Report of the 53rd Meeting of

THE COORDINATION GROUP FOR METEOROLOGICAL SATELLITES

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Evian-Les-Bains, France

CGMS


CGMS
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REPORT OF THE 53RD PLENARY SESSION OF THE COORDINATION GROUP FOR METEOROLOGICAL SATELLITES

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Report edited on behalf of CGMS by:

CGMS Secretariat
EUMETSAT
Eumetsat-Allee-1
64295 Darmstadt
Germany
www.eumetsat.int

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PLENARY SESSION

1. OPENING SESSION

Welcome and opening remarks: EUMETSAT, WMO

Mr. Phil Evans, Head of the CGMS Secretariat and Director-General of EUMETSAT

The opening remarks painted a warm and vivid welcome to the 53rd plenary session of the CGMS in the picturesque town of Evian-les-Bains. The setting, as highlighted by the Lord Mayor, carries a long tradition of diplomacy - a place where people have gathered through history to shape initiatives of great consequence for Europe. Against this backdrop, participants were reminded that the coming three days would be dedicated to crucial discussions designed to strengthen collaboration and better serve the global community of the WMO.

In a world increasingly defined by rapid change and complexity, convening in Evian was described as both symbolic and practical - an opportunity to show how nations can stand together in sustaining coordinated weather and climate observations from space, safeguarding societies worldwide. The welcome extended on behalf of EUMETSAT underlined the importance of unity in this mission.

The address also reflected on the profound transformation underway within the meteorological community, driven not only by advances in space technology but also by breakthroughs in artificial intelligence and machine learning. These innovations are reshaping numerical weather prediction, opening new possibilities for cooperation and ensuring the continued delivery of reliable satellite data. In closing, participants were encouraged to embrace this moment of change, reaffirm CGMS's central role in the global partnership, and enjoy both a productive meeting and the unique charm of Evian.

Dr. Ko Barrett, WMO Deputy Secretary-General

Keynote Address: Advancing Together – Satellites for a Safer, Smarter Future

The keynote address celebrated the achievements and future responsibilities of the Coordination Group for Meteorological Satellites (CGMS). Speaking on behalf of the World Meteorological Organization (WMO), the speaker highlighted how the partnership has become essential for the global community that depends on reliable meteorological data. Over the decades, CGMS has built the backbone of the international observing system by harmonizing satellite missions, ensuring coverage and continuity, and fostering training and capacity building worldwide. This collaboration has dramatically improved forecasting, Earth system monitoring, and disaster risk reduction. Today, satellite data forms the bulk of inputs into weather prediction models, enabling more accurate forecasts, safer communities, and a deeper understanding of climate.

The address also emphasised new challenges. With the private sector entering space-based observation, CGMS and WMO must guide this evolution to integrate private data without fragmenting existing systems.

At the same time, the principle of unrestricted access to core satellite data, especially vital in vulnerable regions, must be preserved as a matter of equity and resilience. The transformative rise of Artificial Intelligence was noted as both an opportunity and a challenge—its value depends on high-quality, diverse satellite data. The speech closed with optimism, stressing CGMS's central role in shaping a safer, smarter future.

2. WMO MATTERS FOR COORDINATION WITH CGMS SPACE AGENCIES

WMO matters for coordination with CGMS space agencies

CGMS-53-WMO-WP-18 Status and plans of WMO key initiatives

WMO presented the key initiatives related to its mandate, with a focus on Early Warning for All (EW4ALL), the WIS2.0 migration, AI/ML challenges, revision of the WIGOS Vision, Greenhouse Gas Monitoring and the Cryosphere Watch.

WIS2.0 will be operational in 2025 with 90 % of the members having completed the migration.

Regarding the AI/ML revolution, AI/ML based models are already outperforming traditional NWP. For example, the new ECMWF AI-based Forecast System (AIFS) is already outperforming the IFS system. Met Norway have prepared a Limited Area version of AIFS. Fully data driven models are in development, with open science questions about what will happen in data sparse regions.

The WMO Integrated Processing and Prediction System (WIPPS) is addressing the major challenges with AI modelling related to:

- Data availability and QC
- Prediction and post processing
- Verification

WMO has established a roadmap for exploration of the associated science questions. WMO research board task team on AI for weather (TT-AI4Wx) and the INFCOM study group on future data infrastructure (SC-FIT) are also addressing the issues. A number of AI pilot projects have been endorsed, and public private joint AI effort coordination will be addressed in the WMO Open Platform session during the Executive Council 79th session.

Regarding the Global Cryosphere Watch, EC-78 requested INFCOM to work with the research board and the satellite community to work on coordination of space-based observations for the cryosphere. WMO emphasised the importance of CGMS in this effort.

In response to ISRO, WMO:

- explained that it is possible with WIS2.0 and its designation process to link observations via data centres via WIS2.0.
- noted that they still need to understand how well AI can perform in data sparse areas.

WMO confirmed to CNES that Microsoft will be invited to the Open Platform session at EC-79 in view of the Microsoft Wx model.

WMO informed EUMETSAT that the AI will have an impact on WIS, data policy and how AI models will be used, and indeed that it will have an effect on the WMO priorities.

CGMS-53-WMO-WP-08 Status and way forward on the WIGOS Vision 2040 update - implications and expectations for CGMS space agency members

The update to the WMO Integrated Global Observing System (WIGOS) vision, for the 2050 timeframe, is under development. The vision is scoped to encompass both the surface- and space-based components, including the integration between the two. WMO has set up a core team (small-enough to be agile) in order to finalise the input by 2026. Many driving factors for this vision have been identified including technology evolution, applications/user needs, the future landscape of observing systems providers including non-traditional systems and commercial providers. This effort is expected to provide the community with a vision that will help coalesce efforts toward a cohesive, complementary global observing system. The vision, should be as well-informed and technically accurate as possible, and should inspire the community to design, evolve and deploy a complementary global observing system that addresses the needs of the future, and leverages the emerging opportunities. Several rounds of discussions, reviews and a face-to-face meeting took place leading to a very initial and preliminary draft of the new vision document.

The purpose of the paper was to inform the CGMS community of this effort, and to seek inputs, thoughts, ideas, and other contributions. It also aimed at sharing some of the preliminary findings to date.

The high level findings are:

- Value of Earth observations will increase;
- Changes in user expectations, application requirements, technology (miniaturized sensors);
- New platforms;
- IoT, IoA, citizen data;
- Decentralised nature, non-traditional observing systems;
- Fragmented landscape;
- Fiscal constraints;
- The multiplication of smallsats/cubesats will likely continue, enhancing the temporal refresh of the global coverage, perhaps with a mixture of quality/quantity combination. The performance of the global constellation will likely be viewed as a whole (quality/quantity);

- The WIGOS vision drafting team looks forward to the CGMS consolidated position, which is expected to be a critical input for this effort. The input regarding the Tier-based approach is particularly important and with reference to the 2040 vision; and
- It is expected that next occurrences of the CGMS HLPP will be influenced by the WIGOS vision update.

In response to ISRO, WMO indicated that LEO and GNSS reflectometry is part of the core constellation, whereas details of the impact have not yet been studied.

In response to the ECCC, WMO indicated that it is unclear whether AI will be used for optimising the network, but leveraging the observations with AI is expected to be a powerful way to use new data and network design.

CGMS-53-CGMS-WP-16 Discussion on the CGMS coordinated response to the update of the WIGOS Vision 2040

CGMS-53 WGIII in March raised a recommendation to plenary to develop a consolidated CGMS space agency position paper for the WIGOS Vision 2050 update. The position paper will reflect the leadership positions of all CGMS members and will provide reference and guidance for the development of the space-based part of the Vision 2050.

Development of this position paper will proceed in parallel to the drafting of the WIGOS vision update. The CGMS Secretariat has issued a survey to members for inputs to the paper in question.

EUMETSAT noted that the environment is rapidly moving and WMO responded that considerations for the evolving nature of space-based observations will be considered in the writing process. EUMETSAT also noted that the backbone (institutional space-based observations) is very important.

ISRO emphasised the need for including the role of mm frequencies, and land monitoring satellites in the vision.

NOAA stated that the backbone is essential, and the community will need to understand how additional capabilities will develop in parallel.

CGMS-53-WMO-WP-15 WMO Early Warnings for All initiative (EW4ALL) - issues at stake

EW4All is a UN-wide initiative to ensure that every person on Earth will be protected by early warning systems, to reduce the impacts to life and property from natural hazards. The changing climate and intensification of severe events add special urgency to tackle this challenge and build climate resilience.

30 countries have been identified as a first priority, and mostly in tropical regions. Four UN agencies have been chosen to lead the effort:

- UNDRR - disaster risk knowledge and management
- WMO - detection, observation, monitoring, analysis, forecasting
- ITU - warning dissemination and communications

- IFRC - preparedness and response

WMO`s EW4All efforts are undertaken using two parallel complementing tracks:

1) Enhancing the global infrastructure: Improvement of international data exchange; more and better products available worldwide; and
2) Better guidance and training to the members.

The main themes of the WMO`s technical commissions are to provide technical support to regional and/or national interventions and to establish regional support systems. WMO`s extrabudgetary projects, such as SOFF, CREWS etc. are targeted investments for closing national gaps in this respect.

WMO has analysed the existing gaps in most of the priority countries, including the status of use of satellite products. Priority hazards were identified and WMO`s technical commissions adopted an action plan focusing on these gaps and hazards.

Several activities are ongoing to improve the capacity of the members in WMO regions related to data dissemination, data processing, data visualisation and training, examples are:

- RAIII/IV: Pilot Project: Strengthening early warning systems in pilot countries in the Caribbean and Latin America (Surinam, Guyana, Belize, Jamaica) through improved satellite data utilisation.
- RAII/V: HimawariCast receiving and processing systems upgrade project under preparation: Technical issues reported related to internet, storage capacity, visualisation.
- RAI: Upgrading of PUMA stations ongoing. The EU-AUC SEWA project (to which ECMWF and EUMETSAT contribute) kicked off to support users in the region.
- Space agencies are encouraged to continue contributing to closing the gaps in access and interpretation of satellite data/products in support of EW4ALL.

ISRO asked about the utilisation of the International Charter Space and Major Disasters. WMO responded that it is a parallel undertaking to the UN activities (and WMO is not a formal partner of the International Charter).

JMA added that they are preparing for a new cloud service and they will report their efforts in filling the gaps to future CGMS meetings.

CMA asked how the EW4ALL gap analysis was made and how it relates to the CGMS gap analysis. WMO clarified that the EW4ALL gap analysis applies to data access, data visualisation, training and data utilisation, and not to technical instrument coverage or capabilities.

CGMS-53-WMO-WP-14 WMO CM-16, considerations on the agenda and status of actions

WMO will host the sixteenth session of the Consultative Meeting on High-level Policy on Satellite Matters (CM-16) in Geneva, Switzerland, 3-4 March 2026. The meeting will be mainly conducted as a face-to-face event; however, remote access will be made available if participants are not able to attend in person.

The purpose of this dialogue is to address the following key topics:

- Vision of the space-based observing system
- Data policy considerations for satellite data, including core data definition
- Socio-economic benefits of satellite programmes
- Dialogue with private sector
- Satellite support to WMO major strategic priorities:
- Early Warnings for All
- Global Greenhouse Gas Watch
- Use of AI/ML technologies
- Earth system monitoring and prediction

Heads of space agencies were invited to confirm their attendance in the meeting at their earliest convenience, and preferably no later than 15 November 2025 by notifying the WMO Secretariat (Ms Natalia Donoho, ndonoho@wmo.int).

CGMS-53-CGMS-WP-10 Proposal for a coordinated CGMS statement to WMO EC-79

The CGMS Secretariat informed the plenary that it would circulate a first draft of a CGMS statement with the intention to provide this to the upcoming WMO EC-79, and for discussion and confirmation by the plenary at the end of the CGMS-53 session.

3. NEW DEVELOPMENTS AND LONG-TERM PLANS BY CGMS SPACE AGENCY MEMBERS SINCE CGMS-52

Main developments since CGMS-52 and an outlook for the future

CGMS-53-CMA-WP-16 CMA updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

FY-3F (launched on 3 August 2023) became operational in July 2024, joining FY-3D, FY-3E, and FY-3G in orbit, forming a comprehensive low earth orbit meteorological satellite observation network. FY-3C was retired on 20 Nov 2024.

FY-3G, which is the first precipitation measurement satellite of the FY-3 series, became operational on 1 May 2024. Following the addition of active radar detection capabilities of FY-3G, new types of remote sensing products have been developed, including three-dimensional raindrop spectral parameter profiles, three-dimensional phase states, and three-dimensional precipitation rate profiles, to detect the fine structure of precipitation.

The "Tianmu-1" constellation with 23 satellites and the "Yunyao-1" series with 12 satellites were integrated into CMA comprehensive meteorological observation system and commenced operational use on December 30

FY-4B at 105°E has replaced FY-4A in providing the operational observation services since 5 March 2024. FY-4A has drifted to 123.6°E (suspended service).

FY-3H in LEO PM orbit will be launched in Q3 2025. FY-3H is a sun-synchronous afternoon orbit satellite, which will take the place of FY-3D launched in 2017. There are 9 instruments including HIRAS-II, MERSI-III, MWRI-II, MWTS-III, MWHS-II, GNOS-II, GAS-II, WAI, IPM, of which GAS-II for greenhouse gas monitoring is newly developed. At present, most of the instruments have finished calibration tests and the satellite is scheduled to complete all tests in the middle of 2025.

FY-4C, the 3rd GEO satellite in FY-4 series with significant improvements will be positioned at 133°E and launch is scheduled for Q4 2025

FY-3J in EM LEO orbit and FY-4D and FY-4MW in GEO orbit will be launched in the next 1-2 years, with the aim to maintain continuous and stable in-orbit operations of FengYun satellites. The third generation FengYun meteorological satellites including FY-5 and FY-6 series are under planning, and CMA has begun to undertake a requirement survey.

CMA has introduced FengYun satellite data and products across seven categories. The FengYun Earth platform, a lightweight and optimised platform for forecasters, offers over 100 quantitative products across five categories. CMA NSMC has developed an international version of the FengYun Earth enabling prompt access to meteorological satellite and numerical forecast data, rapid production of quantified products, and provision of international services.

CMA also highlighted their active involvement in CGMS and WMO activities, supporting WMO initiatives, promoting exchange of data and products, and fostering collaboration with members.

CGMS-53-EUMETSAT-WP-10 EUMETSAT updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

EUMETSAT currently operates 10 satellites. The mandatory GEO programme: Meteosat-9 is located at 45.5°E, Meteosat-10 at 0°, Meteosat-11 at 9.5°E, and Meteosat-12 (MTG-I1) around 0°. Meteosat-12 was declared operational on 4 December 2024. MTG-S1 is scheduled for launch in summer 2025 and will host Copernicus Sentinel-4. The mandatory LEO programme currently covers Metop-B and -C in low Earth sun-synchronous orbits. The launch of the first EPS-SG, Metop second generation carrying Copernicus Sentinel-5, is scheduled for November 2025, with the second one following in summer 2026.

EUMETSAT operates several oceanographic missions, Jason-3, and the Copernicus missions on behalf of the European Commission and international partners (including CNES, ESA, NASA, NOAA), notably Sentinels-3A, -3B, -6/Michael Freilich with the addition of Sentinel-3C confirmed in the meantime. If approved, EUMETSAT expects to operate Sentinels 3D and -6/MF/B. Further, EUMETSAT's planned

contributions to CO2M, Sentinel-3 and -6 NG, CIMR and CRISTAL includes ground segment developments and processing activities.

The enhanced EUMETSAT response to the implementation of WIGOS 2040 is currently under consideration with decisions expected in the 2025 timeframe, covering EPS-Sterna, EPS-Aeolus, and continued commercial RO data procurement with a global license.

EUMETSAT is also engaged in space weather matters as well as implementing its roadmap on AI/ML.

The presentation also provided information on EUMETSAT's response to the WMO EW4All initiative and its activities in Africa providing upgraded infrastructure/reception stations for MTG and EPS-SG reception to secure data access continuity.

The programme Space for Early Warning in Africa (SEWA) and part of the Africa-EU Space Partnership Programme: The overall objective is to strengthen Africa's capacity to access and utilise space-based meteorological data for early warnings and disaster risk reduction. The main activities implemented by EUMETSAT are:

i) Infrastructure for data access: Enhance the Africa continent's local and cloud-based infrastructure to access new meteorological satellite data (MTG, EPS-SG);
ii) Establish the African Meteorological Satellite Application Facility (AMSAF) with an initial focus on nowcasting space-based products to track severe weather events and enhance early warning systems; and
iii) Training: Targeting infrastructure operation and maintenance, and use of space-based products for early warnings.

CGMS-53-ESA-WP-06 ESA updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

CGMS was informed of the status of the European Space Agency's Earth observation missions currently in-orbit. Three of them – MSG, MTG and MetOp – are in co-operation with EUMETSAT, as are the future Aeolus-2 and EPS-Sterna programmes.

Copernicus represents the major continuing initiative of European efforts in Earth observation. The first Copernicus dedicated satellite ("Sentinel-1A") was launched on 3 April 2014, followed by series of satellites until Sentinel-6 Michael Freilich in November 2020. Others will follow in the coming years from the next generation of Sentinels and from the expansion missions. Sentinel missions are developed, launched, and operated in partnership with the European Union and EUMETSAT. The Sentinel-4 and -5 instruments developed by ESA, will fly respectively on the MTG-S and Metop-SG missions also developed by ESA, in cooperation with EUMETSAT.

The Earth Explorer missions – SMOS, CryoSat-2, Swarm and EarthCARE – currently in orbit are performing extremely well and the related data exploitation is based on continuous data of excellent quality. The four missions all feature strong elements of international collaboration and a growing synergy between them. End-Of-Life Activities were conducted from 3 April to 5 July 2023, and Aeolus was successfully deorbited

on 23 July 2023. Aeolus was the first satellite mission to successfully acquire wind profiles at a global scale and a follow-on Aeolus-2 mission is in the planning, in collaboration with EUMETSAT.

The Proba-V Cubesat Companion (PV-CC) was launched on 9 October 2023 as part of the Small Satellites Mission Service (SSMS) rideshare mission, on board Vega flight VV23. The PV-CC successfully concluded its LEOP activities less than 24 hours after launch and its commissioning activities began straight afterwards.

CGMS is further informed of the status of the European Space Agency's Earth observation future missions. While ESA has a wealth of experience under its belt in observing Earth from space, the sector is changing rapidly, becoming increasingly competitive, and is also offering new opportunities as concepts like New Space evolve and the digital revolution gathers pace. Through its Future Earth Observation programme (FutureEO), ESA is committed to remaining ahead of the game.

Progress in the preparation of the forthcoming Explorer missions – Biomass, FLEX, FORUM and Harmony – is described in this report.

Activities related to Aeolus-2, Arctic Weather Satellite (AWS) in cooperation with EUMETSAT are ongoing. Each of these missions are planned to contribute routine, operational monitoring data to improve our understanding of the Earth system and climate change.

Six Copernicus Expansion Missions – CHIME, CIMR, CO2M, CRISTAL, LSTM, and ROSE-L – are being studied to address EU policy and gaps in Copernicus user needs, and to expand the current capabilities of the Copernicus space component. The System Requirements Reviews for all 6 missions have been completed.

CGMS is also informed of the status of the Earth Watch Programme element, Global Monitoring of Essential Climate Variables (also known as the 'ESA Climate Change Initiative' or CCI). The CCI focuses on the exploitation of data records primarily, but not exclusively, from past ESA satellite missions, for the benefit of climate monitoring and climate research. Specifically, the CCI supports the study and monitoring of 23 essential climate variables (ECV) derived from satellite data, thereby helping to fulfil the objectives of the WMO Global Climate Observing System (GCOS).

CGMS-53-CNES-WP-02 CNES updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

Regarding CNES satellite systems in exploitation:

SWOT: CalVal activities have been completed and products are being distributed to all users. First scientific publications and Several communication events have been made. Products are delivered on AVISO for oceanography and Hydroweb next for hydrology.

AltiKa: The mission has been extended until end 2025.

Jason-3: MOU extension (in progress) (NASA/NOAA/CNES/EUM).

CFOSat: The mission has been extended until 2026, and the 5th Science Team meeting was held in Biarritz (18-20 March 2025).

Regarding planning of CNES's satellites systems, Microcarb is scheduled for launch on 25 July 2025 as a demonstrator for Copernicus's CO2M mission.

Regarding data and product distribution, CNES is leading the HPC/Cloud Platform and Data Dissemination Poles and the Space4Ocean Alliance.

CGMS-53-IMD-WP-02 IMD updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

INSAT-3DR and INSAT-3DS are operational, contributing to monitoring of tropical cyclones, monsoon, and severe weather events.

A proposal has been made for the 4th generation INSAT satellite to include the following instruments: an advanced imager, lightning mapper and hyperspectral infrared sounder.

CGMS-53-ISRO-WP-04 ISRO updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

Presently, INSAT-3DR (8-Sep-2016) at 74 degr. E and INSAT-3DS (17-Feb-2024) at 82 degr. E are operational in GEO. INSAT-3D is switched off since Jun 2024, replaced by INSAT-3DS at 82 degr. E. EOS-06 (Oceansat-3), launched on 26 Nov 2022 is operational with Ku-band Scatterometer, and a 13-band Ocean Color Monitor (OCM-3). Data is available to the users through BHUVAN web-portal. EOS-08 (Microsat-2C) was launched on 16-Aug-2024 in low-inclination orbit with GNSS-R and EOIR payloads. EOS-09/RISAT-1B (C-band SAR) launch failed due to technical issue in launch vehicle on 18 May 2025.

The joint NASA-ISRO NISAR mission (L & S band SAR) is planned for launch in June 2025. Oceansat-3A with OCM3, Ku-band SCAT, SSTM, and MATHS payloads will be launched this year. The ISRO-CNES joint mission SARAL/AltiKa is functioning in mis-pointing mode and the mission has been extended until December 2025 provided the health of the satellite is satisfactory.

Under GSICS, inter-calibration of INSAT-3DS observations were carried out for IR channels, with respect to MetOp-IASI and for VIS/SWIR channels using Ray-matching method, with respect to MODIS.

ISRO is presently working on the proposal received from MoES for the 4th generation INSAT satellite and the defined the instruments - Advanced Imager, Lightning Mapper and Hyperspectral Infrared Sounder

CGMS-53-JMA-WP-09 JMA updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

JMA operates two geostationary meteorological satellites, Himawari-8 and -9, equipped with Advanced Himawari Imager (AHI). JMA conducted the operational satellite switchover from Himawari-8 (in operation since July 2015) to Himawari-9 in December 2022 for scheduled operation until FY 2029.

JMA contracted the manufacturing of the follow-on satellite Himawari-10 in March 2023, with initiation of operations scheduled for FY 2029. Himawari-10 is scheduled to carry a visible/infrared imager as well as an infrared sounder and a high energy electron sensor, and high and very high energy proton sensor. JMA is considering Himawari-10 imager and sounder data formats and a plan for transition from Himawari-9 to Himawari-10.

CGMS-53-JAXA-WP-03 JAXA updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

JAXA operates various kinds of satellite sensors and opens the products to the public, and developes improves the products to address climate issues.

The major updates since CGMS-52 is the launch of two satellites. The EarthCARE satellite in May 2024, with JAXA/NICT/ESA releasing the CPR first images in June 2024. EarthCARE Level 1 products were released to the public in January 2025, and Level 2 single-sensor products and 2-sensor synergy products were released in March 2025. Level 2 3-sensor and 4-sensor synergy products are scheduled to be released late 2025. ALOS-4 was launched on 1 July 2024 by the H3 Launch Vehicle Flight 3 (H3F3). The data will be utilised for monitoring disasters, forests, sea ice, infrastructure, and other applications with the advantages of Synthetic Aperture Radar (SAR), i.e. all-weather and day-and-nighttime observation capability. The launch of GOSAT-GW is scheduled for June 2025.

In terms of the WMO project for weather and climate monitoring extremes, JAXA contributes to the WMO Space-based Weather and Climate Extremes Monitoring (SWCEM) project by providing more than 25 years' worth of GSMaP rainfall products with climate normal.

JAXA also contributes to the Global Greenhouse Gas Watch (G3W) by defining the role of satellite products. In May 2023, JAXA started to distribute the latest version of JAXA's GHG products.

Moreover, JAXA hosted the 11th Workshop of the International Precipitation Working Group (IPWG) at Tokyo Institute of Technology from 15-18 July 2024, in collaboration with the IPWG, which is co-sponsored by the CGMS and WMO.

CGMS-53-KMA-WP-03 KMA updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

KMA operates GEO-KOMPSAT-2A (GK2A) equipped with meteorological payload, Advanced Meteorological Imager (AMI) and space weather payload, Korea Space wEather Monitor (KSEM) since 2019. The GEO-KOMPSAT-2B (GK2B) for the oceanic and environmental mission and equipped with Geostationary Ocean Colour Imager-II (GOCI-II) and Geostationary Environment Monitoring Spectrometer (GEMS) is also operational, and data have been released since 2021.

KMA is also working at strengthening the usability of satellite data in weather forecasting. The new retrieval with AI technique has been also tried to overcome the limitation of GEO observation and in-situ measurements.

KMA expanded GK2A Marine Weather Broadcast Service to provide various digital marine weather information with emergency messages of urgent weather to the Asia-Pacific region.

KMA's third meteorological satellite GEO-KOMPSAT-5 (GK5) programme began in April of this year as the start of a seven-year development journey.

CGMS-53-NOAA-WP-09 NOAA updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

The document summarises the status of NOAA current and future LEO, GEO, and Space Weather satellite systems. The reporting period for the current satellite operations is from 1 June 2024 to 1 June 2025. For future satellites, progress to date at the time of writing is included.

Current GEO missions discussed include GOES-15, -16, -17, -18, -19. GOES-19 became operational as GOES-East on 7 April 2025.

Current LEO missions discussed include Jason-3, Suomi-NPP, NOAA-15, -19, -20 and -21. NOAA-18 was decommissioned on 6 June 2025.

DSCOVR is the current operational Space Weather mission and SWFO-L1 will launch in October 2025.

Plans were provided for JPSS-3, and -4, which are part of the current JPSS-mission series and for the future geostationary system GEO-XO.

CGMS-53-NASA-WP-04 NASA updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

NASA continues to operate more than two dozen Earth-observing satellites and instruments. In the past year, NASA launched the Polar Radiant Energy in the Far-InfraRed Experiment (PREFIRE) mission. It consists of two CubeSats stationed in an asynchronous, near-polar orbit each with a Thermal Infrared Spectrometer (TIRS). Data from the mission will help scientists determine how much heat, in the form of infrared radiation, is emitted to space as well as how atmospheric water vapours and clouds influence the amount that escapes. Another example of a recent launch for a demonstration space instrument, occurred on 15 March 2025 from Vandenberg space force base in California onboard Space X Falcon 9. ARGOS stands for Aerosol Radiometer for Global Observation of the Stratosphere. Its objective is to measure aerosols in the stratosphere and the scientific science expected is the potential to substantially enhance our understanding of the radiative effects of stratosphere aerosols and how they influence the Earth energy budget.

There are also a number of NASA Earth-observing instruments on the International Space Station (ISS), offering a unique vantage point for monitoring a variety of parameters. Examples include the SAGE-III (Stratospheric Aerosol and Gas Experiment), OCO-3 (the Carbon observatory), GEDI (Global Ecosystem Dynamics Investigation) and EMIT (Earth Surface Mineral Dust Source Investigation).

In terms of near-term future missions, NASA is looking forward to the launch of the NISAR instrument in partnership with the ISRO, a Synthetic Aperture Radar. NISAR will enable detailed mapping of Earth's

surface topography and the detection of subtle changes, such as landslides, volcanoes, earthquakes, ice sheets and sea ice changes, vegetation changes, etc.

Another aspect NASA highlights in the report is the upcoming capability to deploy the NASA Boeing 777 which is being modified and upgraded to be able to conduct field campaigns not only for understanding and parameterising the Earth system components, but also to potentially serve as a reliable source for validating satellite data. The plane is expected to be ready to conduct research missions in 2026.

CGMS-53-ROSHYDROMET-WP-03 ROSHYDROMET updates since CGMS-52 and report on the medium to long-term future plans on Earth observation

This document addresses the current status of the Russian satellite systems for hydrometeorology and heliogeophysics. Since CGMS-52 the Russian hydrometeorological satellite constellation has been increased by 2 polar-orbiting heliogeophysical satellites Ionosphere-M N1 and Ionosphere-M N2 launched on 5 November 2024.

CGMS-53-ECCC-WP-01 ECCC/CSA updates and reports on the medium to long-term future Earth observation plans

With leadership from Environment and Climate Change Canada (ECCC), the Canadian Space Agency (CSA) and Natural Resources Canada (NRCan), Canada has continued to advance initiatives to address gaps in the up-, mid- and downstream sectors of the Satellite Earth Observation (SEO) value chain

This presentation provides an update on plans and considerations related to five SEO missions in various stages of development: RADARSAT, WildFireSAT, High-altitude Aerosols Water vapour and Clouds (HAWC), the Arctic Observing Mission (AOM) and the Terrestrial Snow Mass Mission (TSMM). These five new and proposed missions are intended to address observation gaps for many geophysical variables, including sea ice, ocean winds, snow, fire, weather, greenhouse gasses, and air quality.

Development has begun on RADARSAT+, WildFireSAT, and HAWC, while TSMM and AOM are continuing preparations for resourcing.

4. CLIMATE AND GREENHOUSE GAS MONITORING

Greenhouse gas monitoring

CGMS-53-WMO-WP-16 Status of WMO global greenhouse gas initiative

WMO presented the status of the WMO G3W initiative long term plan and emphasised the strong coordination with CEOS and CGMS. The implementation of G3W is progressing well with excellent dovetailing with CEOS-CGMS activities, which effectively represent the space component of G3W. The WMO G3W will be presented to the WMO Executive Council on 16 June 2025. Some degree of concern regarding the long-term funding of a critical mass of people within the G3W Secretariat at WMO exist and indication of support within the CGMS statement to WMO would be helpful. Independently from budgetary issues within WMO the GHG operational needs will remain.

WMO asked CGMS to continue working on low latency products as this is decisive input for the overall system latency. There is also a need to fill the spatial gaps identified, particularly for stratospheric methane. In addition, it remains essential to work towards long-term continuity of observations and operations.

Discussion

EUMETSAT commented that the data availability does not fulfil the latency requirements outlined by WMO and that retrieval of CO_2 concentrations is complex, which is visible because many provisions of data are research oriented. Thus, in the operationalisation of missions such as Microcarb, it is essential that the latency of data availability needs to be strongly improved. We need to go from a latency of 3 days towards near real time to satisfy needs of data assimilation schemes. In addition, rather big reprocessing needs were identified early in the mission lifetime to consolidate the available observations. More generally, there is a need to ensure that all relevant documentation (e.g. ATBD, validation reports, etc.) become available and is transparent, e.g. with respect to instrumental issues that cause errors. For the validation of products, the availability of in situ data with a maximum latency of 3-months is needed. This is critical and the current situation reflects how meteorology was about 40 years ago. WMO agreed with the view on the availability of documentation that is necessary to also ensure the transparency on the quality of the observations, which is important for the use in a policy related context. Further, the comparison to the weather enterprise of the past is true, but on the data availability for validation, the operational character of WMO G3W and the similarity of the set up to the GBON concept will allow the labelling of stations in a way that will enable an improvement of latency.

ISRO asked how data from the new satellites such as the upcoming ISRO G20 satellite would be integrated. WMO emphasised that the WIS-2 system will be used throughout. CMA commented that for global datasets a constellation of satellites would be needed and asked what the requirements for the individual products would be. WMO concurred with the need for a constellation of satellites, ideally containing data from both polar and geostationary orbits.

CGMS-53-JWGCLIM-WP-03 Outcomes and recommendations of the operationalisation of GHG observations in the framework of CGMS meeting of 2 June

The presentation summarised the major achievements of the joint WGClimate Greenhouse Gas Task Team (updated roadmap and the emerging needs for CGMS contributions) and the outcomes of the meeting on the operationalisation of GHG observations held on 2 June prior to the CGMS-53 Plenary session. The outcome was a set of specific recommendations to the CGMS Plenary.

Operationalisation of GHG observations

The GHG Task Team recommended that:

- WMO and the GHG Task Team capture the requirements of IMEO and other interested applications for methane observations from geostationary orbit by CGMS-54 plenary. These are necessary to enable an operational implementation at CGMS space agency level.

- WMO and GHG Task Team work on baseline requirements by CGMS-54 for operational GHG monitoring (considering requirements for revisiting time (mapping capabilities), product timeliness, and product availability and completeness) that ensures a common understanding of the requirements and can function as a guideline for the utilisation of current and the establishment of future missions including from the commercial sector.

- as a first step, and towards an infrastructure to validate the operational GHG satellite missions, the assessment of the current capabilities of the research-driven validation capabilities based on known objectives and resource perspectives is necessary. The assessment should be performed by the GHG Task Team with support from additional experts with a report to be provided to the CGMS-54 Plenary in 2026.

Discussion

ISRO asked what type of trace gases are included in the activities of the GHG Task Team and if climate requirements are considered. The GHG Task Team informed Plenary that mainly CO_2 and CH_4 are considered but that other ancillary trace gases are needed in the retrieval process for atmospheric concentration retrieval. EUMETSAT added that the major climate requirement is the continuity of measurement that might be best addressed in the ongoing WIGOS Vision 2050 update.

The GHG task Team suggested that if new satellite systems provide CO_2 and/or CH_4 data like coming from the mentioned upcoming ISRO G20 satellite, agencies should contact and inform the GHG Task Team about it (Yasjka.Meijer@esa.int).

NASA asked if it would be appropriate to strive for an inclusion of the CO_2 and CH_4 measurement capabilities into the CGMS baseline. EUMETSAT emphasised that the first step is to establish the baseline of requirements for operational GHG observations. However, it is worth considering adding the capability for measurements of atmospheric constituents including CO_2 and CH_4 to the CGMS baseline in the future (the later presentation of WGIII on the CGMS baseline reveals that there is already a work item to include short infrared measurements usable for CO_2 and CH_4 retrieval into the CGMS baseline). It is suggested to discuss this in the GHG Task Team and WGClimate, which possibly could result in a proposal to the CGMS-54 Plenary in 2026 using the established requirements for the operational GHG observations.

The GHG satellite mission portal is updated regularly, please visit https://database.eohandbook.com/ghg/ for details.

All recommendations were endorsed by the Plenary.

Updated GST Strategy

Based on the lesson learnt exercise on the delivery of data/information to the first UNFCCC Global Stocktake (GST) performed by the joint CEOS-CGMS WGClimate, CEOS has started an update of the Strategy for Global Stocktakes that is currently a CEOS-only strategy. The updated strategy seeks to improve the delivery of information to the second GST planned for 2028 and subsequently better remote sensing products in the areas of mitigation, adaptation and other potential areas relevant to the UNFCCC.

CEOS plans to provide a solid draft to the CEOS Technical Workshop (9-11 September 2025 at EUMETSAT) and consider next steps for the strategy at CEOS Plenary (4-6 November 2025 in Bath, UK).

The working level meeting held on 2 June explored possible benefits if the GST strategy would become a joint CEOS-CGMS strategy:

– pathways for operational systems providing sustained support for mitigation and adaptation activities, such as demonstrated for the GHG monitoring supporting monitoring of carbon and methane emissions and potentially extended to other areas, e.g., land and ocean monitoring of carbon related quantities.

– in the context of adaptation, provide a better connection of the GST strategy with the WMO EW4ALL initiative, as CGMS agencies support both warning on extreme events and long-term adaptation by learning from the climatology of extremes.

– it could help to ensure the utilisation of past and future observations from operational satellites in geostationary and polar orbits in this context.

The Chairperson of the 2 June meeting proposed to provide the outline of the updated GST strategy document until end of June via the CGMS Secretariat, and CGMS members are asked to provide feedback to the CGMS Secretariat until end of September 2025 answering the question if they see it useful if CGMS joins the strategy formally by endorsing it at Plenary level later this year after thorough review.

Discussion

The discussion on the possibility of CGMS joining the currently updated GST Strategy was appreciated by the CEOS current SIT Chair (JAXA). He suggested to reflect and discuss the results of the CGMS-53 Plenary in one of the next CEOS Secretariat meetings to ensure agreement within CEOS on the approach. Otherwise, there were no objections to proceed with the item on the possibility of CGMS joining the CEOS GST strategy as described in the presentation.

Finally, the importance of increasing the number of agencies that can provide ground-based observation data was emphasised by the GHG Task Team. EUMETSAT responded that it is useful for agencies to join activities of the GHG Task Team to potentially increase the number of validation data providers but that there are also other mechanisms possible to ensure access to suitable data, e.g. in bilateral agreements.

CGMS-53-JWGCLIM-WP-04 Preparation of a common practice document for remote sensing-based estimates of facility-scale emissions and initial feedback by CGMS members

This presentation provided a draft proposal for a joint CEOS-CGMS document on “Common Practices for Quantifying Methane Emissions from Plumes Detected by Remote Sensing’. The common practises document has been developed over the last two years between CEOS parties as well as national measurement institutes and national labs in the US and UK to provide a practical guide to both public and commercial data producers and users of the current practise in satellite-derived (plume-based) methane flux estimates.

Public and commercial observations providers of CO_2 and CH_4 are increasingly being used to identify high emitters for regulation (in addition to science) and are likely needed for a functioning reporting obligations and carbon market. Currently there are three CEOS-member providers (ASI, NASA, DLR) dedicated to facility scale emissions monitoring, with another ten expected in the next few years in addition to the products generated from public data.

There is a need to define the common practices for reporting of Validation, Verification, Uncertainty Quantifications and Quality Assurance for facility scale emissions so that producers of these data know what is expected by the community and (new) users know how the data should be generated and reported so that it can be trusted.

The endorsement of the best practises document is planned for autumn 2025 and followed by a key stakeholder engagement activity (IMEO/GMP/CCAC) and implementation (inc. case study) towards COP 30.

Recommendations:

- CGMS members are invited to comment on the document and provide feedback at CGMS-53 plenary or in writing until the end of June 2025. Feedback can be sent to Paul Green (paul.green@npl.co.uk) & John Worden (john.r.worden@jpl.nasa.gov) copy to CGMSSEC@eumetsat.int
- CGMS members will be requested to endorse the final version of the document in writing later in 2025

No questions being asked, it was noted to provide feedback on the document until end of June 2025.

CGMS-53-CMA-WP-18 China's satellite activities on global greenhouse gas observation

CMA provided an overview of existing and new satellite systems for GHG monitoring supporting international policy, emphasising many improvements in terms of temporal and spatial sampling. CMA also demonstrated how to construct a multi-source satellite remote sensing greenhouse gas dataset that is useful to support the estimation of emissions at the surface.

ESA commented that it looks forward to the launch of Tansat-2 and had a question about the resulting spatial resolution with respect to the orbit choice. CMA responded that the nominal spatial resolution for products is 25 km^2, but that this varies with orbit and swath position.

Climate monitoring

CGMS-53-JWGCLIM-WP-05 WGClimate status, next steps and key recommendations for CGMS plenary

WGClimate is advancing efforts to enhance the use of Earth observations in global climate research and assessments:

- Implementation Plan: WGClimate finalised the space agency responses to the GCOS Implementation Plan 2022. The consolidated response was endorsed by CEOS and CGMS in April 2025.

- Global Stocktake (GST) Contributions: WGClimate led a lesson learned review to improve systematic observation uptake for GST2 (2028). “Lessons Learned and Recommendations from Space Agencies’ Support for the First Global Stocktake” was endorsed by CEOS and CGMS in April 2025.
- UNFCCC Engagement Tiger Team was established to strengthen CEOS and CGMS coordination at key UNFCCC events and a workshop with UNFCCC was held on 30 April 2025.

These efforts ensure stronger climate monitoring, improved international coordination, and greater impact of satellite data in supporting decision-making.

Key issues of relevance to CGMS are:

- “Space Agency Response to the 2022 Global Climate Observing System Implementation Plan” was endorsed by CEOS and CGMS in April 2025 (HLPP 5.3).
- “Lessons Learned and Recommendations from Space Agencies’ Support for the First Global Stocktake” was endorsed by CEOS and CGMS in April 2025 (HLPP 5.7).
- ECV Inventory is now transitioned to CDR Inventory with a new user interface to make it easier to navigate and more flexible (HLPP 5.1).
- Established the UNFCCC engagement coordination Tiger Team to strengthen CEOS and CGMS coordination at key UNFCCC events (HLPP 5.2).
- CGMS liaison to WGClimate’s GHG task team has been involved in the development of the Issue 2 of the GHG Roadmap. A follow-up meeting between CGMS working groups, WGClimate and its GHG task team was held on 2 June 2025 to coordinate on GHG observations (HLPP 5.6).

The CGMS Secretariat recalled that WGClimate demanded a few changes to the HLPP which are included in the updated version of the plan.

WMO emphasised that the coordination between WGClimate with GCOS and UNFCCC has strongly evolved to a very useful level and congratulated the WGClimate for its recent achievements.

CGMS-53-EUMETSAT-WP-15 GEORing - progress, next steps and future opportunities

EUMETSAT presented the ongoing activities of the GEO-Ring project. CGMS agencies EUMETSAT and NOAA are undertaking a bilateral activity to reconstruct radiance measurements into a Fundamental Data Record (FDR) from all historical measurements from imagers in geostationary orbit that form the Geostationary Ring or in short GEO-Ring. JMA supports the project with data and meta data. IMD has started to provide INSAT data prior 1998, which are being analysed by EUMETSAT for inclusion into the GEO-Ring.

The envisioned resulting climatology will initially be served with 30-minute temporal and equal angle 0.05° spatial grid in NetCDF format, being enriched by an HEALPix equal area grid in Zarr format supporting AI/ML applications.

The data coverage starts in the mid-1970s and extends to today's much more advanced measurements - spanning 50 years' worth of data. The FDR enables the creation of a large amount of quasi-global atmospheric, oceanic and terrestrial geophysical data records and has also good potential of being used in NWP model-based reanalyses.

The presentation provided a status update on the data rescue activities, test data and increasing planned usage including by the CGMS International Science Working Groups ICWG and IPWG and further usage potential. The presentation also included information on the usage of cloud infrastructure and remaining open points on data policy.

CGMS agencies are invited to contribute to this activity and to its possible extensions such as addition of imager data from polar orbiting satellites and atmospheric sounding instruments in the future.

