by appointing dedicated points of contact from each CGMS members operating DCSs. These points of contact need to provide the necessary information to consolidate the inputs by CGMS on the existing capabilities and future requirements for the DCS. In order to achieve this, a template with the necessary information requested will be prepared by the CGMS Secretariat and submitted to all CGMS members.

Two actions were recorded during this agenda item:

CGMS-42 actions – PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CGMS space agencies	Plen E.1.1	A42.04	CGMS agencies to identify a point of contact and provide feedback on their respective Data Collection System (DCS) to sean.burns@eumetsat.int	15 Jun and 31 Jul 2014	OPEN	HLPP# 1.2.1
CGMS members	Plen E.1.1 (wrt to WG I)	A42.05	CGMS members to confirm to cgmssec@eumetsat.int the points of contact for preparation of the SATCOM forum meeting (in 2015)	15 Jun 2014	OPEN	HLPP# 1.2.1

E.1.2 Coordination of existing regional retransmission services (RARS)

CGMS-42-EUMETSAT-WP-05-PPT reported on the outcome of WG I discussions on the aspects of coordination of existing Regional Retransmission Services (RARS) to the plenary. The outcome of WG I was a series of recommendations for defining "best practices" for the implementation of RARS systems and to work by inter-sessional meetings to secure adequate WG I progress by CGMS-43.

The plenary acknowledged the recommendation by the 19th International TOVS Study Conference (ITSC-19) for the definition and implementation of community agreed operational procedures for LEO satellite data direct read-out, acquisition, and relay and the WMO decision to re-establish the Direct Readout, Acquisition and Relay of Satellite Data Implementation Group (DRARS IG). The plenary also agreed that participation in the inter-sessional meetings of WG I and participation in the WMO DRARS IG is concomitant and membership is to be ensured both by the different CGMS members participating in RARS activities and/or operating RARS related satellites.

The CGMS Secretariat also raised the point of the additional HLPP topic identified by WG I in the area of RARS for ensuring that operational processing packages for future satellite systems providing regional services are developed by the corresponding satellite operators.

The plenary agreed and endorsed all proposed recommendation for developing best practices and the proposal for the amendment of the HLPP.

E.1.3 Report by Working Group I

The summary of the outcome and conclusions/recommendation from the WG I meeting was presented to the plenary in **CGMS-42-CGMS-WP-02-PPT** by Marlin O Perkins, WG I Chair. The presentation included the consolidation of the scope of work of WG I in the area of direct broadcast and direct readout services including reference to the previous presentation made on the specific aspects of the RARS systems/services evolution.

The CGMS plenary endorsed the proposed CGMS-42 WG I actions and recommendations and the proposed WG I work plan with four inter-sessional meetings on four different themes (global specifications, RARS, DCS, user stations and frequency coordination) by CGMS-43.

During the report to the plenary, ESA highlighted the situation regarding the active remote sensing band 5350-5470 MHz used for SARs, scatterometers and altimeters and asked all CGMS members to closely and regularly liaise with their national frequency management and regulatory authorities on the importance of the frequency bands assigned and associated with CGMS systems and the need to protect and preserve them. These regular activities shall ensure that adequate awareness is raised, and maintained, with the national authorities that will convey the national positions to the WRC. On the same topic, IMD requested support from ROSHYDROMET and CMA to support the coordination of the INSAT-3 DCP frequency allocations. The Chair of WG I supported the proposal but reminded CGMS of the need to achieve the frequency coordination of space systems within the ITU framework and that CGMS can only provide a forum to facilitate preliminary discussions between CGMS members. CGMS cannot replace ITU's formal frequency notification process which is mandatory for all space systems.

Following interventions by IMD, WMO and EUMETSAT, it was agreed to assign an action to WG I Chair to draft a letter from CGMS to WMO addressing the importance of the frequency bands assigned and associated to CGMS systems and the need to protect and preserve them.

The following action was raised as a result:

CGMS-42 actions – PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
WG I Chair	Plen E.1.3 (wrt to WG I)	A42.06	WG I Chair to draft a letter from CGMS to WMO for addressing the importance of the frequency bands assigned/associated to CGMS systems and the need to protect/preserve them. The letter was drafted and endorsed during plenary. The CGMS Secretariat to send the letter to WMO following CGMS-42.	23 May 2014	CLOSED	HLPP# 1.3.3

GEO added it will also encourage its member administrations to support frequency coordination.

Additionally, the WG I Chair reported to the plenary on the adjustments in the scope of WG I and WG IV to better delimit the areas of work by both Working Groups. The plenary supported the revision of the scope of WG I and WG IV and decided that an update of the "Terms of References" of both Working Groups needs to be prepared for endorsement by CGMS-43.

CGMS-42 actions – PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
WG I and WG IV	Plen E.1.3 (wrt WG I and WG IV)	A42.07	Following the revised scope of WG I and WG IV, the WGs to update the "Terms of Reference" of both WGs for endorsement by CGMS	CGMS-43	OPEN	-

The plenary noted the activities undertaken by WG I and endorsed the proposed new actions and recommendations. They concluded by thanking the Chair, Marlin O Perkins, NOAA, as well as the rapporteur, Joaquin Gonzalez Picazo, EUMETSAT, for their support.

