REPORT OF THE 37th MEETING OF THE COORDINATION GROUP FOR METEOROLOGICAL SATELLITES

CGMS-37

Jeju Island, South Korea
26-30 October 2009

Cover photo:
Jeju Island, South Korea
(courtesy of NASA)

Please note that this report is published together with a CD-ROM containing an electronic version of the report and all working papers presented at CGMS-37.

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CGMS MR 37

TABLE OF CONTENTS

TABLES

FINAL REPORT OF THE PLENARY SESSION

A. INTRODUCTION

A.1 Welcome

On behalf of KMA, Dr Ae-Sook Suh, Director of the National Meteorological Satellite Center of Korea, officially opened CGMS-37 at 09:00 on 26 October 2009 on Jeju Island, Korea.

She welcomed participants of the 37th Session of CGMS to the beautiful island of Jeju. She also thanked EUMETSAT, the CGMS Secretariat, for the support provided in the preparations. Recalling that KMA became a CGMS Member in 2005, she reiterated the growing importance of the role of meteorological satellites and their contribution to the Global Observing System. With the forthcoming launch of COMS, KMA would be able to fully contribute both to the GOS and to the CGMS. She concluded by wishing all participants a fruitful and constructive meeting.

On behalf of the CGMS Secretariat, Dr Lars Prahm, EUMETSAT Director General, also welcomed the participants, and expressed his sincere thanks to KMA for hosting the CGMS meeting and for the excellent organisational arrangements. He stated that meteorological satellites represented a key component of the Global Observing System and that the crucial task of enabling operational satellite operators, research and development institutions and WMO to ensure their efficiency and sustainability, through technical and operational coordination, lay within CGMS.

Following the resumption of the Plenary session on Thursday 29 October 2009, Dr Byung-Seong Chun, Administrator of KMA, welcomed the participants to CGMS-37. He expressed his sincere thanks to Dr Lars Prahm, Director General of EUMETSAT and the CGMS Secretariat for organising the meeting in the Republic of Korea in close cooperation with KMA.

He continued by saying that nobody could deny that the main issue of the 21st century was climate change. Countless global efforts focused on developing measures to mitigate the effects and to adapt to climate change by enabling resources and formulating long-term satellite development plans. Furthermore, cooperation among satellite operators was vital to ensure the most efficient use of these resources. In this regard, the annual plenary of CGMS played a pivotal role, and provided an ideal forum for coordination of the development of a global meteorological satellite system.

He was pleased that this event provided KMA with a valuable opportunity to contribute to CGMS endeavors. As a member of CGMS, and with the launch of the COMS, Korea would actively contribute to the establishment of the Global Earth Observation System of Systems.

He concluded by iterating it was an honour for him to host CGMS-37 and wished the participants a fruitful meeting.

On behalf of the CGMS Secretariat, the Director General of EUMETSAT, Dr Lars Prahm, expressed his sincere thanks to KMA for hosting the meeting and the excellent organisational arrangments. Furthermore, he recalled EUMETSAT's long-standing commitment to CGMS and its aspiration to continuing such support by further supporting the role of CGMS Secretariat.

A.2 Election of Chairperson

Dr Ae-Sook Suh, Director of the National Meteorological Satellite Center of Korea, was unanimously elected as Chairperson of CGMS-37, with Mr Mikael Rattenborg, EUMETSAT as co-Chair and the CGMS Secretariat (Mr Gordon Bridge and Ms Anne Taube) as Rapporteurs. The Plenary session confirmed the Chairpersons for the four Working Groups elected in the previous CGMS meeting, namely: Mr Marlin O Perkins for Working Group I on Telecommunications, with Mr Joaquin Gonzalez replacing Gordon Bridge as Rapporteur; Dr Peng Zhang for Working Group II on Satellite Products, with Dr Mitch Goldberg and Dr Johannes Schmetz as Rapporteurs; Mr Gary Davis for Working Group III on Contingency Planning with Mr Jerôme Lafeuille as Rapporteur; and Mr Mikael Rattenborg as Chairperson of Working Group IV on Global Data Dissemination, with Mr Gordon Bridge as Rapporteur.

A.3 Adoption of Schedule

CGMS-37 adopted the schedule and agreed that the four Working Groups would meet on 26-27 October 2009.

The Secretariat provided a draft agenda (see Annex 1), which was used as a basis for the subsequent discussions together with the list of working papers submitted to CGMS-37 (see Annex 2).

A.4 Nomination of Drafting Committee

The Drafting Committee was nominated, consisting of the Chairpersons of CGMS-37. its Rapporteurs, the Chairpersons of the Working Groups and their Rapporteurs, and the CGMS Secretariat.

The drafting of various sections of the final meeting report was carried out by the CGMS Secretariat with the assistance of CGMS participants, based upon summaries of submitted working papers and reports of the Working Groups and plenary sessions.

A.5 Review of Actions from Previous Meetings

The Secretariat reviewed the outstanding actions from previous meetings, taking into account inputs provided in Working Papers by the Members, as well as by other means of correspondence, including e-mail. Related Working Papers: CMA-WP-01, ESA-WP-04, EUM-WP-01/-02, JMA-WP-01, KMA-WP-01, NOAA-WP-01/-36.

Actions open from CGMS-35 (at CGMS-36)					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
NOAA	35.01	Action 35.01: NOAA to provide more detailed information on the DMSP satellite system. Deadline: CGMS-36	NOAA-WP-02&03. The CEOS Earth Observation Handbook also provides information on this matter available on www.eohandbook.com IPWG was approached via e-mail to provide specific details on the mission, to which the IPWG co-chair Ralph.R.Ferraro@noaa.gov provided during CGMS-36. As a result, reporting will be made at CGMS-37.	(CGMS-36) New deadline: CGMS-37	**CLOSED**
NASA	35.02	Action 35.02: CGMS invited NASA to provide information on its current R&D Earth Observation satellites. Deadline: CGMS-36	The "Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond" (2007) is available for free downloading at http://books.nap.edu/catalog.php?record_id=11820 A pdf copy is available on the CGMS ftp-server ftp://cgmsread:welcome100@ftp.eumetsat.int/ in sub directory 'CGMS-37'; in 'Actions recommendations inputs'. Plenary informed 15 July 2009.	(CGMS-36) New deadline: 31 Dec 2008	**CLOSED**
CGMS Members	35.11	Action 35.11: All CGMS Members to nominate points of contact to support the CGMS website editorial committee. Deadline: 31 December 2007	ESA: OPEN EUM: anne.taube (at) eumetsat.int, JMA/MSC: Mr. Motoo Hayashi, System Engineering Division Tel: +81-42-493-4976, Fax: +81-42-492-2433, E-mail: mhayashi (at) met.kishou.go.jp NOAA: daniel.muller (at) noaa.gov WMO: jlafeuille (at) wmo.int Members were encouraged to provide support as necessary. Closed following CGMS-37	(31 Dec 2007) New deadline: 31 Dec 2008	**CLOSED**
WMO, EUM	35.12	Action 35.12: WMO and CGMS Secretariat to establish a CGMS web editorial committee by March 2008 in order to guide the completion and further enhancement of the CGMS website and the ftp server and ensure their sustainability. Deadline: March 2008 and to report to CGMS-36	Action was deferred due to lack of availability on both sides. Members were encouraged to provide support as necessary. Closed following CGMS-37	(CGMS-36) New deadline: 31 Mar 2009	**CLOSED**

Actions open from CGMS-35 (at CGMS-36)

Actionee	Action	Description	Action feedback/closing document	Deadline	Status
NOAA, EUM	WGIV 35.31	Action 35.31: NOAA and EUMETSAT to study possibilities for the use of NPOESS ground infrastructure to improve the timeliness of Metop data, within the framework of JPS discussions and report findings to CGMS. Deadline: CGMS-36	Discussed in WGIV. EUM-WP-R[24]C NOAA: NOAA and EUMETSAT are engaged in ongoing discussions regarding the use of NOAA ground infrastructure to improve timeliness of Metop data. NOAA and EUMETSAT have exchanged letters agreeing to expand the IJPS partnership to include using the NPOESS ground infrastructure at McMurdo Station, Antarctica to improve the timeliness of Metop data. An initial operational capability is planned for 2011. NOAA-WP	(4 Nov 2008) New date: CGMS-37	**CLOSED**
CGMS Members	WGIV 35.32	Action 35.32: CGMS members involved with the IGDDS to consider applying as DCPCs within the context of the IGDDS and WIS, in consultation with WMO. Deadline: May 2008	Discussed in WGIV. WMO-WP CGMS-36 WMO-WP-13 WMO was informed of the intention of JMA to prepare an application. Letter sent by WMO Oct 2008 to all WMO Members and EUMETSAT, informing on the process of GISC/DCPC designation, and inviting to notify their intention to apply. An IGDDS Implementation Group meeting was held 5-6 Feb 2009. Information provided to plenary on 17 July 2009. NOAA input by e-mail 22 Oct 2009: NOAA is considering applying as a DCPC. CGMS is reminded that NOAA consist of several data production centers. Each data production center in NOAA is evaluating the resources necessary to be compliant with ISO 19115. As each data production center completes their investigation, they will make a recommend the NOAA PR. NOAA will continue to keep CGMS inform on the progress of these considerations. CGMS-37: NOAA-WP-31. Plenary informed by e-mail on 24 Oct 2009. WMO: CGMS-37, WMO-WP-06 Closed. Addressed in new action R[31]Cat CGMS-37	(31 May 2008) New deadline: 31 Dec 2008	**CLOSED**

CGMS-36 permanent actions

Actionee	Action	Description	Action feedback/closing document	Deadline	Status
CGMS Members	Permanent 01	All CGMS Members to inform the Secretariat of any change in the status or plans of their satellites to allow the updating of the CGMS Tables e-mail, of Satellites (tables 1-6 of the plenary report). The Secretariat to review the tables of current and planned polar and geostationary satellites, and to distribute this updated information, via the WWW Operational Newsletter, via Electronic Bulletin Board, or other means as appropriate. CGMS satellite operators to update table 7 for polar-orbiting satellite equator crossing times on an annual basis. CGMS Members to update the table on polar-orbiting satellite equator crossing times as well as the table on coverage from geostationary satellites.	CMA-WP-01, ESA-WP-01/-02/-04, EUM-WP-01/-02, JMA-WP-01/-02/-03, KMA-WP-01, NOAA-WP-01/-38	CGMS-37	**CLOSED**
CGMS satellite operators	Permanent 02	CGMS Members to report on spacecraft anomalies from solar events at CGMS meetings.	EUM-WP-06 NOAA-WP-04	CGMS-37	**CLOSED**
CGMS Members	Permanent 03	CGMS Members to provide information for the WMO database of satellite receiving equipment, as appropriate.	NOAA-WP- After consultation with WMO, the Secretariat proposes to close this action in future. Closed at CGMS-37	CGMS-37	**CLOSED**
CGMS Members	Permanent 04	CGMS Members to review the list of available list servers used by CGMS groups and update as appropriate.	Ongoing. Inputs provided by Members as and when needed.	CGMS-37	**CLOSED**
CGMS Members	Permanent 05	CGMS satellite operators to consider the IOC satellite requirements, especially the data dissemination methods, bearing in mind the ongoing formations of GOOS Regional Alliances (GRAs).	ESA-WP-03 Closed for NOAA.	CGMS-37	**CLOSED**

CGMS-36 actions

Actionee	Action	Description	Action feedback/closing document	Deadline	Status
ROSC, ROSH, CMA, CNSA, CGMS Members	36.01	Action 36.01 ROSCOSMOS/ROSHYDROMET, CMA/CNSA and other CGMS Members to provide JAXA with their points of contact if planning to join the activities of the CEOS Precipitation Constellation as microwave satellite operators. Deadline: 31 March 2009	EUM: Not applicable. Reminder to plenary 15Jul09 CNSA: TBD if CNSA will join the activities of the CEOS Precipitation Constellation or not (Oct 09). Discussed at CGMS-37 with a new action agreed.	31-Mar-09	**CLOSED**
WMO	36.02	Action 36.02: WMO to report at CGMS on the major updates brought to the Dossier on the Space-based Global Observing System. Deadline: CGMS-37	WMO-WP-10	CGMS-37	**CLOSED**
CGMS agencies	36.03	Action 36.03: CGMS agencies with current and/or future geostationary programmes to review CGMS-36 NOAA-WP-21 (Characterisation of future channels and sensors for fire monitoring, WGII), and to complete an assessment on the level of compliance to the recommendations in the Working Paper. Deadline: 31 May 2009	EUM-WP-29 NOAA-WP Discussed at CGMS-37	31-May-09	**CLOSED**

CGMS-36 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
VLMG co-Chairs	36.04	Action 36.04: The VLMG co-Chairs to set in place the procedure to recruit the technical support officer whose list of duties were presented in the Working Paper and to report to CGMS-37. Deadline: CGMS-37	WMO-WP-18	CGMS-37	**CLOSED**
CGMS satellite operators	WGI 36.05	Action 36.05 All CGMS satellite operators are invited to consider the above proposal and the status of discussions at SFCG for a coordinated future use of the band 401 – 403 MHz, and to provide responses to the CGMS Secretariat. Deadline: 30 December 2008	CNES expressed that the ARGOS-4 satellite network would not operate in 401.69-402.4MHz frequency band as the Beam2. Under this condition, both Japanese and French administrations agreed that there is no harmful interference between the MTSAT and the ARGOS-4 satellite networks in the band of 402MHz. Document sent by e-mail 18 Dec 2009 JMA e-mail 15 Jan 2009: - Regarding the band 401.701-402.435MHz, the band should be maintained only for the DCS of the geostationary meteorological satellite systems in the world, since JMA will use the band for the DCS of the follow-on satellites to the MTSAT series, and - Regarding the satellite frequency coordination about MTSAT-DCS (JMA, Japan) and ARGOS-4 (CNES, France) in the band of 402 MHz, the coordination has been already completed. Invitation letter for 17 Feb 2009, CNES + JMA feedback provided to cgmsplen on 26 Jan 2009. NOAA plans to provide updates at future meetings	30-Dec-08	**CLOSED**
EUM	WGI 36.06	Action 36.06 CGMS Secretariat to develop a coordinated response, based on the input received from CGMS members, on the future use of the 401 - 403 frequency band. Deadline: 31 January 2009.	Provided at 17 Feb 2009 meeting.	31-Jan-09	**CLOSED**
EUM	WGI 36.07	Action 36.07 CGMS Secretariat to request WMO to coordinate a separate meeting of all CGMS satellite operators that are in attendance at the Working Party 7B and 7C meetings in Geneva, Switzerland, February 2009, to discuss the coordination of the CGMS response to the proposal for future use of the 401 – 403 MHz band. Deadline: 30 December 2008	Roshydromet/SRC Planeta: Dcoument by e-mail 30 Jan 2009. The meeting took place on 17 Feb 2009 in Geneva. Minutes of meeting distributed via plenary on 15 April 2009.	30-Dec-08	**CLOSED**

CGMS-36 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
EUM	WGI 36.08	Action 36.08 CGMS Secretariat to develop a final, coordinated report, based on CGMS members input, for the future use of the 401 – 403 MHz frequency band. Deadline: 30 April 2009	A meeting took place on 17 Feb 2009 in Geneva. Minutes of meeting + comments distributed via plenary on 15 April 2009.	30-Apr-09	**CLOSED**
EUM	WGI 36.09	Action 36.09: CGMS Secretariat to present the CGMS coordinated response on the future use of the 401 – 403 MHz band at the SFCG meeting in June 2009. Deadline: 1 June 2009	EUM-WP-21 Discussed at CGMS-37	01-Jun-09	**CLOSED**
EUM	WGI 36.10	Action 36.10: CGMS Secretariat to send a letter thanking the SFCG Executive Secretariat for the "SFCG Liaison Statement to CGMS." Deadline: 30 November 2008	Letter sent to SFCG Executive Secretary (EUM/SES/LET/08/0367 of 18 Nov 2008), copy disseminated to cgmsplen on 28 Nov 2008. Feedback from CMA by e-mail to cgmsplen on 4 Dec 2008: "Based on priliminary analysis and estimation by the fequency manager of NSMC/CMA the planned Argos would bring potencial harmful interference to the DCS of FY-2 in the band 401.1MHz - 401.4 MHz. Considering that the FY-2 series satellite networks have finished coordination with other frequency networks, and the successive satellites, the FY-2E to be launched December 2008, and the FY-2F and FY-2G that are being manufactured, shall all use this band, there is little possibility for FY-2 to make change. CMA hopes that 401.1MHz - 401.4MHz remain available for DCS using geostationary MetSat systems."	30-Nov-08	**CLOSED**
CGMS Members	WGI 36.11	Action 36.11: CGMS members should implement the IDCS frequency allocation plan change in their systems and update the associated documentation and webpages. The Secretariat will update the IDCS Users' Guide. Due date 31 July 2009	Report sent to plenary on 15 July 09 for review by Members by 31 Aug. NOAA-WP-12 Available on EUMETSAT's CGMS web pages: http://www.eumetsat.int/CGMS under CGMS publications and reports	31-Jul-09	**CLOSED**
NOAA	WGII 36.12	Action 36.12: NOAA to facilitate the setting up of a small Working Group comprising CGMS representatives to encourage public access of agency satellite datasets for nowcasting applications. Deadline: CGMS-37	NOAA-WP. Discussed in WGII.	CGMS-37	**CLOSED**

CGMS-36 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS Members	WGII 36.13	Action 36.13: All CGMS Members to make available the instrument characterisation of their imaging and sounding instruments in polar and geostationary orbit, in particular the spectral response functions. This should include both the currently operational as well as all previous instruments. It is sufficient to make available the web link where the instrument characterisation data can be found. Deadline: 30 May 2009	ESA: http://earth.esa.int/pcs EUM-WP-24 JMA: Input 1 Jun 2009: The spectral response functions of MTSAT-1R and the previous satellites are available at http://mscweb.kishou.go.jp/operation/index.htm#rfunction Plenary informed 12 Jul 2009. NOAA-WP-13 and -15	30-May-09	**CLOSED**
GSICS	WGII 36.14	Action 36.14: GSICS to finalise recommendations for its instrument performance monitoring website. Deadline: CGMS-37	NOAA-WP-11 and -14. Discussed in WGII.	CGMS-37	**CLOSED**
GSICS (+ CEOS WG)	WGII 36.15	Action 36.15: GSICS, in consultation with CEOS WG Cal/Val, to finalise development of guidelines for prelaunch instrument characterization. Deadline: CGMS-37	CEOS Cal/Val WG will make a presentation about their activity in CGMS-37 WGII and plenary. WMO-WP-02	CGMS-37	**CLOSED**
CGMS agencies	WGII 36.16	Action 36.16: CGMS agencies to provide URL addresses of satellite-based climate datasets to the CGMS Secretariat for posting on the CGMS website. Deadline: CGMS-37	EUM input to plenary 12 July 2009. a) EUMETSAT's product navigator/portal: http://www.eumetsat.int/Home/Main/Access_to_Data/ProductNavigator/index.htm b) Satellite Application Facility on Climate Monitoring: http://www.eumetsat.int/Home/Main/What_We_Do/SAFs/Projects/SP_1124289151210?l=en c) Archive data: http://www.eumetsat.int/Home/Main/Access_to_Data/Archive_Service/index.htm?l=en ESA response provided to plenary 21 Sept 2009: http://www.tv5.org/TV5Site/meteo/temperature-des-mers.php http://www.globcarbon.info http://www.globcolour.info/ http://www.medspiration.org/ ftp://uranus.esrin.esa.int/pub/globcover_v2/global/ JMA: JMA-WP-04 http://mscweb.kishou.go.jp/product_reprocess/index.htm	CGMS-37	**CLOSED**
WMO, EUM	WGII 36.17	Action 36.17: WMO and the CGMS Secretariat to initiate the formation of the small group (J. Lafeuille [WMO], M. Goldberg (NOAA) and J. Schmetz [EUMETSAT]) to consider the role of a new International Radio-occultation Working Group under CGMS, to elaborate its draft terms of reference. Deadline: CGMS-37	Roshydromet fax response to CGMS Secretariat 17 Apr 2009; International Radio Occultation WG, Dr Mikhail Gorbunov, Institute of Atmopheric Physics, RAS. (m_e_gorbunov@mail.ru) Tel. Russia, Moscow, 9519574 WMO-WP-20	CGMS-37	**CLOSED**

CGMS-36 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
IWWG Co-Chairs (+ Dr Genkova)	WGII 36.18	Action 36.18: Co-Chairs of IWWG, jointly with Dr Iliana Genkova, to provide a summary paper describing and evaluating the CGMS AMV intercomparisons using MSG image data. Deadline: CGMS-37	EUM-WP-26. Discussed in WGII.	CGMS-37	**CLOSED**
CGMS satellite operators	WGII 36.19	Action 36.19: Satellite operators deriving AMVs to summarise their methods and ways to characterise the AMV errors, with emphasis on the height assignment error. Deadline: CGMS-37	EUM-WP-27 JMA-WP-05 NOAA-WP-21	CGMS-37	**CLOSED**
CGMS Members	WGII 36.20	Action 36.20: CGMS Members to present WPs to CGMS-37 describing their processes for product development, verification and implementation into operations, as well as the process for continuous improvement. Deadline: CGMS-37	ESA-WP-05 JMA-WP-05/-06 NOAA-WP-17	CGMS-37	**CLOSED**
	WGII 36.21	Action 36.21: The CGMS Secretariat to include “Coordination of code forms for satellite data” within the agenda of WG IV, instead of WG II for future CGMS meetings. Deadline: CGMS-37	The agenda has been updated and the item has been included in the CGMS-37 WGIV part of the agenda.	CGMS-37	**CLOSED**
CGMS Task Force on Codes	WGII 36.22	Action 36.22: CGMS Task Force on Codes to investigate whether the WMO file naming convention can be made more flexible than merely having (long filename).bin for all data types. Deadline: CGMS-37	File name extensions have been agreed at the last CBS meeting in Dubrovnik 2009 to distinguish netCDF and HDF data.	CGMS-37	**CLOSED**
WMO	WGII 36.23	Action 36.23: WMO to revise the Terms of Reference of the Task Force on Satellite Data Codes as proposed by the Task Force. Deadline: 28 Feb 2009	To be discussed (and closed) at the TFSDC meeting on 14 September 2009. WMO-WP-09	28-Feb-09	**CLOSED**
WMO	WGIII 36.24	Action 36.24: WMO to convene a contingency planning workshop in the second half of 2009 in order to investigate critical missions and associated potential contingency actions regarding the new missions implied by the Vision for the GOS in 2025. Deadline: 30 June 2009		(30 Jun 2009) New deadline: 30 Jun 2010	**OPEN**
EUM	WGIV 36.25	Action 36.25: CGMS Secretariat to propose a revised Terms of Reference for Working Group IV to reflect the fact that it will now also include activities of the CGMS Task Force on satellite data codes. Deadline: 31 December 2008	WMO-WP. Discussed in WGIV and will be taken into account in the revised CGMS agenda. (Action closed and included in new action 37.19).	31-Dec-08	**CLOSED**

CGMS-36 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS Members	WGIV 36.26	Action 36.26: CGMS Members to nominate their participants to the CGMS Task Force on Satellite Data Codes. Deadline: 31 January 2009	CMA: sunal@cma.gov.cn EUM: Dr Simon Elliott, Meteorological Operations Division, Tel +49-6151-807385, simon.elliott@eumetsat.int JMA: Mr. Motoo Hayashi, System Engineering Division, MSC Tel: +81-42-493-4976, Fax: +81-42-492-2433 E-mail: mhayashi (at) met.kishou.go.jp NOAA: Thomas Smith (NOAA/NESDIS) thomas.smith@noaa.gov ROSHYDROMET: parkhom@planet.iitp.ru WMO: Jerome Lafeuille jlafeuille@wmo.int, Pierre Kerherve pkerherve@wmo.int, Atsushi Shimazaki ashimazaki@wmo.int WMO-WP-09	31-Jan-09	**CLOSED**
CGMS Task Force on Codes	WGIV 36.27	Action 36.27: CGMS Task Force on Satellite Data Codes to propose a permanent framework for the activity by CGMS-37. Deadline: CGMS-37	To be discussed at the TFSDC meeting on 14 September 2009. WMO-WP-09	(CGMS-37) New deadline: CGMS-38	**OPEN**
CMA	WGIV 36.28	Action 36.28: CMA to investigate possibilities for the provision of global FY-3 data to the GTS main trunk network and report back at CGMS-37. Deadline CGMS-37	Discussed in WGIV.	CGMS-37	**CLOSED**
NOAA	WGIV 36.29	Action 36.29: NOAA to provide CGMS with more information on the reception of GOES-R data sets. Deadline: CGMS-37	NOAA: Response: NOAA wishes to inform CGMS that additional information on the status of GOES-R data reception and consideration to use a multi-cast service to support the dissemination of GOES-R data and products is currently not available. Since the GOES-R Ground System contract was just recently awarded and only in its initial development phase, sufficient information on the design of the direct readout and broadcast service is still being formulated. As these the development of the Ground System continues, NOAA will keep CGMS apprised on the development of these activities.	CGMS-37	**CLOSED**
NOAA	WGIV 36.30	Action 36.30: NOAA to consider options for a multi-cast service in support of the dissemination of GOES-R data and products and inform CGMS accordingly. Deadline: CGMS-37	See reponse to action WGIV 36.29	CGMS-37	**CLOSED**

CGMS-36 recommendations					
Actionee	**Recommendation**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS satellite operators	Recommendation 36.01	Recommendation 36.01: CGMS Satellite Operators to keep the WMO Space Programme Office informed of updates of their programmes, satellite and instrument plans to allow the Space Programme Office to incorporate this factual information into Volume I, II and III of the Dossier on the Space-based Global Observing System, as appropriate.	ESA: WMO and CEOS have coordinated inputs about agency plans. Already provided by ESA. JMA-WP-03 NOAA-WP	CGMS-37	**CLOSED**
WMO	Recommendation 36.02	Recommendation 36.02: WMO to continue to keep the Dossier on the Space-based Global Observing System under review by the relevant groups of experts of WMO Members (e.g. the CBS/OPAG-IOS Expert Teams on Satellite Systems and on Satellite Utilization and Products).		CGMS-37	**CLOSED**
WMO	Recommendation 36.03	Recommendation 36.03: WMO to coordinate as appropriate with CEOS for further updates of the Dossier on the Space-based Global Observing System, with a view to avoid duplication in the call for input from space agencies, taking into account the updating process of the CEOS Earth Observation Handbook (www.eohandbook.com).		CGMS-37	**CLOSED**
CGMS satellite operators	Recommendation 36.04	Recommendation 36.04: CGMS satellite operators are invited to take the Vision of the GOS into account when developing their own planning and to report at the next meeting of CGMS on their initiatives to respond and contribute to its implementation.	ESA-WP-01/-02 JMA-WP-03 NOAA-WP	CGMS-37	**CLOSED**
GSICS Executive Panel	Recommendation 36.05	Recommendation 36.05: GSICS Executive Panel to develop a WIGOS pilot project proposal based on GSICS activities. Deadline: February 2009	NOAA-WP	28-Feb-09	**CLOSED**
WMO	Recommendation 36.06	Recommendation 36.06: WMO to maintain the International Polar Year (IPY) Space Task Group (STG) as a mechanism to promote cooperation between major satellite agencies ensuring coordination of their polar observations beyond IPY.	WMO-WP-22	CGMS-37	**CLOSED**
CGMS Members	Recommendation 36.07	Recommendation 36.07: CGMS Members to continue their coordination of international efforts in securing collection of space-borne “snapshots” of the Polar Regions during the IPY and to give further consideration to the establishment of a preliminary structure for sustaining observations in the future, with the goal to achieve a Polar Satellite Constellation as a significant part of the IPY legacy.	ESA: ESA contributes to the IPY-STG. JMA-WP-06 NOAA-WP	CGMS-37	**CLOSED**
CGMS web editorial committee	Recommendation 36.08	Recommendation 36.08: The CGMS web editorial committee to evaluate suggesting to CGMS Members the creation of a dedicated CGMS page on their institutional web sites, and to define broad guidelines for the preparation of such a page. Deadline: October 2009 and to report to CGMS-37		31-Oct-09	**CLOSED**
WMO and EUM	Recommendation 36.09	Recommendation 36.09: Nomination of CGMS representative to attend the 3rd THORPEX International Science Symposium on 9-13 Mar 09 in Monterey, USA. Deadline: 14 February 2009		14-Feb-09	**CLOSED**

CGMS-36 recommendations					
Actionee	**Recommendation**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS Members	WGII Recommendation 36.10	Recommendation 36.10: CGMS Members to pursue the provision of further satellite data of common interest via ADDE servers for training and scientific cooperation activities and to report back to CGMS-37.	JMA intends to introduce an ADDE server. NOAA-WP	CGMS-37	**CLOSED**
GSICS Executive Panel	WGII Recommendation 36.11	Recommendation 36.11: The GSICS Executive Panel to consider establishing in 2009 an end-to-end demonstration toward an operational GSICS by including beta-users in the GSICS process.	NOAA-WP	CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.12	Recommendation 36.12: All CGMS Members are encouraged to actively participate in GSICS by sending delegates to the Executive Panel meetings, and also to participate in the GSICS Research and Data Working Groups. This invitation addresses, in particular, the research space agencies that are planning long-term missions and data analyses for climate applications.	NOAA-WP Roshydromet fax response to CGMS Secretariat 17 Apr 2009; GSICS Data Management WG, Dr Victor Saulskiy, RC Planeta.	CGMS-37	**CLOSED**
GSICS GPRCs	WGII Recommendation 36.13	Recommendation 36.13: GSICS GPRCs should compare geostationary observations with both AIRS and IASI to demonstrate consistency and relative stability of AIRS and IASI.		CGMS-37	**CLOSED**
CGMS Agencies	WGII Recommendation 36.14	Recommendation 36.14: CGMS Agencies to support aircraft campaigns and other methods for using reference observations to provide independent assessment of the absolute accuracy of satellite observations. Comparisons should be periodic (at least annually) and each campaign needs to be tied to a SI traceable reference.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.15	Recommendation 36.15: In view of the most recent studies showing the great benefit of hyperspectral sounding to predict the onset of severe weather with much longer lead times and the potential for climate monitoring and improved satellite intercalibration, CGMS sees a firmly established need to fly hyperspectral sounders on next-generation geostationary satellites.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.16	Recommendation 36.16: CGMS Members to provide Working Papers addressing the seven top concerns of ITWG, as listed in the CGMS-36 WG II Report.		CGMS-37	**CLOSED**
CGMS WGII	WGII Recommendation 36.17	Recommendation 36.17: That Dr. Volker Gaertner (EUMETSAT) takes over from Dr. J. Purdom as IPWG rapporteur to CGMS.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.18	Recommendation 36.18: CGMS Members consider ways to provide additional financial support for attendance at CGMS Science Working Group Meetings, particularly for those participants coming from developing and least developed countries.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.19	Recommendation 36.19: CGMS Members provide and update the inventory of routinely produced precipitation estimates, either operational or experimental/research, and investigate common methods to describe their error characteristics.	NOAA-WP (EUMETSAT verbal feedback in WGII) Discussed in WGII	CGMS-37	**CLOSED**

CGMS-36 recommendations					
Actionee	**Recommendation**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS Members	WGII Recommendation 36.20	Recommendation 36.20: CGMS Members continue to provide data necessary for global, 4-km IR data-products in a timely manner to precipitation product producers.		CGMS-37	**CLOSED**
WMO, IPWG Co-Chairs	WGII Recommendation 36.21	Recommendation 36.21: The WMO Space Programme, the IPWG through its Co-chairs, and the WMO Hydrology Programme establish a small team to investigate the feasibility of "Mainstreaming the Operational use of Satellite Precipitation Data and Products" for Meteorological and Hydrological Services.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.22	Recommendation 36.22: All CGMS members are encouraged to continue or to commence participation in the CGMS AMV intercomparison using the specific MSG image data.	Discussed in WGII. NOAA-WP	CGMS-37	**CLOSED**
CGMS Agencies	WGII Recommendation 36.23	Recommendation 36.23: CGMS agencies to report on the height assignment of AMV cloud tracers using additional information on cloud characteristics.	EUM-WP- (same as for WGII 36.19) JMA-WP-05 NOAA-WP	CGMS-37	**CLOSED**
ITWG, IPWG	WGII Recommendation 36.24	Recommendation 36.24: CGMS encourages the ITWG and IPWG to consider case studies to intercompare algorithms similar to the activity underway in IWWG.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.25	Recommendation 36.25: CGMS Members should actively participate in THORPEX field programmes and become engaged in the planning and execution of those programmes.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.26	Recommendation 36.26: CGMS Members should support the YOTC concept and objectives and, in particular, encourage satellite agencies to facilitate access to relevant satellite data sets and help provide the verification data and products needed to make this project a success.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.27	Recommendation 36.27: CGMS Members to identify a point of contact to aid in the development of a comprehensive satellite component to the YOTC and for further detailed discussion of satellite requirements to support YOTC.		CGMS-37	**CLOSED**
CGMS Members	WGII Recommendation 36.28	Recommendation 36.28: CGMS Members to consider their participation in the Task Force on Satellite Data Codes to ensure broad and permanent representation of CGMS members.	WMO sent invitation for 14 Sept 2009 mtg to Anlai Sun (CMA); Simon Elliott (EUMETSAT); Akihiro Shimizu (JMA); Thomas Smith (NOAA); George Parkhomenko (Rusia) with copy to Milan Dragosavac (ECMWF); Takashi Ohshima (JMA email address); Atsushi Shimazaki (WMO); Barbara Ryan (WMO); Jerome Lafeuille (WMO); Pierre Kerherve (WMO) EUM: Simon.elliott@eumetsat.int	CGMS-37	**CLOSED**

B. REPORT ON THE STATUS OF CURRENT SATELLITE SYSTEMS

B.1 Polar-orbiting Meteorological Satellite Systems

CMA-WP-02 reported on the status of Chinese polar orbiting meteorological satellite programme. FY-1 is the first Chinese polar-orbiting meteorological satellite series that started with the launch of FY-1A on 7 September 1988. The FY-1 programme produced four satellites, namely, FY-1A/B/C/D. The FY-1 series is a 3-axis stabilised spacecraft programme, carrying the multi-channel Visible and Infrared Scanning Radiometer (VIRR) for earth environment monitoring with a sub-point resolution of 1.1 km; the Space Environment Monitor (SEM) for in-situ observation of charged particles in the solar wind. A Direct Readout Service is available through HRPT transmission. As of 4 October 2009, FY-1D is operational. The FY-3 is a new series to replace the FY-1 series. The first FY-3 satellite FY-3A was launched on 27 May 2008. The satellite is 3-axis stabilised and to keep the continuity of AVHRR observations, the FY-3A carries the multi-channel Visible and Infrared Scanning Radiometer that flies on FY-1. In addition, the FY-3A carries the Medium Resolution Spectral Imager (MERIS), the Microwave Radiation Imager (MWRI), the Infrared Atmospheric Sounder (IRAS), the Microwave Temperature Sounder (MWTS), Microwave Humidity Sounder (MWHS), the Total Ozone Unit and Solar Backscatter Ultraviolet Sounder (TOU/SBUS), as well as an Earth Radiation Budget instrument. FY-3 transmits data in three modes: L-band AHRPT, X-band MPT, and DPT. Direct Readout Service of AHRPT is globally provided. According to the schedule of the FY-3 programme, the FY-3B satellite will be launched in 2010. The satellite is designed for a lifetime of 3 years, and LST is 14:00 pm. The FY-3B satellite is being built in the Shanghai Institute of Spaceflight Technology.

The status of the EUMETSAT Polar System (EPS), as of August 2009, was provided in EUM-WP-03. The paper reported that the operational status of the EPS low Earth orbit polar system is stable and the Metop-A satellite continued to perform well over the reporting period, with only some unplanned outages occurring on IASI, GOME, A-DCS. In-Plane Manoeuvres, GOME instrument throughput performance testing, GOME instrument software upload and other routine instrument maintenance led to some further, planned minor losses of operational data. In particular, it can be noted that the Metop-A platform has continued to behave nominally without any major anomaly (e.g. Payload switch off). The redundant A-HRPT has continued to be operated according to switching zones defined according to the trade-off between user needs and radiation risk. On 25 May 2009, the operation zones were extended to further low risk geographical areas outside of Europe, but of significant importance to the user community. The new switching zone was presented in 2.2 of the Working Paper. The dissemination of Metop-A products has continued nominally during the reporting period (except for the above mentioned outages). The operational level 1 product services: ATOVS, AVHRR, IASI, GOME, GRAS, ASCAT, and level 2 product services: ASCAT soil moisture, ATOVS and IASI retrievals, have continued nominally.

NOAA-WP-02 updated CGMS on the status of the Polar-orbiting Operational Environmental Satellite (POES) programme. The POES spacecraft constellation includes one primary, three backup, and one secondary spacecraft. These spacecraft are in circular orbits inclined at approximately 98 degrees (retrograde). As of May 21, 2007, NOAA declared EUMETSAT's METOP-A as NOAA's mid-morning primary operational spacecraft. NOAA's primary afternoon operational spacecraft, NOAA-19, was launched on February 6, 2009 and declared operational on June 2, 2009. Three backup spacecraft, NOAA-18, NOAA-17 and NOAA-15 provide additional payload operational data. NOAA-16 is a secondary afternoon spacecraft supporting additional user data requirements. NOAA-14 and NOAA-12 were decommissioned on May 23, 2007 and August 10, 2007, respectively. NOAA-19 is the last of the Advanced TIROS-N series of spacecraft built for NOAA by NASA. For over forty years, NASA has translated NOAA requirements into technical specifications, contracted for the build of instruments and spacecraft, and provided launch services. NOAA has successfully operated these spacecraft for weather forecasting and warning and has now led to the capability to monitor changes in the climate.

Responding to a query from WMO, NOAA added that the 18th DMSP satellite was launched the week before CGMS-37 and was being operated in an early morning orbit. DMSP Flight models 19 and 20 remained to be launched, as needed. Depending upon the NPOESS launch schedule one of these will be in the 07:30 orbit, the other in the 05:30 orbit.