Key issues of relevance to CGMS are:

- Data processing and distribution via cloud systems is ongoing, a 6-year GEO-Ring test data set will become available at the end of 2025.
- A few data policy issues for the GEO-Ring products including rights required for redistributing the data of another agency are being addressed.
- Integration of IMD INSAT data into the GEO-Ring is planned for a second release of the dataset following quality analysis and needed agreements with IMD on the usage and distribution of the data.
- CGMS ICWG has started to use prototype data for producing ISCPP-NG cloud products and plans cloud product assessment for GEWEX based on GEO-Ring data.
- CGMS IPWG sees GEO-Ring radiance data set as very useful and asks for availability at low latency (maximum 3 hr but with a preference for 15 min) for internal member use in precipitation products.
- EUMETSAT plans to hold a product feedback workshop in 2026.
- The lesson learnt activity encouraged at CGMS-52 is planned for 2027 after the release of the first release of the complete data record.

IMD/ISRO mentioned its increased collaboration with EUMETSAT on the use of INSAT data. The discussions have helped to address issues in the data such as missing metadata. More recent INSAT data as from INSAT 3S has better quality and more complete metadata. ISRO indicated that they strive for the inclusion of all INSAT data into the GEO-Ring data set. EUMETSAT welcomed this statement and looked forward to further enhance the collaboration.

Concluding the session, the following actions were agreed:

CGMS-53 plenary action				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
WMO, WGClimate GHG TT	4	53.01	WMO and the WGClimate GHG Task Team to work on baseline requirements for operational GHG monitoring (considering requirements for revisiting time (mapping capabilities), product timeliness, and product availability and completeness) that ensures a common understanding of the requirements and can function as a guideline for the utilisation of current and the establishment of future missions including from the commercial sector.	CGMS-54
WMO, WGClimate GHG TT	4	53.02	WMO and the GHG Task Team capture the requirements of IMEO and other interested applications for methane observations from geostationary orbit. These are necessary to enable an operational implementation by CGMS agencies.	CGMS-54
CGMS members	4	53.03	CGMS members to provide feedback on the draft common practice document for remote sensing-based estimates of facility-scale emissions to Paul Green (paul.green@npl.co.uk) and John Worden (john.r.worden@jpl.nasa.gov) copy to CGMSSEC@eumetsat.int https://www.cgms-info.org/Agendas/GetWpFile.ashx?wid=46ed374b-19bd-4ea8-92d7-26051665f580&aid=16bce6f8-3abf-44a7-88d2-38abff9bd878 https://www.cgms-info.org/Agendas/GetWpFile.ashx?wid=46ed374b-19bd-4ea8-92d7-26051665f580&aid=bcbf0183-4b5d-4046-be17-e2aa087e84a1	30 June 2025
Paul Green, CGMS members	4	53.04	Paul Green to submit the final version of the common practice document for remote sensing-based estimates of facility-scale emissions to CGMSSEC@eumetsat.int for further circulation to and confirmation by CGMS members.	1 Oct 2025, 30 Nov 2025
CGMS members	4	53.05	*There will be no joint document, hence this action has been superseded by events (September 2025).* The Chairperson of the 2 June side meeting (joerg.schulz@eumetsat.int) proposed to provide the outline of the updated Global Stock Take (GST) strategy to the CGMS Secretariat by end June. CGMS members will be requested to provide feedback to CGMSSEC by September 2025, confirming if CGMS in principle should join the strategy by formally endorsing it at Plenary level by correspondence by end 2025 (i.e. on the understanding that CEOS SIT concurs to a joint document).	30 June 2025, 30 Sept 2025

5. WORKING GROUP REPORTS

Satellite data and products - WGII

CGMS-53-IROWG-WP-03 CGMS International Radio Occultation Working Group (IROWG) key recommendations to CGMS plenary

The IROWG-10 was held at UCAR in Colorado on 12-18 September 2024 in conjunction with the COSMIC/JCSDA Workshop.

The main recommendations from IROWG-10 to CGMS plenary were the need for:

- a reliable replacement for the FORMOSAT-7/COSMIC-2 tropical and subtropical radio occultation observations to be in place by 2030 at the latest;
- the continuation and expansion of the RO observational network since the current radio occultation observational network is the top two or three most beneficial observing system to NWP in terms of forecast impact;
- permanent archiving of the Level 0 (raw) data from all RO missions and the government agencies purchasing commercial data to secure an associated open data policy and be responsible for their archiving;
- relevant agencies to undertake a ROMEX-like study for space weather;
- improving planetary boundary layer (PBL) profiling from GNSS-RO through technology and retrieval developments, and utilisation of information from the PBL in NWP data assimilation as well as the further exploitation of RO-derived water vapor.

There being no discussion, Plenary noted the recommendations from IROWG.

CGMS-53-IROWG-WP-04 ROMEX - Outcomes from the 2nd ROMEX workshop and recommendations

On behalf of the project, EUMETSAT presented the outcomes of the 2nd Radio Occultation Modelling Experiment (ROMEX) Workshop. The workshop evaluated the impact of increasing radio occultation (RO) observations on Numerical Weather Prediction (NWP) using real data. The workshop evaluated the impact of up to 35.000 daily RO profiles (the maximum number available for the experiment) on numerical Weather Prediction (NWP) using real data. The ROMEX forecast impacts obtained by leading international NWP models support the IROWG recommendation of at least 20,000 occultations per day, preferably with uniform global and local time coverage.

The ROMEX findings were:

- Optimisation of data assimilation schemes is required to use large increases in RO numbers efficiently;
- RO requirements can be met with data from multiple sources including different instruments, satellites, orbits, countries, and both public and commercial providers;
- RO observations provide valuable information to NWP and Space Weather; both needs should be considered; and

- Importance of uniform spatial and geographical data distribution for NWP and space weather.

Discussions:

EUMETSAT thanked the data providers from China and the US. EUMETSAT pointed out that additional RO data beyond 20,000 profiles per day do not bring the same effect on NWP performance, and this needs to be put in a proper context. Continued analysis is warranted, particularly for extreme weather.

CMA pointed out that it is drafting a set of guidelines for commercial satellite data including commercial satellite RO data constellations. It will decrease the risk of continuity of operational data use. ROMEX participants appreciated CMA's associated efforts.

It was also pointed out that using RO data for AI models has significant potential and should be considered as an option for future work for ROMEX.

CGMS-53-IPWG-WP-03 CGMS International Precipitation Working Group (IPWG) key recommendations to CGMS plenary

The IPWG-11 Workshop took place on 15-18 July 2024 in Tokyo, addressing the current and future status of satellite-based global precipitation estimation. Co-chair Giulia Panegrossi replaced Takuji Kubota while the other chairperson Chris Kummerow will continue.

IPWG emphasised to following to CGMS:

- CGMS should consider allowing real-time GEO-Ring processing for internal member use in precipitation products;
- Growing usage of AI/ML techniques in algorithms and growth of unverified global products of questionable provenance;
- Cubesats/smallsats often lack quality control/intercalibration, efforts needed for consistent precipitation applications. It is necessary to ensure that cubesats are complemented by preferred conically-scanning passive microwave imagers;
- Precipitation products have limited ability to predict uncertainties in regions without validation data. The Baseline Surface Precipitation Network effort collects radar/rain gauge data and processes these to similar standards and from as many different climatological regimes;
- The IPWG benchmarking activity is the IPWG's equivalent of a weather OSSE, to assess the overall quality of the precipitation product generated from a suite of imagers, sounders and precipitation radar; and
- Consistent long-term leadership will be needed to ensure that precipitation products retain the quality, accessibility, and documentation that are needed by the user community.

Plenary noted the IPWG recommendations**.**

CGMS-53-IWWG-WP-02 CGMS International Winds Working Group (IWWG) key recommendations to CGMS plenary

IWWG-17 took place virtually on 19-22 May 2025. The meeting participants emphasised significant ongoing developments of new satellite-based wind retrieval approaches (Stereographic, Optical Flow, AI/ML) with the retrieval of 3D vertical wind profiles as a priority. Participants agreed that a 5th AMV intercomparison study should be done based on the value of prior AMV intercomparison studies.

Plenary noted the IWWG recommendations and placed the following action on the IWWG (for monitoring in WGII):

CGMS-53 plenary action				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
IWWG	5	53.08	(To be addressed in the framework of WGII) IWWG to consider holding a 5th AMV Global Intercomparison Study.	CGMS-54

CGMS-53-ITWG-WP-02 CGMS International TOVS Working Group (ITWG) key recommendations to CGMS plenary

The ITSC-25 meeting was held on 8-14 May 2025 in India with participation ranging from satellite operators, NWP centres and private companies developing microwave sounders. The outcome of the meeting highlighted:

- The need for stability and adequate calibration and space agencies to act as a link;
- The importance of the completion of the baseline observing network with GEO, LEO, 6-SSO, and low inclination orbits with microwave sounders;
- A need to review the resilience of climate datasets;
- Emerging AI/ML technologies to bring rapid changes on and in weather industries; and
- Observations will remain critically important and should be made ML-ready.

Plenary agreed that the following HLPPs associated with the ITWG had been accomplished:

- 4.2.6 Establish a commonly agreed approach for retrieval of PC scores and associated parameters from hyperspectral infrared data, minimising information loss
- 4.7.2 Conduct trade-off studies regarding the benefits of spectral, radiometric and spatial resolution of infrared sounders

Further, it was suggested that curating data for AI applications beyond numerical weather prediction (such as climate modelling and atmospheric chemistry) could become an essential part of future backbone architectures and should be discussed.

CGMS-53-IESWG-WP-02 CGMS International Earth Surface Working Group (IESWG) status and plans including key recommendations to CGMS plenary

The IESWG reported on their activities to enhance the exploitation of Earth surface observations which promote interaction among the CGMS International Science Working Groups. IESWG have identified

(near-) global remotely sensed snow water equivalent observations as the most significant land observation data gap, in terms of potential to improve NWP forecasts.

Following the first two-year initiation of the group as a CGMS ISWG, the IESWG is due for confirmation by the plenary as a CGMS ISWG. However, in view of the next and 6th IESWG meeting only taking place a week later, on 11-13 June in Germany, Plenary requested that the IESWG report back following their meeting before Plenary could take a decision. The IESWG expected to address land observation usage in NWP, recommendations on how land observation needs might change due to acceleration of AI/ML within NWP at its upcoming meeting.

Discussions:

Before the endorsement of extension of this IESWG, plenary pointed out that it would like to see the IESWG provide a report including the proposed revised Terms of Reference for review shortly after the upcoming IESWG meeting, and for the IESWG to report to the next plenary session.

Concluding the item, the following actions was agreed:

CGMS-53 plenary action				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
IESWG leading entity	5	53.06	On IESWG: IESWG to share with CGMSSEC (for redistribution to CGMS members) the outcome of its June 2025 meeting, incl. updated ToRs, and for further reporting to CGMS-54	15 Aug 2025, CGMS-54

CGMS-53-GSICS-WP-02 GSICS Executive Panel report to CGMS plenary

The Chair of GSICS EP reported on the new sub-groups on space weather and lunar calibration establishment. He also indicated the benefit of GSCIS activities on satellite operations after the incident of the FCI hardware failure onboard MTG-I1 (MICMICS implementation). One outcome of the GSICS annual meeting in March 2025 was to shift efforts from the generation of GSICS inter-calibration coefficient products, commonly known as the "GSCIS corrections", to the operational monitoring of the radiometric performances. The next GSICS meeting will be hosted by the National Research Council (NRC) of Canada on 23-27 March 2026, in Ottawa, Canada.

GSICS pointed out that CGMS contributing organisations may be required to help mitigate the loss of GSICS support in the next years in view of recent budgetary developments in the United States.

Following the presentation, Plenary pointed out the importance of the GSICS for operational work.

CGMS-53-WGII-WP-07 WGII key recommendations to CGMS plenary, confirmation of WGII co-chair

In addition to the reports by the CGMS International Science Working Groups, WGII informed plenary on the importance of:

- articulating how MW missions with different frequencies should be addressed and visualised in the CGMS baseline and risk assessment;
- based on the rapid decline in the number of satellites equipped with CERES instruments, the need for analysing the status and development of outgoing longwave and shortwave flux measurements (in conjunction with GEWEX);
- investigating other capabilities for UV limb sounding to complement JPSS to be further discussed at upcoming intersessional meetings. The plan is also to request the WCRP programme on stratosphere to provide an intersessional WGII talk;
- Dedicating significant efforts on AI in all CGMS Science Working groups (with the IPWG having already presented AI use cases to CGMS-53 Working Group II);
- Continuing to coordinate gaps in greenhouse gas monitoring through collaboration with WGClimate/GHG TT, GSICS, and WMO programmes; and
- Targeting a baseline proposal for operational GHG service (including MVS/G3W) for CGMS-54 plenary endorsement (2026).

Further, Plenary confirmed Takuya SAKASHITA (JMA) as the new co-chair for WGII, and thanked J V Thomas (ISRO) for his contributions to WGII.

Operational continuity and contingency planning - WGIII

CGMS-53-WGIII-WP-12 WGIII key recommendations to CGMS plenary

The WGIII co-chair Irene Parker (NOAA) presented the groups key recommendations to plenary since CGMS-52. Following the presentation, plenary:

- noted the current status of the CGMS risk assessment (ref. 7th CGMS risk assessment workshop);
- adopted the WGIII proposed changes to the CGMS Baseline and noted WGIII had:
    - reviewed with the ranges of the CMA GEO slots in the attributes to assure they covered all CMA satellites.
    - addressed separate RO sensor types for Ionospheric Electron Density – which will be further addressed with SWCG in the intersessionals following plenary and for the SWCG to provide a recommendation to the 8th risk assessment workshop in February 2026.
    - identified that a day-night visible channel in the LEO early morning and afternoon orbits is missing in the risk assessment.
    - identified that an IR dual-angle view imagery for high-accuracy SST (at least one am spacecraft) is missing in the risk assessment.
    - Removed a VIS/UV and Narrow Band Imager sensors 128.2 degrees GEO location (NIER's GEMS instrument is not part of the baseline).

- added an L5 orbit for Coronagraph, Interplanetary Magnetometer and Plasma Analyser sensors. For the latter two, L5 as in-situ measurement was added as an attribute;
- approved the CGMS Contingency Plan;
- endorsed the conclusion of the CGMS Futures Project 2022+: Relationship to the Private Sector theme.

The Group also proposed a number of changes and proposals for conclusion to the CGMS High-Level Priority Plan, that were endorsed by the CGMS-53 plenary:

1.2.5 Work towards ensuring low frequency microwave imagery for all-weather SST and ice monitoring from at least 2 sun-synchronous orbits.

- On the basis of the CIMR (ESA) mission, measurement will be provided from AMSR-3 (PM orbit) and CIMR (EM orbit).

1.2.7 Work towards increasing geographical resolution and coverage for altimetry measurements, including very high latitudes.

- On the basis of the CRISTAL (EC/ESA) mission it will secure altimetry measurements. Regarding the general coverage of altimetry missions, very promising results have been achieved by SWOT, but further operational missions in the future are unknown.

1.3 Ensure long-term continuity of OSCAR/Space as a primary tool to support the CGMS risk assessment and the WMO Rolling Review of Requirements including gap analysis against observing system requirements for satellite data and make OSCAR/Space the primary repository for WIGOS satellite metadata records generated by CGMS operators.

- To be removed in the HLPP, it is reflected in the work of WGIII and has as a standing agenda item in WGIII. The matter is also partially discussed in WGII and WGIV.

1.6.1. Identify/evaluate potential or commercial Earth observation (EO) technologies and share information on pilots/testbeds etc. to evaluate new commercial EO technologies.

- WGIII has successfully institutionalised this action incorporating commercial data and technologies, item 1.6.1 is therefore considered concluded.

1.6.2 Assess the operational maturity of commercial observation technology.

- CGMS WGIII will consider technologies presented under its standing agenda item on public private engagement with collaboration of WMO PPE office, and the item 1.6.2 is considered completed.

1.6.3 Develop best practices/templates for end user license agreements/procurements, for considering the value of public access and the additional costs of data sharing rights, including quality control considerations.

- CGMS-52 endorsed the best practices document in 2024. WGIII has an action to review the best practices document every two years and update it as necessary. Item 1.6.3 is therefore considered concluded.

1.2.3 Work towards operational hourly daytime UV/VIS mapping of air quality from geostationary orbit as GEMS has now been removed from baseline and the UV GEO capability will only be provided by MTG-S1/Sentinel-4 for the foreseeable future. The status will therefore be changed to yellow in the flyout charts of the risk assessment.

1.2.1 Work towards establishing optimum constellations for new observations introduced in the CGMS baseline:

- Short-wave IR spectrometers for monitoring of greenhouse gases (CO_2 and CH_4).

- Multi-viewing, multi-channel, multi-polarisation imaging for aerosols.

o The main capability will be provided by 3MI on Metop-SG A. Requirements for more frequent observations have not been stated in WMO Gap Analysis. The HLPP is considered completed.

- UV limb sounding spectrometry for profiles of Ozone and trace gases.

WGIII also reviewed the following HLPP items with no proposed changes:

- 1.1 Mitigate the impact of identified degradation or loss of capabilities of the CGMS Baseline and ensure appropriate contingency measures (green status);
- 1.2 Advance the response to the WIGOS 2040 Vision for space (yellow status);
- 1.4 Assess impact and benefits of CGMS satellite missions (green status).

WGIII further encouraged CGMS Members to participate in WGIII and the risk assessment workshop to present their undertakings on socio economic benefits and their relationship with the private sector, and engage in the WMO Open Consultative Platform efforts and discussions when appropriate.

The WGIII co-chair, Tang Shihao (CMA), highlighted that the CGMS WGIII risk assessment is the key WGIII initiative and undertaking, together with the increasing commercial sector partnerships. Hence, this is why CGMS cross-coordination is needed. WGIII co-chair, Irene Parker (NOAA), confirmed that this is an important topic to be discussed in WGIII intersessional meetings.

CGMS-53-WGIII-WP-14 Key outcomes of the 7th risk assessment

Melissa Johnson (NOAA) presented the main findings of the 7th risk assessment and identified potential risks as concerns commitment for:

- High risk: Continuity of RO observations in low inclination orbits in the later part of the decade as there is no commitment for a follow-on to COSMIC-2.

- Moderate continuity risks:

  - UV limb spectrometer
  - SWIR Imaging Spectrometer
  - Precipitation Radar
  - Microwave Imager
  - Scatterometry
  - Coronagraphy in GEO
  - Energetic particle sensors in LEO

Plenary took note of the further details of the latest risk assessment updates presented.

CGMS-53-WGIII-WP-13 Update of the CGMS baseline for plenary endorsement

Anne Taube (CGMS SEC/EUMETSAT) presented the updates of the CGMS Baseline document.

Plenary agreed to the following edits proposed to the observations and orbits section:

- GEO slot range slots in the attributes and to cover all CMA satellites;
- A day-night visible channel in the LEO early morning and afternoon orbits are missing in the risk assessment;
- IR dual-angle view imagery for high-accuracy SST (at least one am spacecraft) is missing in the risk assessment;
- For VIS/UV and Narrow Band Imager sensors 128.2 degrees GEO location was removed (GEMS no longer being part of the baseline);
- For coronagraph, interplanetary magnetometer and plasma analyser sensors, L5 was added as an orbit; and
- For interplanetary magnetometer and plasma analyser sensors, L5 as in-situ measurement was added as an attribute.

CGMS-53-CGMS-WP-09 Update of the CGMS contingency plan

Plenary noted the editorial update to the CGMS Baseline document which consisted of an update concerning the review of the document, instead of every 4 years it was changed to an annual review. (It is always reviewed on the occasion of each WGIII risk assessment workshop.

CGMS-53-WGIII-WP-15 Concluding the future direction 2022+ relationship to the private sector theme and the path forward for plenary endorsement

Melissa Andersen Garcia (NOAA) presented the private sector theme conclusion and way forward. The main purpose of the activity was to leverage the opportunities of a rapidly growing commercial space sector while maintaining operational standards and open data sharing.

She outlined the key achievements as follows:

- Share information among members on pilots/testbeds/data buys of commercial EO technologies;
- Develop shared criteria/standards for purchasing commercial observations;
- Evaluate commercial EO technologies that may be available to members to supplement government observations; and
- Mechanism to engage commercial industry.

The intersessional period focussed on the mechanism on how to engage with the commercial sector and continue evaluating Earth observation technologies that may be available to members to supplement governmental observations.

CGMS WGIII recommended developing a mutually beneficial partnership with the WMO Public-Private Engagement (PPE) Office. This partnership between PPE's existing Open Consultative Platform (OCP) and CGMS would benefit both parties. CGMS will benefit from the broad convening power of OCP, and WMO will benefit from timely feedback from the space agency perspective. Given this new mechanism, CGMS WGIII recommended to CGMS-53 plenary the conclusion of the theme ´Relationship to the Private Sector´ as concerns the Future Direction Project 2022+ and to continue the ongoing activities above in the framework of the CGMS WGIII.

WGIII encouraged CGMS members to actively participate in the established WGIII standing agenda item on the relationship with the private sector and engage in WMO Open Consultative Platform efforts and discussions regularly and as appropriate.

CGMS-53 WGIII Plenary endorsed the conclusion of the Futures Project 2022+ theme: Relationship to the Private Sector, in view of the fact that it is well embedded within the WGIII standing agenda.

CGMS-53-WGIII-WP-09 Progress of the CGMS socio economic benefit activities (future direction 2022+)

Kazuki Yasui (JMA) presented the status of the socio-economic benefit (SEB) studies in JMA. SEB studies have recently played an important role in convincing stakeholders of the value of the observations provided by satellite programmes. JMA is currently conducting a survey to understand the current status of SEB case studies among CGMS members and gather opinions on the direction of future SEB activities.

Currently, EUMETSAT and NOAA have conducted SEB studies of meteorological satellite systems. EUMETSAT has undertaken SEB studies for LEO (EPS-METOP and EPS-AEOLUS & EPS-STERNA). NOAA for its next generation GEO programme (GeoXO), space weather service and for ocean colour data.

CGMS-53-EUMETSAT-WP-09 EUMETSAT's socio economic benefits network/community of practice incl. lessons learned

EUMETSAT presented the background of the lessons learned for undertaken socio-economic benefit (SEB) studies. The number of SEBs of weather services is constantly growing indicating benefit cost ratios (BCR) between 3:1 to more than 2000:1. The general problem is how to quantify the SEBs from increasing forecast accuracy.

EUMETSAT has concluded several SEB studies for EUMETSAT missions. The most recent ones were concluded for EPS-Sterna and EPS-Aeolus. The studies are showing BCRs 20:1 (Aeolus), 51:1 (Sterna) and 33:1 for both missions operational together.

EUMETSAT pointed out that there are limitations and gaps in sector-specific SEB studies like in energy, construction and water resources.

WMO commented that SEB studies go hand in hand with the trustfulness of the service to build the social benefit. Thus, impact of satellite data is in every forecast product which explains the high BCRs.

WMO further asked about SEB studies on space weather services to which EUMETSAT responded that so far, its SEB studies do not include space weather.

EUMETSAT added that some observations of EUMETSAT EPS-Sterna, such as e.g. aerosol detection or 325 GHz band ice detection, were left out in the SEB study to make the result trustworthy. In addition, more experience is required prior to the inclusion of such observations in such studies.

WMO commented that it would be important to have SEB studies related to the energy sector, because the benefits are relatively easy to measure in energy savings and consumption. EUMETSAT agreed that there are very few SEB studies on the energy sector even if they have been using weather services for years.

Space Weather Coordination Group - SWCG

CGMS-53-SWCG-WP-09 SWCG key recommendations to CGMS plenary

The SWCG co-chair reported on the activities of the SWCG over the past year.

The risk status in the CGMS risk assessment dedicated to space weather has overall improved significantly, with only a remaining and moderate risk for gap or performance degradation towards the middle of the next decade for coronography from GEO and energetic particle sensors in LEO. A recommendation on how to treat the ionospheric radio occultation capabilities separately from neutral atmosphere radio occultation within the risk assessment remains to be formulated.

The CGMS baseline has been updated taking onboard several measurements from the L5 Vigil mission.

The SWCG highlighted the unique opportunity arising from having a total of at least six spacecraft (SWFO-L1, IMAP, Aditya-L1 and the legacy ACE, DSCOVR, and Wind missions) approximately in the same location of space simultaneously measuring the solar wind plasma, particle, and magnetic parameters by the end of 2025. This opportunity should be used to advance both cross-calibration issues as well as assessment of the variability scales of heliospheric structures and the model sensitivity to these variations.

Inputs on data requirements have been gathered and received from a survey to the ICAO SWXC centres which identified improved auroral observations as a target. The SWCG will further analyse and formulate a response to the identified needs.

The OSCAR/Space database and associated WMO Gap Analysis has been improved in terms of representing and addressing the orbit requirements for space weather observations. Further improvements are needed to record data availability and accessibility as well as to implement filtering capabilities for energetic particles and ionospheric radio occultation capabilities. In an ongoing action CGMS space agencies are requested to supply latency information for their data.

The GSICS space weather subgroup, together with COSPAR/PRBEM, has progressed on the revision of the PRBEM Data analysis procedure to better address the L1 observations and cross calibration among the various observing platform.

The CGMS Spacecraft Anomaly Task Group has compiled the anomaly database since 2015 (available at https://cgms-info.org/about-cgms/space-weather-coordination-group/) with 2024 data currently only provided by EUMETSAT. CGMS member agencies are encouraged to provide their inputs to the database. Error detection and correction (EDAC) data have proven useful for analysis and CGMS member agencies are encouraged to also provide EDAC data for 2024 and to report on their ability to provide these for historical and future data.

The NASA-developed SPARK tool is used as a repository for CGMS member agency anomalies, and its suitability to serve as a central tool, including data access criteria, metadata needs and standardisation will be assessed.

The Data Access Task Group has worked together with the WMO Expert Team on Space Weather and clarified that the aspects of data access mechanisms and data formats can and need to be treated separately also in terms of standardisation and has taken follow-on actions for both.

The Ionospheric Radio occultation task group refined the table of ionospheric radio occultation capabilities and continues to consider and assess OSE's and OSSES, including a ROMEX like experiment for ionospheric RO.

The actions related to space environment sustainability have been transferred to the newly established Task Group under WGI, but SWCG highlighted the value of GNSS Precise Orbit Determination in addressing the data gap in near-real-time thermospheric density observations which are required by operational users.

The SWCG provided the following key recommendations to plenary:

- Operational thermospheric density measurements are crucial to effective space traffic coordination and collision avoidance. Specific items are proposed to be added to the HLPP with associated actions to improve observations and modelling and establish this as a baseline activity within 1 to 2 years.
- Improved auroral observations were identified as needed by the aviation users and new operational satellite systems are planned by CMA and ESA and foreseen to become part of the baseline.
- Ionospheric RO is recommended to undergo a dedicated risk assessment in 2026 as distinct needs become better defined.

- CGMS satellite anomalies compiled since 2015 are published on the CGMS website on the SWCG page. However, only a few CGMS members are currently providing data, and the objectives of the database cannot be achieved without more data from CGMS members and other operators.
- A new NASA-developed anomaly database tool - SPARK - contains advanced analysis features allowing correlation with space weather effects and protection of sensitive data, and the tool is ready for evaluation by the CGMS agencies.
- SWCG Terms of Reference will be reviewed and updated, based on the CGMS Future Directions Project outcomes and inputs from the Task Groups for presentation to CGMS-54.
- Due to the increasing importance to CGMS members of operational space weather observational systems, the maturing of capabilities and future expansion plans, it is recommended to plan for a dedicated space weather coordination agenda point as part of the CGMS-54 plenary.
- Plenary was invited to endorse Jim Spann (NOAA) as co-chair of SWCG, following the departure of Elsayed Talaat (NOAA).
- Proposed addition to the HLPP of an item to work on comparing different measurement strategies and techniques for characterising the thermospheric environment.

Discussion

ISRO enquired on data access, whether there are specific requirements for being AI/ML ready and the need for any new metadata. ISRO also pointed to considerations in other data types related to AI/ML.

The SWCG co-chair responded that some users are already using AI applications, especially in ongoing research and it would be valuable to collect their feedback. Following earlier reports on AI/ML space weather applications in WGII there has been the suggestion of organising intersessional seminars on this topic. Such intersessional seminars could be an opportunity to also collect considerations on metadata requirements.

JMA noted that WGIV is looking at AI issues and considers that additional information/metadata is added to those products in order to record they were generated by AI learning. It was highlighted that the SWCG needs to ensure that WGIV considerations are also coordinated with the SWCG.

Concluding the item, Plenary also endorsed Jim Spann, NOAA, as new co-chair of the SWCG.

Satellite systems and operations - WGI

CGMS-53-WGI-WP-16 WGI key recommendations to CGMS plenary

The WGI co-chair presented a summary of WGI activities since CGMS-52.

Plenary noted the good progress on the Enhanced Data Collection Platform (EDCP) standard implementation and the progress on assessing capabilities in collision avoidance/space traffic coordination.

CGMS Plenary noted the overall progress for the WGI Task Groups including the first engagement within WGI on the topic of antenna arraying techniques for LEO missions within CGMS, ongoing efforts on

characterising RFI issues impacting DCS, and also investigations (ref. CGMS-53-WGI-WP-06ii) on using DCS signal data to detect and study ionospheric scintillation.

CGMS-53-WGI-WP-18 Agency guidance for RFI detection monitoring and mapping for remote passive sensors (information document)

CGMS Plenary took note of the report on "Agency guidance for RFI detection monitoring and mapping for remote passive sensors"

Data access and end user support - WGIV

WGIV key recommendations to CGMS plenary

CGMS-53-WGIV-WP-12 Natalia Donoho (WMO) has vacated her role as co-rapporteur of WGIV and was endorsed by plenary as the new co-chair of WGIV**.**

CGMS-53-WGIV-WP-13 Updated WGIV Terms of Reference

Plenary endorsed the updated WGIV Terms of Reference as recommended by the WGIV.

CGMS-53-VLab-WP-02 VLab strategic orientation and 2024-2025 progress highlights

Plenary endorsed Di XIAN, CMA, as the new co-chair of VLab on behalf of CGMS.

There was a discussion about the need for due training of IT experts in order to make the data available as needed to the end users. It was observed that a gap still exists in terms of the skills needed to e.g. create channel combinations, and that this lack of expertise can lead directly to a lack of uptake of available data. It was confirmed that this could be addressed within the scope of the VLab, and that in RA-III and -IV there are already workshops addressing the technical aspects of data access and display. Although the topic is challenging, the VLab was recognised as helping to deliver socioeconomic benefits by maximising the use of valuable satellite data, and therefore continued contributions to VLab's funding by CGMS members were encouraged.

The VLab co-chair informed plenary that IMD is planning to establish a VLab Centre of Excellence and that a request for plenary endorsement will be presented to CGMS-54.

6. AI USE CASES

CGMS-53-CGMS-WP-28 Introduction

The WGII rapporteur introduced the session on reshaping the boundary between data producers and users. Over the past three years, machine learning (ML) has accelerated across the weather enterprise at an unprecedented pace. Traditional value chains are collapsing as "end-to-end" AI stacks that can ingest raw data and output operational tailored information directly.

The impact on data processing and user ecosystems: The rise of foundational models and direct observational prediction could transform the entire data production chain, from algorithms to delivery, while simultaneously broadening and diversifying the user landscape.

The contributions of CGMS could be to:

- keep track of the developments at the agency level and across the international science working groups;
- periodically, assess standards in different parts of the ML value chain (i.e. data curation, formats, chunks, error characterisation);
- foster international coordination and cooperation across international working groups on ML applications; and
- specific collaborative projects under CGMS.

CGMS-53-WGII-WP-08 Case study results using AI exploiting satellite data

The IPWG Rapporteur (Joe Turk, NASA, JPL/Caltech) summarised AI/ML-related materials contributed by CGMS members and the international science working groups, highlighting AI/ML techniques in use or development, applied to a variety of meteorological satellite and forecasting applications. Meteorological satellite data are well-suited for AI/ML techniques, to address complex satellite forward and inverse problems, and improve processing efficiency. Numerous presentations showcased customised hazardous weather-related products, including short-term, low latency predictions of lightning locations, ground-based radar reflectivity patterns, and tropical cyclone vortex location and intensity. Use cases demonstrated improved and automated scene masking and feature identification from multispectral data. Demonstrations of data-driven forecasts based on observations alone were shown to exhibit skilful short-term forecasts of near surface temperature and wind speed. Continued rapprochement and consultation between the CGMS international science working groups is encouraged to assess potential ways to promote cross-agency and cross science working group synergies.

CGMS-53-NICT-WP-04 Case study results of AI-based space weather forecast models using satellite data

NICT presented the Japanese case study results of AI-based space weather forecast models using satellite data including:

- The world's first operational solar flare forecast system using deep learning (launched on 5 April 2019 and six years in operation).
- Ultra-fast computation of 2D Auroral current system using an ML-based emulator.
- Probabilistic forecast of high-energy electron fluence levels using Deep Learning.

The study concluded the following key points:

a) Space weather forecasting is well-suited for the introduction of AI/ML:
   - Since the flow of energy and materials is primarily unidirectional (the Sun → solar wind → Magnetosphere → Ionosphere. Note: Coupling processes exist within Geospace), making it easier for AI/ML to learn the cause and effect.

- While both ground-and space-based space weather observations (especially in-situ space-based observations), are sparser compared to terrestrial weather observations. However, some degrees of meaningful outputs can still be derived from AI/ML-based models.
- The importance of upstream space-based observations (e.g. solar and solar wind observations from L1, L5, and L4) is increasing.

b) Collaboration with AI/ML technology researchers is key.
   - Efficient model and product development through the fusion of specialised knowledge in space weather research and AI/ML research.

c) Utilisation as a tool of operational forecasting.
   - Final forecast decisions are made by human experts. AI/ML results serve as reference information for forecasters.

CGMS-53-CMA-WP-19 FengYu: A foundation AI model to bridge the regions in solar–terrestrial Space

CMA presented its FengYu foundational model to support next-generation space weather forecasting.

The main innovations of the FengYu model are:

- Embracing the causal flow of space weather.
  - The Sun-to-Ionosphere energy flow forms a clear causal path, ideal for AI to learn and forecast space weather.
- Modelling physics by region, not one-size-fits-all.
  - Different physics across solar wind, Magnetosphere, and Ionosphere demand tailored AI architectures for each layer.
- Learning from sparse and heterogeneous observations.
  - By fusing GNSS, LEO, and geostationary signals on adaptive grids, FengYun extracts value even from incomplete data.
- Coordinated optimisation across subsystems.
  - A dynamic loss mechanism ensures that downstream predictions adjust responsively to upstream disturbances.

CGMS-53-WGI-WP-17 Agency existing and future uses of AI, ML for pattern recognition in RFI detection and mitigation in remote sensors

Radio frequency interference (RFI) poses a growing threat to various fields, degrading signal quality and system performance. Traditional RFI detection and mitigation methods are often insufficient in complex environments. AI/ML offer promising solutions through advanced algorithms capable of detecting, classifying, and mitigating interference. AI/ML techniques, including supervised and unsupervised learning, reinforcement learning, and deep learning, are being utilised for RFI detection, classification, and mitigation through adaptive filtering, dynamic spectrum access, and cognitive radio. Applications span Earth observation, enhancing satellite imagery, and wireless sensor networks, improving reliability and energy efficiency.

While challenges exist, including data scarcity, dynamic RF environments, computational complexity, model interpretability, and adversarial attacks, ongoing research in transfer learning, few-shot learning, and explainable AI is addressing these issues. For international groups like the CGMS, AI/ML-driven RFI solutions are crucial for ensuring the accuracy and reliability of meteorological data, protecting investments in satellite technology, and fostering international cooperation in spectrum protection.

Discussion

Based on the presented use cases, the potential response of CGMS to the AI challenges was discussed, which resulted in the endorsement of four key AI/ML areas to enhance meteorological and space weather data utilisation:

1) Data curation standards

The purpose of this initiative is to standardise Earth observation data, including formats like Zarr and metadata per CF conventions, to ensure compatibility with AI and ML. As part of the deliverables, the CGMS Secretariat will lead a survey of agencies within the CGMS. Additionally, Working Groups II and IV will collaboratively draft standards that will be reviewed at CGMS-54.

2) AI/ML applications catalogue

The purpose of this initiative is to centralise global AI advancements for community reuse, similar to GitHub repositories. The deliverables include an agency survey conducted by the CGMS Secretariat to collect model metadata, and a Version 1 catalogue developed by Working Group II to be presented at CGMS-54.

3) Space Weather AI readiness

The focus is on predicting solar flares and coronal mass ejections (CMEs), as well as tackling the challenges associated with real-time forecasting. To address these issues, it was agreed to hold 2–3 seminars jointly organised by SWCG/WGII.

4) AI error propagation framework for precipitation products

The objective is to measure the uncertainties caused by AI in operational products, and it is the responsibility of the IPWG to formulate the methodology for this purpose.

7. REVIEW OF CGMS PLENARY ACTIONS AND RECOMMENDATIONS

Review of actions from CGMS-52 and new actions from CGMS-53

CGMS-53-CGMS-WP-25 Status of CGMS-52 plenary actions

Following the discussions in CGMS-53 plenary, it was agreed to close the CGMS-52 plenary actions whereas the recommendations would be carried on to the CGMS-53 list of actions. The status and action summary are provided following the chapter on the closing session.

CGMS-53-CGMS-WP-25bis Summary of new actions from CGMS-53 plenary

The CGMS Secretariat presented the summary list of actions resulting from plenary discussions. The actions are included under the relevant agenda items, and a summary list of CGMS-53 plenary actions and recommendations are provided following the chapter on the closing session

CGMS-53-CGMS-WP-24 Status of CGMS representatives and nominations (CGMS WGs, ISWGs, GSICS, VLAB, WMO and other initiatives)

The CGMS Secretariat informed the Plenary that currently there are co-chairs and rapporteurs in the five main working groups. Nevertheless, NOAA added that it would welcome additional leadership support from those members not yet represented which was supported by the Plenary.

CGMS-53-CGMS-WP-26 Status of implementation of CGMS HLPP (2024-2028)
CGMS-53-CGMS-WP-27 Revised CGMS HLPP (2025-2029)

Mikael Rattenborg (CGMSSEC) summarised the implementation status of the CGMS High Level Priority Plan for 2024-2027 and the proposed revisions for the updated version for 2024-2028. The proposed revision considered in particular the conclusions made by the CGMS-53 Plenary on GHG/Climate matters. The CGMS-53 plenary endorsed the revision, subject to any final feedback to be provided within a deadline of 2 weeks after the CGMS-53 Plenary session.

CGMS-53 plenary action				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
CGMS members	7	53.09	CGMS members to review the revised HLPP 2025-2029 (https://www.cgms-info.org/Agendas/WP/CGMS-53-CGMS-WP-27) and provide feedback if/as necessary to cgmssec@eumetsat.int	23 Jun 2025

8. CONFERENCE ANNOUNCEMENTS

CGMS-53-CMA-WP-17 CMA FengYun satellite user's conference/AOMSUC, October 2025

CMA will organise the 15th Asia-Oceania Meteorological Satellite Users' Conference (AOMSUC-15) and the CMA Feng Yun Satellite Users Conference (FYSUC) 26-31 October 2025 in Qingdao, Shandong Province, China.

A training event on satellite data and product utilisation will precede the user conferences and to be concluded with a joint WMO RAII–RAV coordination meeting.

CGMS-53-EUMETSAT-WP-14 EUMETSAT Meteorological Satellite Conference, September 2025

The EUMETSAT Meteorological Satellite Conference will be held in Lyon, France, on 15-19 September 2025, and will focus on space to safety - Earth observation for future weather and climate preparedness.

9. OUTSTANDING MATTERS FOR ENDORSEMENT

9.1 On AI/ML

CGMS-53-CGMS-WP-29 AI proposed undertaking for CGMS-54

WGII presented a proposal for AI undertakings until the next plenary session: To facilitate the use of AI/ML by CGMS contributing agencies and meteorological data users, CGMS shall identify standards for using and converting meteorological EO data into a suitable form for Machine Learning applications. The key elements to be addressed are: Data standards and formats, such as for example the Zarr usage best practices; Most relevant data transformation/representation per measurement type, i.e., remapping, standard vertical grids, etc.; Adoption of standard metadata per measurement type, preferably using CF metadata conventions, i.e., source of the information, AI fused or original data, error characterisation of original and fused data.)

Concluding the item, plenary agreed on the following actions:

CGMS-53 plenary action				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
WGII, WGIV. CGMSSEC	6	53.07	On data curation standards: WGII and WGIV to prepare a survey on standardisation of Earth observation data, including formats like Zarr and metadata per CF conventions, to ensure compatibility with AI and ML for CGMSSEC to circulate to members	Dec 2025, Jan 2026
WGII, WGIV	6	53.07i	On data curation standards: WGII and WGIV to jointly draft standards that will be reviewed at CGMS-54 WGII/WGIV.	Feb 2026, April 2026
WGII, CGMSSEC	6	53.07ii	AI/ML applications catalogue: Centralisation of global AI advancements for community reuse, similar to GitHub repositories. CGMSSEC to circulate a survey on model metadata as prepared by WGII	Dec 2025, Jan 2026
WGII	6	53.07iii	AI/ML applications catalogue: WGII to prepare a first version cataloguing such meta data and present it to CGMS-54.	Feb 2026, April 2026
WGII, SWCG	6	53.07iv	Space weather AI readiness: SWCG and WGII to jointly hold 2–3 online meetings in order to address the prediction of solar flares and coronal mass ejections (CMEs), as well as tackling the challenges associated with real-time forecasting.	Q1 2026, April 2026
IPWG	6	53.07v	AI error propagation framework for precipitation products: IPWG to formulate a methodology to measure the uncertainties caused by AI in operational products.	Q1 2026, April 2026

9.2 CGMS statement to WMO EC-79 - for endorsement

CGMS-53-CGMS-WP-10bis CGMS coordinated statement to WMO EC-79 for plenary endorsement

The coordinated statement was distributed by CGMSSEC during the session and endorsed by the CGMS-53 plenary.

10. FUTURE CGMS PLENARY SESSIONS

Future CGMS plenary sessions

CGMS-53-CGMS-WP-23 **Tentative schedule of future CGMS plenary sessions and announcement of CGMS-54 plenary and working group meetings**

Plenary agreed that the next and 54th plenary session would be held on 2-4 June 2026 to be hosted by KMA, and the preceding working groups will be held on 13-17 April 2026 to be hosted by EUMETSAT in Darmstadt, Germany.