E.2 Global data dissemination (WG IV)

E.2.1 Status of Himawari-8 and -9 data distribution and dissemination

CGMS-42-JMA-WP-09 described how all imagery derived from Himawari-8 and -9 will be distributed to NMHSs via an Internet cloud service. JMA also plans to start the HimawariCast service, through which primary sets of imagery will be disseminated to NMHSs via a communication satellite using DVB-S2 technology. The Internet cloud service will mainly provide Himawari standard data which will

be used to create all products related to Himawari-8/-9 as master data from all 16 bands with the finest spatial resolution. JMA plans to start test operations of the service in Q1 2015 with distribution of Himawari-8 in-orbit-test imagery. The core data of the HimawariCast service will be HRIT files which are compatible with the current MTSAT series HRIT service. These will feature five bands near the current MTSAT observation bands. Dissemination will further include meteorological data other than Himawari imagery in SATAID format. JMA plans to start the service early in 2015 while MTSAT-2 is still in operation. MTSAT-2 imagery will be disseminated through this service in parallel with direct dissemination via MTSAT-1R until Himawari-8 becomes operational in mid-2015. Himawari-8 data imagery will thereafter be disseminated via the service.

JMA also invited users (NMSs) to make delivery tests from the cloud. Interested users are invited to contact Mr. Yasushi Izumikawa, JMA Satellite Programme Division (metsat@met.kishou.go.jp).

E.2.2 Report by Working Group IV

CGMS-42-CGMS-WP-03-PPT provided the outcome of the discussions of Working Group IV, a forum for the discussion and distribution of information on satellite data dissemination, including data exchange and retransmission, and the tools to facilitate data exchange.

Further progress has been made on the deployment of DVB-based dissemination services:

- Through various projects, NOAA is planning enhancements of the GEONETCast Americas System by providing more services, in order to better support the user community's requirements; and
- JMA is implementing HimawariCast, a DVB-S2 based data dissemination system using a commercial telecommunication satellite to support the transition between the current and the next generation Himawari-8 and-9 satellites in 2015, and to serve user communities in regions with poor Internet access like the Pacific. In addition to images, products will also be disseminated on this system.

EUMETSAT regularly assesses dissemination of R&D and pre-operational mission data, and NOAA is providing global data and imagery through its LANCE facility for download in near real-time. Regarding coordinated dissemination services: NOAA is working on continued and increased participation in the International Charter Space and Major Disasters with GEONETCast Americas as an alternative dissemination method; CNSA is working on remote sensing processing technology to provide environment and disaster information quickly and accurately; and EUMETSAT was involved in the International Ocean Colour Science Meeting 2013, whose recommendations are being followed up in an action to CGMS members (CGMS-42 WG III/3 A42.10 and CGMS-42 WG IV/4.2 A42.01).

As for global data exchange from the next generation GEO satellites, ROSHYDROMET and EUMETSAT are exchanging data in the context of EARS and Electro-L №1. It is also planned to continue this activity also for Electro-L №2. JMA will provide Himawari-8 and -9 data via the Internet and HimawariCast, IMD already provides access to INSAT-3D via internet (access for users worldwide is possible after registration), and KMA is planning satellite data dissemination for GeoKOMPSAT-2A in Ultra (enhanced) HRIT and HRIT/LRIT format.

WMO presented its new Integrated Global Data Dissemination Strategy (IGDDS) with a reformulation of the vision and the strategic targets. As a result, an action was raised for CGMS members to provide comments to WMO (CGMS-42 WG IV/7 A42.03).

Data access portals and their harmonisation were also discussed as well as other user interface matters.

A clearer split of responsibilities has been achieved between WG I and WG IV and the HLPP has been updated accordingly. (See also chapter E.1.3).

Two inter-sessional meetings will be held to focus on the analysis of the LRIT/HRIT Global Specification by CGMS members' focal points and to review CGMS-42 actions and recommendations in preparation of CGMS-42.

The plenary noted the activities undertaken by WG IV, endorsed the new actions and recommendations proposed, and concluded by thanking the co-Chairs, Vasily Asmus, ROSHDYROMET, and Jae-Dong Jang, KMA, as well as Klaus-Peter Renner, EUMETSAT, for their support.

E.3 Satellite data and products (WG IWG II)

E.3.1 Scientific presentations

E.3.1.1 Summary of highlights and request for guidance from IROWG

Tony Mannucci, rapporteur for the International Radio Occultation Working Group, provided a report from the 3rd International Radio Occultation Workshop (IROWG-3), which took place on 5-11 September 2013 at Leibnitz, Austria (**CGMS-42-IROWG-WP-01-PPT**). The plenary noted that radio occultation (RO) data had a positive impact on Numerical Weather Prediction (NWP), climate monitoring, space weather, and temperature- and humidity-related atmospheric research and the need to ensure continuity of measurements. The presentation summarised the outcome of the workshop attended by more than 70 scientists. The plenary noted the desire to move towards a fully operational Global Navigation Satellite System (GNSS) RO constellation providing at least 10,000 observations per day and preferably 16,000 per day regularly distributed in time and space. The current observing systems provide approximately 3,000 soundings daily, half of which comes from research missions. The magnitude of the impact from additional RO observations appears to be nearly linear in the number of soundings up to at least 18.000 per day, making it difficult to identify an optimum number of observations needed for NWP.

The ensuing discussion centred on whether non-operational missions should be included in quantifying the number of daily observations going forward, the conclusion being that lack of continuity from research missions, and the time required to properly assimilate observations in NWP may misrepresent the robustness of the RO capability if research missions are included. The plenary noted the importance of observations not only from low- to mid-latitude observations but high-latitude observations as well. In this regard, NOAA provided an update on its efforts to extend RO coverage to high latitudes. The WMO reported on its plans to host the Sixth Impact Workshop in 2016, and reminded the plenary that this event provides an important opportunity to review and consolidate the assessment of the impact of RO observations.