Table 1: Current Polar-Orbiting Satellites Coordinated within CGMS
(as of 30 October 2009; sorted by Equatorial Crossing Time and organisation)

Orbit type (equatorial crossing times)	**Satellites in orbit** (+operation mode) P=Pre-operational Op=operational B=back-up L=limited availability R= R&D	**Operator**	**Equatorial Crossing Time and orbital altitude** A=Ascend (northward) D=Descend (southward)	**Launch date**	**Status**
Sun-synchronous local "early morning" orbit (05:00 –07:00) (17:00 – 19:00)	FY-1D (Op)	CMA	06:50 (D) 866 km	15 May 2002	Functional. CHRPT. MVISR, SEM. Expected end of service ≥2009. Last s/c of FY-1 series.
	NOAA-15 (B)	NOAA	04:46 (D) 807 km	13 May 1998	Functional (intermittent problems with AVHRR, AMSU-B & HIRS). AMSU-A1 channels 11 & 14 inoperative.
	DMSP-F13 (B)	NOAA	18:33 (A) 850 km	24 Mar 1995	Defence satellite. Data available to civilian users through NOAA. Only 1 recorder on-board with limited functionality.

Orbit type (equatorial crossing times)	**Satellites in orbit** (+operation mode) P=Pre-operational Op=operational B=back-up L=limited availability R= R&D	**Operator**	**Equatorial Crossing Time and orbital altitude** A=Ascend (northward) D=Descend (southward)	**Launch date**	**Status**
	DMSP-F14 (B)	NOAA	17:24 (A) 852 km	4 Apr 1997	Defence satellite. SSMI1 (microwave temperature sounder) non-functional. SSMT2 non-functional. No functional on-board recorder.. Data available to civilian users through NOAA
	DMSP-F17 (Op)	NOAA	17:31 (A) 850 km	4 Nov 2007	Defence satellite. SSMIS. Data available to civilian users through NOAA.
Sun-synchronous local "morning" orbit (07:00 – 12:00) (19:00 – 24:00)	DMSP-F18	NOAA	08:00 (D) 833 km	Launched 2009	(SSMI/S)
	FY-3A	CMA	10:00 (D) 836 km	27 May 2008	AHRPT/MPT transmission, 11 instruments; SBUS failed, IRAS with intermittent problem.
	Metop-A (Op)	EUMETSAT	21:30 (A) 817 km	19 Oct 2006	Operational. HRPT and LRPT not functional. EUMETCast ADM
	NOAA-17 (B)	NOAA	9:22 (D) 810 km	24 June 2002	Functional. AMSU-A1 failed. DTR5 Failed February 2003. STX3 output power degraded to inoperable level. STX1 diminished performance.
	DMSP-F15 (B)	NOAA	19:37 (A) 850 km	12 Dec 1999	Defence satellite. SSMT2 (microwave water vapour sounder) non-functional. Data available to civilian users through NOAA.
	DMSP-F16 (Op)	NOAA	20:04 (A) 850 km	18 Oct 2003	Defence satellite. SSMIS. Data available to civilian users through NOAA.
	DMSP-F18 (Op)	NOAA	08:00 (D) 833 km	18 Oct 2009	(SSMI/S)
	METEOR-M N1	ROS-HYDROMET	09:30 (D) 835 km	17 Sep 2009	HRPT, LRPT. Commissioning ongoing.
Sun-synchronous local "afternoon" orbit (12:00 – 17:00) (00:00 – 05:00)	NOAA-16 (B)	NOAA	17:57 (A) 849 km	21 Sep 2000	Functional, no APT, no LAC. Intermittent problems with AVHRR.
	NOAA-18 (B)	NOAA	13:45 (A) 854 km	20 May 2005	Functional. Noise on HIRS long wave channels. 7 June 2009 MIMU-2 failure (loss of redundancy)
	NOAA-19 (Op)	NOAA	13:51 (A) 870 km	6 Feb 2009	Primary pm spacecraft as per 2 June 2009, part of IJPS. Functional. Noise on MHS Channel H3.

Orbit type (equatorial crossing times)	**Satellites in orbit** (+operation mode) P=Pre-operational Op=operational B=back-up L=limited availability R= R&D	**Operator**	**Equatorial Crossing Time and orbital altitude** A=Ascend (northward) D=Descend (southward)	**Launch date**	**Status**
	DMSP-F12 (L)	NOAA	15:35 (A) 850 km	8/1994	Defence Satellite. SSMI (microwave imager) and SSMT1 non-functional. Non-operational (no onboard recorders). Decommissioned October 2008.
Non-sun synchronous orbit	OSTM/Jason-2 (Ocean Surface Topography Mission)	CNES EUMETSAT NASA NOAA	(66° inclin.) 1336 km	20/06/ 2008	Follow-on of Jason-1. Sea surface topography measurement. Global ocean circulation for climate prediction.

B.2 Geostationary Meteorological Satellite Systems

CMA-WP-03 reported on the status of the current FY-2 geostationary programme. The programme has produced 4 satellites FY-2A/B/C/D that provide GEO imagery observation. Currently FY-2C/D are operationally active. FY-2D was launched on November 15, 2006. It was positioned at 86.5°E. FY-2C was launched on 19 October 2004 and was positioned at 105°E. FY-2E, launched on 23 December 2008, is located at 123.5°E. FY-2C and FY-2D observe alternatively thereby transmitting S-VISSR image every 15 minutes during the rainy season from June-September, and every 30 minutes from October-May. As FY-2C is older than its designed life time and the remaining propellant onboard is insufficient to maintain FY-2C stationed any longer, the positions of FY-2E and FY-2C will be swapped. Accordingly, it will take one month to move FY-2E to 105°E and take over the role of FY-2C. Thereafter FY-2C will be drifted to 123.5°E. This process began on 22 October 2009. The FY-2 Programme will continue with FY-2F/G/H.

In EUM-WP-05 EUMETSAT summarised the status of Meteosat Operations, and the performance of related services. The status of several operations projects since CGMS-36 was also presented. It was recalled that detailed performance statistics for the services can be found in the regular EUMETSAT Operations Reports to CGMS. The operational status of the geostationary systems is stable with Met-6 at 67.5º East (Indian Ocean Data Collection DCP), Met-7 at 57.5º East (Indian Ocean Data Collection imaging), Met-8 at 9.5º East (Rapid Scan Service) and Met-9 at 0º (prime Meteosat service). The EUMETSAT Council has approved the operation of Meteosat-7 over the Indian Ocean until the end of 2013.

No significant in-flight anomalies have occurred on board the geostationary satellites during the reporting period with the exception of a Met-9 Safe Mode

on 17 April 2009 which was due to a Single Event Upset (SEU). The anomaly caused a 0º Meteosat service interruption of about 3 hours before the prime mission could be transferred to the backup satellite (Met-8). As a side effect a suspension of Met-8 RSS for about 7 days was necessary. The most significant geostationary satellite operations have been the ones related to the spring 2009 eclipse season and a Met-9 north-south orbit inclination manoeuvre (in May 09).

JMA-WP-02 reported on the status of JMA's Multi-functional Transport Satellite-1R (MTSAT-1R) which has been operating in geostationary orbit at 140°E since 28 June 2005. No significant spacecraft anomalies have occurred on MTSAT-1R during the reporting period. The IDCS of MTSAT-1R has been functioning properly since the satellite began operation. MTSAT-2 has been on standby in geostationary orbit since 4 September 2006. Currently, JMA obtains images from MTSAT-2 several times a year to examine and review its observation capability.

The Agency plans to switch the operational use of MTSAT-1R's imaging function over to that of MTSAT-2 on 1 July 2010. After the switchover, MTSAT-1R will continue the dissemination services of HRIT/LRIT image data from space to MDUS/SDUS stations, and full-disk visible images will, additionally, be disseminated via LRIT. The positions of the two satellites will not change.

NOAA-WP-03 reported on the status of its geo-synchronous meteorological satellites. NOAA nominally operates two meteorological satellites in geostationary orbit over the equator. Each satellite views almost a third of the Earth's surface: One monitors North and South America and most of the Atlantic Ocean, the other North America and the Pacific Ocean basin. GOES-12 (or GOES-East) is positioned at 75°W longitude and the equator, while GOES-11 (or GOES-West) is positioned at 135°W longitude and the equator. GOES-10 is located at 60°W and will support coverage of South America through December 2009.

NOAA informed CGMS that GOES-10 will have to be removed from its orbit in December 2009 as all station keeping fuel would be consumed by that time. NOAA added that plans to continue the coverage provided by GOES-10 with GOES-12 are currently under consideration, and a formal announcement is expected before the end of 2009.

The GOES-13 satellite was successfully launched on 24 May 2006 and is currently in in-orbit storage mode as the primary backup for the operational GOES satellites. GOES-14 was successfully launched at 6:51PM EDT on 27 June 2009 and reached its geosynchronous orbit at 89.5°W on 8 July 2009. GOES-14 Post Launch Test (PLT) will continue until the middle of December 2009.

NOAA informed CGMS that the GVAR format on GOES-14 will be different from previous GOES services. Considering the format of the GVAR transmission, factory coefficients are normally placed and sent in block 0.

Beginning with GOES-O, the imagers will have an additional infrared detector. There will be eight, instead of seven, IR detectors. In block 0, the amount of space for the drift correction coefficients (currently words 5587-6304) will need to be increased by approximately 15% to accommodate the data for the eighth detector. To make room in block 0, the factory coefficients (currently words 6305-8040) will be removed and will be sent instead in a new type of block 11. The reason NOAA retains the drift correction data but not the factory data in block 0 is that the drift correction data are updated with each scan line, whereas the factory coefficients remain the same for a given satellite for all times. Also, block 0's are sent with each scan line, whereas blocks 11's are sent less often. GVAR users will need to adjust their software to read the factory coefficients from block 11 rather than block 0. Additional information about the GOES-14 GVAR change can be found at http://www.osd.noaa.gov/gvar/.

Table 2: Current Geostationary Satellites Coordinated within CGMS
(as of 30 October 2009, sorted by longitude and organisation)

Sector	Satellites currently in orbit (+type) P: Pre-operational Op: Operational B: Back-up L: Limited Availability	Operator	Location	Launch date	Status
West–Pacific (108°E-180°E)	MTSAT-1R (Op)	JMA	140°E	26 Feb 2005	Fully Functional
	MTSAT-2 (B)	JMA	145°E	18 Feb 2006	Multifunctional Transport Satellite (in-orbit back-up to MTSAT-1R until 2010 thereafter operational)
	FY-2E	CMA	123°E	23 Dec 2008	5 channel VISSR, to be moved to 105°E at the end of 2009.
East-Pacific (180°W-108°W)	GOES-11 (Op)	NOAA	135°W	3 May 2000	Operational GOES-West spacecraft since 28 Jun 2006. X-Ray Positioner failed February 2008.
	GOES-14 (P)	NOAA	89.5° W	27 Jun 2009	In post-launch testing.
West-Atlantic (108°W-36°W)	GOES-10 (B)	NOAA	60° W	25 Apr 1997	Supports South America. Inverted, solar array anomaly, DCP interrogator on back-up. Decommissioning planned for December 2009.
	GOES-12 (Op)	NOAA	75°W	23 Jul 2001	SXI Imaging suspended indefinitely April 2007. X-Ray Positioner failed April 2007.
	GOES-13 (B)	NOAA	105°W	24 May 2006	In storage mode. XRS/EUV instrument had a capacitor failure rendering unit inoperable.

Sector	Satellites currently in orbit (+type) P: Pre-operational Op: Operational B: Back-up L: Limited Availability	Operator	Location	Launch date	Status
East-Atlantic (36°W-36°E)	Meteosat-8 (B)	EUMETSAT	9.5°E	28 Aug 2002	No LRIT. Back-up to Meteosat-9. Rapid scanning service. EUMETCast ADM.
	Meteosat-9 (Op)	EUMETSAT	0°W	21 Dec 2005	Primary s/c. Fully operational. EUMETCast ADM.
Indian Ocean (36°E-108°E)	FY-2C (Op)	CMA	105°E	19 Oct 2004	S-VISSR (improved), DCS, SEM. Expected end of service at the end of 2009 and be moved to 123.5°E.
	FY-2D (Op)	CMA	86.5°E	15 Nov 2006	S-VISSR (improved), DCS, SEM.
	Meteosat-6 (B)	EUMETSAT	67.5°E	20 Nov 1993	Functional. Back-up to Meteosat-7. DCP mission support. EUMETCast ADM. Likely to be de-orbited in 2010.
	Meteosat-7 (Op)	EUMETSAT	57.5°E	2 Sep 1997	Functional. IODC coverage committed till end 2013. EUMETCast ADM.
	GOMS-N1 (L)	Roshydromet	76°E	31 Oct 1994	Since 09/1998 in stand-by
	INSAT 3-C (L)	IMD	74°E	24 Jan 2002	No meteorological payload. Used for dissemination of processed meteorological data in broadcast mode in S-Band only over India and neighbouring countries. No WEFAX broadcast capability in L-band.
	Kalpana-1 (Op) (formerly METSAT)	IMD	74°E	12 Sep 2002	Dedicated meteorological satellite. - Monitoring cyclones & monsoon - CMV Winds - OLR - Rainfall Estimation Working satisfactorily.
	INSAT-3A (Op)	IMD	93.5°E	10 Apr 2003	- Monitoring cyclones & monsoon - CMV Winds - OLR - Rainfall Estimation - Mesoscale features - Flood/intense precipitation advisory - Snow detection Operational since 24 Apr 2003. A 3-channel VHRR imager and CCD payload available for use similar to INSAT-2-E.

B.3 Research and Development Satellite Systems

ESA-WP-01 provided CGMS with information on the status of the current European Space Agency Earth Observation missions. Two of them, MSG and Metop are carried out in cooperation with EUMETSAT. The success of the Envisat mission, launched in 2002, is well established, with a constant increase of user demand for data and services. Currently, over 2200 scientific projects are served with Envisat data. Today, the Envisat mission has exceeded the original foreseen 5 years lifetime and a 3 years extension from 2011 to 2013 has been approved. ERS-2, the second ESA EO mission, launched in 1995, continues to satisfy the steadily increasing demand for data despite the failure of the gyroscopes and the low rate recorders for which workaround solutions have been successfully implemented. PROBA, an experimental ESA satellite, has provided remarkable hyperspectral data since 2001. The archive contains more than 13,000 products. Finally, the Gravity field and steady-state Ocean Circulation Explorer, GOCE, was successfully launched on 17 March 2009. The commissioning phase and instrument calibration were completed by early September 2009.

ISRO made a presentation of its current and future plans for meteorological and R&D satellite systems. The data policy for satellite data was explained. Limited sets of INSAT data were available to the scientific community upon request from ISRO/SAC, Ahmedabad, otherwise the supply of real time operational data was generally according to bilateral agreements or through the IMD. Data from other satellites was normally provided via special agreements. On the other hand, data from the Megha Tropiques satellite is expected to be freely available from ISRO/SAC, Ahmedabad and ICARE/France after the validation phase. Similarly, L2 products from Oceansat-2 ISCAT will be openly available from ISRO/NRSC, Hyderabad after the validation phase.

WMO commented that imagery and products, e.g. from Kalpana, from the web site normally took the form of GIF images and being of low resolution, were not suitable for further processing. ISRO commented that high resolution data had to be specifically requested, on a case by case basis, for research applications.

The Chairperson stressed the importance of continued dialogue with ISRO on data access through the various existing bilateral agreements with some CGMS members. He hoped that through this process, wider access to e.g. Oceansat, SARAL and Megha Tropiques data would be secured in due course.

JAXA-WP-01, informed CGMS about the current status of JAXA's Advanced Land Observing Satellite (ALOS) – "Daichi" and Greenhouse gases Observing SATellite (GOSAT) – "Ibuki" being the updated name. Daichi has completed its three-year regular operations phase, and entered the post operations phase, whilst Ibuki has completed its initial functional check phase. Access to data is normally via the JAXA web site.

Table 3: Current R & D satellites discussed within CGMS

(as of 30 October 2009, sorted by organisation)

Satellites in rbit (+operation mode)	**Operator**	**Orbital altitude and Equator Crossing Time** A=Northw D=Southw +Altitude	**Launch date**	**Application/ instruments**	**Status, Application and other information**
PARASOL	CNES	705 km sun-synchr.	18 Dec 2004	POLDER	Characterisation of clouds and aerosols micro-physical and radiative properties. Data can be accessed at <http://www.icare.univ-lille1.fr/>
SPOT-5	CNES	832 km sun-synchr.	3 May 2002	DORIS, HRG, HRS, VEGETATION	Cartography, land surface, agriculture and forestry, civil planning and mapping, digital terrain models, environmental monitoring
CBERS-02	CNSA/ AEB	10:30 (D) 778 km	21 Oct 2003	Multi-spectral Camera, Infrared Scanner Camera, Wide Field Imager Camera	Land resource observation
CBERS-02B	CNSA/ AEB	10:30 (D) 778 km	19 Sep 2007	Multi-spectral Camera, Infrared Scanner Camera, Wide Field Imager Camera	Land resource observation
HJ-1A	CNSA	650 km 10:30 A	06 Sep 2008	Land, resource and environment monitoring	
HJ-1B	CNSA	650 km 10:30 A	06 Sep 2008	Land, resource and environment monitoring	
HY-1B	CNSA	10:30 +/-30 min (D) 798 km	11 Apr 2007	Ocean colour and temperature scanner and 4 bands CCD imager. (CZI)	In operation.
ERS-1	ESA	10:30 (D) 785 km	17 Jul 1991	Altimeter, SAR, SAR-wave, ATSR, Scatterometer	Replaced by ERS-2 in March 2000 after an overlapping period
ERS-2	ESA	10:30 (D) 785 km	21 Apr 1995	Altimeter, SAR, SAR-wave, ATSR, Scatterometer, GOME	▪ No on-board recorder since 2003, the data acquisition is ensured over a network of acquisition stations. ▪ ATSR-2 instrument anomaly since Feb 2008.

Satellites in rbit (+operation mode)	**Operator**	**Orbital altitude and Equator Crossing Time** A=Northw D=Southw +Altitude	**Launch date**	**Application/ instruments**	**Status, Application and other information**
ENVISAT	ESA	10:00 (D) 800 km	1 Mar 2002	10 instruments for Environment: ASAR, AATSR, MERIS, GOMOS, MIPAS, SCHIAMACHY, RA-2, MWR, DORIS	▪ MIPAS is operated at 80% of its duty cycle. ▪ GOMOS performs with reduced azimuth range, since Aug 2005. GOMOS instrument anomalies since early 2009. ▪ Altimeter: Loss of secondary frequency (S-band) in Jan.08, compensated with on-ground ionospheric corrections. Operations funding extended 3 years.
GOCE	ESA	(6:00 A) 250 km	17 Mar 2009	Gravity-Field and steady-state Ocean Circulation Explorer,	Commissioning achieved.
SMOS	ESA	755 km (6:00 A)	2 Nov 2009	Ocean salinity and soil moisture	
PROBA	ESA	10: 30 (D) 615 km	22 Oct 2001	CHRIS	Drifting orbit. Technology experiment. AO Science mission since 2001.
OCEANSAT-1	ISRO	12:00 (A)/ 24:00 (D) 98.28° 720 Km sun-synchronous	26 May 1999		Multifrequency Scanning Microwave Radiometer (MSMR) for SST, Sea surface wind speed, total water vapour, cloud liquid water, sea ice extend, rainfall, soil moisture etc.
OCEANSAT-2	ISRO	Sun synch.	23 Sept 2009	Scatterometer, Radio Occultation Sounder, Ocean Colour Monitoring	
DAICHI (ALOS)	JAXA	10:30 691.65 km sun-synchronous	24 Jan 2006	PRISM, AVNIR-2, PALSAR	Mapping, precise land coverage observation, disaster monitoring, resource surveying.
IBUKI (GOSAT)	JAXA & Japan's Ministry of Environ-ment	13:00 666km sun-synchronous	23 Jan 2009	TANSO-FTS and TANSO-CAI	Greenhouse gas and carbon dioxide monitoring.
TRMM	JAXA/ NASA	402 km non-sun-synchr.	27 Nov 1997	Precipitation Radar equipment provided by JAXA and TRMM Microwave Imager (TMI), satellite bus and other instruments provided by NASA	Measures tropical rainfall/precipitation and radiation energy

Satellites in rbit (+operation mode)	**Operator**	**Orbital altitude and Equator Crossing Time** A=Northw D=Southw +Altitude	**Launch date**	**Application/ instruments**	**Status, Application and other information**
ACRIMSAT	NASA	716 km sun-synchr.	20 Dec 1999	ACRIM III	Active Cavity Radiometer Irradiance Monitor Satellite Measures total solar irradiance, studies incoming solar radiation and adds measurements of ocean and atmosphere currents and temperatures as well as surface temperatures.
Aura	NASA/BNSC	705 km sun-synchr.	15 Jul 2004	Comprehensive measurements of atmospheric chemistry and trace gasses	
Terra	NASA	705 km sun-synchr.	18 Dec 1999	CERES, MISR, MODIS, MOPITT, ASTER	Measurement of the Earth's climate system, atmosphere, land, oceans and interactions with solar radiation
Jason-1	NASA/ CNES	1336 km non-sun-synchr.	07 Dec 2001	Laser retroreflector array Poseidon-2 solid state radar altimeter DORIS receiver Jason Microwave Radiometer BlackJack GPS Receiver tracking system	Ocean surface topography Follow-on mission to TOPEX/P. Monitor global ocean circulation for global climate prediction.
Aqua	NASA	705 km sun-synchr.	04 May 2002	AMSR-E, AIRS, AMSU-A, CERES, HSB, MODIS	Collects data on Earth's water cycle, precise atmospheric and oceanic measurements, and interaction with solar radiation AMSR-E provided by JAXA. HSB provided by INPE (no longer functional)
Landsat 7	NASA	705 km sun-synchr.	15 Apr 1999	Enhanced Thematic Mapper Plus Instrument (ETM+)	Well-calibrated, multispectral, moderate resolution, substantially cloud-free, sunlit digital images of the Earth's continental and coastal areas
NMP EO-1 (New Millennium Program Earth Observing-1)	NASA	10:01 (D) 705 km sun-synchr.	21 Nov 2000	Advanced Land Imager Hyperion LAC (atmospheric corrector)	Demonstrates and validates advanced technology instruments (multi and hyperspectral), spacecraft systems, and in flight mission concepts
ICESat (Ice, Cloud, and Land Elevation Satellite)	NASA	600 km circular non-sun-synchr.	12 Jan 2003	Geo-science Laser Altimeter System GPS BlackJack receiver	Measures ice sheet topography, ice sheet elevation changes, cloud and aerosol heights and land topography and vegetation characteristics.

Satellites in rbit (+operation mode)	**Operator**	**Orbital altitude and Equator Crossing Time** A=Northw D=Southw +Altitude	**Launch date**	**Application/ instruments**	**Status, Application and other information**
QuikSCAT (Quick Scatterometer)	NASA	803 km sun-synchr.	19 Jun 1999	SeaWinds	Sea surface wind speed and direction data for global climate research operational weather forecasting and storm warning
SORCE (Solar Radiation and Climate Experiment)	NASA	(40˚ incl) 640 km non-sun-synchr.	25 Jan 2003	- XPS (Extreme Ultraviolet (XUV) Photometer System) - TIM (Total Irradiance Monitor) - SIM (Spectral Irradiance Monitor A&B) - SOLSTICE (Solar Stellar Irradiance Comparison Experiment A&B)	Will provide total irradiance measurements and full spectral irradiance measurements. Continuation of ACRIMSAT total solar irradiance measurements.
GRACE (Gravity Recovery and Climate Experiment)	NASA/ DRL	(89˚ incl) 485 km non-sun-synchr.	17 Mar 2002	- Star Camera Assembly - GPS BlackJack Receiver - Instruments Processing Unit - Laser Retro-Reflector Assembly - K-Band Ranging Instruments - SuperSTAR Accelerometers	Accurate global and high-resolution determination of static and time-variable components of Earth's gravity field Measurement of: - Gravitational field - GPS atmospheric and ionospheric limb sounding
CALIPSO	NASA/ CNES	705 km sun-synchronous	28 Apr 2006	Lidar CALIOP Infrared radiometer IIR Visible camera WFC	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations for climate predictions. Data can be accessed at <http://eosweb.larc.nasa.gov/PRODOCS/calipso/table_calipso.html> and <http://www.icare.univ-lille1.fr/>
CloudSAT	NASA/ CSA	705 km sun-synchronous	28 Apr 2006		Global cloud properties (applications: air quality, aviation safety, disaster management, energy and water management)
Monitor-E	ROSCOSMOS	(550 km) (10:30)	26 Aug 2005	Land Observing Satellite	Experimental exploitation

Satellites in rbit (+operation mode)	**Operator**	**Orbital altitude and Equator Crossing Time** A=Northw D=Southw +Altitude	**Launch date**	**Application/ instruments**	**Status, Application and other information**
RESURS-DK1	ROSCOSMOS	Elliptical orbit, H_p=360km, H_a=604km, incl.=70.4°	15 Jun 2006	- Panchromatic scanner - Multi-spectral scanner - PAMELA (Italy) for primary cosmic radiation investigation - ARINA for earthquake prediction investigation	Exploitation

B.4 Other LEO satellites

No working papers were submitted.

B.5 Spacecraft anomalies from solar and other events

EUM-WP-06 provided an updated report on all anomalies attributed to solar events that have been detected on the EUMETSAT in-orbit satellites (i.e. Metosat-6, -7, -8 and -9 and Metop-A) from 8 November 2008 to 9 September 2009. These events include two Met-9 transitions to Safe Mode (respectively on 17 April 2009 and 15 August 2009), and several outages of the Metop A instruments. The anomalies affecting the performance of EUMETSAT spacecraft due to solar events before November 2008 were reported in CGMS-35 EUM-WP-05 and CGMS-36 EUM-WP-05.

EUMETSAT added that it was continuing to develop and test improved software to mitigate the impact of such anomalies on the supply of operational data from its satellites.

NOAA-WP-04 provided an example of a new space weather product under development, reported on the progression and prediction of the solar cycle, and provided a summary of significant space weather events. The new product will serve customers such as power utilities and those who depend on conditions in the ionosphere that affect communications and navigation. Predictions are given for the year and the magnitude of Solar Cycle 24 maximum (the next maximum is expected in 2013). The revised consensus prediction is that the new cycle will be smaller than recent cycles and reach a maximum in May 2013. This prediction, of great importance for planning activities affected by solar activity, will be updated as needed. Information was also provided that showed the lack of major space weather activity from August 2008 through July 2009. It is typical for energetic electron fluxes to

increase during the declining phase of the solar cycle as recurrent coronal holes produce regular intervals of high-speed solar wind that interact with the geomagnetic field. Electron fluxes reached high levels on 34% of days during the first half of the period, but only 8% of days during the second half of the period.

NOAA-WP-39 reported on solar wind data and coronal mass ejection (CME) imagery. This imagery is critical for warnings and alerts of potential and impending geomagnetic storms, which are the most damaging form of space weather. NOAA currently receives all this data from NASA and ESA research missions which are, in some cases, well beyond their 2-year design lives. NOAA has studied how to follow these research missions with a continuing operational capability. At the direction of the White House Office of Science & Technology Policy (OSTP), NOAA and other federal agencies are developing a plan to address the long-term need for solar wind & CME data. Prior NOAA studies identified government smallsats, commercial data buys, and refurbishment of the NASA Deep Space Climate Observatory (DSCOVR) as options for meeting solar wind requirements. NOAA also studied new, smaller coronagraph designs for CME imaging. This work was brought to the interagency study for OSTP, which has now been completed.

C. REPORT ON FUTURE SATELLITE SYSTEMS

C.1 Future Polar-orbiting Meteorological Satellite Systems

EUM-WP-08 provided updates on the work performed so far and the plans for the EUMETSAT Post-EPS Programme, which will be the follow on to the EUMETSAT Polar System (EPS) operational programme with an anticipated start of operations in 2018/2019. Post-EPS development is currently at the end of Phase 0, which defines preliminary mission requirements and will follow similar definition and development logic to that used for the Meteosat Third Generation satellites.

Post-EPS development will start the feasibility assessment, called phase A, at mission, system and space and ground segment levels in early 2010. Post-EPS Phase B will be handled by EUMETSAT through a Preparatory Programme subject to EUMETSAT Council approval and expecting to start in late 2011. The Post-EPS Programme approval is targeted for the second half of 2013 allowing the start of Phase C/D activities immediately thereafter.

The Post-EPS Programme is part of the Joint Polar System, whose definition with NOAA is progressing in parallel.

EUM-WP-11 informed CGMS about EUMETSAT's participation in the European Commission (EC)–ESA initiative for the Global Monitoring for Environment and Security (GMES). GMES covers several areas of applications, among which EUMETSAT has targeted to play a key role as satellite data provider for the oceanography and atmosphere user

communities. In GMES, in addition to its contribution through its mandatory and optional programmes (MSG, MTG, EPS, Jason-2), EUMETSAT will be the operational agency for the GMES Sentinel-3 satellite (oceanography mission) and for the GMES Sentinel-4 and -5 instruments (for atmospheric chemistry) which will be flown on the MTG-S and post-EPS satellites, respectively. Finally, EUMETSAT will support the European Commission in planning for future oceanography and atmospheric chemistry monitoring missions, starting with the establishment of a structured user requirements definition processes for these areas. The EC has informed its Delegations that EUMETSAT will be responsible for the operations of these satellites and the distribution of their data.

NOAA-WP-05 reported on NOAA's future polar-orbiting meteorological satellite systems. NOAA addressed the current operational system and the launch of NOAA-N Prime (NOAA-19). Information was also provided on the international polar-orbiting satellite programme coordination between EUMETSAT and NOAA. The goal of this cooperation is to provide continuity of measurements from polar orbits, cost sharing, and improved forecast and monitoring capabilities through the introduction of new technologies. An agreement is in place between NOAA and EUMETSAT on the Initial Joint Polar-orbiting Operational Satellite System (IJPS). This programme will include two series of independent but fully coordinated NOAA and EUMETSAT satellites, exchange of instruments and global data, cooperation in algorithm development, and plans for real-time direct broadcast.

NOAA also informed CGMS that the NPOESS Preparatory Project (NPP) is scheduled for launch in January 2011. NPP will carry four of the critical NPOESS sensors (VIIRS, CrIS, OMPS, and the NASA-developed ATMS) as well as CERES. The NPP mission will provide operational agencies early access to the next generation of operational sensors, thereby greatly reducing the risks incurred during the transition from POES and DMSP to NPOESS. Early system-level integration and testing will provide "lessons learned" and allow for any required modifications in time to support readiness for the first NPOESS launch. In addition to serving as a valuable risk reduction and prototyping mission for the IPO and users of NPOESS data, NPP will provide continuity of the calibrated, validated, and geo-located NASA EOS Terra and Aqua systematic global imaging and sounding observations for NASA Earth Science research. With a five-year design lifetime, NPP will provide a "bridge" from NASA's EOS research missions (Terra, Aqua, and Aura) to the operational NPOESS mission. NPP will extend the series of key measurements in support of long-term monitoring of climate change and of global biological productivity. NPP will also provide continuity of POES data should NOAA-19 fail before the first NPOESS satellite (C1) is launched.

NOAA then discussed the development and implementation plans for NPOESS. Beginning later this decade, NPOESS spacecraft will be launched into two orbital planes to provide significantly improved operational capabilities and benefits to satisfy the critical civil and national security requirements for space-based, remotely sensed environmental data. The

advanced technology visible, infrared, and microwave imagers and sounders that are being developed for NPOESS will deliver higher spatial and resolution atmospheric, oceanic, terrestrial, and solar-geophysical data enabling more accurate short-term weather forecasts and significantly improved long range numerical weather forecasts as well as serving the data continuity requirements for improved global climate change assessment and prediction. The NPOESS programme is designed to deliver a high performance, polar-orbiting satellite system that will be more responsive to user requirements and provide sustained, space-based measurements as a cornerstone of an Integrated Global Observing System. The first NPOESS launch is currently foreseen in mid 2014, the second in mid 2016.

ROSH/ROSC-WP-01, informed CGMS that Russia plans to launch two hydro-meteorological satellites and one oceanographic satellite within the Meteor-3M Programme by 2015. The first Meteor-M #1 satellite was launched on 17 September 2009. The second Meteor-M #2 will be similar to Meteor-M #1 and is scheduled for launch in 2010, and the third oceanographic satellite, Meteor-M #3, will be launched in 2012. The Working Paper also reported on the principal characteristics and status of the Meteor-3M Programme and described the ground station reception and processing capabilities.

ROSHYDROMET confirmed that there would be LRPT and HRPT downlinks from the satellites allowing easy local access to data. General user access to the X-band radar data downlink was currently not foreseen. Whilst global data dumps were foreseen, these would not be operationally available to the general user community. However, this type of data dump might be accessible in near-real time through bilateral agreements. In addition, there would be a central archive from which users could order data.

As the commissioning of Meteor M #1 would take around 4 months the system was expected to become operational early in 2010.

WMO informed ROSHYDROMET that it would be very happy to inform its members about the availability of Meteor-3M LRPT and HRPT data in due course.

Responding to a query from the Chairperson concerning the availability of calibration data, ROSHYDROMET commented that this was foreseen and would be made available in due course. ROSHYDROMET intended to carry out intercalibration campaigns with EUMETSAT and NOAA satellite data.

Action 37.01: ROSHYDROMET to inform CGMS about the availability of Meteor-M calibration data. Deadline: CGMS-38

Table 4: Future Polar-Orbiting Satellites Coordinated within CGMS

(as of 30 October 2009, sorted by Equatorial Crossing Time and organisation)

Orbit type (equatorial crossing times)	Future additional Satellites	Operator	Equatorial Crossing Time and orbital altitude A=Ascend. (northward) D=Descend. (southward)	Planned launch date	Other information
Sun-synchronous local "early morning" orbit (05:00 – 07:00) (17:00 – 19:00)	NPOESS-2	NOAA	05:30 (D) 833 km	2016	LRD (AHRPT), HRD
	NPOESS-4	NOAA	05:30 (D) 833 km	2022	LRD (AHRPT), HRD
	DMSP-F19	NOAA	05:30 (D) 833 km	2012	(SSMI/S)
	DMSP-F20	NOAA	05:30 (D) 833 km	2014	(SSMI/S)
Sun-synchronous local "morning" orbit (07:00 – 12:00) (19:00 – 24:00)	FY-3B	CMA	836 km	2010	- " -
	FY-3C	CMA	836 km	2013	- " -
	FY-3D	CMA	836 km	2015	- " -
	FY-3E	CMA	836 km	2017	- " -
	FY-3F	CMA	836 km	2019	- " -
	FY-3G	CMA	836 km	2021	- " -
	Metop-1	EUMETSAT	21:30 (A) 817 km	2012	HRPT, LRPT. EUMETCast ADM.
	Metop-3	EUMETSAT	21:30 (A) 817 km	2016	HRPT, LRPT. EUMETCast ADM.
	Post-EPS	EUMETSAT		2019	
	DMSP-F18	NOAA	08:00 (D) 833 km	2009	(SSMI/S)
	METEOR-M N3	ROS-HYDROMET	TBD ~560 km	2012	HRPT, LRPT
Sun-synchronous local "afternoon" orbit (12:00 – 17:00) (00:00 – 05:00)	FY-3B	CMA	14:00 (A) 836 km	2010	AHRPT/MPT, VIRR, MERSI, MWRI, IRAS, MWTS, MWHS, TOU/SBUS, SEM, ERM, SIM
	NPP-NPOESS Preparatory Project	NOAA/NASA	13:30 (A) 833 km	2011	(VIIRS, CrIS, ATMS, OMPS) HRD. Monitoring climate trends, global biological productivity
	NPOESS-1	NOAA	13:30 (A) 833 km	2014	LRD (AHRPT), HRD
	NPOESS-3	NOAA	13:30 (A) 833 km	2020	LRD (AHRPT), HRD
	METEOR-M N2	ROS-HYDROMET	15:30 (A) 835 km	2010	HRPT, LRPT
Non-sun synchronous Orbit	Jason-3	EUMETSAT NOAA		2013	OST
	Jason-CS			2016	OST

C.2 Future Geostationary Meteorological Satellite Systems

EUM-WP-09 provided information on the status of the current Meteosat Second Generation (MSG) Programme development of MSG-3 and 4, following the successful entry into service of MSG-1 and MSG-2 respectively in January 2004 and July 2006.

Based on the operational status of MSG-1 and MSG-2 and the projected operational evolution of these two satellites, in June 2009 the EUMETSAT Council agreed to postpone by one year the launch of MSG-3 and MSG-4. The new launch dates which are used for planning purposes are now January 2012 for MSG-3 and January 2014 for MSG-4.

EUMETSAT has already started interactions with its launcher Agency, Arianespace, to define the launch period for MSG-3. The preparatory work for the Launch and Early Orbit Phase service will be kicked-off in early 2010.

The MSG-3 satellite is in long term storage at the Prime contractor's premises and ongoing work is limited to monitoring the storage conditions, periodic activation of SEVIRI, anomaly investigations and corrective actions. The implementation of the measures to solve the anomaly associated with an inconsistent Telemetry read-out in the redundant chain of the SEVIRI Preamplifier Unit and Functional Control Unit, reported at CGMS-36, was successfully achieved by November 2008.

The design concept of the Gauging Sensor Units (GSU) which are used for fuel monitoring on Meteosat-8/9 and currently mounted on MSG-3/4 was changed to a new Ultrasonic Gauging Sensor (UGS) following the failures observed on ground and in orbit. The manufacturing of the UGS flight units for MSG-3 and MSG-4 are ongoing. The delivery of UGS Flight Models will likely take place in the second quarter 2010, and compatible with planned MSG-3 destorage activities.

The MSG-4 satellite is stored in the clean room at the Prime contractor's premises. Based on the outcome of the MSG-4 Pre Storage Review (PSR) that concluded with a non conformance associated with missing lines observed once during a SEVIRI scan activation. The analyses points to the Drive Unit (DU), part of the Scan Mechanisms of SEVIRI and it has been technically and contractually agreed with Industry to replace this unit. The manufacturing of a new drive unit started in January 2009, also re-using, as far as possible, available Engineering Model parts. The current schedule forecasts the delivery of the SEVIRI Flight Model with the new Drive Unit by mid 2011, which remains not critical with respect to the agreed launch plans.

EUM-WP-10 updated CGMS on its plans for Meteosat Third Generation (MTG). Tasks of the EUMETSAT Meteosat Third Generation (MTG) Programme are progressing at EUMETSAT as part of the Preparatory Programme. Phase A has been completed and Phase B is ongoing. At ESA level, following the MTG Programme approval at the Ministerial Council in 2008, Phase B1 activities have

been completed. Phase B2 activities will start in early 2010 following selection of the Industrial prime contractor for the satellites.