Plenary further noted the tentative schedule for future plenary sessions as follows:

***TENTATIVE* plan for CGMS plenary sessions in the 2024-2033 period**

CGMS plenary #	Year	Location	
CGMS-54 WGs	2026, 13-17 April	Europe	Confirmed!
CGMS-54	2026 2-4 June	South Korea	Confirmed!
CGMS-55	2027	India	
CGMS-56	2028	China	
CGMS-57	2029	WMO	
CGMS-58	2030	Japan	
CGMS-59	2031	North America	
CGMS-60	2032	Europe	
CGMS-61	2033	South Korea	
CGMS-62	2034	Russian Federation	

11. CLOSING SESSION

Handover of CGMS flag

The CGMS flag was handed over from EUMETSAT to the Korean Meteorological Administration, host of CGMS-54.

Closing remarks

The Head of the CGMS Secretariat Phil Evans, EUMETSAT thanked all participants for a very productive and pleasant meeting, expressed his appreciation to the staff from the CGMS Secretariat for the excellent organisation of the session and wished everybody a safe return to their home.

OPENING ADDRESSES

Opening remarks by EUMETSAT Director-General / H/CGMSSEC

(The spoken word prevails).

Good morning, distinguished colleagues, CGMS members, observers, esteemed guests, ladies and gentlemen,

It is my great pleasure to welcome you all to the beautiful town of Evian-les-Bains for the 53rd plenary session of the Coordination Group for Meteorological Satellites.

As explained by the Lord Mayor yesterday, Evian is a city with a culture of diplomacy, bringing people to gather and support initiatives, some of which have changed the history of Europe. Over the next three days, we will engage in vital discussions aimed at strengthening our collaboration to better serve the global user community of the WMO. In a world marked by rapid change and increasing complexity, we thought that bringing CGMS to Evian is an opportunity to demonstrate how we can, all together, sustain globally coordinated weather and climate observations from space that protect our societies. So, from EUMETSAT, welcome in Evian.

Our meteorological community is undergoing profound transformation driven by emerging technologies - on the space side but also with advances in AI and ML - which are revolutionising numerical weather prediction. These innovations present new opportunities for us to deepen cooperation and ensure the continued delivery of high-quality satellite observations that underpin global weather, climate, and Earth monitoring. CGMS must adapt accordingly and reaffirm its role as a cornerstone of this global partnership.

This plenary will also focus on identifying concrete responses from CGMS space agencies to key WMO initiatives, including EW4ALL, G3W, and the ongoing update of the WIGOS Vision. We will also consider inputs from the international science working groups that have convened over the past year.

A particular highlight is the recommendation from the WGClimate GHG Task Team regarding the establishment of a baseline for an operational greenhouse gas observation service - a step forward addressing climate challenges through enhanced satellite monitoring. [TBC on 2 June after the GHG TT meeting].

During this plenary, we will seek your endorsement on several important agenda items across our working groups:

- In WGII, the continuation of the International Earth Surface Working Group (IESWG) and confirmation of the new co-chair.
- In WGIV, the confirmation of the new WGIV co-chair, and updated Terms of Reference.
- In WGIII, a proposal on concluding the first phase of engagement with the private sector and path forward, alongside revisions to the CGMS Baseline and Contingency Plans.

- The Space Weather Coordination Group (SWCG) will also introduce a new co-chair.
- The adoption of the revised High-Level Priority Plan (HLPP) for 2025-2029.

Additionally, we will seek agreement on a common CGMS statement to be delivered at the upcoming 79th session of the WMO Executive Council the week after next.

Thank you.

Opening remarks by WMO Deputy Secretary-General Ko Barret

(The spoken word prevails).

Advancing Together – Satellites for a Safer, Smarter Future

Good morning colleagues,

It's a pleasure to be with you this morning—and to have the chance to recognize the important work we are doing together through the Coordination Group for Meteorological Satellites.

As a founding member of CGMS, the World Meteorological Organization is proud to represent the global community of users who rely on meteorological data and services. We support this effort because we see this partnership as essential.

Every life-saving forecast, every extra moment of early warning, and every insight into our changing planet begins with data that is shared, trusted, and usable across borders and systems.

Over the decades, CGMS has shaped the very backbone of our global observing system. You have worked hand in hand to harmonize meteorological satellite missions—ensuring not only coverage and continuity but also capacity building and training for users across the globe.

This collaboration has transformed forecasting, Earth system monitoring, and disaster risk reduction. Satellite data now accounts for the vast majority of inputs into numerical weather prediction models. The result? Stronger more accurate predictions. Safer communities. And a deeper understanding of our climate system.

But, as our Chair said, the horizon is shifting—and with it, our responsibilities. The private sector is emerging as a powerful actor in space-based observations. This presents both opportunities and complexities. CGMS and WMO must work together to help guide this evolution—ensuring that private-sector data can be integrated without fragmenting the system we've built.

At the same time, we must protect the principle of unrestricted access to core satellite data, as enshrined in WMO's Unified Data Policy. This is not just a technical perogative—in many vulnerable areas, especially in data-sparse regions of the Global South, satellite observations are often the only reliable source of

information. These data are not just inputs for scientific discovery—they are lifelines for equity and resilience.

Colleagues, we meet at a time where we are witnessing the transformative power of Artificial Intelligence. AI is changing the way we model the Earth system—and the way we distill and deliver insights to users. But its promise depends entirely on the quality, quantity, and diversity of the data we provide. In this new era, satellite observations will be more valuable than ever—fuel for an intelligent, responsive forecasting system that can serve, well…humanity.

Exciting times...and CGMS plays a unique and vital role in shaping all of this. Thank you for your continued dedication, collaboration, and commitment to building better systems—for all who rely on them.

I wish you a productive and inspiring meeting—and hope you find a moment to enjoy the natural beauty of Évian.

Thank you.

STATUS OF PLENARY-52 ACTIONS AND RECOMMENDATIONS FOLLOWING CGMS-53 PLENARY

STATUS OF CGMS-52 PLENARY ACTIONS RESULTING FROM CGMS-53 PLENARY DISCUSSIONS

CGMS-52 Plenary Actions

Actionee	AGN item	Action #	Description	Action feedback/closing document	Deadline	Status
CGMS members	2	A52.01	**WIGOS Vision 2040 update:** CGMS members invited to nominate a CGMS representative to the WMO Task Team for the updating of the WIGOS Vision 2040. CGMS members are requested to send nominations to CGMSSEC@eumetsat.int by end June.	07 May 2025 WMO to provide a status and way forward report to plenary CGMS-53-WMO-WP-08, and CGMSSEC will present the plan for a coordinated space agency response to the WIGOS Vision update CGMS-53-CGMS-WP-08 26 Mar 2025 WMO provided a status report to CGMS-53 WGIII, CGMS-53-WMO-WP-05; CGMSSEC proposal CGMS-53-CGMS-WP-13 06 Nov 2024 The CGMS Secretariat is currently represented by Sean.burns@eumetsat.int 27 Jun 2024 NASA nominates Mike Seablom, Associate Director of the Earth System Technology Office in the NASA Earth Science Division (michael.s.seablom@nasa.gov)	30 Jun 2024	CLOSED
CGMS members	5	A52.02	**WG reports to plenary:** Members to provide nominations for the WGI co-rapporteur, WGII co-chair position, and WGIV co-chair in particular, as well as other open positions as per https://www.cgms-info.org/Agendas/WP/CGMS-52-CGMS-WP-11p	12 Jun 2025 Closed at CGMS-53 plenary 3-5 June 2025. Status/updates provided and endorsed by CGMS-53 plenary. Non-represented CGMS members are nevertheless invited to consider supporting the leading entities of the five working groups. 27 Mar 2025 CGMS-53 working groups: WGI co-chair: Sean Burns, EUMETSAT (acting) WGII co-chair: Takuya Sakashita, JMA, recommended to plenary for confirmation. WGIV co-chair: Natalia Donoho, WMO, recommended as co-chair to plenary. SWCG co-chair: James Spann, NOAA, recommended as co-chair to plenary. VLab: CGMS space agency representative: XIAN Di, CMA, nominated to replace Bernie Connell, for plenary endorsement. 26 Feb 2025 The SWCG co-chair Elsayed Talaat, NOAA, has stepped down as co-chair, with James Spann, NOAA, acts as interim. Nominations/elections to be held at the CGMS-53 SWCG. 12 Feb 2025 WGIV IS: WMO has nominated Natalia Donoho as co-chair of WGIV. If confirmed by plenary 53, there will be a need for a new WGIV co-rapporteur (20 Nov 2024 The WGI co-chair, Dohyeong Kim, KMA, has informed the CGMS Secretariat he will need to step down as co-chair). @Sean Burns, EUMETSAT, will support as acting WGI co-chair. 01 Oct 2024 WGII co-chair: Takuya SAKASHITA, JMA, has been nominated as the new co-chair for WGII and will replace Dr JV Thomas, ISRO, over the coming months. Nominations for WGI co-rapporteur and WGIV co-chairs are still outstanding.	30 Jun 2024	CLOSED

CGMS members	4, 8	A52.03	**WGClimate/G3W:** CGMS members to nominate two representatives to take the proposals in https://www.cgms-info.org/Agendas/PPT/CGMS-52-EUMETSAT-WP-13p forward. Following feedback, CGMSSEC will address next steps with WGClimate. (+ need for dedicated intersessional meeting between the CGMS WGs and WGClimate).	03 Jul 2024 Action superseded by events. Simon Elliott, EUMETSAT, nominated as the focal point of contact/lead on WGClimate/GHG TT/G3W/and CGMS operational matters. CGMS-52 plenary endorsed the nomination.	30 Jun 2024	**CLOSED**
CGMS members	8	A52.04	**AI-ML next steps: proposed use cases for CGMS** CGMS members to provide comments and feedback on the proposals in https://www.cgms-info.org/Agendas/PPT/CGMS-52-WGII-WP-04 CGMS members to nominate two focal points of contact as leading entity to pursue this activity. Following feedback, CGMSSEC will address next steps with WGI, WGII and WGIV leading entities.	12 Jun 2025 Closed on the occasion of CGMS-53 plenary 5 June 2025: Closure proposed following the presentations made in CGMS-53 plenary session 6 on AI use cases. https://www.cgms-info.org/agendas/agendas/CGMS-53plenary 21 May 2025 T Nagatsuma, NICT, SWCG co-chair, will make a presentation to plenary on AI and space weather (CGMS-53-SWCG-WP-16) as well as CMA (CGMS-53-CMA-WP-19) and on Agency existing and future uses of AI, ML for pattern recognition in RFI detection and mitigation in remote sensors 07 May 2025 Joe Turk, NASA, IPWG rapporteur will make a presentation to plenary including several agency cases (CGMS-53-WGII-WP-08). 27 Mar 2025 The IPWG made a presentation to CGMS-53 WGII (CGMS-53-IPWG-WP-02) "AI and satellite integration - proposals for CGMS including further analysis from the IPWG, examining the impact of direct satellite data usage in machine learning training" https://www.cgms-info.org/Agendas/GetWpFile.ashx?wid=347d1b7e-4ac2-40d9-9bc0-19cd2e5ee1de&aid=d343a39c-fbdd-4638-97c4-158894dcb97f The SWCG has been tasked to identify an AI/ML use case presentation for plenary. Joe Turk, NASA, IPWG rapporteur to CGMS, nominated as champion.f 25 Feb 2025 Important for members to come forward with nominations to drive this initiative forward.	30 Jun 2024	**CLOSED**

STATUS OF CGMS-52 PLENARY RECOMMENDATIONS RESULTING FROM CGMS-53 PLENARY DISCUSSIONS TO BE CARRIED OVER TO CGMS-53

CGMS-52 Plenary Recommendations				
Leading entities	**AGN item**	**Rec #**	**Description**	**Recommendation feedback/closing document**
CGMS members	WMO MATTERS FOR COORDINATION WITH CGMS SPACE AGENCIES	**R**51.01	Plenary recommended that CGMS members actively support and respond to the WMO strategic initiatives and resolutions, such as EW4ALL, G3W, and Unified Data Policy implementation. (Original recommendation: Plenary recommended that CGMS members actively support and respond to the WMO strategic initiatives and resolutions, such as EW4ALL, G3W, and Unified Data Policy implementation; and asks CGMS space agency members to participate in the upcoming Core Satellite Data Workshop (4-7 December 2023) and WMO Consultative Meetings on High-level Policy on Satellite Matters (Feb 2024).)	12 Jun 2025 Recalled on the occasion of the CGMS-53 plenary 3-5 June 2025 27 Mar 2025 CGMS-53 WGIII, recommendation remains valid. WMO recalls CM-16 on 3-4 March 2026 and the participation of CGMS space agency heads. 04 Jun 2024 https://www.cgms-info.org/Agendas/PPT/CGMS-52-WMO-WP-03p, https://www.cgms-info.org/Agendas/PPT/CGMS-52-WMO-WP-02p Recommendation carried over to CGMS-52 actions and recommendations 09 Apr 2024 Most CGMS members participated in the NWP core satellite data workshop, and CM-15 and provided their inputs to WMO.
CGMS members	WMO MATTERS FOR COORDINATION WITH CGMS SPACE AGENCIES (WGIV/6)	**R**51.02 (WGIV/(P)A50.01)	(Recommendation monitored by WGIV) CGMS members are invited to contact WMO to provide contributions to the WMO VLab Trust Fund to ensure the continuation of technical support to the VLab through the VLab Technical Support Officer as well as to the implementation of VLab projects.	12 Jun 2025 Recalled on the occasion of the CGMS-53 plenary 3-5 June 2025 27 Mar 2025 CGMS-53 WGIII. This recommendation remains valid, and also valid for the WMO space programme trust fund. 04 Jun 2024 https://www.cgms-info.org/Agendas/PPT/CGMS-52-VLab-WP-01p, https://www.cgms-info.org/Agendas/PPT/CGMS-52-GUEST-WP-03 Recommendation carried over to CGMS-52 actions and recommendations

PLENARY-53 ACTIONS AND RECOMMENDATIONS FOLLOWING CGMS-53 PLENARY SESSION

CGMS-53 PLENARY ACTIONS RESULTING FROM CGMS-53 PLENARY DISCUSSIONS

CGMS-53 Plenary Actions						
Actionee	**AGN item**	**Action #**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
WMO, WGClimate GHG TT	4	53.01	WMO and the WGClimate GHG Task Team to work on baseline requirements for operational GHG monitoring (considering requirements for revisiting time (mapping capabilities), product timeliness, and product availability and completeness) that ensures a common understanding of the requirements and can function as a guideline for the utilisation of current and the establishment of future missions including from the commercial sector.		CGMS-54	**OPEN**
WMO, WGClimate GHG TT	4	53.02	WMO and the GHG Task Team capture the requirements of IMEO and other interested applications for methane observations from geostationary orbit. These are necessary to enable an operational implementation by CGMS agencies.		CGMS-54	**OPEN**
CGMS members	4	53.03	CGMS members to provide feedback on the draft common practice document for remote sensing-based estimates of facility-scale emissions to Paul Green (paul.green@npl.co.uk) and John Worden (john.r.worden@jpl.nasa.gov) copy to CGMSSEC@eumetsat.int https://www.cgms-info.org/Agendas/GetWpFile.ashx?wid=46ed374b-19bd-4ea8-92d7-26051665f580&aid=16bce6f8-3abf-44a7-88d2-38abff9bd878 https://www.cgms-info.org/Agendas/GetWpFile.ashx?wid=46ed374b-19bd-4ea8-92d7-26051665f580&aid=bcbf0183-4b5d-4046-be17-e2aa087e84a1	11 Aug 2025 No further feedback received. Action closed. 16 Jun 2025 NASA will provide its input via the WGClimate Chair (from NASA) and to Paul Green/John Worden.	30 June 2025	**CLOSED**
Paul Green, CGMS members	4	53.04	Paul Green to submit the final version of the common practice document for remote sensing-based estimates of facility-scale emissions to CGMSSEC@eumetsat.int for further circulation to and confirmation by CGMS members.	11 Aug 2025 Deadline for full endorsement *moved forward* by GHG TT. E-mail circulated with final version of the document by CGMSSEC on 11 Aug 2025.	18 Aug 2025 ~~1 Oct 2025, 30 Nov 2025~~	**OPEN**

CGMS-53 Plenary Actions						
Actionee	**AGN item**	**Action #**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
WMO, WGClimate GHG TT	4	53.01	WMO and the WGClimate GHG Task Team to work on baseline requirements for operational GHG monitoring (considering requirements for revisiting time (mapping capabilities), product timeliness, and product availability and completeness) that ensures a common understanding of the requirements and can function as a guideline for the utilisation of current and the establishment of future missions including from the commercial sector.		CGMS-54	**OPEN**
WMO, WGClimate GHG TT	4	53.02	WMO and the GHG Task Team capture the requirements of IMEO and other interested applications for methane observations from geostationary orbit. These are necessary to enable an operational implementation by CGMS agencies.		CGMS-54	**OPEN**
CGMS members	4	53.03	CGMS members to provide feedback on the draft common practice document for remote sensing-based estimates of facility-scale emissions to Paul Green (paul.green@npl.co.uk) and John Worden (john.r.worden@jpl.nasa.gov) copy to CGMSSEC@eumetsat.int https://www.cgms-info.org/Agendas/GetWpFile.ashx?wid=46ed374b-19bd-4ea8-92d7-26051665f580&aid=16bce6f8-3abf-44a7-88d2-38abff9bd878 https://www.cgms-info.org/Agendas/GetWpFile.ashx?wid=46ed374b-19bd-4ea8-92d7-26051665f580&aid=bcbf0183-4b5d-4046-be17-e2aa087e84a1	11 Aug 2025 No further feedback received. Action closed. 16 Jun 2025 NASA will provide its input via the WGClimate Chair (from NASA) and to Paul Green/John Worden.	30 June 2025	**CLOSED**
Paul Green, CGMS members	4	53.04	Paul Green to submit the final version of the common practice document for remote sensing-based estimates of facility-scale emissions to CGMSSEC@eumetsat.int for further circulation to and confirmation by CGMS members.	11 Aug 2025 Deadline for full endorsement *moved forward* by GHG TT. E-mail circulated with final version of the document by CGMSSEC on 11 Aug 2025.	18 Aug 2025 ~~1 Oct 2025, 30 Nov 2025~~	**OPEN**

CGMS members	4	53.05	The Chairperson of the 2 June side meeting (joerg.schulz@eumetsat.int) proposed to provide the outline of the updated Global Stock Take (GST) strategy to the CGMS Secretariat by end June. CGMS members will be requested to provide feedback to CGMSSEC by September 2025, confirming if CGMS in principle should join the strategy by formally endorsing it at Plenary level by correspondence by end 2025 (i.e. on the understanding that CEOS SIT concurs to a joint document).	12 Aug 2025 CEOS has informed CGMS that this document will remain a CEOS document rather than a joint CGMS-CEOS document. Action closed. 16 Jun 2025 NASA will respond once the outline is provided.	30 June 2025, 30 Sept 2025	**CLOSED**
IESWG leading entity	5	53.06	On IESWG: IESWG to share with CGMSSEC (for redistribution to CGMS members) the outcome of its June 2025 meeting, incl. updated ToRs, and for further reporting to CGMS-54	(12 Aug 2025 reminder sent to the IESWG leading entity.)	15 Aug 2025, (CGMS-54)	**ONGOING**
CGMSSEC, CGMS members, WGII, WGIV	*6*		*For reference ! See detailed action breakdown further below.* *On AI/ML:* *CGMS Secretariat to survey CGMS contributing agencies. WGII and WGIV to propose initial standards to be presented at CGMS-54* *(To facilitate the use of AI/ML by CGMS contributing agencies and meteorological data users, CGMS shall identify standards for using and converting meteorological EO data into a suitable form for Machine Learning applications. The key elements to be addressed are:* *+ Data standards and formats, such as for example the Zarr usage best* *+ practices Most relevant data transformation/representation per measurement type, i.e., remapping, standard vertical grids, etc.* *+ Adoption of standard metadata per measurement type, preferably using CF metadata conventions, i.e., source of the information, AI fused or original data, error characterisation of original and fused data.)*	*(12 Aug 2025 WGII and WGIV leading entities requested to provide the questions for the survey to CGMSSEC for September.)*	*Autumn 2025* *CGMS-54*	-

WGII, WGIV	6	53.07	On data curation standards: WGII and WGIV to jointly draft standards that will be reviewed at CGMS-54 WGII/WGIV.		Feb 2026, April 2026	***OPEN***
WGII, CGMSSEC	6	53.07i	AI/ML applications catalogue: Centralisation of global AI advancements for community reuse, similar to GitHub repositories. CGMSSEC to circulate a survey on model metadata as prepared by WGII		Dec 2025, Jan 2026	
WGII	6	53.07ii	AI/ML applications catalogue: WGII to prepare a first version cataloguing such meta data and present it to CGMS-54.		Feb 2026, April 2026	***OPEN***
WGII, SWCG	6	53.07iii	Space weather AI readiness: SWCG and WGII to jointly hold 2–3 online meetings in order to address the prediction of solar flares and coronal mass ejections (CMEs), as well as tackling the challenges associated with real-time forecasting.		Q1 2026, April 2026	***OPEN***
IPWG	6	53.07iv	AI error propagation framework for precipitation products: IPWG to formulate a methodology to measure the uncertainties caused by AI in operational products.		Q1 2026, April 2026	***OPEN***
IWWG	5	53.08	IWWG to consider holding a 5th AMV Global Intercomparison Study	To be dealt with in WGII	CGMS-54	**OPEN**
CGMS members		53.09	CGMS members to review the revised HLPP 2025-2029 (https://www.cgms-info.org/Agendas/WP/CGMS-53-CGMS-WP-27) and provide feedback if/as necessary to cgmssec@eumetsat.int	12 Aug 2025 No further inputs received. Action closed. 16 Jun 2025 NASA has no further inputs on the HLPP.	23 Jun 2025	**CLOSED**

CGMS-53 Plenary Recommendations				
Leading entities	**AGN item**	**Rec #**	**Description**	**Recommendation feedback/closing document**
CGMS space agency members	5	R53.01	**On ITWG - instrument disaggregation** As part of future architecture analysis, due attention must be given to ensure that the disaggregation of instruments does not degrade the time/space coincident measurements in different spectral ranges currently found in the backbone missions. Any disaggregation could impede the effectiveness of various meteorological and environmental applications such as for example severe weather nowcasting or large-scale aerosol/ash plume monitoring.	
CGMS members	WMO matters for coordination with CGMS space agencies	R51.01	**WMO initiatives** Plenary recommended that CGMS members actively support and respond to the WMO strategic initiatives and resolutions, such as EW4ALL, G3W, and Unified Data Policy implementation. (Original recommendation: Plenary recommended that CGMS members actively support and respond to the WMO strategic initiatives and resolutions, such as EW4ALL, G3W, and Unified Data Policy implementation; and asks CGMS space agency members to participate in the upcoming Core Satellite Data Workshop (4-7 December 2023) and WMO Consultative Meetings on High-level Policy on Satellite Matters (Feb 2024).)	12 Jun 2025 Recalled on the occasion of the CGMS-53 plenary 3-5 June 202 27 Mar 2025 CGMS-53 WGIII, recommendation remains valid. WMO recalls CM-16 on 3-4 March 2026 and the participation of CGMS space agency heads. 04 Jun 2024 https://www.cgms-info.org/Agendas/PPT/CGMS-52-WMO-WP-03p, https://www.cgms-info.org/Agendas/PPT/CGMS-52-WMO-WP-02p Recommendation carried over to CGMS-52 actions and recommendations 09 Apr 2024 Most CGMS members participated in the NWP core satellite data workshop, and CM-15 and provided their inputs to WMO.
CGMS members	WMO matters for coordination with CGMS space agencies	R51.02	**Contributions to the VLab Trust Fund** (Action to be monitored by WGIV) CGMS members are invited to contact WMO to provide contributions to the WMO VLab Trust Fund to ensure the continuation of technical support to the VLab through the VLab Technical Support Officer as well as to the implementation of VLab projects.	12 Jun 2025 Recalled on the occasion of the CGMS-53 plenary 3-5 June 2025 27 Mar 2025 CGMS-53 WGIII. This recommendation remains valid, and also valid for the WMO space programme trust fund. 04 Jun 2024 https://www.cgms-info.org/Agendas/PPT/CGMS-52-VLab-WP-01p, https://www.cgms-info.org/Agendas/PPT/CGMS-52-GUEST-WP-03 Recommendation carried over to CGMS-52 actions and recommendations

LIST OF PLENARY PARTICIPANTS

CGMS-53 - List of plenary participants		
First name	Last name	Organisation
Mikael	Rattenborg	CGMS Secretariat
Cao	Xiaozhong	CMA
Fang	Xiang	CMA
Xu	Wanzhi	CMA
Tang	Shihao	CMA/NSMC
Xu	Na	CMA/NSMC
Guan	Min	CMA/NSMC
Di	Xian	CMA/NSMC
Zhou	Chen	CMA/NSMC
Murielle	LAFAYE	CNES
Gilles	Brassard	CSA, Canadian Space Agency
David	Harper	ECCC
Christoph	Rüdiger	ECMWF
Marie-Claire	Greening	ESA
Yasjka	Meijer	ESA
Paul	Counet	EUMETSAT
Paolo	Ruti	EUMETSAT
Sean	Burns	EUMETSAT
Jörg	Schulz	EUMETSAT
Robert	Varley	EUMETSAT
Karolina	Nikolova	EUMETSAT
Andrew	Monham	EUMETSAT
Bojan	Bojkov	EUMETSAT
Simon	Elliott	EUMETSAT
Ruediger	Lang	EUMETSAT
Philip	Evans	EUMETSAT/CGMS Secretariat
Anne	Taube	EUMETSAT/CGMS Secretariat
Ashim Kumar	Mitra	IMD
Joe	Turk	IPWG / Jet Propulsion Laboratory, California Institute of Technology
Ulrich	Foelsche	IROWG - University of Graz
Hui	Shao	IROWG/JCSDA
Anthony	Mannucci	IROWG/JPL, California Institute of Technology
Christian	Marquardt	IROWGEUMETSAT
Pradeep	Thapliyal	ISRO

CGMS-53 - List of plenary participants		
First name	Last name	Organisation
Nilesh	DESAI	ISRO
Jayaprakash V	Thomas	ISRO
Reima	Eresmaa	ITWG
Fiona	Smith	ITWG / Bureau of Meteorology
Feng	Lu	IWWG/CMA
Osamu	Ochiai	JAXA
Moeka	Yamaji	JAXA
Kotaro	Bessho	JMA
Kazuki	Yasui	JMA
Takuya	Sakashita	JMA
Wenying	Su	JWGCLIMATE/NASA
Eunha	Sohn	KMA
Kwang Deuk	Ahn	KMA
Yoonjae	Kim	KMA
Maudood	Khan	NASA
Joel	Scott	NASA
Eric	Mcvay	NASA
Sid	Boukabara	NASA
Tsutomu	Nagatsuma	NICT
Steve	Volz	NOAA
Mary Ann	Kutny	NOAA
Mara	Browne	NOAA
Melissa	Andersen Garcia	NOAA
Melissa	Johnson	NOAA
James	Spann	NOAA
James	Donnellon	NOAA
Irene	Parker	NOAA
Beau	Backus	NOAA
Konstantin	Litovchenko	ROSHYDROMET / SRC Planeta
Ko	Barrett	WMO
Heikki	Pohjola	WMO
Natalia	Donoho	WMO
Jesse	Andries	WMO
Nir	Stav	WMO
Gianpaolo	Balsamo	WMO
Albert	Fischer	WMO
Zoya	Andreeva	WMO

CGMS-53 - List of plenary participants		
First name	Last name	Organisation
Rodica	Nitu	WMO
VS	Prasad	NCMRWF
Paul	Green	NPL
Lu	Feng	CMA

Working groups

WG I:	Satellite systems and operations
WG II:	Satellite data and products
WG III:	Operational continuity and contingency planning
WG IV:	Data access and end user support
SWCG:	Space weather coordination group
	Joint WGI-WGIV-SWCG

Satellite systems and operations

WGI REPORT

Co-Chairs: *James Donnellon, NOAA / Sean Burns, EUMETSAT*
Rapporteur: *Karolina Nikolova, EUMETSAT*

1. WGI meeting introduction and expected outcomes

CGMS-53-WGI-WP-01 - WGI meeting introduction by Co-Chairs/Co-Rapporteurs (incl. welcome, meeting agenda, current and future WGI scope within CGMS, latest WGI ToR, overview of Task Groups) (Co-Chairs / Rapporteur)

The WGI Co-Chairs and Rapporteur opened the meeting with a welcome address, re-calling the role of WGI within CGMS, the objectives of WGI, its current structure, and status on WGI Co-Chairs / Co-Rapporteurs.

WGI reviewed and adopted the draft agenda proposed by the CGMS Secretariat prior to the meeting, which is in line with the Terms of Reference for WGI.

WGI welcomed and encouraged nominations for additional Task Group members. The contributions and representation of each agency are valuable for the progress and impact of the CGMS Task Group activities.

WGI included representatives of the satellite operators from CMA, ESA, EUMETSAT, JMA, KMA, NOAA, ROSHYDROMET, and WMO (see CGMS report for full list of participants).

The WGI meeting was hybrid, with in-person participation in Xi'an and also virtual attendance via Webex.

In view of the common items of interest in relation to Space Weather, the representatives of WGI, WGIV, and the Space Weather Coordination Group participated also in the joint WGI-WGIV-SWCG Meeting.

CGMS-52-WGI-WP-02 - Status of WGI Co-Chairs/Co-Rapporteurs Nominations

Following several years of co-chairing WGI, Dohyeong Kim is stepping down from the CGMS WGI Chair position. WGI thanked Dohyeong Kim for his contributions to CGMS and WGI, and wished him all the best in next role.

Sean Burns (EUMETSAT) has been acting as interim WGI Co-Chair.

WGI welcomed nominations for new WGI Co-Chair. Additionally, WGI welcomed nominations for the vacant position of WGI Co-Rapporteur.

CGMS-53-CGMS-WP-01 - WGI expected outcomes (Co-Chairs / Rapporteur)

The WGI Co-Chairs and Rapporteur summarised the expected outcomes and key objectives for the CGMS-53 WGI meeting.

It was recalled that, in line with the recommendation from CGMS-51 WGI, all Task Group should present their:

- Status on current and planned activities
- Up-to-date list of members
- Latest Terms of Reference
- Up-to-date Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis
- Latest version of Best Practices and proposed updates (if any)
- Status of implementation of Best Practices for each agency

Beyond the above reoccurring agenda items, the Task Group present dedicated papers, as required.

The CGMS-53 WGI agenda and expected outcomes have been structured accordingly.

2. Low latency data access

CGMS-52-WGI-WP-03 - Report from the CGMS WGI Task Group on Low Latency Data Access (incl. latest ToR, status on current & proposed/planned activities, and associated future direction themes) (N. Coyne/A. Monham)

The Low Latency Data Access Task Group was formed from the merger of the former Direct Broadcast Task Group and the Coordination of LEO Orbits Task Group.

The LLDA Task Group provides a forum for CGMS agencies to address improving LEO satellite systems low latency data access from both a global and regional perspective, harnessing common emerging technologies and taking account of the evolution of the commercial and agency space systems. It is foreseen that historical boundaries between global and regional mission requirements and architectures may be substantially eliminated.

The Terms of Reference presented at CGMS-52 remain valid.

The document “Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis of Low Latency Data Access from LEO Meteorological Satellites” [CGMS-52-EUMETSAT-WP-13] presented at CGMS-52 requires further analysis through subject matter experts, in order to propose priority areas and concrete steps for demonstrations. The Task Group members are encouraged to engage with the technical /programmatic teams in their respective organisations to report on:

- Identified priorities
- Planned demonstrations of new technologies and operations paradigms
- Expected outcomes in terms of improved low latency data delivery

Members are encouraged to bring back proposals to the Task Group (WGI/A52.02 remains OPEN). The Task Group will then compare and contrast the approaches, assess scope for coordination and report on the expected user value from these plans.

Further analysis of the draft Global LLDA Best Practices revealed further maturation is needed and the way forward on Action WGI/A51.09 is presented separately in "Proposed way forward for LEO Direct Broadcast and coordination of LEO orbits Best Practices" [CGMS-53-WGI-WP-14].

The current status of Task Group membership was provided and includes members from CMA, ESA, EUMETSAT JAXA, JMA, KMA, NASA-GSFC, NOAA. An additional member from ISRO would complement the current composition well.

Compliance with the best practices are covered by the agency's individual reports.

Regarding the progress on identifying actions from SWOT analysis and progressing on future technologies, Sean Burns suggested strongly engaging with research agencies. He also suggested that the SpaceOps conference and IAC conference are a good place and an opportunity to engage with agencies and discuss future technologies, and encouraged participating members to actively seek engagement on these topics during those conferences.

Sean Burns also suggested engaging with DBNet. Mikael Rattenborg noted that DBNet is primarily focused on data access from current satellites, rather than future technologies. It was concluded that at the very least it would be good to occasionally have a DBNet presence/presentation in the CGMS Working Group.

WGI agreed the following action:

CGMS-53 ACTIONS - WGI				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
Mikael Rattenborg	**2.1**	WGI/A53.01	Arrange a DBNet presentation in CGMS-54 WGI.	CGMS-54 WGI

CGMS-53-CMA-WP-01 - Operational Direct Broadcast Systems Status Report & Status of Implementation of Best Practices (CMA) (T. Siwei)

This paper presented the status of Low Latency Data Access and status of implementation of best practices at CMA. All FY3 satellites are either compliant/partially compliant or planned to be compliant with the best practices. Some best practices are not applicable depending on the type of instrument.

CGMS-53-EUMETSAT-WP-01 - Low Latency Data Access status report + status of implementation of best practices (EUMETSAT) (N. Coyne/A. Monham)

This paper presented the status of Low Latency Data Access and status of implementation of best practices at EUMETSAT. The Metop mission is compliant or partially compliant with all of the best practices. The EPS-SG mission is compliant or will be compliant with all of the best practices. The EPS-Sterna mission is compliant or will be compliant with most of the best practices, and some of the aspects of the best practices are still in preparation or under assessment.

Since the reporting in CGMS-52, HIRS instrument turned off on Metop-B. Although it was still active at the time, HIRS was already not providing any valid instrument data. HIRS was turned off on 25th January 2025. Additionally, the physical document TD-18 was removed and the content is now only available online from the user portal.

Sean Burns noted that the current launch date for the Metop-SGA1 satellite, the first of the EPS-SG series, is planned for 12 August 2025. The launch for EPS Sterna is currently planned for 2029.

CGMS-53-NOAA-WP-01 - Low Latency Data Access status report + status of implementation of best practices at NOAA (T. Hutchings)

This paper presented the status of Low Latency Data Access and status of implementation of best practices at NOAA. The POES and JPSS missions are compliant with all of the best practices.

James Donnellon noted that the current POES End of Life is planned for September 2025.

CGMS-53-WGI-WP-14 - Proposed way forward for LEO Direct Broadcast and coordination of LEO orbits Best Practices (A. Monham)

This presentation provides the response to Action WGI/A51.09. Due to the lack of maturity and experience in the implementation of low latency global data access technologies for DB (regional) services, the proposal to merge the LEO (Global) and DB (regional) best practices into a single "Low Latency Best Practices" is considered premature.

It is therefore recommended to close this action with this response and open a new action to report on the status of the global data low latency acquisition best practices at the CGMS-54.

WGI agreed to close Action WGI/A51.09 and agreed to open instead the following new action.

CGMS-53 ACTIONS - WGI				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
LLDA TG	**2.1**	WGI/A53.02	Report on the status of the global data low latency acquisition best practices at the CGMS-54.	CGMS-54 WGI

WGI agreed also the following action:

CGMS-53 ACTIONS - WGI				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
LLDA TG	**2.1**	WGI/A53.03	Review the contents of the Direct Broadcast information on the CGMS website and	CGMS-54 WGI

			update as needed (Direct Broadcast – CGMS – Website).	

3. Space environment sustainability

CGMS-53-WGI-WP-04 - Report from CGMS WGI Task Group on Space Environment Sustainability (A. Monham/Juha-Pekka Luntama)

This document reported on the background, content of the Terms of Reference and progress achieved for the CGMS WGI Task Group on Space Environment Sustainability, relevant to CGMS member current and planned missions.

The CGMS members rely on the sustainability of the space environment to ensure their satellite missions remain able to deliver meteorological and space weather data to global forecasting services. In this regard, safety on Earth is very much intertwined with safety in space. CGMS has therefore established a Task Group on Space Environment Sustainability which shall address all aspects of operations in the space environment where CGMS member coordination can help improve the safety and sustainability of space operations for all space actors. The objectives include establishing best practices covering Space traffic coordination, lifetime extensions, end-of-life disposal and space weather mitigation of risks and effects. It is foreseen that a proposal on acceptable space traffic coordination practices can be submitted for consideration by UN COPUOS.

This Task Group builds upon the preliminary work initiated by its predecessor, the Space Debris and Collision Avoidance Task Group established in 2019, but having lapsed activities since 2022 [“Discussion on future CGMS WGI efforts on Space Debris and Collision Avoidance”, CGMS-51-WGI-WP-07]. Note that activities conducted were at that time limited to bilateral interactions between NOAA and EUMETSAT. CGMS-51-WGI-WP-07 provides the references to the reports issued, including the Terms of Reference. The name of this revived Task Group was changed in recognition of the broader scope of activities, dealing not only with debris but also with safe operations in increasingly congested orbits and additionally taking into account potential impacts from space weather. Furthermore, the objectives and actions from the CGMS Future Directions Project SSA theme were considered in the scope of this Task Group [CGMS-51-CGMS-WP-19].

The Terms of Reference were approved at CGMS-52 and have remained stable. The Terms of Reference is addressed to all CGMS participants and is relevant for all management, engineering and legal functions responsible for ensuring the definition, implementation and operation of CGMS agency space-based systems is compatible with the space environment and its sustainability. The Task Group objectives and activities defined by the Terms of Reference are therefore applicable across all satellite-based programmes in all mission phases.

Membership of the Task Group has gradually increased since CGMS-52 which allows a meaningful exchange to take place. The current status of membership was provided and includes members from CMA, ESA, EUMETSAT, JAXA, KASA, KASI, KMA, NASA, NICT, NOAA, WMO, ISES, SANSA.

In particular, membership with responsibility for space debris mitigation and situational awareness, which has been underrepresented is starting to increase, but would still benefit from additional nominations. Identification of experts from member organisations who can support offline analyses of the Task Group is key to progressing on the objectives of the Task Group and this remains to be achieved.

Due to the scope of the Task Group, a secretarial function supporting the Co-Chairs would be welcomed.

The current top priorities of the Task Group are:

- Produce best / acceptable practices for Space Traffic Coordination (collision avoidance, active on active satellite coordination practices)
- Produce a report of space weather observation requirements for improved STC services and space sustainability
- Review current usage of space weather data for spacecraft operations and goals for improvement

The Task Group achievements on Space Traffic Coordination since CGMS-52 were presented, including:

- Matrices of capabilities in CA/STC exist for LEO, GEO, HEO, Extra-Terrestrial
- Expert, offline analysis to identify commonalities, gaps, potential for improvement
- Assessment on-going of active-on-active conjunction contact points, data formats and 3rd party operator access

The Task Group achievements on Space Weather Requirements supporting Space Traffic Coordination and Safe Spacecraft Operations since CGMS-52 were presented, including:

- Separate matrices for STC and Safety in LEO, GEO (concentrating on LEO, GEO)

On space weather requirements, inputs on the ESA approach have been received so far. Further inputs from agencies are requested.

The Task Group noted that currently good propagation products using space weather inputs come from US 18th Squadron. However, their starting point (knowledge of operator orbit) is based on their own measurements, rather than operator supplied orbit. If the owner/operator orbit and future manoeuvres could be supplied, then the propagation may be more accurate. Task Group members are requested to consider the requirement for this and steps for implementation. It is recommended to follow up with TraCSS (US DoC).

Since CGMS-52, the Task Group has held four intersessional meetings. An additional Task Group meeting prior to CGMS-53 plenary is proposed on 7 May 2025. Five virtual intersessional meetings are proposed in the lead up to CGMS-54. Opportunities for face-to-face discussions as side meeting in other conferences shall also be considered.

Sean Burns suggesting highlight presentations in next year's Task Group intersessionals and CGMS-54 WGs on:

- The overall landscape of work on SES topics and where the CGMS TG on SES fits in it

- Agencies experience and practices on collision avoidance
- Agencies experience and practices on Debris removal

Sean Burns suggested also that Andrew Monham develops a paper on CGMS work on SES for presentation at IAC in 2026.

WGI agreed the following actions:

CGMS-53 ACTIONS - WGI				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
SES TG	**3.1**	WGI/A53.04	Define the requirement for supplying owner/operator orbit and manoeuvre information to TraCCS and identify steps for implementation	CGMS-54 WGI
SES TG	**3.1**	WGI/A53.05	Identify steps to coordinate modelling of thermospheric density impacts and perform inter-comparison of model results	CGMS-54 WGI
SES TG	**3.1**	WGI/A53.06	Discuss in intersessionals and prepare highlight presentations in next year's Task Group intersessionals and CGMS-54 WGs on: • The overall landscape of work on SES topics and where the CGMS TG on SES fits in it. • Agencies experience and practices on collision avoidance • Agencies experience and practice on Debris removal	CGMS-54 WGI
EUM	**3.1**	WGI/A53.07	Develop a paper on CGMS work on SES for presentation at IAC in 2026. (A Monham)	CGMS-54 WGI
SES TG	**3.1**	WGI/A53.08	Review current usage of space weather data for spacecraft operations and goals for Improvement. This action has been transferred from CGMS-52 to WGI (previously SWCG/A51.02).	CGMS-54 WGI
SES TG	**3.1**	WGI/A53.09	Produce a report of space weather observation requirements for improved STC services and space Sustainability. This action has been transferred from CGMS-52 to WGI (previously SWCG/A51.11).	CGMS-54 WGI

4. Satellite Data and Codes

CGMS-53-WGI-WP-05 - Report from the CGMS WGI Task Group on Satellite Data and Codes (incl. latest ToR, status on current & proposed/planned activities) (S. Elliott)

The CGMS Task Group on Satellite Data and Codes has been actively supporting the coordination of work on satellite product format issues within the CGMS community and providing support to the work of WMO's expert teams since its first meeting in 2008.

The Task Group has worked with the WMO Secretariat and the WMO Expert Team on Data Standards (ET-Data) and its Task Team on Table Driven Code Forms (TT-TDCF) on the development of a number of new BUFR encoding sequences and Common Code Table entries. In each case, the Task Group acts as a reference group of experts who are invited to consider and endorse relevant proposals going through WMO's approval process.