The discussions led to the following action within the scope of WG II:

CGMS-42 actions – PLENARY (for WG IWG II)						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CMA	WG II/7 (from Plen E.3.1.1)	A42.10	CMA is invited to present a paper to WG II at CGMS-43 on prospects of RO measurements with future FY-3 satellites.	CGMS-43	OPEN	HLPP# 1.1.4

E.3.1.2 Status of volcanic ash test bed activities

CGMS-42-JMA-WP-07 reported on the status of JMA's activities in SCOPE-Nowcasting. The paper referred to the successfully introduced RGB composite images in this session. It was pointed out that a web site and a users' guide will be available (https://mscweb.kishou.go.jp/sat_dat/). Applications to data from MTSAT-2 were presented with examples dedicated to users from regions RA II and RA V as a part of SWFDP and SWFDDP activities. In the discussion it was clarified that the RGB products are created according to recommendations made by WMO. It was also mentioned that more channels on future satellites will open the possibilities for more products, thus indicating an important perspective for Himawari-8 and -9.

CGMS-41 invited JMA to establish an environment to be used as a test bed for inter-comparison of retrievals and Toshiyuki Kurino, JMA, provided an update on the status of volcanic ash activities. The plenary noted the impact of volcanic ash, especially on aviation, and the work of Volcanic Ash Advisory Centers (VAACs) in issuing advisories to civil aviation authorities and other decision makers. The need for advanced algorithms to advance volcanic ash retrieval was identified, particularly the development of multiple algorithms to be tested in JMA's test bed. A core organising committee has been established to plan for a future workshop related to the selection of volcanic ash cases, validation methods and their inter-comparison.

The plenary encouraged CGMS members to identify new participants for the test bed activities, especially from organisations developing volcanic ash retrieval algorithms, for the upcoming workshop in Madison, Wisconsin in October 2014.

E.3.1.3 Summary of highlights and request for guidance from ITSC-19

Niels Bormann, an International TOVS Working Group (ITWG) co-Chair, provided a report from the International TOVS Study Group-19 held on Jeju Island, South Korea, on 26 March - 1 April 2014 (**CGMS-42-ITWG-WP-01**). The conference, hosted by KMA, was attended by 196 participants from 35 organisations, which provided a wide range of scientific contributions on observing systems, data assimilation, climate application, processing systems and retrieval science topics. This was the first time that the ITWG met as a formally recognised CGMS International Science Working Group, a sub-group of CGMS, and the recognition was appreciated by the group. The plenary acknowledged China's approach to FY-3 data provision and noted the first results of the commissioning of FY-3C. Advanced hyperspectral IR instruments (e.g. AIRS, IASI and CrIS) continue to provide unprecedented scope for inter-comparisons and further advances. Further investigation is required into the efficient use of radiances, use of reconstructed radiances for level-2 retrievals and NWP and strategies for

data dissemination. The plenary noted the emerging potential use of new hyperspectral sounders such as IASI and CrIS for climate studies, due to their long-term calibration characteristics being far better than expected. Highlights of the key ITSC-19 recommendations to the CGMS plenary were:

- the requirement for at least three roughly equally spaced orbital planes (early morning, morning and afternoon) providing both IR and microwave sounding capabilities;
- studies to analyse the trade-off benefits between spectral, radiometric and spatial resolutions of IR sounders;
- low-cost, timely delivery of data to NWP centres;
- support for line-by-line reference model development;
- broader access to satellite data during the calibration/validation phase to help NWP centres; and
- inter-comparison of AIRS, IASI and CrIS level-2 products.

ITSC-20 is planned to be held on 28 October to 3 November 2015 at Lake Geneva, Wisconsin, USA, and will be hosted by the Space Science and Engineering Center.

The plenary noted the contributions of Prof. H.J. Bolle, a co-founder of the ITWG, who passed away last year.

E.3.1.4 SCOPE-Nowcasting status report

Jérôme Lafeuille, WMO, provided a status report on SCOPE-Nowcasting activities in **CGMS-42-WMO-WP-11**. The objectives of SCOPE-Nowcasting include the provision of continuous and sustained products for nowcasting in the zero to six hour range where NWP capability is limited. The goal is to allow access to satellite data by metrological/hydrological services in developing nations where facilities for processing and utilising satellite data may be limited. Four pilot projects have been identified: Harmonised product suite for Asia-Oceania; quantitative volcanic ash products, quantitative precipitation estimates, and sand dust events in Asia. The first meeting of the SCOPE-Nowcasting team was held in Geneva in November 2013 and included participation from CMA, JMA, EUMETSAT, NOAA, ESA and the Australian Bureau of Meteorology. All four pilot projects have developed 2014-2015 work plans and the formulation of an ad-hoc SCOPE-Nowcasting Steering Group is underway. The plenary noted that the continuing commitment of CGMS operators is critical.

More on SCOPE-Nowcasting is available here:
http://www.wmo.int/pages/prog/sat/scopenowcasting_en.php

E.3.2 Working Group II report

The WG II co-Chair, Lars Peter Riishojgaard, presented the outcome of WG II discussions on 19-20 May 2014 (**CGMS-42-CGMS-WP-11**). WG II considered more than 50 working papers from member organisations, including reports from all four CGMS International Science Working Groups. WG II recommended the formation of a fifth CGMS International Science Working Group - the International Clouds Working Group (ICWG) - which was endorsed by the plenary. The plenary noted the actions associated with NOAA's use of a day-night band on its Suomi NPP mission, expressed its appreciation for the work in the area of calibration and validation of the outgoing Chair of the GSICS

Executive Panel, Mitch Goldberg, and welcomed the new Chair, Peng Zhang of CMA. The plenary took note of the demonstrated qualitative benefits of an early morning orbit in the area of regional precipitation forecasts from NOAA and the ongoing work of KMA on the impact of soil moisture observations on NWP. An action inviting JAXA to explore possibilities to adjust the GCOM-C1 orbit in order to optimise the mission with Sentinel-3 was also noted. The plenary noted that the current Sentinel-3 schedule precluded consideration of changes to its orbit.