The system architecture has adopted a twin-satellite configuration, with an Imaging Satellite embarking a Flexible Combined Imager and a Lightning Imaging Instrument, and a sounding Satellite embarking the Infrared Sounder and accommodating the GMES provided Sentinel 4 instrument to support atmospheric chemistry applications. The Programme is designed for 20 years of operations of the imagery mission and at least 15.5 years of operations of the sounding mission.

Approval of the full MTG programme by EUMETSAT will follow the release of the Programme Proposal, a draft version of it having been released and a final version planned for the first quarter of 2010. Start of Phase C/D activities at EUMETSAT is planned for late 2010.

JMA-WP-03 provided a report on plans for Himawari-8 and Himawari-9, the follow-on satellites to MTSAT-2. JMA plans to launch Himawari-8 in summer 2014 and commences its operation in 2015, when MTSAT-2 is scheduled to complete its period of operation. The Agency also plans to launch Himawari-9 in 2016. Himawari-8 and -9 are each scheduled to carry an imager comparable to the Advanced Baseline Imager (ABI). To disseminate the huge amounts of information that these satellites will gather, JMA plans to provide all observation data via the Internet.

KMA-WP-02 provided an update on the COMS programme. The integration of the COMS system has been completed, and various ground tests including the compatibility test between the payloads and the ground image processing system are being performed. The Working Paper also included the current status of COMS payload development, information about the observation channels, and the HRIT/LRIT broadcasts.

KMA-WP-05 reported on tentative plans for satellites to follow COMS. Currently, KMA plans to launch a follow-on satellite to COMS in 2017 before COMS completes its period of operation. The COMS follow-on satellite is tentatively planned to carry an imager comparable to the Advanced Baseline Imager (ABI) or the Flexible Combined Imager (FCI). The other missions will be planned in 2010 in cooperation with other Korean Ministries engaged in the Programme.

NOAA-WP-06 provided a status and an overview of the future GOES satellite system. The GOES-13 satellite was successfully launched on 24 May 2006 and is in on-orbit storage at 105°W as the primary backup for the operational GOES satellites. The GOES-O spacecraft was launched on 27 June 2009 and is now in on-orbit post-launch testing. GOES-P has completed system integration and testing and is in ground storage at the spacecraft contractor facility in El Segundo, California. It is planned to be launched in March 2010 and will be stored in orbit.

Steady progress has continued with the development of the GOES-R programme in 2009. The spacecraft, ground segment and all instruments are in the implementation phase. The new GOES-R instruments will advance operational environmental remote sensing technology by several decades. The technological advances will provide environmental information over a greater geographical location in less time, at higher resolutions, and with higher spectral content.

Action 37.02: EUMETSAT and NOAA to inform CGMS about the cooperative scientific studies being carried out as part of the preparations for MTG and GOES-R. Deadline: CGMS-38

Action 37.03: EUMETSAT to inform CGMS about the data dissemination plan for MTG. Deadline: CGMS-38

ROSH/ROSC-WP-02 provided information on the new geostationary meteorological satellite "Electro-L" which is planned to be launched in the first or second quarter of 2010. The satellite is currently being tested. The Working Paper also reported on the principal characteristics and status of the satellite.

Table 5: Future Geostationary Satellites Coordinated within CGMS
(as of 30 October 2009, sorted by longitude and organisation)

Sector	Future additional satellites	Operator	Planned launch	(Planned location) Other remarks
East-Atlantic sector (36°W-36°E)	MSG-3	EUMETSAT	2012	0°. LRIT, EUMETCast ADM.
	MSG-4	EUMETSAT	2014	0°. LRIT, EUMETCast ADM.
	MTG I1	EUMETSAT	2016	Meteosat Third Generation 1st imaging satellite
	MTG S1	EUMETSAT	2018	Meteosat Third Generation 1st sounding satellite
	MTG I2	EUMETSAT	2021	Meteosat Third Generation 2nd imaging satellite
	MTG I3	EUMETSAT	2025	Meteosat Third Generation 3rd imaging satellite
	MTG S2	EUMETSAT	2026	S2 Meteosat Third Generation
	MTG I4	EUMETSAT	2029	Meteosat Third Generation 4th imaging satellite
East-Pacific (180˚W-108˚W) and West-Atlantic (108˚W-36˚W)	GOES-P	NOAA	2010	135° W or 75° W
	GOES-R	NOAA	2015	135° W or 75° W ABI, GLM, SUV, EXIS, SEISS (Advanced Baseline Imager, Geostationary Lightning Mapper), Solar UV Imager, Extreme UV and X-ray Irradiance Sensors, Space Environment In-Situ Suite)
	GOES-S	NOAA	2016	
Indian Ocean (36˚E-108˚E)	FY-2F	CMA	2011	5 channel VISSR 86.5°E
	FY-4A, C, E	CMA	2014	Multi-spectral imager, Atmospheric Sounder, lightning mapper, SEM

Sector	Future additional satellites	Operator	Planned launch	(Planned location) Other remarks
	Electro-L N1	Roshydromet	2010	76°E HRIT/LRIT
	Electro-L N2	Roshydromet	2011	14.5° W (TBD)
	Electro-M N1	Roshydromet	2015	TBD
	INSAT-3D	IMD	2010	Location TBD. Dedicated Meteorological mission with improved 6- channel Imager and a 19 channel Sounder.
West-Pacific (108°E-180°E)	FY-2G	CMA	2013	5 channel VISSR 123°E
	FY-4B, D, F	CMA	2016	Multi-spectral imager, Atmospheric Sounder, lightning mapper, SEM
	Himawari-8	JMA	2014	140°E (Previously MTSAT follow-on).
	Himawari-9	JMA	2016	140°E. Himawari 8 and Himawari 9 15 years of operations foreseen in total.
	COMS	KMA	2010	5 channel. HRIT/LRIT Meteorological imager (MI), Geostationary Ocean Colour Imager (GOCI) 128.2°E
	COMS follow-on	KMA	2017	116.2°E or 128.2°E

C.3 Future Research and Development Satellite Systems

ESA-WP-02 informed CGMS about future European Space Agency Earth Observation missions. Two of them, MTG and Post EPS will be developed in cooperation with EUMETSAT. The ESA MTG programme was approved at the ESA Ministerial in 2008. It is now in phase B. The Living Planet Programme has three lines of implementation: Earth Explorer satellites, Earth Watch satellites plus services and applications demonstration. The 7th Core Explorer is under selection and the next Explorer launch is now foreseen in November 2009.

Action 37.04: ESA to inform CGMS whether the soil moisture information derived from SMOS data is comparable to that derived from Scatterometer data. Deadline: CGMS-39

Since January 2002 the Earth Watch programme includes the Global Monitoring for Environment and Security (GMES) services element. ESA is responsible for the GMES space component including coordination of the ground segment. It is currently in Phase 1 and is well advanced. Three families of Sentinels: S-1, S-2, and S-3 are under development and two more are planned.

JAXA-WP-02 updated CGMS on JAXA's future satellite systems. These include the Global Change Observation Mission (GCOM), Global Precipitation

Measurement (GPM), Dual Frequency Precipitation Radar (DPR) and Earth, Clouds, Aerosols and Radiation Explorer (EARTHCARE)/Cloud Profiling Radar(CPR). The long term plan for JAXA Earth observations was also highlighted in the document.

Action 37.05: CGMS members are encouraged to collaberate with JAXA in the context of the GPM and CEOS Precipitation Constellation activities. JAXA to report on the status of these collaberative activites. Deadline: CGMS-38

ROSH/ROSC-WP-03 reported that the two Russian agencies, Roscosmos and Roshydromet, have been developing the future space system called "Arctica" since the beginning of the year. The main aim of the system is to monitor the Arctic region thereby providing a lot of information in support of weather forecasting and social-economical activity in the entire Russian Arctic region. The Working Paper also reported on the principal functions, configuration and parameters of the "Arctica" space segment and its supporting ground infrastructure.

ESA made a presentation on the CEOS Satellite Missions, Instruments and Measurements (MIM) Database which is coordinated with the CEOS Systems Engineering Office located at NASA, Langley, USA, and the WMO Space Programme. ESA offered the use of the database to CGMS Members.

CGMS, being aware of potential duplication of effort in the preparation of similar tables prepared on a regular basis by CGMS, sought clarification on the content and the quality of the MIM database, and its relationship with the CGMS Dossier on the space component of the Global Observing System. It was agreed that this would be discussed under item D.1 and WMO-WP-10 Dossier on the space-based GOS.

Table 6: Future R&D satellites discussed within CGMS
(as of 30 October 2009, sorted by Equatorial Crossing Time and organisation)

Satellites	Operator	Equatorial Crossing Time and orbital altitude	Planned launch date	Application and other information
SARAL	CNES/ISRO	800 km (6:00D).	2010	AltiKa (Ka band altimeter) Doris receiver Argos-3 Laser retroreflector
MEGHA-TROPIQUES	CNES/ISRO	867 km 20° inclination	2010	Microwave radiometer (MADRAS), microwave humidity sounder (SAPHIR), Radio Occultation sounder, Earth radiation budget (SCARAB)
HJ-1C	CNSA	499 km (6:00 D)	2010	Land, resource and environment monitoring
CBERS-03	CNSA/AEB	778 km (10:00 A)	2010	Land, resource and environment monitoring

Satellites	Operator	Equatorial Crossing Time and orbital altitude	Planned launch date	Application and other information
CBERS-04	CNSA/AEB	778 Km (10:30 D)	2012	Land, resource and environment monitoring
CRYOSAT-2	ESA	717 km Non-sun-synchronous	2010	Polar ice monitoring
SMOS	ESA	763 km (6:00 D)	2 Nov 2009	Ocean salinity and soil moisture
ADM-Aeolus	ESA	405 km (18:00 A)	Sept 2011	Wind profiles
SWARM (three satellites)	ESA	2 sats at 450 km 1 sat at 530 km (drifting up to 9 hours from the lower pair)	June 2011	Earth interior
EarthCare	ESA/JAXA	400 km (10:30D)	Sep 2013	Cloud, radiation, aerosols
OCEANSAT-2	ISRO	723 km (12:00 D).	23 Sept 2009	Scatterometer, Radio Occultation Sounder, Ocean Colour Monitoring
SAC-D/Aquarius	NASA/CONAE	657 km (6:00 D)	May 2010	Global sea surface salinity (SSS)
GPM (core)	NASA/JAXA	405 km 65° inclination	Jul 2013	Global Precipitation Measurement, follow-on and expanded mission of the current on-going TRMM
GCOM-W1	JAXA	700 km (13:30 A)	JFY2011 (Jan 2012)	Global water and energy circulation
GCOM-C1	JAXA	800 km (10:30 D)	JFY2014	Carbon cycle and radiation budget (Atmosphere, Ocean, Land and Cryosphere)
LDCM (Landsat Data Continuity Mission)	NASA/US Geological Survey	705 km (10:00 D)	Jan 2011	Extension of Landsat record of multispectral 30m resolution
Glory	NASA	705 km (13:30 A)	2010	in framework of Climate Change Research Initiative (CCRI) global distribution of natural and anthropogenic aerosols
Kanopus-V N1	ROSCOSMOS	650 km (10:30)	2010	Monitoring of naturally occurring and man-made extreme events
Kanopus-V N2	ROSCOSMOS	650 km (10:30 A)	2011	Monitoring of naturally occurring and man-made extreme events

C.4 Future other LEO satellites

EUM-WP-12 described the activities and programmes that EUMETSAT is conducting with the aim of positioning EUMETSAT as the leading European Operational Agency serving the space data needs of the Operational Oceanography User Community with both routine and off-line products. The

primary objective of EUMETSAT is to act as the main space data provider to serve the requirements of the GMES fast track service on Marine Core Service (MCS). These EUMETSAT activities in ocean monitoring were approved by the EUMETSAT Council in 2005.

The document first recalled the user needs as expressed within the report on "Space infrastructure for the GMES Marine Core Service". Then, the way EUMETSAT is contributing to the fulfilment of these requirements is reviewed, both through its current and future mandatory and optional Programmes, but also through the participation of EUMETSAT in Third Party Programmes, and the establishment of Bilateral Agreements with other organisations with the objective of increasing data and product exchange with them.

NOAA-WP-37 presented the status of the operational Jason-2 mission, an overview of NOAA activities performed to support this mission and plans for the Jason-3 mission.

The Ocean Surface Topography Mission (OSTM) of Jason-2 is a joint effort by four organisations, namely, NOAA, EUMETSAT, CNES and JPL, to measure sea surface height by using a radar altimeter mounted on a low-Earth orbiting satellite. The collection of precise measurements of sea surface height is essential for ocean climatology and ocean weather applications. Ocean climatology includes global sea-level rise, a key indicator of climate change, decadal variability in the ocean, seasonal/inter-annual variability, and coastal variability and its impact on ecosystems. Ocean weather involves operational oceanography, surface wave forecasting and evaluation, and hurricane intensity forecasting.

The research satellites, TOPEX/Poseidon and Jason-1, have been instrumental in providing sea surface height measurements necessary for ocean modelling, forecasting El Niño/La Niña events, and hurricane intensity prediction. The currently operational Jason-2/OSTM mission, launched in June 2008 maintains continuity of data measurements.

The planned Jason-3 mission will ensure further continuity of the nearly 20-year data record. Jason-3 is planned as a joint US and European mission. The planned launch in 2013 will provide an overlap with the Jason-2 mission of about 6 months. The overlap period will be used to conduct initial cross-calibration and validation activities, complete on-orbit check-out operations, and maintain consistent observations of sea surface height between the successive altimeter missions.

C.5 Future HEO or combinations of LEO and GEO missions

WMO-WP-11 presented an update on the IGEOLab HEO Project. Since the initial proposal to discuss cooperation on Highly Elliptical Orbits (HEO) in the framework of IGeoLab, advances have been made by both Canada on the Polar Communications and Weather Satellite (PCW or PolarSat) project and

the Russian Federation on the Arctica project. An international workshop, hosted by the Canadian Space Agency and Environment Canada on Satellite Imaging in the Arctic, took place on 14-15 September 2009 in Montreal, Canada. The intent of the Workshop was to better coordinate requirements for satellite observations for both the Arctic and Antarctic. As indicated by WMO at this workshop, these planned HEO missions provide multiple opportunities for cooperation. A meeting will be held on 27 January 2010 in Geneva in order to advance international cooperation on HEO missions.

EUMETSAT responded that it was seriously considering participation in this meeting to exploit possible areas of support and cooperation.

D. OPERATIONAL CONTINUITY AND RELIABILITY

D.1 Global Planning, Including Orbital Positions and Reconfiguration of the Space-based Component of the GOS

WMO-WP-10 introduced the Dossier on the space-based GOS. It recalled its background and main features, listed the main updates since CGMS-36, and informed on current and future developments of the Dossier.

The Dossier is updated three times a year in January, June and October. The January 2009 issue incorporated the updated information collected at CGMS-36. Similarly, the updates provided by CGMS Members at CGMS-37 will be included in the January 2010 issue.

The latest issue of the Dossier can be downloaded from the WMO ftp site at the following address: ftp://ftp.wmo.int/Documents/PublicWeb/sat/DossierGOS. It consists of a zipped package of six files: *Introduction*, *Programmes*, *Instruments*, *GapAnalysis*, *Products* and *Compliance*. The files are connected by hyperlinks, therefore must be unzipped all at once in the same folder without changing their names. The current Dossier contains descriptions of 203 satellite missions and 234 satellite instruments.

Two main developments are ongoing and are planned to continue over the next year:

- Cooperation with CEOS, specifically through NASA and ESA, to seek convergence on e.g. geophysical parameters definition, instrument categorisation, and approximate product performance evaluation from categorised instruments; and

- Supporting the WMO Rolling Requirements Review (RRR) in comparing user requirements and satellite performances, highlighting non-compliances and suggesting ways forward to address these non-compliances.

Recommendation 37.01: WMO to continue to keep the Dossier on the Space-based Global Observing System under review by the relevant groups of experts of WMO Members (e.g. the CBS/OPAG-IOS Expert Teams on Satellite Systems and on Satellite Utilization and Products). (**Replacing recommendation 36.02)**

CGMS also endorsed a new WMO Recommendation:

Recommendation 37.02:

- **WMO to continue to pursue harmonisation of structure and contents of the GOS Dossier and the CEOS databases, in cooperation with CEOS. (Replacing recommendation 36.03).**

- **WMO to continue to inform CGMS of the status of the Rolling Requirements Review process (RRR).**

- **CGMS space agencies to support WMO in filling the gaps in the GOS Dossier Volume II (Instrument descriptive tables) in response to specific requests by WMO.**

and additionally

- **that WMO continues to report on the major updates to the Dossier on the Space-based Global Observing System.**

Concerning convergence between CEOS MIM Database and WMO Dossier on the GOS, two initiatives have been conducted in parallel regarding the inventory of space-based capabilities:

- the CEOS Missions, Instruments and Measurements Database (MIM) developed by ESA on behalf of CEOS with input from CEOS Members, associated with the online Earth Observation Handbook, and

- the Dossier on the Space-based Global Observing System developed by WMO with input from CGMS Members.

The WMO Dossier is oriented towards comparison with WMO observation requirements, while CEOS MIM refers solely to space mission capabilities. The CEOS Database is accessible online, with a number of tools provided in order to search and visualise the information.

CGMS recognised that these two initiatives provide valuable and highly complementary reference information, but recommended seeking convergence between them in order to avoid unnecessary duplication of work, and to avoid repeated requests to Agencies for information.

ESA and WMO have analysed the following differences between the CEOS MIM and the WMO Dossier updating process:

- CEOS MIM and WMO Dossier do not involve exactly the same members since some CGMS Members are not in CEOS;

- Detailed instruments characteristics required by the Dossier are not all covered by the CEOS MIM;

- While in both cases, agencies are approached in the case of doubtful entries, CEOS directly reflect the agencies' input, while WMO populates the data by checking against different sources;

- CEOS MIM is updated once a year (by CEOS Plenary), while the Dossier has a major update in January, with intermediate updates released in June and October.

In order to minimise these differences and to rely as far as possible on the same updating process, the following two proposals were made:

Action 37.06: CGMS Members who are not represented at CEOS should designate a focal point who will receive from CEOS the annual call for updates. Deadline: 30 April 2010

Recommendation 37.03: As far as practical, ESA will include additional fields in the forms used for the CEOS Call for updates, in order to address the detailed questions to be answered for the Dossier.

The difference in levels of consistency check is found legitimate, and is not a problem since it only affects those replies that are doubtful.

CGMS also noted a possible duplication between the proposed updates to the CGMS report Satellite Tables and the Working Papers submitted under agenda items B and C. The following recommendation was made:

- The input for updating the satellite tables should systematically be included into the papers submitted for items B and C, as was already done by some Members. [Ref. permanent action 01].

- This would be facilitated by including a few additional columns/rows in the satellite table document template (these would be disregarded for WPs addressing items other than B or C).

Action 37.07: CGMS Secretariat to revise the satellite table and provide it to CGMS Members. Deadline: 30 April 2010

Vision of the Global Observing System (GOS) for 2025

WMO-WP-12 presented the Vision of the Global Observing System (GOS) for 2025 which had been presented in a draft form at the last meeting of CGMS. It had been finalised by the WMO Commission for Basic Systems (CBS-XIV) and

endorsed in June 2009 by the WMO Executive Council (EC-LXI). The Council requested CBS to develop a new version of the Implementation Plan for the Evolution of Space and Surface-based Sub-systems of the GOS which should provide a roadmap to implement the Vision.

The new Vision calls for substantial enhancement of space-based observations. It anticipates a transition of several important missions from experimental to operational status and implies a new paradigm for global satellite mission planning, data sharing and interoperability.

The WMO Executive Council stressed the importance of an active partnership between WMO and the space agencies to achieve this challenging goal.

Action 37:08: CGMS satellite operators take the Vision for the GOS in 2025 into account when developing their own planning, and to report at the next meeting of CGMS on their initiatives to respond and contribute to its continued implementation. Deadline: CGMS-38

D.2 Inter-regional contingency measures

No Working Papers were presented under this item.

D.3 Long-term global contingency planning

No Working Papers were presented under this item.

E. SATELLITE REQUIREMENTS OF WMO AND IOC

E.1 WMO programmes and projects

KMA-WP-18/JMA-WP-07 introduced the background and the activities of a WMO RA-II Pilot Project to support for NMHSs in their use of satellite data, products and to provide relevant training. WMO XIV-RA II (December 2008) adopted a resolution to establish the Pilot Project. After XIV-RA II, the WMO Secretariat invited WMO Members to join the Pilot Project Coordinating Group, and designated JMA and KMA as co-coordinators. A Coordination Group for the Pilot Project with 12 member countries had been established, and the first Newsletter was issued at the end of September 2009.

WMO informed CGMS that a Project web page located in the Space Programme section would be available in due course. Additionally, the WMO VL was very interested in supporting the activity and confirmed that it was very important for it to cooperate in the training objectives.

WMO-WP-13 provided information on the WMO Integrated Global Observing system (WIGOS). Many of the environmental issues facing society today call for

information across multiple domains resulting in an evolving and increasingly complex set of user requirements. The WIGOS is intended to bring into a single framework, the WMO observing systems that are vital for the activities of its Members, and if better integrated can meet these more complex user requirements. Integration of the WMO observing systems through WIGOS will occur across three levels – instrumentation, data management, and product quality assurance – all of which are of importance. CGMS, through its role in global contingency planning and technical harmonisation, format standardisation, intercalibration and product generation efforts, can play a critical role in WIGOS as more comprehensive and diversified space-based capabilities evolve.

Further integration of space-based components of the GOS should result in increased interoperability, enhanced robustness, wider audience and greater benefit to the society.

Recommendation 37.04 CGMS satellite operators are invited to take the Vision for the GOS in 2025 into account when developing their own planning, and to report at the next meeting of CGMS on their initiatives to respond and contribute to its continued implementation. (Ref. Recommendation 36.04).

E.2 GCOS and other joint programmes and projects

EUM-WP-13 summarised the EUMETSAT activities in support to Climate Monitoring (CM). It started with a review of the current EUMETSAT contributions to CM through international activities (i.e. in the context of WMO, CGMS or CEOS). The document then listed all dedicated internal EUMETSAT activities contributing to CM, i.e. in the EUMETSAT Central Facility or in the EUMETSAT SAF Network. Finally, the document briefly reported on the discussions at the 67th EUMETSAT Council held in June 2009, during which EUMETSAT Member States agreed on a precise definition of the role of EUMETSAT and its SAFs in support of CM. This Council Statement will lead to the development of an Implementation Plan which will take place in the course of 2010 and a report on progress will be submitted to CGMS-38.

NOAA-WP-07 provided information on the progress of the Global Space-based Inter-Calibration System (GSICS). The GSICS mission is 1) to provide sustained calibration and validation of satellite observations, 2) to intercalibrate critical components of the global observing system to climate quality benchmark observations and/or reference sites, and 3) to provide corrected observations and/or correction algorithms to the user community for current and historical data. GSICS has developed and implemented new intercalibration techniques for correcting the geostationary imagers to AIRS and IASI for the infrared channels, and MODIS and deep convective clouds for the visible channels. These corrections are now becoming routine and available to the user community. With its good foundation, GSICS is now

being more proactive in engaging the user community. This Working Paper also summarised the first GSICS user workshop.

Roshydromet informed CGMS it wished to participate in the GSICS and to join the forthcoming Executive Panel meeting.

NOAA-WP-12 reported on a correction algorithm for geostationary imagers. This paper was provided in response to CGMS recommendation 36.11 "the GSICS Executive Panel to consider establishing in 2009 an end-to-end demonstration of an operational GSICS by including beta-users in the GSICS process." A comprehensive description of the GSICS operation, with sufficient details of the theoretical basis for the design and generation of the products is necessary in order to involve the users into the GSICS process. This Working Paper was part of the effort to fill these needs.

NOAA added that it would be beneficial for CGMS to encourage widening participation to include Russia and India.

In ESA-WP-06 CGMS was informed that the Earth Observation stakeholder community has now reached a level of maturity where it is critical that data derived products have an indicator of their quality associated with them, in order to enable users to assess their suitability for applications, i.e. their "fitness for purpose". This quality indicator needs to be unequivocal in its interpretation and derivation across the full range of EO activities which are coordinated through GEO. The document provided an introduction to the Quality Assurance framework of GEO (QA4EO) established to achieve this task.

NOAA-WP-19 informed CGMS that as part of its climate mandate, NOAA has a responsibility to provide the United States with objective data and tools to help it characterise, understand, predict, mitigate and adapt to climate change and variability. To help fulfil that responsibility, NOAA has begun working with other federal agencies to coordinate the respective Climate Data Record (CDR) activities.

The National Climatic Data Center (NCDC) initiated the Climate Data Record (CDR) Project to lead the Agency's CDR activities and to coordinate with partner agencies. Given that early algorithm development is supported elsewhere, the CDR Project is focused on the generalisation and application of mature algorithms to multiple satellites and sensors which together span climate-relevant time periods. It will also emphasise the development and generation of Climate Information Records (CIRs), defined as time series of CDR-derived metrics tailored for specific users communities (e.g. hurricane trends, arctic sea ice coverage, coastal inundation). The CDR Project expects to execute its responsibilities in partnership with the larger scientific community through annual NOAA Announcements of Opportunity, open to academic, commercial, non-profit and government proposers, as well as through community reviews and working groups.

Collaboration with the international community on developing intercalibrated satellite observation datasets and downstream climate data and information records is being achieved through the WMO Space Programme Global Space-based InterCalibration System (GSICS) and Sustained, Co-Ordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) projects, with further collaboration with the World Climate Research Programme (WCRP).

NOAA invited CGMS members to provide ideas for additional SCOPE-CM pilot CDR projects as well as identifying their needs for Climate Information Records to CGMS and to the SCOPE-CM Executive Panel.

WMO-WP-16 summarised GCOS activities related to satellite activities in support of climate monitoring, namely on (i) the GCOS Progress Report 2004-2008, (ii) the update of the GCOS Implementation Plan and implications for satellite operators, (iii) recommendations by GCOS and World Climate Research Programme (WCRP) expert panels related to space agencies, and (iv) update on the GCOS Reference Upper-Air Network (GRUAN).

ESA recalled that it had reported at CGMS-36 on its plans for a climate change initiative programme. This was approved in November 2008 and is now being implemented. The programme responsed to GCOS satellite requirements and addresses some of the ECVs.

Action 37.09: CGMS members to provide reports to the next session of CGMS on climate-related activities and plans in support of GCOS requirements. These reports should include comments on the maturity index for climate data records under development by NOAA, as well as on the *Guideline for the Generation of Satellite-based Datasets and Products Meeting GCOS Requirements* (GCOS-128). Deadline: CGMS-38

Action 37.10: CGMS members to review the draft updated GCOS Implementation Plan (IP-09) during the open review period running from November 2009 to February 2010, and send their comments to the GCOS Secretariat. Deadline: 15 February 2010

WMO-WP-14 informed CGMS about progress that had been made on several fronts with the Sustained Co-Ordinated Processing of Environmental satellite data for Climate Monitoring (SCOPE-CM). Progress with the five ongoing pilot projects, as well as with the development of a maturity index for satellite products has been made this year. Discussions are being held to encourage one or more additional pilot projects which would address an oceanic and/or another terrestrial Essential Climate Variable (ECV), and additional participation is being sought from the research space agencies in order to better address the transition from research to operations for satellite products.

CGMS endorsed the WMO recommendation that CGMS Members, including research space agencies, be invited to participate in SCOPE-CM and propose additional pilot projects for the sustained and coordinated processing of

environmental satellite data, in particular for the oceanic and/or terrestrial ECVs.

Recommendation 37.05: CGMS Members, including research space agencies, are invited to participate in SCOPE-CM and propose additional pilot projects for the sustained and coordinated processing of environmental satellite data, in particular for the oceanic and/or terrestrial ECVs.

WMO-WP-17 informed CGMS that the Third World Climate Conference (WCC-3) was held in Geneva from 31 August to 4 September 2009. The Conference, hosted by WMO and its international partners, initiated a process to establish a Global Framework for Climate Services, to ensure that climate information and predictions are made available to decision-makers and sectors encountering the impacts of climate variability and change. This decision was unanimously adopted at the opening of the WCC-3 High-level Segment, which followed three days of intense deliberations by multidisciplinary international experts. Present on the occasion were the Presidents and Heads of State of 12 nations and close to 80 Ministers, as well as UN Secretary-General Ban Ki-moon and 12 Executive Heads of UN Agencies and Programmes. The participation of more than 2500 decision-makers and experts was also unprecedented.

EUMETSAT, referring to WMO-WP-17 on the World Climate Conference and for the proposal to develop climate services, stated the importance of satellite observations and monitoring from space in this regard. CGMS recommended that WMO to take fully into account the importance of space observations for climate monitoring. It was agreed that a letter would be prepared by the CGMS Secretariat to WMO on this subject and the content of the letter would be agreed by CGMS in advance by e-mail. In addition, a statement from CGMS would be attached to the letter.

Action 37.11: CGMS Secretariat to prepare a letter including a statement from CGMS on the importance of space observations for climate monitoring. Deadline: 15 November 2009

E.3 IOC Programmes

ESA-WP-03 informed CGMS about the ocean related parameters provided or will be provided by ESA missions such as ERS, Envisat, the Explorers and the GMES Space programme. Many of them were relevant to IOC requirements.

F. INTERACTION WITH GEO

F.1 Contribution of meteorological satellites to the Societal Benefit Areas (SBAs)

EUM-WP-14 provided an update on related activities of the EUMETSAT Network of Satellite Application Facilities (SAFs).

The SAF in support of Operational Hydrology and Water Management had entered the last year of its development phase, whilst all other SAFs were in their Continuous Development and Operations Phase (CDOP), and would soon complete the 3rd rd year of those activities.

In the last reporting period, the number of operational SAF products had increased, especially for those based on EPS data. Similarly, there was an increased availability of SAF off-line products through the EUMETSAT Central Archive. The Paper concluded by informing CGMS that in 2010, the SAFs will prepare proposals for a second part of the CDOP, covering the period March 2012 to February 2017.

F.2 GEONETCast

EUM-WP-15 provided information on GEONETCast, which consists of a network of three dissemination systems - GEONETCast Americas operated by NOAA, FENGYUNCast operated by CMA and EUMETCast operated by EUMETSAT. This network had achieved near global coverage. The three GEONETCast Network Centres (GNC) operated by NOAA, CMA and EUMETSAT are interconnected with data exchange links for the exchange of GEONETCast relevant data. All three GNCs are disseminating their GEONETCast contributions in their respective footprints operationally. The next step is to include data exchange contributions from other GNCs into the respective regional dissemination. EUMETSAT is already disseminating contributions from NOAA and CMA over all EUMETCast footprints and covering Europe, the Middle East, Africa and South and Central America.

The Working Paper also presented in more detail the actual status and intended evolution of the EUMETCast services, as a significant contribution to GEONETCast, by presenting the data services provided by EUMETCast dissemination and an overview of the GEONETCast Product Navigator which provides one-stop-shop access allowing GEONETCast data discovery.

F.3 CGMS and GEO/GEOSS interactions

A presentation on the activities of the CEOS Working Group on Calibration and Validation was made by its Chairperson Mr Pascal Lecomte. The presentation stressed the complementarity between the respective roles of CEOS WGCV and GSICS in their efforts for a better Calibration and Validation of the observing system that is required for Climate monitoring. CGMS members expressed their appreciation for the presentation, and highlighted the important coordinating role played by WGCV at the global scale.

G. WORKING GROUP REPORTS

Reports from the four working groups were presented by Mr Marlin O Perkins (WG I on Telecommunications), Dr Peng Zhang (WG II on Satellite Products), Mr Gary Davis (WG III on Global Contingency Planning) and Mr Mikael Rattenborg (WG IV on Global Data Dissemination).

CGMS-37 took note of the reports and thanked the Working Group participants, Chairpersons and Rapporteurs for their active and fruitful discussions.

CGMS-37 endorsed the proposed actions and recommendations formulated by each Working Group and congratulated the four Groups for their comprehensive reports and for their achievements since the preceding meeting of CGMS.

H. OTHER ITEMS OF INTEREST

H.1 Training

EUM-WP-16 reported on the status and future plans for EUMETSAT training activities in satellite meteorology and those in support of the Centres of Excellence (CoE) in Africa, the Middle East and Europe. The actual training activities follow an approved 5-year Training Plan (2009-2013). As in the past, in this plan the EUMETSAT Council tasks the User Service Division Training Team to conduct a range of training activities in Europe, Africa, the Arabian Gulf and also in parts of South America. Also included within this plan are the EUMETSAT contributions to the WMO Virtual Laboratory (VL).

WMO thanked EUMETSAT for the wide range of training activities it had carried out over the last year.

KMA-WP-16 reported on the 3rd International Training Course on the Analysis of COMS Data in Korea. KMA had organised the training course for potential foreign data users from 14 countries in the Asia-Pacific area in order to introduce them to the COMS programme and to form a user community of COMS data. (Note: COMS - Communication, Ocean, and Meteorological Satellite).

KMA-WP-17 informed CGMS about KMA's intention to participate in the WMO-CGMS Virtual Laboratory (VL) programme. KMA, as the operator of COMS, had its own plan for providing various training opportunities and information regarding COMS data utilisation. These activities would be harmonised with those of the Virtual Laboratory and the activities of the regional Centres of Excellence. The 37th CGMS meeting will be the beginning point for KMA's participation.

The EUMETSAT Co-Chair of the Virtual Laboratory commented that he strongly supported the participation of KMA in Virtual Laboratory activities. Concluding the discussion, CGMS members warmly welcomed the participation of KMA in the Virtual Laboratory.

NOAA-WP-08 provided a summary of NOAA support to the WMO/CGMS Virtual Laboratory and its Focus Groups from September 2008 to June 2009 (Session II).

The EUMETSAT Virtual Laboratory Co-Chair and CGMS members expressed their deep appreciation to NOAA for its generous contribution towards the funding of the Virtual Laboratory Technical Support Officer position in 2010, and for the potential contribution of COMET's ESRC as a training resource library of the Virtual Laboratory.

WMO-WP-18 reported on training activities within the framework of the Virtual Laboratory for training and education in satellite meteorology (VL) along with future plans and directions. Important developments had taken place since CGMS-36, including the CBS approval of the five-year VL strategy, the recognition of new Centres of Excellence (CoEs) in Pretoria, South Africa and in Moscow/St Petersburg, Russian Federation, and the appointment of the VL Technical Support Officer (TSO). The TSO has efficiently supported the activity and advanced the objectives of the VL along the lines of the new five-year strategy, but the position needed further funding. A summary was also given of the annual reports from the VL CoEs and their sponsoring satellite operating agencies for the period from September 2008 to April 2009.

In addition, a proposal was presented to initiate training activities directed towards research communities in developing countries, following an initial suggestions from NASA.

CGMS endorsed the following WMO actions:

Action 37.12: VL Co-chairs to discuss with VL sponsoring agencies the funding of the Technical Support Officer (TSO) position from the end of 2010 onwards. Deadline: CGMS-38

Action 37.13: VL Co-chairs and WMO to convene the fifth Virtual Laboratory Management Group (VLMG-5) meeting during the first half of 2010. Deadline: CGMS-38

Action 37.14: WMO to continue dialogue with ISRO regarding the establishment of an Indian CoE and the co-sponsoring of the CoE in Oman. Deadline: CGMS-38

Action 37.15: VL Co-chairs and WMO to seek an agreement between CGMS, COMET and WMO with a view of using the ESRC as a resource library for the VL. Deadline: CGMS-38

Action 37.16: The Co-chairs, in consultation with the WMO Space Programme and other relevant WMO Departments, to prepare a roadmap towards widening the scope of VL activities to serve the needs of emerging scientific communities in developing countries. This roadmap will be reviewed by the VLMG and presented to CGMS-38 for approval. Deadline: CGMS-38

H.2 Information

EUM-WP-17 provided CGMS with a brief summary of conferences and events which have taken place since CGMS-36 and listed those planned for the next two years. EUMETSAT's recent and current publications, as well as those in preparation, were also listed in the document.

EUM-WP-19 informed CGMS about a fact sheet created by EUMETSAT on CGMS's contribution to climate monitoring - GSICS. Observations from space contribute with unique information for decision making related to the understanding, mitigation and adaptation to climate change, and hence CGMS Members were obvious contributors. As a result of the growing importance of the impact of climate change on CGMS, EUMETSAT had prepared the fact sheet "Global Space-based Inter-Calibration System – a CGMS Contribution to climate monitoring" and the text had been prepared by EUMETSAT in coordination with the GSICS Executive Panel.

It was agreed that the fact sheet should be discussed during the forthcoming GSICS Executive Panel meeting for minor modifications and endorsement.

In WMO-WP-19, CGMS noted that following the discussions held at CGMS-36 in response to Action 35.28, all CGMS satellite operators have been contacted in May 2009 by WMO and were invited to provide summary information on how to access their satellite data, or links to a website containing such information. This information was inserted in the WMO-CGMS tables on "latest satellite status": http://cgms.wmo.int/Satellites.html. The tables provide a wealth of useful links of great value to the users, however, indications are still missing for some missions. Furthermore the level of information is rather inhomogeneous.

Cooperation of all CGMS satellite operators would be very much appreciated to complete this information. In particular, for operational missions, it would be helpful if the information systematically included links enabling users to get all the necessary details to access full resolution data in near-real time.

Action 37.17: CGMS Members to complete the tables of data access information, and to provide the relevant internet links to WMO.
Deadline: 31 January 2010

H.3 Any other business

In the discussion of WMO-WP-20, CGMS noted that as an outcome of the workshop on applications of Radio Occultation held at ECMWF in June 2008, the Radio Occultation user community proposed establishing an International Radio Occultation Working Group (IROWG) in order to foster scientific development and applications of radio occultation to areas such as global and regional numerical weather prediction and climate research. Following the successful example of the International TOVS Working Group (ITWG), the International Winds Working Group (IWWG) and the International Precipitation Working Group (IPWG), it was furthermore proposed that the IROWG be established under the auspices of CGMS and be sponsored by WMO.