The current status of Task Group membership was provided and includes members from CMA, EUMETSAT, JMA, KMA, NOAA, SRC Planeta, WMO. An additional member from ISRO would complement the current composition well.

During the period since CGMS-52, several entries have been defined in Common Code Table C-5 for satellite identifiers, including Loft Orbital YAM Longbow, tomorrow.io 6U CubeSat, GCOM-C, GOSAT-GW, Tianmu-1, NOAA-22, NOAA-23.

During the period since CGMS-52, several entries have been defined in Common Code Table C-8 for instrument identifiers including tomorrow.io instruments (Microwave sounder, Ka band precipitation radar), JAXA instruments (AMSR3), ESA instruments (CO2I, MAP, CLIM).

The Group has continued to encourage WMO to ensure that OSCAR/Space includes references to the Common Code Table entries used for satellite identifiers (table C-5) and instruments (C-8). WMO has made significant progress in this area and the WIGOS Station Identifier is included in WMO OSCAR Space for some satellites, e. g. METEOSAT-10: 0-20009-0-057. The Group will continue to encourage the inclusion of instrument identifiers from C-8.

Some satellite data are now also live on WIS 2.0, including Meteosat-10 SEVIRI images (EUMETSAT pilot node), Metop-B IASI 3D winds (EUMETSAT pilot node), FY-3E GNOS (CMA), INSAT-3DR winds (IMD), S-NPP/NOAA-20/NOAA-21/Metop-B/Metop-C CrIS/IASI full spectral resolution (NOAA/CIMSS).

Between CGMS 53 and CGMS 54, the Task Group will continue their work on coordinating format standardisation for satellite data, following the implementation of WIGOS station identifiers for satellite platforms, and providing subject matter expertise to WMO Expert Teams.

An important task for this period will be working together with the WGI Task Group on Metadata on supporting WMO with the transition to WIS 2.0, and the input to this from the satellite community.
Two intersessional meetings are planned; late September 2025 and early January 2026.

5. Data Collection Services

CGMS-53-WGI-WP-06 - Report from the CGMS WGI Task Group on Data Collection Services (incl. latest ToR, status on current & proposed/planned activities) (N. Coyne)

The paper presents the report from the WGI Task Group on Data Collection Services (DCS).

The creation of the group was endorsed at CGMS-46. The main purpose of the group is to make continued effective progress with DCS activities and issues in the context of CGMS. The first task of the group has been to address the need for and make proposals for a new IDCS DCP standard, the development of DCS best practices for common DCS data access mechanisms and DCP certification, as well as the inclusion of CGMS DCS webpage.

The Task Group on DCS, consisting of DCS Managers from each of the satellite operators, have met virtually as part of the WGI Intersessional meetings, but also face-to-face in the context of other already scheduled DCS-related meetings. Specifically, since CGMS-52, the group has held regular intersessional meetings with a monthly frequency due to the discussions on the Enhanced DCP standard and a summer/winter pause. For the Enhanced DCP, a face-to-face meeting in Washington in October 2024 was held with participation from EUMETSAT, NOAA, and manufacturers (Microcom, OTT, AEM).

The current status of Task Group membership was provided and includes core members from EUMETSAT, JMA, NOAA. Additionally, representatives from Aerospace Corporation, ESA, Roshydromet and WMO are included on the mailing list. An additional member from ISRO would complement the current composition well.

Since CGMS-52, the discussions of the Enhanced DCP (EDCP) standard have continued and the EDCP standard is a major topic for the group. The Task Group has planned a 4-phased approach to develop and progress with the EDCP Implementation. The items in phase 4 can be worked on independently of the other phases.

- Phase A: The new modulation standards BPSK at 400 baud and QPSK at 800 baud would be introduced along with the forward error correction elements. It would not include any modifications to the DCP header to introduce some of the items that had been discussed previously, these would be in done in phase D.
- Phase B: Certification of EDCP as defined in phase A.
- Phase C: Operations of new standard.
- Phase D: Addition of new headers to EDCP standard and other enhancement which will require new processing updates and also modifications on the user side.

There is currently no method to collectively provide resources to a common plan for this project through CGMS. In the absence of this mechanism, but noting the significant value in an EDCP standard, EUMETSAT and NOAA have proceeded with the development of general plan that relies on individual efforts at each agency. JMA has stated that there is no incentive or reason to extend its functionality and fund the new

EDCP standard (Ref “Report of the 52nd Plenary Session of the Coordination Group for Meteorological Satellites” Section 7.3). This precludes the EDCP standard from being used as global international standard. The benefits of the EDCP for DCP robustness and moving platform suitability mean that even without the international aspect the EDCP standard is still of great benefit to the users.

The group has made good progress with the EDCP implementation plan since CGMS-52:

- NOAA has incorporated the EDCP standard into ongoing communication protocol efforts. This is significant because it highlights the value of the CGMS Task Group’s collaboration in that even without resources, sharing information can assist in standardising activities that may benefit other groups.
- In a free and open exchange of information with all DCP manufacturers and DCP operators, NOAA has been able to incorporate feedback into current efforts for developing and testing the EDCP standard.
- Microcom has updated software for GOES DCS-based ground infrastructure and demonstrated a prototype of the 400 baud EDCP standard during the face-to-face meeting on 25 October 2025.
- Microcom is now developing the 800 baud capability with plans to port this software to an existing DCP and conduct testing through April 2025, which is very promising.

The prototype is being developed from the standard that was endorsed in CGMS-52. It can already be seen that it may be necessary to relax the standard and target 350 and 700 baud to ensure the standard fits into a 1.5 kHz bandwidth.

EUMESAT is now investigating how they may incorporate similar updates to their system for the same purpose. This ongoing effort will be subject to the associated risk of relying on individual agency resources, but the Task Group remains optimistic that the DCP Standard represents a transformational capability to improve and expand the capabilities of DCS operations within the timeline established by the group.

The current revised schedule for the EDCP looks as follows:

- 2025
    - Confirm the project funding plan – addressed with this paper
    - Produce and test a prototype transmitter
    - Modify one of the receive sites to enable the reception of the EDCP - Microcom receivers are now compliant. EUMETSAT to be confirmed.
    - Test the system and verify the performance of the prototype and ensure it covers the different modes
- 2026
    - Certify the EDCP transmitters from the manufacturers
    - Modify the reception systems of all agencies
    - Test the reception for all agencies and satellites
- 2027
    - Declare EDCP operational

The previous SWOT analysis of the Task Group identified five topics to be worked on. Their current status is as followed:

- **RFI Mitigation**
  - Existing electromagnetic radio, increased use of the spectrum, and spectrum sharing are the sources of current and potential RFI. One of the dilemmas facing DCS operators is that sources of interference may originate from various terrestrial or space-based locations and in different frequency bands. Traditionally, the burden of identifying the impact of RFI, the location of RFI, the mitigation of RFI and removal of RFI, if possible, is the responsibility of the operator. In many cases, locating RFI on a hemispheric level is extraordinarily challenging due to available resources. Furthermore, reporting RFI to a regulatory agency requires that the report specifies the location. Thus, without a location the RFI cannot be reported and may not be considered for purposes of broader RFI awareness.
  - The Task Group on DCS has collaborated with the Task Group on RFI to discuss this issue and have determined that an RFI Register would be an appropriate method to document existing RFI issues being experienced by CGMS DCS operators. The first DSC RFI Register is enclosed with this report, and moving forward, it will be constantly updated and shared with the Task Group on RFI.

- **Joint DCS PR Materials** - The group published the DCS Handbook. This will be republished to reflect the EDCP standard and also to detail the changes for the users perspective from the migration to WIS 2.0.

- **DCS Introduction video -** No progress.

- **Manufacturers workshop** – The Task Group has involved the manufacturers in the EDCP project and has been working closely with them. Not only has the Task Group moved forward with the EDCP, but also established a closer relationship with the manufacturers. The Task Group proposes to ensure that all agencies are invited to each other's workshops.

- **Discoverable information improvements** – No progress.

The group has an additional proposal on scintillation. A study conducted by researchers at Boston College Institute for Scientific Research and supported by NOAA, looked at the feasibility of using DCS signal data to detect and study Ionospheric Scintillation (IS). GNSS radio occultation data is traditionally used for this purpose, so employing a DCS to investigate this phenomenon is a novel approach. The preliminary results of this research are favourable that in addition to traditional data relay services, a DCS can be used as an ionospheric scintillation sensor and potentially provide scientifically useful signal information to build prediction models. Positives for employing a DCS in this manner are that the UHF band is more sensitive to scintillation than GNSS, transmitters are globally distributed, and DCS infrastructure is distributed around the globe. On the negative side the transmissions from traditional DCS users are quite short and infrequent. Longer transmissions from better defined data platforms may be needed to develop the

requisite signal data for detailed analysis. Modifying ground demodulation systems to account for signal characteristic during a broadcast and deploying new or using current DCP platforms is a fairly straightforward process. Costs are somewhat mitigated by fact that they are primarily associated with software implementations in the ground system and that new dedicated data collection platforms would not need the addition of environmental sensors. This topic should be of interest to groups dealing in space weather, particularly ionospheric scintillation, given that the preexisting DCS infrastructures provide significant data gathering potential. The DCS task group proposes to look into this topic and provide more information to CGMS on its potential and detailing a way forward.

A related paper on "Gannon Storm Scintillation Observations via the NOAA Data Collection System" has been included for reference [CGMS-53-WGI-WP-06ii].

CGMS WGI agreed the following actions:

CGMS-53 ACTIONS - WGI				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
DCS TG	**5.1**	WGI/A53.10	Further investigate the Ionospheric Scintillation and its potential use with DCS transmissions	CGMS-54 WGI
DCS TG	**5.1**	WGI/A53.11	Share the information/paper on scintillation with WGII and SWCG.	CMGS-54 WGI
DCS TG	**5.1**	WGI/A53.12	Identify best opportunity to hold a DCS workshop (consider e.g. MTI Expo, NOAA conference).	CMGS-54 WGI
DCS TG	**5.1**	WGI/A53.13	EUMETSAT and JMA to analyse the use of monitoring NOAA has put in place on RFI.	CMGS-54 WGI

An update on the Smallsat project was presented:

- **Smallsat project introduction and purpose:** NOAA and EUMETSAT, with JMA observing, demonstrated the operational use of the Data Collection System (DCS) by a LEO satellite, identifying its operational purpose and potential benefits. The successful launch and testing have determined that DCS can support satellites equipped with a DCS transmitter and thus provides an alternate approach for smallsats to use the UHF band in a shared manner with other DCS users.

- **TechEdSat-11 and Testing:** Since its successful launch on 4 July 2024, TechEdSat-11 has successfully transmitted DCS messages from a LEO platform, demonstrating interoperability with various DCPRs, specifically on GOES-E, GOES-W, Meteosat-10 and Meteosat-12. The satellite completed validation testing and achieved its project goals, including reliable message transmission and coordination with GOES and Meteosat DCPRs. Based on that success, the project is deemed to be operationally viable.

- **Mission Success and Achievements:** TES-11 achieved full success criteria by transmitting messages to multiple DCPRs, with performance meeting, and in some instances exceeding, mission goals. The satellite demonstrated long-duration error-free message transmission and reception, showing the ability to receive well at low power.

- **Challenges and Observations:** An unusual effect of "ghosting" and "smearing" of received transmissions has been observed, likely due to Doppler differences between the spacecraft and the Earth. This effect was not observed in ground receptions and is believed to be caused by signal reflections from the Earth's atmosphere or water.

- **Smallsat project Conclusion and Future Steps:** Satellite use of DCS has been successfully validated both conceptually and operationally. One more satellite is planned for launch this summer as TES-16. This satellite will be like TES-11, though larger (12U) than TES-11 (6U). TES-16 will use the new EDCP standard and offer an opportunity to test multi-satellite access to DCS. Next steps also include determining the policy and regulations for satellite use of DCS by respective organizations and the Coordination Group of Meteorological Satellites.

The Task Group has reviewed the current Best Practices on DCS and has identified no necessary updates ("Best practices in support to DCP TX certification process" and "Best Practices in support to DCP data access").

CGMS-53-EUMETSAT-WP-04 - Operational DCS status report incl. EDCP implementation plans + status of implementation of best practices (EUMETSAT) (N. Coyne)

This paper presented status of the EUMETSAT Data Collection Services (DCS) [CGMS-53-EUMETSATWP-03]. These are currently supported Meteosat-12 (MTG) at 0° and Meteosat-9 at 45.5°E (MSG). MTGI1 took over the 0° DCS service on 25 January 2025.

The paper detailed the channel utilisation, DCP allocation, geographical distribution and DCP data dissemination mechanisms. The DCS is one of the core services operated by EUMETSAT in support of meteorology and weather prediction.

The EUMETSAT DCS currently supports both standard-rate (100bps) and high-rate (1200bps) DCPs. The prime IODC application is for the Indian Ocean Tsunami Warning Network (IOTWS). As of 10 February 2025, there are a total of 1819 DCPs allocated, with 537 actively transmitting. Out of those DCPs allocated, 743 are HRDCPs transmitting at 1200 bps (716 supported by Meteosat-10 at 0° and 27 by Meteosat-9 at 45.5°E). The remaining 1076 are Standard Rate DCPs (942 supported by Meteosat-12 (MTG) at 0° and 134 by Meteosat-9 (MSG) at 45.5°E). The EUMETSAT DCS had a reliability greater than 99% during the reporting period (from 1 January 2024 to 31 December 2024).

EUMETSAT has begun the preparations for the migration of the DCS data to WIS 2.0. The migration is planned to take place in early Q3 2025.

The paper included the EUMETSAT status of implementation of the CGMS Best Practices in support to DCP Transmitter Certification Process (EUM/CGMS/DOC/21/1252912). EUMETSAT is compliant with all of the best practices, apart from having an interactive online registration process for manufacturer certification. The paper included the EUMETSAT status of implementation of the CGMS Best Practices in support to DCP Data Access (EUM/CGMS/DOC/21/1252911). EUMETSAT is compliant with all of the best practices, apart from offering tailoring features via the web service, making all DCS data available to users of the web service, and making DCS documentation easily accessible via the web service. A new version of the EUMETSAT DCS web service is planned that is expected to address the data tailoring and data access documentation best practices.

CGMS-53-ISRO-WP-01 - Operational DCS status report incl. EDCP implementation plans + status of implementation of best practices (ISRO)

This paper presented the status of the ISRO Data Collection Services (DCS), currently supported by The Geostationary Satellites INSAT-3DR, INSAT-3DS and GSAT-17, carrying Data Relay Transponder (DRT) in UHF x C band, operating at 74E, 82E and 93.5E respectively. ISRO/India has launched INSAT-3DS satellite as a replacement of INSAT-3D on February 17, 2024. The payloads are operating in the 402 MHz band for uplink and 4.5 GHz band for downlink. These help in collecting real-time data for meteorological, hydrological and oceanographic applications, from automatic data collection platforms (DCP).

DRTs are supporting about 1200 Automatic Weather Stations and 64 Automatic Tide Gauges, ~600 terminals for Water recourses, ~100 terminals of Snow and Avalanche Study, 50 terminals for environment radiation monitoring, 375 terminals for Moored Buoy data collection, 15 terminals for Tsunameter. About 20000 terminals are for Distress Alert Transmitter.

350 more AWS terminals are planned for Snow & Avalanche study. 50 more terminals are also planned for radiation monitoring.

CGMS-53-JMA-WP-02 - Operational DCS status report incl. status of implementation of best practices (JMA)

The Japan Meteorological Agency (JMA) has operated the Data Collection System (DCS) since its first Geostationary Meteorological Satellite (GMS) went into operation in 1978.

The system plays important roles in collecting meteorological information as well as seismic intensity and tidal/tsunami data collaborating with the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS). In Japan, more than 400 data collection platforms (DCPs) collect seismic intensity data. Himawari-8's DCS has been operational since July 2015, and Himawari-9 took over the DCS service in 2022 and will continue in this role until 2029.

In the last years a number of DCPs stopped using DCS and transitioned to private services (8 tidal DCPs in 2024).

As of February 2025, the following DCPs are supported:

- 154 for surface meteorological observation
- 55 for tidal/tsunami (UNESCO/IOC)
- 370 for seismic intensity in Japan
- 8 for mobile surface meteorological observation in Japan

The Agency has decided that the planned Himawari-10 program set to replace Himawari-8/9 will assume the same DCS. Related discussions at CGMS WGI are expected to be helpful for future Himawari-DCS.

The paper included the JMA status of implementation of the CGMS Best Practices in support to DCP Transmitter Certification Process (EUM/CGMS/DOC/21/1252912). JMA is compliant with all of the best practices.

JMA does not require certification for DCP transmitter manufacturers, so the CGMS Best Practices in support to DCP Data Access (EUM/CGMS/DOC/21/1252911) are not relevant.

Sean Burns encouraged further discussion on the topic of future Himawari-DCS within the Task Group.

CGMS-53-NOAA-WP-02 - Operational DCS status report incl. EDCP implementation plans + status of implementation of best practices (NOAA) (W. Dronen)

The GOES DCS is an environmental data relay system that supports the collection of over one million message per day from over 33,000 active Data Collection Platforms (DCPs) throughout the Western Hemisphere. The GOES DCS Program has 721 user agency agreements representing 50 countries. Use of GOES DCS continues to expand, with system growth remaining around 2% per year. Data Collection Platforms have transitioned to Communication Standard (CS) 2, 84% of messages are now CS2.

Some examples of organisational use of DCS were presented, including:

- U.S. Forest Service & multiple international agencies
- Chilean Navy, Caribbean Tsunami Warning Center
- Alaska Avalanche Info Ctr, Idaho Transportation Dept
- NOAA National Weather Service U.S. Geologic Survey
- U.S. Army Corps of Engineers
- U.S. Bureau of Reclamation, Int'l Boundary & Water Commission
- Brazil Climate and Water, Nat' Met Service of Belize
- DCP Manufacturers, Researchers

Human-caused Radio Frequency Interference (RFI) remains a persistent problem. Solar Maximum and Space Weather (Ionospheric Scintillation) have impacted system performance for some users. Locating interference sources can be problematic and prevent official reporting to regulatory agencies. Improved awareness through use of an Interference Register is recommended.

Collaborations with CGMS has resulted in progress exploring more robust communication protocols and an Enhanced Data Collection Platform (EDCP) Standard that may benefit all DCS operators. The EDCP

Standard and other initiatives in progress at NOAA offer potential to improve system performance and mitigate external factors impacting GOES DCS such as radio frequency interference (RFI).

The following NOAA initiatives to improve system performance are planned:

- Communication Protocol Improvements including the Enhanced DCP Standard. Reed-Solomon Encoding at 400bps and 800bps have been developed and are in testing. The project will continue in 2025.
- The GOES DCS IT System is being modernized. Initial communication ingest (demodulation direct to cloud services) and prototype user/platform management interfaces have been developed in the NOAA.
- Common Cloud Framework (NCCF). System delivery September 2026.
- Data Collection Platform Commanding (DCP)
- Remote platform configuration changes. IT system changes are in place on the legacy system, a prototype command modulator was tested in March 2025. DCP receiver and other reference designs will be delivered in April 2025.

The GOES DCS has implemented all applicable Best Practices that can be employed on the current system. Any minor differences in Best Practices are related to the existing concept of operations for GOES DCS and NOAA's data delivery model.

CGMS-53-ROSHYDROMET-WP-01 - Operational DCS status report incl. EDCP implementation plans + status of implementation of best practices (ROSHYDROMET)

This document addresses the current status and technical specifications of the Russian data collection system and related future plans. The DCS is established to provide collection and distribution of meteorological data from the remote areas and to support natural hazards warning system. Roshydromet has developed and deployed the national DCS based on geostationary meteorological satellites Electro-L N2, N3 and N4 (14.5W, 76E, 165.8E) with a backup option via Luch series communication satellite and highly elliptical orbit satellites Arctica-M N1 and N2. There are 696 DCPs currently deployed. DCPs are distributed all over the Russian territory, including 141 DCPs in hard-to-reach areas. The Russian DCS will be further complemented with the launch of geostationary Electro-L N5 satellite.

6. Frequency management

CGMS-53-CGMS-WP-02 - Report on frequency management related topics (incl. SFCG, WMO, ITU, etc) (M. Dreis)

The report provided an overview on the outcome of the following meeting/conferences on issues of interest to CGMS:

- 43rd annual meeting of the Space Frequency Coordination Group (SFCG), 4-12 June 2024;
- 6th meeting of WMO Expert Team on Radio Frequency Coordination (ET-RFC), 26-28 February 2025.

Issues worth noting by CGMS WGI that were discussed and progressed at SFCG-43 and/or the 6th meeting of the WMO ET-RFC are the following:

- Update of remote sensing information in OSCAR and general proposals for modifications to the database from SFCG to WMO;
- Presentation of the activities of WGI TG on RFI detection, monitoring and mapping to SFCG.
- Long term continuity in information/knowledge transfer/exchange between SFCG and CGMS, including WMO, on frequency management topics of common interest (Action Item: WGI/A52.01).
- Progress in SFCG and WMO on their objectives/positions for WRC-27 agenda items of interest/concern to CGMS (as listed in the HLPP).

Markus Dreis invited CGMS to note the report and:

- Provide feedback and information on its activities via the CGMS/SFCG Liaison Officer to SFCG-44 (June 2025) on any frequency-related matters.
- Respond to the question from WMO ET-RFC regarding potential prioritisation of WRC-27 agenda items included in the HLPP from operational perspective of MetSat systems.

7. RFI detection, monitoring and mapping

CGMS-53-WGI-WP-07 - Report from the CGMS WGI Task Group on RFI detection, monitoring and mapping (incl. latest ToR, status on current & proposed/planned activities) (B. Backus)

In CGMS-52, WGI tasked the Task Group on RFI detection, monitoring and mapping to continue pursuing the establishment of a proposed set of best practices for CGMS-53 based on the common aspects of the approaches already adopted by members and to explore the potential / existing uses of AI/ML and pattern recognition in RFI detection. This paper outlined the Task Group status, described its activities in the past year and the plans for the coming period.

In the discussion, updated Terms of Reference are recommended, in order to reflect most recent status.

CGMS-53-WGI-WP-08 - Proposed best practice on RFI detection, monitoring and mapping – for review/consideration (B. Backus)

International radio regulations contain frequency ranges where radio frequency transmissions are not allowed, although it is possible that excessive anthropogenic energy may be present regardless, such as 5G mentioned earlier. Adjacent frequency band services often have regulatory limits regarding the level of out-of-band emissions that are allowed from those services that may fall into a nearby passive band. As current and future telecommunication services, satellite and broadband-aviation uplinks in millimeterwave bands are implemented, there are potential interference risks to passive sensors, to include operational microwave sensors used by Earth observation satellite systems. This interference could degrade the data used by Numerical Weather Prediction (NWP) Models and other applications, with resulting accuracy degradation. The current impact is somewhat limited, but there is significant potential for increased impact as technology advances. It is desired that members of CGMS formulate a

comprehensive long-term solution through best practices to efficiently and adequately handle radio frequency interference as public demand, new technology system needs, and passive instrument technologies continue to evolve.

This RFI "best practice" includes a focus on passive band Radio Frequency Interference (RFI) due to the aggregation of multiple sources of RFI, such as from 5G, where the level of RFI increases over time from a negligible to an insidious and finally to an obvious level of RFI.

The summary of proposed best practices is as follows:

- BP.01: Select frequencies, considering the level of regulatory protection
- BP.02: Set / update theoretical protection requirements and establishment of regulatory limits to be protected from RFI as globally as possible
- BP.03: Define hardware and software for RFI detection
    - BP.03A: Detection mechanisms for known and unknown RFI
    - BP.03B: RFI direction through sensor technology
- BP.04: RFI detection through dedicated instruments or satellites/constellations (either develop payloads/missions dedicated to RFI detection or procure RFI information from commercial sector)
- BP.05: Map, monitor and report RFI

As mass market RF intensive applications approach, reach, or even exceed the tolerable numbers of deployment for those applications, sophisticated monitoring processes and systems will be needed for determining and monitoring where RFI occurs:

- Consideration must be given to the aggregate level of RFI that may originate from one service with many transmissions at the same time and in the same area or from several different radio services.
- As the data are acquired by a global network of sensors on meteorological satellites, exchanged and fed into global forecast models, also the threshold selection should ideally be decided collectively by the international partners for global consistency.
- Standards relevant to remote RF passive sensors do not currently exist for measuring, evaluating, and mitigating RFI affecting spaceborne Earth observation satellites.
- Remote passive sensor design, development and implementation should consider RFI detection and mitigation as an aspect of their system design.

In other words, some key takeways:

- RFI is increasing globally over time.
- RFI progresses from undetectable to insidious to blatant.
- Insidious RFI causes unnoticed data corruption.
- Monitoring RF-intensive applications is crucial.
- Building RFI measurement records is necessary.
- Long-term RFI trend observations are essential.

WGI was invited to recommend to CGMS-53 Plenary the endorsement of the "CGMS Agency Best Practices for RFI Detection, Monitoring, and Mapping for Remote Passive Sensors".

Sean Burns noted the excellent work of the RFI Task Group. WGI agreed to present to plenary the work to CGMS-53 Plenary as a "Guidance report on RFI Detection, Monitoring, and Mapping for Remote Passive Sensors", alongside a recommendation to work with the Task Group to analyse the report. Sean suggested that the presentation to Plenary should be split into blocks relevant to the different actors, so that it can be distributed further.

Sean asked about the involvement of development agencies. Some participation from development agencies in the Task Group intersessionals, but the resource investment required in order to progress this topic is beyond the capacity of the Task Group.

Sean suggested a Task Group intersessional meeting ahead of CGMS-53 Plenary, in order to work on framing a report for CGMS-53 Plenary. The report should include concrete information on support/decisions needed by CGMS-53 Plenary.

WGI agreed the following action:

CGMS-53 ACTIONS - WGI				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
LLDA TG	**7.2**	WGI/A53.14	Prep a "Guidance report on RFI Detection, Monitoring, and Mapping for Remote Passive Sensors" for CGMS-53 Plenary. Include clear blocks relevant to different actors to ease further distribution. Include concrete information on support/decisions needed by CGMS-53 Plenary.	CGMS-Plenary

CGMS-53-WGI-WP-15 - Status of exploring uses of AI/ML and pattern recognition in the area of RFI detection (B. Backus)

Radio Frequency Interference (RFI) poses a growing threat to various fields, degrading signal quality and system performance. Traditional RFI detection and mitigation methods are often insufficient in complex environments. Artificial Intelligence (AI) and Machine Learning (ML) offer promising solutions through advanced algorithms capable of detecting, classifying, and mitigating interference. AI/ML techniques, including supervised and unsupervised learning, reinforcement learning, and deep learning, are being utilized for RFI detection, classification, and mitigation through adaptive filtering, dynamic spectrum access, and cognitive radio. Applications span Earth observation, enhancing satellite imagery, and wireless sensor networks, improving reliability and energy efficiency. While challenges exist, including data scarcity, dynamic RF environments, computational complexity, model interpretability, and adversarial attacks, ongoing research in transfer learning, few-shot learning, and explainable AI is addressing these

issues. For organizations like the CGMS Agencies, AI/ML-driven RFI solutions are crucial for ensuring the accuracy and reliability of meteorological data, protecting investments in satellite technology, and fostering international cooperation in spectrum protection.

The following is a summary of how AI, ML, and Pattern Recognition contribute to RFI detection and mitigation:

- Automated Detection: AI/ML algorithms can analyse vast amounts of data from meteorological satellites to automatically detect RFI, even when it is weak or intermittent. This is crucial because traditional methods can be time-consuming and may miss subtle interference.
- RFI Identification: Pattern recognition techniques can be used to identify the sources of RFI by analysing the characteristics of the interference signals. This helps in mitigating the interference at the source.
- Real-time Mitigation: AI/ML can enable real-time mitigation of RFI by dynamically adjusting satellite receivers or filtering out interference from the data. This ensures minimal impact on data quality.
- Prediction: Machine learning models can be trained to predict when and where RFI is likely to occur, allowing for proactive mitigation strategies.
- Data Quality Improvement: By effectively detecting and mitigating RFI, AI/ML helps to significantly improve the quality and reliability of meteorological satellite data.

By embracing AI, ML, and pattern recognition, CGMS members can enhance their ability to detect and mitigate RFI, ensuring the continued success of meteorological satellite missions and the availability of high-quality data for critical applications.

8. WGI coordination Items

8.1 Antenna arraying techniques for LEO missions

CGMS-53-WGI-WP-09 - Antenna arraying techniques for LEO missions (X. Enrich)

The purpose of this working paper was to propose to CGMS to engage a discussion on antenna arraying techniques for future missions.

This position paper was submitted by EUMETSAT ahead of the CGMS-53 working group and plenary sessions, with the objective to trigger reactions from CGMS members and to organise a discussion on this topic firstly in the CGMS-53 WGI meeting and secondly during the CGMS-53 plenary.

In 1996 EUMETSAT agreed to establish its first EUMETSAT Polar System Programme (EPS). The space segment consisted of three Metop satellites accommodating the payload instruments with an expected operational lifetime of approximately 14 years (5 years of operations per satellite, with an overlap period of six months).

In 2014 the EPS-SG Programme was approved. The baseline configuration for the EPS-SG mission is a dual spacecraft configuration (Metop-SG A and Metop-SG B) with an instrument complement to be split over

both Metop-SG spacecraft. Although the baseline assumption is that each spacecraft in the programme will be launched independently, both satellites of the dual configuration will be operated simultaneously in the same orbit, at defined relative phases in the orbit.

In 2025, EUMETSAT is about to embark on its first spacecraft constellation under the umbrella of the EPS-Sterna programme. The initial nominal configuration will consist of a total of six satellites in three orbital planes. The EPS-Sterna satellites will be deployed in three different sun-synchronous orbital planes, chosen to be complementary to EPS-SG, the JPSS satellites and Chinese FY-3 satellites, in order to maximise the constellation performance in terms of "time to achieve 90% global coverage".

Most agencies involved in Earth observation activities and/or responsible for weather and climate monitoring may have had similar roadmaps in terms of spacecraft set-up.

Whilst in 1996 EUMETSAT's main focus on ground stations was finding suitable sites offering existing infrastructure, optimum coverage, simultaneous tracking and data acquisition of multiple spacecraft was only an emerging need. In fact, at that time, the proposed technical solution was to provision for dedicated antennas and acquisition chains for the morning and for the afternoon spacecraft. In other words, a backup "facility" was identified as mandatory to guarantee the security of the mission and the continuity of the service.

Today, the landscape looks somehow different. Prime and back-up ground stations cannot simply follow the logic used back in 1996.

The question arises of how CGMS can help define ground station networks in support of operational meteorological programmes so that they are sustainable and cost effective. CGMS member agencies are vital actors in establishing international collaboration whilst fostering best practices and technology advances when defining new ground stations networks.

A number of challenges/opportunities for CGMS were presented:

- Data recorded on-board the spacecraft (and constellations) throughout their orbits will be transmitted to dedicated polar ground stations in the northern and southern hemisphere. This should allow provision of calibrated data with global coverage in less than a few hours. If observations from other satellites from other agencies are combined, timeliness and quality are expected to be increased. At least two new elements have been incorporated into the discussion: Mandatory presence in the northern and southern hemisphere and (simultaneous) data acquisition from several satellites in visibility from the same site.
- These new needs generate a set of challenges for the ground segment and, in particular for ground stations: expansion of the ground station infrastructure; reduction of development times; improvement of timeliness for data delivery; maximisation in the use/reuse of assets; management of interrelations with other programmes (including other agencies) and cost contention.
- In view of such challenges, the current approach for the procurement of new ground segments and, in particular of new ground stations, might need to be revisited. New technologies providing

responses to the emerging needs may need to be considered and further analysed. Ground stations comprising multi-beam antennas (e.g. electronically steer phased array antennas) might help reducing the number of assets at a given site whilst increasing the number of spacecraft serviced by each single antenna.

The impact on CGMS activities it that there is a need to:

- Consider medium- and long-term impacts on planning and implementation of new ground station networks in the frame of sustainability and costs;
- Consider benefits from new antenna technologies to satellite operators in CGMS member agencies; and
- Synergies with other associated themes/areas of CGMS.

A number of possible Short-, medium- and long-term goals for CGMS were presented for consideration and further discussion.

Sean Burns asked how close this technology is to being operational. Xavier explained that this technology is mature in L-band and in use in the area of defence. It needs to be discussed what frequencies are of interest and to be analysed. An obvious use would be the use for payload data reception. ESA have also invested in starting to look at using this technology in S-band, but this is further away in maturity.

Andrew Monham noted that the SWOT analysis of the Task Group on LLDA considers antenna arraying techniques, so engagement on this topic withing the LLDA TG would be good.

CGMS-53-NOAA-WP-04 - Antenna arraying techniques at NOAA (S. Leonard)

The purpose of this working paper was to provide a high-level overview of NOAA/NESDIS related activities centred on the adoption and utilization of antenna arraying techniques.

This position paper was submitted by NOAA/NESDIS ahead of the CGMS-53 working group and plenary sessions, with the objective to trigger reactions from CGMS members and to organize a discussion on this topic firstly in the CGMS-53 WGI meeting and secondly during the CGMS53 plenary.

NOAA's National Environmental Satellite, Data, and Information Service (NESDIS), provides secure and timely access to global environmental data and information from satellites and other sources to promote and protect the nation's security, environment, economy, and quality of life.

The NESDIS mission entails ownership and operation of current LEO satellite missions (NOAA-20 and -21) as well the provision of operational coverage for multiple other US Government and International partnership missions to include (EPS-SG, Jason-3, Suomi NPP, DMSP, EWS-G, others). Future planning encompasses continued LEO operational support for current and anticipated follow-on NESDIS (NEON) and partnerships missions such as EPS-Sterna. The expectation is that support to a growing proliferated LEO (pLEO) environment will necessitate changes to ground system components to accommodate increasing support requirements in a cost efficient and low latency manner.

To the end, NOAA/NESDIS has been investigating advances in antenna arraying techniques to evaluate the value proposition and business case for adoption and utilization of antenna arrays. NESDIS has utilized expanded and non-traditional market research techniques to understand the development trajectory of current commercial industry capabilities for Electronically Scanned Arrays (Passive and Active), Digital Beam Forming and Hybrid Antenna Arrays. NOAA/NESDIS conducted a Cooperative Research and Development Agreement (CRADA) with L3Harris in 2023 to perform an extensive demonstration of its Multi-Band Multi-Mission Digital Beamforming (DBF) Phased Array Antenna System (DPAAS). NESDIS has also completed commercial market research through multiple Broad Agency Announcements (BAAs) and Requests for Information (RFI). The composite of this research has allowed NESDIS to evaluate and assess antenna arrays across multiple aspects to include:

- Cost benefit analysis
- Potential Adoption On-Ramp timelines
- Technology Readiness Level (TRL) for deployment
- Scalability to support future proliferated LEO operational coverage

NESDIS continues to monitor Antenna Arraying technology development with current market research efforts that may include additional CRADAs and/or demonstrations of hybrid phased arrays.

8.2 Outcome of the latest CGMS Risk Assessment Workshop and any implementation aspects for WGI)

CGMS-53-WGIII-WP-02WGI - Status and outcome of the 7th CGMS risk assessment (M. Johnson)

The objective of the Risk Assessment Workshop is to:

- Update the CGMS Baseline based on member inputs;
- Prepare a consolidated Risk Assessment against the CGMS Baseline;
- Identify contingency actions to be taken, or actions to identify in the HLPP;
- Identify ways to integrate satellite data into the CGMS Baseline and characterise CGMS' contribution.

WGI reviewed the draft update of the CGMS Risk Assessment.

The CGMS baseline document updates [CGMS-53-WGIII-WP-01WGI] and CGMS contingency plan editorial updates [CGMS-53-WGIII-WP-11WGI] were provided for information.

8.3 CGMS High Level Priority Plan (incl. review, status of implementation, proposed updates)

CGMS-53-CGMS-WP-07WGI - Status of implementation of CGMS High Level Priority Plan (2024-2028) (M. Rattenborg)

This working paper provided the status of implementation of CGMS High Level Priority Plan (2024-2028). It also listed proposals for changes to the HLPP targets. WGI reviewed and provided inputs to the current status of the HLPP.

CGMS-53-CGMS-WP-04 - Revised HLPP 2025-2029 - for recommendation to plenary (M. Rattenborg)

WGI provided inputs for updates to the relevant sections of the HLPP.

8.4 WGI action items and recommendations (incl. review/updates of existing and proposed new action items and recommendations)

CGMS-53-WGI-WP-10 - Status review of CGMS-52 actions and recommendations, and any CGMS-52 plenary actions relevant to WGI (Co-chairs / Rapporteur)

WGI discussed the actions and recommendations from previous CGMS plenary sessions (CGMS-52 and earlier). The status of the open actions on and recommendations for WGI were reviewed and updated.

CGMS-53-WGI-WP-11 - Review of any new WGI actions resulting from CGMS-53 (Co-chairs / Rapporteur)

WGI reviewed the actions resulting from CGMS-53 WGI and updated them with inputs from participants as needed.

8.5 Future WGI sessions (incl. dates for future plenary and intersessional meetings, proposals for new agenda items)

CGMS-53-WGI-WP-12 - Decision on dates on WGI intersessional activities in 2025-2026 (CGMS-53 to CGMS-54) (for discussion) (Co-chairs / Rapporteur)

The paper guided the discussion on planning the dates and formats of the WGI activities between CGMS-53 and up to and including CGMS-54.

WGI agreed on the WGI and Task Group intersessional meeting dates up to CGMS-54.

CGMS-53-CGMS-WP-12, CGMS-53-CGMS-WP-14WGI - Status of co-chairs/rapporteurs of the CGMS working groups, CGMS International Science Working Groups, VLab, and other groups (for recommendation to plenary)

A paper on the status of co-chairs, rapporteurs, and representatives at meetings was provided for information.

9. Election of co-chair

Nominations for co-chair were welcomed again, in time for CGMS-53 Plenary.

10. Any other business

11. Meeting Conclusions

CGMS-53-WGI-WP-13 - Agreement on outcomes, conclusions & preparations of WGI report for plenary (Co-chairs / Rapporteurs)

The WGI Co-Chairs and Co-Rapporteur thanked the WGI meeting participants for their valuable contributions to a successful meeting.

The outcomes and conclusions of the meeting were reviewed against the expected outcomes presented in the beginning of the meeting. The expected WGI outcomes were achieved.