The co-Chair reported on discussions to provide sustained financial support to the conduct of the International Science Working Groups under CGMS and the conclusion of WG II was that while there were benefits to establishing a recurrent trust fund, the current approach that relies on voluntary contributions (financial or in-kind) has worked quite well and should be continued in light of the challenges of establishing a trust fund. In view of the fact that the work of the ISWGs will continue to take place based on voluntary contributions, CGMS member organisations were kindly reminded that contributions on a voluntary basis were necessary and the plenary encouraged all CGMS members to contribute resources to this work when they see opportunities to do so.

The plenary noted the progress that WG II had made on its actions and endorsed the new actions and recommendations proposed, and they concluded by thanking the two co-Chairs, Lars Peter Riishojgaard, WMO, and Toshiyuki Kurino, JMA, as well as the two rapporteurs, Ajay Mehta, NOAA, and Johannes Schmetz, EUMETSAT, for their support.

E.4 Operational continuity and contingency planning

E.4.1 Key notes

E.4.1.1 Risk assessment of operational programmes

There were no presentations or discussions under this agenda item.

E.4.1.2 Report from Socioeconomic Tiger Team (SETT) and proposed way forward

Mr. Charles Wooldridge, SETT lead, provided a status report on the activities of the CGMS Socioeconomic Benefits Tiger Team (SETT) in **CGMS-42-NOAA-WP-19-PPT**. The accomplishments of the first year of the Tiger Team include: Establishment of Membership , compilation of relevant studies and activities for review, identification of socio-economic expertise by members, and a first workshop held to identify and discuss key applications and case studies (April 2014). The CGMS Plenary was briefed on the major themes and results of the workshop and the future work plan of activities. According to the work plan, SETT will finalise the workshop report and develop a two-three 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. Prior to CGMS-43, SETT will prepare a recommendation for future activities and plan a keynote on socio-economic benefits at CGMS-43. A SETT report will also be provided to the WMO Consultative Meeting on 20 June 2014. SETT plans to hold its next workshop in autumn 2014 in the Washington DC area and new members are invited to participate in SETT. Mr. Wooldridge noted the complementarities of many of the studies undertaken by CGMS members explaining that operational and research agencies can leverage each others' expertise and

experiences. In the discussion following the report, CGMS members encouraged SETT to reach outside of the normal CGMS community to ensure the necessary expertise is at the table and to capture user input. WMO noted the complementarity of this activity with what is being undertaken by the Commission on Basic Systems and expected visibility on this topic at the upcoming Executive Council and Congress meetings. Members also asked that SETT focus on users in developing countries.

E.4.2 Report by Working Group III

Suzanne Hilding, co-Chair of WG III, presented the outcome of the discussions in Working Group III on operational contingency and continuity planning in **CGMS-42-CGMS-WP-05-PPT**.

The main topics discussed were related to continuity issues and risk analysis of geostationary and polar-orbiting missions (GEO: Indian Ocean coverage, GOES-R user transition in South America; and LEO: early morning orbit, SNPP-JPSS transition, radio-occultation, ocean surface topography, scatterometry, Earth Radiation Budget); the CGMS baseline and climate architecture; the progress report by the Tiger Team on socio-economic benefits of space missions; the transition of R&D missions into operational status; the proposed update of the HLPP; and the identification of issues to be monitored at inter-sessional meetings.

Continuity issues related to the CEOS Virtual Constellations (Sea Surface Temperature, Sea Vector Winds and Ocean Colour Monitoring missions) were also presented and discussed.

The main outcomes of WG III deliberations were:

- An agreed roadmap for Indian Ocean coverage: IMD/ISRO to share data from INSAT-3D and follow-on, EUMETSAT to assist in data dissemination, CMA will consider moving FY-2F (on the understanding that FY-2G and 2H are fully functional), ROSHYDROMET will assist with Data Collection System services);
- LEO early morning orbit gap: WG III remains hopeful that CMA can confirm FY-3E on the 6:00 ECT to ensure full sounding capability in the early morning;
- On altimetry and scatterometry: Encourage SOA-EUMETSAT high-level dialogue towards agreement on an HY-2 near real-time data dissemination;
- On radio-occultation: ISRO-EUMETSAT efforts on Oceansat-3/ROSA and ScatSat, NOAA efforts towards full implementation of COSMIC-2 and optimised operation of COSMIC-1, CMA will continue RO measurements with GNOS on FY-3C and beyond.

The plenary noted the progress that WG III had made on its actions and endorsed the new actions and recommendations proposed. It concluded by thanking the two co-Chairs, Suzanne Hilding, NOAA, and Peng Zhang, CMA, as well as the rapporteur, Jérôme Lafeuille, EUMETSAT, for their support.

F EDUCATION AND TRAINING (F)

F.1 Education and training

CGMS-42-EUMETSAT-WP-10 described the current status and future plans for training in satellite meteorology provided by EUMETSAT in partnership with the Centres of Excellence (CoE) in Africa, the Middle East and Europe (in the WMO RA I, RA II and RA VI regions) and CGMS was invited to take note.

A joint JMA-KMA presentation was made outlining the background and mission of the WIGOS Project to Develop Support for RA II NMHSs in Satellite Data, Products and Training, and also detailed recent related accomplishments (**CGMS-42-JMA-WP-03** and **CGMS-42-KMA-02**).

F.1.1 Status report on CMA VLab activities (incl. FY-3 product suite)

Mr Bangzhong Wang from the China Meteorological Administration Training Centre (CMATC), a recognised WMO Centre of Excellence, presented the current state of affairs and future plans in **CGMS-42-CMA-WP-04-PPT**. This covered:

Current state of affairs:

- Eight international training classes and many domestic training classes of meteorological satellite have been held in recent years. The training sessions have covered the application of satellite imagery in weather forecasting, in environmental monitoring, and in the use of software for FY meteorological satellite data.
- On 12 March 2014, online discussions were held between CMATC and BOMTC at which cooperation on education and training was discussed and confirmed. The first educational online classes took place on 1 April and 6 May 2014 in which CMATC teachers participated.
- The teaching materials used include books, DVD, viewgraph presentations and case studies. The materials are used both in class room and distance learning training sessions.