Whilst the successful demonstration provided by the COSMIC constellation is planned to fly up to about 2011, several follow-on missions involving either constellations or individual Radio Occultation (RO) instruments are currently discussed. Plans for constellations are ranging from data-buy options to semi-operational, with varying degrees of maturity. For research missions, it ranges from opportunity missions to dedicated RO observations, generally not considering near-real-time data provision. International coordination of efforts is needed to maximise coverage, avoid gaps in the observation system, and ensure a sufficient data flow. Furthermore, there is a need to foster the development of standard software for operational and scientific use, maintain standard datasets for processing harmonisation and validation, promote best practices for the effective use of this data and organise ongoing re-processing of RO data for climate use. The proposed IROWG is expected to play a key role in this respect. Thus, in response to CGMS-36 Action 36.17 the draft Terms of Reference for such a group have been reviewed by a small group involving EUMETSAT, NOAA and WMO.

CGMS endorsed the establishment of the IROWG and agreed to the proposals for the Co-Chairs. CGMS also proposed that the Terms of Reference should also include recommendations on the usage of ground support infrastructure. CGMS agreed to nominate Axel von Engeln from EUMETSAT and David Ector from NOAA as Co-Chairs and Mitch Goldberg, NOAA as rapporteur. It was noted that the working group will be constituted under the lead of the Co-Chairs with support from the rapporteur and other CGMS Members. In the future the working group will nominate its chairpersons following the practice as will be laid out in their terms of reference.

Action 37.18: WMO to finalise the IROWG Terms of Reference in accordance with the conclusions of CGMS-37 and inform the CGMS Secretariat and the two nominated Co-Chairs. Deadline: 31 December 2009.

In WMO-WP-21, CGMS noted that in response to a request from some WMO Members, who are also CGMS satellite operators, WMO has taken steps to

develop a framework for increased Space Weather coordination. WMO Executive Council (EC-LXI) recognised the importance of Space Weather and welcomed the establishment of an Inter-programme Coordination Team on Space Weather involving representatives from both the Commission on Basic Systems (CBS) and the Commission on Aeronautical Meteorology (CAeM). In addition to nominations for the Inter-programme Coordination Team, WMO Members have been asked to provide the name of a point of contact for Space Weather activities.

Recommendation 37.06: CGMS Members are invited to support collaboration and CGMS invited individual countries to contribute to the WMO Trust Fund or provide a secondment, as appropriate.

WMO-WP-22 informed CGMS about the International Polar Year (IPY) satellite activities carried out by space agencies through the Global Inter-agency IPY Polar Snapshot Year (GIIPSY) project and the IPY Space Task Group (STG). The main achievements made by space agencies during the IPY as a result of a coordinated approach were recently reviewed by STG and its SAR working group meetings. According to their conclusion, exceptional progress was made during IPY which includes: Acquiring L, C and X- band SAR imagery over the polar ice sheets and acquiring pole to coast InSAR data for ice sheet surface velocity; optically derived, high resolution digital elevation models of the perimeter regions of ice caps and ice sheets; coordinated campaigns to fill gaps in Arctic and Antarctic sea ice cover; extensive acquisitions of optical imagery of permafrost terrain; and observations of atmospheric chemistry using the Sciamachy instrument. IPY Space Task Group's next steps are to focus on the generation of higher level scientific products; and to ensure access to acquired snapshots, space agency IPY portfolios and data products. The purpose is to leave a legacy data set compiled from multiple space agency satellite data portfolios comprising a broad range of "polar snapshot" products and propose a cooperation arrangement between major satellite agencies ensuring coordination of their polar observations beyond IPY. This cooperation arrangement would establish a preliminary structure for sustaining observations and pave the way for a future Polar Satellite Constellation.

CGMS noted the request for support.

I. FINAL SESSION

I.1 Nomination of CGMS Representatives at WMO and other meetings

CGMS-37 agreed that the CGMS Secretariat (EUMETSAT) would represent CGMS at:

- the 62nd Executive Council of WMO (EC-LXII) in 2010, in Geneva, Switzerland; and

- the Commission for Basic Systems CBS-XV, in 2010.

On a different note, CGMS furthermore recommended to continue the cooperation between the CEOS WGCV and GSICS initiatives. Representatives from each group will attend each others' meetings on an ad hoc basis as necessary.

I.2 Nomination of Chairpersons of Working Groups for CGMS-38

- **Working Group I on Telecommunications** will be chaired by Mr Marlin O Perkins, with Mr Joaquin Gonzalez as Rapporteur;

- **Working Group II on Satellite Products** will be chaired by Prof Vasily Asmus, Roshydromet, with Dr Johannes Schmetz and Dr Mitch Goldberg as rapporteurs;

- **Working Group III on CGMS Global Contingency Planning** will be chaired by Mr Gary Davis, with Mr Jerôme Lafeuille as Rapporteur;

- **Working Group IV on Integrated strategy for data dissemination from meteorological satellites** will be chaired by Mr Mikael Rattenborg, with Mr Gordon Bridge as Rapporteur.

I.3 Summary List of Actions from CGMS-37

Actions open from CGMS-36 (at CGMS-37)					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
WMO	WGIII 36.24	Action 36.24: WMO to convene a contingency planning workshop in the second half of 2009 in order to investigate critical missions and associated potential contingency actions regarding the new missions implied by the Vision for the GOS in 2025. Deadline: 30 June 2009		(30 Jun 2009) New deadline: 30 Jun 2010	OPEN
CGMS Task Force on Codes	WGIV 36.27	Action 36.27: CGMS Task Force on Satellite Data Codes to propose a permanent framework for the activity by CGMS-37. Deadline: CGMS-37	To be discussed at the TFSDC meeting on 14 September 2009. WMO-WP-09	(CGMS-37) New deadline: CGMS-38	OPEN

CGMS-37 permanent actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS Members	Permanent 01	All CGMS Members to inform the Secretariat of any change in the status or plans of their satellites to allow the updating of the CGMS Tables e-mail, of Satellites (tables 1-6 of the plenary report). The Secretariat to review the tables of current and planned polar and geostationary satellites, and to distribute this updated information, via the WWW Operational Newsletter, via Electronic Bulletin Board, or other means as appropriate. CGMS satellite operators to update table 7 for polar-orbiting satellite equator crossing times on an annual basis. CGMS Members to update the table on polar-orbiting satellite equator crossing times as well as the table on coverage from geostationary satellites.		CGMS-38	OPEN
CGMS satellite operators	Permanent 02	CGMS Members to report on spacecraft anomalies from solar events at CGMS meetings.		CGMS-38	OPEN
CGMS Members	Permanent 03	CGMS Members to review the list of available list servers used by CGMS groups and update as appropriate.		CGMS-38	OPEN
CGMS Members	Permanent 04	CGMS satellite operators to consider the IOC satellite requirements, especially the data dissemination methods, bearing in mind the ongoing formations of GOOS Regional Alliances (GRAs).		CGMS-38	OPEN

CGMS-37 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
ROSHYDROMET	37.01	Action 37.01: ROSHYDROMET to inform CGMS about the availability of Meteor-M calibration data. Deadline: CGMS-38		CGMS-38	OPEN
EUM, NOAA	37.02	Action 37.02: EUMETSAT and NOAA to inform CGMS about the cooperative scientific studies being carried out as part of the preparations for MTG and GOES-R. Deadline: CGMS-38		CGMS-38	OPEN
EUM, NOAA	37.03	Action 37.03: EUMETSAT to inform CGMS about the data dissemination plan for MTG. Deadline: CGMS-38		CGMS-38	OPEN
ESA	37.04	Action 37.04: ESA to inform CGMS whether the soil moisture information derived from SMOS data is comparable to that derived from Scatterometer data. Deadline: CGMS-39		CGMS-39	OPEN
CGMS Members	37.05	Action 37.05: CGMS members are encouraged to collaberate with JAXA in the context of the GPM and CEOS Precipitation Constellation activities. JAXA to report on the status of these collaberative activites. Deadline: CGMS-38		CGMS-38	OPEN
CGMS Members	37.06	Action 37.06: CGMS Members who are not represented at CEOS should designate a focal point who will receive from CEOS the annual call for updates. Deadline: 30 Apr 2010		30-Apr-10	OPEN
EUM	37.07	Action 37.07: CGMS Secretariat to revise the satellite table and provide it to CGMS Members. Deadline: 30 April 2010		30-Apr-10	OPEN
CGMS Members	37.08	Action 37.09: CGMS members to provide reports to the next session of CGMS on climate-related activities and plans in support of GCOS requirements. These reports should include comments on the maturity index for climate data records under development by NOAA, as well as on the *Guideline for the Generation of Satellite-based Datasets and Products Meeting GCOS Requirements* (GCOS-128). Deadline: CGMS-38		CGMS-38	OPEN
CGMS Members	37.09	Action 37.10: CGMS members to review the draft updated GCOS Implementation Plan (IP-09) during the open review period running from November 2009 to February 2010, and send their comments to the GCOS Secretariat. Deadline: 15 February 2010		15-Feb-10	OPEN
CGMS Members	37.10	Action 37.10: CGMS members to review the draft updated GCOS Implementation Plan (IP-09) during the open review period running from November 2009 to February 2010, and send their comments to the GCOS Secretariat. Deadline: 15 February 2010		15-Feb-10	OPEN
EUM	37.11	Action 37.11: CGMS Secretariat to prepare a letter including a statement from CGMS on the importance of space observations for climate monitoring. Deadline: 15 November 2009		15-Nov-09	OPEN

CGMS-37 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
VL Co-chairs	37.12	Action 37.12: VL Co-chairs to discuss with VL sponsoring agencies the funding of the Technical Support Officer (TSO) position from the end of 2010 onwards. Deadline: CGMS-38		CGMS-38	OPEN
VL Co-chairs	37.13	Action 37.13: VL Co-chairs and WMO to convene the fifth Virtual Laboratory Management Group (VLMG-5) meeting during the first half of 2010. Deadline: CGMS-38		CGMS-38	OPEN
WMO	37.14	Action 37.14: WMO to continue dialogue with ISRO regarding the establishment of an Indian CoE and the co-sponsoring of the CoE in Oman. Deadline: CGMS-38		CGMS-38	OPEN
WMO + VL Co-chairs	37.15	Action 37.15: VL Co-chairs and WMO to seek an agreement between CGMS, COMET and WMO with a view of using the ESRC as a resource library for the VL. Deadline: CGMS-38		CGMS-38	OPEN
WMO + VL Co-chairs	37.16	Action 37.16: The Co-chairs, in consultation with the WMO Space Programme and other relevant WMO Departments, to prepare a roadmap towards widening the scope of VL activities to serve the needs of emerging scientific communities in developing countries. This roadmap will be reviewed by the VLMG and presented to CGMS-38 for approval. Deadline: CGMS-38		CGMS-38	OPEN
CGMS Members	37.17	Action 37.17: CGMS Members to complete the tables of data access information, and to provide the relevant internet links to WMO. Deadline: CGMS-38		CGMS-38	OPEN
WMO	37.18	Action 37.18: WMO to finalise the IROWG Terms of Reference in accordance with the conclusions of CGMS-37 and inform the CGMS Secretariat and the two nominated Co-Chairs. Deadline: 31 December 2009.		31/12/2009	OPEN
EUM	37.19	Action 37.19: The CGMS Secretariat to send a proposal of the revised agenda to Members for comment and approval in order to use it at CGMS-38. Deadline: 28 February 2010		28-Feb-10	OPEN
EUM	WGI 37.20	Action 37.20: CGMS Secretariat to develop the CGMS coordinated response on the future use of the 401–403 MHz band at the 2010 SFCG-30 meeting. Deadline: 31 January 2010		31-Jan-10	OPEN
EUM	WGI 37.21	Action 37.21: EUMETSAT to present the CGMS Secretariat's statement on the final outcome of the rationalisation of the frequency assignments and use of the DCS uplink band (401-403 MHz). Deadline: SFCG-30		30-Jun-10	OPEN
CGMS Members	WGI 37.22	Action 37.22: CGMS members to present their plans for frequency bands above 275 GHz. Deadline: CGMS-38		CGMS-38	OPEN
CGMS Members	WGI 37.23	Action 37.23: All CGMS members to report on their plans of utilisation for the band 7750-7850/7900 MHz (i.e. including the 7850-7900 MHz extension if agreed in WRC-11). Deadline: CGMS-38		CGMS-38	OPEN

CGMS-37 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS Members	WGI 37.24	Action 37.24: As proposed by ESA, CGMS members to coordinate with CEOS in providing inputs for the report being prepared by ITU-R "The essential role and global importance of radio spectrum use for Earth observations and for related applications." In particular, for chapter 4 about the potential economical impacts of data loss due to RF interference. Deadline: 31 May 2010		31-May-10	OPEN
CGMS Members	WGI 37.25	Action 37.25: CGMS members to review the proposed position for WRC-12 contained in WMO-WP-01 and send comments to the Chairperson of SG-RFC (philippe.tristant (at) meteo.fr) and to WMO Secretariat (jlafeuille (at) wmo.int). Deadline: 31 December 2009		31-Dec-09	OPEN
CGMS Members	WGI 37.26	Action 37.26: In the future when reporting on systems, all CGMS members are asked to expand the details to cover the use of the different frequency bands and the related services. Deadline: CGMS-38		CGMS-38	OPEN
CGMS Members involved in GSICS	WGII 37.27	Action 37.27: GSICS to work with CEOS WGCV to assess Dunhuang and Qinghai Lake as reference sites. Deadline: CGMS-38		CGMS-38	OPEN
ESA	WGII 37.28	Action 37.28: ESA to provide a working paper on the long-term monitoring of MERIS as a reference calibration instrument. Deadline: CGMS-38		CGMS-38	OPEN
NOAA (GSICS EP Chair)	WGII 37.29	Action 37.29: GSICS Executive Panel Chair to send letter to JAXA on the roles and responsibility of JAXA as a GSICS full member. Deadline: 30 Apr 2010		30-Apr-10	OPEN
CGMS Members involved in GSICS	WGII 37.30	Action 37.30: GSICS agencies to implement web-accessible instrument performance monitoring capabilities using the guidelines provided from the GSICS Coordination Center. Deadline: CGMS-38		CGMS-38	OPEN
CMA	WGII 37.31	Action 37.31: CMA to make available in near-real time the FY-3A sounder radiance data for NWP. CMA to provide a status of the work to the CGMS Secretariat. Deadline: 31 January 2010		31-Jan-10	OPEN
NOAA (GSICS EP Chair)	WGII 37.32	Action 37.32: NOAA to organise a working-level meeting of experts in coordination with GSICS, to provide a consensus algorithm for achieving a GSICS version-1 MSU and AMSU intercalibrated dataset. Deadline: 30 Aug 2010		30-Aug-10	OPEN
CGMS Members	WGII 37.33	Action 37.33: CGMS confirms Dr G. Huffman as single point of contact for GEO precipitation activities.	CLOSED (completed during the CGMS-37 plenary session).	30-Oct-09	**CLOSED**
NOAA	WGII 37.34	Action 37.34: On the basis of existing scientific prototype software for GOES-R, NOAA to report on the availability of software to other satellite operators with similar planned geostationary instruments. Deadline: 30 June 2010		30-Jun-10	OPEN
KMA	WGIV 37.35	Action 37.35: KMA to provide CGMS with information on its Point of Contact for user access enquiries. Deadline: 30 April 2010		30-Apr-10	OPEN

CGMS-37 actions					
Actionee	**Action**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
NOAA	WGIV 37.36	Action 37.36 : NOAA is invited to develop a simplified current GOES/GOES-R user data access scheme, for use especially during the period of transition from the current GOES system to the operational GOES-R and S system. Deadline: CGMS-38		CGMS-38	OPEN
CGMS satellite operators	WGIV 37.37	Action 37.37: All CGMS satellite operators to regularly include user statistics in their reports on current satellite systems. Deadline: CGMS-38		CGMS-38	OPEN
CMA	WGIV 37.38	Action 37.38: CMA to inform CGMS about its upgraded FENGYUNCast service. Deadline: CGMS-38		CGMS-38	OPEN
NOAA	WGIV 37.39	Action 37.39: NOAA to report on its plans for the full integration of GEONETCast Americas into the global GEONETCast system and service all GEO Societal Benefit Areas. Deadline: CGMS-38		CGMS-38	OPEN
CGMS satellite operators	WGIV 37.40	Action 37.40: CGMS satellite operators to consider using the layout of the table of satellite data requirements for South and central America, presented in document ET-SUP-RED-1/Doc. 6.2, (24.IX.2009) as a template for the collection of user requirements in other WMO Regions. Deadline: CGMS-38		CGMS-38	OPEN
WMO	WGIV 37.41	Action 37.41: WMO to consider including Metop-IASI data within the RARS. Deadline: CGMS-38		CGMS-38	OPEN
WMO - TFSDC	WGIV 37.42	Action 37.42: The Chairperson of the Task Force on Satellite Data Codes should write to the CGMS Secretariat explaining the rationale behind the WMO-requested actions and provide full supporting documentation to allow CGMS to formulate possible further actions on Members concerning the categorisation of their products. Deadline: 30 Apr 2010		30-Apr-10	OPEN
WMO, ROSHYDROMET	WGIV 37.43	Action 37.43: WMO to confirm with ROSHYDROMET its membership of the Task Force on Satellite Data Codes. Deadline: 30 Apr 2010		30-Apr-10	OPEN

CGMS-37 recommendations					
Actionee	**Recommendation**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
WMO	Recommendation 37.01	Recommendation 37.01: WMO to continue to keep the Dossier on the Space-based Global Observing System under review by the relevant groups of experts of WMO Members (e.g. the CBS/OPAG-IOS Expert Teams on Satellite Systems and on Satellite Utilisation and Products). (Replacing recommendation 36.02)		CGMS-38	OPEN
WMO, CGMS satellite operators	Recommendation 37.02	Recommendation 37.02: • WMO to continue to pursue harmonisation of structure and contents of the GOS Dossier and the CEOS databases, in cooperation with CEOS. (Replacing recommendation 36.03); • That CGMS space agencies support WMO in filling the gaps in the GOS Dossier Volume II (Instrument descriptive tables) in response to specific requests by WMO; • WMO to continue to inform CGMS of the status of the Rolling Requirements Review process (RRR); and additionally • that WMO continues to report on the major updates to the Dossier on the Space-based Global Observing System.		CGMS-38	OPEN
ESA	Recommendation 37.03	Recommendation 37.03: As far as practical, ESA will include additional fields in the forms used for the CEOS Call for updates, in order to address the detailed questions to be answered for the Dossier.		CGMS-38	OPEN
CGMS satellite operators	Recommendation 37.04	Recommendation 37.04 CGMS satellite operators are invited to take the Vision for the GOS in 2025 into account when developing their own planning, and to report at the next meeting of CGMS on their initiatives to respond and contribute to its continued implementation. (Ref. Recommendation 36.04).		CGMS-38	OPEN
CGMS Members	Recommendation 37.05	Recommendation 37.05: CGMS Members, including research space agencies, are invited to participate in SCOPE-CM and propose additional pilot projects for the sustained and coordinated processing of environmental satellite data, in particular for the oceanic and/or terrestrial ECVs.		CGMS-38	OPEN
CGMS Members	Recommendation 37.06	Recommendation 37.06: CGMS Members are invited to support collaboration and CGMS invited individual countries to contribute to the WMO Trust Fund or provide a secondment, as appropriate.		CGMS-38	OPEN
CGMS Members	Recommendation 37.07 WGI	Recommendation 37.07: CGMS members are encouraged to continue to inform spectrum meeting representatives on the relevance and importance of frequency agenda items of importance to CGMS.		CGMS-38	OPEN
CGMS Members involved in CEOS WG CV and GSICS	Recommendation 37.08 WGII	Recommendation 37.08: CEOS WG CV and GSICS to study and report on intercomparisons of vicarious calibrations and trends in visible channels obtained from various land sites.		CGMS-38	OPEN

CGMS-37 recommendations					
Actionee	**Recommendation**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS Members involved in GSICS	Recommendation 37.09 WGII	Recommendation 37.09: GSICS to establish a publicly accessible database to provide full history of operational changes that affect instrument performance and calibration. It should include the date and time of each operating changes that affect the performance and calibration of each instrument, a short summary of the change, and a quantitative assessment of the severity of the impact on the instrument's calibration.		CGMS-38	OPEN
CGMS Members	Recommendation 37.10 WGII	Recommendation 37.10: All CGMS agencies are encouraged to participate in GSICS in order to ensure a world wide comparability and seamless integration of space-based observation data sets, which will ultimately benefit all.		CGMS-38	OPEN
NOAA	Recommendation 37.11 WGII	Recommendation 37.11: NOAA is encouraged to merge the MSU and AMSU data into a consistent climate time series of radiance/temperature data. A report to CGMS-38 is welcome.		CGMS-38	OPEN
CGMS Members	Recommendation 37.12 WGII	Recommendation 37.12: CGMS Members to contribute to page changes of the "Special Collection Issue" of papers arising from IPWG-4 in the AMS Journal of Applied Meteorology and Climatology.		CGMS-38	OPEN
CGMS Members	Recommendation 37.13 WGII	Recommendation 37.13: CGMS members to provide support for attendance at the next IPWG Workshop, 4-8 October 2010, in Hamburg, Germany for six scientists from developing and least developed countries.		31-Aug-10	OPEN
CGMS Members involved in GSICS	Recommendation 37.14 WGII	Recommendation 37.14: GSICS is requested to provide IPWG current and archived instrument metadata and information regarding instrument health for sensors used to estimate precipitation.		CGMS-38	OPEN
CGMS Members - satellite operators	Recommendation 37.15 WGII	Recommendation 37.15: CGMS operators are requested to undertake reprocessing of L1 radiance data and L2 precipitation data sets when significant calibration corrections are developed and algorithm improvements are implemented into operations.		CGMS-38	OPEN
CGMS Members - satellite operators	Recommendation 37.16 WGII	Recommendation 37.16: CGMS operators are requested to contribute in a timely fashion to the open archive of the international constellation of precipitation-relevant sensors, for example, for use in GPM.		CGMS-38	OPEN
CGMS Members involved in IPWG	Recommendation 37.17 WGII	Recommendation 37.17: Co-chairs of IPWG are invited to formally contact KMA concerning its participation in IPWG. KMA to provide IPWG with the point of contact. Deadline: 30 June 2010		30-Jun-10	OPEN
CGMS Members	Recommendation 37.18 WGII	Recommendation 37.18: WMO encourages CGMS members to repeat the very informative international operational AMV algorithm intercomparisons at regular time intervals of about 3-4 years.		CGMS-38	OPEN
CGMS Members	Recommendation 37.19 WGII	Recommendation 37.19: CGMS members should provide support to the next IWW10 meeting by approving participation of scientists and operational staff working on the utilisation and derivation of satellite winds and, if possible, by providing some support to travel of relevant people from the research community.		30-Jun-10	OPEN

CGMS-37 recommendations					
Actionee	**Recommendation**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS Members	Recommendation 37.20 WGII	Recommendation 37.20: Efforts by CGMS Members to enhance the use of AMVs in NWP should continue to address both the quality of the AMVs as well as the way the product is utilised in NWP assimilation systems.		CGMS-38	OPEN
CGMS polar operators	Recommendation 37.21 WGII	Recommendation 37.21: In view of the success of the polar winds all efforts should be undertaken to continue such products as long as possible from imaging instruments in polar orbits.		CGMS-38	OPEN
CGMS members involved in IWWG 10	Recommendation 37.22 WGII	Recommendation 37.22: IWWG 10 is requested to address the development of a stand-alone software package for the derivation of AMVs from imaging satellite instruments.		CGMS-38	OPEN
CGMS Members	Recommendation 37.23 WGII	Recommendation 37.23: CGMS endorsed and recommended all topics listed in EUM-WP-31 section 6 for a detailed discussion at IWWG 10.		CGMS-38	OPEN
JMA	Recommendation 37.24 WGII	Recommendation 37.24: JMA is invited to report at IWW10 on the derivation and quality of AMVs derived from the MTSAT imaging at time intervals as short as 7 and 4 minutes, respectively.		CGMS-38	OPEN
EUM, NOAA	Recommendation 37.25 WGII	Recommendation 37.25: On the basis of existing scientific prototype software for product retrievals, NOAA and EUMETSAT offer to other satellite operators existing prototype algorithm software for testing and further development.		CGMS-38	OPEN
CGMS Members	Recommendation 37.26 WGII	Recommendation 37.26: CGMS agencies are encouraged to review NOAA-WP-17 and EUM-WP-28, and provide working papers describing their product development processes at CGMS-38.		CGMS-38	OPEN
NOAA	Recommendation 37.27 WGII	Recommendation 37.27: NOAA is encouraged to include GRUAN radiosondes into NPROVS and to provide regular performance statistics of satellite products with GRUAN.		CGMS-38	OPEN
CGMS Members	Recommendation 37.28 WGII	Recommendation 37.28: CGMS members are invited to consider the testing and use of the NOAA NPROFS and EDGE systems and to contribute to comparisons by providing relevant data sets.		CGMS-38	OPEN
CGMS satellite operators	Recommendation 37.29 WGIV	Recommendation 37.29: Satellite operators to support the further development and expansion of IGDDS/RARS as operational components of the WIS architecture.		CGMS-38	OPEN
CGMS satellite operators	Recommendation 37.30 WGIV	Recommendation 37.30: All Satellite operators to consider applying as DCPCs.		CGMS-38	OPEN
CGMS satellite operators	Recommendation 37.31 WGIV	Recommendation_37.31: Satellite operators to prepare metadata related to satellite data and products to the GISCs in accordance with the WMO core profile of the ISO metadata standard and to make them available to the GISCs.		CGMS-38	OPEN
CGMS satellite operators	Recommendation 37.32 WGIV	Recommendation 37.32: Satellite operators to apply ISO 23950 for search as an effective enablement for interoperability between systems, including the WIS.		CGMS-38	OPEN

CGMS-37 recommendations					
Actionee	**Recommendation**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CGMS - TFSDC	Recommendation 37.33 WGIV	Recommendation 37.33: The CGMS Task Force on Satellite Data and Codes (TFSDC) to interact as appropriate with the WMO/CBS Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC), and the WMO/CBS Inter-Programme Expert Team on Metadata and Data Interoperability (IPET-MDI) with a view to contributing to the development of the WMO/WIS data representation and code forms for satellite data and products, and to the development of a comprehensive WIS data representation system policy.		CGMS-38	OPEN

I.4 Approval of Draft Final Report

CGMS reviewed the Draft Final Report of the meeting. The Secretariat agreed to include amendments received at the meeting in a revised draft version, which would be distributed electronically to CGMS Members for final comments. It was agreed that CGMS Members would submit any further modifications to the Secretariat by Tuesday 17 November 2009, to enable the electronic distribution of a finalised version by the Secretariat three weeks thereafter. It was further agreed that the final version of the report would be provided to participants both as a hard copy document and via CD-ROM, which would also contain all CGMS-37 Working Papers and presentations. The final report would also be made available on the EUMETSAT web site. As for future reports, CGMS Members recommended that the hard copy document continue to be provided.

In conjunction with this, and following discussions prior and during CGMS-37, the CGMS Secretariat would provide a proposal of a revamped CGMS agenda. This in order to appropriately address new areas of cooperation such as e.g. climate monitoring.

Action 37.19: The CGMS Secretariat to send a proposal of the revised agenda to Members for comment and approval in order to use it at CGMS-38. Deadline: 28 February 2010

I.5 Date and Place of Next Meetings

CGMS was pleased to accept an offer from India Meteorological Department to host CGMS-38 in New Delhi from 8-12 November 2010.

The Chairperson thanked all participants for their cooperation and fruitful participation in CGMS-37, adding that there had been many interesting discussions and important developments during the Working Group and Plenary sessions. WMO thanked KMA for hosting the meeting on Jeju Island, and for the excellent organisational arrangements, as well as the Rapporteurs and Secretariat for preparing the final report in a timely manner.

The meeting adjourned at 13:15 on 30 October 2009.

PARALLEL WORKING GROUP SESSIONS

WORKING GROUP I: TELECOMMUNICATIONS

I/0 Introduction

As agreed at the beginning of the plenary session of CGMS-37, Mr Marlin O. Perkins (NOAA) and Joaquin Gonzalez (EUMETSAT) were elected as Chairperson and Rapporteur, respectively, of Working Group I (WG I) on Telecommunications. WG I comprised representatives of the satellite operators from CMA, CNES, ESA, JMA, KMA, NOAA, ROSCOSMOS, ROSHYDROMET, and EUMETSAT together with WMO (see Annex 4 for full list of participants).

I/I Coordination of frequency allocations: SFCG, ITU and WRC activities

CMA-WP-04 provided an update on the status of the FY-4 Programme plans. It is the next generation of Chinese geostationary meteorological satellites that will take over the FY-2 series after 2015. Preliminary consideration on the FY-4 frequency network is given with respect to the frequency requirement for the increased amount of data in transmission. The spacecraft will collect atmospheric and surface condition parameters such as vertical temperature and moisture profiles, sea surface temperature, clouds, occurrence of lightning, and aerosol using instruments sensing in visible, near-IR and thermal IR frequencies. Data broadcast system will include the LRIT and a data downlink as well as an international and domestic DCP service. Due to the increased data volume, the raw data transmission (downlink) will be either x-band (7350-7550 MHz) or K_a band (18.1-18.4GHz). The first satellite will use X-band. This is TBD for the follow on satellites, and relies on the manufacturer for the development of the system. Other factors to be considered for the future FY-4 frequency network include the requirement for a new orbital location for satellites for backup/storage purposes, beside the primary locations at 86.5°E, 105°E, and 123.5°E.

WG I thanked CMA for the update on their FY-4 network.

Coordination of Future Use of the DCS in the 401–403 MHz Band

CNES-WP-01 invited CGMS members to consider the interferences identified by the Argos system within the 401-403 MHz band and to ask their respective administrations where interferences have been located and to take the appropriate actions for the removal of these interferences.

WG I thanked CNES for bringing the problem of interference to WG I attention and encouraged CGMS members to work with each other, with their frequency representatives and frequency administrations to resolve any conflicts.

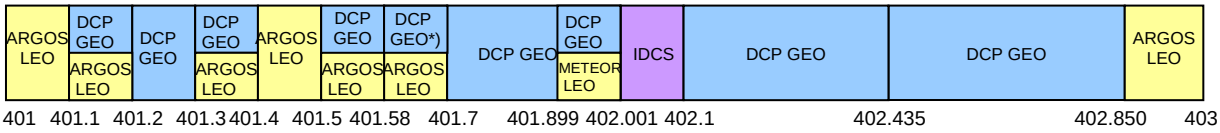
EUM-WP-21 provided a status report on the remaining open element concerning the coordination of DCP GEO platforms within the territory of the Russian Federation and ARGOS LEO in the frequency band 401.58–401.7 MHz. The Russian Federation and CNES agreed to conduct a coordination meeting on 9 September 2009 in Geneva.

At this meeting, attended by the Russian Federal Space Agency (RFSA), CNES, NOAA and EUMETSAT, a conclusion on the remaining open coordination issue in the band 401.58–401.7 MHz was reached between RFSA and CNES.

It was agreed between RFSA and CNES that for the long term coordinated usage of the band 401.58-401.7 MHz dedicated to ARGOS-LEO, DCP GEO can be operated over the territory of Russia only. However, in order to maintain the common usage of the band between LEO and GEO systems, DCP GEO should not to exceed an EIRP of 16 dBW.

Figure1 contains the agreed updated status of coordination with a basic general partitioning of the band 401–403 MHz for future long-term coordinated use of DCS systems on geostationary and non-geostationary MetSat and EESS systems.

Figure 1. Basic general partitioning of the band 401 – 403 MHz for future long-term coordinated use of DCS systems on geostationary and non-geostationary MetSat and EESS systems



*) In the band 401.58–401.7 MHz operation of DCP GEO only over the territory of the Russian Federation with a maximum EIRP of 16 dBW.

WG I thanked EUMETSAT for its support in developing and coordinating the basic partition of the 401–403 MHz band. Roshydromet confirmed its agreement to the proposed partitioning for the coordinated use of the DCP band. CNES also confirmed that the version presented in EUM-WP-21 corresponds to the agreement reached with the Russian Federation during September 2009 and complements the agreements reached by all CGMS members through the process agreed at CGMS-36.

Action 37.20: CGMS Secretariat to develop the CGMS coordinated response on the future use of the 401–403 MHz band at the 2010 SFCG-30 meeting. Deadline: 31 January 2010

Action 37.21: EUMETSAT to present the CGMS Secretariat's statement on the final outcome of the rationalisation of the frequency assignments and use of the DCS uplink band (401-403 MHz). Deadline: SFCG-30

The meeting recalled that the agenda of the World Radio-communication Conference 2012 (WRC-12, January 2012) includes several items of serious importance for WMO and CGMS related to the requirements of meteorological satellites and the Earth exploration satellite service in particular for passive sensing.

WMO-WP-01, EUMETSAT-WP-20 and NOAA-WP-09 each highlighted topics of most relevance to CGMS members and provided a short summary of the decisions on those items and their consequences for the operation of meteorological satellites.

1. Among WRC-12 agenda items, the following items concern frequency bands or issues of prime interest/concern for CGMS:

- **agenda item 1.6**: Passive service between 275 and 3000 GHz
- **agenda item 1.8**: Fixed service between 71 and 238 GHz
- **agenda item 1.15**: Oceanographic radars in the frequency range 3-50 MHz
- **agenda item 1.16**: Lightning detection below 20 kHz
- **agenda item 1.22**: Effect of emissions from short-range devices (SRD)
- **agenda item 1.24**: Extension of the 7750-7850 MHz MetSat band to the band 7850-7900 MHz
- **agenda item 1.25**: Mobile Satellite Service
- **agenda item 8.1.1**: (issue C) Resolution 673 (WRC-07) on Radiocommunications use for Earth observation applications

In addition, several agenda items are currently not involving specific frequency bands used for meteorological purposes but may potentially have an impact on meteorological interests, either due to their wide open scope in terms of frequency ranges under study or in relation with a potential general interest.

There are also items of potential concern for CGMS, should identification or allocations for other radio communication services be considered in bands allocated to MetSat or EESS, as follows:

- **agenda item 1.3**: Unmanned Aircraft Systems (UAS)
- **agenda item 1.5**: Electronic News Gathering (ENG)
- **agenda item 1.7**: Aeronautical mobile under Resolution 222 (Rev. WRC-2007)
- **agenda item 8.2**: WRC-2015 Agenda

Agenda item 1.6: Passive service between 275 and 3000 GHz

This agenda item will consider a review of No. 5.565 of the Radio Regulations with a view to update the spectrum use by the passive services between 275 and 3 000 GHz and, in particular, the Earth exploration-satellite service.

Bands within this frequency range are currently or planned to be used by a number of passive sensors flying on meteorological and environmental satellites such as PREMIER, CIWSIR, MWI, MLS, MASTER, GEM, GOMAS (TBC), CLOUDS, ODIN/SMR, SOPRANO or SMILES and correspond in particular to important water vapour and oxygen spectral lines or cloud ice and cirrus measurements.

One can also note that these bands are of interest for ground-based passive sensing (aeronomy), although not a specific radio service, focusing on terrestrial atmosphere studies from the ground and making use of different types of instruments.

WMO stressed the high interest and importance of such bands above 275 GHz for meteorology, climatology and environmental activities and supports such review and update of spectrum use by EESS or aeronomy to allow early assessment of meteorological next generation equipment.

EUMETSAT supported the process within ITU-R and SFCG for revision of RR No. 5.565 to include all appropriate frequency bands within the range 275 to 3000 GHz to be used by systems belonging to the Earth exploration-satellite (passive) in order to protect these bands for scientific applications now and in the future.

Frequency bands above 275 GHz currently planned to be used by the Microwave Imager (MWI) instrument in the framework of Post-EPS were submitted to the relevant fora and are properly reflected in the relevant documentation within SFCG (SFCG-Resolution 29-1 “Passive bands of interest above 275 GHz”) and the ITU-R (“Draft New Report ITU-R RS.[above 275] on Passive bands of interest to EESS/SRS from 275 to 3000 GHz”).

WG I supported any activity to merge the individual plans of space agencies and MetSat operators into a coordinated and consolidated list of frequency bands above 275 GHz, finding a reasonable compromise between requirements and plans for current and future use by passive sensors of bands above 275 GHz.

WG I agreed that such frequencies bands above 275 GHz are extremely important for meteorology, climatology and environmental activities, and supports such review and update of spectrum use. WMO asked each CGMS member to provide their plans for frequency bands above 275 GHz.

Action 37.22: CGMS members to present their plans for frequency bands above 275 GHz. Deadline: CGMS-38

Agenda item 1.8: Fixed service between 71 and 238 GHz

This agenda item mainly considered technical and regulatory issues related to the fixed service between 71 and 238 GHz, including sharing and adjacent compatibility with passive services under Resolution 731 (WRC-2000). This frequency range covers a number of important EESS (passive) frequency bands, such as 86-92 GHz, 100-102 GHz, 114.25-122.25 GHz, 148.5-151.5 GHz, 174.8-191.8 GHz, 226-231.5 GHz and 235-238 GHz, covered or not by RR No. 5.340 and already in use by a number of instruments.

WMO supported the protection of passive frequency bands in the 71-238 GHz range and strongly urges that any technical and regulatory conditions set up for the Fixed Service should be associated with appropriate in-band or adjacent-band conditions to ensure protection of the EESS (passive).

WG I agreed the issue currently with the highest potential impact is WRC-12 Agenda Item 1.8, which calls for ITU-R studies concerning the technical and regulatory issues relative to the fixed service in the bands between 71 GHz and 238 GHz. WG I recalled this frequency range includes bands currently used by many passive sensors such as AMSU-A and MHS as well as future passive sensors on planned missions. It must be ensured that any consideration or studies resulting in proposals to WRC-12 do not negatively impact the long term usability and protection of these EESS (passive) bands.

WG I confirmed it will be necessary to ensure that any considerations regarding this agenda item will take into account the protection requirements of the passive sensing use in bands allocated to the EESS (passive) in the range 71 GHz to 238 GHz.

Agenda item 1.15: Oceanographic radars in the frequency range 3-50 MHz

This agenda item will consider possible allocations in the range 3-50 MHz to the radiolocation service for oceanographic radar applications. The experience gained from operating experimental or pre-operational HF oceanographic radars in a number of countries around the world has provided an understanding of spectrum needs and spectrum sharing considerations, as well as an understanding and confirmation of the benefits provided by these systems through measurement of coastal sea surface conditions to support environmental, oceanographic, meteorological, climatological, maritime and disaster mitigation activities.

WMO underlined the importance of oceanographic radars for meteorology, climatology and environmental activities and supports relevant radiolocation service allocations within the 3-50 MHz band to enable the implementation and operation of such radars.