LIST OF WGI ACTIONS

Actionee	AGN item	Action #	Description	Action feedback/closing document	Deadline	Status	HLPP ref
TGRFI	3.1	WGI/A51.04	Analyse the inputs provided by CMA, EUMETSAT, KMA and NOAA on spectrum concerns and activities on RFI detection, monitoring and mapping, and pursue the establishment of a draft set of best practices, based on the common aspects of the approaches already adopted by members.	**2025 Mar 25 (WGI): WGI agreed to present to plenary the work to CGMS-53 Plenary as a "Guidance report on RFI Detection, Monitoring, and Mapping for Remote Passive Sensors" for information / analysis** 2025 Feb 11: Best practice will be presented in WGI meeting. 2024 Nov 26: Best Practices for RFI. The group has determined that 2 BPs are needed - passive sensor RFI (which will be addressed in BP being worked on at the moment) + active sensors (which will be addressed in a future BP) 2024 Apr 22 (WGI): The draft best practice was presented and well received. The completed best practice will be presented for endorsement in CGMS-53. 2024 Mar 15: Best Practice preparation progressing, to be finalised after intersessional on 26 March. 2024 Jan 24: A draft Best Practice is being prepared and will be presented to WGI in April. 2023 Sep 26: Action on this will be taken following first TG on RFI intersessional, expected in October 2023.	CGMS-53 Plenary	**OPEN**	2.2.3
TGRFI	3.1	WGI/A51.05	Explore the potential / existing uses of AI/ML and pattern recognition in the area of RFI detection	**2025 Mar 25 (WGI): WGI agreed to present to plenary "Agency existing and future uses of AI, ML for pattern recognition in RFI detection and mitigation in remote sensors" for information / analysis** 2025 Feb 11: Progress will be presented in WGI meeting. 2024 Nov 26: AI/ML use in RF interference, detection and mitigation. A draft document has been started. It would be beneficial here to explore what each agency is already working on, that can tie into this topic. E.g. Scott Leonard is working on related topics. 2024 Apr 22 (WGI): The group will place more focus on this action in the lead up to CGMS-53. Markus highlighted that uses of AI/ML may be relevant for RFI management in view of large constellations. 2024 Jan 24: To be discussed in more detail in next intersessional. 2023 Sep 26: Action on this will be taken following first TG on RFI intersessional, expected in October 2023.	CGMS-53 Plenary	**OPEN**	

SFCG Rep	2.1	WGI/A52.01	Identify mechanisms to ensure long term continuity in information/knowledge transfer/exchange between SFCG and CGMS, including WMO, on frequency management topics of common interest.	**2025 Mar 25 (WGI): The role of the CGMS-SFCG Liaison Officer in exchanges between CGMS/SFCG/WMO was recalled. No need has been identified to change this mechanism. Markus will continue to cover this role. Action closed.** 2025 Feb 11: Markus will continue to be the SFCG Representative reporting updates to CGMS. Markus will include in his report some information SFCG – CGMS channel and how the SFCG Rep acts as a link.	CGMS-53	**CLOSED**	
LLDA TG	5.5	WGI/A51.09	Merge the LEO (Global) and DB (regional) best practices into a single "Low Latency Best Practices" document proposed to be structured as follow:	**2025 25 Mar (WGI): WGI agreed to close Action WGI/A51.09 and agreed to open instead the following new action to "Report on the status of the global data low latency acquisition best practices at the CGMS-54." (WGI/A53.02)**	CGMS-52	**CLOSED**	2.3.3

LLDA TG	5.5	WGI/A51.09	Merge the LEO (Global) and DB (regional) best practices into a single "Low Latency Best Practices" document proposed to be structured as follow: · Common BPs for both regional and global missions · BPs specific for DB · BPs specific for global mission Present the merged BPs for endorsement to CGMS-52.	**2025 25 Mar (WGI): WGI agreed to close Action WGI/A51.09 and agreed to open instead the following new action to "Report on the status of the global data low latency acquisition best practices at the CGMS-54." (WGI/A53.02)** 2025 Feb 11: Keep global and regional separate, and keep global in draft. 2024 Nov 26: 2 Combining Best practices for global + low latency BPs. There's a bit of pushback to combine these. It may need to be reassessed whether these two BPs are merged. Andy will come to WGI with a proposal to the next intersessional, and discuss way forward for the BPs. 2024 9 Sep: In progress, The concept of merging the best practices is under discussion. 2024 Apr 22 (WGI): A draft was presented to CGMS-52. TG will continue work on the merged best practices in the lead up to CGMS-53 and present them for endorsement in CGMS-53. Once endorsed, the agencies can begin to present on their status against the updated best practices in CGMS-54. In CGMS-53, EUMETSAT would already present against the proposed merged best practices, to serve as a template for all agencies in CGMS-54. 2024 Mar 15: Draft will be presented to CGMS-52 WGs, final iteration will be presented to CGMS-53. *2024 Jan 24: First draft under preparation – ongoing.* 2023 Sep 26: Work underway.	CGMS-52	**CLOSED**	2.3.3

LLDA TG	5.6	WGI/A52.02	Identify concrete CGMS actions based on the LLDA SWOT, including priority areas and demonstration cases in agencies. E.g. cloud, TT&C, relation with private sector, etc.	***2025 Mar 25 (WGI): Members are encouraged to bring back proposals to the Task Group. Action remains open. The Task Group will then compare and contrast the approaches, assess scope for coordination and report on the expected user value from these plans.*** *2025 Feb 11: List of questions will be sent to TG members to stimulate inputs ahead of the WGI* *2024 Nov 26: Identify concrete actions from SWOT analysis. Overlap with Future Directions themes on technological considerations being reviewed (with Kathryn Shontz, although she is moving into a new role, to be replace Chris O'Connors). Andy and Nick will work out how to prepare for next intersessional and how to progress on this, and how to bring Chris into this. It has also been realised that within the organisations, there's activities ongoing, that can be linked to this. An effort should be / is being made to collect information from within the organisation.* *2024 9 Sep: In progress. Plan is to contact future programmes. NOAA point of contact on programme side needed.*	CGMS-54	**OPEN**	

TG on Space Environment Sustainability	5.1	WGI/A50.07	Deliver a Best Practice document on Space Environment Sustainability, with supporting presentation to CGMS WGI, for recommendation for endorsement in CGMS-52.	***2025 Mar 25 (WGI): Remains open for delivery of first Best Practices document at CGMS-54*** 2025 Feb 11: Same status as 26 Nov 2024. High level input on BPs provided by several agencies, but experts need to be identified to provide further inputs. 2024 Nov 26: Too early to deliver a Best Practice. Still working on gather critical mass for inputs from all agencies. A report on the activities will be included in the TG Report. 2024 Apr 22 (WGI): To be developed in the lead up to CGMS-53. 2024 Mar 15: Target continues to be CGMS-53. 2024 Jan 24: The TG activities are starting and ToR being prepared, but best practice will not be ready for CGMS-52. Target would be CGMS-53. *2023 26 Sep: Action on this will be taken following first intersessional of the TG (expected November 2023).* 2023 24 Apr (CGMS-51 WGI): Action to be kept open, and pursued by TG in the lead up to CGMS-52. This should be based	CGMS-54	**OPEN**	2.6.2
				on previous inputs from EUMETSAT and NOAA, and seek wider participation from CGMS agencies. 2023 21 Mar: No updates, way forward to be discussed in CGMS-51 WGI. 2023 24 Jan: No updates. Tom will follow up with Brian Walling. 2022 27 Sep: Task Group meeting to be held			

TG SDC, WMO	WGIV/5	WGIV/A49.02	The CGMS Task Group on Satellite Data and Codes to work closely with WMO on addressing the following points: i. Linking between OSCAR/Space and the WSI and/or CCT C-5 identifiers (WMO internal) ii. Potential extension of the use of the Issue Number in the WSI for satellites in order to explicitly indicate metadata which are otherwise only implicitly embedded in the Local Identifier (CGMS-50) iii. Identification of when and how the WSI should be included in the satellite products exchanges in the context of the WIGOS (CGMS-50) (ref CGMS-49-WMO-WP-08)	***25 March 2025 (WGI): Action not reviewed*** 2024 Nov 26: Visible progress on WMO OSCAR. WIGOS station identifiers have been included for satellites on WMO OSCAR (not for all satellites, but for some). 2024 9 Sep: Work in progress. Implemented, but not yet on the operational server. Some testing is still pending. 2024 Apr 22 (WGI): C-5 identifiers completed, C-8 identifiers in progress. 2024 Jan 24: Ongoing 2023 26 Sep: Well in progress. Should be implemented before INFCOM-3. Submission expected to INFCOM-3 in April 2024. 2023 24 Apr (CGMS-51 WGI): Action is progressing and expected to be closed soon. 2023 21 Mar: No update 2023 24 Jan: Simon is in discussion with Heikki, who is working on this. Progress on this action will be reported in the TGSDC report for CGMS-51. 2022 27 Sep: First intersessional meeting was held in September 2022. Participation was very low. Broader participation in intersessional meetings is encouraged, but communication is handled also via offline email communication. CGMS-50: The Task Group is continuing to work on the use of WIGOS Station identifiers for satellite products. CGMS-50-CGMS-WP-14 includes text prepared by WMO Secretariat for the guide on the WIGOS explaining the use of WIGOS Station Identifiers for satellites. The Task Group continues to assess the best use the Issue Number (currently fixed to 0) in the future. 2022 11 Apr: Transferred to WGI. To be discussed with WMO (Simon, Chair, to follow up). WMO will first complete the ongoing WSI for satellites design and documentation in WIGOS Guide and its implementation in OSCAR/Space. CCT-C5 will be tentatively covered by that work. 2022 18 Jan: WMO to address latest on 27 October, ongoing work, done through WGI	CGMS-53 WGI	**OPEN**	2.4

TG on DCS	5.1	WGI/A49.03	Analyse existing DCP standards taking into account user feedback, and propose a common standard that could be used as a future IDCS standard. This would be an evolution of an existing standard. Following approval of the new EDCP standard, develop an implementation plan including prototyping, validation and outreach to users.	***2024 Apr 22 (WGI): The EDCP Standard proposal was presented. WGI agreed to present the draft EDCP Standard, prototype development and related funding requirements for endorsement by CGMS-52 Plenary, noting that the report would need further work in the lead up to CGMS-52 Plenary to further detail the use cases for the new EDCP (not related to international use), as well as how this new standard would be introduced into operations (e.g. alongside or in addition to existing standards, as well transition plans). If this is endorsed by CGMS-52 Plenary, this action will be closed and a new action will be opened to track the development of the EDCP prototype.*** 2024 Mar 15: EDCP Standard progressing. To be finalised after final intersessional on 28 March. 2024 Jan 24: A draft EDCP Standard document has been prepared and sent for review. To	CGMS-52 Plenary	**CLOSED**	2.1.2

				be discussed in upcoming intersessional on 25 Jan. NOAA and EUMETSAT looking into funds for prototype. FTS may also support the activity. 2023 26 Sep: Progressing well. Microcom and Sutron have been joining DCS intersessionals, which contributes to the definition of the standard. 2023 24 Apr (CGMS-51 WGI): Action description updated. The plan is for the new EDCP standard to be proposed for endorsement in CGMS-52. 2023 21 Mar: Progress has been made and will be presented as part of the task group report. The main topic for WGI will be how to move forward. 2023 24 Jan: DCS Workshop in October 2022, in conjunction with Satcom Forum. Some progress has been made on EDCP Standard discussions. A further Manufacturers workshop was held on 19 January to continue the EDCP Standard discussions. OTT, Microcom and Dr. Paul Crawford were present. This involved also a discussion on whether there is still the need for the EDCP standard, and the feedback was positive. Target is to have a draft outline and timeline for the EDCP standard for CGMS-51.		

DCS TG	7.2	WGI/A52.03	Work on the five proposals for DCS improvements based on the SWOT analysis, including work with RFI Task Group and DCS RFI register, DCS promotional materials presenting global view of DCS, improved DCS outreach via DCS introduction video, further work on EDCP standard, improvements to DCS user information across agencies.	***25 Mar 2025 (WGI): Progress on several of the proposals. EDCP standard progressing well. WIS2.0. DCS RFI register enclosed in the DCS TG Report. In terms of PR materials, the DCS Handbook will be updated and republished to reflect EDCP standard and No progress on DCS introduction video and discoverable information.*** 11 Feb 2025: Ongoing, but difficult in terms of group resources. 26 Nov 2024: Progressing well with Enhanced DCP Standard. Progress to be reported in WGI.	CGMS-54	**OPEN**	
DCS TG	7.2	WGI/A52.04	Propose an interagency approach for DCS data access via WIS 2.0. Review also related changes to the Data Access Best Practice document.	***25 Mar 2025 (WGI): Discussions have taken place on the implementation on WIS 2.0 for DCS and also making and attempt to have a consolidated interagency report. Nothing concrete has been decided yet. EUMETSAT has not migrated to WIS 2.0. This is expected in Q3 2025.*** 11 Feb 2025: Same status as 26 Nov 2024. 26 Nov 2024: Early discussions. Wouldn't be in a position to have a separate report / BP by CGMS-53 WGI. Update on WIS 2.0 discussions in context of DCS will be included in the DCS TG report.	CGMS-54	**OPEN**	
DCS TG	7.2	WGI/A52.05	Present an overview of the various applications of DCS known across CGMS Operators.	***25 Mar 2025: Same status as 26 Nov 2024.*** 11 Feb 2025: Same status as 26 Nov 2024. 26 Nov 2024: Has not been started yet. Attempt will be made to include something in DCS TG report, but EDCP is focus.	CGMS-54	**OPEN**	

DCS TG	7.11	WGI/A52.06	The Task Group on DCS Satellite Operators to report on how their policies affect the usage of Smallsat.	***25 Mar 2025:* Small sat progresses but the group is not in a position to cover this action yet. Some aspects are covered in section 8 of TG report.** 11 Feb 2025: Same status as 26 Nov 2024. 26 Nov 2024: Two aspects: 1. UHF spectrum used by DCS is allocated only for ground-to-space agreement and space-to-ground, but not space-to-space (which is what Smallsat uses). If CGMS agrees this should be pursued, then this can be done via SFCG. 2. Each agency has use of conditions of DCS. Need to describe how these affect Smallsat, e.g. do policies have anything against it.	CGMS-54	**OPEN**	
DCS TG	7.11	WGI/A52.07	The Task Group on DCS to work on DCS Handbook updates related to Smallsat, EDCP, international DCP capability, scintillation.	***26 Mar 2025 (WGI): Same status as 26 Nov 2024 and 11 Feb 2025.*** 11 Feb 2025: The IDCS guide update would need to go hand in hand with DCS Handbook update. 26 Nov 2024: Still too early to include something on Smallsat in the DCS Handbook, as Smallsat is not operational yet and more work to be done on defining possible use cases. Another Smallsat launch planned in 2025 and actions on clarifying policies. DCS Handbook updates can be made for CGMS-54 earliest.	CGMS-54	**OPEN**	

WGI Co-Chairs / Rapporteur / WGI Task Group Chairs	1.1	WGI/A51.01	Propose an updated WGI Terms of Reference, based on the CGMS Future Directions Project outcomes and inputs from the WGI Task Groups, to be presented for endorsement to CGMS-52. The WGI Terms of Reference will be based on inputs from the WGI Task Groups on their latest Terms of Reference.	***2024 9 Sep: The WGI Terms of Reference were endorsed by CGMS-52 Plenary. Action closed.*** 2024 Apr 22 (WGI): WGI approved the updated WGI Terms of Reference. A summary will be presented to CGMS-52 Plenary for endorsement. 2024 Mar 15: Draft reviewed in WGI intersessional on 15 March. Draft will be presented in CGMS-52 WGI. 2024 Mar 15: Draft reviewed in WGI intersessional on 15 March. To be presented to CGMS-52 WGs. 2024 Jan 24: Updated ToR to be presented in WGI in April. Draft to be distributed beforehand. 2023 26 Sep: Sean and Karolina will prepare WGI ToRs, with inputs from the TG ToRs and support from TG Chairs.	CGMS-52	**CLOSED**	
CGMS Members	5.1	WGI/A50.08	All CGMS Members involved in spacecraft operations are strongly encouraged to nominate participants for the CGMS WGI Task Group on **Space Environment Sustainability**. The names of nominated participants are to be provided to the Task Group lead and CGMS WGI Co-chairs / rapporteur before CGMS-51 Plenary, so that the names of members can be reported to CGMS-51 plenary. This is to allow the formulation of the initial Best Practice on collision avoidance and debris mitigation before CGMS-52.	***25 Mar 2025: Membership of the Task Group has gradually increased since CGMS-52 which allows a meaningful exchange to take place. Action closed.*** 2024 9 Sep: Call for membership was made in CGMS-52 Plenary. TG Chairs to report on current needs of membership within the Task Groups. 2024 Apr 22 (WGI): A formal call for membership will be made by WGI in CGMS-52 Plenary. 2024 Mar 15: Andy sent out an email to CGMS WGI, Plenary, SWCG mailing lists. We should continue to encourage membership in WGs and Plenary. 2024 Jan 24: Andy Monham will send out to CGMS mailing lists with a call for members, including CGMS plenary. 2023 26 Sep: There is also a CGMS plenary action on this. Sean/Karolina to follow up with Anne to communicate to all CGMS members and encourage participation.	CGMS-52	**CLOSED**	2.6.2

Actionee	AGN item	Action #	Description	Action feedback/closing document	Deadline	Status	HLPP ref
TGRFI	3.1	WGI/A51.04	Analyse the inputs provided by CMA, EUMETSAT, KMA and NOAA on spectrum concerns and activities on RFI detection, monitoring and mapping, and pursue the establishment of a draft set of best practices, based on the common aspects of the approaches already adopted by members.	**2025 Mar 25 (WGI): WGI agreed to present to plenary the work to CGMS-53 Plenary as a "Guidance report on RFI Detection, Monitoring, and Mapping for Remote Passive Sensors" for information / analysis** 2025 Feb 11: Best practice will be presented in WGI meeting. 2024 Nov 26: Best Practices for RFI. The group has determined that 2 BPs are needed - passive sensor RFI (which will be addressed in BP being worked on at the moment) + active sensors (which will be addressed in a future BP) 2024 Apr 22 (WGI): The draft best practice was presented and well received. The completed best practice will be presented for endorsement in CGMS-53. 2024 Mar 15: Best Practice preparation progressing, to be finalised after intersessional on 26 March. 2024 Jan 24: A draft Best Practice is being prepared and will be presented to WGI in April. 2023 Sep 26: Action on this will be taken following first TG on RFI intersessional, expected in October 2023.	CGMS-53 Plenary	**OPEN**	2.2.3

TGRFI	3.1	WGI/A51.05	Explore the potential / existing uses of AI/ML and pattern recognition in the area of RFI detection	**2025 Mar 25 (WGI): WGI agreed to present to plenary "Agency existing and future uses of AI, ML for pattern recognition in RFI detection and mitigation in remote sensors" for information / analysis** 2025 Feb 11: Progress will be presented in WGI meeting. 2024 Nov 26: AI/ML use in RF interference, detection and mitigation. A draft document has been started. It would be beneficial here to explore what each agency is already working on, that can tie into this topic. E.g. Scott Leonard is working on related topics. 2024 Apr 22 (WGI): The group will place more focus on this action in the lead up to CGMS-53. Markus highlighted that uses of AI/ML may be relevant for RFI management in view of large constellations. 2024 Jan 24: To be discussed in more detail in next intersessional. 2023 Sep 26: Action on this will be taken following first TG on RFI intersessional, expected in October 2023.	CGMS-53 Plenary	**OPEN**	

LLDA TG	5.6	WGI/A52.02	Identify concrete CGMS actions based on the LLDA SWOT, including priority areas and demonstration cases in agencies. E.g. cloud, TT&C, relation with private sector, etc.	***2025 Mar 25 (WGI): Members are encouraged to bring back proposals to the Task Group. Action remains open. The Task Group will then compare and contrast the approaches, assess scope for coordination and report on the expected user value from these plans.*** *2025 Feb 11: List of questions will be sent to TG members to stimulate inputs ahead of the WGI* *2024 Nov 26: Identify concrete actions from SWOT analysis. Overlap with Future Directions themes on technological considerations being reviewed (with Kathryn Shontz, although she is moving into a new role, to be replace Chris O'Connors). Andy and Nick will work out how to prepare for next intersessional and how to progress on this, and how to bring Chris into this. It has also been realised that within the organisations, there's activities ongoing, that can be linked to this. An effort should be / is being made to collect information from within the organisation.* *2024 9 Sep: In progress. Plan is to contact future programmes. NOAA point of contact on programme side needed.*	CGMS-54	**OPEN**	

TG on Space Environment Sustainability	5.1	WGI/A50.07	Deliver a Best Practice document on Space Environment Sustainability, with supporting presentation to CGMS WGI, for recommendation for endorsement in CGMS-52.	***2025 Mar 25 (WGI): Remains open for delivery of first Best Practices document at CGMS-54*** 2025 Feb 11: Same status as 26 Nov 2024. High level input on BPs provided by several agencies, but experts need to be identified to provide further inputs. 2024 Nov 26: Too early to deliver a Best Practice. Still working on gather critical mass for inputs from all agencies. A report on the activities will be included in the TG Report. 2024 Apr 22 (WGI): To be developed in the lead up to CGMS-53. 2024 Mar 15: Target continues to be CGMS-53. 2024 Jan 24: The TG activities are starting and ToR being prepared, but best practice will not be ready for CGMS-52. Target would be CGMS-53. *2023 26 Sep: Action on this will be taken following first intersessional of the TG (expected November 2023).* 2023 24 Apr (CGMS-51 WGI): Action to be kept open, and pursued by TG in the lead up to CGMS-52. This should be based on previous inputs from EUMETSAT and NOAA, and seek wider participation from CGMS agencies.	CGMS-54	**OPEN**	2.6.2

TG SDC, WMO	WGIV/5	WGIV/A49.02	The CGMS Task Group on Satellite Data and Codes to work closely with WMO on addressing the following points: i. Linking between OSCAR/Space and the WSI and/or CCT C-5 identifiers (WMO internal) ii. Potential extension of the use of the Issue Number in the WSI for satellites in order to explicitly indicate metadata which are otherwise only implicitly embedded in the Local Identifier (CGMS-50) iii. Identification of when and how the WSI should be included in the satellite products exchanges in the context of the WIGOS (CGMS-50) (ref CGMS-49-WMO-WP-08)	***25 March 2025 (WGI): Action not reviewed*** 2024 Nov 26: Visible progress on WMO OSCAR. WIGOS station identifiers have been included for satellites on WMO OSCAR (not for all satellites, but for some). 2024 9 Sep: Work in progress. Implemented, but not yet on the operational server. Some testing is still pending. 2024 Apr 22 (WGI): C-5 identifiers completed, C-8 identifiers in progress. 2024 Jan 24: Ongoing 2023 26 Sep: Well in progress. Should be implemented before INFCOM-3. Submission expected to INFCOM-3 in April 2024. 2023 24 Apr (CGMS-51 WGI): Action is progressing and expected to be closed soon. 2023 21 Mar: No update 2023 24 Jan: Simon is in discussion with Heikki, who is working on this. Progress on this action will be reported in the TGSDC report for CGMS-51. 2022 27 Sep: First intersessional meeting was held in September 2022. Participation was very low. Broader participation in intersessional meetings is encouraged, but communication is handled also via offline email communication.	CGMS-53 WGI	**OPEN**	2.4

DCS TG	7.2	WGI/A52.03	Work on the five proposals for DCS improvements based on the SWOT analysis, including work with RFI Task Group and DCS RFI register, DCS promotional materials presenting global view of DCS, improved DCS outreach via DCS introduction video, further work on EDCP standard, improvements to DCS user information across agencies.	***25 Mar 2025 (WGI): Progress on several of the proposals. EDCP standard progressing well. WIS2.0. DCS RFI register enclosed in the DCS TG Report. In terms of PR materials, the DCS Handbook will be updated and republished to reflect EDCP standard and No progress on DCS introduction video and discoverable information.*** 11 Feb 2025: Ongoing, but difficult in terms of group resources. 26 Nov 2024: Progressing well with Enhanced DCP Standard. Progress to be reported in WGI.	CGMS-54	**OPEN**	
DCS TG	7.2	WGI/A52.04	Propose an interagency approach for DCS data access via WIS 2.0. Review also related changes to the Data Access Best Practice document.	***25 Mar 2025 (WGI): Discussions have taken place on the implementation on WIS 2.0 for DCS and also making and attempt to have a consolidated interagency report. Nothing concrete has been decided yet. EUMETSAT has not migrated to WIS 2.0. This is expected in Q3 2025.*** 11 Feb 2025: Same status as 26 Nov 2024. 26 Nov 2024: Early discussions. Wouldn't be in a position to have a separate report / BP by CGMS-53 WGI. Update on WIS 2.0 discussions in context of DCS will be included in the DCS TG report.	CGMS-54	**OPEN**	

DCS TG	7.2	WGI/A52.05	Present an overview of the various applications of DCS known across CGMS Operators.	***25 Mar 2025: Same status as 26 Nov 2024.*** 11 Feb 2025: Same status as 26 Nov 2024. 26 Nov 2024: Has not been started yet. Attempt will be made to include something in DCS TG report, but EDCP is focus.	CGMS-54	**OPEN**	
DCS TG	7.11	WGI/A52.06	The Task Group on DCS Satellite Operators to report on how their policies affect the usage of Smallsat.	***25 Mar 2025:* Small sat progresses but the group is not in a position to cover this action yet. Some aspects are covered in section 8 of TG report.** 11 Feb 2025: Same status as 26 Nov 2024. 26 Nov 2024: Two aspects: 1.UHF spectrum used by DCS is allocated only for ground-to-space agreement and space-to-ground, but not space-to-space (which is what Smallsat uses). If CGMS agrees this should be pursued, then this can be done via SFCG. 2.Each agency has use of conditions of DCS. Need to describe how these affect Smallsat, e.g. do policies have anything against it. • The above two aspects will be covered in the DCS TG Report in WGI, with a proposal for next steps.	CGMS-54	**OPEN**	

DCS TG	7.11	WGI/A52.07	The Task Group on DCS to work on DCS Handbook updates related to Smallsat, EDCP, international DCP capability, scintillation.	***26 Mar 2025 (WGI): Same status as 26 Nov 2024 and 11 Feb 2025.*** 11 Feb 2025: The IDCS guide update would need to go hand in hand with DCS Handbook update. 26 Nov 2024: Still too early to include something on Smallsat in the DCS Handbook, as Smallsat is not operational yet and more work to be done on defining possible use cases. Another Smallsat launch planned in 2025 and actions on clarifying policies. DCS Handbook updates can be made for CGMS-54 earliest.	CGMS-54	**OPEN**	
Mikael Rattenborg	**2.1**	WGI/A53.01	Arrange a DBNet presentation in CGMS-54 WGI.	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
LLDA TG	**2.1**	WGI/A53.02	Report on the status of the global data low latency acquisition best practices at the CGMS-54.	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
LLDA TG	**2.1**	WGI/A53.03	Review the contents of the Direct Broadcast information on the CGMS website and update as needed (Direct Broadcast – CGMS – Website).	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
SES TG	**3.1**	WGI/A53.04	Define the requirement for supplying owner/operator orbit and manoeuvre information to TraCCS and identify steps for implementation	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
SES TG	**3.1**	WGI/A53.05	Identify steps to coordinate modelling of thermospheric density impacts and perform inter-comparison of model results	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	

SES TG	**3.1**	WGI/A53.06	Discuss in intersessionals and prepare highlight presentations in next year's Task Group intersessionals and CGMS-54 WGs on: · The overall landscape of work on SES topics and where the CGMS TG on SES fits in it. · Agencies experience and practices on collision avoidance · Agencies experience and practice on Debris removal	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
EUMETSAT (Andrew Monham)	**3.1**	WGI/A53.07	Develop a paper on CGMS work on SES for presentation at IAC in 2026.	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
SES TG	**3.1**	WGI/A53.08	Review current usage of space weather data for spacecraft operations and goals for Improvement. This action has been transferred from CGMS-52 to WGI (previously SWCG/A51.02).	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
SES TG	**3.1**	WGI/A53.09	Produce a report of space weather observation requirements for improved STC services and space Sustainability. This action has been transferred from CGMS-52 to WGI (previously SWCG/A51.11).	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
DCS TG	**5.1**	WGI/A53.10	Further investigate the Ionospheric Scintillation and its potential use with DCS transmissions	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
DCS TG	**5.1**	WGI/A53.11	Share the information/paper on scintillation with WGII and SWCG.	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
DCS TG	**5.1**	WGI/A53.12	Identify best opportunity to hold a DCS workshop (consider e.g. MTI Expo, NOAA conference).	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
DCS TG	**5.1**	WGI/A53.13	EUMETSAT and JMA to analyse the use of monitoring NOAA has put in place on RFI.	25 Mar 2025 (WGI): Action opened.	CGMS-54 WGI	**OPEN**	
RFI TG	**7.2**	WGI/A53.14	Prep a "Guidance report on RFI Detection, Monitoring, and Mapping for Remote Passive Sensors" for CGMS-53 Plenary. Include clear blocks relevant to different actors to ease further distribution. Include concrete information on support/decisions needed by CGMS-53 Plenary.		CGMS-Plenary	**OPEN**	

LIST OF WGI PARTICIPANTS

CGMS-53 - WGI List of Participants			
First name	Last name	Organisation	Email
Anne	Taube	CGMS Secretariat	anne.taube@eumetsat.int
Mikael	Rattenborg	CGMS Secretariat	mikael@rattenborg.eu
Siwei	Tian	CMA	tiansw@cma.gov.cn
Di	Xian	CMA/NSMC	xiandi@cma.gov.cn
Na	Xu	CMA/NSMC	xuna@cma.gov.cn
Shuze	Jia	CMA/NSMC	jiasz@cma.gov.cn
Nie	Jing	CMA	
Juha-Pekka	Luntama	ESA	juha-pekka.luntama@esa.int
Andrew	Monham	EUMETSAT	andrew.monham@eumetsat.int
Karolina	Nikolova	EUMETSAT	karolina.nikolova@eumetsat.int
Miruna	Stoicescu	EUMETSAT	miruna.stoicescu@eumetsat.int
Nicholas	Coyne	EUMETSAT	nicholas.coyne@eumetsat.int
Sean	Burns	EUMETSAT	sean.burns@eumetsat.int
Simon	Elliott	EUMETSAT	simon.elliott@eumetsat.int
Xavier	Enrich Sard	EUMETSAT	Xavier.Enrich@eumetsat.int
Markus	Dreis	EUMETSAT	markus.dreis@eumetsat.int
Babu Govindha Raj	Kesavannamboothiri	ISRO	govind@isro.gov.in
Sanjeev Kumar	Gupta	ISRO	sanjeevg@isro.gov.in
Akihiro	Shimizu	JMA	aki-shimizu@met.kishou.go.jp
Kazuki	Yasui	JMA	k_yasui@met.kishou.go.jp
Kotaro	Bessho	JMA	kbessho@met.kishou.go.jp
Miki	Abe	JMA	abe.miki@met.kishou.go.jp
Nakayama	Ryuichiro	JMA	r-nakayama@met.kishou.go.jp
Norio	Kamekawa	JMA	orion-kamekawa@met.kishou.go.jp
Taro	Ono	JMA	taro.ono@met.kishou.go.jp
Toshiyuki	Kitajima	JMA	kitajimatoshiyuki@met.kishou.go.jp
Tsuneyuki	Harada	JMA	t.harada@met.kishou.go.jp
Yasuhiko	Sumida	JMA	y_sumida@met.kishou.go.jp
Yumiko	Yamane	JMA	yamane.yumi@met.kishou.go.jp
Dohyeong	Kim	KMA	dolong@korea.kr
Jiyoung	Kim	KMA	aceasia@korea.kr
Yumi	Seo	KMA	hohoo11@korea.kr

CGMS-53 - WGI List of Participants			
First name	**Last name**	**Organisation**	**Email**
Yeji	Hwang	KMA	yejihwang@korea.kr
Kwang Deuk	Ahn	KMA	stratus12@korea.kr
Tsutomu	Nagatsuma	NICT	tnagatsu@nict.go.jp
Lihang	Zhou	NOAA	lihang.zhou@noaa.gov
Melissa	Andersen Garcia	NOAA	melissa.garcia@noaa.gov
Andrew	Heidinger	NOAA/NESDIS	andrew.heidinger@noaa.gov
Beau	Backus	NOAA/NESDIS	Beau.Backus@noaa.gov
James	Donnellon	NOAA/NESDIS	james.donnellon@noaa.gov
Melissa	Johnson	NOAA/NESDIS	melissa.c.johnson@noaa.gov
Scott	Leonard	NOAA/NESDIS	Scott.Leonard@noaa.gov
Xi	Zhang	NSOAS	zhangxi@mail.nsoas.org.cn
Juhong	Zou	NSOAS	zoujuhong@mail.nsoas.org.cn
Jinquan	Zhao	NSOAS	zjq@mail.nsoas.org.cn
Konstantin	Litovchenko	SRC Planeta	litovchenko@planet.iitp.ru
Jesse	Andries	WMO	jandries@wmo.int
Natalia	Donoho	WMO	ndonoho@wmo.int

WGII Working Group II

CGMS

Satellite data and products

WGII REPORT

Co-Chairs: Na Xu, CMA / J. V. Thomas ISRO (outgoing) / Takuya Sakashita, JMA (incoming)
Rapporteurs: Paolo Ruti, EUMETSAT / Andrew Heidinger, NOAA

1. Opening

1.1 Meeting objectives and expected outcomes, WGII ToR

The session aimed to review inter-agency progress in calibration, product generation, and coordination across CGMS International Science Working Groups. It emphasized strengthening collaboration, ensuring continuity and quality in satellite-based observations, and advancing intercalibration methodologies. Expected outcomes included updated recommendations for the CGMS plenary and strategic alignment on emerging topics such as AI/ML, space weather, and lunar calibration.

The CGMS Working Group II session aimed to:

- Review progress on the generation and use of satellite data and products since mid-2024.
- Address climate monitoring contributions, particularly in support of global stocktake processes.
- Evaluate risks, gaps, and opportunities in the observation system.
- Discuss organizational updates, joint work with WMO, and emerging scientific and technical directions, such as super-sites and AI in climate modelling.

The meeting aimed to review and update the High-Level Priority Plan (HLPP) for CGMS Working Group II. Expected outcomes included consolidating feedback from international science working groups and identifying key actions and recommendations for the plenary session.

1.2 Survey Review: Analysis of WGII list of actions based on responses (Paolo Ruti)

2. CGMS agency reports on highlights and issues in dataset and product generation since mid-2024

2.1 CGMS agency reports on highlights and issues in dataset and product generation

A brief synthesis of the main presentation is reported here. For additional information please visit the CGMS website where you can find the presentations.

- **EUMETSAT** highlighted the operational status of MTG-I1's instruments (FCI and LI) and ongoing validation of Level 2 products. Achievements included recovery from MTG-FCI on-board calibration mechanism using GSICS-developed algorithms. Key advancements were noted in 3D wind retrievals from hyperspectral infrared data using the IASI system and polarimetric aerosol retrievals with the upcoming EPS-SG mission.
- **ISRO** presented updates on operational geostationary and ocean observation missions, including INSAT-3DR, Oceansat-3, and upcoming satellites. New instruments for atmospheric sounding and intercalibration activities with other agencies were also noted.

- **CMA** (China Meteorological Administration): Presented observations and retrievals from FY-3F UV hyperspectral instruments, highlighting advancements in monitoring ozone, SO_2, and aerosols. Discussed level-one and level-two product processing, including calibration and validation efforts.
- **JMA** (Japan Meteorological Agency): Introduced developments in Principal Component Analysis (PCA) for data compression and AI-based retrieval of 3D physical quantities from satellite data.
- **JAXA** (Japan Aerospace Exploration Agency): Reported on the EarthCARE mission, including initial data releases and validation results for cloud profiling and aerosol measurements. Highlighted plans for synergy products and assimilation experiments.
- **NOAA**: GOES-19 is set to become the new operational GOES-East satellite, with all Level 1 and Level 2 products ready for use, while GOES-18 continues nominal operations as GOES-West and GOES-16 is being moved to storage. In the polar orbiting constellation, NOAA-21—launched in November 2022—is now the primary satellite at 13:30 LTAN and is operating nominally, with NOAA-20 serving as the secondary satellite. Suomi NPP (SNPP), launched in 2021, is now a tertiary asset and maintained on a best-effort basis, with users expected to have transitioned to NOAA-20 and NOAA-21.
- **NASA**'s ongoing efforts across calibration and validation, research, and data product development to support Earth science and space weather monitoring. Calibration activities include the continued expansion of surface-based networks such as the Tropospheric Ozone Lidar Network and the Pandora System. Several field campaigns—such as FireSense, PACE-PAX, and ARCSIX—focus on fire detection, ocean ecosystems, and aerosol-radiation interactions in Arctic regions, enhancing satellite data validation and mission planning. In research, significant strides have been made in both space weather and Earth science. NASA's Heliophysics System Observatory and Space Weather Centers of Excellence contribute to monitoring and preparedness, including the May 2024 solar storm analysis. On the Earth science front, studies using GPM IMERG products improve understanding of extreme precipitation, while research on global freshwater decline, saltwater intrusion, and satellite-based flood monitoring provide critical insights into climate-driven changes.
- **ESA** Accurate weather forecasts rely heavily on satellite data from both geostationary and polar orbits, yet a significant gap remains in the Arctic, where weather conditions—especially water vapour—can change rapidly. Geostationary satellites like Meteosat provide frequent updates but lack polar coverage, while MetOp satellites, although capable of observing the poles, require up to 24 hours for global coverage. To address this, the Arctic Weather Satellite (AWS) was launched as a prototype, with the planned EPS-Sterna constellation of six satellites aiming to close this critical observation gap by providing more frequent and reliable weather data over the Arctic.
- **CNES** The next generation of Earth observation missions, driven by international cooperation, is paving the way for advanced monitoring of key environmental variables. The Surface Water and Ocean Topography (SWOT) mission, jointly developed by NASA-JPL, CNES, UKSA, and CNSA, features a swath altimeter capable of measuring water height across oceans, lakes, and rivers—marking a significant step toward operational satellite hydrology. In parallel, the MicroCarb mission, a CNES–UKSA initiative, aims to quantify atmospheric carbon by identifying emission sources and estimating fluxes to derive CO_2 concentrations at regional and global scales, serving as a demonstrator for future missions like Copernicus CO2M. Complementing these is IASI-NG, a

high-performance infrared sounder with heritage from the IASI series, doubling sensitivity and resolution for operational meteorology at EUMETSAT.

- **KMA**. The Korea Meteorological Administration (KMA) is advancing the capabilities of the GK2A geostationary satellite through the integration of artificial intelligence (AI) to enhance early detection of hazardous weather and address observational limitations of both geostationary and low Earth orbit satellites. Notable developments include an AI model for predicting convective initiation and the likelihood of radar reflectivity exceeding 35 dBZ within one hour. KMA is also leveraging GK2A Atmospheric Motion Vector (AMV) data to estimate sea surface wind (SSW) changes, aiding real-time monitoring of severe weather events like typhoons. Additionally, an AI-based method has been developed to derive 3D ice water path (IWP) values from 2D GK2A observations, utilizing CloudSAT data to improve cloud water path estimations.
- **WMO**. The World Meteorological Organization (WMO) will host the Sixteenth Consultative Meeting on High-Level Policy on Satellite Matters (CM-16) in Geneva from 3 to 4 March 2026, primarily as an in-person event with remote access options for those unable to attend. The meeting aims to facilitate high-level dialogue between WMO and space agency leadership, aligning on WMO's strategic goals and the vital role of space agencies in their realization. Related activities include the WIGOS Vision update group meeting on 28–29 April.

3. CGMS International Science Working Groups

Multiple science working group rapporteurs were present (e.g., IPWG, IROWG, IESWG). Activities included progress reporting and coordination on calibration, validation, and shared algorithm development. Discussions emphasized readiness for using new data types, such as polarimetry, and highlighted collaborative work on best practices and intercomparisons.

- **GSIWG (Global Space-based Intercalibration System)**: Emphasized harmonized performance monitoring by agencies using standard operating procedures for the in-flight calibration. A common metric for reporting is expected to be operational next year.
- **IWWG (International Winds WG)**: Addressed 3D wind retrievals, improved quality indicators, and joint work with NWP centers. Highlighted cooperation with other science groups. Developed a living document for best practices in high-resolution winds. Focused on commonality in Atmospheric Motion Vector (AMV) products and hyperspectral IR winds (both GEO and LEO).
- **ITWG (International TOVS WG)** Highlighted ongoing work on hyperspectral sounder intercomparisons and error estimation methodologies.
- **IPWG (Precipitation WG)**: Shared advances in AIML, global merged products, and new CubeSat observations. Emphasized the need for a core reference satellite (e.g., GPM) for intercalibration and validation of precipitation products. Focused on merging satellite precipitation products and validation against ground data. Noted challenges with microwave sensor diversity and the need for benchmarking. Advanced AI-based retrieval algorithms for snowfall and merged IR/microwave precipitation products, with plans for real-time global QPE products. Conducted a workshop in Tokyo with over 130 participants; focus on benchmarking and low-latency data.

- **ICWG (International Cloud WG)**: Preparing for its next workshop; current focus is cloud product consistency and upcoming intercomparison exercises. Engaged in cloud property intercomparisons and validation against EarthCARE data. Addressed intercomparison efforts for cloud products and data sharing agreements (e.g., GeoRing). Plans for a joint meeting in October 2025 in South Korea.
- **IESWG (International Earth Surface WG)** Newly established; progress report expected by June 2025. Highlighted the need for global snow water equivalent products and L-band soil moisture observations, with plans for a June 2025 meeting to discuss gaps.
- **IROWG (Radio Occultation):** Emphasized data continuity and archiving, highlighted the success of ROMEX experiments, and underlined the risk of decreasing RO data after COSMIC-2. Plans to expand GNSS-R capabilities. Discussed the importance of maintaining a radio occultation constellation with 20,000 daily profiles for NWP.

4. Climate and greenhouse gas observations

- Significant progress has been made in enhancing the space-based contribution to climate monitoring and greenhouse gas (GHG) observations. These efforts align with global priorities such as the Global Stocktake under the Paris Agreement and the evolving needs of the WMO Global Greenhouse Gas Watch (GGGW).

- **Climate Monitoring and the ECV Inventory:** The Working Group on Climate (WG Climate) continued to lead the coordination of satellite-based climate observations, with notable milestones such as the publication of the updated Essential Climate Variables (ECV) Inventory in October 2024. This inventory has now transitioned into a Climate Data Record Inventory, encompassing approximately 1,300 records (920 existing and 370 planned). These records are critical for supporting long-term climate analyses and for informing future reanalyses and assessments.

- **Support for Global Stocktake and GGGW:** CGMS members reviewed and reinforced their support for the WMO G3W initiative, including a jointly endorsed draft letter to WMO from CEOS and CGMS. The G3W pre-operational phase (2024–2027) is now underway, aiming to establish sustained data flows and modeling frameworks. Key requirements include low-latency satellite data for flux inversion and validation, as well as enhanced stakeholder engagement. Lessons from the first Global Stocktake underscored the need to reduce uncertainties in GHG flux estimates and to improve coordination with the modeling community, including the WCRP and IPCC.

- **Greenhouse Gas Monitoring Developments:** Discussions included plans for GHG super-sites to serve as anchor points for space-based validation, building on existing Cal/Val infrastructure. The Greenhouse Gas Task Team presented its updated roadmap, endorsed by CGMS and CEOS, which promotes co-development of data products and collaboration with initiatives such as G3W and the International Methane Emissions Observatory (IMEO). Emphasis was also placed on data quality challenges and the potential for using commercial and non-traditional observation systems.

- **Advancements in UV Limb Sounding and Data Rescue:** The potential of UV limb sounding (e.g., via FY-3F) to fill observational gaps in stratospheric ozone and related species was also discussed. In parallel, the GeoRing Project is working to rescue and reprocess historical geostationary satellite data (dating back to the 1970s). This includes testing calibration algorithms for infrared and visible channels and holds strong potential for climatology and AI/ML applications.

5. High Level Topics - New horizons

Significant advancements in Earth Observation (EO) are anticipated, driven largely by innovations in Artificial Intelligence (AI) and Machine Learning (ML), alongside the development of novel sensor technologies. AI/ML applications are being actively explored across various domains, including nowcasting, cloud detection, 3D atmospheric parameter retrieval, precipitation improvements, lightning prediction (KMA), cloud microphysics (KMA), and next-generation fire detection systems (NOAA). Furthermore, NASA presented multimodal AI foundation models aimed at enhancing data fusion and enabling zero-shot learning capabilities for diverse Earth observation tasks, including weather and climate monitoring. The consolidation of AI inputs and the need for standardized training datasets were also highlighted as key areas for development.

The future landscape of EO will also be shaped by the deployment of innovative sensors. This includes hyperspectral instruments, such as infrared sounders for 3D wind mapping and imagers developed by agencies like CMA and ISRO, as well as emerging hyperspectral microwave technologies (Technology Readiness Level of most systems ranges from 2–3 to 5) with potential impacts on Numerical Weather Prediction (NWP) and climate studies. Polarimetry, utilized for improved aerosol typing (EUMETSAT, NASA/PACE), and GNSS-Reflectometry (ISRO) represent other key sensor advancements. There is a recognized push for NWP centers to achieve readiness for ingesting these new data types within the next five years.

Emerging platforms like CubeSats and small satellites are poised to make significant contributions, particularly with the expansion of high-frequency microwave sounders (e.g., EPS-Sterna, Tempest), emphasizing the concurrent need for robust cross-calibration and data quality assurance. The integration of commercial data sources, such as radio occultation and microwave sounder data, is also being explored for NWP, underscoring the importance of quality control and archival strategies. Overall, there is a strong emphasis on methodology innovation, particularly for near real-time systems, and ensuring the long-term sustainability and strategic alignment of these advanced satellite datasets with the needs of modeling communities and global initiatives like the UNFCCC stocktake.

Looking towards 2050, the WMO envisions WIGOS evolving into a truly seamless, fully integrated, and responsive global observing system, underpinning all Earth system monitoring and prediction activities. This future WIGOS will leverage technological advancements like AI, next-generation sensors, and ubiquitous data sharing platforms to provide comprehensive, high-quality, and easily accessible observational data across all domains – from the deep oceans to outer space. The focus will be on addressing critical observational gaps, ensuring sustainability and resilience, and dynamically meeting the escalating user needs for weather, climate, water, and related environmental information to support global initiatives like the Sustainable Development Goals and effective climate action.