Future prospective:

- Faculty building (training platform, teaching teams and curriculum construction);
- International training (carrying out training courses on the application of FY data and developing international distance learning);
- Information sharing (translating teaching material); and
- Holding online discussions with other WMO Centres of Excellence.

F.1.2 Status report on VLab activities

CGMS-42-WMO-WP-16 reported on activities within the WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab), along with future plans and directions. Since CGMS-41, VLab members have offered a variety of training opportunities, attracting significant interest with up to 600 online participants in a single event. The paper highlights the Virtual Round Table on Competence Requirements for Aeronautical Meteorological Personnel, Science Week 2013, Aviation Week, and the two GEONETCast Event Weeks which were presented in English and Spanish.

Furthermore, the project on “Conceptual Models for the Southern Hemisphere” was completed, involving trainers and experts from VLab Centres of Excellence.

Future plans include a series of satellite direct readout training events, including on NPP and Metop, lectures on the product suites from FY-3 and Meteor-M, and continuing collaboration with COSPAR on satellite capacity building events.

An update on the WMO VLab Trust Fund shows that although contributions to the WMO VLab Trust Fund match expenses through mid-2014, no progress has been made in the level and spread of funding by CGMS members following the call for contributions sent by CGMS and WMO Secretariats in August 2013 (plenary Action 41.10).

The following recommendation was therefore made:

CGMS-42 recommendation – PLENARY						
Actionee	Rec	#	Description	Deadline	Status	HLPP ref
CGMS members	Plen F.1.2	R42.04	CGMS members that are sponsors of VLab Centres of Excellence to review and where possible augment their support to these Centres, as per the "Procedure for establishing Virtual Laboratory Centres of Excellence for Training in Satellite Meteorology" (section 2.2, http://www.wmo-sat.info/vlab/wp-content/uploads/2012/02/Procedures-for-New-CoEs_LV2012.pdf)	CGMS-43	OPEN	HLPP # 4.2.3

Furthermore, in a letter to WMO, the Russian Federation has proposed as new VLab co-Chair Prof. Grigory Chichasov, Director of the WMO Regional Training Centre in the Russian Federation, assisted by Mr Eduard Podgaiskiy from the Russian State Hydrometeorological University. The proposal was endorsed by the CGMS plenary which thanked Dr. Volker Gaertner, previous VLab co-Chair, for his contributions to the VLab.

On this occasion, contributions for supporting the VLab Trust Fund (funding of the Technical Support Officer) were recalled and the following action was raised:

CGMS-42 actions – PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CGMSSEC/ CGMS members	Plen F.1.2	A42.08	CGMS Secretariat to send a reminder to CGMS members to respond to the CGMS/WMO letter sent in August 2013 regarding call for contributions for supporting the VLab Trust Fund (funding of the Technical Support Officer)	10 Jun, 30 Sep 2014	OPEN	HLPP# 4.2.3

G OUTREACH (G)

CGMS-42-NOAA-WP-03-PPT: NOAA and EUMETSAT/CGMS Secretariat provided an update on CGMS outreach activities completed to date and those planned for the next year. The completion of the new CGMS website represents the largest accomplishment, and plans for the near future include the publication of an inreach newsletter and the development of a new CGMS brochure.

CGMS Members were asked to provide feedback on the new CGMS website and the following action was raised:

CGMS-42 actions – PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CGMS Members	Plen G	A42.09	CGMS members to provide feedback on the CGMS web-site (http://www.cgms-info.org) to cgmssec@eumetsat.int (including any news, text, reports other content for publication, improvements, etc.)	15 Oct 2014	OPEN	HLPP# 4

H CROSS CUTTING ISSUES (H)

H.1 Space Weather

A report from the Ad-hoc meeting on Space Weather was provided in **CGMS-42-NOAA-WP-30** by Suzanne Hilding, Chair of the Ad-hoc meeting. The meeting had focussed on actions resulting from CGMS-41 which had all been completed. The following Terms of Reference of CGMS space weather activities were proposed and endorsed by the 42nd plenary session:

The overarching goal of CGMS Space Weather activities is to support the continuity and integration of space-based observing capabilities for operational Space Weather products and services. This includes:

1. Keeping abreast of major user interests for operational Space Weather products and services (e.g. for spacecraft operations, aviation, energy, disaster management) and the related **requirements for space-based observations** that can be addressed by CGMS members, in particular those space weather requirements expressed by WMO[1];

2. Evaluating existing operational space weather **products and services in support of spacecraft operations**, and recommending additional services as appropriate;

3. Encouraging **Space Weather monitoring missions** either through dedicated satellites or through hosting space weather payloads aboard weather and climate monitoring satellites as technically appropriate;

4. Supporting when relevant the **dual use of sensors** such as GNSS radio-occultation receivers that provide essential information for weather/climate monitoring and ionosphere monitoring;

5. Fostering orbit coordination, on-orbit sensor calibration and harmonisation of operational Space Weather sensors and data formats with a view to ensuring **interoperability** and data consistency;

6. Reporting on **spacecraft anomalies** and sharing the results of anomaly resolution and analyses;

7. Pursuing **global coordination** of the operational Space Weather observing constellation, with a view to helping sustain future observing capabilities, as CGMS has done successfully for terrestrial weather and climate observations, encouraging complementarity, compatibility and possible mutual back-up in the event of system failure through cooperative mission planning;

8. Communicating on **socio-economic benefits** of space weather prediction to policy makers, the public, and the non-technical community;

9. In pursuing these objectives, CGMS recognises the complementary roles of the activities of its members and other international organisations or initiatives such as the International Space Environment Service (ISES), the Committee on Space Research (COSPAR) Panel on Space Weather.;

10. CGMS promotes partnership with these initiatives with a view to optimising overall efforts.

In terms of participation, CGMS members can invite other partners to participate in the team (e.g. NICT in the case of JMA). In future, and for the time being, space weather activities will be handled within the scope of WG III.