WG I upheld the importance of oceanographic radars for meteorology, climatology and environmental activities and supports relevant radiolocation

service allocations within the 3-50 MHz band to enable the implementation and operation of such radars.

Agenda item 1.16: Lightning detection below 20 kHz

This agenda item will consider recognition of systems in the meteorological aids service (passive) in the frequency range below 20 kHz for lightning detection applications and a corresponding service allocation.

One such system is currently deployed and operated by the UK Met Office to the benefit of meteorological organisations worldwide. This system contributes towards safety of life, both in terms of forecasting for public safety and safety of aviation operations, especially over the oceans and large areas of land where national lightning detection systems do not exist. In addition to the dangers of the lightning strike itself, thunderstorms can result in intense precipitation with consequent flooding, severe icing, wind shear, turbulence and gusting winds.

This system, which does not yet provide the required global coverage, is currently operated below 20 kHz without a RR allocation. This system allows for long distance (several thousands kilometers) strike detection but is currently experiencing interference that is impacting its quality of service. An allocation to the meteorological aids service (passive) in a given frequency band below 20 kHz would provide necessary recognition and long-term protection to this application.

WMO supported an allocation to the meteorological aids service (passive) below 20 kHz that is the only solution to ensure long-term availability of long range and global lightning detection applications of importance for a number of meteorological services and the whole meteorological community.

WG I thanked WMO for its support in recognising the importance of long range and global lightning detection applications to the meteorological services. Further, WG I confirmed the need for lightning detection in fire monitoring. An allocation to meteorological aids service would ensure its long-term availability.

Agenda item 1.22: Effect of emissions from short-range devices (SRD)

This agenda item will examine the effects of emissions from Short Range Devices (SRDs) in order to ensure that radio communication services are adequately protected.

Even though a particular focus is made on radio frequency identifications (RFIDs), this agenda item could consider all types of SRDs, including Ultra Wide Bands (UWB) applications, and, to this respect, could hence lead to a global consideration of all frequency bands of interest for the meteorological community.

Should any provision relating to SRDs be included in the Radio Regulations, WMO urges that compatibility with and protection of meteorological applications and services be ensured.

WG I agreed that compatibility with and protection of meteorological applications and services must be ensured.

Agenda item 1.24: Extension of the 7750-7850 MHz Meteorological-satellite service allocation to the band 7850-7900 MHz

This agenda item will consider the extension of the existing primary allocation to the meteorological-satellite service in the band 7750-7850 MHz to the band 7850–7900 MHz, for non-geostationary meteorological satellites in the space-to-Earth direction.

The mission requirements for next generation non-GSO (Geostationary-Satellite Orbit) meteorological satellites in terms of observations, instruments and user-services clearly show a need to transmit higher data rates compared to current systems.

EUMETSAT supported the extension of the existing allocation of the 7750-7850 MHz band to the MetSat service (space-to-Earth) for use by non-geostationary satellites into the 7850-7900 MHz band and performed and introduced the necessary sharing studies in the relevant ITU-R Working Party 7B resulting in “DRAFT NEW REPORT ITU-R [METSAT 7.9 GHz] on Compatibility between the meteorological satellite and the fixed service in the band 7 850-7 900 MHz”.

From the results of the sharing studies which is taking into account use of the band by MetSat for raw data dump and/or direct readout applications it can be concluded that the sharing scenarios in the frequency band 7850-7900 MHz are similar to ones in the frequency band 7750-7850 MHz, thus MetSat could be operated under the same regulatory conditions as in the existing MetSat band.

Considering the different concepts for using this band by current polar-orbiting MetSat systems, such as FY-3, NPOESS and Metop and the potential to interfere with each other, once the band 7850–7900 MHz is allocated to MetSat (at WRC-12) a coordinated approach for planning the long term use of the entire band 7750–7900 MHz would be necessary, taking into account SFCG RES 19-7R3.

WMO stressed that similar services are allocated in the 7750-7850 MHz and 7850-7900 MHz bands hence justifying similar sharing conditions with MetSat service. WMO supports the MetSat allocation extension in the 7850-7900 MHz under similar conditions to the current 7750-7850 MHz band.

WG I stated that a coordinated approach for planning the long term use of the band 7750–7900 MHz would be necessary, taking into account SFCG RES 19-7R3.

Based on outcome of the discussions, EUMETSAT proposed to coordinate a draft proposal for the next CGMS meeting. This was agreed by WG I.

Agenda item 1.25: Mobile Satellite Service

This agenda item considers studies of possible bands for new allocations to the mobile-satellite service in the Earth-to-space and space-to-Earth directions, with particular focus on the range 4-16 GHz in which a number of bands are allocated and used by various meteorological applications (METSAT, radars, EESS).

WMO will involve itself in these studies but already stressed the difficulty of coexistence with MSS, in particular on the uplink. Indeed, MSS Earth stations are mobile and unlicensed by nature and as such, make the necessary separation distances with fixed stations (e.g. MetSat receiving stations) difficult to control.

Should identification or allocations for mobile satellite service be considered in bands allocated to meteorological or EESS services, WMO urged that adequate protection be ensured with related applications.

WG I thanked WMO for its concerns and involvement in the ITU-R studies focusing on possible bands for new allocations to the mobile-satellite service in the Earth-to-space and space-to-Earth directions, with particular interest in the 4–16 GHz range.

Within the framework of the ITU-R the band 7750–7900 MHz is currently listed as one of the candidate bands to be studied for a future MSS allocation (Earth-to-space direction) under WRC-12 agenda item 1.25 as proposed by the MSS proponents, for which sharing studies with the existing services will need to be performed.

Regarding the sharing studies still to be performed within the framework of the ITU-R for a potential MSS uplink (Earth-to space) in a band allocated to a MetSat downlink (7750–7850 (7900)MHz), the risk of interference by the MSS uplink through the side lobes of the MetSat Earth stations needs to be assessed.

EUMETSAT informed WG I that to counter a potential allocation to the MSS, MetSat operators will have to study and determine the required separation distance to MetSat Earth stations and provide the results to raise their concerns in the relevant ITU-R and regional preparatory fora for WRC-12.

The aim should be to delete the band 7750–7900 MHz from the list of bands to be studied for a potential allocation to the MSS in order to avoid a potential impact to the future use of this band by MetSat systems.

WG I thanked EUMETSAT for its considerations and invited CGMS members to raise their concerns for the ITU-R studies focusing on 7750–7900 MHz band as

a new allocation to the mobile-satellite in the relevant ITU-R and regional preparatory forums for WRC-12 with particular interest in the 4-16 GHz range. WG I proposed the following action:

Action 37.23: All CGMS members to report on their plans of utilisation for the band 7750-7850/7900 MHz (i.e. including the 7850-7900 MHz extension if agreed in WRC-11). Deadline: CGMS-38

Agenda item 8.1.1 (Issue C): Resolution 673 (WRC-07) on Radiocommunications use for Earth observation applications

WRC-07 adopted Resolution 673 (WRC-07) on Radiocommunications use for Earth observation applications, highlighting and recognising the importance of the essential role and global importance of Earth observation radio communications applications and calling on studies on possible means of improving this recognition and of increasing the knowledge and understanding of administrations regarding the utilisation and benefits of these applications.

This Resolution 673 (WRC-07) instructs the Director of the Radiocommunication Bureau to report to WRC-12 on these studies and will, to this respect, be considered under WRC-12 agenda item 8.1.1 (Issue C).

WMO emphasised the importance of Resolution 673 (WRC-07) that has already been referred to and welcomed in the Earth Observation Summit Ministerial declaration (Cape Town, Nov 07).

To this respect, it is worth emphasising the intergovernmental Group on Earth Observations (GEO) worldwide effort over the next 10 years to build a Global Earth Observation System of Systems (GEOSS) that will work with and build upon existing national, regional, and international systems to provide comprehensive, coordinated Earth observations from thousands of instruments worldwide, transforming the data they collect into vital information for society.

WMO stressed the recognised importance of Resolution 673 (WRC-07) in relation to Earth observation activities and the need to secure it as a long-term ITU Resolution. WMO supported on-going ITU-R studies toward an ITU-R Report on “The essential role and global importance of radio spectrum use for Earth observations and for related applications“. Also, WMO encouraged the use of such study results to identify frequency bands for use in Earth observation activities, which could require consideration at future WRCs.

WG I thanked WMO for bringing to the group’s attention the importance of Resolution 673 (WRC-07) in relation to Earth observation activities. WG I noted that several CGMS satellite operators are planning new satellite systems for monitoring the Earth’s oceans, land and atmosphere. These systems support forecast and warnings, and inevitably contribute to climate monitoring. The essential role and global importance of radio spectrum is critical for these observations and their related applications. WG I encouraged CGMS members

to use these studies to identify frequency bands for use in Earth observation activities, which could require consideration at future WRC meetings. The following action was agreed:

Action 37.24: As proposed by ESA, CGMS members to coordinate with CEOS in providing inputs for the report being prepared by ITU-R "The essential role and global importance of radio spectrum use for Earth observations and for related applications." In particular, for chapter 4 about the potential economical impacts of data loss due to RF interference. Deadline: 31 May 2010

Recommendation 37.07: CGMS members are encouraged to continue to inform spectrum meeting representatives on the relevance and importance of frequency agenda items of importance to CGMS.

Other agenda items

Agenda item 1.3: Unmanned Aircraft Systems (UAS)

Although no specific frequency bands are mentioned, this agenda item will probably consider spectrum in the range between 2 and 10 GHz in which a number of bands are allocated and used by various meteorological applications.

WMO noted that UAS applications are currently not considered in frequency bands used for meteorological applications.

WMO recognised that UAS have already been operated in the past by some meteorological services and that such vehicles are of interest for future climatological, meteorological and environmental activities, either for research or operational use. It is assumed that these UAS requirements would fit in the current general requirements made for other purposes.

WMO supported this agenda item. However, should identification of allocations for Unmanned Aircraft Systems (UAS) be considered in bands allocated to meteorological services, WMO urges that compatibility with related applications be assessed and adequate protection be ensured.

WG I thanked WMO for its concerns for bands allocated to meteorological services and agreed that compatibility with related applications be assessed and adequate protection must be ensured.

Agenda item 1.5: Electronic News Gathering (ENG)

Some frequency bands used or under consideration for ENG are also allocated to meteorological services (e.g. 2700–2900 MHz and 10.6–10.68 GHz) in which concentration of rather powerful ENG operations could adversely impact corresponding meteorological applications.

Should identification or allocations for Electronic News Gathering (ENG) be considered in bands allocated to meteorological services, WMO urged that compatibility with related applications be assessed and adequate protection be ensured.

WG I thanked WMO for its concerns for bands allocated to meteorological services and agreed that compatibility with related applications be assessed and adequate protection must be ensured.

Agenda item 1.7: Aeronautical mobile under Resolution 222 (Rev. WRC-2007)

Although no specific frequency bands are mentioned, this agenda item will probably consider spectrum above 1.6 GHz in which a number of bands are allocated and used by various meteorological applications (MetSats, radars, EESS).

Should identification or allocations for Aeronautical mobile service be considered in bands allocated to meteorological services, WMO urges that compatibility with related applications be assessed and adequate protection be ensured.

WG I thanked WMO for its concerns for bands allocated to meteorological services and agreed that compatibility with related applications be assessed and adequate protection must be ensured.

In conclusion, WMO wished to receive feedback from CGMS Members on the proposed position for WRC-12 contained in the Appendix to WMO-WP-01, which had been prepared by the Steering Group on Radio-Frequency Coordination (SG-RFG).

Action 37.25: CGMS members to review the proposed position for WRC-12 contained in WMO-WP-01 and send comments to the Chairperson of SG-RFC (philippe.tristant (at) meteo.fr) and to WMO Secretariat (jlafeuille (at) wmo.int). Deadline: 31 December 2009

Technical Information from the Space Frequency Co-ordination Group and ITU-R

In NOAA-WP-09, NOAA reported on it participation at SFCG-29 held in Moscow, Russia in June 2009, at the invitation of the Russian Federal Space Agency (Roscosmos) and the Russian Institute for Space Devices Engineering (RISDE). At SFCG-29, NOAA proposed a revision to the existing Preliminary Draft New Report ITU-R RS [ABOVE 275 GHz] regarding passive bands of interest from 275 to 3000 GHz and an updated list of present and future radio frequency requirements of NOAA satellite networks.

At SFCG-29, the working group on ITU Matters and preparation for WRC-12 drafted a new resolution dealing with WRC-12 agenda items of importance to

the CGMS membership. The group also reviewed the many SFCG resolutions and recommendations attributed to EES and MetSats. Of interest to CGMS are:

Discussions on protection of passive sensor frequencies and the communications links used by MetSats, including the provisional recommendation entitled “Efficient Sharing of the 25.5-27 GHz Band between EESS (s-E) and SRS (s-E)”, which considers the band proposed by NPOESS to downlink (i.e. s-E or space-to-Earth), critical raw sensor data to the SafetyNet receptor sites. This draft recommendation is moving forward in parallel through ITU WP7B and Study Group 7

International Telecommunication Union–Radiocommunication (ITU-R) sector Working Parties 7B and 7C (WP7B, WP7C)

The ITU-R WP7B and WP7C met twice in the last 12 months (31 March–4 April 2008 and 7-13 October 2008). WP7B is concerned with space radio systems, i.e. the transmissions between the Earth and satellites, both uplinks and downlinks. A major topic of interest to CGMS under consideration in this WP is furthering technical studies toward gaining approval of expanding the existing non-geostationary MetSat space-to-Earth allocation at 7750-7850 MHz by 50 MHz. At the September 2009 meeting of WP7B, a draft report on compatibility between MetSats and the fixed service in 7850-7900 MHz was finalised and sent to Study Group 7 (SG 7). WP7B also updated draft text for the Conference Preparatory Meeting (CPM) on this WRC-12 agenda item. The text indicates that MetSat sharing the extended band with the existing fixed and mobile services is feasible.

NOAA proposed a global review of all ITU-R recommendations dealing with EESS and meteorological satellite service space-to-Earth and Earth-to-space links since interference assessments has changed since the last major revision of the ITU-R Recommendations on EESS and MetSat systems.

Under WRC-12 agenda item 1.25, WP 4C (Efficient orbit/spectrum utilisation for the mobile-satellite service (MSS)) is currently performing sharing studies between possible future MSS allocations in various bands and corresponding incumbent services, including MetSats in the 7750–7900 MHz (non-geostationary meteorological satellite space-to-Earth links). Preliminary analysis in WP 7B indicates that keep-out distances for MES to prevent interference to MetSat Earth stations could be around 100 km. Transmissions from maritime MES or land-based MES near large bodies of water will require significantly larger distances. The distances would be even greater for aeronautical MES.

WP7B deemed the preliminary draft new recommendation entitled “Guidelines for Efficient Use of the 25.5-27 GHz Band by the Earth Exploration-satellite Service (space-to-Earth) and Space Research Service (space-to-Earth)” to be mature and approved its being sent forward to SG 7 for consideration.

WP7C covers applications in the EES concerning active and passive sensors as well as metaids, i.e. radiosondes and meteorological radars. The major thrust in

WP7C during the last meeting of interest to CGMS is to address the WRC-12 agenda item 1.6, viz., to review the last footnote (5.565) in the ITU table of frequency allocations in order to update the spectrum use by the passive services between 275 GHz and 3000 GHz. The draft report on passive sensing use in this region of spectrum reached consensus at the September 2009 meeting and was sent to SG 7 for approval. Additionally, several documents (reports and recommendations) related to passive sensors reached maturity and were presented to SG 7 for consideration and approval.

Study Group 7–Science Services

As the overseeing body for its working parties, SG7 is responsible for reviewing the outputs of the working parties. If an output is approved by SG7, it is sent forward to the members of the ITU for adoption and approbation by correspondence. At the SG 7 September 2009 meeting the following documents were approved for sending to administrations:

1) Report ITU-R [METSAT 7.9 GHz]-Compatibility between the meteorological satellite and the fixed service in the band 7 850-7 900 MHz (from WP7B)

2) Recommendation ITU-R RS.[AGGREGATE]-Characterization and assessment of aggregate interference to EESS (passive) sensor operations from man-made emission power sources (Question ITU-R 243/7) (from WP7C)

3) Recommendation ITU-R RS.[DISASTER]-Use of remote sensing systems in the event of natural disasters and similar emergencies for warning and relief operations (from WP7C)

4) Recommendation ITU-R RS.[PASSIVE_CHARS]-Typical technical and operational characteristics of Earth exploration-satellite service (passive) systems using allocations between 1.4 and 275 GHz (from WP7C)

5) Report ITU-R RS.[IDEN_DEGRAD]-Identification of degradation due to interference and characterisation of possible interference mitigation techniques for passive sensors operating in the Earth exploration-satellite service (passive) (from WP7C)

6) Recommendation ITU-R SA.[26 GHz]-Guidelines for efficient use of the band 25.5-27.0 GHz by the Earth exploration-satellite service (space-to-Earth) and space research service (space-to-Earth) (from WP7B)

World Meteorological Organization (WMO) Commission for Basic Systems (CBS) Steering Group on Radio Frequency Coordination (SG-RFC)

The WMO's SG-RFC met 14-15 September 2009 to discuss topics related to metaids and MetSats. The major topic of interest to MetSat operators was the WMO position on several of the WRC-12 agenda items concerning MetSats and metaids. Details of the position on the various agenda items are provided in a

separate input from the WMO. The joint (WMO/ITU) publication (2009) of the handbook entitled “Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction” was also discussed. The handbook updates the original edition published in 2002 and provides comprehensive information on meteorological satellites, radars and radiosondes. The handbook is available without charge at:

http://www.itu.int/publications/publications.aspx?lang=en&media=electronic&parent=R-HDB-45-2008. SG-RFC also considered topics on frequency bands used for MetSat transmissions and those concerning spaceborne remote sensing as well as contributions to the ITU-R involving MetSat and EESS allocations.

I/2 Telecommunication techniques

EUM-WP-22 provided a summary of the activities performed by EUMETSAT for future programmes, EUMETSAT evaluated the relevant band allocations in 18.1 and 26.5 GHz (K and Ka-Band) to downlink the instrument data (because of the associated data volumes and rates). As these bands are recognised to be fade prone, it is necessary to secure the downlink from the satellites implying the provision of margins in the design of the system. As any system margin, this needs to be balanced with the resource implications that the implementation of the margin will imply. In telecommunication systems this led to looking for alternatives to mitigate the fading effects. Fade mitigation techniques are described in the literature and have been evaluated in previous systems (e.g. by NASA and ESA) that have allowed ITU, for instance, deriving statistical models that are currently used by telecommunications operators when planning systems in these bands. However, these statistical models have been derived for an average year and allow system planning for quality of service (QoS) in telecommunications systems also expressed in percentage of unavailability (errored seconds) over an average year.

In the case of the meteorological satellites, the downlink from the instrument(s) contains data that have a temporal dimension (or even a repeat cycle concept), in the order of minutes, that needs to be taken into consideration when processing the data and that is subject to timeliness requirements when generating and making the different levels of processed products available to the user community. In this sense, there is a short term component in the data that it is not well covered by the long term (average year) statistical modelling done for telecommunication systems. In order to better understand the short term component of the fading in these bands, and the potential benefits of site diversity as a fading mitigation technique, EUMETSAT is currently performing a study for characterising the short term behaviour of a “mission data downlink” signal in this band. The study is using a beacon (19.3 GHz) provided by a telecommunications satellite but ITU models can be used for frequency scale the results. The study contains two reception sites so the improvement achieved by site diversity is also covered. The case example of MTG (@ Phase B1) is used to model the problem and

derive results (e.g. data downlink yearly availability is stated to be 99.9% which corresponds to atmospheric attenuation margin of approx 6 dB @ 19.3 GHz).

This Working Paper summarised the logic that has been followed in the study and its preliminary results, and informed CGMS members about the activities performed by EUMETSAT in the area of the CGMS WG I on telecommunications techniques that could be of relevance for future systems using these frequency bands (18.1 and/or 26.5 GHz).

NOAA informed WG I on the studies performed on simulations of the GOES-R data set at the Wallops Command and Data Acquisition (WCDA) station. NASA/NOAA conducted a study on using L Band dual polarisation to try & increase the data capacity of the GOES R Project's GOES Re-Broadcast (GRB) processed data relay. The testing was conducted using Wallops antennas, over the course of a year, and was successful in showing that significant increase in data capacity can be obtained by relaying half the data in Left Hand Circular (LHC) polarisation & the other half in Right Hand Circular (RHC) using the same frequency.

WG I encouraged CGMS members to provide any comments regarding similar or related experiences, (if provided to CGMS Secretariat they will be circulated to WG I participants).

I/3 Co-ordination of International Data Collection & Distribution

I/3.1 Status and Problems of the IDCS

JMA-WP-02 informed CGMS that MTSAT-1R's International Data Collection System (IDCS) has been functioning properly since the satellite started operation. Severe interference was frequently observed on IDCS channel 33 from August 2008 through to July 2009. However, there was no negative effect on IDCS operation as no International Data Collection Platform (IDCP) is registered on this channel. IDCPs were registered on 5 out of 33 MTSAT-IDCS channels as of 31 July 2009, and no effective data has been transmitted during the reporting period. JMA plans to switch the operational use of MTSAT-1R's imaging function over to that of MTSAT-2 in summer 2010 when the service period of MTSAT-1R's earth imaging sensor reaches the end of its five-year design lifetime. The provisional date for the switchover is 1 July 2010. A further announcement will be made once the exact date and time of the switchover are determined. MTSAT-1R will continue to operate the DCS, including the IDCS, to collect environmental data from DCPs even after the switchover. Further information regarding MTSAT-IDCS is available under the *Monthly Operations* reports on the MSC website at http://mscweb.kishou.go.jp/operation/opr_report.htm.

I/3.2 Ships, Including ASAP

No working papers were presented under this topic.

I/3.3 Dissemination of DCP messages (GTS or other means)

No working papers were presented under this topic.

I/4 Future use of the IDCS

NOAA-WP-10 provided a status report on the performance of the International Data Collection System (IDCS). NOAA's DCS Automated Processing System (DAPS) is still running, but a new system is nearing completion, and is expected to deploy for full operation in October 2009. The DCS Administration and Data Distribution System (DADDS) can now be brought online when needed, providing distribution of critically needed data through the Internet, a commercial communications satellite (DOMSAT), and NOAA's National Weather Service Telecommunications Gateway (NWSTG), which feeds the Global Telecommunication System (GTS). In addition, interconnectivity is provided through direct connectivity to the DCS demodulators. DADDS is planned to provide all the functionality of the DAPS system, with improved system monitoring capabilities and better user interface. NOAA has finalised new Certification Standards to allow transmitters to use smaller channels, and plans to begin development of new transmitters within 6 to 12 months. This will allow NOAA to double the number of channels on our system over the long term from approximately 200 channels to 400 channels (estimated 10 years to completion). The transition to high data rate (HDR) continues, with approximately 19,000 of the 26,000 platforms assigned reporting at 300 or 1200 bit/sec. The number of 100 bit/sec transmitters is finally beginning to drop, indicating that users are decommissioning the older transmitters. NOAA is investigating the use of two way communications to better command and control platforms. A phase I analysis was completed, and a Phase II effort which will deliver a prototype receiver and waveform definition has been underway for one year. A prototype is due in approximately 6 months. NOAA is proceeding slowly with this project, since most resources are being committed to DADDS and to the Version 2 HDR transmitter implementation. As previously noted, a conflict in the addressing scheme makes it difficult for the NOAA to include new addresses generated by EUMETSAT. There is no current plan to address this issue, as use of the international channels is minimal. During the last year research has been conducted to prove the concept of commanding DCS platforms using CDMA technology.

From October 2008 through September 2009 the total number of platforms assigned to the international channels was as follows:

New International Channels	224	226	228	230	232	234	236	238	240	242	244
Channel #	01	02	03	04	05	06	07	08	09	10	11
# of PLT(s)	0	0	0	1	1	0	0	0	6	0	0

There had been very few new allocations of IDCPs within the past year. CGMS members took note of the status and performance of the IDCS at http://www.noaasis.noaa.gov/DCS/.

I/5 Search and Rescue (S&R)

No working papers were presented under this topic.

I/6 Review of actions, conclusions and preparation of WG report

Participants at WG I agreed that all the working papers and inquiries provided valuable information on the current and future frequency plans for MetSats and meteorological aids. It was agreed that:

Action 37.26: In the future when reporting on systems, all CGMS members are asked to expand the details to cover the use of the different frequency bands and the related services. Deadline: CGMS-38

The Working Group report was prepared and all actions were agreed upon in Plenary.

WORKING GROUP II: SATELLITE PRODUCTS

II/0 Introduction

Working Group II on Satellite Products was chaired by Dr Peng Zhang, CMA. Mitch Goldberg, NOAA, and Johannes Schmetz, EUMETSAT, assisted as rapporteurs. 47 Working Papers were presented and discussed. The order of presentation was modified: As most papers under II/2 were related to GSICS, agenda item II/2 was moved to Tuesday, 27 October 2009, in order to allow for the participation of the GSICS Chair Dr M Goldberg. A contributed paper from ESA addressed the CEOS Working Group on Calibration and Validation (WGCV) organisation and current activities. This paper, presented by Mr Pascal Lecomte, Chair of the CEOS WGCV, was particularly welcomed by CGMS as it pointed out the relationship between the CEOS WGCV and GSICS. (See Annex 4 for full list of participants).

The three CGMS Working groups ITSC, IPWG and IWWG did not hold workshops in 2009 and therefore the presentations on ITSC, IPWG and IWWG were in preparation of upcoming workshops in 2010 and presented recent related activities and progress. It was noted that all past actions were successfully addressed and closed.

II/1 Image Processing Techniques

No paper was presented under this section.

II/2 Satellite Data Calibration and Validation

CMA-WP-05 reported on the actions taken by the GSICS Processing and Research Center (GPRC) in CMA, in response to recommendations from the CGMS-36 concerning GSICS. The progress of the CMA GPRC the last year includes the establishment of computer hardware system, operational inter-calibration for FY-2 satellites, and the GSICS website. GSICS GEO-LEO inter-calibration for FY-2 is running operationally at CMA, and the result is displayed on the website. Effort is spent on real-time monitoring of the performance of FY satellites sensors, and the test for LEO-LEO inter-calibration for FY-3A optical sensors such as MERSI, VIRR, and IRAS based on AIRS, IASI, and MODIS. CMA has also made progress on the recalibration of the historical FY-1C/1D data using historical data from Cal/Val experiments in fields of Dunhuang and Qinghai Lake to calibrate and validate the L1B radiance and L2 retrieval products of satellite data.

Action 37.27: GSICS to work with CEOS WGCV to assess Dunhuang and Qinghai Lake as reference sites. Deadline: CGMS-38

CMA-WP-06 introduced the methods being used for the three FY-3A optical instruments (the MEdium Resolution Spectral Imager - MERSI, the Visible and InfraRed Radiometer –VIRR, and the InfraRed Atmospheric Sounder - IRAS). To acquire accurate calibration, several measurements are taken, for instance, to use the China Radiometric Calibration Sites (CRCS), the inter-calibration based on GSICS SNO method and sites cross-calibration method, and calibration degradation monitoring from CEOS/WGCV global reference sites. In response to a recommendation from CGMS-36, the instrument performance is monitored by the new Instrument Performance Monitoring (IPM) developed at CMA. Progress is also being made for the calibration of MERSI and VIRR which uses land-based reference sites in the Gobi Desert, Dunhuang, Libya, Greenland, Antarctica and DOME-C to monitor stability and to update coefficients for the visible channels.

Recommendation 37.08: CEOS WG CV and GSICS to study and report on intercomparisons of vicarious calibrations and trends in visible channels obtained from various land sites.

ESA-WP-05 discussed the functional baseline of the Sensor Performance, Products and Algorithms (SPPA) activities at ESA and in particular those related to 1) Operational data and product quality control, 2) Product verification, calibration and Validation, 3) Instrument Calibration, 4) Sensor Performance monitoring and Assessment, and 5) Algorithm and processing chains development, verification, maintenance and evolution. In order to cover this large spectrum of tasks and to preserve the independence between scientific and operational activities, SPPA has put in place three support entities: 1)The Expert Support Laboratories (ESL), 2) The Quality Centres, and 3) The Validation Teams. ESL provide scientific support to the mission. In particular, they are responsible for Algorithm Development, Verification and Maintenance. In support to this activity they are responsible for the development and the maintenance of the IPF prototype. The main output of this activity is the delivery of the Detailed Processing Model (DPM), Input Output Data Definition (IODD) and Test Data Sets (TDS), required by the Quality Centres for the maintenance of the IPF. The ESL support ESA for scientific investigation and in the overall scientific management of the mission. The Expert Quality Centres are in charge of the long-term monitoring of ESA's Earth Observation mission sensor performances and also of the routine product quality control and maintenance for ESA and Third Party Missions. The Quality Centres also provide support to ESA, investigate anomalies, ensure the correct monitoring and updating of the ESA Ground Segment configuration, which includes the evolution, analysis and debugging of the operational chains (High Rate/Low Rate) and software facilities, as well as support to calibration and validation activities. The Validation Teams (for example the Meris and AATSR Validation Team (MAVT), the Atmospheric Chemistry Validation Team (ACVT) and the ESA Stratospheric Aircraft and Balloon Campaigns (ESABC) Team for Envisat) are supporting ESA in the product validation. In particular, they execute Validation campaigns and provide support for the Validation campaign data analysis.

Action 37.28: ESA to provide a working paper on the long-term monitoring of MERIS as a reference calibration instrument. Deadline: CGMS-38

ESA-WP-07 provided an overview of the CEOS Working Group on Cal/Val (WGCV). The objectives of the WGCV include:

1) Sensor-specific calibration and validation: To document and establish forums for the assessment and recommendation of current techniques and standards for pre- and post-launch characterisations and calibration.

2) Geophysical validation: To document and establish forums for the assessment and recommendation of techniques for validation of geophysical parameters derived from Earth observation satellite systems.

Meeting these objectives will include the promotion of a) exchange of technical information and documentation, b) investigation of possibilities for technical coordination and cooperation for space and ground segments, c) coordination of calibration and validation campaigns and programmes optimising and sharing of available facilities, expertise, and resource as appropriate; and, d) agreements on common terminology. WGCV complements the operational and sustaining role of GSICS by supporting the development of best standards and practices for pre-launch and post-launch calibration and by recommending, validating and ensuring inter-calibration of reference sites.

EUM-WP-23 reported on EUMETSAT's contributions to the Global Space-based Inter-Calibration System (GSICS) during 2008/2009. These contributions have focused on helping to define the GSICS Correction, the Algorithm Theoretical Basis Document (ATBD) used to derive it, as well as GSICS Data and Products Servers and NetCDF formats for the exchange of data. One of GSICS' first prototype products is the GSICS correction of infrared radiances from Meteosat SEVIRI to be consistent with those of IASI, which is used as a reference instrument. The ATBD for this product has been written following a hierarchical structure, much of which is generally applicable to the inter-calibration of other satellite instruments. In parallel a study has been investigating the potential use of NWP bias monitoring statistics as an inter-calibration tool. Results of this method are being compared with direct comparisons of collocated radiances from the infrared channels of Meteosat, HIRS and IASI. Data exchange within GSICS is facilitated by EUMETSAT's GSICS Data Management Server, which allows partners access to common datasets of level 1 satellite radiances and the distribution of statistical data derived from these, used to apply the GSICS Correction. NetCDF formats have been defined for these datasets.

EUM-WP-24 was prepared in response to CGMS Action 36.13 "to make available the instrument characterisation of their imaging and sounding instruments". This action has also been identified by the Global Space-Based Inter-Calibration System (GSICS) as a requirement for the inter-calibration of

these instruments. GSICS have now compiled a set of links to descriptions and Spectral Response Functions of operational GEO and LEO imagers and sounders. These are published on the GSICS Coordination Center website, hosted by NOAA:

www.star.nesdis.noaa.gov/smcd/spb/calibration/icvs/GSICS/InstrSpec.php.

This page will be expanded to include further instruments as GSICS develops operational products for them.

GSICS has also identified a need for a full history of operating changes that affect the performance and calibration of each instrument. While much of this information is currently available in different locations, a common portal, ideally in a common format, would facilitate the processing and interpretation of the inter-calibration results. Such a resource would be greatly beneficial to GSICS researchers, users and the community as a whole.

Recommendation 37.09: GSICS to establish a publicly accessible database to provide full history of operational changes that affect instrument performance and calibration. It should include the date and time of each operating changes that affect the performance and calibration of each instrument, a short summary of the change, and a quantitative assessment of the severity of the impact on the instrument's calibration.

JAXA-WP-03 provided an overview of the extensive vicarious and cross-calibration comparisons of ALOS AVNIR-2 with land sites such as DOME-C, TuzGolu (Turkey) and NOAA's Marine Optical Buoy (MOBY). This work is in coordination with the CEOS WGCV. Also reported were the early calibration/validation activities for GOSAT. JAXA is planning to become a full member of GSICS with emphasis on the long-term sustaining Cal/Val of the future GCOM series.

Action 37.29: GSICS Executive Panel Chair to send letter to JAXA on the roles and responsibility of JAXA as a GSICS full member. Deadline: 30 April 2010

JMA-WP-04 reported on JMA's activities regarding GSICS and SCOPE-CM. JMA began operation of the MTSAT-1R infrared intercalibration system on GSICS on 2 July 2008. JMA will change the current intercalibration system to satisfy the guidelines on GSICS correction determined by the GSICS Research and Data Working Groups this year. The description of its ATBD on the current operational algorithm was completed, and will update this documentation when the intercalibration system is changed for the GSICS correction. JMA has reprocessed the calibration of GMS-5 and MTSAT-1R visible images in cooperation with the University of Tokyo and Chiba University, and has also made homogeneous ice clouds a new target of investigation to improve the accuracy of simulated reflectivity. JMA also participated in the establishment of SCOPE-CM (formerly named R/SSC-CM),

and will proceed with initial activities related to Essential Climate Variable (ECV) satellite products of Atmospheric Motion Vectors (AMVs) and Clear Sky Radiance (CSR) as a pilot project within the framework of SCOPE-CM.

KMA-WP-06 reported on KMA's GSICS activities. In support of the recommendation by GSICS to expand the CNES SADE database from exclusively northern Africa desert regions to include sites from global deserts to support vicarious calibration of geostationary satellites, KMA selected two desert targets. One is the Australian Simpson desert centred at (26.075°S, 137.175°E), and the other is the Chinese Tengger desert centred at (38.125°N, 103.0°E). KMA also implemented GSICS software for IR inter-calibration with AIRS and IASI using MTSAT-1R as a proxy for COMS. For long-term analysis and preparation of operational use with COMS data, KMA implemented the GSICS S/W for near real-time operation and will post the analysis of the intercalibrations on a KMA publicly accessible website which will be linked to the GSICS central website.

NOAA-WP-11 and -14 were prepared in response to CGMS Action 36.14 (GSICS to finalise recommendations for its instrument performance monitoring website). The paper also reports on satellite instrument calibration anomalies and performance for NOAA-19 AMSU, MHS, AVHRR, and HIRS using the GSICS/GCC recommended instrument performance monitoring website running at NOAA/NESDIS. NOAA-WP-14, presented at CGMS-36, provided details on the instrument performance tool developed at NOAA. With more and more environmental satellite data being assimilated in numerical weather prediction (NWP) and used for constructing long-term climate data records, the quality of these satellite data becomes a critical issue. Instruments always present some degree of variations, which possibly show fairly different patterns over different space locations or during different period of time. Therefore, a real time monitoring system for instrument status is able to explicitly provide users the information regarding the satellite data quality for product generation and the additional calibration efforts for better quality of satellite data. Meanwhile, long-term instrument monitoring systems can also help to identify systematic error that is unknown before launch and to improve future instrument development techniques for better remote sensing. The instrument performance monitoring (IPM) can facilitate the communication of instrument anomalies amongst instrument and calibration scientists. It is also a very important component of GSICS, because if the problems are detected from the GSICS satellite intercalibration monitoring website, the instrument monitoring web can determine which instrument may have the anomaly. In particular, a web-based IPM system will

- facilitates dissemination of IPM information to satellite programme administrators, product providers and data users;

- allow a distributed archive of IPM data and information that is accessible through a single portal; and

- provide an opportunity to “advertise” the importance of calibration programmes to numerical weather prediction and climate change detection.

Action 37.30: GSICS agencies to implement web-accessible instrument performance monitoring capabilities using the guidelines provided from the GSICS Coordination Center. Deadline: CGMS-38

NOAA-WP-13 was prepared in response to CGMS Action 36.13 “GSICS GPRCs should compare geostationary observations with both AIRS and IASI to demonstrate consistency and relative stability of AIRS and IASI”. The paper provided a detailed analysis of the relative bias between IASI and AIRS within the GOES Imager spectral coverage during a 16-month time period. The results indicate that, at the 95% confidence level, the mean values of the IASI-AIRS brightness temperature differences are -0.0641±0.0074 K, -0.0432 ± 0.0114 K, and -0.0095±0.0151 K for GOES-11 6.7, 10.7, and 12.0μm channels, and -0.0490±0.0100 K, -0.0419±0.0224 K, -0.0884±0.0160 K for GOES-12 6.5, 10.7, and 13.3 μm channels for typical warm scenes. This suggests that the radiance difference between AIRS and IASI within the GOES Imager channels is less than 0.1K while AIRS is slightly warmer than IASI. Furthermore the trend of the difference is insignificant, demonstrating that both instruments are very stable and can be used as a “benchmark” to correct geostationary and other polar-orbiting infrared imagers/sounders.

NOAA-WP-15 was prepared in response to CGMS Action 36.13 “to make available the instrument characterisation of their imaging and sounding instruments”. In response, NOAA prepared the Paper to provide the characteristics of its satellite instruments, on its Polar-orbiting Operational Environmental Satellites (POES) and Geostationary Operational Environmental Satellite (GOES), which are currently operational or were operational in the past. The Paper includes links to a website from which information such as spectral response function can be obtained. Instrument characteristics are important for proper interpretation and utilisation of instrument measurements. NOAA/NESDIS supports the effort by CGMS to make such fundamental information widely and readily available, of all operational meteorological satellites and for the international community. NOAA/NESDIS is committed to maintaining such information accurate, current, and continuously available, and encourages a repository of such information from all agencies.

WMO-WP-02 informed CGMS on the GSICS pilot project for WIGOS initiated in response to recommendation 36.05. The GSICS Pilot Project helps identifying key issues related to satellite data integration. It also raises the visibility of satellite matters in the WIGOS process.