6. CGMS risk assessment and baseline

The CGMS risk assessment framework is undergoing expansion, incorporating more granular analysis, particularly concerning microwave sensors to emphasize diversity and redundancy across missions. A key top-level risk identified remains the anticipated decline in Radio Occultation (RO) data availability, especially post-2026 with the aging of COSMIC-2. This gap poses a high risk to Numerical Weather Prediction (NWP) and climate continuity, prompting advocacy for replacement systems or commercial RO procurement. Specific emphasis was placed on ensuring continued tropical and subtropical RO coverage, potentially mitigated by backbone missions like EPS-SG and Sentinel-6.

Several other moderate risks were discussed, including a potential gap in UV limb sounding capabilities following the JPSS era, and risks associated with precipitation radars, coronagraphs, and energetic particle sensors. Declining L-band missions (SMAP, SMOS) present risks for snow and soil moisture monitoring, compounded by a lack of global snow products. Concerns were also raised regarding the potential for degraded data quality and the absence of long-term archival strategies when relying on commercial data providers, alongside the general issue of overreliance on specific key instruments, such as the GPM core sensor for precipitation measurements. The importance of archiving Level 0 data, particularly from commercial sources, was highlighted.

Regarding the CGMS baseline, several updates were noted, including the formal addition of missions such as EPS-Sterna, GOES-U, FY-4E/F, and MetOp-SG B2. The availability of on-orbit spares like GOES-16 and Himawari-8 contributes to baseline resilience. Discussions are ongoing regarding the potential inclusion of geostationary observations within the CGMS baseline, specifically for broadband radiometer measurements. Efforts continue in areas supporting the baseline, such as standardizing core channels across missions, reviewing critical microwave frequencies for various applications (informed by IPWG and ITWG), and cross-calibration activities (e.g., scatterometers, with feedback expected from G6). Several related actions concerning nighttime lights, solar spectrum references, and microwave calibration methodologies were marked for closure.

7. Selected topics of high priority to members

Several key areas emerged as high priorities for members, reflecting a focus on enhancing current capabilities, addressing critical data gaps, and preparing for future observational needs. **Improving calibration practices and coordination** stood out as a significant priority. This includes expanding the use of lunar calibration techniques across different domains, establishing formal mechanisms for crucial cross-calibration activities, particularly for scatterometers (potentially leveraging volunteer efforts like the G6 subgroups), and considering formal support for innovative calibration work currently driven by volunteers (e.g., lunar and space weather calibration).

Another major priority area revolves around **addressing critical data product needs and ensuring observational continuity**. This encompasses improving the availability and access to Level 2 products, especially from polar-orbiting satellites, and enhancing access to aerosol and cloud products derived from new instruments. Specific product needs highlighted include the development of globally consistent Snow Water Equivalent (SWE) data, requiring coordination between CGMS, WMO, and upcoming missions, and the standardization of Volcanic Ash products to align better with operational requirements like aviation safety. Linked to continuity, the recommendations from ROMEX underscore the essential need to maintain robust Radio Occultation (RO) coverage (at least 20k profiles/day with uniform distribution), highlighting its value, particularly for boundary layer characterization, amidst concerns about future gaps.

Furthermore, the **growing role and integration of Artificial Intelligence (AI)** was identified as a cross-cutting priority. There was a recognized need to assess AI's implications for future surface observation data requirements and a unified call across working groups to systematically document AI use cases in areas such as retrieval algorithms, Radiative Transfer Model (RTM) acceleration, and improving various observational products. Other important topics discussed included the integration of lightning data for nowcasting, the coordination of microwave sensor frequencies, investigating options for UV limb sounding continuity, the potential establishment of GHG super-sites (with an emphasis on leveraging existing WMO infrastructure), and ensuring timely data delivery (low-latency) to support applications like global greenhouse gas monitoring.

Scientifically, the EarthCARE mission is designed to provide unprecedented synergistic measurements crucial for understanding the complex interactions between clouds, aerosols, and radiation. By combining a Cloud Profiling Radar (CPR) and an Atmospheric Lidar (ATLID), it delivers detailed vertical profiles of cloud structures (including ice/water content) and aerosol distributions. These are complemented by a Multi-Spectral Imager (MSI) for context and a Broad-Band Radiometer (BBR) to directly measure the reflected solar and emitted thermal radiation. This integrated approach aims to quantify the intricate ways clouds and aerosols scatter and absorb radiation, thereby significantly reducing uncertainties in climate model projections and improving numerical weather prediction by providing crucial data on their impact on Earth's energy budget.

8. Review of WGII organisational matters

The session covered key organizational aspects of Working Group II (WGII), beginning with a review of the status of action items from previous meetings and the roadmap for their closure or update. WGII leadership was confirmed. Changes in subgroup leadership, such as an acting co-chair from ECMWF for the Surface WG, were noted. Coordination with relevant science working groups, including new entities like the International Earth Surface Working Group (IESWG), was reaffirmed as essential. Furthermore, the introduction of NSOS (China Ocean Satellite) as a new contributor to WGII activities was welcomed.

Plans for future meetings and workshops were discussed, including the upcoming DWD meeting in June, the IPWG workshop in Poland (2025), the ICWG meeting in South Korea (October 2025), and the IROWG workshop scheduled for Austra in 2026. Challenges in organizing meetings, particularly hybrid formats requiring visas or navigating travel restrictions (as experienced by ITWG), were acknowledged. WMO financial constraints were also noted, highlighting reduced travel funding and an increasing emphasis on self-funded participation for meetings. Intersessional meetings are planned between September 2025 and March 2026 to address pending topics before the next formal gathering.

Procedurally, working groups are aligning timelines and utilizing surveys to document current practices and user needs effectively. A proposal was discussed to formalize best practices identified within the working groups and ensure their endorsement to better support CGMS-level planning and communication efforts. Final recommendations and updates stemming from WGII activities are being prepared for presentation at the upcoming June plenary session, covering areas such as intercomparison endorsements, advocacy for observational continuity, and support for AI/ML and hyperspectral advancements.

Key Actions Discussed:

- Finalize the closeout of pending action items (e.g., related to microwave mission visualization).

- Assign clear responsibility for the investigation into UV limb sounding continuity options.
- Finalize updates to the High-Level Priority Plan (HLPP) based on consolidated working group feedback.
- Organize focused intersessional meetings (Sept 2024 – Mar 2025) to progress specific pending topics.
- Coordinate efforts with WMO regarding greenhouse gas super-sites and the standardization of volcanic ash products.

9. Review of WGII organisational matters

10. Any other business

11. Conclusions of CGMS-53 WGII, preparation of the WGII report for plenary

Actions

- A53.01 To articulate how MW missions with different frequencies should be addressed and visualized in the CGMS baseline and risk assessment – Ongoing – WMO leading.
- A53.02 To investigate other capabilities for UV limb sounding to complement JPSS to be discussed at intersessional meetings – Requesting WCRP Programme on Stratosphere to organise an intersessional talk. During the Risk Assessment meeting, a moderate risk was identified concerning potential gaps or performance degradation in the UV Limb Spectrometer's long-term continuity. The assessment recommends that WGII explore alternative capabilities for UV limb sounding to complement the JPSS mission.
- A53.03 Based on the comment that "The currently achieved **accuracy of Outgoing Longwave and Shortwave fluxes (2.5 Wm^{-2}) is insufficient to determine the absolute magnitude of Earth's Energy Imbalance."** It would be useful to have an overview presentation during WG II intersessional meeting from GEWEX on how do they see this evolving.
- A53.04 Ensuring the coordination on GHG supersites with existing capabilities identifying the potential gaps – Organise a call involving WGclimate, GHG task team, GSICS, WMO-G3W, WMO-GAW.
- A53.05 WGClimate engaging IPWG and IROWG in the ESMO-CMIP interaction for the exploitation of satellite products – WGClimate send information to Int WGs.
- International WGs send 2-3 slides to Joe Turk on AI applications in their remit – Joe presenting to Plenary – CGMSec sending email.

Recommendations

- IPWG - Maintain a core reference satellite equipped with coordinated precipitation radar and radiometer sensing capabilities, including the preferred constant-incidence low-frequency microwave (MW) channels, to intercalibrate and reference the constellation of passive MW radiometers. Ensure continuity in global precipitation data production in case of a catastrophic failure of the GPM Core Observatory, which currently serves as the reference satellite.
- IPWG - Establish and maintain a Baseline Surface Precipitation Network (BSPN), to collect radar/raingauge data and processes to similar standards from as many different climatological regimes as possible.
- ICWG - Endorsement for the GEO-Ring intercomparison efforts to maximize participation from space agencies, and establish a data-sharing agreement to enable the open, free, and near-real-time distribution of GEO-Ring L1g data.
- IROWG - IROWG recommends that a reliable replacement for the FORMOSAT-7/COSMIC-2 tropical and subtropical radio occultation observations be in place by 2030 at the latest.
- IROWG - Given the demonstrated benefits of radio occultation (RO) data for numerical weather prediction (NWP), the IROWG recommends the continuation and expansion of the global RO observational network. Initial results from ROMEX indicate that increasing the number of daily RO profiles with global coverage significantly improves NWP forecast accuracy (with a potential threshold of 20,000 profiles per day). While current models do not yet utilize RO data at its full level of accuracy, this should not be interpreted as accepting lower quality data, as future advances in modeling will better exploit its full potential.
- IROWG - recommends that Level 0 (raw) data from RO missions be permanently archived and that the government agencies that purchase the data be responsible for its archiving with an open data policy. All data acquired by RO instruments should be archived without pre-filtering or editing and without intentional degradation.

Intersessional meeting

- September: 10 Sep
- November: 21 Nov
- December Survey on actions
- January: 21 Jan
- March: 11 Mar
- CGMS 54 WG II meeting
- Hyperspectral MW: Assessing Observational Capabilities and NWP Integration Readiness
- Volcanic Ash – observational capabilities over the past 10-15 years

LIST OF ACTIONS

CGMS-53 ACTIONS – WGII high level actions and recommendations					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
WMO		A53.01	To articulate how MW missions with different frequencies should be addressed and visualized in the CGMS baseline and risk assessment – Ongoing – WMO leading	CGMS-54	**OPEN**
CGMS WGII		A53.02	Ensuring the coordination on GHG supersites with existing capabilities identifying the potential gaps – Raise at CGMS pre meeting in June or Organise a call involving WGClimate, GHG task team, GSICS, WMO-G3W, WMO-GAW	CGMS-54	**OPEN**
IESWG CGMS rapporteur	WGII report	A51.03	The IESWG to report on progress to plenary CGMS-53	CGMS-53	**OPEN**

CGMS-53 ACTIONS – WGII internal actions					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
WMO	2	WGII/A49.10	Review the baseline dissemination strategy for volcanic ash product Feb 2025: WMO - Re-evaluation of volcanic ash product dissemination with WIS 2.0 is needed.		**OPEN**

CGMS-53 ACTIONS – WGII internal actions					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
CGMS WGII		A53.02	To investigate other capabilities for UV limb sounding to complement JPSS to be discussed at intersessional meetings – Requesting WCRP Programme on Stratosphere to organise an intersessional talk	CGMS-54	**OPEN**
CGMS WGII		A53.03	Based on the comment that "The currently achieved accuracy of Outgoing Longwave and Shortwave fluxes (2.5 Wm^{-2}) is insufficient to determine the absolute magnitude of Earth's Energy Imbalance." It would be useful to have an overview presentation during WG II intersessional meeting from GEWEX on how do they see this evolving.	CGMS-54	**OPEN**
WG Climate		A53.05	WGClimate engaging IPWG and IROWG in the ESMO-CMIP interaction for the exploitation of satellite products – WGClimate send information to Int WGs	CGMS-54	**OPEN**

CGMS-53 ACTIONS – WGII second level internal actions					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
IESWG CGMS rapporteur	WGII report	A51.03	The IESWG to report on progress to plenary CGMS-53	CGMS-53	**OPEN**

WGII agreed to close following actions:

Actionee	AGN item	Action #	Description	Status
7th RAWS: Action on WGII	7th risk assessment	-	WGII to consider whether observations from geostationary orbit should be added to the CGMS baseline requirements for the broadband short/long wave radiometer (https://cgms-info.org/wp-content/uploads/2021/06/CGMS-Baseline-Sustained-contributions-to-the-observing-of-the-Earth-system-space-environment-and-Sun-v6-1.pdf)	CLOSED and we propose an action for the intersessional It would be useful to have an overview presentation during WG II intersessional meeting from GEWEX on how do they see the evolution.
WMO and CGMS Members		WGIIR50.05	(IROWG) WMO and CGMS are encouraged to coordinate any GNSS-RO data purchases to ensure the current 20,000 daily target identified in HLPP is met with global and full local time coverage. Feb 2025 - WMO comment: Existing data buys have been maintained by CGMS members. Status of Chinese companies and possible data buys will be updated in CGMS-53/WGIII meeting.	CLOSED ROMEX to provide new advice by 2025 and new recommendation
CGMS Members		WGIIR50.04	(IROWG) All providers of RO observations are encouraged to classify RO data as core data in the sense of the WMO Unified Data Policy (Res. 1). Therefore, free, timely and unrestricted access shall be provided to NRT RO data and free and unrestricted access shall be provided to archived raw data (including auxiliary data). CGMS-52: WMO has added GNSS-RO data to the Unified Data policy from agency missions, but not missions from the private sector.	CLOSED - To be moved to best practices and to organise a Best Practices document
CGMSSEC & WMO		WGIIA50.01	CGMSSEC and WMO to consider if night-time light capabilities should be covered in HLPP, the CGMS Baseline, and should be reflected in the WMO Gap Analysis. CGMS-52: Night-time	CLOSED in CGMS-53

Actionee	AGN item	Action #	Description	Status
			capability has been added to the WMO gap analysis, question about whether or not to add to CGMS baseline.	

CGMS-53 ACTIONS – WGII internal actions				
Actionee	**AGN item**	**Action #**	**Description**	**Status**
GSICS	CGMS 50		Establish a common reference solar spectrum with appropriate spectral coverage and spectral resolution and develop common methods and tools for on-ground calibration and characterisation and inter-calibration of UV-Vis- NIR SWIR spectrometers. 2025 Jan: The common reference solar spectrum has been dealt by CEOS and references can be found at CEOS Cal/Val portal. TSIS-1 HSRS - Cal/Val Portal	CLOSED
GSICS	CGMS 50		Establish a methodology to characterise microwave instruments for O2 absorption channels through the SNO and RTM modelling. The implementation will be done successively by the individual satellite operators. 2025 Jan: The latest on action 4.1.5: The SNOs and NWP bias monitoring method (using RTMs) is part the routines of all agencies operating PMW sensors. The methods and SOP are being discussed and coordinated with the agencies through the GSICS MWSG. The action can be closed.	CLOSED

CGMS-53 ACTIONS – WGII internal actions				
Actionee	**AGN item**	**Action #**	**Description**	**Status**
WMO	2	WGII/A49.12	WMO conduct a survey on baseline Level-2 product requirements for LEO satellites. CGMS-53 WGII: - what is the real benefit to have a narrow L2 survey? Let s focus first on GEO and revisit this topic later on	CLOSED

CGMS-53 ACTIONS – WGII second level internal actions				
Actionee	**AGN item**	**Action #**	**Description**	Status
ITWG	WGII/3	WGII/A48.03	ITWG to send a report demonstrating the value of temperature sounding of the upper stratosphere and mesosphere (as for the SSMIS UAS channels).	CLOSED

LIST OF PARTICIPANTS

CGMS-53 - WGII List of Participants (TO BE CONFIRMED)			
Firstname	**Lastname**	**Organisation**	**Email**
Anne	Taube	CGMS Secretariat	anne.taube@eumetsat.int
Mikael	Rattenborg	CGMS Secretariat	mikael@rattenborg.eu
Kanghui	Zhou	CMA	zhoukh@cma.gov.cn
Yapeng	Wang	CMA	wangyp@cma.gov.cn
Xiaochun	Zhai	CMA	zhaixc@cma.gov.cn
Di	Xian	CMA/NSMC	xiandi@cma.gov.cn
Fangli	Dou	CMA/NSMC	doufl@cma.gov.cn
Lu	Zhang	CMA/NSMC	zhanglu_nsmc@cma.gov.cn
Na	Xu	CMA/NSMC	xuna@cma.gov.cn
Wang	Haofei	CMA/NSMC	wanghf@cma.gov.cn
Feng	Lu	CMA/NSMC	lufeng@cma.gov.cn
Zhao-Cheng	Zeng	CMA/Peking University	zczeng@pku.edu.cn
Murielle	Lafaye	CNES	murielle.lafaye@cnes.fr
Yasjka	Meijer	ESA	yasjka.meijer@esa.int
Juha-Pekka	Luntama	ESA	juha-pekka.luntama@esa.int
Bojan	Bojkov	EUMETSAT	bojan.bojkov@eumetsat.int
Miruna	Stoicescu	EUMETSAT	miruna.stoicescu@eumetsat.int
Mounir	Lekouara	EUMETSAT	mounir.lekouara@eumetsat.int
Paolo	Ruti	EUMETSAT	Paolo.Ruti@eumetsat.int
Joe	Turk	IPWG/JPL	jturk@jpl.nasa.gov
Hui	Shao	IROWG/JCSDA	huishao@ucar.edu
Anthony	Mannucci	IROWG/NASA-JPL	anthony.j.mannucci@jpl.nasa.gov
Ulrich	Foelsche	IROWG/University of Graz	ulrich.foelsche@uni-graz.at
Babu Govindha Raj	Kesavannamboothiri	ISRO	govind@isro.gov.in
Pradeep	Thapliyal	ISRO	pkthapliyal@gmail.com
Govind		ISRO	
Fiona	Smith	ITWG/Bureau of Meteorology	fiona.smith@bom.gov.au
Reima	Eresmaa	ITWG/FMI	reima.eresmaa@fmi.fi
Misako	Kachi	JAXA	kachi.misako@jaxa.jp
Kurino	Toshiyuki	JAXA	kurino.toshiyuki@jaxa.jp

CGMS-53 - WGII List of Participants (TO BE CONFIRMED)			
Firstname	**Lastname**	**Organisation**	**Email**
Osamu	Ochiai	JAXA	ochiai.osamu@jaxa.jp
Takuji	Kubota	JAXA	kubota.takuji@jaxa.jp
Nao	Yoshida	JAXA	yoshida.nao@jaxa.jp
Hiroshi	Suzue	JMA	hiroshi.suzue@met.kishou.go.jp
Kazuki	Yasui	JMA	k_yasui@met.kishou.go.jp
Kotaro	Bessho	JMA	kbessho@met.kishou.go.jp
Kouki	Mouri	JMA	k_mouri@met.kishou.go.jp
Miki	Abe	JMA	abe.miki@met.kishou.go.jp
Nakayama	Ryuichiro	JMA	r-nakayama@met.kishou.go.jp
Norio	Kamekawa	JMA	orion-kamekawa@met.kishou.go.jp
Shiho	Naiki	JMA	s.naiki@met.kishou.go.jp
Shiro	Omori	JMA	s-ohmori@met.kishou.go.jp
Takuya	Sakashita	JMA	sakashita@met.kishou.go.jp
Taro	Ono	JMA	taro.ono@met.kishou.go.jp
Yasuhiko	Sumida	JMA	y_sumida@met.kishou.go.jp
Yumiko	Yamane	JMA	yamane.yumi@met.kishou.go.jp
Wenying	Su	JWGCLIMATE/NASA	Wenying.Su-1@nasa.gov
Dohyeong	Kim	KMA	dolong@korea.kr
Hyejin	Moon	KMA	
Jiyoung	Kim	KMA	aceasia@korea.kr
Eunha	Sohn	KMA	soneh0431@korea.kr
Inchul	Shin	KMA	icshin@korea.kr
Jinyoung	Kim	KMA	haru424@korea.kr
Yumi	Seo	KMA	hohoo11@korea.kr
Na-Yeon	Park	KMA	nayeonpark@korea.kr
Jieun	Yu	KMA	jieun5973@korea.kr
Yeji	Hwang	KMA	yejihwang@korea.kr
Maudood	Khan	NASA	maudood.n.khan@nasa.gov
Sid	Boukabara	NASA	sid.a.boukabara@nasa.gov
Rahul	Ramachandran	NASA	rahul.ramachandran@nasa.gov
Tsutomu	Nagatsuma	NICT	tnagatsu@nict.go.jp
Lihang	Zhou	NOAA	lihang.zhou@noaa.gov
Clara	Draper	NOAA	clara.draper@noaa.gov
Andrew	Heidinger	NOAA/NESDIS	andrew.heidinger@noaa.gov
Melissa	Johnson	NOAA/NESDIS	melissa.c.johnson@noaa.gov

CGMS-53 - WGII List of Participants (TO BE CONFIRMED)			
Firstname	**Lastname**	**Organisation**	**Email**
Scott	Leonard	NOAA/NESDIS	Scott.Leonard@noaa.gov
Laurie	Rokke	NOAA/NESDIS	
Yunfei	Lu	NSOAS	lyf@mail.nsoas.org.cn
Xi	Zhang	NSOAS	zhangxi@mail.nsoas.org.cn
Juhong	Zou	NSOAS	zoujuhong@mail.nsoas.org.cn
Jinquan	Zhao	NSOAS	zjq@mail.nsoas.org.cn
Konstantin	Litovchenko	SRC Planeta	litovchenko@planet.iitp.ru
Benjamin	Ruston	UCAR	benr@ucar.edu
Heikki	Pohjola	WMO	hpohjola@wmo.int
Jesse	Andries	WMO	jandries@wmo.int
Oksana	Tarasova	WMO	otarasova@wmo.int
Kwang Deuk	Ahn	KMA	stratus12@korea.kr

Operational continuity and contingency planning

WGIII REPORT

Co-Chairs: *TANG Shihao, CMA / Irene Parker, NOAA (remote)*

Rapporteur: *Heikki Pohjola, WMO, (Anne Taube, EUMETSAT, acting)*

1. Opening and introduction

CGMS-53-WGIII-WP-06 - Meeting introduction, objectives and expected outcomes by co-chairs

Co-chair Shihao Tang (ST) (CMA) opened the meeting and welcomed all participants to the WGIII session of CGMS-53 working groups. He presented the meeting agenda, and the objectives of the meeting related to the role of WGIII with regards to the CGMS baseline and the CGMS risk assessment. Co-chair Irene Parker (IP) (NOAA) welcomed everyone, and she was sorry to be able participating the meeting online only. The meeting participants were introducing themselves with a roundtable onsite and online. The list of the participants can be found in Annex 1.

2. WMO core satellite data (WMO Res 1)

CGMS-53-WMO-WP-04 - Update on WMO efforts to establish core data

HP presented updates on WMO's efforts on defining core and recommended satellite data for nowcasting and hydrology applications. He explained the background of defining core and recommended data sets and how they linked to WMO data policy. A workshop with satellite operators, nowcasting user community and WMO is planned (15-16 October 2025) to finalize and agree the core and recommended satellite data for nowcasting and finalize a workshop statement. Then, the datasets are added to the next version of WIGOS Manual and submitted to INFCOM-4 (Q3 2026) for Members' approval. TT-EHN is working with the same procedure to define core and recommended satellite data for hydrology application. The goal is to have proposal for additional datasets ready by end of 2025.

Paolo Ruti (PR) (EUMETSAT) was asking about the role of AI with regards to Core satellite data for nowcasting. HP responded that this aspect is taken into account, and it links to the WMO Expert Team on Operational Weather Forecasting System (ET-OWFS) where role of AI in nowcasting is studied. All space agencies are involved through WMO Expert Team on Space Systems and Utilization (ET-SSU).

3. WIGOS Vision

CGMS-53-WMO-WP-05 - WIGOS Vision 2050 - status update and way forward

Sid Boukabara (SB) (NASA) (virtually) presented WIGOS Vision 2050 update project status on behalf of the WIGOS Vision Update Group. An effort has been kick started (January 2025) to update the WMO Integrated Global Observing System (WIGOS) vision for the 2050 timeframe. He outlined the primary objectives of WIGOS Vision 2050, stating that the Vision aimed to define an integrated observing system capable of meeting evolving user requirements over the next 25 years. It provides high-level targets to guide the evolution of the WIGOS in the coming decades. The scope will include space- and surface-based

components and will envision a global system to measure the Earth, and address WMO-relevant applications.

He highlighted three key drivers shaping the vision including 1) Evolution of user and application requirements, particularly concerning early warning systems and climate change adaptation, 2) Advancements in observing technology, including new satellite capabilities and ground-based networks, and 3) Implementers needs, focusing on satellite operators, but also covering the needs of ground-based networks.

The team also did look back and see how the 2040 vision was done to try to learn the lessons from that exercise and potentially implement it in the WIGOS Vision 2050 exercise. The main thing that that the Vision connected users of observation (and requirements) with the observation systems owners including space and surface components. It influenced some of the space agencies plans either directly or through the CGMS.

A representative (but small-enough to be agile) core team was put together by WMO to this end, with the purpose of finalizing the product in 2026. This effort is expected to provide the community with a vision that will help coalesce efforts toward a cohesive, complementary global observing system. The vision should be as well-informed and technically accurate as possible, and should inspire the community to design, evolve and deploy a complementary global observing system that addresses the needs of the future, and leverages the emerging opportunities.

WIGOS Vision Update group was established under SC-ON of the Infrastructure commission. The working structure of the WIGOS Vision Update Group has eight specialized subgroups formed to address different aspects of the vision. Subgroup 2 (SG2) is responsible for space component evolution.

A tentative timeline and milestones for finalizing the WIGOS Vision 2025:

- 28-29 April 2025 – Face-to-face meeting of the WIGOS Vision Update Group.
- September 2025 – Community engagement workshop.
- July 2026 – Drafting and finalization process, with a goal of presenting the final document at WMO Congress in 2027.

CGMS-53-CGMS-WP-13 - CGMSSEC proposal for a coordinated CGMS response to the WIGOS Vision update

Sean Burns (SeB) (EUMETSAT) CGMSSEC proposal for a coordinated CGMS response to the WIGOS Vision update. He explained the current composition of the WIGOS Vision drafting team and sub-group structure under WMO. In order to provide CGMS high-level guidance to the work of the WMO sub-group on space, it is proposed that a consolidated CGMS position paper is developed under the leadership of WGIII and supported by CGMSSEC. Schedule will be aligned with the WMO WIGOS Vision 2050 milestones. The outline will be presented in the WIGOS Vision Workshop 28 Apr 2025, and preliminary position paper will be expected in CGMS-53 Plenary.

It will cover minimum following aspects:

- Coverage of user requirements for Earth system monitoring,
- Focus on a core constellation, fully committed by CGMS members;
- Evolution of the 4-tier concept;
- Consideration of emerging capabilities;
- Contributions of commercial satellites;
- Impact of AI/ML;
- Ground segment aspects;

It was agreed that WGIII recommends to CGMS-53 plenary the proposal for developing a CGMS position paper on the WIGOS Vision 2050 according to the timeline provided in this working paper, and ask for nominations from CGMS members who would like to be involved in this process/join this effort.

Sid Boukabara thanked CGMS Sec for initiating this activity and emphasized the importance to find the balance in WIGOS Vision not to be too descriptive but also keep guidance aspect. Also, HP added that this is very important activity serving the WMO need engaging with space agencies. MK on behalf of NOAA concurs with the proposal to develop a consolidated CGMS position on the update to the WIGOS Vision and believe the timeline laid out by the CGMS Secretariat is appropriate.

CGMS-53 ACTIONS - WGIII				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
CGMS members	4	WGIII/53.02	CGMS members to review focus areas of the CGMS position paper on WIGOS Vision 2050 update	15 Apr 2025

4. WMO OSCAR/Space database status update

CGMS-53-WMO-WP-06 - Status and plans of WMO OSCAR/Space database

HP presented an update on status and plans of WMO OSCAR/Space database. The main mechanism for the WMO Space Programme Office to collect the relevant information for the database content updating is through online templates submitted to the OSCAR/Space Support Team (O/SST) members, usually two to three times per year. In addition, the similar request was sent to some non-CGMS members having their satellites in OSCAR/Space. Hp explained the ongoing issues to receive feedback from space agencies. He underlined the importance of the space agency focal points to promptly respond to update requests by WMO.

OSCAR/Space is a key tool and information source to support the WMO Rolling Review of Requirements (RRR) process and WMO Gap Analysis (CGMS-53-WMO-WP-07), which are used to monitor the compliance of satellite programmes in the implementation of the CGMS Baseline and the space-based component of the Vision for WIGOS in 2040 (WMO-No. 1243).

WMO Space Programme Office continued a successful development framework with a contractor for the OSCAR/Space technical maintenance. The recent development plan in 2024 resulted software release including Microsoft Azure compliant software version with Single Sign on login using WMO identity providers, automatic update of EOL and launch dates at year end and implementation of Essential Climate Variable filter in gap analysis. The major miles stones in 2025 are the implementation of a reporting tool for Radio Frequency Interferences, modify frequency interface not displaying TT&C frequency information, separate out primary space agency and collaborating agency in user interfaces, improve filtering for Essential Climate Variables in gap analysis, improve accessibility of space agency instrument pages for monitoring and calibration, modify information displayed on MW frequencies and automate updates of data latency information. In addition, WMO wants to Kick off the work towards OSCAR/Analysis including the first step to combine variable requirements with OSCAR/Space capabilities.

At the end of the presentation HP wanted to thank all space agencies who contributed to Space Programme Trust Fund, which is very critical founding source for OSCAR/Space operations and development.

5. Socio economic benefits (SEB)

CGMS-53-WGIII-WP-09WGIII - Update on CGMS socio economic benefit activities (future direction 2022+)

Yasuhiko Sumida (YS) (JMA) presented the status and background of the ongoing task to assess SEB studies on satellite data. A survey will be conducted among CGMS members to gather insights on existing SEB studies and expectations for future assessments. In addition, there is a plan to organize a workshop on SEB methodologies and impact assessment.

So far, the survey had only few responses. YS kindly ask each CGMS member agency to cooperate by actively submitting information to increase the effectiveness of this survey by 11 April 2025 (https://forms.office.com/r/nAztzSRwmU).

AT on behalf of CGMS Sec also encouraged CGMS agencies to respond the survey.

CGMS-53-CMA-WP-05 - Best practices for regional EW4ALL for the benefit of the local government

Mingjuan Li (ML) (CMA) gave the best practices for regional EW4ALL for the benefit of the local government presentation. She gave a short introduction on Feng Yun satellite system, because that is the basis for their satellite data-based applications. She presented four application areas: Weather Monitoring (hailstorm early warning, supercooled cloud water detection), Disaster Prevention and Mitigation (monitoring of ice, flood, land surface temperature, snow cover, and fog).), Crop Monitoring (food security, bloom time monitoring, frost and heat stress) and Ecological Conservation in Qinling and Yellow River Basin (scientific basis for ecological protection policies, climate bulletin).

China released "Early Warning Promoting Climate Change Adaptation Action Plan" in Nov 2024. Related to that, the “Silk Road–Meteorological Zhitian” Meteorological Early Warning and Agricultural and Ecological Meteorological Platform was established. It is tri-lingual (Chinese, Russian, English) platform including five modules. The role of FY satellite data is to expand provincial and regional remote sensing

products in Belt and Road international services, strengthen the product foundation, providing high-frequency real-time monitoring services for Central Asia. It offers 50+ remote sensing products, enabling services for drought, vegetation, water bodies, dust storms, glaciers, and other scenarios to meet agricultural, ecological, and diversified needs.

SeB wanted thank CMA and acknowledged the great set of products and developments in the utilisation of FY satellite data.

HP thanked CMA for a great presentation and proposed an action to CMA present this in CGMS-54 WGIV.

CGMS-53 ACTIONS - WGIII				
Actionee	**AGN item**	**Action**	**Description**	**Deadline**
CMA	7	WGIII/53.03	CMA to present Best practices for regional EW4ALL for the benefit of the local government in CGMS-54 WGIV meeting.	CGMS-54

This action has been transferred to WGIV following plenary.

6. Public-private partnerships

6.1 Future direction 2022+ initiative

CGMS-53-WGIII-WP-07 - Relationship with the private sector: Closure proposal and next steps

Mary Ann Kutny (MK) (NOAA) (remotely) on behalf of the CGMS Futures Champion Mara Brown provided an update on CGMS Future Direction 2022+ Relationship with the Private Sector theme. She was outlining the key achievements:

- Best Practices for Commercial Data Purchases were developed and endorsed at CGMS-52.
- CGMS-52 endorsed WGIII's recommendation to have a standing agenda item on CGMS's members' private sector engagement.

This intersessional period the focus is on the mechanism how to engage with commercial sector and continue evaluating (e.g. CGMS WGII and IROWG) Earth Observation technologies that may be available to Members to supplement governmental observations.

It was recommended to institutionalize collaboration between CGMS and the WMO PPE Office/ Open Consultative Platform (OCP) as a mechanism to engage commercial industry (Recommendation 1). The WMO Public-Private Engagement Office Director will present OCP plans annually at WGIII intersessional meetings, thus giving CGMS an opportunity to provide a space sector perspective. Therefore, PPE office representative will be invited to CGMS WGIII intersessional meetings from now. CGMS will benefit of the access to broad convening power of WMO OCP, which is staffed. Also, WMO will benefit the Information from space agencies to inform private sector engagement for the benefit of WMO Members.

It was recommended to sunset the Future Direction Project 2022+ relationship to the Private sector theme and continue the ongoing activities above.

- 1.6.1. Identify/evaluate potential or commercial Earth observation technologies -- and share information on pilots/testbeds etc. to evaluate new commercial EO technologies.

o WGIII has successfully institutionalized this action through the adoption by CGMS 52 of the WGIII standing agenda item, and item 1.6.1 could be considered complete.

- 1.6.2 Assess the operational maturity of commercial observation technology

o CGMS WGIII will consider technologies presented under its standing agenda item on public private engagement with collaboration of WMO PPE office, and the item 1.6.2 can be considered completed.

- 1.6.3 Develop best practices/templates for end user license agreements/ procurements, for considering the value of public access and the additional costs of data sharing rights, including quality control considerations

o CGMS 52 endorsed the best practices document in 2024. WGIII has an action to review the best practices document every two years an update if needed.

HP and AT wanted to thank NOAA and Mara Brown for the great work she has done as the CGMS Futures Champion for the Relationship with the private sector theme. They look forward the continuation within WGIII and WMO PPE office.

6.2 Private sector engagement

CGMS-53-CMA-WP-06 - CMA updates on private sector engagement

Mi Liao (ML) (CMA) gave a presentation on CMA private sector engagement. She explained the need for the balance the hybrid satellite observing architecture to deliver cost-effective and high-quality data to operational meteorological users and respond to their evolving needs for operational and R&D-focused observations. Then, hybrid architecture will consist of constellations of smaller satellites with less accurate sensors, complementing the large satellite constellations.

As an ongoing CMA effort to guide the developments of hybrid satellites, China encourages creating space for commercial aerospace development, and point out the encouragement of “business if possible“. CMA explores the development of small satellite constellations, such as microwave temperature and humidity profiles, GNSS radio occultation and reflective wind measurement, high spatiotemporal resolution cloud and precipitation observation. The future small sat constellation is called the "the Belt and Road" meteorological small satellite constellation. Thus, Fengyun plus framework, aims to explore business cooperation patterns for coordinated observation between large and small satellites.

CMA has issued operational requirements for commercial satellite meteorological observation

services at the end of 2024, so the first batch of commercial RO data from two companies

Tianmu (23 satellites) and Yunyao (12 satellites) was brought into CMA. Operational data delivered to CMA consist of 45 000 RO profiles. They are operationally assimilated into CMA's operational NWP system (CMA-GFS 4.2).

HP was asking a question about the RO data quality and the assimilation impact study results of 45000 RO profiles. It was agreed that CMA will present those results in the CGMS-54 working group meeting.

CGMS-53 ACTIONS - WGIII				
Actionee	**AGN item**	**Action**	**Description**	**Deadline**
CMA	3.2	WGIII/53.01	CMA to present in CGMS-54 WGIII meeting RO impact studies of commercial RO data assimilated in their NWP model	CGMS-54

CGMS-53-NOAA-WP-05 - NOAA updates on private sector engagement

MJ presented NOAA updates on private sector engagement. their future architecture development on small sat market and their engagement with private sector. As NOAA aims to expand observations, evolve models, and improve information systems, we require more partnerships, as well as a reimagining of how we design, acquire and operate future observation information systems. Given the rapid pace of innovation, the commercial aerospace arena and remote sensing capabilities are becoming an increasing part of NOAA's future architecture as we continue to integrate commercial satellite environmental data into our portfolio of satellites for NOAA operational services and for other government agencies and international partners.

This year, NOAA's Commercial Data Program (CDP) successfully engaged with the commercial sector through pilots and acquisition of operational satellite data-as-a-service for commercial data to help improve weather forecasts and provide risk reduction to the overall observing system. In December 2024, NOAA also released its Guidance for Commercial Data Buys, which lays out the considerations, best practices, and guidelines by which NOAA programs and offices should consider when engaging in commercial data buy opportunities from sources that contribute to environmental intelligence. NOAA commercial data buy guidance is aligned with best practices endorsed by CGMS in 2024.

NOAA space-based commercial weather data buys:

- Radio Occultation Data Buy II (RODB-2), 2023-2028
  - Delivery Order 5 (Sep 2024 – Sept 2025)
  - NOAA contracted with Spire Global and PlanetIQ for 3,000 near-real-time GNSS RO data profiles per day (Neutral Atmosphere Data only)
  - All data purchased with unlimited distribution rights, and no duplication with other data sales by Spire
  - Annual RFI to seek additional sources

NOAA Commercial Weather Data Pilots:

- GNSS-R Ocean Surface Winds (OSW) Pilot (ongoing): 2024 - 2025
- Microwave Sounder Pilot (ongoing): 2024 - 2026
- Space Weather Pilot- Completed: Ended in 2024

HP asked about the ongoing NOAA issued RFIs on commercial space capabilities. MK confirmed that there are two RFIs open and provided links for the further information:

https://www.space.commerce.gov/noaa-issues-2025-rfi-on-commercial-space-capabilities/

https://sam.gov/opp/0e7bc9f95fda41348224d17ffe398b2e/view

7. Updates on significant observational missions (in response to/from a CGMS baseline/risk assessment point of view)

7.1 Operational missions

CGMS-53-CMA-WP-07 - Status of upcoming CMA missions

Min Guan (MG) (CMA) a status update on upcoming CMA missions. In 2025, CMA will launch two meteorological satellites, Fengyun-3H (FY-3H) and Fengyun-4C (FY-4C).

FY-3H is a sun synchronous afternoon orbit satellite, mainly used for quantitative atmospheric detection and climate monitoring. The data is used for weather forecasting, atmospheric chemistry, and climate monitoring operations and research, and is equipped with nine instruments. FY-3H will be launched in Oct 2025.

FY-4C is a geostationary orbit satellite equipped with 3 Earth observation instruments, including an imager, a sounder, and a lightning imager, as well as 3 space weather observation instruments. It is planned to be launched by the end of 2025. After the successful launch of FY-4C, it will form an east-west network operational configuration with FY-4B.

CGMS-53-CMA-WP-14 - Status of greenhouse gas missions in China

Lin Chen (LC) (CMA) presented the status of China's greenhouse gas satellite missions (CO_2, CH_4, aerosols). FY-3D/GAS and DQ1 are operating normally, but TanSat has now stopped working. The next generation CMA GHG satellites FY-3H with GAS-II (passive instrument) will be launched in Oct 2025 and TanSat-2 (passive) will be launched in May 2026. DQ-2 (active-passive combined) will be launch in 2026. CMA does not have plans to have GEO satellite instrument for GHG monitoring.

She pointed out that it is difficult for any satellite to meet the growing demand for greenhouse gas monitoring by itself. Therefore, greenhouse gas satellites need to form a virtual constellation, or at least establish data standards to facilitate data fusion. There is scarcity of high-quality ground-based data for calibration and validation, the establishment of a cooperative group for related data sharing is needed.

CGMS-53-EUMETSAT-WP-07 - EUMETSAT's approach for continuation of IODC observations

Sean Burns (SeB) (EUMETSAT) gave a status of IODC observations. The 106th EUMETSAT Council authorised EUMETSAT for the preparation of operational plans to extend the IODC service with Meteosat-10. This is subject to the condition that Meteosat-10 would only be moved once MTG-I2 is operational and noting that final authorisation to relocate Meteosat-10 would be subject to a dedicated Council decision. Meteosat-9 (current IOCD satellite) end of life is currently planned for mid-2027. EUMETSAT are assessing the possibility to extend the lifetime until mid-2028 to reduce the risk to IOCD service continuity.

This continues the best effort undertaking which reflects a decision of the EUMETSAT Council to use a residual Meteosat Second Generation capacity for this purpose, in the context of a temporary data gap over the Indian Ocean. The decisions on the location and timing of any Meteosat-10 move are foreseen by the EUMETSAT Council at the end of 2025.

CGMS-53-ESA-WP-05 - Status of the CIMR-A and -B programme

Armin Loescher (AL) (ESA) (remotely) gave a presentation on CIMR programme status. CIMR (The Copernicus Imaging Microwave Radiometer Mission) is ESA-EU funded for 2 (+1 optional) Spacecraft mission. Full industrial consortium was released with 70+ European sub-contractors in 16 countries. It has synergy with other Copernicus Expansion missions (eg. Ground Segment, Platform). Th mission is now in Phase CD, which means Project Design Review was completed in 2022. Critical Design Revies are taking place in 2025 and 2026, and Proto Flight Model will be ready in 2028.

Polar Oceans are fundamental to understanding in the global environment. CIMR mission is designed to prevent the anticipated Gap in capability for an ice-free Arctic Ocean monitoring. It is monitoring sea ice concentration, sea surface temperature, sea ice thickness, sea surface salinity, wind speed and soil moisture. It measures every ~6 hours in the Polar regions with no hole at the pole, and high spatial resolution (5–15 km, 95% global coverage every day). CIMR will be a “Game Changer” and major complement of the current Copernicus line-up.

SeB complemented that EUMETSAT will take care of the data hosting and dissemination. PR asked about intersessional polar year in 2025, and if CIMR linked to polar year. AL responded that he is not sure, but agreed it is very good idea. Xu Na asked about the lifetime of the satellite. AL responded that the design lifetime is around 7 years but could be operated even 12 years in a good case.

7.2 Research missions

None discussed.