Following the presentation, CMA informed the plenary that space weather is considered an important topic in China, and invited other CGMS members to join the implementation team.

The following actions were raised by the plenary for WG III as a result of the discussions:

CGMS-42 actions – PLENARY (for WG IWG III)						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
CGMS members	WG III (from Plen H.1)	A42.14	CGMS Members to establish an implementation team tasked to define detailed objectives for the implementation of CGMS space weather activities as defined in the Terms of Reference	15 Oct 2014, CGMS-43	OPEN	HLPP# 5.2.2
CGMS members	WG III (from Plen H.1)	A42.15	The implementation team to propose next steps until CGMS-43 and objectives to be included in the HLPP.	15 Mar 2015, CGMS-43	OPEN	HLPP# 5.2.2

			This includes space weather observations into the WIS and implementation procedures to report on spacecraft anomalies			

H.2 Oceanography

H.2.1 Joint requirements by IOC-UNESCO and WMO

CGMS-42-IOC-UNESCO-WP-01 examined how the penetration of solar radiation to depths within the ocean interacts with biological and chemical constituents to generate subsequent near-surface heating and modify sea surface temperature (SST). The atmosphere and oceans are joined together over 70 % of Earth, with SST an important linkage to climate and weather phenomena. Many processes influence SST, such as wind, ocean current, solar radiation, and ocean biology.

Based on the presentation by IOC-UNESCO, there was a discussion on which aspects CGMS-coordinated observations could support the modelling of biological and chemical processes in the upper ocean, and in this regard it was proposed that IOC-UNESCO provide a presentation to CGMS-43 on sea surface salinity observations and the following action was agreed:

CGMS-42 actions – PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
IOC-UNESCO	Plen H.2.1	A42.10	IOC-UNESCO to provide a Working Paper on guidance to CGMS members on sea surface salinity observations	CGMS-43	OPEN	-

H.2.2 Status of Chinese ocean observing satellite systems

CGMS-42-CNSA-WP-03 provided the status of CFOSAT, a new satellite for ocean remote sensing and Haiyan (HY). It has two payloads, a wave spectrometer (SWIM) and a wind scatterometer (SCAT). It is designed to provide accurate information on sea state, wind and waves, to improve wind and wave forecast for marine meteorology, ocean dynamics modelling and prediction, and also to improve our knowledge of climate variability, fundamental knowledge on surface processes linked to wind and waves. In addition, CFOSAT will provide information to improve the knowledge and modelling of sea-surface processes. In the period September 2010 - September 2013, phase C of the CFOSAT satellite project was completed and phase D has started for some sub-systems. The Chinese ground segment has completed the design proposal, which consists of five sub-systems.

A complementary presentation on CFOSAT was made by Dr. Mingsen Lin, NSOAS, in **CGMS-42-CNSA-WP-03 PPT,** in which the HY-2 programme and future plans were included illustrating China's efforts in ocean observations. The data acquisition and distribution of HY-2 data were described and it was noted that data exchange with EUMETSAT had been established. There was also ongoing cooperation with EUMETSAT to review the feasibility of establishing HY-2 near real-time global data access using the FMI Sodankylä ground station in Finland. HY-2 applications were also presented (ocean disaster surveillance such as tropical cyclones, tropical fisheries, marine environment forecasting, and navigation safeguard).

As for the future, China has formulated and implemented several medium- and long-term national plans for the development of the HY programme. It is intended to establish an operational satellite development plan with CNSA and to advance the satellite application system using an R&D satellite (GF-3 satellite).

EUMETSAT thanked NSOAS for the presentation and, in view of NSOAS highly attractive satellite programmes, invited CGMS to encourage NSOAS to become a CGMS member. NSOAS indicated that this would need to be a decision taken by the China State Oceanic Administration (SOA), to which NSOAS belongs, and NSOAS would therefore continue to contribute to CGMS through CNSA for the time being.

Concluding the discussions, CGMS invited SOA/NSOAS to consider becoming a CGMS member in view of the relevance and contribution of their satellite programme to the WMO Global Observing System.

H.2.3 CGMS coordination in the ocean context

Several coordination areas are well catered for outside CGMS, in particular by the CEOS Virtual Constellations. Mr. Mikael Rattenborg, CGMS Secretariat, presented **CGMS-42-CGMS-WP-06-PPT**, with the aim of identifying a way forward for CGMS to take action, if any, in the context of oceanography which would be complementary to what is already undertaken by CEOS.

The following points were brought to the attention of the plenary for consideration:

- There are gaps in the coordination of global data exchange and NRT dissemination services for ocean, the integration of ocean-related satellite data in the WIS and in the area of contingency planning for baseline GOS missions providing ocean measurements and CGMS should therefore consider action in these areas;

- As a result, it was proposed to consider actions:
  - To encourage the CEOS Virtual Constellations to submit papers to CGMS on relevant operational matters with appropriate recommendations to CGMS;
  - CGMS Secretariat to ensure that Ocean WPs are considered in all appropriate CGMS Working Groups;
  - To strengthen the link to JCOMM, in particular the Cross cutting Task Team on Satellite Data Requirements. A dedicated report to CGMS on the Task Team activities by the IOC member and a dialogue on data dissemination requirements with CGMS WG IV would be useful;
  - To continue the dialogue with GHRSST and IOCCG;
  - To explicitly include Ocean-related matters on agendae of WG III and WG IV;
  - In general to encourage members to submit ocean-related working papers for consideration by CGMS.