Recommendation 37.10: All CGMS agencies are encouraged to participate in GSICS in order to ensure a world wide comparability and seamless integration of space-based observation data sets, which will ultimately benefit all.

II/3 Vertical Sounding and ITWG Matters

CMA-WP-07 presented the progress on FY-3A atmospheric sounding data assimilation. FY-3A carries the Vertical Atmospheric Sounder System (VASS) which comprises the InfRared Atmospheric Sounder (IRAS), the MicroWave Temperature Sounder (MWTS), and the MicroWave Humidity Sounder (MWHS). The paper summarised the VASS radiance data assimilation results that have been obtained at CMA and ECMWF. Both sets of results show VASS data are comparable to ATOVS for data assimilation into NWP models. The VASS data gave a positive impact for both the northern hemisphere and southern hemisphere in the CMA NWP model and a neutral to slightly beneficial impact at ECMWF.

In the discussion WMO reminded the Working Group of the data request from ECMWF and encouraged CMA to establish the operational link between CMA and ECMWF to provide the FY-3A VASS data. EUMETSAT drew the attention of the Working Group to a request from Dr Steven Dewitte, Royal Meteorological Institute (RMI) of Belgium, who asked, on behalf of the CM-SAF, whether CMA could provide Earth radiation budget data from the ERM instrument on FY-3A.

Action 37.31: CMA to make available in near-real time the FY-3A sounder radiance data for NWP. CMA to provide a status of the work to the CGMS Secretariat. Deadline: 31 January 2010

In the discussion that followed, EUMETSAT raised a request to CMA to consider provision of radiation budget data from ERM on FY-3B to the EUMETSAT/Climate SAF and to report on ways to do so by the end of 2009. Points of contact are the EUMETSAT CGMS Secretariat and Dr Dewitte, RMI, Belgium. CMA kindly agreed to follow up this request.

KMA-WP-07 discussed the current status of satellite data assimilation at KMA. The paper reported on the recent progress of the satellite data assimilation in numerical weather prediction at KMA. KMA uses the Unified Model (UM) of the UK Met Office and has started a closer cooperation on data assimilation with the UK Met Office.

NOAA-WP-20 described the approach developed at NESDIS/STAR for creating a long-term intercalibrated dataset from MSU and AMSU observations to monitor tropospheric and stratospheric temperature change. The MSU/AMSU intercalibration system provides a consistent set of multi-satellite level-1c radiances and merged gridded level-3 deep-layer atmospheric temperatures. Instrument errors such as the warm target contamination have been minimised in the level-1c radiances. Therefore, they will benefit modelling reanalyses when these radiances are assimilated into reanalysis systems. Incident angle and diurnal drift errors are further removed in the level-3 temperature products. Thus, climate trend can be determined with more confidence. Currently, a 28-year simultaneous nadir overpass (SNO) calibrated MSU-only dataset is available online at STAR's website which can be used for reanalysis data

assimilation and climate trend monitoring. A simultaneous nadir overpass calibrated and merged MSU/AMSU dataset will also be put online once a quality control is completed. Finally, plans are being made to intercalibrate all AMSU-A channels including those not having companion MSU channels.

Action 37.32: NOAA to organise a working-level meeting of experts in coordination with GSICS, to provide a consensus algorithm for achieving a GSICS version-1 MSU and AMSU intercalibrated dataset. Deadline: 30 August 2010

Recommendation 37.11: NOAA is encouraged to merge the MSU and AMSU data into a consistent climate time series of radiance/temperature data. A report to CGMS-38 is welcome.

NOAA-WP-16, prepared on behalf of the ITWG and presented by the ITWG rapporteur, was in response to CGMS Recommendation 36.16 which called for papers addressing the seven top recommendations of the ITWG as reported at CGMS-36. This paper addressed the following ITWG recommendation: "The community software packages (i.e. AAPP, IAPP, and IMAPP) have been essential in the use of ATOVS, IASI, AIRS and MODIS data by the meteorological community, especially for those who rely on the use of real-time direct broadcast data. The ITWG encouraged satellite agencies to continue to support these packages for existing missions and to develop and release processing software packages (e.g. IPOPP) as soon as practicable before the launch of all future missions. The paper also provided overviews of these processing packages and highlighted their functions for the benefit of users and also documented the software status and issues. To date, hundreds of direct broadcast ground stations have been installed around the world, with the purpose of receiving direct broadcast data in real-time from CGMS agency meteorological satellites. The resulting images and geophysical products are providing immediate information to government, education, defense, and private sector operations worldwide.

The International MODIS/AIRS Processing Package (IMAPP) is a collection of software programmes which facilitate any ground station capable of receiving Terra or Aqua direct broadcast data to process the raw data from Level 0 (raw instrument packets) to Level 1B (calibrated geolocated radiances), and to a selection of Level 2 products (geophysical parameters). Supported instruments include MODIS, AIRS, AMSU, HSB, and AMSR-E. Recently, IMAPP has expanded its goal to build the capability of real-time product utilisation and applications. Two major efforts are the real-time distribution of IMAPP products via a seamless interface with United States' National Weather Service (AWIPS), and the real-time data assimilation of MODIS products into regional weather forecast models. Similarly, IAPP (International ATOVS Processing Package) and AAPP (ATOVS and AVHRR Pre-Processing Package) are processing packages that enable direct broadcast data users to process data into geo-calibrated and navigated Level 1 data from Level 0 raw data. IAPP uses Level 1-D data output from AAPP to provide Level 1 to Level 2 functions, wherein a set of common and useful atmospheric

products can also be generated. In summary AAPP is a “pre-processing” package since it only produces Level 1 data. IAPP has been designed to work with the HIRS Level 1-D output file that is produced by the AAPP. IMAPP belongs to the “processing” package category since it produces both Level 1 and Level 2 products. AAPP, IAPP and IMAPP are the backbone of the processing software that enable users to process in real-time local area environmental polar-orbiting satellite data including the infrared, microwave and visible sensors of AVHRR, HIRS, AMSU-A, AMSU-B, MHS, IASI, AIRS, MODIS, AMSR-E.

It is critical to users that the international satellite agencies, or their affiliates, continue to maintain these packages for existing sensor systems and to develop new processing capabilities for planned future missions such as NPP/NPOESS of the United States, METOP series of Europe, and FY polar series of China, and other sustained polar orbiting satellite mission series. Without these packages the owners of hundreds of direct broadcast ground stations around the world who have invested significant receiving and computing resources, will find it difficult to continue operating and fulfil their roles in providing environmental monitoring, weather forecasting and many other services which are heavily reliant on daily data and products efficiently generated by these processing packages.

In the discussion the Working Group recalled that CGMS agencies are requested to provide pre-processing software for their instruments to ITWG for inclusion in free and open Direct Readout processing software systems.

II/4 Precipitation and IPWG Matters

KMA-WP-13 summarised the current status of microwave sensor applications and the Global Precipitation Mission (GPM) activity at KMA/NIMR. In particular, it provided the efforts in KMA/NIMR during 2008 and 2009 including a pilot study on GPM ground validation prototype by reflectivity comparisons between ground-based radar and TRMM PR. KMA concluded by expressing a firm interest in becoming even more involved in the GPM work in the framework of international cooperation with the PMM Office of NASA/GSFC.

WMO-WP-23 informed CGMS on the status of activities of the International Precipitation Working Group (IPWG) since CGMS-36. The paper was presented by the IPWG rapporteur to CGMS, Dr V Gaertner. Specific activities of note included:

- IPWG Validation Activities had been expanded to include numerically generated precipitation estimates, in conjunction with WGNE;
- IPWG agreed to provide leadership in the GEO Precipitation Activity, with Co-chair G Huffman designated as the point of contact; and
- It was agreed with ITWG to work on topics of common interest, particularly the need for better dissemination of metadata and calibration information for precipitation-relevant satellite sensors.

Action 37.33: CGMS confirms Dr G. Huffman as single point of contact for GEO precipitation activities. CLOSED (completed during the CGMS-37 plenary session).

Recommendation 37.12: CGMS Members to contribute to page changes of the "Special Collection Issue" of papers arising from IPWG-4 in the AMS Journal of Applied Meteorology and Climatology.

Recommendation 37.13: CGMS members to provide support for attendance at the next IPWG Workshop, 4-8 October 2010, in Hamburg, Germany for six scientists from developing and least developed countries.

Recommendation 37.14: GSICS is requested to provide IPWG current and archived instrument metadata and information regarding instrument health for sensors used to estimate precipitation.

Recommendation 37.15: CGMS operators are requested to undertake reprocessing of L1 radiance data and L2 precipitation data sets when significant calibration corrections are developed and algorithm improvements are implemented into operations.

Recommendation 37.16: CGMS operators are requested to contribute in a timely fashion to the open archive of the international constellation of precipitation-relevant sensors, for example, for use in GPM.

Recommendation 37.17: Co-chairs of IPWG are invited to formally contact KMA concerning its participation in IPWG. KMA to provide IPWG with the point of contact. Deadline: 30 June 2010

II/5 Atmospheric Motion Vectors and IWWG Matters

EUM-WP-26 presented results from the international operational AMV algorithms comparison study. The paper basically constitutes the final report from the 1st international operational AMV algorithms comparison which had been proposed at the 8th International Winds Workshop and was formulated as CGMS Recommendation 34.15 at CGMS-34. Later an Action 36.18 followed at CGMS-36. The study clearly demonstrated commonalities in the winds processing and also discrepancies often due to different realisations of physical concepts in terms of algorithms. CGMS warmly welcomed the report and commended Dr Iliana Genkova, Dr Mary Forsythe and Mr Jaime Daniels on their conscientious and informative paper.

Recommendation 37.18: WMO encourages CGMS members to repeat the very informative international operational AMV algorithm intercomparisons at regular time intervals of about 3-4 years.

Improvements to EUMETSAT AMV's and the preliminary impact on NWP were presented in EUM-WP-27. The paper summarised the main results of

the operational tests done at EUMETSAT using the new pixel selection method proposed by Borde and Oyama (2008) at IWW9. The method keeps a closer link between the tracking and the height assignment steps in the AMV extraction algorithm, using the individual pixel contribution to the cross correlation coefficient as measure for the selection of the pixels that contribute the most to the tracking. This in turn offers a suitable subset of image pixels for the height assignment. Results of operational tests show improvements of the new scheme on the AMV product for both the Vis0.8, HRVis and IR10.8 channels, increasing the total amount of AMVs (QI>80) and also the amount of good AMV/radiosonde collocations. However, speed biases against radiosondes are generally a bit larger, especially the known slow biases observed at high levels for IR10.8 AMVs. Two periods have been tested in the forecasting system at ECMWF, showing a general neutral to slightly positive impact on the forecast although the first guess departures show a less convincing signal. More work in that area is warranted.

EUM-WP-31 presented in some detail the preparations for the 10th International Winds Workshop. The paper announced the 10th Workshop of the International Winds Working Group (IWW10) to be held in Tokyo with the Japan Meteorological Agency as local host. The paper also recalled pertinent actions from the 9th International Winds Workshop, which took place from 14-18 April 2008 in Annapolis,USA, and relevant actions and recommendations from CGMS-36.

Research and development issues related to AMVs were put forward for discussion in CGMS WG II. The paper had been written by the IWW rapporteur (Dr J Schmetz) jointly with the two co-chairs Dr Mary Forsythe (UK) and Mr Jaime Daniels (USA). The paper also introduced the new web site of the International Winds Working Group.

The Working Group was asked to discuss the topics raised in the paper and to provide guidance and recommendations to IWW10 for further elaboration. After the discussion, WG II endorsed the following actions and recommendations:

Recommendation 37.19: CGMS members should provide support to the next IWW10 meeting by approving participation of scientists and operational staff working on the utilisation and derivation of satellite winds and, if possible, by providing some support to travel of relevant people from the research community.

Recommendation 37.20: Efforts to enhance the use of AMVs in NWP should continue to address both the quality of the AMVs as well as the way the product is utilised in NWP assimilation systems.

Recommendation 37.21: In view of the success of the polar winds all efforts should be undertaken to continue such products as long as possible from imaging instruments in polar orbits.

The potential deployment of an imager in a highly elliptical orbit raised interest and the Working Group expressed strong support.

Following a detailed discussion of the matter, WG II formulated the following recommendation:

Recommendation 37.22: IWWG 10 is requested to address the development of a stand-alone software package for the derivation of AMVs from imaging satellite instruments.

Furthermore, CGMS WG II had a look at the list of recommendations presented in the paper under section 6 and recommended all for elaboration at the upcoming 10th International Winds Workshop.

Recommendation 37.23: CGMS endorsed and recommended all topics listed in EUM-WP-31 section 6 for a detailed discussion at IWWG 10.

In JMA-WP-05 the Atmospheric Motion Vectors developments at JMA were summarised. The working paper reported on the recent status of JMA's AMVs from MTSAT-1R, and included the Agency's responses to Recommendation 36.23 and Actions 36.19 and 36.20 from the previous meeting of CGMS. On 18 August 2009, JMA began the dissemination of AMVs at 03, 09, 15 and 21 UTC to users via the GTS in addition to those at 00, 06, 12 and 18 UTC. In order to improve AMV quality, JMA conducted three upgrades to its AMV derivation between October 2008 and September 2009: (1) JMA started to use higher-resolution GPVs from forecast fields as reference data at 05 UTC on 9 October 2008; (2) JMA upgraded the height assignment scheme for IR AMVs and the size of the image segment for tracking clouds, and expanded the derivation region from 50S – 50N to 60S – 60N at 05 UTC on 19 May 2009; and (3) the process for tracking clouds was improved at 05 UTC on 15 September 2009. In response to Recommendation 36.23, a new height assignment scheme was introduced at 05 UTC on 19 May 2009. In terms of recent activities, JMA has attempted to generate AMVs from rapid-scan images using best schemes and parameters. The Agency is also reprocessing AMVs from GMS, GOES-9 and MTSAT-1R images using the latest algorithms to contribute the future reanalysis project and SCOPE-CM (formerly named R/SSC-CM). Finally JMA recalled that it will host the meeting of the 10th International Winds Workshop in Tokyo on 22-26 February 2010.

A discussion on AMVs from rapid scans at 4 and 7 minute intervals raised the following recommendation.

Recommendation 37.24: JMA is invited to report at IWW10 on the derivation and quality of AMVs derived from the MTSAT imaging at time intervals as short as 7 and 4 minutes, respectively.

KMA-WP-10 reported on the current status of Atmospheric Motion Vector (AMV) derivation at KMA. The paper introduced the current status of KMA AMVs and recent monitoring results on the quality of the AMV. It was reported

that the AMVs have uncertainties due to the algorithm itself as well as due to NWP profiles applied for height assignment. Therefore, it is difficult to identify the causes that produce AMV outliers. Additionally, the AMV accuracy varies seasonally.

NOAA-WP-21 was prepared in response to CGMS Action 36.19: "Satellite operators deriving AMVs to summarise their methods and ways to characterise the AMV errors, with emphasis on the height assignment error". The paper described the two sets of calibration/validation tools that have been developed, or are currently under development at NOAA/NESDIS, to validate and characterise errors associated with its operational AMV products. The first of tools are categorised as routine operational AMV calibration/validation tools. This category of tools includes tools that are used within NESDIS operations for the sole purpose of monitoring the quality of the operational AMV products in a routine and automated way, and includes routine generation of statistics comparing AMV with radiosondes and model analysis wind speed and direction. The second set of tools are categorised as "Deep-dive" AMV calibration/validation tools. This category of tools includes a set of customised tools that are used within the research and development environment that enable "Deep-Dive" assessments of the AMV products. This category of tools includes a set of customised tools that are used within the research and development environment that enable "Deep-Dive" assessments of the AMV products. These customised set of tools rely on several libraries that include the Man-computer Interactive Data Access System (McIDAS), Interactive Data Language (IDL), Java, and PGPLOT Graphics Subroutine Library. The customised set of tools, some of which are currently under development, provide the following functionality:

- Provide an interactive capability that can be used for case studies and enable a user to:

    - Derive a single AMV product for any specified location;
    - Select/provide alternative inputs that alters the manner in which the AMV product is generated;
    - Visualise/display/loop any and all initial, intermediate, final data at varying spatial scales used and/or produced by the AMV product generation process;
    - Visualise the collocated reference ("ground-truth") wind observations, if available; and
    - Enable collocation and preprocessing of alternative reference ("ground truth") data with AMVs Standard observational data sources that are used at NOAA/NESDIS for validating its AMVs, include radiosondes and wind profiler observations. Forecast and analysis wind fields from NOAA NCEP's GFS forecast model also serve as reference ("truth") data for validation of the AMV products. New data sources such as the CALIPSO backscatter imagery and Level-2 derived cloud products are now being leveraged at NOAA/NESDIS to validate the heights assigned to the AMVs.

NOAA-WP-22 continued with the current state of Atmospheric Motion Vector (AMV) algorithm development at NOAA/NESDIS in preparation for the future GOES-R Advanced Baseline Imager (ABI). The paper reported on NOAA/NESDIS' current and planned AMV development work in preparation for the future GOES-R Advanced Baseline Imager (ABI). Part of this development work involves AMV height assignment derived from cloud property information retrieved at the pixel-level and is the focus of this report.

In the discussion that followed, NOAA offered to other CGMS members the opportunity to benefit from the development work and from the insight gained by the new prototyping work. This resulted in a general recommendation:

Recommendation 37.25: On the basis of existing scientific prototype software for product retrievals, NOAA and EUMETSAT offer to other satellite operators existing prototype algorithm software for testing and further development.

II/6 Cloud and Dust Related Products

NOAA-WP-18 provided a detailed description of the development of the IDEA Product for GOES-R Aerosol Data. The NOAA GOES-R Advanced Baseline Imager (ABI) will have nearly the same capabilities as NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) to generate multi-wavelength retrievals of aerosol optical depth (AOD) with high temporal and spatial resolution, which can be used as a surrogate of surface particulate measurements such as $PM_{2.5}$ (particulate matter with diameter less than 2.5 μm). To prepare for the launch of GOES-R and its application in air quality forecasting, NOAA has transferred and enhanced the Infusing satellite Data into Environmental Applications (IDEA) product from the University of Wisconsin to NOAA NESDIS. The enhanced IDEA product provides near-real-time imagery of AOD derived from multiple satellite sensors including MODIS Terra, MODIS Aqua, GOES EAST and GOES WEST imager. Air quality forecast guidance is produced through a trajectory model initiated at locations with high AOD retrievals and/or high aerosol index (AI) from OMI (Ozone Monitoring Instrument). The product is currently running at http://www.star.nesdis.noaa.gov/smcd/spb/aq/. The IDEA system will be tested using the GOES-R ABI proxy dataset, and will be ready to operate with GOES-R aerosol data when GOES-R is launched.

CMA-WP-08 presented the FY-3A aerosol product and its application. Aerosol retrieval is one of the applications of the MERSI sensor flying on FY-3A satellite. The method works over dense dark vegetation and uses observations in band-1(0.47micron), band-3(0.65micron) and band-7 (2.13micron) of MERSI as the operational algorithm to obtain the aerosol optical thickness (AOT). Currently at NSMC/CMA, the operational MERSI aerosol product provides AOT at 470, 550 and 650nm and the Ångström coefficient. Validation for MERSI products was made by comparison with the MODIS aerosol and found that the AOT/MERSI was little lower than

AOT/MODIS, the two products have highly linear relativity with each other. When AOT/MERSI was compared with AOT/ CMA-CARSNET in situ, RMS of AOT at 550nm was 0.24 depending on 61 samples. AOT/MERSI aerosol product is now used for monitoring the air quality.

KMA-WP-11 updated WG II on the operational analysis of Asian dust at KMA. KMA has been using GEO as well as LEO data for the operational analysis of Asian dust since 2002. Brightness Temperature Difference (BTD) between IR1 and IR2 is basically used for dust detection due to its availability during night time. KMA developed the IODI (Infrared Optical Depth Index) which is now operationally used and updated the IODI algorithm to reduce the uncertainties, such as the overestimations over the Chinese northern desert region and underestimations over ocean.

WMO-WP-03 presented the DLR World Data Centre on Remote Sensing of the Atmosphere. The purpose of the paper was to inform CGMS Members of the establishment of the World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT) on 22 July 2009 by signature of a MOU between WMO and the German Aerospace Centre (DLR). The scope of WDC-RSAT hosted by the German Remote Sensing Data Centre (DFD) is to act as a ”one-stop shop“, providing access to space-based observations on the chemical composition of the atmosphere.

WMO-WP-04 on Satellite needs of the WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) discussed the needs of the (SDS-WAS) concerning current and future satellite products. The Paper reviewed the existing products of different satellite operators, described the importance of using the satellite parameters to improve the monitoring and prediction of the sand and dust storm atmospheric process, and indicated what gaps there were in providing dust-relevant products to the SDS-WAS community. During the discussion it was clarified that this WMO WP described the situation in the Asia - Pacific region SDS-WAS Regional Centre. The situation is different in the Northern Africa-Middle East-Europe area, which is in the nominal Meteosat field of view, and where MSG/SEVIRI data contributes significantly to real time dust monitoring.

II/7 Other Parameters and Products

In EUM-WP-28 EUMETSAT presented its general product development approach. EUMETSAT products are developed in the EUMETSAT Central Facility and the Satellite Application Facilities (SAFs) or are implemented in these facilities through external studies. EUMETSAT provides operational geostationary and low Earth orbit satellite services with a consistent approach with respect to service levels and quality, independently of the origin of the service. To develop new products or to perform significant major changes in a consistent way, the SAFs and the Central Facility have defined the EUMETSAT product life cycle which comprises the following phases:

- Product Definition
- Product Development
- Engineering Verification
- Product Validation
- Product Implementation into Operations
- Continuous Improvement

To reflect the scientific maturity, the level of commitment and the status of validation, EUMETSAT has defined a set of product status categories. The Product status categories are:

- In Development
- Demonstrational
- Pre-Operational
- Operational

NOAA-WP-17 was prepared in response to CGMS action 36.20 “CGMS Members to present WPs to CGMS-37 describing their processes for product development, verification and implementation into operations, as well as the process for continuous improvement.” NOAA's Satellite and Information Service (NESDIS) develops and distributes environmental satellite data and products for all NOAA line offices as well as for a wide range of Federal Government agencies, international users, state and local governments, and the general public. Considerable resources are required to develop new or enhanced satellite-derived data products. It is essential that an orderly review and approval process be used to manage the development of these products. The NESDIS Satellite Products and Services Review Board (SPSRB) is responsible for the oversight and guidance necessary to effectively manage the product life cycle process from product development, transition into operations, enhancements and retirement. The SPSRB provides a powerful evaluation mechanism which enables a more efficient use of personnel, fiscal and information technology resources. There are six key SPSRB steps:

(1) User Request
(2) Assessment
(3) Analysis of Alternatives
(4) Initial Project Plan
(5) Operational Decision, and
(6) Product Divestiture or Retirement.

In addition, there are several SPSRB interface processes. These include:

(1) Resource Identification and Product Development/Reporting,
(2) Consolidated Observational Requirements List (CORL) and Mission Observational Requirements List (MORL) databases, and
(3) NOAA Observational System Architecture (NOSA) database.

The SPSRB focuses on the transition of satellite products from research into operations to meet a user need for satellite information. Details are provided in the paper.

Recommendation 37.26: CGMS agencies are encouraged to review NOAA-WP-17 and EUM-WP-28, and provide working papers describing their product development processes at CGMS-38.

CMA-WP-09 addressed the FY-3A ozone product and its application. In summary the paper briefly introduced the characteristics of the FY-3A ultraviolet instrument and its products: the global total ozone and ozone profile which were retrieved during the satellite in-orbit test. The TOU total column ozone has an rms relative bias less than 3% compared to the AURA/OMI global total column ozone product and less than 5% compared to ground measurements. The ozone profile retrieval results are basically consistent with SBUV/2 and ozone sonde measurements.

In the discussion, WMO encouraged CMA to provide the FY-3A ozone product and to contribute to the WMO ozone programme.

CMA-WP-10 described the FY-3A/MERSI Ocean colour product and its preliminary validation. Some applications were briefly introduced. WG II noted that the Ocean colour product is an example demonstrating the importance of cross-calibration and encouraged the satellite operators to enhance cross-calibration activities in the solar bands.

EUM-WP-29 assessed the specification of relevant MTG channels for fire monitoring. The document provided an analysis of the imager end-user requirements onboard the Meteosat Third Generation (MTG) satellite, in response to CGMS action 36.03. The compliance of these requirements with working paper CGMS-36 NOAA-WP-21 recommendations were analysed. User requirements for wild fire detection and characterisation have been explicitly taken into account for the FCI onboard MTG. The dynamic range of the 3.8 µm channel has been expanded to support user requirements on fire detection and characterisation. This translates into a 450K saturation value of the FDHSI mission for a sampling distance of 2km at the sub-satellite point.

In EUM-WP-30 examples were given on how MSG data and products are being used for the initial prototyping of the MTG Imager. The MTG Imager (MTG-FCI – Meteosat Third Generation Flexible Combined Imager) will provide approximately 3 times more information than the current Meteosat Second Generation (MSG) SEVIRI instrument. Any efficient usage of this data will require a comprehensive and objective image analysis scheme to derive meteorological products where, in the light of the mere data volume of the image data, the importance of the derived products is expected to grow in the MTG era. The Working Paper also described how the currently already available MSG-SEVIRI data can be used to prepare for a growing demand for products and for product quality. Although the current MSG product retrieval algorithms are a good first baseline for the MTG-FCI, the advent of MTG

should be used to prepare for a more comprehensive image interpretation and corresponding product extraction scheme presented in this paper. First feasibility studies in this respect suggest that MSG data can be well used to test these novel ideas. The WG recalled that a pertinent recommendation had been made in the context of the discussion of NOAA-WP-22.

JMA-WP-06 presented a Sea-ice Motion Vector Product derived at the JMA/ MSC. The paper reported on the sea-ice motion vector product generated by MSC in relation to Action 36.20 and Recommendation 36.07 from CGMS-36. The sea-ice motion vector product is generated using data from MTSAT-1R/JAMI, and sea-ice drift velocity is calculated. JMA/MSC has been providing this product since March 2009 and utilising it for sea-ice monitoring.

In the discussion JMA explained that the product has been given to relevant sea ice experts for evaluation.

KMA-WP-08 provided an update on the operational analysis of Tropical Cyclones at KMA. The paper reported that KMA has added a new algorithm to retrieve the radius of maximum wind (RMW) in a web-based Satellite Image Analysis System. The validation between RMW and QuikSCAT wind speed has been performed by using seven typhoon cases in 2008.

KMA-WP-09 discussed the current status of weather support for nowcasting and very-short range forecasting. KMA updated its satellite image analysis technique through the introduction of new advanced skills from the EUMETSAT NWC SAF. This Automatic Satellite Image Interpretation is going to be provided to forecasters through the KMA intranet at the end of this year.

KMA-WP-12 introduced the Operational Analysis of Fog Detection at KMA. KMA has been using GEO as well as LEO data for operational fog and low cloud analyses since 2005. The DCD (Dual Channel Difference between 11μm and 3.7μm) is basically used for fog and low cloud detection due to their emissivity difference on low stratus. The probability of fog areas is determined by comparison between surface temperature and 11μm brightness temperature.

KMA-WP-14 presented a plan for providing the SST Data from COMS into the GHRSST International Framework at KMA/NIMR. KMA/NIMR has been retrieving GEO-based sea surface temperature (SST) by using MTSAT-1R satellite over East Asia. As there is an increased need for high resolution SST with no gaps caused by clouds, NIMR has started to use multi-sensor SSTs as well as model predicted SST to produced composites using the 1-D ocean mixed layer model over the SST missing area. NIMR plans to apply this to COMS data later, and the SST with no gaps will be provided to NOAA/NODC within the international framework of GHRSST.

In the discussion, the WG expressed its appreciation for the enormous efforts that KMA is putting into using satellite data and, especially, for the preparations being made for the new Korean geostationary satellite COMS.

NOAA-WP-24 described the NOAA programme for developing the GOES-R algorithms for generating products (Level-2). The GOES-R Programme Office (GPO) assigned the NOAA/NESDIS Center for Satellite Research and Applications (STAR) the responsibility for technical leadership and management of GOES-R algorithm development and calibration/validation. STAR responded with the creation of the GOES-R Algorithm Working Group (AWG) to manage and coordinate development and calibration/validation activities for GOES-R proxy data and geophysical product algorithms. The AWG consists of 15 application teams that bring expertise in product algorithms that span atmospheric, land, oceanic, and space weather disciplines. Each AWG team will develop new scientific Level-2 algorithms for GOES-R and will also leverage science developments from other communities (other government agencies, universities and industry), and heritage approaches from current operational GOES and POES product systems. All algorithms will be demonstrated and validated in a scalable operational demonstration environment. All software developed by the AWG will adhere to new standards established within NOAA/NESDIS. The AWG Algorithm Integration Team (AIT) has the responsibility for establishing the system framework, integrating the product software from each team into this framework, enforcing the established software development standards, and preparing system deliveries. The AWG will deliver an Algorithm Theoretical Basis Document (ATBD) for each GOES-R geophysical product as well as Delivered Algorithm Packages (DAPs) which includes all documentation and test datasets and software to the GPO.

Action 37.34: On the basis of existing scientific prototype software for GOES-R, NOAA to report on the availability of software to other satellite operators with similar planned geostationary instruments. Deadline: 30 June 2010

NOAA-WP-25 described the recent GPS radio occulation (RO) activities at NOAA. The NOAA National Weather Service started assimilating COSMIC observations into its Global Data Assimilation System in May 2007. Since then, several impact studies have shown the benefits of incorporating GPS RO observations into the observing system. The use of COSMIC observations results in a significant improvement in model forecast skill, mostly due to the fact that GPS RO observations do not oversample, are unbiased and very accurate, have similar accuracy over land than over ocean, and are minimally affected by clouds and precipitation.

The number of applications of GPS RO observations within NOAA is steadily increasing. These applications include the use of the data in regional models, profiling the lower troposphere and understanding how the use of RO data improves the use of nadir satellite radiances. In addition, NCEP is also assimilating GPS RO observations into its reanalysis system. NOAA is also working on the design of GPS RO OSSE experiments within the international Joint OSSE project. A GPS RO follow-on capability mission for COSMIC is under current evaluation at NOAA.

NOAA-WP-26 described a powerful new tool at NESDIS to assess the performance of temperature and moisture soundings derived from various instruments and algorithms including HIRS, AMSU, AIRS, IASI and COSMIC (GPS RO). The tools are called NOAA PROducts Validation System (NPROVS) and Environmental Data Graphical Evaluation (EDGE) Interface. NPROVS provides NOAA STAR with a centralised validation protocol for the routine monitoring and inter-comparing derived atmospheric weather products from polar orbiting and GOES environmental satellites. This is primarily achieved through the compilation and analysis of collocated radiosonde, NWP and independently processed satellite product systems. Currently 19 operational and experimental products systems are included. NPROVS compiles collocations on a daily basis with all collocations routinely archived at STAR. As described, NPROVS includes a variety of analytical interface and sampling options (EDGE) including satellite and Raob QC, space and time windows, terrain designation, individual and common denominator sampling, radiosonde instrument type selection, regional (i.e. GOES Conus) designation and more. Analysis on real-time weather (daily, weekly) and climate scales (monthly, seasonal, annual) are facilitated. Expansion of this protocol to create dedicated collocation dataset/base spanning TOVS (1979) through next generation NPP and NPOESS platforms is under consideration as a potentially useful long-term record of critical observations for climate. One of the potential strengths of the NPROVS collocation dataset is that it can provide feedback to data providers (and managers) concerning the sensitivities and relative performance of the respective satellite and ground truth data platforms, particularly those secured over a continuous long-term record. The paper demonstrated how both COSMIC and differences between observed radiances and computed radiances from radiosondes can be used to assess the performance of different radiosonde instruments. These comparisons clearly showed a day/night bias in radiosonde observed upper tropospheric humidity.

Recommendation 37.27: NOAA is encouraged to include GRUAN radiosondes into NPROVS and to provide regular performance statistics of satellite products with GRUAN.

Recommendation 37.28: CGMS members are invited to consider the testing and use of the NOAA NPROFS and EDGE systems and to contribute to comparisons by providing relevant data sets.

Finally NOAA-WP-28 provided an up-to-date-record of US satellite missions, instruments and frequencies. The information presented in the document was accurate for the period ending 30 September 2009.

II/8 Review of actions, conclusion and preparation of the WG report

The Chairperson thanked all participants for lively, concise and fruitful discussions. WG II returned its thanks to Dr Peng Zhang for his very good Chairmanship.

WG II had covered a very broad range of activities, and highlights included the excellent results from GSICS presented in section II/2. The outlook papers in preparation for upcoming workshops under the auspices of CGMS (IWWG and IPWG) provided a basis for lively discussion, iteration and guidance from WG II. This was supplemented by contributed papers from CGMS members. The WG also noted the demonstration by CMA of the successful utilisation of measurements from various instruments on FY-3A.

WORKING GROUP III: CONTINGENCY PLANNING

III/0 Introduction

Working Group III on Contingency Planning was convened on 26 October 2009. The meeting was chaired by Mr Gary Davis from NOAA and was attended by 23 participants representing CMA, ESA, EUMETSAT, ISRO, JAXA, JMA, KARI, KMA, NOAA, ROSCOSMOS, ROSHYDROMET and WMO (see Annex 4 for the full list of participants).

Introducing the meeting, the Chairperson proposed to address first the two papers that had been formally submitted to the Working Group, and to dedicate the rest of the meeting to an exchange of views among all CGMS satellite operators on overall continuity and contingency issues. The aim of this discussion being to provide a high-level overview of the status of CGMS satellite programmes, and to highlight possible risk areas that would require further attention or contingency action. In line with the outcome of Working Group III at CGMS-36, the Chairperson stressed that the discussion should not be limited to the core weather monitoring missions in GEO or LEO, but to also address the long-term continuity of climate monitoring missions. The meeting agreed to review sequentially the plans for GNSS Radio Occultation (RO), Earth Radiation Budget, ocean colour, ocean surface wind, then weather monitoring missions in polar orbit, and geostationary missions.

III/1 Use of NPOESS Ground Infrastructure to improve the Timeliness of Metop data

NOAA-WP-30 informed CGMS on plans for implementing a ground station in Mc Murdo, Antarctica, in cooperation with EUMETSAT, in order to complement the main Metop downlink service over Svalbard. This would allow a significant reduction in the maximum timeliness of Metop Global Data and would thus minimise the gap between Metop mission characteristics and NPOESS timeliness requirements.

Although not exactly related to any contingency situation, if a satellite was lost the reduced data latency would be quite userful. This collaboration between NOAA and EUMETSAT was appreciated by the WG III as an excellent example of joining the resources of two satellite operators in order to satisfy key operational requirements.

III/2 Radio Occultation

KMA-WP-15 informed CGMS on the status and plans regarding KOMPSAT-3, planned for launch in October 2010 on a dawn-dusk 550 km sun-synchronous orbit . KOMPSAT-5 will include, in particular, a dual-frequency GPS receiver to

generate precision orbit determination data and occultation data. The Radio Occultation (RO) data will be made openly available.

WG III expressed its appreciation to this project and recalled that, following the COSMIC mission, it had been demonstrated that it was highly beneficial for operational NWP and for climate monitoring to have a number of such GNSS RO sensors. KOMPSAT-5 would provide a valuable contribution to this effort. WMO encouraged KARI to make the radio-occultation data available in near-real time over the GTS or otherwise in order to ensure its availability for the NWP community at large.

In the light of experience with GRAS, EUMETSAT and ESA underlined that RO data required a very complex processing infrastrucutre. It was suggested to share ground facilities and to cooperate on product processing as already discussed at previous CGMS meetings *(Action 34.05 EUMETSAT to convene and lead a Task Force to assess possibilities for sharing ground segment facilities for radio-occultation missions and report at CGMS-35*). It was noted that WMO-WP-20 presented the Terms of Reference of a future CGMS Working Group on Radio-Occultation in response to CGMS Action 36.17. This working group should provide an adequate forum to explore cooperation opportunities among operators of GNSS RO sensors, and to refine product specifications with the scientific user community.

CGMS also noted the availability of GRAS data from the Metop series, from ROSA on Oceansat-2 (launched in September 2009), and the plans of Roshydromet to fly Radiomet on Meteor-M N3 (2012). NOAA indicated it was developing plans for purchasing a set of GNSS RO sensors and identifying possible flight opportunities in order to provide some follow-on to the COSMIC constellation.

III/3 Earth Radiation Budget

Currently planned Earth Radiation Budget (ERB) instruments in Low Earth Orbit for outgoing radiation at the top of the atmosphere are CERES on NPP (2011) and NPOESS-C1 (2014), SCARAB on Megha-Tropiques (2010), ERM on FY-3A and follow-on (2008 to 2024).

CGMS welcomed the confirmation by ISRO that, after completion of the validation phase, Megha-Tropiques data would be openly available from ISRO/SAC (for level 1 and level 2) and CNES/ICARE (for level 2).

III/4 Ocean surface wind from scatterometry

In a brief discussion WG III recalled that the NSOAS of China had informed CGMS-36 of its plans for HY-2A and the near real time availability of the data. EUMETSAT added that this had led to a data exchange agreement between EUMETSAT, CMA and NSOAS.

ISRO indicated that, after completion of the validation phase, Oceansat-2 ISCAT data will be openly available from the ISRO/SAC.

III/5 Ocean colour

Existing or planned ocean coulour observation sensors include:

- OCM on Oceansat-2 (ISRO), with data made available by ISRO/NRSC in Hyderabad;

- MERIS on Envisat (ESA);

- OCS on Meteor-M N3 (Roshydromet) in 2012;

- a mission aboard the Sentinel-3 series, with data openly available, subject to confirmation by the European Commission (ESA/EUMETSAT); and

- SGLI aboard GCOM-C1 (2014) and its follow-on (JAXA).

ESA recalled that ocean colour was one of the topics for which CEOS had defined a Virtual Constellation. The Ocean Colour Constellation is led by the Joint Research Centre of the European Commission (JRC), JAXA and the International Ocean Colour Coordination Group (IOCCG). The CEOS constellations are fostering harmonisation and coordination of plans and prototype products.

III/6 General comment on climate missions

WG III underlined that CGMS should seek to agree on long-term commitments from satellite operators in order to ensure continuity, as required for climate monitoring and for operational weather forecasting.