8. CGMS baseline and risk assessment

CGMS-53-WMO-WP-07 - WMO Gap Analysis

Heikki Pohjola (HP) (WMO) presented the WMO Gap Analysis covering Earth observation and space weather observation gaps against WMO WIGOS Vision 2040. The basic inputs for this analysis were from the WMO OSCAR/Space database, which is continuously updated with the latest satellite status provided by the space agencies. The results are dependent on the lifetime of the satellites being accurate which is often not the case as dates can be extended subject to the payload's technical functionality and funding being available. The summary charts were presented together with the more detailed analysis of the recognized gaps related to the instrument types in the WIGOS sub-components 1 and 2 for the next decade. The gap analysis summarises 18 gaps for Earth observation and 7 gaps for space weather.

As a summary of the most critical gaps in WIGOS based on WMO Gap Analysis he summarized 1) Doppler wind Lidar measurements on LEO/Drift, 2) high temporal MW sounders on LEO/Drift orbits, 3) greenhouse gas measurements and 4) limb sounder in IR and MW on LEO/Drift orbits (action from 7th Risk Assessment Workshop). These are important measurement areas where the future plans are not confirmed (1,2,3) or missing completely (4).

Table 1. Summary of the recognised gaps in WMO gap analysis for Earth observation.

01	*Hyperspectral IR sounders (GEO)*	*10*	*GNSS Reflectometry (LEO/Drift)*
02	*UV/VIS/NIR sounders (GEO)*	*11*	*Doppler Wind Lidar (LEO/Drift)*
03	*Day-night visible imagers (LEO)*	*12*	*Backscatter Dial Lidar (LEO/Drift)*
04	*Microwave Imagers (LEO)*	*13*	*Lidar and wide swath radar for Altimetry (LEO/Drift)*
05	*Low frequency microwave imager (LEO)*	*14*	*Limb sounder in IR and MW (LEO/Drift)*
06	*UV/VIS Nadir and Limb Sounders (LEO)*	*15*	*UV/VIS/NIR spectrometer (LEO/Drift)*
07	*Precipitation radar and cloud radar*	*16*	*High Temporal MW Sounders (LEO/Drift)*
08	*Total and spectral solar irradiance (LEO)*	*17*	*Multi-angle polarised radiometer (LEO)*
09	*Altimeter lidar (Drift)*	*18*	*SW Occultation limb sounder*

Table 2. Summary of the recognised gaps in WMO gap analysis for space weather observations.

01	*Solar wind, coronograph and magnetic field observations from L1 beyond 2033.*	*05*	*Solar heliospheric imagers from L1*
02	*Solar X-ray spectrograph observations from LEO.*	*06*	*Observations of electric, magnetic and radio wave fields from polar orbits (LEO, HEO)*
03	*Solar X-ray/UV/EUV spectrometers and imagers at L1.*	*07*	*Radio wave measurements from polar orbits (LEO, HEO)*
04	*Observations of magnetic fields from L1 and solar orbits*		

CGMS-53-WGIII-WP-02WGIII - Status and outcome of the 7th CGMS Risk Assessment

Melissa Johnson (MJ) (NOAA) presented the risk assessment preparation and explained the process how data for flyout charts were collected. NOAA is requesting the updates from space agencies just before the risk assessment workshop to ensure that data reflects the most up-to-date situation related to the missions of the space agencies. MJ presented the lates version of the risk assessment slide set, which was coordinated between NOAA, satellite operators and WMO. MK thanked the input from all space agencies for the Risk Assessment.

The following updates were noted during the flyout chart review:

- FY-4D EOL moved to 2034
- FY-4E EOL moved to 2035
- FY-4F launch moved to 2029
- HY-2B EOL moved to 2025
- Sentinel mission EOLs now include 2.5 yr life extension
  - Sentinel-1A EOL moved to 2025
  - Sentinel-1C EOL moved to 2034
  - Sentinel-1D EOL moved to 2035
  - Sentinel-2C EOL moved to 2034
  - Sentinel-2D EOL moved to 2038
  - Sentinel-3C EOL moved to 2036
  - Sentinel-3D EOL moved to 2038

- Sentinel-5P EOL moved to 2027
- Sentinel-6A/MF EOL moved to 2028

- MetOp-B EOL moved to 2027
- MTG-I3 launch moved to 2033 and EOL to 2043
- INSAT-3DS EOl moved to 2034
- GCOM-C and GCOM-W EOLs moved to 2025
- GOSAT and GOSAT-2 EOLs moved to 2025
- GOSAT-GW launch moved to 2025 and EOL to 2032
- Himawari-10 launch moved to 2028
- GOES-18 EOL moved to 2040
- GEO-XO I1 launch moved to 2032 and EOL to 2040
- NOAA-15, 18 and 19 EOL moved to 2025
- NOAA-20 EOL moved to 2031
- NOAA-21 EOL moved to 2036
- JPSS-4 EOL moved to 2036
- JPSS-3 EOL moved to 2041
- ALOS-2 EOL moved to 2025
- ALOS-4 launch moved to 2024 and EOL to 2031
- SOHO EOL has been moved to 2027
- DSCOVR EOL has been moved to 2028

The flyout charts also reflect the following additional updates:

- GOES-16, GOES-17, Himawari-8 and INSAT-3D have now been listed as on-orbit spares for the appropriate observations
- GOES-U is now GOES-19
- AWS and EPS Sterna 1, 2 and 3 have now been added to the Microwave Sounder flyout
- GeoXO-I2 has now been added to the flyouts for GEO Imager, Lightning Mapper, and Narrow Band Visible & Near Infrared Imager

- FY-4D has been added to the flyouts for Hyperspectral Infrared Sounder, GEO Imager, Lightning Mapper, EUV Imager, and Energetic Particle Sensors in GEO (Low, High and Very High)
- FY-4E has been added to the flyouts for Hyperspectral Infrared Sounder, GEO Imager and Magnetometer in GEO
- FY-4F has been added to the flyouts for Hyperspectral Infrared Sounder, GEO Imager, and Lightning Mapper
- Metop-SG-B2 has been added to the flyout for Radio Occultation
- GK-2B removed from the flyouts for GEO Imager, Narrow Band Visible & Near Infrared Imager, and Visible/UV Spectrometer
- SWNext SOL-A and SOL-B have been added to the flyouts for Magnetometer at L1, Energetic Particle Sensor at L1, Plasma Analyzer, Coronagraph, and X-ray Spectrograph
- GK-5 has been added to the flyouts for GEO Imager, Energetic Particle Sensor High, and Magnetometer GEO
- CIMR-A and B have been added to the flyout for Microwave Imager
- CRISTAL-A and B have been added to the flyout for Radar Altimetry
- EarthCARE has been removed from the flyouts for Sub-Millimeter Ice Cloud Imager and Precipitation Radar, and has been added to the flyout for LEO Imagers

After the review the top-level risk assessment reflects the following high-risk areas:

- Continuity risk from RO observations in low inclination orbits in the later part of the decade as there is no commitment for a follow-on to COSMIC-2.
  - Ongoing action on SWCG to make a recommendation to WGIII how to separate RO and Ionospheric Electron Density profiles.

In addition, the top-level risk assessment reflects the following moderate risk areas:

- Slight long-term continuity risk for the UV Limb Spectrometer
  - Ongoing action on WGII to investigate other capabilities for UV limb sounding to complement JPSS
- Slight long-term continuity risk for the SWIR Imaging Spectrometer
  - Ongoing action on GHG TT via WGII has action to indicate if SWIR missions for CH_4 and CO_2be added to the baseline
- Slight long-term continuity risk for the Precipitation Radar

- Ongoing action on NASA and JAXA to provide additional information on the GPM continuation mission

- Slight long-term continuity risk for the Microwave Imager
- Slight long-term continuity risk for Scatterometry
- Slight long-term continuity risk for Coronagraphy in GEO
- Slight long-term continuity risk for Energetic Particle Sensors in LEO

HP was commenting that there are many RO profiles available from the commercial sector, and we need to put more effort into data buys. This was successfully demonstrated in the NOAA/EUMETSAT commercial data buy pilots.

Sean Burns (SeB) (EUMETSAT) noted that MTG-I1 indicated in the slides has been renamed to Meteosat-12.

CGMS-53-WGIII-WP-01WGIII - CGMS baseline document updates proposed from the 7th risk assessment workshop (Recommendation to plenary)

Anne Taube (AT) (EUMETSAT) presented CGMS baseline document update. The following updates were proposed and submitted to plenary:

Observations and orbits Section:

- Review with CMA the GEO slot range slots in the attributes and if they cover all CMA satellites.
- Radio occultation to have separate sensor type for Ionospheric Electron Density - to be discussed with SWCG and for SWCG to provide a recommendation to CGMS-53 WGIII or 8th risk assessment WS.
- A day-night visible channel in the LEO early morning and afternoon orbits are missing in the Risk Assessment
- IR dual-angle view imagery for high-accuracy SST (at least one am spacecraft) is missing in the Risk Assessment
- For VIS/UV and Narrow Band Imager sensors 128.2 deg GEO location was removed (GEMS not part of the baseline)
- For Coronagraph, Interplanetary Magnetometer and Plasma Analyser sensors, L5 was added as an orbit
- For Interplanetary Magnetometer and Plasma Analyser sensors, L5 as in-situ measurement was added as an attribute.

HP commented that the instrument table in the baseline document needs some revisions in the 8th Risk Assessment Workshop. For example, in the orbit column it mixes with orbits and sun-earth line, which is not actual orbit.

It was discussed that "day-night visible channel instruments in LEO early morning and afternoon orbits" and "IR dual-angle view imager for high-accuracy SST (at least one am spacecraft)" will be added to risk assessment by CGMS-53 Plenary (edit: After the meeting it was agreed that this change will be made for the 8th workshop only, because it does not effect on the risk assessment at the moment.).

TS commented that GOES XO has a narrow band imager, but all GEO XO will be added into risk assessment only for the next risk assessment workshop. This was confirmed by Mary Ann Kutny (MK) (NOAA).

CGMS-53-WGIII-WP-11 - CGMS contingency plan - editorial updates proposed from the 7th risk assessment workshop (For confirmation by plenary)

AT presented CGMS Contingency Plan update. The following updates were proposed and will be submitted to plenary.

In the reference documents:

- Revised annually instead of every four years.
- All reference documents to be updated the CGMS-53 versions

2. Any outstanding items on the baseline and risk assessment

None.

9. Review of actions

9.1 Review of CGMS-52 and CGMS-53 actions

CGMS-53-WGIII-WP-05 - CGMS-52 WGIII list of actions and any relevant CGMS-52 plenary actions

The CGMS Secretariat presented the status of CGMS WGIII and risk assessment actions and WGIII updated the as necessary.

CGMS-53-WGIII-WP-10 - CGMS-53 WGIII actions

WGIII confirmed the new actions raised and as recorded by the rapporteur.

10. CGMS High Level Priority Plan (HLPP

10.1 Review and updating of the HLPP

CGMS-53-CGMS-WP-07WGIII - Recap of summary of WGIII status of implementation of CGMS HLPP (2024-2028)

Mikael Rattenborg (MR) (CGMS SEC) presented HLPP risk areas related to operational continuity and contingency planning.

1.1.1 Ensure continuity of passive microwave imager measurements:

- General situation for MW imagers is good, but concern remains for continuity of specific MW measurements. For low frequency conical scanning CIMR-A/B remains to be confirmed by ESA. For precipitation identification of critical measurements is needed. There are related WGIII/II actions to mitigate more detailed application needs.

1.1.2 Ensure continuity of Scatterometer measurements:

- ISRO to confirm plans beyond OceanSat-3A.

1.2.4 Ensure continuity of Radio Occultation Measurements with required quantity, geographical coverage and temporal sampling for numerical weather prediction and

for ionospheric monitoring:

- There is a gap between available observations and the baseline commitment, which should be better characterized through actions on IROWG.

1.2.1 Work towards establishing optimum constellations for new observations introduced in the CGMS baseline:

Short Wave IR Spectrometers for monitoring of Greenhouse Gases (CO_2 and C_4); SWIR; input from WGClimate to establish which instruments are in the baseline

- Ongoing, input expected from WGClimate

Multi-viewing, multi-channel, multi- polarisation imaging for aerosols;

- The main capability will be provided by 3MI on Metop-SG A. Requirements for more frequent observations have not been stated in WMO GA. Action could be considered closed.

UV limb sounding spectrometry for profiles of Ozone and trace gases;

- Critical measurement of detailed profiling of O3 and trace gases. Main UV limb sounding continuity provided by JPSS on PM orbit. Meteor and FY-3F were included in the Risk Assessment, but operational usage is unclear. Action on WG-II to look at the data and operational continuity.

Work towards operational observations of Top-of-Atmosphere Solar Irradiance

- This is anew proposed target based on WMO Gap Analysis and should be considered by WGIII.

Work towards operational Cloud Radar observations

- This is a new proposed target based on WMO Gap Analysis and should be considered by WGIII.

1.2.3 Work towards operational hourly daytime UV/VIS mapping of air quality from geostationary orbit

- Propose to change the status to yellow, as GEMS has now been removed from baseline and the UV GEO capability will only be provided by MTG-S1/Sentinel-4 for the foreseeable future.

1.2.4 Work towards ensuring optimised Hyperspectral IR measurements from LEO and GEO orbits to improve time sampling, spatial and spectral resolution and timeliness of observations, including the deployment of HSIR instruments across the GEO ring as per WIGOS vision 2040

- To be discussed with ITWG in preparation for ITSC in May 2025.

1.2.5 Work towards ensuring low frequency microwave imagery for all-weather SST and ice monitoring from at least 2 sun-synchronous orbits

- CIMR to be confirmed by ESA. Could then be considered achieved as the measurement will be provided from AMSR-3 (PM orbit) and CIMR (EM orbit).

1.2.7 Work towards increasing geographical resolution and coverage for altimetry measurements, including very high latitudes

- CRISTAL to be confirmed by EU/ESA. Regarding the general coverage of altimetry missions, very promising results are achieved by SWAT, but any operational mission in the future is unknown.

1.2.8 Advance the atmospheric Radio Occultation constellation, with the long-term goal of providing 20000 occultations per day with uniform spatial and local time coverage on a sustained basis

- ROMEX may provide new information on the RO saturation points, and this could result in an update to the target of 20000 daily occultations.

1.2.9 Work towards operational 3D wind profile observations from space-based lidar

- EPS-Aeolus is not yet confirmed

1.2.11 Work towards operational infrared/μwave limb sounding for climate monitoring and NWP applications

- Measurement will stop at Aura/MLS end of life. Science missions are being considered by NASA (SCRIBE) and ESA (CAIRT), but details, including data availability, are not yet available.

1.2.12 Establish the operational framework for the provision of magnetometer data from LEO orbit

1.2.13 Investigate continuous space weather observations from lunar orbit for terrestrial and future lunar space weather services as well as for heliophysics research, complementing the geostationary and L1 measurements.

1.2.14 Work towards auroral monitoring capabilities.

- SWCG input is needed

1.3 Ensure long-term continuity of OSCAR/Space as a primary tool to support the CGMS Risk assessment and the WMO Rolling Review of Requirements including gap analysis against observing system

requirements for satellite data and make OSCAR/Space the primary repository for WIGOS satellite metadata records generated by CGMS operators

- To be removed in HLPP due to highlighted elsewhere already

1.4.1 Support satellite impact studies, including in particular impact of data latency and the impact of the Early Morning orbit

- Impact workshop 2024 recognized the need for better consideration of data latency in impact studies.

1.4.2 Collect and make available to CGMS members SEB case studies of relevant satellite systems for the purpose of identifying common practices in the next phase.

- Compilation of undertaken SEB case studies ongoing and publication on the CGMS website. A survey will be undertaken starting in March 2025 to establish SEBs already undertaken, and if there are planned SEB to be undertaken by members. Preparing common or best practices is currently premature.

1.4.3 Explore with WMO and other agencies the possibility to develop a study on the SEB value of the space-based observing system responding to WIGOS 2040 in cooperation with CGMS, and to trigger collaboration with CGMS members

- WMO has previously indicated there are insufficient resources to do this. Item to be maintained if the scenario changes and in view of the WIGOS Vision 2050.

1.6.1 Identify/evaluate potential or future commercial Earth observation technologies – and share information on pilots/testbeds etc. to evaluate new commercial Earth observation technologies.

- Proposed for Closure: Working Group III has established a standing agenda item for presentations by Members regarding their current/future plans for engagement with the private sector; and if needed, WGIII will refer reported technologies to WGII for further evaluation.

1.6.2 Assess the operational maturity of commercial observation technology.

- No progress. Propose for closure: CGMS Best Practices for Commercial Data Buys adopted by CGMS-52 include recommendations on the assessment of the operational maturity of commercial observation technology; and WGIII established as standing agenda item for presentations on Members engagement with the private sector and, if needed, WGIII will refer reported observation technologies to WGII for further evaluation.

1.6.3 Develop best practices/templates for end user license agreements/procurements, for considering the value of public access and the additional costs of data sharing rights, including quality control considerations

- Green – completed. CGMS-52 Adopted the CGMS Best Practices for Commercial Data Buys. Initial version of Best Practices issued. Further actions TBD. Working Group III will review the need for updates every two years.

11. Future CGMS WGIII meetings

CGMS-53-CGMS-WP-14WGIII - Status of co-chairs/rapporteurs of the CGMS working groups, CGMS International Science Working Groups, VLab, and other groups

AT presented the current status of the co-chairs/rapporteurs of the CGMS working groups, CGMS International Science Working Groups, VLab, and other groups. She explained that the situation is generally good. However, CGMS members are invited to nominate candidates for the co-chair and rapporteur positions (or upcoming ones), and the CGMS working groups are requested to make recommendations on such nominations to plenary. Currently we are seeking nominations for

WGI: co-chair and co-rapporteur, WGIV: co-chair (and potentially co-rapporteur), SWCG: co-chair

VLab: CGMS co-chair

CGMS-53-WGIII-WP-08 - Confirmation of selected for WGIII inter-sessional activities/meetings in 2024-2025 (CGMS-53 to CGMS-54) and dates of the CGMS-53 WGIII plenary session

AT presented the next WGIII-related meetings.

WGIII intersessional meetings are taking place 25 Sep 2025, 12 Nov 2025, 21 Jan 2026 and 11 Mar 2026.

WGIII agreed on the 8th Risk Assessment Workshop to take place 3-5 Feb 2026 (virtual only).

She concluded that CGMS-54 plenary will take place in June 2026 in South Korea, and the CGMS-54 working groups will tentatively be held during the week from 13 April 2026 (EUMETSAT).

12. Any other business

13. Conclusions , preparation of the WGIII report for plenary

Co-Chair Irene Parker (and Mary Ann Kutny) (NOAA) concluded that meeting was well chaired and organized. She thanked very much for accommodating the remote participation. She wished to be there in person with you, and we look forward to seeing you all in France in June. HP and AT, on behalf of WMO and CGMS Sec, thanked CMA for the great hospitality and well-organized meeting. Co-Chair Tang Shihao concluded that meeting had very fruitful outcome to agree with WGIII main objectives including good discussion on WIGOS Vision update and many other topics. He wanted to thank CMA colleagues and polytechnical university for facilitating the meeting. He declared meeting closed.

LIST OF WGIII ACTIONS

CGMS-53 ACTIONS - WGIII				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
CMA	3.2	WGIII/53.01	CMA to present in CGMS-54 WGIII meeting RO impact studies of commercial RO data assimilated in their NWP model	CGMS-54
CGMS members	4	WGIII/53.02	CGMS members to review focus areas of the CGMS position paper on WIGOS Vision 2050 update	15 Apr 2025
CMA	7	WGIII/53.03	CMA to present Best practices for regional EW4ALL for the benefit of the local government in CGMS-54 WGIV meeting. *ACTION CLOSED IN WGIII AND TRANSFERRED TO WGIV LOA*	CGMS-54

CGMS-52 WGIII REMAINING OPEN ACTIONS				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
WGIII & WGII	7.1	WGIII/ 52.03	WGIII to recommend to WGII the need for articulating MW missions with different frequencies in the CGMS baseline and risk assessment in the future and how to visualise it in the flyout charts **ONGOING** (April 2025)	Q1/2026
WGIII for WGII/ GHG TT	7.1	WGIII/ 52.04	WGIII for WGII: GHG TT to review representation of SWIR missions for CH_4, and CO_2 in the CGMS baseline and the risk assessment **ONGOING** (April 2025) WGII nominated Wenying Su (WGClimate) as a focal point for their support. 7th risk assessment: Addressed with WGII. (Action rephrased at the 7th RAWS). Recalled in CGMS WGII IS#3 to WGII who will address it at their IS#4 session on 24 Feb 2025. simon.elliot@eumetsat.int IS#2: feedback from GHG TT still pending Heikki/WMO contacted GHG TT focal point (Simon Elliott) to communicate request to GHG TT. WGIII IS#1: Heikki/WMO to draft an input for sending to the GHG TT and SWCG leading entities.	Q1/2026

7th CGMS RISK ASSESSMENT WORKSHOP ACTIONS						
Actionee	**AGN item**	**Action #**	**Description**	**Feedback**	**Deadline**	**Status**
WMO	4	7RAWS-1	WMO to provide a summary of the most critical gaps in WIGOS based on WMO Gap Analysis		CGMS-53 WGIII	**OPEN**
SWCG	4	7RAWS-2	The SWCG to review WMO space weather gap analysis and inform WMO on missing or incorrect (NRT) data availability indicated in the WMO Gap Analysis document.		CGMS-53 SWCG	**OPEN**
EUM	5	7RAWS-3	EUMETSAT to provide updated graphics of the RO profiles available per satellite mission vs time.	Provided to the risk assessment book captain (NOAA/Melissa Johnson)	CGMS-53 WGIII	**OPEN**
NASA, JAXA	5	7RAWS-4	NASA and JAXA to provide a coordinated additional information on possible GPM continuation mission.		CGMS-53 WGIII	**OPEN**
NASA	5	7RAWS-5	NASA on IMAP mission and if its data is compliant with CGMS Baseline criteria.		CGMS-53 WGIII	**OPEN**
CGMSSEC	7th risk assessment WS	7RAWS-6	CGMSSEC to contact ESA to clarify EarthCare instruments and to which observations it should be included in the risk assessment		CGMS-53 WGIII	**OPEN**
Action on CMA	7th risk assessment WS	7RAWS-7	CMA to confirm if current GEO slots in the Baseline document are compliant with the locations of CMA satellites.	CMA confirmed the baseline document is currently compliant.	CGMS-53 WGIII	**CLOSED**
Action on SWCG	7th risk assessment WS	7RAWS-8	The SWCG to make a recommendation to WGIII how to separate RO and Ionospheric Electron Density profiles in the CGMS Baseline and the risk assessment documents.		CGMS-53 plenary/CGMS-54	**OPEN**
Action on SWCG	7th risk assessment WS	7RAWS-9	The SWCG to define how to add each satellite position in the attributes of the in-situ measurements of CGMS Baseline.	SWCG complemented the baseline document as necessary at this stage.	CGMS-53 SWCG	**CLOSED**

7th CGMS RISK ASSESSMENT WORKSHOP ACTIONS						
Actionee	**AGN item**	**Action #**	**Description**	**Feedback**	**Deadline**	**Status**
Action on NASA/ESA	7th risk assessment WS	7RAWS-10	NASA and ESA to confirm if the L5 JEDI mission and its data is compliant with CGMS Baseline criteria.		CGMS-53 WGIII	**OPEN**
Action on ESA	7th risk assessment WS	7RAWS-11	ESA to (re)confirm if Vigil data is compliant with CGMS Baseline criteria, and if its instruments could be added to the plasma analyser and interplanetary magnetometer measurement of the CGMS Baseline	E-mail from J-P Luntamaa/ESA: He confirms that ESA Vigil mission data from the baseline instruments is compliant with the CGMS Baseline principles. This compliancy applies to the following Vigil instruments: • Coronagraph (CCOR) • Heliospheric Imager (HI) • Magnetograph (PMI) • Solar wind Plasma Analyser (PLA) • Magnetometer (MAG) Data from CCOR will remain owned by NOAA and they will also handle the data dissemination to the users. NOAA has confirmed that all NOAA data will be compliant with CGMS Baseline.	CGMS-53 WGIII/plenary	**CLOSED**
Action on WGII	7th risk assessment WS	7RAWS-12	WGII to investigate other capabilities for UV limb sounding to complement JPSS	*Action transferred to WGII*	Jan/Feb 2026 CGMS-54	**OPEN**
Action on WGII	7th risk assessment WS	7RAWS-13	WGII to study and report back to WGIII the need of top of the atmosphere spectral solar irradiance capabilities to be recorded in CGMS Risk Assessment and Baseline. (Link to HLPP, being addressed by WGII)		CGMS-53 WGII	**OPEN**

LIST OF WGIII PARTICIPANTS

CGMS-53 - WGIII List of Participants			
First name	Last name	Organisation	Email
Anne	Taube	CGMS Secretariat	anne.taube@eumetsat.int
Mikael	Rattenborg	CGMS Secretariat	mikael@rattenborg.eu
Chang	Liu	CMA/NSMC	liuc@cma.gov.cn
Di	Xian	CMA/NSMC	xiandi@cma.gov.cn
Min	Guan	CMA/NSMC	guanmin@cma.gov.cn
Na	Xu	CMA/NSMC	xuna@cma.gov.cn
Tang	Shihao	CMA/NSMC	tangsh@cma.gov.cn
Mingjuan	Li	CMA/Shaanxi Provincial Met. Service	sxpms_lmj@126.com
Armin	Löscher	ESA	armin.loescher@esa.int
Juha-Pekka	Luntama	ESA	juha-pekka.luntama@esa.int
Andrew	Monham	EUMETSAT	andrew.monham@eumetsat.int
Miruna	Stoicescu	EUMETSAT	miruna.stoicescu@eumetsat.int
Paolo	Ruti	EUMETSAT	Paolo.Ruti@eumetsat.int
Sean	Burns	EUMETSAT	sean.burns@eumetsat.int
Babu Govindha Raj	Kesavannamboothiri	ISRO	govind@isro.gov.in
Misako	Kachi	JAXA	kachi.misako@jaxa.jp
Osamu	Ochiai	JAXA	ochiai.osamu@jaxa.jp
Kazuki	Yasui	JMA	k_yasui@met.kishou.go.jp
Miki	Abe	JMA	abe.miki@met.kishou.go.jp
Nakayama	Ryuichiro	JMA	r-nakayama@met.kishou.go.jp
Norio	Kamekawa	JMA	orion-kamekawa@met.kishou.go.jp
Shiro	Omori	JMA	s-ohmori@met.kishou.go.jp
Taro	Ono	JMA	taro.ono@met.kishou.go.jp
Tsuneyuki	Harada	JMA	t.harada@met.kishou.go.jp
Yasuhiko	Sumida	JMA	y_sumida@met.kishou.go.jp
Yumiko	Yamane	JMA	yamane.yumi@met.kishou.go.jp
Dohyeong	Kim	KMA	dolong@korea.kr
Jiyoung	Kim	KMA	aceasia@korea.kr
Yumi	Seo	KMA	hohoo11@korea.kr
Jaegwan	Kim	KMA	kimjgwan@korea.kr

CGMS-53 - WGIII List of Participants			
First name	**Last name**	**Organisation**	**Email**
Geun-Hyeok	Ryu	KMA	geunhyeokryu@korea.kr
Yeji	Hwang	KMA	yejihwang@korea.kr
Kwang Deuk	Ahn	KMA	stratus12@korea.kr
Eric	Mcvay	NASA	eric.s.mcvay@nasa.gov
Sid	Boukabara	NASA	sid.a.boukabara@nasa.gov
Tsutomu	Nagatsuma	NICT	tnagatsu@nict.go.jp
Lihang	Zhou	NOAA	lihang.zhou@noaa.gov
Melissa	Andersen Garcia	NOAA	melissa.garcia@noaa.gov
Andrew	Heidinger	NOAA/NESDIS	andrew.heidinger@noaa.gov
Irene	Parker	NOAA/NESDIS	Irene.Parker@noaa.gov
James	Donnellon	NOAA/NESDIS	james.donnellon@noaa.gov
Melissa	Johnson	NOAA/NESDIS	melissa.c.johnson@noaa.gov
Scott	Leonard	NOAA/NESDIS	Scott.Leonard@noaa.gov
Juhong	Zou	NSOAS	zoujuhong@mail.nsoas.org.cn
Jinquan	Zhao	NSOAS	zjq@mail.nsoas.org.cn
Heikki	Pohjola	WMO	hpohjola@wmo.int
Jesse	Andries	WMO	jandries@wmo.int
Natalia	Donoho	WMO	ndonoho@wmo.int
Mary Ann	Kutny	NOAA	mary.ann.kutny@noaa.gov

Data access and end user support

WGIV REPORT

Co-Chairs: *Kotaro Bessho, JMA*
Rapporteurs: *Simon Elliott, EUMETSAT / Natalia Donoho, WMO*

1. Opening, objectives and expected outcomes / WGIV co-chairs and rapporteur status

CGMS-53-WGIV-WP-01 - Meeting objectives and expected outcomes (verbal), status of WGIV co-chairs and rapporteurs

Kotaro Bessho from JMA welcomed the participants as chairman of WG IV. He introduced the key activities of the group and looked forward to a productive meeting.

CGMS-53-WGIV-WP-02 - Nominations for WGIV co-chair and VLab co-chair

WMO nominated Natalia Donoho for the role of co-chair of WG IV. The CGMS Secretariat had not received any other nominations. The nomination was unanimously endorsed by the members of the working group and will be passed to plenary for final endorsement.

The group was also reminded that one of the co-rapporteur positions remained unfilled.

The election of a VLab co-chair was addressed under §6.

WGIV agreed the following actions.

CGMS-53 ACTIONS – WGIV					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
All CGMS members	**1**	WGIV/A53.01	Endorsement of Natalia Donoho as co-chair of WGIV by plenary.	CGMS 53 plenary 2025	**Open**
All CGMS members	**1**	WGIV/A53.02	Nominations for co-rapporteur of WGIV to be sent to CGMS SEC	2025	**Open**

2. User-provider dialogue on regional/global scales

2.1 User-provider dialogue on regional/global scales

CGMS-53-KMA-WP-07 - RAII and RAV (KMA, JMA, CMA, and BoM) progress report on the RAII WIGOS Project to develop support for NMHSs in satellite data, products, and training in 2024

KMA, JMA, CMA, and BoM have strengthened cooperation in 2024 to develop support for meteorological satellite users in RA II and RA V. In 2024 AOMSUC-14 was held in New Delhi hosted by IMD, and cooperation activities were carried out through Training Event and Joint RA II and RA V Coordination Meeting held in conjunction with conference.

Joint RA II and RA V Coordination Meeting on 7th December 2024 included about 37 participants and 17 Country Reports from 11 members of RA II and 6 members of RA V. The meeting consisted of 7 presentation sessions including Updates on Working Structure and Operating Plans of RA II ET-SOA and RA V ET-SAT, Members' reports, Reports from RA I and RA III/IV, WMO-CGMS VLab updates and plans and so on. The member report included Utilization of GEO/LEO satellite data, Capacity building and training needs, and technical infrastructure challenges. And they hoped that the presentation time for each member report would be extended to more than 10 minutes.

Additionally, Work Plan of RA II ET-SOA and RA V ET-SAT in 2024 shared. There are Joint Meeting between RA II ET-SOA and RA V ET-SAT in May, Training Event & Joint RA II and RA V Coordination Meeting during AOMSUC-14, and Training course on satellite meteorology such as RTC-Beijing and RTC-Seoul. RA II ET-SOA has also ongoing plan of RA II WIGOS Newsletter and Cooperative activities of RA II ET-SOA with ET-SSU for WMO EW4ALL.

JMA explained that the actions for the next years to be jointly implemented and the next AOMSUC meeting (to be hosted by CMA in Qingdao, China) will be with a training joint activity again. KMA re-emphasised the excellent cooperation between the parties involved (KMA, JMA, CMA, and BoM).

2.2 Implementation and evolution of sustained and coordinated communication satellite broadcast systems

CGMS-53-CMA-WP-11 - Report on the Service Situation of CMACast System

In the framework of GEONETCast, CMACast distributes data to Asia-Pacific users who use the Integrated CMACast system to receive and process data and to make weather forecasts.

CMA reported on the operation of the CMACast system, including the types, data volume, and timeliness of various meteorological data such as meteorological satellites, as well as the situation of serving users in the Asia - Pacific region. CMA also introduced the operation overview of their WIS2.0 systems and the situation of serving meteorological satellite data products through the WIS2.0 system.

It was noted that CMA were among the very first to share satellite data (FY-3E GNOS) via WIS 2.0. CMA explained that they intend to distribute all their satellite data currently available via the GTS and WIS 1.0 exchange via WIS 2.0 by the end of 2025.

CGMS-53-CMA-WP-08 - Update and plans of FengYun satellite data and application services

CMA addressed the data policy of FENGYUN satellite data, the status and future plan of the FENGYUN satellite data distribution and services. FY-3G and FY-3F data distribution information was updated. FENGYUN satellite data are open to NMSs and other international organizations and users for free charge in many ways. For real-time users, FENGYUN satellite data can be accessed via direct broadcast stations, CMA data broadcasting system (CMACast), the GTS, and WIS 2.0. For non-real-time users, FENGYUN satellite data can be accessed from the FENGYUN satellite data center website, downloading toolkits and

offline data services. For emergency users, FENGYUN satellite emergency support mechanism (FY_ESM) is useful to NMSs. The software platform of FENGYUN Earth still provides to the international user for enhancing FENGYUN satellite data application this year.

In response to a question about the overheads concerned with the maintenance of tool s for three different groups of users, CMA explained that FENGYUN Earth is for both types of data, but that SWAP and SMART are for GEO and LEO respectively, so there is no significant overlap.

CGMS-53-JMA-WP-07 - Update and plans on usage of cloud services, data dissemination and distribution of Himawari-8/9

JMA gave an overview of Himawari-8/9 data dissemination and distribution in JMA and reports their recent updates. It was explained that they will move to netCDF for Himawari-10 data. This transition will be supported by provision of Himawari-9 data in Himawari-10 format during 2027. The data volumes are too large to make distribution via WIS 2.0 a viable option.

JMA intend to follow the best practices for user preparation established by CGMS WGIV and WMO.

2.3 Global or inter-regional data circulation and access, WIS

CGMS-53-CMA-WP-10 - **New-Generation FY Satellite Data Service System**

With the continuous development of information technology and the diversification of user needs, the National Satellite Meteorological Centre (NSMC) of the China Meteorological Administration (CMA) has comprehensively revised and upgraded the FY Satellite Remote Sensing Data Service website. The aim is to deepen the supply-side reform of FY meteorological satellite data services, enhance refined service capabilities, and build a more efficient and advanced new generation of meteorological satellite service system. This revision marks a transition from traditional data management to knowledge management, from data services to knowledge services, and from passive services to proactive services, signalling a new level of achievement for FY meteorological satellite data services.

2.4 Widening of data access, to new missions/providers as well as for other user communities

Nothing discussed under this point in the agenda.

2.5 Disaster support

CGMS-53-CMA-WP-09 **- Status of CMA FY_ESM Service**

CMA has established the Emergency Support Mechanism of FENGYUN (FY) Satellite (FY_ESM) in 2018 for international user disaster prevention.

Through FY_ESM, CMA will provide high frequency observations of target areas covering an area of 2,000 km x 2,000 km at an interval of up to 1 minute.

Since 2018, 36 countries have registered as FY_ESM members and more than 160 emergency support services have been provided to 65 countries worldwide.
CMA presented updated information on Rapid Scan Services under the Emergency Support Mechanism of FENGYUN Satellite (FY_ESM), including the satellite rapid scan service status, the activation procedure, and overview of FY_ESM services in 2024.

In response to a question about the data latency, CMA explained that the service can be implemented within 24 hours.

CGMS-53-JMA-WP-08 - Status of JMA Himawari Request service

In January 2018, the Japan Meteorological Agency (JMA) launched a new international service "HimawariRequest", in collaboration with the Australian Bureau of Meteorology. The service allows NMHS users in Himawari-8/9 coverage area to request Target Area observation covering a 1,000km x 1,000km area every 2.5 minutes.

Target Area observation supports JMA's national/international services including the RSMC Tokyo - Typhoon Center and the Tokyo VAAC.

In response to a recommendation made at the 2015 Joint RA II/RA V Workshop on WIGOS for Disaster Risk Reduction, JMA developed the service through the RA II WIGOS Project to Develop Support for NMHSs in Satellite Data, Products and Training.

As of 1 March 2025, JMA had taken registrations from 22 NMHSs in RA II and RA V, and 19 have completed preparation for their requests. There have been 293 international requests since the commencement of the service, among which 267 have been approved. Targets have included tropical cyclones in the South Pacific, extreme weather and bushfires in Australia, and volcanic activity in Indonesia.

JMA expects the HimawariRequest service to support disaster risk reduction activities in the Asia Oceania region based on the regional monitoring of extreme events such as tropical cyclones and volcanic eruptions using the Target Area observation.

As part of the RA II WIGOS Project, JMA is working on user-friendly map content displaying the locations of request-based high frequency regional observations conducted by CMA, JMA and KMA in real time for at-a-glance viewing.

JMA explained that rapid scan enhancement is being implemented thanks to cooperation with CMA/KMA/JMA making a map to visualize the areas used. This is expected to take two or three years to complete.

CGMS-53-EUMETSAT-WP-08 - Activities relating to the International Charter: Space and Major Disasters

The presentation addressed the use of satellite data to support disaster response worldwide. It explained what the International Charter: Space and Major Disasters is, who it helps and how. The group discussed how the charter could be activated and who could ask for support in response to disaster situations. It was noted that the ESA's Charter Operational System (COS 2) plays an important a contributing role. The group also discussed access to high resolution image data and how to handle the data volumes involved – images (rather than image data) are already exchanged.

2.6 Support to the ocean user community

Nothing discussed under this point in the agenda.

2.8 Support for hyperspectral infrared instruments

CGMS-53-JMA-WP-05 - Update on JMA's hyperspectral infrared sounding mission

In March 2023, the Japan Meteorological Agency (JMA) contracted the manufacture of the Himawari-10, equipped with Geostationary Himawari Sounder (GHMS) and other instruments, as a successor to the Himawari-8/9. Initial operation is scheduled for JFY 2029. JMA is currently producing simulated observation data of GHMS to support early user readiness for the IR sounder and plans to make the data widely available for user support.

JMA confirmed that, in terms of data policy, the imager data from Himawari-10 and the principal component scores and possibly a subset of channels from GHMS will be designated core data.

2.9 CGMS Future Direction 2022+ Project

CGMS-53-CMA-WP-15 - Support to developing countries-proposal

CMA presented the concept of a satellite application centre for EW4ALL, which would enhance meteorological satellite applications' supporting role for Early Warnings, NWP, meteorological disaster protection and reduction. The centre would:

- Promote meteorological satellite applications;
- Provide meteorological satellite data and technical support;
- Train professional talents;
- Support research and innovation;
- Develop standards and norms, and
- Improve meteorological satellite service quality.

The group discussed the concept in some detail. WMO noted that EW4ALL is a strategic initiative of WMO, and that they require more time to carefully consider the proposal before being able to fully endorse it.

There was a widely held view in the group that there could well be an overlap with existing initiatives in place at a regional level in RA-II and RA-V. The relevance of the intended goal was acknowledged, and the group sought a way to ensure that efforts would not be duplicated leading to redundant results.

CMA reminded the group that this initiative is in response to user requirements from RTC Nanjing, and that there is an open action from INFCOM MG to follow up on this. EUMETSAT explained that from INFCOM MG's perspective, there is a need to carefully define the scope of an appropriate survey, and how the fits into the work of SC-ON and ET-SSU, which ensuring a lack of overlap with CGMS.

WGIV has user readiness within its scope and so is the appropriate group in CGMS to address this topic. The topic can be addressed with a document detailing draft ideas based upon the survey results already implemented in many regions at a forthcoming intersessional meeting.

WGIV agreed the following actions.

CGMS-53 ACTIONS – WGIV					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
CMA	**2.9**	WGIV/A53.03	In the context of CMA's proposal to develop a Satellite Application Centre for support to developing countries: analyse the results of the survey data and the results of the existing surveys and at intersessional provide a detailed analysis and proposal of what the solution might look like	WGIV intersessional	**Open**

3. Coordination of metadata (incl. standards within ocean communities)

The group noted that the Task Group on Metadata has run successfully under the leadership of Anna Milan from WMO. Since she has had to step back from the leadership of the group there has been a lull in activity. Participants were asks to consider proposing a new chair for the Task Group on Metadata.

4. Cloud services interoperability

CGMS-53-WGIV-WP-04 - Status and plans of the CGMS WGIV Cloud Service Expert Group (2024-2025) including the outcome and recommendations from the 3rd cloud technology workshop

The members of the Cloud Service Expert Group met monthly to exchange information on Cloud activities. They finalised "CGMS agency best practices in support of using cloud for storage, storing, processing and dissemination of meteorological data" and published the same in the summer of 2024.

More recently, the members met on March 4th - 6th, 2025 to discuss the following areas with participation from JMA, NOAA, EUMETSAT, CMA, JAXA and NASA:

- Artificial Intelligence and Machine Learning (AI/ML) in the Cloud
- Migration Journeys to Cloud
- Security, Reliability, and Costs in the Commercial Cloud

Members obtained a better understanding on where different agencies are in their adoption of private and public cloud systems, development of cloud-based applications, and the migration of their applications to the cloud. The team discovered challenges with cloud models and increased their understanding of fixed and variable costs associated with development and maintenance of cloud technologies. Members learned about the agency's differing maturity levels in cloud adoption, and technologies being leveraged. While the hybrid meeting was beneficial, it was noted that in-person meetings provided higher benefits due to the increased likelihood that all participants could attend simultaneously, reinforcing the value of face-to-face interaction for more effective collaboration.

Several agencies are exploring cloud technologies and artificial intelligence (AI), with cloud platforms providing the infrastructure and resources for increased AI development, deployment and scaling. Leveraging AI and cloud can enhance cloud service automation, decision making and scalability. However, the approach to embarking on AI in the cloud were discussed with the recommendation to begin small, identify use cases that are easily demonstrable with business benefit, and produce real world data, gain capabilities in the process, and then move on to other targets.

It was confirmed that the Expert Team has established Best Practices, but only use these as a source of reference and for compliance checking. There is currently no reporting of compliance with the Best Practices.

The Expert Group reported that the next Cloud Workshop will look at leveraging AI technology to make the most of the cloud. CMA announced that the Chinese government will host the world AI conference in Shanghai in July 2025.

5. Long term data preservation

CGMS-53-WGIV-WP-09 - Direction of CGMS approach towards long term data preservation

Long-term data preservation of satellite observation data has in the past been part of the terms of reference of Working Group IV. During the recent review of the scope of Working Group IV's responsibility, there was some discussion about the merits of transferring this topic to Working Group II, noting that the quality of data is core to the work of that group.