- Regarding the HLPP and the cross-cutting issues of CGMS, ocean is considered explicitly in climate activities and handled by the JWGClimate, and the increased capabilities of the next generation GEO satellites for ocean applications will also be addressed in this context.

It was also recalled that WG III at CGMS-42 had detailed discussions with the Virtual Constellations for Ocean Colour Radiometry, Ocean Surface Vector Winds and Sea Surface Temperature, and that WG III had proposed several CGMS actions to secure operational continuity of ocean measurements in the light of recent terminations of important ocean missions.

IOC-UNESCO expressed its appreciation to CGMS for its efforts to ensure continuity of all ocean surface vector winds measurements following the Oceansat-2 termination, iterated the need of the international ocean community for NRT OSWV data and urged every space agency flying scatterometers to make OSVW products available in near real-time. IOC-UNESCO also supported the proposal for more detailed interactions with the newly established JCOMM Task Team on Satellite Data.

ESA and other CGMS members noted the severe problems with C-band interference affecting radar ocean measurements, and urged CGMS to take necessary actions to secure the future protection of the C-band sensing frequencies.

CGMS members thanked the CGMS Secretariat for the comprehensive analysis of CGMS coordination in the ocean context and supported the proposed short- and medium-term actions of the CGMS Secretariat to optimise the contributions of CGMS to the ocean community, in particular in the areas of operational continuity, near real-time distribution of data and products and protection of ocean-relevant sensing frequencies.

H.3 Climate

H.3.1 GCOS progress report and new implementation plan

Dr. Stephen Briggs, new Chair of the Global Climate Observing System (GCOS) Steering Committee, presented a progress report and new implementation plan for GCOS (**CGMS-42-WMO-WP-02/PPT**). The GCOS programme has started the next round of its assessment cycle. The next GCOS status report on the global observing systems for climate and the future implementation plan will be highly relevant to space agencies, WMO programmes and related IOC and UNEP programmes and climate science activities, especially in light of the evolving Global Framework for Climate Services (GFCS).

Dr. Briggs noted that the GCOS programme appreciates the contributions of CGMS members to the global observing system for climate, and the specific activities undertaken by CGMS working groups and expert teams. GCOS looks to continued support in future, including by:

- assisting the GCOS programme in its assessment of progress in implementing a global climate observation system, in its assessment of adequacy of the current and foreseen observing system, and in its identification of new implementation actions;
- continuing to generate Fundamental Climate Data Records (FCDR) and ECV products, including from reprocessing past data records where needed;
- continuing its work with CEOS and the WMO Space Programme on the inventory of climate datasets; and
- promoting the intercomparison and assessment of datasets.

The creation of the new CEOS-CGMS Joint Working Group on Climate (JWGClimate) has been strongly supported by GCOS, as it provides a single mechanism through which space agencies can coordinate their response to GCOS requirements. In common with the meeting of the precursor CEOS WGClimate, the strong emphasis placed on the development of the climate monitoring architecture was a very welcome feature.

H.3.2 CEOS-CGMS Joint Working Group on Climate (JWGClimate)

Dr. John Bates, Chair of the CEOS-CGMS Joint Working Group on Climate (JWGClimate) presented the first status report of the new group (**CGMS-42-CEOS-WP-04/PPT**). The major activities covered in his report were:

- approval of revised Terms of Reference at CEOS plenary 2013;
- the first meeting of the JWGClimate;
- review of CEOS Strategy for Carbon Observations from Space; and
- reporting to the UN Framework Convention on Climate Change (UNFCCC) Subsidiary Body on Scientific and Technological Advice (SBSTA).

One area of focus during the CGMS WG III meeting discussions was the pending CGMS-41 actions for the JWGClimate regarding the production of an inventory of Fundamental Climate Data Records (FCDRs). This activity has been promoted by WMO, however, the JWGClimate did not feel that what was initially proposed by CGMS could be considered as part of the initial JWGClimate activities. In WG III discussions, it was however felt important to have some focused FCDR activity, since such a climate action helps CGMS agencies promote and encourage climate activities in their respective agencies, particularly those agencies with emerging climate activities. In particular, China (CMA) and South Korea (KMA) are both planning to join SCOPE-CM activities in re-processing their geostationary data as FCDRs. This is an important development and such activities are encouraged. Based on these developments, the CGMS-41 actions were closed and a revised action on FCDRs was raised to support these agencies promote those efforts:

CGMS-42 actions – PLENARY						
Actionee	Action	#	Description	Deadline	Status	HLPP ref
JWGClimate	H.3.2	A42.11	Regarding the Pilot FCDR Inventory: • Conduct an initial analysis of available FCDRs past and current available for or planned for use in the current set of SCOPE-CM projects using CEOS, CGMS, and WMO satellite data bases; • Identify SCOPE-CM ECV projects that are or may be able to use the above FCDRs; • Assess availability of the above FCDRs for the future;	CGMS-43, CGMS-44	OPEN	HLPP# 5

			• Following the first ECV gap analysis, consider FCDRs that may be useful in assessing ECV opportunities in the future ECV gap analysis.			

GCOS, IOC, and other CGMS members expressed satisfaction with the progress and maturation of the JWGClimate in its first year. GCOS noted its appreciation of the coherent way forward and how GSICS, SCOPE-CM and the CGMS International Science Working Groups are integrated jointly with CGMS/CEOS. Members encouraged effective links to climatology and climate modelling work and the needs of the Global Framework for Climate Services.