It is understood however that the continuity requirements for operational missions and for climate monitoring are not the same and could have different implications on e.g. the need for hot back-up and relaunch policy. CGMS-36 had recommended to convene a contingency planning workshop to investigate in more detail the continuity requirements of critical missions and the potential need for contingency arrangements related to the new missions foreseen in the WMO Vision for the GOS in 2025 (Action 36.24); this action has not yet been addressed and its relevance is confirmed.

Action 36.24: WMO to convene a contingency planning workshop in the second half of 2009 in order to investigate crtiical missions and associated potential congingecy actions regarding the new missions imlied by the Vision for the GOS in 2025. New deadline: 30 June 2010

III/7 Continuity issues for weather missions in polar orbit

WG III discussed the status of core operational missions (multispectral VIS/IR imagery, IR hyperspectral sounding, microwave sounding) with reference to the three nominal categories of Equatorial Crossing Times (Morning, afternoon, early morning). A summary of the discussion is provided in the Table below:

Orbit type	Satellite series	ECT asc.	Agency	Comments
Morning (07:00-12:00/ 19:00-24:00)	Metop-A,B,C	21:30	EUMETSAT	
	FY-3A	22:30	CMA	IR sounder, not hyperspectral
	Meteor-M 1	21:30	Roshydromet	IR sounder, not hyperspectral
Afternoon (12:00-17:00/ 00:00-05:00)	NPP, NPOESS-C1,C3	13:30	NOAA	
	FY-3B	14:00	CMA	IR sounder, not hyperspectral
	Meteor-M 2	15:30 (TBC)	Roshydromet	
Early morning (05:00-07:00/ 17:00-19:00)	NPOESS-C2, C4	17:30	NOAA	No sounding

WG III felt confident that the morning and afternoon orbits would be well covered by the currently planned missions. It noted a relative weakness of the early morning orbit and encouraged satellite operators to investigate the possibility to fly on an early morning orbit for future missions.

EUMETSAT commented that the strong cooperation established among NOAA and EUMETSAT for the Joint Polar System had enabled it to plan for a robust three-satellite configuration. It looked forward to a wider cooperation in the post-EPS era. NOAA informed the WG on its plans for further cooperation between the USA and JAXA on GCOM-W.

III/8 Geostationary missions

WG III recalled that at CGMS-36 it had identified two potentially critical situations: The coverage of South America after termination of the GOES-10 mission at 60°W, and the coverage of the Indian Ocean after termination of the EUMETSAT IODC mission. The situation for these two areas is now the following:

NOAA informed CGMS that an official announcement was being prepared regarding the replacement of GOES-10 by GOES-12 by June 2010, which

would enable the resumption of South America coverage before the start of the Atlantic hurricane season. WMO expressed its gratitude for this effort that would directly respond to an important operational requirement coming from WMO Region III.

EUMETSAT indicated that Meteosat-6 (located at 67.5°E) would be decommissioned by the end of 2010 after 17 years of faithful service, and that Meteosat-7 (located at 57.5°E) was expected to remain in operation until the end of 2013.

Confirmed launch or relocation plans are summarised in the table below.

Agency	**Satellite**	**Nominal location**	**Planned launch date or relocation**
KMA	COMS-1	128.2°E	Spring 2010
Roshydromet	Elektro-L 1	76°E	Spring 2010
	Elektro-L 2	14.5°W	2011
CMA	FY-2E	Moved to 105°E	(On going)
	FY-2F, -2G FY-4		
ISRO	Insat-3D	82°E	2010
EUMETSAT	Meteosat-10, 11	0°	2012, 2014
JMA	Himawari-8 & 9	140°E	2014, 2016
NOAA	GOES-P GOES-R,S,T	75°W 135°W/75°W	2010 2015

In view of these firm plans, WG III felt confident about the continuity of geostationary coverage for the coming years. It was highlighted however that, for several satellite operators (CMA, EUMETSAT, JMA, NOAA), around the 2015 time frame, there will be a change of satellite generation, which could introduce a measure of risk. This simultaneous occurrence had to be monitored with particular attention.

The Chairperson recalled that the CGMS Global Contingency Plan was based on the “Help your neighbour” principle, which has been translated into formal bilateral agreements between “neighbouring” satellite operators (EUMETSAT-NOAA, NOAA-JMA). These agreements provided a legal framework facilitating a quick implementation of back-up arrangements which have proved to be essential in several occasions in support of Meteosat, GOES or Himawari. He invited the other satellite operators to consider such arrangements in order to futher increase the overall robustness of the geostationary constellation. It was noted, however, that the planned coverage of the Eastern hemisphere included a certain degree of overlap between the fields of view of neighbouring satellites, therefore if a contingency situation arose, this would not necessarily imply relocating a satellite, but would require maximum interoperability of the data and products. Integration of data management practices would thus be an element of increased robustness. WG III agreed that this should be further investigated.

III/9 Review of actions, conclusion and preparation of the WG report

In conclusion, the Chairperson highlighted that continuity of operational missions seemed to be ensured for the years to come both on the geostationary orbit and on polar orbits.

He was also pleased to note that a number of climate missions had started to be incorporated in operational plans in addition to research missions, or as a follow-on to them, and were planned to make their data available in an open manner. There was in this respect a clear complementarity between, on one hand, research missions that are needed to investigate climate processes and experiment new technologies, and, on the other hand, climate monitoring missions that are expected to provide long-term continuity. He expected that CGMS will be as effective in coordinating these long-term climate monitoring missions as it had been to date in ensuring operational continuity.

He underlined that the continuity requirements and the associated concept of contingency needed to be further refined for these climate monitoring missions and recommended that this be addressed in more detail at CGMS-38.

WORKING GROUP IV: GLOBAL DATA DISSEMINATION

IV/0 Introduction

As agreed at CGMS-36, Mr Mikael Rattenborg from EUMETSAT was elected Chairperson of Working Group IV (WG IV) on global data dissemination, with Mr Gordon Bridge, also from EUMETSAT, appointed as Rapporteur. WG IV comprised representatives of the following satellite operators: CMA, EUMETSAT, JMA, KMA, KARI, NOAA, and WMO (see Annex 4 for the full list of participants).

IV/1 Direct Dissemination from Meteorological Satellites

WG IV noted that WMO-WP-05, Regional data dissemination requirements, would be addressed later in the Agenda.

KMA-WP-03 informed WG IV about the planned data dissemination methods of COMS. All observation data from the COMS satellite is planned for dissemination via direct broadcast and the Internet. KMA added that whilst all COMS data would be encrypted, free and open access to all data was envisaged.

Action 37.35: KMA to provide CGMS with information on its Point of Contact for user access enquiries. Deadline: 30 April 2010

KMA-WP-04 summarised the current status of the COMS Ground Segment at the National Meteorological Satellite Center (NMSC) of KMA. The COMS ground system at NMSC has been fully installed and is in its final test phase.

NOAA-WP-33 provided a status report on its Geostationary Operational Environmental Satellite Series R (GOES-R) and polar-orbiting satellite constellations. The first of the GOES-R series of satellites is scheduled for launch in 2015. The GOES-R sensors are making great progress. The ABI Prototype model is in test and the other sensors are heading towards Critical Design Review (CDR). Also, the Ground Segment development is under way. A major Contractor, Harris Corporation, is onboard and working towards an Integrated Baseline Review and Preliminary Design. The Government Algorithm Development team is making enormous progress on developing a mature ATBD. In addition, the Ground System is starting some initial Cal/Val experiments. The GOES-R Proving Ground activities continue to show progress towards ensuring GOES-R readiness.

WG IV was pleased to note that there would be free and open access to the GOES-R downlink by authorised users. WMO raised the issue that during the commissioning and eventual transition to the full GOES-R, and -S, operational system, users would have to face the possibility of simultaneously maintaining two data reception systems (in order to receive data from still operational current generation of GOES satellites and data from GOES-R). In response,

NOAA confirmed that it was considered a “transitional” data access scheme based upon the possible use of a legacy spacecraft, for its GOES users. In the view of NOAA, that was a requirement that should be stressed by WMO and other participating CGMS members at the forthcoming GOES User Conference in the USA (week beginning 3rd November 2009) at which there will be a User Forum. The following action was agreed:

Action 37.36: NOAA is invited to develop a simplified current GOES/GOES-R user data access scheme, for use especially during the period of transition from the current GOES system to the operational GOES-R and S system. Deadline: CGMS-38

NOAA-WP-35 provided the status of the Low Rate Information Transmission (LRIT) on the GOES I-M and N-P spacecraft. The LRIT broadcast is operational on both GOES-east and GOES-west spacecraft. NOAA continues to concentrate its efforts on upgrading system reliability and monitoring activities. NOAA began the expansion of the product suite through additional imagery products and environmental products. NOAA continues to work with users and vendors to assess the quality and reliability of the LRIT service.
NOAA will continue to re-evaluate the system architecture and to upgrade the hardware and software in LRIT domains. Future development of the LRIT system will be defined through increased utilisation and community outreach activities. NOAA will continue to work on the provision of a combined HRIT/EMWIN broadcast on the upcoming GOES-R series of satellites.

WGIV noted that with advent of GOES-R the data rate will increase from the current 128 Kbs to around 400 Kbs. NOAA explained the difficulties encountered in establishing realistic statistics on its users. Whilst periodic user surveys were carried out, it was not always possible to achieve a high response rate from its various user communities. Noting that this was a wide-scale problem for CGMS satellite operators, and that knowledge of user statistics would benefit all members in better preparing user support services, WG IV agreed the following action:

Action 37.37: All CGMS satellite operators to regularly include user statistics in their reports on current satellite systems. Deadline: CGMS-38

IV/2 Advanced Dissemination Methods

No documents were submitted.

IV/3 Global Data Exchange

No documents were submitted.

IV/4 Integrated Global Dissemination Service (IGDDS) development

EUM-WP-04 informed CGMS about proposed improvements to the timeliness of the EPS/Metop Global Data Service (GDS) through the introduction of an Antarctic Data Acquisition (ADA) Service. A proposal, based upon a cooperation with NOAA, was approved in July 2009 at the 67th EUMETSAT Council meeting. The document summarised the proposal and included planning for the implementation of the improved Metop timeliness ADA service and highlighted the impact on the timeliness of product delivery to end users.

WG IV noted that related document NOAA-WP-30 addressing the use of NPOESS Ground Infrastructure to improve the timeliness of Metop data, had also been presented to WG III for information.

The Chairperson expressed the appreciation of EUMETSAT for all the support provided by NOAA for this project.

CMA commented that it was already considering a similar scheme to improve the timeliness of FY-3B data access in the future.

EUM-WP-15 reported on the status of GEONETCast, which consisted of a network of three dissemination systems, namely, GEONETCast Americas operated by NOAA, FENGYUNCast operated by CMA and EUMETCast operated by EUMETSAT, and providing nearly global coverage. The three GEONETCast Network Centres (GNC) operated by NOAA, CMA and EUMETSAT are interconnected with data exchange links for the exchange of GEONETCast relevant data. All three GNCs are disseminating their GEONETCast contributions in their respective footprints operationally. The next step is to include these data exchange contributions of the other GNCs into the respective regional dissemination. EUMETSAT is already disseminating these contributions from NOAA and CMA on all EUMETCast footprints covering Europe, Middle East, Africa and South and Central America.

The document also presented in more detail the actual status of the GEONETCast system as regards the respective participating dissemination systems, data exchange and data services supported, with an outlook into the near term evolution. Additional focus was given to FENGYUNCast, the actual status and the intended evolution of EUMETCast services, as a significant contribution to GEONETCast. Data services provided by EUMETCast dissemination are accessed via the GEONETCast Product Navigator which provides one-stop-shop access to GEONETCast data collection discovery.

CMA informed WGIV that mid 2010 it would be upgrading its FENGYUNCast system and this would improve data exchange with EUMETSAT and will provide a greater capacity for the distribution of data and products in the reception footprint. WMO highlighted some difficulties it had experienced in locating a single, English language point of contact for potential users of

FENGYUNCast disseminated data and products outside of China. CMA informed CGMS that it was aware of this problem and was taking steps to rectify the situation, which would be complete by the time of the system upgrade. CMA confirmed that FENGYUNCast data was available for use by national users and users outside of China, and that it was willing to rebroadcast data and products from data providers outside of China. China also confirmed that the upgraded system will use the same broadcast technology, based upon ASIASAT and furthermore, the intention was that FENGYUNCast should become a full component of GEONETCast network. The following action was agreed:

Action 37.38: CMA to inform CGMS about its upgraded FENGYUNCast service. Deadline: CGMS-38

NOAA-WP-32 presented WG IV with an overview of GEONETCast Americas. As a regional component, GEONETCast Americas serves North, Central, and South America and the Caribbean Basin. NOAA stated that the regional service is operating very well and took the opportunity to inform CGMS about its customers/providers, products and finally an outline of its future plans. NOAA acknowledged GEONETCast America customers are mostly providers at this point. The list of customers/providers consist of INPE (Brazil), IMN (Costa Rica), CONAE (Argentina), SERVIR (Panama), CATHALAC (Panama), Chile Meteorological Service (military) and NOAA's CREST programme. NOAA commented that Costa Rica is putting in a small network of three stations as part of its flood project while the Chilean met service is buying a station this year. The NOAA CREST programme is providing two stations for Bowie State University in Maryland and the University of Puerto Rico. NOAA mentioned several other countries in Central America having revealed a sincere interest in GEONETCAST Americas during the CAFTA-DR seminars with CATHALAC and SERVIR. In addition, NOAA informed WG IV that GEONETCast Americas has products from several providers. These provider/products are:

- NOAA/NESDIS contributes Ozone, Hazard Mapping System (HMS), ABBA Fires, e-TRAP Probability of Rain and precipitation amounts, and will soon to have Chlorophyll products (this month);
- INPE provides twenty-six (26) different products (i.e., GOES-10;
- GOES-MSG merged imagery, model output products);
- CONAE contributes SAC-C Imagery Products in JPEG format;
- CATHALAC SERVIR makes available MM5 Model output for Central America;
- US Environmental Protection Agency (EPA) adds Air Quality products and information;
- Additionally a suite of RANET products for Central America and several products from NWS GTS are also available; and
- IMN Costa Rica is planning a new product suite on Flash Flood Guidance.

The current and future plans of GEONETCast Americas include an Announcement of Opportunity in the region, as well as NOAA Lines and USGEO to advertise for users and providers. The Outreach activities of the GEONETCast Americas Coordination Group (U.S., Canada, Brazil, Argentina, Costa Rica, Chile, and Panama (CATHALAC)) will focus on building the user base. Regional leadership such as the expert cadres at CATHALAC (Panama), INPE (Brazil), IMN (Costa Rica), and CONAE (Argentina) will aid in station set up and outreach activities. GEONETCast America is pursuing the possible transmission of COMET training materials. These training resources will be available in English, Spanish, Portuguese and French. Further plans to promote and expand GEONETCast Americas include:

- Exploring the use of the Hazard and Alert Channel;
- Working with NOAA's NWS on expanding the content on products from the GTS;
- Developing Pilot Projects to leverage on existing regional partnerships (proposed);
- Increasing Costa Rica Flash Flood Alert - VCP Programme in coop w/ NWS to install 3 more stations in addition to one at IMN;
- STAR CREST Partnerships - Bowie State, University of Puerto Rico; and
- Improving the requirements process - Increase products and providers using requirements gathering from CAFTA-DR Training Seminars from the summer 2009 and the WMO RAIII and IV requirements as a guide.

NOAA is firmly committed to supporting a global integrated GEONETCast system. As GEONETCast Americas is enhanced and the user and provider communities grow, this vision can be begin to be realised in the Americas and beyond, through collaboration among all the GEONETCast Americas partners.

WMO added its appreciation for the growing number of data contributors to the GEONETCast Americas system, which were clearly responding to several user requirements coming from the region. WMO-WP-05, although not presented at this meeting, drew attention to the table of satellite data requirements for South and Central America, which had been presented in document ET-SUP-RED-1/Doc. 6.2, (24.IX.2009). It was agreed that this table could serve as a template which could be used to standardise the input of requirements (including those going beyond meteorology) arising from e.g. user surveys and feedback in other regions of the world.

NOAA added that whilst it would be continuing its direct read-out services which clearly did support the meteorological community, it considered that GEONETCast Americas should be more general in product content. If WMO and CGMS members considered that this remained an issue, then any concerns should be addressed to Helen Wood, in NOAA, who was responsible for developing the GEONETCast Americas service. The Chairperson recalled that whilst the EUMETSAT Council will most likely agree an extension of the EUMETCast support to much of the region until 2013, this was on the basis of

a clearer picture of the use of such data in the region and the long term support to be provided by NOAA. The following action was agreed:

Action 37.39: NOAA to report on its plans for the full integration of GEONETCast Americas into the global GEONETCast system and service all GEO Societal Benefit Areas. Deadline: CGMS-38

WMO-WP-07 informed WG IV that the WMO Information System (WIS) provides an integrated approach suitable for all WMO Programmes to meet the requirements for routine collection and automated dissemination of observed data and products, as well as data discovery, access and retrieval services for all weather, climate, water and related data produced by centres and Member countries in the framework of any WMO Programme. The scope of the WIS is to ensure interoperability with other user communities including Earth sciences and the various GEO societal benefit areas within the Global Earth Observation System of Systems (GEOSS). WIS, as a system with essential data exchange and data management services, is expected to play a core role in the GEOSS with respect to weather, water and climate data and products. Contributions from satellite operators in the WIS operation and implementation are essential to ensure and facilitate the discovery and access of satellite data and products by users.

NOAA commented that given the importance of the WIS, it hoped all CGMS satellite operators would be in a position to fully support WIS implementation and operation. WMO confirmed that several CGMS members had indicated their willingness to provide full support, others had indicated partial support and a few none at all so far. CMA confirmed that it considered FENGYUNCast should be a component of the WIS and as such CMA would be applying to be a DCPC. NOAA suggested that all agencies intending to launch satellites providing data services should be encouraged to support the WIS as this would be an excellent mechanism to standardise services and harmonise associated data policies globally.

As a consequence of the above, the Chairperson concluded that WG IV could endorse the recommendations proposed by WMO, namely:

Recommendation 37.29: Satellite operators to support the further development and expansion of IGDDS/RARS as operational components of the WIS architecture.

Recommendation 37.30: All Satellite operators to consider applying as DCPCs.

Recommendation 37.31: Satellite operators to prepare metadata related to satellite data and products to the GISCs in accordance with the WMO core profile of the ISO metadata standard and to make them available to the GISCs.

Recommendation 37.32: Satellite operators to apply ISO 23950 for search as an effective enablement for interoperability between systems, including the WIS.

Recommendation 37.33: The CGMS Task Force on Satellite Data and Codes (TFSDC) to interact as appropriate with the WMO/CBS Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC), and the WMO/CBS Inter-Programme Expert Team on Metadata and Data Interoperability (IPET-MDI) with a view to contributing to the development of the WMO/WIS data representation and code forms for satellite data and products, and to the development of a comprehensive WIS data representation system policy.

WMO-WP-06 informed WG IV that the Integrated Global Data Dissemination Service (IGDDS) project aims at enhancing the availability of satellite data and products in the context of the WMO Information System (WIS). The IGDDS Implementation Plan contains some broad strategic guidelines, states key functional requirements, and defines a few critical actions.

The third meeting of the IGDDS Implementation Group (IGDDS-IG 3) was held in Tokyo in February 2009, in conjunction with the RARS Implementation Group and with participation of the APSDEU community. The meeting reviewed the progress and confirmed the importance of the critical actions including:

- ensuring the dissemination of satellite data and products through a coordinated set of operational DVB-S services with global coverage;

- ensuring full integration of these dissemination services into the WIS through referencing in DCPC catalogues, association with metadata, development of appropriate coding and use of agreed file name structures;

- collecting the expression of data requirements at the regional level; and

- facilitating user consultation mechanisms allowing the adjustment of dissemination service contents to the regional data needs.

An IGDDS DVB-S Operators Standards document has been approved by IGDDS-IG 3.

Actions have been initiated for the collection of regional data requirements from South and Central America and from Africa. These initiatives should be pursued and followed up in a user consultation mechanism with NOAA and EUMETSAT, respectively. Similar actions are under consideration in Asia in the context of a RA II Pilot Project led by Japan and Korea.

Based on the outcome of IGDDS-IG 3, it is planned to update the IGDDS Implementation Plan for consideration by IGDDS-IG 4 to be held in Geneva in March 2010.

Recalling the previous discussion related to WMO-WP-05, the following action was agreed:

Action 37.40: CGMS satellite operators to consider using the layout of the table of satellite data requirements for South and Central America, presented in document ET-SUP-RED-1/Doc. 6.2, (24.IX.2009) as a template for the collection of user requirements in other WMO Regions. Deadline: CGMS-38

WMO-WP-08 provided a brief report on the global network of Regional ATOVS Retransmission Services (RARS). As of 1 October 2009, the global RARS network included 32 stations (12 in EARS, 15 in the Asia-Pacific RARS and five in the South American RARS) covering in total 68% of the globe's surface. Additional stations in Miami, Muscat, Fortaleza, Santiago and Fiji are expected to become operational in the RARS network during the last quarter of 2009 which will increase the coverage to 76%. As of May 2009, all RARS stations are transmitting their data over the GTS in accordance with a unified file naming convention agreed within the RARS Implementation Group.

A new phase of the RARS project has been initiated for the retransmission of advanced sounder data from the future NPP and NPOESS missions. A project plan has been developed and adopted in July 2009. The first activity under this plan is to collect and review the detailed requirements from the NWP community regarding the fast delivery of hyperspectral sounding data.

The Chairperson proposed that Metop IASI data should also be included in the RARS and consideration should also be given to the inclusion of Metop-B HRPT sounding data which will become operational in the first half of 2012. The following action was agreed:

Action 37.41: WMO to consider including Metop-IASI data within the RARS. Deadline: CGMS-38

WG IV also endorsed the recommendation proposed by WMO that CGMS Members involved in the RARS project (CMA, EUMETSAT, JMA, KMA, NOAA, ROSHYDROMET), in collaboration with other parties involved, are invited to continue their support to the RARS project that provides an efficient means to improve the timeliness of polar-orbit sounding data, and to support in particular the extension of the RARS project to advanced sounders (X-RARS).

IV/5 Coordination of code forms for satellite data

In WMO-WP-09 WG IV were informed about amendments to the Manual on Codes (WMO No. 306) including those related to satellite data, which were recommended by the fourteenth session of the WMO Commission for Basic Systems (CBS-XIV), and which were approved by the sixty-first session of the WMO Executive Council (EC-LXI). They will take effect as from 4 November 2009. Amendments to the Manual on Codes separately proposed for RARS

and other satellite data exchange have been circulated to the President of CBS for approval through the fast track procedure.

The second meeting of the Task Force on Satellite Data Codes (TFSDC-II) was convened on 14 September 2009 as a “virtual meeting” (through phone conference) and agreed some amendments to the Manual on Codes to be approved by the fast track procedure. TFSDC-II also agreed amendments on satellite data code forms to be submitted to the first meeting of the WMO/CBS Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC) (15-18 September 2009) followed by the TFSDC-II. Those amendments were discussed by the IPET-DRC-I and approved for validation or pre-operational use.

The TFSDC-II reviewed the new data typology currently under validation and agreed that more feedback was necessary to finalise it. It also reviewed Common Code Table C-5 in the light of currently planned satellite series.

WG IV noted the following WMO actions proposed in the document, namely:

- CGMS Members to draw up an inventory of the products they generate and to allocate these products to the proposed data categories and sub-categories, as a “beta-testing” for the new typology, and provide feedback; and

- Satellite Operators to ensure that, in advance of the launch of their satellites, or as soon as possible after the launch, the necessary steps are taken for the allocation of identifiers and other code values for the exchange of their data over the GTS;

WG IV endorsed these actions and the following actions were agreed:

Action 37.42: The Chairperson of the Task Force on Satellite Data Codes should write to the CGMS Secretariat explaining the rationale behind the WMO-requested actions and provide full supporting documentation to allow CGMS to formulate possible further actions on members concerning the categorisation of their products. Deadline: 30 April 2010

Action 37.43: WMO to confirm with ROSHYDROMET its membership of the Task Force on Satellite Data Codes. Deadline: 30 April 2010

The Chairperson also stressed the need for strong participation by CGMS members in the meetings and activities of the Task Force on Satellite Data Codes.

IV/6 Review of actions, conclusion and preparation of the WG report

WG IV then reviewed the status of open actions from previous meetings:

Action 35.31 NOAA and EUMETSAT to study possibilities for the use of NPOESS ground infrastructure to improve the timeliness of Metop data, within the framework of JPS discussions and report findings to CGMS. Closed at CGMS-37

Action 35.32 CGMS members involved with the IGDDS to consider applying as DCPCs within the context of the IGDDS and WIS, in consultation with WMO. Closed at CGMS- 37, and addressed in a new action.

Action 36.25: CGMS Secretariat to propose revised Terms of Reference for Working Group IV to reflect the fact that it will now also include activities of the CGMS Task Force on Satellite Data Codes. Discussed at CGMS-37. To be taken into account when revising the overall CGMS agenda for CGMS-38 (ref. action 37.19)

Action 36.26: CGMS Members to nominate their participants for the CGMS Task Force on Satellite Data Codes. Closed at CGMS-37.

KMA informed WG IV that it will also participate in the CGMS Task Force on Satellite Data Codes.

Action 36.27: CGMS Task Force on Satellite Data Codes to propose a permanent framework for the activity by CGMS-37. Open. Process still needs formalising. New deadline: CGMS-38

Action 36.28: CMA to investigate possibilities for the provision of global FY-3 data to the GTS main trunk network and report back at CGMS-37. Closed.

In mentioning the current data exchange already engaged with EUMETSAT and Madison, CMA advised that more general provision was not yet on the agenda. However, CMA would actively respond to operational demands of NWP for global FY-3 data within the technical possibility and policy

The following actions:

- Action 36.29: NOAA to provide CGMS with more information on the reception of GOES-R data sets; and

- Action 36.30: NOAA to consider options for a multi-cast service in support of the dissemination of GOES-R data and products and inform CGMS accordingly. Deadline: CGMS-37;

were closed following the discussions and NOAA agreed to report on progress at future meetings.

WG IV concluded its business with the finalisation of its Report to Plenary, taking into account the related actions generated during the session.

ANNEXES:

AGENDA OF THE CGMS-37
26-30 October 2009

- Plenary Session -

A. Introduction
A.1 Welcome
A.2 Election of Chairperson
A.3 Adoption of Schedule
A.4 Nomination of Drafting Committee
A.5 Review of Action Items
B. Report on the Status of Current Satellite Systems
B.1 Polar Orbiting Meteorological Satellite Systems
B.2 Geostationary Meteorological Satellite Systems
B.3 Research and Development Satellite Systems
B.4 Other LEO satellites
B.5 Spacecraft anomalies from solar and other events
C. Report on Future Satellite Systems
C.1 Future Polar Orbiting Meteorological Satellite Systems
C.2 Future Geostationary Meteorological Satellite Systems
C.3 Future Research and Development Satellite Systems
C.4 Future other LEO satellites
C.5 Future HEO or combinations of LEO and GEO missions
D. Operational Continuity and Reliability
D.1 Global planning, including orbital positions and reconfiguration of the space-based component of the GOS
D.2 Inter-regional contingency measures
D.3 Long-term global contingency planning
E. Satellite Requirements of WMO and IOC
E.1 WMO programmes and projects
E.2 GCOS and other joint programmes and projects
E.3 IOC Programmes
F. Interaction with GEO
F.1 Contributions of meteorological satellites to the Societal Benefit Areas
F.2 (SBAs)
F.3 GEONETCast
CGMS and GEO/GEOSS interactions
G. Working Group Reports
G.1 Reports from the Working Groups
H. Other Items of Interest
H.1 Training
H.2 Information
H.3 Any other business
I. Final Session
I.1 Nomination of CGMS Representatives at WMO, CEOS and other meetings
I.2 Nomination of Chairperson of Working Groups for CGMS-38
I.3 Summary List of Actions from CGMS-37
I.4 Approval of Draft Final Report
I.5 Date and place of next meeting

AGENDA OF THE CGMS-37
26-30 October 2009

- Working Group Sessions -

Working Group I: Telecommunications	
I/0	Introduction
I/1	Coordination of frequency allocations: SFCG, ITU and WRC activities
I/2	Telecommunication techniques
I/3	Coordination of International Data Collection & Distribution
I/3.1	Status and Problems of IDCS
I/3.2	Ships, including ASAP
I/3.3	Dissemination of DCP messages (GTS or other means)
I/4	Future use of IDCS
I/5	Search and Rescue (S&R)
I/6	Review of actions, conclusion and preparation of WG report
Working Group II: Satellite Products	
II/0	Introduction
II/1	Image processing techniques
II/2	Satellite Data Calibration and Validation
II/3	Vertical sounding and ITWG matters
II/4	Precipitation and IPWG matters
II/5	Atmospheric Motion Vectors and IWWG matters
II/6	Cloud and dust related parameters
II/7	Other parameters and products
II/8	Review of actions, conclusion and preparation of WG report
Working Group III: Contingency Planning	
III/0	Introduction
III/1	Revised GOS baseline for geostationary satellites
III/2	CGMS Global Contingency Plan for geostationary orbit
III/3	Revised GOS baseline for polar-orbiting satellites
III/4	Contingency considerations for oceanographic and climate satellites
III/5	Review of actions, conclusion and preparation of WG report
Working Group IV: Global Data Dissemination	
IV/0	Introduction
IV/1	Data Dissemination from meteorological satellites
IV/2	Advanced Dissemination Methods
IV/3	Global data exchange
IV/4	Integrated Global Dissemination Service (IGDDS) development
IV/5	Coordination of code forms for satellite data
IV/6	Review of actions, conclusion and preparation of WG report

Annex 2

WORKING PAPERS SUBMITTED TO CGMS-37

CMA

WP Number	Title	Agenda Item
CMA-WP-01	CMA Review of Action Items	A.5
CMA-WP-02	Status of CMA Polar-orbiting Meteorological Satellites	B.1
CMA-WP-03	Status of CMA Operational Geostationary Satellite	B.2
CMA-WP-04	Preliminary Consideration on FY-4 Frequency Network	I/1
CMA-WP-05	Update on GSICS activities at NSMC	II/2
CMA-WP-06	Progress on optical calibration of FY-3A payloads	II/2
CMA-WP-07	Progress on FY-3A atmospheric sounding data assimilation	II/3
CMA-WP-08	**FY-3A aerosol product and its application**	II/6
CMA-WP-09	FY-3A ozone product and its application	II/7
CMA-WP-10	FY-3A ocean colour product and its application	II/7

CNES

WP Number	Title	Agenda Item
CNES-WP-01	Interference on ARGOS system	I.1/I.3

ESA

WP Number	Title	Agenda Item
ESA-WP-01	Status of Current ESA Earth Observation Missions	B.3
ESA-WP-02	Status of the Future ESA Earth Observation Missions	C.3
ESA-WP-03	Oceanographic Information Provided by ESA Missions	E.3
ESA-WP-04	Status of ESA Actions	A.5
ESA-WP-05	Description of ESA's Sensor Performance, Products and Algorithms Monitoring	WG II/2
ESA-WP-06	A Quality Assurance Framework for Earth Observation: Operational guidelines	B.3
ESA-WP-07	CEOS Working Group on Calibration and Validation Organisation and current activities	WG II/2

EUMETSAT

WP number	Title	Agenda Item
EUM-WP-01	Review of action items	A.5
EUM-WP-02	EUMETSAT input to satellite tables	A.5
EUM-WP-03	Status of EUMETSAT Polar System (EPS)	B.1
EUM-WP-04	Plans for improved Metop timeliness via NPOESS ground station infrastructure (within framework of JPS)	WGIV/4 WGIV
EUM-WP-05	Status of the Meteosat System	B.2
EUM-WP-06	Report on spacecraft anomalies from solar events	B.5
EUM-WP-08	Plans for Post-EPS	C.1
EUM-WP-09	Status of preparations for MSG-3 and MSG-4	C.2
EUM-WP-10	Plans for Meteosat Third Generation (MTG)	C.2
EUM-WP-11	EUMETSAT contribution to GMES	C.1/C.2/ C.4
EUM-WP-12	EUMETSAT activities on ocean monitoring	C.4
EUM-WP-13	EUMETSAT activities on climate monitoring	E.2
EUM-WP-14	Status of EUMETSAT Satellite Application Facilities (SAFs)	G.3
EUM-WP-15	GEONETCast Status Report	WGIV/4
EUM-WP-16	Report on EUMETSAT training activities	H.1
EUM-WP-17	EUMETSAT conferences and publications	H.2
EUM-WP-19	Proposed fact sheet on GSICS/CGMS	H.3
EUM-WP-20	EUMETSAT Report on Frequency Management topics	WGI/1
EUM-WP-21	Update of the status of the coordinated use of the DCP band	WGI /1 WGI
EUM-WP-22	MTG mission data downlink in K/Ka-Band: Summary results of the atmospheric propagation effects in the downlink availability	WGI/2
EUM-WP-23	GSICS scientific and data management achievements 2008/2009	WGII/2
EUM-WP-24	Instrument characterisation of current and future LEO and GEO satellites	WGII/2 WGII
EUM-WP-26	CGMS AMV intercomparisons using MSG image data [IWWG]	WGII/5 WGII
EUM-WP-27	Improvements to EUMETSAT AMVs and preliminary impact on NWP	WGII/5 WGII
EUM-WP-28	EUMETSAT product development approach	WGII/6 WGII
EUM-WP-29	Assessment of the specification of relevant MTG channels for fire monitoring	WGII/7
EUM-WP-30	MSG data and products as prototype for the MTG Imager	WGII/7
EUM-WP-31	Preparation of and recommendations for the 10th International Winds Workshop	WGII/5

JAXA

WP No	Title	Agenda Item
JAXA-WP-01	Update on the Status of JAXA's Current Satellite Systems	B.3
JAXA-WP-02	Update on the Status of JAXA's Future Satellite Systems	C.3
JAXA-WP-03	JAXA's Contribution to GSICS	II/2

Annex 2

JMA

WP Number	Title	Agenda Item
JMA-WP-01	Review of Action Items	A.5
JMA-WP-02	Status and Plan of Multi-functional Transport Satellite (MTSAT)	B.2, I/3.1
JMA-WP-03	Plans for Follow-on Satellites to MTSAT-2	C.2
JMA-WP-04	JMA's GSICS and SCOPE-CM activities	II/2
JMA-WP-05	JMA's Atmospheric Motion Vectors	II/5
JMA-WP-06	Sea-ice Motion Vector Product at MSC of JMA	II/7
JMA-WP-07	Introduction of the Pilot Project to Develop Support for NMHSs in Satellite Data, Products and Training in WMO RA II Region	E.2

KMA

WP Number	Title	Agenda Item
KMA-WP-01	Review of Action Items	A.6
KMA-WP-02	Update on COMS Program	C.2
KMA-WP-03	Update on COMS Data Service Plan	IV/1
KMA-WP-04	Current Status of COMS Ground System at National Meteorological Satellite Center of KMA	IV/1
KMA-WP-05	Tentative Plans for Follow-on Satellites to COMS	C.2
KMA-WP-06	KMA's GSICS Activities	II/2
KMA-WP-07	Current Status of the Satellite Data Assimilation in KMA	II/3
KMA-WP-08	Update on Operational Analysis of the Tropical Cyclone at KMA	II/7
KMA-WP-09	Current Status of Weather Support for Nowcasting and Very Short Range Forecast	II/7
KMA-WP-10	Current Status of Atmospheric Motion Vector at KMA	II/5
KMA-WP-11	Update on Operational Analysis of Asian Dust at KMA	II/6
KMA-WP-12	Operational Analysis of Fog Detection at KMA	II/7
KMA-WP-13	Current status on Microwave Sensor Application and GPM Activity in KMA/NIMR	II/4
KMA-WP-14	Plan for Providing the SST Data from COMS into the GHRSST International Framework at KMA/NIMR	II/7
KMA-WP-15	Current Status of Research and Development Activities on GNSS Radio Occultation in Korea	III/3
KMA-WP-16	The 3rd International Training Course on the Analysis of COMS Data in Korea	H.1
KMA-WP-17	KMA'S Plan for Participating Virtual Laboratory	H.1
KMA-WP-18	Introduction of the Pilot Project to Develop Support for NMHSs in Satellite Data, Products and Training in WMO RAII region	E.2

NOAA

WP Number	Title	Agenda Item
NOAA-WP-01	Review of CGMS-36 Action items	A.5
NOAA-WP-02	Polar Orbiting Operational Environmental Satellites	B.1
NOAA-WP-03	Geostationary Operational Environmental Satellite (GOES)	B.2
NOAA-WP-04	Anomalies from Solar Events	B.5
NOAA-WP-05	Future Polar-orbiting Meteorological Satellite System	C.1
NOAA-WP-06	Future Geostationary Meteorological Satellite System	C.2
NOAA-WP-07	Global Space-based Intercalibration System (GSICS) Progress Report	C.5
NOAA-WP-08	NOAA Support for the CGMS Virtual Laboratory Focus Group (Session II)	H.1
NOAA-WP-09	Technical Input to the SFCG and ITU-R	I/1
NOAA-WP-10	Status of the International Data Collection System (IDCS)	I/4
NOAA-WP-11	NOAA Report on Satellite Calibration Anomalies	II/2
NOAA-WP-12	GSICS Correction Algorithm for Geostationary Imagers	II/2
NOAA-WP-13	Intercomparison of Geostationary Observations with AIRS and IASI	II/2
NOAA-WP-14	Recommendation for Instrument Performance Monitoring Website	II/2
NOAA-WP-15	Report on Instrument Characterisation of the Imager and Sounder Instruments in Polar and Geostationary Orbit	II/2
NOAA-WP-16	Report on Community Direct Broadcast Software Processing Packages	II/2
NOAA-WP-17	A description of NOAA's Processes for Product Development, Verification and Implementation Into Operations	II/2
NOAA-WP-18	Development of IDEA Products for GOES-R Aerosol Data	II/3
NOAA-WP-19	NOAA's Approach to Providing Climate Date Records (CDRs)	C.1
NOAA-WP-20	Recalibration of the AMSU-A sensor for climate applications	II/3
NOAA-WP-21	Characterisation of Errors Associated with Atmospheric Motion Vectors Derived at NOAA/NESDIS	II/5
NOAA-WP-22	Current State of Atmospheric Motion Vector (AMV) Algorithm Development at NOAA/NESDIS in Preparation for the Future GOES-R Advanced Baseline Imager (ABI)	II/6
NOAA-WP-24	GOES-R Algorithm Development	II/7
NOAA-WP-25	NOAA Report on Global Positioning System (GPS) Radio Occultation Measurements	II/7
NOAA-WP-26	The NOAA Product Validation System (NPROVS) and Environmental Data Graphical Evaluation (EDGE) Interface	II/7
NOAA-WP-27	NOAA Table of Polar-orbiting Satellite Equator Crossing Times and Frequencies	III/3
NOAA-WP-28	Updates to the CEOS/WMO Database	
NOAA-WP-29	NOAA's Consideration as DCPCs within the Context of the IGDDS and WIS	III/1
NOAA-WP-30	The Use of NPOESS Ground Infrastructure to Improve the Timeliness of Metop Data	III/2
NOAA-WP-32	Update on GEONETCast Americas	IV/4
NOAA-WP-33	An Overview of the GOES-R System	IV/1
NOAA-WP-35	Current Status of the GOES LRIT Service	IV/1
NOAA-WP-36	NOAA Table of Satellites	
NOAA-WP-37	Current Status of Jason-2 and planned activities for the Jason-3 Program	B.1
NOAA-WP-39	NOAA Planning for Operational Solar Wind Monitoring and Coronal Mass Ejection Monitoring Imaging	B.5

Annex 2

ROSCOSMOS/ROSHYDROMET

WP Number	Title	Agenda Item
ROSH/ROSC-WP-01	Future Polar Orbiting Meteorological Satellite Systems	C.1
ROSH/ROSC-WP-02	Future Geostationary Meteorological Satellite Systems	C.2
ROSH/ROSC-WP-03	Future Research and Development Satellite Systems	C.3

WMO

WP Number	Title	Agenda Item
WMO-WP-01	Frequency Management Issues	I/1
WMO-WP-02	GSICS Pilot Project for WIGOS	II/2
WMO-WP-03	DLR World Data Centre on Remote Sensing of the Atmosphere	II/6
WMO-WP-04	Satellite needs of the Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)	II/6
WMO-WP-05	Regional data dissemination requirements	IV/1
WMO-WP-06	Update on IGDDS	IV/4
WMO-WP-07	Contribution to WIS operation and implementation	IV/4
WMO-WP-08	Update on RARS	IV/4
WMO-WP-09	Update on satellite data code forms	IV/5
WMO-WP-10	Dossier on the space-based GOS	D.1
WMO-WP-11	Update on IGEOLab HEO project	C.5
WMO-WP-12	Vision of the GOS for 2025	D.1
WMO-WP-13	WIGOS	E.1
WMO-WP-14	Sustained Coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM)	E.1
WMO-WP-15	WMO/GAW – IGACO satellite needs	E.1
WMO-WP-16	GCOS and Satellite Activities for Climate Monitoring	E.2
WMO-WP-17	Outcome of the Third World Climate Conference (WCC-3)	E.2
WMO-WP-18	Virtual Laboratory matters	H.1
WMO-WP-19	WMO-CGMS web pages	H.2
WMO-WP-20	Radio-Occultation Working Group	H.3
WMO-WP-21	WMO activities on Space Weather	H.3
WMO-WP-22	International Polar Year and Follow-on Satellite Activities	H.3
WMO-WP-23	Report on the International Precipitation Working Group	II/4

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APPENDIX: GENERAL CGMS INFORMATION

1. Charter for CGMS
2. CGMS Membership
3. Addresses for Procuring Archive Data
4. Contact List for Operational Engineering Matters
5. Address List for Distribution of CGMS Documents
6. E-mail List Servers
7. Glossary

CHARTER FOR THE COORDINATION GROUP FOR METEOROLOGICAL SATELLITES (CGMS)[1]

PREAMBLE

RECALLING that the Coordination on Geostationary Meteorological Satellites (CGMS) has met annually as an informal body since September 1972 when representatives of the United States (National Oceanic and Atmospheric Administration), the European Space Research Organisation (now the European Space Agency), and Japan (Japan Meteorological Agency) met to consider common interests relating to the design, operation and use of these agencies planned meteorological satellites,

RECALLING that the Union of Soviet Socialist Republics (State Committee for Hydrometeorology), India (India Meteorological Department) and the People's Republic of China (State Meteorological Administration) initiated development of geostationary satellites and joined CGMS in 1973, 1978, and 1986 respectively,

RECOGNIZING that the World Meteorological Organisation (WMO) as a representative of the meteorological satellite data user community has participated in CGMS since 1974,

NOTING that the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) has, with effect from January 1987, taken over responsibility from ESA for the METEOSAT satellite system and the current Secretariat of CGMS,

CONSIDERING that CGMS has served as an effective forum through which independent agency plans have been informally harmonised to meet common mission objectives and produce certain compatible data products from geostationary meteorological satellites for users around the world,

RECALLING that the USA, the USSR, China and Europe have launched polar-orbiting meteorological satellites, and that the polar and geostationary meteorological satellite systems together form a basic element of the space based portion of the WMO Global Observing System,

BEING AWARE of the concern expressed by the WMO Executive Council Panel of Experts over the lack of guaranteed continuity in the polar-orbit and its recommendation that there should be greater cooperation between operational meteorological satellite operators world-wide, so that a more effective utilisation of these operational systems, through the coordination and standardisation of many services provided, can be assured,

[1] This Charter was amended at CGMS-31 to take into account new membership of the R&D agencies ESA, NASA, JAXA and Rosaviakosmos. It was further amended at CGMS-34 to take into account the new membership of CNES (since CGMS-32), KMA (since CGMS-33), and CNSA.