Announcement: Symposium on Climate Research and Earth Observation from Space

EUMETSAT Director General Alain Ratier announced the Symposium on Climate Research and Earth Observations from Space: Climate Information for Decision Making, to be held in Darmstadt, Germany, on 13-17 October 2014. The main goal of the symposium is to provide a forum for discussing the current state of climate science and climate observations in order to evaluate recent achievements, ascertain critical objectives to be achieved with satellite-based climate information, and identify gaps in the current space-based climate observing system. A major topic that will be discussed is the proposed Architecture for sustained Climate Monitoring from Space. Beyond the monitoring of the current state of the climate system, the conference will also consider how Earth observation contributes to future developments in climate prediction and climate change projection. The Symposium is being organised jointly by the World Climate Research Programme and EUMETSAT, along with several cooperating agencies and sponsors.

I GEO

In **CGMS-42-GEO-WP-01-PPT**, Mr. Osamu Ochiai, GEO Secretariat, presented GEO/GEOSS progress and post-2015 plans focusing on the following issues:

The need for:

- continued improvement of Earth observations worldwide;
- broad and open data policies and practices, essential for publically funded collections and strengthening them;
- economic value of downstream elements (value-added products and services);
- broadened stakeholder engagement, including by the private sector;
- strengthened policy linkages/mandates; and
- national, regional and international collaboration.

The presentation reconfirmed the link between CGMS and GEO in view of GEONETCast, the aim to harmonise data accessibility, radio frequency protection, climate activities and closer cooperation with WMO towards post-2015.

J HLPP (I)

As part of the agreed revision cycle for the CGMS High Level Priority Plan (HLPP), the CGMS Secretariat presented a proposed update in **CGMS-42-CGMS-WP-07**. The update is based on the following inter-sessional activities:

- Revision of the priorities for part 3: "Enhance the quality of satellite-derived data and products" as elaborated by the co-Chairs and rapporteurs of CGMS WG IWG II;
- Recommendations from ITWG - Refinement of split of responsibilities between CGMS WG I and WG IV;
- Establishment of a four-year work plan for climate by the JWGClimate; and
- Other revisions identified by CGMS WG Chairs and co-Chairs, Annex 1 – Status of implementation of HLPP 2014-2018 (Version 2), Annex 2 – Proposed updated High-Level Priority Plan 2014-2018 (Version 3, incl. track changes).

Following the discussions, a further few updates were proposed and made, and the HLPP was endorsed by the plenary. The final version will be concluded and published by the CGMS Secretariat following CGMS-42.

K REVIEW OF CGMS-42 ACTIONS AND RECOMMENDATIONS (J)

CGMS Secretariat reviewed the list of actions and recommendations in the plenary which was endorsed by the plenary. The final list of CGMS plenary actions and recommendations resulting from CGMS-42 deliberations is available here.

L AOB AND CLOSING SESSION (K)

K.1 Nominations

It was agreed that the CGMS Secretariat will represent CGMS at the WMO EC-66 in Geneva, Switzerland, in June 2014 and at the GEO-XI plenary in Libreville, Gabon, in November 2014.

The plenary also endorsed the following CGMS Working Group Chairs and rapporteurs as follows:

WG I: Marlin Perkins, NOAA, Lars-Peter Riishojgaard, WMO (co-Chairs)
Joaquin Gonzalez, EUMETSAT (rapporteur)

WG II: Toshiyuki Kurino, JMA, and Stephan Bojinski, WMO (co-Chairs)
Johannes Schmetz, EUMETSAT, and Mitch Goldberg, NOAA (rapporteurs)

WG III: Suzanne Hilding, NOAA, Peng Zhang, CMA (co-Chairs)
Jérôme Lafeuille, WMO (rapporteur)

WG IV: Vasily Asmus, ROSHYDROMET, and Jae-Dong Jang, KMA (co-Chairs)
Klaus-Peter Renner, EUMETSAT (rapporteur)

K.2 Any other business

ISRO announced its intention to become a CGMS member. In view of ISRO's contribution of its Earth observation missions to the WMO Global Observing System and its fulfilment of the requirements of the CGMS Charter, the plenary very much welcomed this.

It was agreed that the CGMS Secretariat and ISRO interact on the next steps with the objective of ISRO becoming a full CGMS member by CGMS-43.

K.3 Closing

K3.1 Date and Place of next meeting

NOAA confirmed that it will host the 43rd plenary session of CGMS on 18-22 May 2015, in Boulder, Colorado, USA.

In view of CGMS-42 being the last CGMS plenary session attended by Ms. Mary Kicza's of NOAA, WMO, CMA, EUMETSAT and the CGMS plenary thanked her for her contributions over the years, on both a multi-lateral and bilateral partner level, as well as for the contributions to the WMO user community through NOAA's environmental polar satellite programme during a difficult period coloured by the hardship of the global financial crisis.

Mary Kicza thanked all CGMS colleagues for the kind words. She said that it had been a privilege to work and serve in the CGMS arena. Recalling that it had not been just her achievement, but the result of team work, she also expressed her thanks for the support of her close colleagues and team over the years.

Afterwards, CMA handed the CGMS flag over to NOAA.

K3.2 Closing remarks

Concluding the meeting, Dr Jun Yang, CMA, firstly declared that CGMS-42 had been a successful and fruitful meeting.

He thanked the representatives of all members and observers for their dedication, which ensured that the meeting had been a success. Dr. Yang also thanked the co-Chairs for supporting him during the meeting.

Secondly, over the two days of the plenary, all agenda items had been handled with encouraging results. He said the discussions on the proposal and updates of the High Level Priority Plan (HLPP) will guide CGMS on the way forward over the next five years. He added that the outcomes in terms of actions and recommendations will be collated by the CGMS Secretariat and circulated to all participants after the meeting.

Thirdly, he thanked all those who contributed to organising the meeting so successfully, namely the outstanding work by the Working Group Chairs and rapporteurs, the support provided by the CGMS Secretariat before and during the meeting, and the support of the local organising committee.

Finally, he hoped to see everyone at the 43rd CGMS plenary session in Colorado in 2015.

The 42nd plenary session of CGMS was closed at 16:45 on Friday 23 May 2014.