RECOGNIZING the importance of operational meteorological satellites for monitoring and detection of climate change,

RECOGNIZING the expansion of the space-based component of the WMO's World Weather Watch Global Observing System to include Research & Development missions and the commitment of the National Aeronautics and Space Administration (NASA), European Space Agency (ESA), Russian Aviation and Space Agency (Rosaviakosmos) and the National Space Development Agency of Japan (NASDA) to make observations from its missions available to the world community at the 2nd session of the WMO Consultative Meetings on High Level Policy on Satellite matters in February 2002,

NOTING the expansion of CGMS at CGMS-31 to include NASA, ESA, Rosaviakosmos and the Japan Aerospace Exploration Agency (JAXA) as full members to improve coordination between operational meteorological and R&D satellite operators,

NOTING the further expansion of CGMS at CGMS-32 to include CNES, at CGMS-33 to include KMA, and at CGMS-34 to include CNSA, following to their commitment to make observations from their missions available to the world community in full adherence with the space-based component of the WMO's World Weather Watch Global Observing System,

AND RECOGNIZING the need to update the purpose and objectives of CGMS,

AGREE

I. To change the name of CGMS to the Coordination Group for Meteorological Satellites

II. To adopt a Charter, establishing Terms of Reference for CGMS, as follows:

OBJECTIVES

a) CGMS provides a forum for the exchange of technical information on geostationary and polar-orbiting meteorological satellite systems and research & development missions, such as reporting on current meteorological satellite status and future plans, telecommunications matters, operations, intercalibration of sensors, processing algorithms, products and their validation, data transmission formats and future data transmission standards.

b) CGMS harmonises to the extent possible meteorological satellite mission parameters such as orbits, sensors, and data formats and downlink frequencies.

c) CGMS encourages complementarity, compatibility and possible mutual back-up in the event of system failure through cooperative mission planning, compatible meteorological data products and services and the coordination of space and data related activities, thus complementing the work of other international satellite coordinating mechanisms.

MEMBERSHIP

d) CGMS Membership is open to all operators of meteorological satellites, to prospective operators having a clear commitment to develop and operate such satellites, and to the WMO, because of its unique role as representative of the world meteorological data user community. Further CGMS Membership is open to space agencies operating R&D satellite systems that have the potential to contribute to WMO and supported programmes.

e) The status of observer will be open to representatives of international organisations or groups who have declared an intent, supported by detailed system definition studies, to establish a meteorological satellite observing system. Once formal approval of the system is declared, membership of CGMS can be requested by the observer.

Within two years of becoming an observer, observers will report on progress being made towards the feasibility of securing national approval of a system. At that time CGMS Members may review the continued participation by each Observer.

f) The current Membership of CGMS is listed in Appendix 2 to this charter.

g) The addition of new Members and Observers will be by consensus of existing CGMS Members.

ORGANISATION

h) CGMS will meet in plenary session annually. Ad hoc Working Groups to consider specific issues in detail might be convened at the request of any Member provided that written notification is received and approved by the Membership at least 1 month in advance and all Members agree. Such Working Groups will report to the next meeting of CGMS.

i) One Member, on a voluntary basis, will serve as the Secretariat of CGMS.

j) Provisional meeting venues, dates and draft agenda for plenary meetings will be distributed by the Secretariat 6 months in advance of the meeting, for approval by the Members. An agreed Agenda will be circulated to each Member 3 months in advance of the meeting.

k) Plenary Meetings of CGMS will be chaired by each of the Members in turn, the Chairperson being proposed by the host country or organisation.

l) The Host of any CGMS meeting, assisted by the Secretariat, will be responsible for logistical support required by the meeting. Minutes will be prepared by the Secretariat, which will also serve as the repository of CGMS records. The Secretariat will also track action items adopted at meetings and provide CGMS Members with a status report on these and any other outstanding actions, four months prior to a meeting and again at the meeting itself.

PROCEDURE

m) The approval of recommendations, findings, plans, reports, minutes of meetings, the establishment of Working Groups will require the consensus of Members. Observers may participate fully in CGMS discussions and have their views included in reports, minutes etc., however, the approval of an observer will not be required to establish consensus.

n) Recommendations, findings, plans and reports will be non-binding on Members or Observers.

o) Once consensus has been reached amongst Members on recommendations, findings, plans and reports, minutes of meetings or other such information from CGMS, or its Working Groups, this information may be made publicly available.

p) Areas of cooperation identified by CGMS will be the subject of agreement between the relevant Members.

COORDINATION

q) The work of CGMS will be coordinated, as appropriate, with the World Meteorological Organisation and its relevant bodies, and with other international satellite coordination mechanisms, in particular the Committee on Earth Observation Satellites (CEOS) and the Earth Observation International Coordination Working Group (EO-ICWG) and the Space Frequency Coordination Group (SFCG).

Organisations wishing to receive information or advice from the CGMS should contact the Secretariat; which will pass the request on to all Members and coordinate an appropriate response, including documentation or representation by the relevant CGMS Members.

AMENDMENT

r) These Terms of Reference may be amended or modified by consensus of the Members. Proposals for amendments should be in the hands of the Members at least one month prior to a plenary meeting of CGMS.

EFFECTIVE DATE AND DURATION

s) These Terms of Reference will become effective upon adoption by consensus of all CGMS Members and will remain in effect unless or until terminated by the consensus of CGMS Members.

MEMBERSHIP OF CGMS

The current Membership of CGMS is:

CMA	joined 1989
CNES	joined in 2004
CNSA	joined in 2006
ESA	re-joined in 2003
EUMETSAT	joined 1987 (currently CGMS Secretariat)
IMD	joined 1979
IOC/UNESCO	joined in 2001
JAXA	joined in 2003
JMA	founder member, 1972
KMA	joined in 2005
NASA	joined in 2003
NOAA	founder member, 1972
ROSCOSMOS	joined in 2003
ROSHYDROMET	joined 1973
WMO	joined 1973

In some cases delegates are supported by other Agencies, for example SRC Planeta (with Roshydromet), and ISRO (with IMD).

GLOSSARY

AAPP	AVHRR and ATOVS Processing Package
AATSR	Advanced Along Track Scanning Radiometer
ABI	Advanced Baseline Imager (GOES-R)
ABS	Advanced Baseline Sounder (GOES-R)
ACARS	Automated Communications Addressing and Reporting System
ACC	ASAP Coordinating Committee
ACRIMSAT	Active Cavity Radiometer Irradiance Monitor Satellite (NASA)
ADC	Atlantic Data Coverage
ADEOS-II	Advanced Earth Observing Satellite-II (JAXA)
ADM	Atmospheric Dynamics Mission (ESA)
ADM	Alternative Dissemination Methods
ADM	Advance Dissemination Means (WMO)
AERONET	Remote-sensing aerosol monitoring network programme
AIRS	Advanced IR Sounder
AHRPT	Advanced High Rate Picture Transmission
ALOS	Advanced Land Observing Satellite (JAXA)
AMDAR	Aircraft Meteorological Data Relay
AMR	Altimetry Microwave Radiomete
AMS	American Meteorological Society
AMSR	Advanced Microwave Scanning Radiometer
AMSR-E	Advanced Microwave Scanning Radiometer (modified version on ADEOS-II)
AMSU	Advanced Microwave Sounding Unit
AMV	Atmospheric Motion Vectors
AOCE	Attitude and Orbit Control Electronics
AOPC	Atmospheric Observation Panel for Climate (GCOS)
APSATS	Asian-Pacific Satellite Training
APT	Asia-Pacific Telecommunity (WRC)
APT	Automatic Picture Transmission
Aqua	Earth's water cycle observing mission (NASA)
Aquarius	global sea surface salinity measuring mission (NASA)
ARGOS	Data Collection and Location System
ARINA	scientific payload on Resurs-DK1 for earth quake prediction
ASAP	Automated Shipboard Aerological Programme
ASCAT	C-band dual swath scatterometer (Metop)
ASCII	American Standard Code for Information Interchange
ASDAR	Aircraft to Satellite Data Relay
ASICs	Application Specific Integrated Circuits
ATMS	Advanced Technology Microwave Sounder
ATOVS	Advanced TOVS
ATSR	Along Track Scan Radiometer (ERS, ESA)
Aura	Mission measuring atmospheric chemistry and trace gases (NASA)
AVHRR	Advanced Very High Resolution Radiometer
AVNIR	Advanced Visible and Near Infrared Radiometer type 2 (ALOS, JAXA)

Baumanets	R&D space technology satellite primarily for students (Roscosmos)
BBC	Black Body Calibration (Meteosat)
BCCP	Business Continuity and Contingency Plan (USA)
GMD	Basic Meteorological Data
BMTC	Australia Bureau of Meteorology Training Centre
BTD	Brightness Temperature Differences
BUFR	Binary Universal Form for data Representation
BSS	Broadcasting Satellite Service
CAL	Computer Aided Learning
CALIPSO	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite (NASA/CNES)
CART	Cloud and Radiation Test-bed
CAS	Commission for Atmospheric Sciences (WMO)
CboM	Commonwealth Bureau of Meteorology Australia
CBS	Commission for Basic Systems
CCD	Charged Couple Device (INSAT-2E)
CCIR	Consultative Committee on International Radio
CCRI	Climate Change Research Initiative
CCSDS	Consultative Committee on Space Data Systems
CD	Compact Disc
CDAS	Command and Data Acquisition Station
CDMA	Code Division Multiple Access
CDS	Climate Data Set (EUMETSAT)
CEOS	Committee on Earth Observation Satellites
CEPT	Conference Européenne des Postes et Télécommunications/European Conference of Postal and Telecommunications Administrations
Cg	WMO Congress
CGMS	Coordination Group for Meteorological Satellites
CHAMP	German EO Satellite
CHRIS	Compact High Resolution Imaging Spectrometer (PROBA, ESA)
CHRPT	Chinese HRPT (FY-1C and D)
CI	Convective Initiation (NOAA)
CIIS	Common Instrument Interface Studies
CIMS	GOES Channel Interference Monitoring System
CIMSS	Cooperative Institute of Meteorological Satellite Studies, Univ. Wisconsin
CIS	Commonwealth of Independent States
CITEL	Inter-American Telecommunication Commission
CLARE	Cloud Lidar And Radar Experiment
CLASS	Comprehensive Large-Array Stewardship System (NOAA)
CloudSat	Global cloud property measuring satellite (NASA/CSA)
CLS	Collecte Localisation Satellites (Toulouse)
CM	WMO Consultative Meetings on High-Level Policy on Satellite Matters
CMA	China Meteorological Administration
CMD	Cyclone Warning Dissemination Service
CME	Coronal Mass Ejections

CMIS	Conical Scanning Microwave Imager/Sounder
CM-SAF	Satellite Application Facility on Climate Monitoring (EUMETSAT)
CMP	Climate Monitoring Principles (GCOS)
CMS	Centre de Météorologie Spatiale (Lannion)
CMV	Cloud Motion Vector
CMW	Cloud Motion Wind
CNR	Consiglio Nazionale delle Ricerche (Italy)
CNSA	China National Space Administration
COCTS	10-band Chinese Ocean Colour and Temperature Scanner
COEs	Centres of Excellence (WMO)
COMS	Communication, Ocean and Meteorological Satellite (KMA)
CONAE	Comisión Nacional de Actividades Espaciales (Argentina)
COOP	Coastal Oceans Observations Panel (GOOS)
COP	Conference of the Parties (GCOS)
COSPAR	Committee on Space Research
COSPAS/ SARSAT	International satellite system for search and rescue (SAR)
CPM	Conference Preparatory Meeting (WRC)
CR	CGMS Consolidated Report
CrIS	Cross track Infrared Sounder
CRYOSAT	Polar Ice Monitoring Programme (ESA)
CZI	4-band Coastal Zone Imager (HY-1B).
DAPS	DCS Automated Processing System (USA)
DCP	Data Collection Platform
DCPC	Data Collection or Production Centre (WIS, WMO)
DCRS	Collaboration on Global Frequency Allocation harmonization
DCS	Data Collection System
DCWDS	Digital Cyclone Warning Dissemination System (India)
DIF	Directory Interchange Format
DMSP	Defense Meteorological Satellite Program (NOAA)
DOD	Department of Defense (USA)
DOMSAT	Domestic telecommunications relay Satellite (NOAA)
DPC	Directional Polarisation Camera (CNSA)
DPI	Derived Product Images (USA)
DPM	WMO Natural Disaster Prevention and Mitigation Programme
DPT	Delayed Picture Transmission
DR	Direct Readout services (ADM)
DRS	DCP Retransmission System (Meteosat)
DRT	Data Relay Transponder (INSAT)
DSB	Direct Soundings Broadcast
DSCOVR	Deep Space Climate Observatory (NASA)
DUS	Data Utilisation Station (USA) (Japan)
DVB	Direct Video Broadcast
DWS	Disaster Warning System (India)
EARS	EUMETSAT ATOVS Retransmission Service
EarthCARE	Cloud & aerosol mission (ESA)
EBB	Electronic Bulletin Board

EC	Executive Council (WMO)
ECP	European Common Proposal (CEPT)
ECT	Equator crossing time
ECV	Essential Climate Variables
ECMWF	European Centre for Medium-Range Weather Forecasts
EDR	Environmental Data Records (NPOESS)
EDU	Engineering Development Unit
EEIS	EUMETSAT External Information System
EESS	Earth Exploration Satellite Service (Frequency Management)
EIRP	Effective isotropically-radiated power
ELEKTRO	Geostationary meteorological satellite
EMWIN	Emergency Manager Weather Information Network (NOAA)
ENVISAT	ESA polar satellite for environment monitoring
EO	Earth Observation
EOS	Earth Observation System
EPA	US Environmental Protection Agency
EPS	EUMETSAT Polar System
ERBE	Earth Radiation Budget Experiment
ERBS	Earth Radiation Budget Satellite (NASA)
ERS	ESA Remote Sensing Satellite
ESA	European Space Agency
ESCAP	Economic and Social Commission for Asia and the Pacific, UN
ESJWG	Earth Sciences Joint Working Group
ESOC	European Space Operations Centre (ESA)
ET-ODRRGOS	Expert Team on Observational Data Requirements and Redesign of the GOS
ET-EGOS	Expert Team on Evolution of the Global Observing System (WMO)
ET-SAT	OPAG IOS Expert Team on Satellite Systems (WMO)
ET-SUP	OPAG IOS Expert Team on Satellite Utilisation and Products (WMO)
EU	European Union
EUCOS	EUMETNET Composite Observing System
EUMETCast	EUMETSAT Satellite Data Dissemination System
EUMETNET	The Network of European Meteorological Services
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FAA	Federal Aviation Authority (USA)
FAO	Food and Agriculture Organisation (UN)
FENGYUNCast	FENGYUN Satellite Data Dissemination System
FOV	Field of View (NOAA)
FTP	File Transfer Protocol
FWIS	Future WMO Information Systems (CBS Inter-Programme Task Team)
FXTS	Facsimile Transmission System (USA)
FY-1	Polar-orbiting Meteorological Satellite (PRC)
FY-2	Future Geostationary Meteorological Satellite (PRC)
FY-3	Second generation of Polar-orbiting Meteorological Satellite (PRC)

GAW	Global Atmosphere Watch (WMO Atmospheric Research Environment Programme)
GCOM	Global Change Observation Mission (NASDA)
GCOS	Global Climate Observing System
GDPT	Chinese Delayed Picture Transmission Format (Global Data) (FY-1C)
GDS	Ground Data System
GEO	inter-governmental Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GERB	Geostationary Earth Radiation Budget (MSG, EUMETSAT)
GESN	Global Education and Science Network
GEWEX	Global Energy and Water Cycle Experiment (WCRP)
GIFTS	Geosynchronous Imaging Fourier Transform Spectrometer (NASA)
GISC	Global Information System Centre (WIS, WMO)
GIMTACS	GOES I-M Telemetry and Command System
GLI	Generation Global Imager (GCOM)
GLM	Geostationary Lightning Mapper (GOES, NOAA)
GLOBUS	multichannel scanning radiometer (Meteor-3M N2)
Glory	CCRI global distribution of natural and anthropogenic aerosols mission (NASA)
GMES	Global Monitoring for Environment and Security (EU)
GMR	GOES-Meteosat Relay
GMS	Geostationary Meteorological Satellite (Japan)
GNSS	Global Navigation Satellite System
GOCE	Gravity Field and Steady State Ocean Circulation Explorer (ESA)
GOES	Geostationary Operational Environmental Satellite (USA)
GOME	Global Ozone Monitoring Experiment (Metop, ERS)
GOMS	Geostationary Operational Meteorological Satellite (Russ. Fed.)
GOMAS	Geostationary Observatory for Microwave Atmospheric Sounding (WMO)
GOOS	Global Ocean Observing System (IOC, UNEP, WMO, ICSU)
GOS	Global Observing System (WMO)
GOSAT	Greenhouse Gases Observing Satellite (JAXA/Jap. Min. of Environment)
GSLMP	Global Sea Level Monitoring Programme
GPCP	Global Precipitation Climatology Project
GPM	Global Precipitation Measurement (JAXA/NASA)
GPS	Global Positioning System
GRA	GOOS Regional Alliances
GRACE	Gravity Recovery and Climate Experiment (NASA/DLR)
GRAS	GNSS Receiver for Atmospheric Sounding
GRIB	Data representation form for General Regularly-distributed Information in Binary (WMO)
GRP	GEWEX Radiation Panel (GEWEX, WCRP)
GSICS	Global Satellite Intercalibration System
GTS	Global Telecommunication System (WMO)
GVAR	GOES Variable (data format) (USA)

HAPS	High Altitude Platform System
HDF	Hierarchical Data Format
HDFS	High Density Fixed Service
HDFSS	High Density Fixed Satellite Systems
HDR	High Data Rate
HEO	Highly Elliptical Orbit
HES	Hyperspectral Environmental Suite (GOES, NOAA)
HiRID	High Resolution Imager Data
HIRS	High Resolution Infrared Sounder
HR	High Resolution
HRD	High Rate Data (NPOESS, USA)
HRDCP	High Rate DCP
HRPT	High Rate Picture Transmission
HSRS	High Spectral Resolution Sounder (MSG)
HWR	Hydrology and Water Resource Programme (WMO)
HYDROS	Hydrosphere State Mission (NASA)
ICESat	Ice Cloud and Land Elevation Satellite (NASA)
ICI	Inversion Coupled with Imager (Meteo-France)
ICSC	CAS International Core Steering Committee (THORPEX)
ICWG	International Coordination Working Group (EO)
IDCP	International DCP
IDCS	International Data Collection System
IDDI	Infra-red Difference Dust Index
IDN	International Directory Network (CEOS)
IDPS	Interface Data Processing Segment (NPOESS)
IFRB	International Frequency Registration Board
IGACO	Integrated Global Atmospheric Chemistry Observations (IGOS)
IGDDS	Integrated Global Data Dissemination Service
IGEOLab	International Geostationary Laboratory concept
IJPS	Initial Joint Polar-orbiting Operational Satellite System
IKFS-2	advanced IR atmospheric sounder
IMT-2000	International Mobile Telecommunication 2000 (before FPLMTS)
INSAT	Indian geostationary satellite
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IODC	Indian Ocean Data Coverage
IOP	Initial Operations Phase (SAF, EUMETSAT)
IOTWS	Indian Ocean Tsunami Warning Service
IPO	Integrated Program Office (NOAA)
IPOMS	International Polar-orbiting Meteorological Satellite Group
IPWG	International Precipitation Working Group
IPY	International Polar Year (ICSU, WMO)
IQGSE	Image Quality Ground Support Equipment (EUMETSAT)
IR	Infrared
IRAS	Infrared Atmospheric Sounder (FY-3, CMA)
IRTS	Infrared Temperature Sounder (EPS)
IRW	Infrared Window
ISS	Information Systems and Services; International Space Station
ISCCP	International Satellite Cloud Climatology Project (GEWEX, WCRP)

ISADP	Integrated System for the ATOVS Data Processing
ISWMR	SAF Integrated Satellite Wind Monitoring Report (EUMETSAT)
ISY	International Space Year
ITSC	International TOVS Study Conference
ITT	Invitation to Tender
ITU	International Telecommunication Union
ITWG	International TOVS Working Group
IVOS	Infrared and Visible Optical System Calibration (CEOS WGCV)
IWW	International Winds Workshop
IWWG	International Winds Workshop Group
JASON	Ocean surface Topography follow-on mission to TOPEX/POSEIDON (CNES/NASA)
JAXA	Japan Aeronautic Exploration Agency (name change of NASDA)
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
JCSDA	Joint Centre for Satellite Data Assimilation (USA)
JMA	Japan Meteorological Agency
JRA-25	“Japanese Re-Analysis 25 years" JMA research project of long-range re-analysis of global atmosphere
JSC	Joint Scientific Committee (WCRP)
KARI	Korea Aerospace Research Institute
KLIMAT	scanning Infrared radiometer on Meteor-3M N1 (Russia)
KMA	Korea Meteorological Administration
KNMI	the Royal Dutch Meteorological Institute
KOMPAS	Microsatellite, earthquake investigations (Roscosmos)
LAN	Local Area Networks (Telecommunication)
Landsat	NASA Earth observing Satellite (NASA/USGS)
LBR	Low Bit Rate
LCL	Latch Current Limiter
LDCM	Landsat Data Continuity Mission (NASA/US Geological Survey)
LDPT	Chinese Delayed Picture Transmission Format (Local Data Coverage) FY-1C
LEOP	Launch and Early Operations Phase
LR	Low Resolution
LRD	Low Rate Data (NPOESS, USA)
LRIT	Low Rate Information Transmission
LRPT	Low Rate Picture Transmission
LSPIM	Land Surface Processes and Interactions Mission (ESA)
LST	Local Solar Time
MAP	Mesoscale Alpine Experiment
MAP-SST	Merged Atlantic Product - Sea Surface Temperature (SAF, EUMETSAT)
MARF	Meteorological Archive and Retrieval Facility (EUMETSAT)
MBWG	MSG Biosphere Working Group
MCP	Meteorological Communications Package

MCUT	Multi-Constellation User Terminal (NOAA)
MDD	Meteorological Data Distribution (Meteosat)
MDUS	Medium-scale Data Utilization Station (for GMS S-VISSR)
MEGHA-TROPIQUE	CNES/ISRO mission
MERIS	Medium Resolution Imaging Spectrometer (ENVISAT)
MERSI	Medium Resolution Spectral Imager (FY-3, CMA)
MetAids	Meteorological Aids Service (frequency regulation)
Metop	European meteorological polar-orbiting satellite
METEOR	Polar-orbiting meteorological satellite (Roshydromet)
Meteosat	Geostationary meteorological satellite (EUMETSAT)
METSAT	Indian geostationary meteorological satellite
MetSat	meteorological satellite systems (frequency regulation)
MHS	Microwave Humidity Sounder (EPS)
MIEC	Meteorological Information Extraction Centre (ESOC)
MIMR	Multi-frequency Imaging Microwave radiometer
MIVZA	microwave scanning radiometer (Meteor 3M N1)
MOCC	Meteosat Operational Control Centre (ESOC)
MODIS	Moderate Resolution Imaging Spectroradiometer (NOAA)
MOP	Meteosat Operational Programme
MONITOR-E	Land Observing Satellite (Roscosmos)
MPEF	Meteorological Products Extraction Facility (EUMETSAT)
MSC	Meteorological Satellite Centre (Japan)
MSC-CAL	Computer Aided Learning system by JMA/MSC
MSG	Meteosat Second Generation
MSM	Meso-Scale Model
MSMR	Multichannel Scanning Microwave Radiometer (OCEANSAT-1)
MSS	Mobile Satellite Services (frequency regulation)
MSU	Microwave Sounding Unit
MTG	Meteosat Third Generation
MTP	Meteosat Transition Programme
MTS	Microwave Temperature Sounder (EPS)
MTSAT	Multi-functional Transport Satellite (Japan)
MTVZA	microwave scanning radiometer (Meteor 3M N1)
MVIS	Multi-channel VIS and IR Radiometer (FY-1C and D of PRC)
MWHS	Microwave Humidity Sounder
MWR	Microwave Radiometer (ERS, ESA)
MWRI	Microwave Radiation Imager (FY-3, CMA)
MWRS	Microwave Radiometers
MWTS	Microwave Temperature Sounder (FY-3, CMA)
NASA	National Aeronautics and Space Agency
NASDA	National Space Development Agency of Japan (changed to JAXA in 2003)
NEDT	Noise Equivalent Delta Temperature
NESDIS	National Environmental Satellite Data and Information Service
NGDC	National Geophysical Data Centre (USA)
NGSO	Non-geostationary systems
NIST	US National Institute of Standards and Technology

NMC	National Meteorological Centre
NMHS	National Meteorological & Hydrological Service
NMP EO-1	New Millennium Program Earth Observing Mission (NASA)
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service (USA)
NPOESS	National Polar-orbiting Operational Environmental Satellite System (USA)
NPP	NPOESS Preparatory Project
NSMC	National Satellite Meteorological Center of CMA (PRC)
NTIA	National Telecommunications and Information Agency (USA)
NWP	Numerical Weather Prediction
NWS	National Weather Service (USA)
OCAP	Operational Consortium of ASDAR Participants
OCEANSAT	Indian satellite for ocean applications
OCO	Orbiting Carbon Observatory (NASA)
OLR	Outgoing Longwave Radiation
OOPC	Oceans Observations Panel for Climate (GOOS)
OPAG-IOS	Open Programme Area Group in Integrated Observing Systems (successor of CBS WG on Satellites)
OSE	Operational System Experiments (ET-ODRRGOS)
OSSE	Observing System Simulation Experiments (ET-ODRRGOS)
OSTM	Ocean Surface Topography Mission (Jason-2) (CNES/NASA/ NOAA/EUMETSAT)
OWSE-AF	Operational WWW Systems Evaluation for Africa
PALSAR	Phased Array type L-band Synthetic Aperture Radar ((ALOS, JAXA)
PAMELA	AntiMatter Exploration and Light-nuclei Astrophysics
PATMOS	AVHRR Pathfinder Atmosphere (NOAA)
PC	Personal Computer
PMW	Passive Microwave
POEM	Polar-orbiting Earth Observation Mission (ESA)
POES	Polar-orbiting Operational Environmental Satellite (USA)
PR	Precipitation Radar (on TRMM, JAXA)
PRC	People’s Republic of China
PRISM	Panchromatic Remote-sensing Instrument for Stereo Mapping (ALOS, JAXA)
PROBA	Project for On-Board Autonomy (ESA EO satellite)
PTT	Post Telegraph and Telecommunications authority
PTWC	Pacific Tsunami Warning Centre
QA4EO	Quality Assurance Framework for Earth Observation
QI	Quality Indices (EUMETSAT)
QuikSCAT	Quik Scatterometer (NASA)

RA	Regional Association of WMO
RARS	Regional ATOVS Re-transmission System (WMO)
RAMSDIS	Menu-driven system for analysing digital satellite imagery (McIDAS, USA)
RAOBS	Radiosonde Observations
RASA	Russian Aviation and Space Agency
RDCP	Regional DCP (Japan)
RDR	Raw Data Records (NPOESS)
Resurs-DK	Russian land observing satellite (Roscosmos)
RFI	Radio Frequency Interference
RLAN	new wireless LANs
RMS	Root Mean Square
RMTC	Regional Meteorological Training Centre (WMO)
Roscosmos	[Russian] Federal Space Agency
Roshydromet	Russian Federal Service for Hydrometeorology and Environmental Monitoring
RSB	Reflective Solar Bands (MODIS NOAA)
RSMC	Regional Specialised Meteorological Centre
RSO	Rapid Scan Operations (NOAA)
RSS	Rapid Scan Service (EUMETSAT)
RT	Radiative Transfer
S&R	Search and Rescue mission
SAF	Satellite Application Facility (EUMETSAT)
SAFISY	Space Agency Forum on the ISY
SAGE III	Stratospheric Aerosol and Gas Experiment (NASA)
SAM	Satellite Anomaly Manager
SAR	Synthetic Aperture Radar (ERS ESA)
SARA	Short Range Automotive Radar (frequency management)
SARSAT	Search And Rescue, Satellite supported facility
SAST	Shanghai Academy of Space Technologies.
SATAID	Satellite Animation and Interactive Diagnosis (Japan)
SATOB	WMO code for Satellite Observation
SBA	Societal Benefit Area
SBSTA	UNFCCC Subsidiary Body for Scientific and Technology Advice
SBUS	Solar Backscatter Ultraviolet Sounder (FY-3, CMA)
SBUV	Solar Backscattered Ultra Violet (ozone)
SD	Solar Diffuser (MODIS)
SDR	Sensor Data Records (NPOESS)
SEAS	Shipboard Environmental (data) Acquisition System
SEC	Space Environment Center (NOAA)
SEISS	Space Environmental In-Situ Suite (GOES, NOAA)
SEM	Space Environment Monitor (GOES)
SEVIRI	Spinning Enhanced Visible and Infrared Imager (MSG)
S-FAX	S-band facsimile broadcast of FY-2 (PRC)
SFCG	Space Frequency Coordination Group
SGLI	Second Generation Global Imager (CGOM-B1)
SG-RFC	Steering Group on Radio Frequency Coordination
SICH-1M	Russian oceanographic satellite (Roscosmos)

SIS	Solar Imaging Suite (GOES, NOAA)
SMA	State Meteorological Administration (PRC)
SMD	Stored Mission Data (NPOESS)
SMOS	Soil Moisture and Ocean Salinity (ESA)
SORCE	Solar Radiation and Climate Experiment (NASA)
SOT	Ship Observation Team (JCOMM)
SP	Space Programme (WMO)
SRR	Automotive Short-Range Radars (frequency management)
SRF	Spectral Response Function
SRS	Space Research Service (frequency regulation)
SRSO	Super-Rapid-Scan Operations
SRTM	Shuttle Radar Topography Mission (NASA)
SSM/I	Special Sensor Microwave/Imager (NOAA)
SSMI/S	Special Sensor Microwave Imager/Sounder (NOAA)
SSMR	Scanning Multispectral Microwave Radiometer
SSMT1	microwave temperature sounder (NOAA)
SSMT2	microwave water vapour sounder (NOAA)
SSP	Sub-Satellite Point
SST	Sea Surface Temperature
SSU	Stratospheric Sounding Unit
STC	Semi-Transparent Correction (NOAA)
S-VISSR	Stretched VISSR
SWARM	Earth Observation mission (ESA)
SXI	Solar X-Ray Imager (GOES-12)
TERRA	Earth climate measuring satellite (NASA)
TD	Technical Document (WMO)
THORPEX	International global atmospheric R&D programme (WMO CAS)
TIGGE	THORPEX Interactive Grand Global Ensemble
TIROS	Television Infrared Observation Satellite
TMI	TRMM Microwave Imager
TOMS	Total Ozone Mapping Spectrometer (NASA)
TOR	Terms of Reference
TOU	Total Ozone Unit (FY-3, CMA)
TOVS	TIROS Operational Vertical Sounder
TPW	Total Precipitable Water (NOAA)
TRMM	Tropical Rainfall Measuring Mission (NASA, JAXA)
TTC	Telemetry Tracking Control
UARS	Upper Atmosphere Research Satellite (NASA)
U-MARF	United Meteorological Archive Retrieval Facility (EUMETSAT)
UHF	Ultra High Frequency
UK	United Kingdom
UMTS	Universal Mobile Telecom System
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNISPACE	United Nations Space Conference
UN-OOSA	UN Office of Outer Space Affairs
USA	United States of America

UPS	Unified Propulsion Subsystem
UTC	Universal Time Coordinated
UWB	Ultra Wide Band
VAS	VISSR Atmospheric Sounder
VGT	Vegetation
VHF	Very High Frequency
VHRR	Very High Resolution Radiometer
VIIRS	Visible Infrared Imaging Radiometer Suite
VIRSR	Visible and Infrared Scanning Radiometer (EPS)
VIS	Visible channel
VISITView	VL tool
VISSR	Visible and Infrared Spin Scan Radiometer
VL	Virtual Laboratory (training concept)
VL-FG	VL Focus Group Meeting
VLSI	Very Large Scale Integrated circuit
VPN-PP	WIS Virtual Private Network Pilot Project
VTX	VHF transmitter (NOAA)
WALEX	WAter vapour Lidar EXperiment
WARC	World Administrative Radio Conference
WCRP	World Climate Research Programme (WMO/ IOC/ ICSU)
WCS	WMO Core Standards
WEFAX	Weather facsimile
WG	Working Group
WGCV	CEOS Working Group on Calibration and Validation
WGNE	Working Group on Numerical Experimentation
WHyCOS	World Hydrological Cycle Observing System (HWR, WMO)
WIS	WMO Information System
WMO	World Meteorological Organization
WP	Working Paper
WRC	World Radio Conference (ITU)
WV	Water Vapour
WVMW	Water Vapour Motion Winds
WWW	World Weather Watch (WMO)
X-ADC	Extended Atlantic Data Coverage
Y2K	Year 2000 compatibility
ZAP	Z-axis Precession Mode (GOES)
ZAMG	Zentralanstalt für Meteorologie und Geodynamik (Austrian NMHS)