The CEOS Guidelines for the Long Term Preservation of Earth Observation Space Data Preservation refer to the following eight themes:

- Preserved data set content definition and appraisal
- Archive operations and organisation
- Archive security
- Data ingestion

- Archive maintenance
- Data access and interoperability
- Data exploitation and re-processing
- Data purge prevention.

Of these, the Working Group considered data access and interoperability to be within the scope of WG IV and the remaining themes better accommodated in WG II. It was agreed that this would be noted when considering the updated terms of reference of WG IV (see §8).

WGIV agreed the following actions.

CGMS-53 ACTIONS – WGIV					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
WGIV leadership	**8**	WGIV/A53.08	Update draft ToRs to refine definition of LTDP task as per A47.06. This has been completed and is reflected in §8, below.	CGMS 53 plenary 2025	**Closed**

6. User readiness for new satellite systems

CGMS-53-GUEST-WP-04 - Building Bridges: How EOTEC DevNet Communities of Practice Enhance EO Data Access and Use

After the status update on EOTEC DevNet it was noted that CGMS WGs III and IV have supported this area and that both Bernie Connell (Colorado State University) and Zoya Andreeva (WMO) are part of the global leadership team. Training staff from CGMS members were invited to contribute to the activities.

CGMS-53-VLab-WP-01 - **Status and plans of the VLab and the relevant parts of CGMS-53-CGMS-WP-15 - HLPP associated with the VLab were considered together.**

Over the past year, the Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) Management Group (VLMG) has coordinated its activities through quarterly online meetings. An important milestone was the Eleventh VLMG Meeting, held in Muscat, Oman, from 20–23 January 2025, hosted by the Directorate General of Meteorology (DGMET).

Since CGMS-52, VLab members have provided diverse training opportunities, focusing on data access and capacity building for utilizing various satellite systems. Special emphasis was placed on preparations for and operational use of Meteosat Third Generation (MTG) geostationary data. Additionally, targeted training efforts supported the Early Warnings for All (EW4ALL) Initiative.

The VLab Trust Fund continues to receive annual contributions from NOAA/NWS, EUMETSAT, and KMA. However, to meet evolving WMO-CGMS training requirements and ensure the long-term sustainability of

VLab activities, an increase in contributions from additional CGMS agencies is essential. Regular financial support from CGMS Members remains critical to sustaining and expanding VLab training initiatives.

CGMS-53-WGIV-WP-05 - Election of VLab co-chair (CGMS space agency representative)

There was widespread and heartfelt thanks and recognition for Bernie Connell and the significant contributions she has made over the years.

CMA nominated Di XIAN to be the VLab co-chair on behalf of CGMS Space Agencies. The nomination was unanimously endorsed by the members of the working group and will be passed to plenary for final endorsement.

WGIV agreed the following actions:

CGMS-53 ACTIONS – WGIV					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
CGMS members	**6**	WGIV/A53.04	CGMS members are invited to contact WMO to provide contributions to the WMO VLab Trust Fund to ensure the continuation of technical support for the VLab through the VLab Technical Support Officer as well as for the implementation of VLab projects.	CGMS 54 2026	**Open**
CGMS members	**6**	WGIV/A53.05	CGMS members are invited to establish agreements with respective VLab CoEs for collaboration on training development programs. These agreements should ensure the availability of trainers with the necessary expertise within CoEs to address local and regional training needs	CGMS 54 2026	**Open**
CGMS members	**6**	WGIV/A53.06	CGMS members are invited to develop and provide Jupyter Notebooks for each satellite product with clear instructions on downloading, processing, and visualizing the product	CGMS 54 2026	**Open**
CGMS plenary	**6**	WGIV/A53.07	CGMS plenary is invited to endorse CMA's nomination of Di XIAN to be the VLab co-chair on behalf of CGMS Space Agencies, as unanimously supported by WG IV	CGMS 53 plenary 2025	**Open**

7. Research to operations - Operations to research (R2O/O2R)

7.1 R2O/O2R

CGMS-53-WGIV-WP-06 - Report on the outcome of the CGMS survey on R2O/O2R, and next steps

NASA and NOAA agreed to co-champion the CGMS Futures 2022+ Research to Operations Pilot during the CGMS-51 Plenary in Tokyo, Japan.

The CGMS Working Group IV convened on a quarterly basis to discuss advancements in Research-to Operations (R2O) and Operations-to-Research (O2R) methodologies. The group recognized the significant contributions of departing member Jordan Gerth, who transitioned to a new role at NOAA, and welcomed Dr. Vijay Tallapragada from NOAA's National Weather Service, who joined the group in 2025.

In 2024, a comprehensive survey of CGMS members, including responses from EUMETSAT, JAXA, JMA, NOAA, and WMO, was completed to collect insights on R2O/O2R practices. Key findings from the survey highlighted the different operational constraints and research priorities of CGMS agencies and emphasize the need for a coordinated and adaptable approach to R2O/O2R across the meteorological and environmental satellite community.

The CGMS Working Group IV aims to continue fostering collaboration and knowledge sharing to enhance the transition of research into operational systems while maintaining flexibility to meet the unique needs of each agency.

WG IV discussed the concrete outcomes expected from this activity. NOAA will look at their process and see how others might follow that. EUMETSAT suggested looking at the transition from ESA's AWS to EPS-Sterna as an example for R-O for satellite systems.

8. Review of WGIV actions and recommendations

CGMS-53-WGIV-WP-03 - Updated Terms of Reference

The WGIV Terms of Reference were last updated in CGMS-46 (CGMS-46-CGMS-WP-18). The WGIV Chair and Rapporteurs have prepared an updated version of the terms of reference to reflect the actual activities of the group. These were presented in §2.2 of CGMS-53-WGIV-WP-03.

Based upon the discussion of the handling of topics related to long-term data preservation (see §5), the group decided to refine objective 8 slightly, resulting in the following objectives for WGIV:

1. To support the user-provider dialogue on regional/global scales;
2. To support the implementation and evolution of sustained and coordinated communication satellite broadcast systems (e.g. GEONETCAST related);
3. To address global or inter-regional data circulation and access (e.g. WIS 2.0/GTS, academic networks, other terrestrial networks, etc.) in coordination with WMO dedicated expert teams;

4. To promote the widening of data access, to new missions/providers as well as for other user communities, considering cloud access, small satellite networks, and additional data sharing technologies;
5. To support the coordination of metadata for satellites and instruments;
6. To address the user readiness for new satellite systems and the WMO-CGMS Virtual Laboratory (VLab);
7. To address the notification of changes (and alerts) in satellite data and/or products impacting users, with the aim of defining best practices;
8. To address long term data preservation issues related to data access and interoperability;
9. To consider research to operations (R2O) with a view to secure the continuation of high-value observations demonstrated with research satellites in a sustainable way, and to maximise research benefits from operational satellites;
10. To address the use of satellite systems to mitigate emergency situations;
11. To discuss relevant aspects on the implementation of the global contingency plan (as proposed by WGIII) from Plenary, and
12. To address topics from the CGMS High Level Priority Plan within the scope of WG IV.

With this modification the proposed terms of reference were agreed by the group.

CGMS-53-WGIV-WP-07 - Status of CGMS-52 WGIV actions and recommendations (and any relevant plenary actions)

The existing open actions were reviewed by the group.

WGIV agreed the following:

CGMS-53 ACTIONS – WGIV					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
EUMETSAT	**8**	WGIV/A53.09	To report on the status of data dissemination from Indian Ocean Data Coverage partners, as identified in CGMS-43-EUM-14 roadmap. Consider original paper answering this action which described which operators provide what data and how, over the Indian Ocean. Based upon this, and the state of the art including WIS 2.0, provide an updated analysis	WGIV CGMS 54 2026	**Open**
WGIV leadership	**8**	WGIV/A53.10	The Terms of Reference of the CGMS Working Groups to be reviewed every 5 years. WGIV to review its ToRs in 2030. To be presented for agreement at WGIV in WGs meeting of CGMS 58 in 2030, and for	2030	**Pending**

CGMS-53 ACTIONS – WGIV					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**
			endorsement by CGMS 58 plenary session in 2030		

CGMS-53-WGIV-WP-10 - CGMS-53 WGIV actions and recommendations (verbal)

The newly raised actions, WGIV/53.01 to WGIV/53.10, were reviewed and agreed.

CGMS-53-CGMS-WP-14WGIV - Status of co-chairs/rapporteurs of the CGMS working groups, CGMS International Science Working Groups, VLab, and other groups - highlighting any "vacant" positions and need for nominations

This point had already been covered under agenda items §1 and §6.

9. CGMS High Level Priority Plan (HLPP)

Review and updating of the HLPP

CGMS-53-CGMS-WP-19 - Status of implementation of CGMS High Level Priority Plan (2024-2028)

The group addressed the update of the status of the High Level Priority Plan on a point-by-point bases, noting the following:

3.1 “Support the user-provider dialogue on regional/continental scales through regional coordination groups maintaining requirements for dissemination of satellite data and products through the various broadcast services”. Input is required from the Task Group on User Readiness for this and will be provided for the next meeting.

3.1.1 “Establish a sustained interaction with the operational nowcasting communities with a view to fully utilise the commonality of the future geostationary imagers and sounders”. This is being addressed to some extent under the WMO initiative to define which core data are driven by requirements coming from the nowcasting community.

3.2 “Prepare operational users for new generation of meteorological satellites through user readiness programmes, with coordinated contributions from CGMS members“. This is to be addressed by the Task Group on User Readiness.

3.3 “Coordinated global data exchange”. Progress is pending the establishment of the new Task Group on Data Access and Exchange.

3.4 “Increase access to, and use of, data from R&D and pre-operational missions”. Progress is pending the establishment of the new Task Group on Data Access and Exchange.

3.5 “Investigate the feasibility of utilizing existing dissemination systems for meteorological information in helping to mitigate disasters”. Progress is pending the establishment of the new Task Group on Data Access and Exchange.

3.6.1 “Ensure the timely access to and exchange of nearreal-time scatterometer data, share access to calibration and validation information across CGMS agencies”. Progress is pending the establishment of the new Task Group on Data Access and Exchange.

3.6.2 “Promote the product metadata standards within ocean communities, such as on SST, ocean colour, ocean vector surface wind and ocean surface topography, to facilitate common data representation and near-real time exchange. This must be done in dialogue with the relevant CEOS Virtual Constellations”. This should be addressed by the Task Group on Metadata.

3.7 “Application of Cloud Technologies“. This should be addressed by the Expert Team on Cloud Technology.

3.8 “Research to operations “. This should be addressed by the CGMS champions for the R2O strategic theme.

7.1 “Engage in communication and outreach activities to promote Space Weather observations benefits.”. This update was endorsed by VLab.

7.2.2 “Update and develop new training material through the WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) and in partnership with the WMO Training and Education Programme. Link training materials to the 2025 update of ‘Guidelines on Satellite Skills for Operational Meteorologists and Specialists in Related Application Areas’”. This update was endorsed by VLab.

7.2.3 “SatOps and CoEs to coordinate and collaborate on succession planning. Many members are experiencing staff shortages due to employee turnover and retirement.”. New priority endorsed by VLab.

7.2.4 “SatOps and CoEs to establish agreements to collaborate on training development programs for CoE trainers. These agreements aim to ensure that local trainers gain expertise within the CoE to support local and regional training needs. This is especially important for countries where the native language is not English”. New priority endorsed by VLab.

10. Future CGMS WGIV meetings

CGMS-53-WGIV-WP-11 - Decision on dates on WGIV intersessional activities in 2025-2026 (CGMS-53 to CGMS-54)

Dates for forthcoming intersessional meetings are:

Tuesday, 9 September 2025 at 12-13 UTC;

Tuesday, 2 December 2025 at 12-13 UTC, and

Wednesday, 18 February 2026 at 12-13 UTC.

11. Any other business

Nothing discussed under this point in the agenda.

12. Conclusions, preparation of the WGIV report for plenary

The chairman thanked the participants for a constructive and efficient meeting. It was agreed that the report of the meeting would be prepared in the coming weeks.

LIST OF WGIV ACTIONS

List of CGMS-53 WGIV actions						
Actionee	**AGN item**	**Action #**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
CMA, EUMETSAT	WGIV/3	WGIV/A48.01	To report on the status of data dissemination from Indian Ocean Data Coverage partners, as identified in CGMS-43-EUM-14 roadmap	24 Mar 2025 close and make new action on EUM to handle this (A53.01) 12 Feb 2025 WIS 2.0 is operational. Satellite data are starting to flow. Monitor and report progress. There will a paper on this at WG III / Risk Assessment. 24 Apr 2024 This will be revisited as the WIS2.0 is implemented and the global data exchange infrastructure evolves WGIV 11 Oct 2023 : EUMETSAT to present a summary report at the WGIV meeting for CGMS-52 WGIV 26 Jan 2023 : EUMETSAT to present a summary report at the WGIV meeting for CGMS-51 WGIV Apr 2022: EUMETSAT verbally summarised the ongoing MET8→ MET9 transition. MET9 will operate at 40.5E. MET9 will become EUMETSAT primary IODC satellite from 1 Jun 2022 and will operate in parallel with MET8 until 1 Jul 2022 , at which point MET8 will stop. EUMETSAT confirmed that although there is a 4 degree longitude difference, the EUMETCast dissemination and data policy will not change. CMA stated that its Indian Ocean Data Coverage support remains unchanged, and is based upon FY-2H at 79E. EUMETSAT will present a summary report at a WGIV intersessional meeting before CGMS-51 2022 29 Apr: EUMETSAT to provide updates - proposed to close 2022 18 Jan: Ongoing		**CLOSED**

CGMS members	WGIV/16	A47.06	CGMS members, through WGIV, to review CGMS members' adherence levels to the CEOS Data Preservation Guidelines on a regular basis (every 2-5 years). For review at CGMS in the 2023-2024 timeframe.	24 Mar 2025 ToRs to be adjusted on LTDP to refer to data access and interoperability only. This will then be in the agenda, and this action can be closed 12 Feb 2025 this will be addressed together with the review of the ToRs. Can moved to WG II as related to data quality. This is part of the proposal for the update to the ToRs. Before putting this topic in WGIV there was a discussion deciding it concerned archives and reprocessing, thus architecture. To be discussed with WG II. 25 Apr 2024 Will be addressed at forthcoming intersessional meeting. A leader for this preparation work will facilitate a meaningful discussion. 12 Oct 2023 to be taken up at intersessional meeting #2 on 25 Jan 2024 2022 18 Jan: 2019, 10 Dec, IS WGIV: CGMSSEC/Anne to raise it with MRa if this should be covered by the HLPP. ISRO/Nitant Dube will secure that CGMS is informed once new version(s) of the CEOS DP guidelines are available. (The related recommendation was endorsed by CGMS-47 plenary).		**CLOSED**
			The Terms of Reference of the CGMS Working Groups to be reviewed every 5 years. WGIV to review its ToRs in 2023.	24 Mar 2025 ToRs endorsed at WGIV meeting, noting point on LTDP to refer to data access and interoperability only 12 Feb 2025 draft update will be shared with team prior to WG meeting in March 2025 25 Apr 2024 we will follow in the footsteps of WGI and take this up at the next intersessional meeting 9 Sept 2024 . The previous presentation on this topic in 2018 was from Harald Rotfuss (EUM)		**CLOSED**

CGMS Members	§3.4	WGIV/A50.01	CGMS members continue to foster the growth of EOTEC DevNet by, for example: joining the CoPs, identifying other experts for the CoPs, contributing to EOTEC DevNet products, and sharing EOTEC DevNet information within their network.	24 Mar 2025 To be addressed as standing agenda item for WGIV rather than an un-closable action, and closed here 12 Feb 2025 EOTEC DevNet remain keen to contribute and would present if invited (note that VLab is a part of EOTEC DevNet) 25 Apr 2024 EOTEC DevNet is complimentary to VLab. We could ask for input at next WGIV CGMS 53 under item 3.5 Disaster Support		**CLOSED**
	CGMS members	6	WGIV/(P)A50.01	24 Mar 2025 actions from paper to be passed to plenary and this action closed (Action to be monitored by WGIV) CGMS members are invited to contact WMO to provide contributions to the WMO VLab Trust Fund to ensure the continuation of technical support to the VLab through the VLab Technical Support Officer as well as to the implementation of VLab projects.		**CLOSED**
CGMS space agencies	WGIV report	A51.06	CGMS agencies to nominate additional members for all the WGIV Task Groups, in particular those agencies who currently have no representatives in the Task Group(s): · WGIV Task Group on Data Access/Exchange · WGIV Task Group on Metadata - CGMS members to nominate a chairperson for this TG. · WGIV Task Group on User Readiness	24 Mar 2025 WG session asked for nominations for co-rapporteur, chair of TG-Metadata and members of TG-Data Access/Exchange. WMO, NOAA, JMA, KMA and ISRO contacted individually asking for members of TG-Data Access/Exchange. 12 Feb 2025 TG Metadata needs a new chair as Anna has to step down. Also need members for TG on Data Access/Exchange 25 Apr 2024 We need someone really for TG on Data Access / Exchange. Other groups are adequately represented but more participants are always welcome 11 Oct 2023 Call to be sent by CGMS Sec in liaison with WGIV rapporteurs during October 2023	Dec 2025	**ONGOING**

All members	1, 2.4, 8	WGIV/A53.01	endorsement of Nat as co-chair of WGIV by plenary	To be included in WGIV inputs to plenary for endorsement	CGMS 53 plenary 2025	**CLOSED**
All members	1, 2.4, 8	WGIV/A53.02	nominations for co-rapporteur of WGIV	To be sent to CGMS SEC	2025	**OPEN**
CMA	2.9	WGIV/A53.03	CMA Satellite Application Centre for support to developing countries.	Analyse the results of the survey data and the results of the existing surveys and at intersessional provide a detailed analysis and proposal of what the solution might look like 9 Sept 2025 CMA plan to address this at AOMSUC in Qing Dao, and will report at intersessional meeting #2 in December 2025	WGIV intersessional	**OPEN**
All members	6	WGIV/A53.04	Contributions to VLAB funding	CGMS members are invited to contact WMO to provide contributions to the WMO VLab Trust Fund to ensure the continuation of technical support for the VLab through the VLab Technical Support Officer as well as for the implementation of VLab projects 9 Sept 2025 WMO recognized contributions received from KMA and EUMETSAT	CGMS 54 2026	**OPEN**
All members	6	WGIV/A53.05	Development of VLab Jupyter notebooks	CGMS members are invited to develop and provide Jupyter Notebooks for each satellite product with clear instructions on downloading, processing, and visualizing the product	CGMS 54 2026	**OPEN**
All members	6	WGIV/A53.06	Establish VLab CoEs	CGMS members are invited to establish agreements with respective VLab Centres of Excellence (CoEs) for collaboration on training development programs. These agreements should ensure the availability of trainers with the necessary expertise within CoEs to address local and regional training needs	CGMS 54 2026	**OPEN**
All members	6, 8	WGIV/A53.07	endorsement of Xian Di as co-chair of VLAB by plenary	To be included in WGIV inputs to plenary for endorsement	CGMS 53 plenary 2025	**CLOSED**

WGIV leadership	8	WGIV/A53.08	Update draft ToRs to refine definition of LTDP task as per A47.06	Update draft ToRs to refine definition of LTDP task as per A47.06 Update included in §8 of WGIV report for CGMS 53	CGMS 53 plenary 2025	**CLOSED**
EUMETSAT	9	WGIV/A53.09	To report on the status of data dissemination from Indian Ocean Data Coverage partners, as identified in CGMS-43-EUM-14 roadmap	Consider original paper answering this action which described which operators provide what data and how, over the Indian Ocean. Based upon this, and the state of the art including WIS 2.0, provide an updated analysis	WGIV CGMS 54 2026	**OPEN**
WGIV leadership	8	WGIV/A53.10	The Terms of Reference of the CGMS Working Groups to be reviewed every 5 years. WGIV to review its ToRs in 2030.	To be presented for agreement at WGIV in WGs meeting of CGMS 58 in 2030, and for endorsement by CGMS 58 plenary session in 2030	2030	**PENDING**
WGII, WGIV	Plenary 6	53.07i	On data curation standards: WGII and WGIV to jointly draft standards that will be reviewed at CGMS-54 WGII/WGIV.		Feb 2026, April 2026	**OPEN**
CMA	(7)	WGIV/A53.11	12 Aug 2025 Action transferred from WGIII: CMA to present best practices for regional EW4ALL for the benefit of the local government in CGMS-54 WGIV meeting.			CGMS-54 WGIV

List of CGMS-53 WGIV recommendations

Lead	AGN item	Rec #	Description	Recommendation feedback/closing document
CGMS members	WMO matters for coordination with CGMS space agencies	R51.02	(Recommendation to be monitored by WGIV. Raised in plenary) CGMS members are invited to contact WMO to provide contributions to the WMO VLab Trust Fund to ensure the continuation of technical support to the VLab through the VLab Technical Support Officer as well as to the implementation of VLab projects.	12 Jun 2025 Recalled on the occasion of the CGMS-53 plenary 3-5 June 2025 27 Mar 2025 CGMS-53 WGIII. This recommendation remains valid, and also valid for the WMO space programme trust fund. 04 Jun 2024 https://www.cgms-info.org/Agendas/PPT/CGMS-52-VLab-WP-01p, https://www.cgms-info.org/Agendas/PPT/CGMS-52-GUEST-WP-03 Recommendation carried over to CGMS-52 actions and recommendations 23 Apr 2024 Addressed at CGMS-52 WGIV meeting. WMO expected to address this in detail at CGMS-52 plenary, 2023 11 July: Noted as a recommendation by the CGMS Secretariat 2023 28 June: Plenary endorsed the recommendation in the report by the VLab to plenary. The "action" still remains valid. 2023 19 June: CGMS members are kindly requested to contribute to the VLab to secure the continuity of this valuable activity. 2023 2 June: Topic to be raised in the report of the WGIV CGMS-51-WGIV-WP-01 EXT and VLab CGMS-51-VLab-WP-02 EXT to plenary.
CGMS space agencies	4.1	(R49.02)	Transferred from CGMS-49 plenary When pursuing data purchasing, CGMS recommends CGMS space agencies to consider an option for redistributing data to global NWP centres	2022 11 Apr: NOAA is currently distributing the Radio Occultation data we are purchasing under our current delivery order to National Meteorological and Hydrological Centers for non-commercial use WGIV to consider adding this to the WGIV CGMS-50 agenda. WGIV to collect input from CGMS space agencies on the data buy redistribution options to global NWP centres by end 2021.

Plenary	2	(WGIIR49.)	Transferred from CGMS-49 WGII and plenary Working Group II recommends to CGMS Plenary the adoption of the proposed baseline products for geostationary satellites presented in CGMS-49-WMO-WP-14 with the addition of SSTs, to be considered for subsequent implementation by all Agencies.	2022 18 Jan: 2021 9 Nov: await the work from WGII, then follow up Endorsed by CGMS-49 plenary. WGII/Ken to send to WGIII and WGIV relevant parts of WGII report. Action to WGIII to update the baseline accordingly. (WGII action to WGIV on related redistribution mechanisms).
CGMS members	2	WGIV/R49.01	To consider an enhancement of advance notifications of processing changes as specified below and provide feedback to WG-IV. If a planned change to data processing results in a change in brightness temperature of 0.1K or 20% of NEdT (whichever is smaller), this should be made clear in notifications to users. These notifications should be made no later than 8 weeks before the change and test data should be provided if possible. [From the ITWG ITSC-21 Report]	2022 11 Apr: NOAA: To be addressed by the Task Group on User Readiness once established 2021 9 Nov: to be addressed by the Task Group on User Readiness once established To be converted into a good practice document.
CGMS members	12	WGIV/R49.02	The WGIV Cyber Security Expert Group welcomes any other members who are not yet represented in the group, and to propose new security related topics to be addressed by the group	2022 11 Apr: NOAA: So far the cyber security group met only once, for establishing the terms of reference. They should have met in December 2021; however, the attendance was too low and all experts were busy. 2021 9 Nov: standing recommendation to support Task Group, outreach to be addressed
CGMS members	12	WGIV/R49.03	The Cloud Expert Group welcomes any other members who are adopting cloud services to discuss best practices, exchange information, and identify emerging coordination opportunities.	2023 Nov: Change of NOAA representative Maria Grady (previously Jessica Wieman) 2022 11 Apr: NOAA: Ongoing 2021 9 Nov: standing recommendation to support Task Group, outreach is planned via a flyer by end of November
CGMS members	WGIV/ (PI 9.1)	WGIV/R48.01 (PI R47.10)	On training and education: CGMS members to provide contributions into the WMO VLab Trust Fund to ensure the continuation of technical support to the VLab. CGMS members considering to provide additional support should contact the WMO Space Programme Secretariat	2022 11 Apr: NOAA: WMO has confirmed that NOAA contributed to the Trust Fund and the money was transferred in December 2021. 2020 Aug: Transferred to WGIV 2020 May CGMS-48 WG discussions: VLab will in future be addressed in WGIV, user preparedness. The plenary recommendation is critical! 2020 Jan 22, CGMSSEC IS#2: To be addressed within the framework of Vlab, WMO, CGMSSEC plus communication to CGMS agencies

CGMS space agencies	WGIV/7	R42.01	Satellite operators to provide WIS Discovery Metadata Records, compliant to WIS requirements and following the guidance to be provided by the CGMS-WMO Task Force on metadata implementation, in order to facilitate satellite information discovery and access	2022 11 Apr: NOAA: To be addressed by the Task Group on Metadata once established 2021 9 Nov: to be addressed by the Task Group on MetaData once re-established CGMS-48: to be converted into Best Practise by IS sub-group (NOAA: NCEI? See also WGIV/A48.02) at CGMS-47: consider conversion into best practise during inter-sessional meeting
CGMS space agencies	WGII/10	R43.07	CGMS agencies to make available a non real-time cache of satellite level 1 data over the previous 2-3 months, similar to the NOAA CLASS system.	2022 18 Jan: 2021 9 Nov: to be addressed by the Task Group on Data Access/Exchange once established CGMS-48: to be converted into Best Practise by IS sub-group at CGMS-47: consider conversion into best practise during inter-sessional meeting
CGMS members	WGIV/6		On training and education: CGMS members to participate in the EOTEC DevNet regional discussions planned in the future, held online across time zone". Information for the upcoming regional meetings is available at https://ceos.org/ourwork/other-ceos-activities/eotec-devnet/ and more detailed information for the most recent regional meetings at https://ceos.org/meetings/eotec-devnet-regional-meetings/.	2022 18 Jan: 2021 9 Nov: WGIV proposed to create a recommendation for ongoing meetings, to strengthen cooperation between CEOS and CGMS-WMO VLab communities.
CGMS Plenary	§4.3	WGIV/R50.01	CGMS WGIV recommends to the Plenary Session of CGMS 50 to suspend the activities of the Task Group on Cyber Security, and to revisit the role of the Task Group for CGMS 52.	
WGIV Cloud Service Expert Group	§4.3	WGIV/R50.02	WG IV recommends that Cloud Service Workshops are organised on an annual basis, the schedule being shortened to take advantage of the consequent recurrence.	
	WGIV §3.1		AOMSUC-13 in 2023 will be held in Busan, Korea hosted by KMA together with VLab training, and a RA II/V joint coordination meeting. RA II/V Joint Coordination Group ask for CGMS's support and encouragement to attend.	November 2023
	WGIV §3.3		Given that GTS operational availability is not guaranteed beyond 2030, CGMS Members are recommended to develop plans for the adoption of the WMO Information System WIS 2.0 in support of international data exchange.	2025

List of CGMS-52 WGIV actions							
Actionee	**AGN item**	**Action #**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**	**HLPP ref**
CMA, EUMETSAT	WGIV/3	WGIV/A48.01	To report on the status of data dissemination from Indian Ocean Data Coverage partners, as identified in CGMS-43-EUM-14 roadmap	12 Feb 2025 WIS 2.0 is operational. Satellite data are starting to flow. Monitor and report progress. There will a paper on this at WG III / Risk Assessment. 24 Apr 2024 This will be revisited as the WIS2.0 is implemented and the global data exchange infrastructure evolves WGIV 11 Oct 2023 : EUMETSAT to present a summary report at the WGIV meeting for CGMS-52 WGIV 26 Jan 2023 : EUMETSAT to present a summary report at the WGIV meeting for CGMS-51 WGIV Apr 2022: EUMETSAT verbally summarised the ongoing MET8→ MET9 transition. MET9 will operate at 40.5E. MET9 will become EUMETSAT primary IODC satellite from 01 Jun 2022 and will operate in parallel with MET8 until 01 Jul 2022 , at which point MET8 will stop. EUMETSAT confirmed that although there is a 4 degree longitude difference, the EUMETCast dissemination and data policy will not change. CMA stated that its Indian Ocean Data Coverage support remains unchanged, and is based upon FY-2H at 79E. EUMETSAT will present a summary report at a WGIV intersessional meeting before CGMS-51 2022 29 Apr: EUMETSAT to provide updates - proposed to close 2022 18 Jan: Ongoing	CGMS-53	**ONGOING**	

CGMS members	WGIV/16	A47.06	CGMS members, through WGIV, to review CGMS members' adherence levels to the CEOS Data Preservation Guidelines on a regular basis (every 2-5 years). For review at CGMS in the 2023-2024 timeframe.	12 Feb 2025 this will be addressed together with the review of the ToRs. Can moved to WG II as related to data quality. This is part of the proposal for the update to the ToRs. Before putting this topic in WGIV there was a discussion deciding it concerned archives and reprocessing, thus architecture. To be discussed with WG II. 25 Apr 2024 Will be addressed at forthcoming intersessional meeting. A leader for this preparation work will facilitate a meaningful discussion. 12 Oct 2023 to be taken up at intersessional meeting #2 on 25 Jan 2024 2022 18 Jan: 2019, 10 Dec, IS WGIV: CGMSSEC/Anne to raise it with MRa if this should be covered by the HLPP. ISRO/Nitant Dube will secure that CGMS is informed once new version(s) of the CEOS DP guidelines are available. (The related recommendation was endorsed by CGMS-47 plenary).	2024	**OPEN**
			The Terms of Reference of the CGMS Working Groups to be reviewed every 5 years. WGIV to review its ToRs in 2023.	12 Feb 2025 draft update will be shared with team prior to WG meeting in March 2025 25 Apr 2024 we will follow in the footsteps of WGI and take this up at the next intersessional meeting 09 Sep 2024 .	2024	**ONGOING**

CGMS Members	§3.4	WGIV/A50.01	CGMS members continue to foster the growth of EOTEC DevNet by, for example: joining the CoPs, identifying other experts for the CoPs, contributing to EOTEC DevNet products, and sharing EOTEC DevNet information within their network.	12 Feb 2025 EOTEC DevNet remain keen to contribute and would present if invited (note that VLab is a part of EOTEC DevNet) 25 Apr 2024 EOTEC DevNet is complimentary to VLab. We could ask for input at next WGIV CGMS 53 under item 3.5 Disaster Support	CGMS 53	**ONGOING**	
	CGMS members	6	WGIV/(P)A50.01	(Action to be monitored by WGIV) CGMS members are invited to contact WMO to provide contributions to the WMO VLab Trust Fund to ensure the continuation of technical support to the VLab through the VLab Technical Support Officer as well as to the implementation of VLab projects.	Monitoring action only	**ONGOING**	
CGMS space agencies	WGIV report	A51.06	CGMS agencies to nominate additional members for all the WGIV Task Groups, in particular those agencies who currently have no representatives in the Task Group(s): · WGIV Task Group on Data Access/Exchange · WGIV Task Group on Metadata - CGMS members to nominate a chairperson for this TG. · WGIV Task Group on User Readiness	12 Feb 2025 TG Metadata needs a new chair as Anna has to step down. Also need members for TG on Data Access/Exchange 25 Apr 2024 We need someone really for TG on Data Access / Exchange. Other groups are adequately represented but more participants are always welcome 11 Oct 2023 Call to be sent by CGMS Sec in liaison with WGIV rapporteurs during October 2023	Dec 2024	**ONGOING**	

List of CGMS-52 WGIV recommendations				
Lead	**AGN item**	**Rec #**	**Description**	**Recommendation feedback/closing document**
CGMS space agencies	4.1	(R49.02)	Transferred from CGMS-49 plenary When pursuing data purchasing, CGMS recommends CGMS space agencies to consider an option for redistributing data to global NWP centres	2022 11 Apr: NOAA is currently distributing the Radio Occultation data we are purchasing under our current delivery order to National Meteorological and Hydrological Centers for non-commercial use WGIV to consider adding this to the WGIV CGMS-50 agenda. WGIV to collect input from CGMS space agencies on the data buy redistribution options to global NWP centres by end 2021. Feedback to WGIV to WGIII on the baseline/risk assessment (Feb 2022) for inclusion or not - TBD.
Plenary	2	(WGIIR49.)	Transferred from CGMS-49 WGII and plenary Working Group II recommends to CGMS Plenary the adoption of the proposed baseline products for geostationary satellites presented in CGMS-49-WMO-WP-14 with the addition of SSTs, to be considered for subsequent implementation by all Agencies.	2022 18 Jan: 2021 9 Nov: await the work from WGII, then follow up Endorsed by CGMS-49 plenary. WGII/Ken to send to WGIII and WGIV relevant parts of WGII report. Action to WGIII to update the baseline accordingly. (WGII action to WGIV on related redistribution mechanisms).
CGMS members	2	WGIV/R49.01	To consider an enhancement of advance notifications of processing changes as specified below and provide feedback to WG-IV. If a planned change to data processing results in a change in brightness temperature of 0.1K or 20% of NEdT (whichever is smaller), this should be made clear in notifications to users. These notifications should be made no later than 8 weeks before the change and test data should be provided if possible. [From the ITWG ITSC-21 Report]	2022 11 Apr: NOAA: To be addressed by the Task Group on User Readiness once established 2021 9 Nov: to be addressed by the Task Group on User Readiness once established To be converted into a good practice document.

CGMS members	12	WGIV/R49.02	The WGIV Cyber Security Expert Group welcomes any other members who are not yet represented in the group, and to propose new security related topics to be addressed by the group	2022 11 Apr: NOAA: So far the cyber security group met only once, for establishing the terms of reference. They should have met in December 2021; however, the attendance was too low and all experts were busy. 2021 9 Nov: standing recommendation to support Task Group, outreach to be addressed
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	WGIV §3.3		Given that GTS operational availability is not guaranteed beyond 2030, CGMS Members are recommended to develop plans for the adoption of the WMO Information System WIS 2.0 in support of international data exchange.	2025

LIST OF WGIV PARTICIPANTS

CGMS-53 - WGIV List of Participants			
First name	**Last name**	**Organisation**	**Email**
Anne	Taube	CGMS Secretariat	anne.taube@eumetsat.int
Mikael	Rattenborg	CGMS Secretariat	mikael@rattenborg.eu
Li	Xiaoru	CMA	lixiaoru@cma.gov.cn
Di	Xian	CMA/NSMC	xiandi@cma.gov.cn
Hao	Gao	CMA/NSMC	gaohao@cma.gov.cn
Ling	Gao	CMA/NSMC	gaoling@cma.gov.cn
Yonggang	Qi	CMA/NSMC	butlerqq@163.com
Andrew	Monham	EUMETSAT	andrew.monham@eumetsat.int
Daniel	Lee	EUMETSAT	daniel.lee@eumetsat.int
Karolina	Nikolova	EUMETSAT	karolina.nikolova@eumetsat.int
Miruna	Stoicescu	EUMETSAT	miruna.stoicescu@eumetsat.int
Sean	Burns	EUMETSAT	sean.burns@eumetsat.int
Simon	Elliott	EUMETSAT	simon.elliott@eumetsat.int
Borys	Saulyak	EUMETSAT	borys.saulyak@eumetsat.int
Miruna	Stoicescu	EUMETSAT	miruna.stoicescu@eumetsat.int
Babu Govindha Raj	Kesavannamboothiri	ISRO	govind@isro.gov.in
Kazuki	Yasui	JMA	k_yasui@met.kishou.go.jp
Kotaro	Bessho	JMA	kbessho@met.kishou.go.jp
Miki	Abe	JMA	abe.miki@met.kishou.go.jp
Nakayama	Ryuichiro	JMA	r-nakayama@met.kishou.go.jp
Norio	Kamekawa	JMA	orion-kamekawa@met.kishou.go.jp
Taro	Ono	JMA	taro.ono@met.kishou.go.jp
Tsuneyuki	Harada	JMA	t.harada@met.kishou.go.jp
Yasuhiko	Sumida	JMA	y_sumida@met.kishou.go.jp
Yumiko	Yamane	JMA	yamane.yumi@met.kishou.go.jp
Dohyeong	Kim	KMA	dolong@korea.kr
Jiyoung	Kim	KMA	aceasia@korea.kr
Yumi	Seo	KMA	hohoo11@korea.kr
Jaegwan	Kim	KMA	kimjgwan@korea.kr
Taekyu	Jang	KMA	denver@korea.kr
Yeji	Hwang	KMA	yejihwang@korea.kr
Joel	Scott	NASA	joel.scott@nasa.gov
Sid	Boukabara	NASA	sid.a.boukabara@nasa.gov
Tsutomu	Nagatsuma	NICT	tnagatsu@nict.go.jp

CGMS-53 - WGIV List of Participants			
First name	**Last name**	**Organisation**	**Email**
Lihang	Zhou	NOAA	lihang.zhou@noaa.gov
Melissa	Andersen Garcia	NOAA	melissa.garcia@noaa.gov
Andrew	Heidinger	NOAA/NESDIS	andrew.heidinger@noaa.gov
James	Donnellon	NOAA/NESDIS	james.donnellon@noaa.gov
Kumar	Machado	NOAA/NESDIS	kumar.machado@noaa.gov
Yunfei	Lu	NSOAS	lyf@mail.nsoas.org.cn
Xi	Zhang	NSOAS	zhangxi@mail.nsoas.org.cn
Juhong	Zou	NSOAS	zoujuhong@mail.nsoas.org.cn
Jinquan	Zhao	NSOAS	zjq@mail.nsoas.org.cn
Bernadette	Connell	VLab/CIRA/CSU & WMO VLab	bernie.connell@colostate.edu
Lu	Ren	VLab/CIRA/CSU & WMO VLab	renlu_work@126.com
Jesse	Andries	WMO	jandries@wmo.int
Natalia	Donoho	WMO	ndonoho@wmo.int
Mary Ann	Kutny	NOAA	mary.ann.kutny@noaa.gov
Laurie	Rokke	NOAA	laurie.rokke@noaa.gov

SWCG

CGMS

Space weather coordination group

SWCG REPORT

Co-Chair: *Tsutomu Nagatsuma, NICT*
Rapporteurs: *Andrew Monham, EUMETSAT, Jesse Andries, WMO*

1. Welcome, objectives and review of agenda

CGMS-53-SWCG-WP-12 - Meeting objectives and expected outcomes by co-chairs (verbal) (Co-chairs)

SWCG Chairs Dr. Tsutomu Nagatsuma, supported by Rapporteurs Mr. Andrew Monham and Mr. Jesse Andries, welcomed the participants, consisting of representatives from CMA, ESA, EUMETSAT, IROWG/JCSDA, ISRO, JAXA, JMA, KARI, KMA, NASA, NICT, NOAA and WMO (see Annex 1 for full list of participants).

SWCG reviewed and adopted the draft agenda proposed by the CGMS Secretariat prior to the meeting which is in line with the Terms of Reference for SWCG.

CGMS-53-SWCG-WP-15 - Status of SWCG Co-Chairs/Co-Rapporteurs Co-chair nominations (Co-chairs/rapporteurs)

It was noted that the co-chair Dr. Elsayed Talaat has left NOAA and can no longer fulfil this CGMS role. NOAA has therefore nominated a replacement co-chair, Dr. James Spann.
The SWCG had no objections to the nomination and therefore proposes Dr. James Spann as co-chair for confirmation by the CGMS-53 plenary in June.

2. CGMS risk assessment and baseline update

CGMS-53-WGIII-WP-02SWCG - Status and outcome of the 7th CGMS WGIII risk assessment (Melissa Johnson)

CGMS conducts an annual risk assessment against the CGMS baseline to track how well CGMS is meeting its commitments. For each sensor/observation such assessment is based on a qualitative analysis of all the orbits and satellite missions from which the observation is provided. It is based on planned launch dates and design life while resiliency, quality and availability are not analysed in detail. Hosted payloads operated by Members are included as well as commercially sourced data if the provision is consistent with the CGMS Baseline principles of sustained commitment to provide the data on a free and open basis for operational applications.

The Risk Assessment process is fully described in the CGMS Contingency Plan. The risk assessment was updated in a workshop in February following updates provided by the agencies.

In general, the risk posture has improved. Compared to last year the high risk for gap after 2031 for an energetic particle detector, plasma analyser, and magnetometers at L1 has been removed. The remaining risks are a moderate risk for gap or performance degradation towards the middle of next decade for coronagraphy from GEO and energetic particle sensors in LEO
The following actions were requested:

- The SWCG to make a recommendation to WGIII how to separate RO and Ionospheric Electron Density profiles in the CGMS Baseline and Risk Assessment.
- The SWCG to define how to add each satellite position in the attributes of the in-situ measurements of CGMS Baseline.
- NASA to determine if IMAP mission data is compliant with CGMS Baseline criteria to be incorporated into the Risk Assessment. NASA has agreed to clarify this by next year.

Discussion
It has been suggested to adjust the colour scheme to better signal the remaining risks even if no large risks are present (the yellow colour is hard to distinguish from green).

CGMS-53-WGIII-WP-01SWCG - CGMS baseline document updates

Updates to the CGMS baseline were discussed and added to the draft version of the CGMS baseline.

- Coronagraph and EUV imager: a separate line for an off-Sun-Earth-line L5 mission is added (separate line but in same table row)
- The specific orbit locations have been removed for the X-ray measurements in GEO
- The specific orbit locations for the particle sensors and magnetometers in GEO have been updated
- Similar as above additional lines are included for a plasma analyser and a magnetometer in L5
- A Heliospheric imager and Solar magnetograph are added as remote sensing from off-Sun-Earth line

- To be clarified by SWCG:
    - Does NASA spectral meet all baseline EUV requirements?
    - Next year consider whether a heliospheric imager from PUNCH should be identified.
    - Consider also NASA SDO

- **Proposed Actions on SWCG:**
    - Decide which NASA missions have sufficient commitment to include in the CGMS baseline (e.g. JEDI, PUNCH, SDO)
    - Recommend to WGIII how to separate RO Ionospheric Electron Density profiles in the CGMS Baseline and Risk Assessment.

CGMS-53-WGIII-WP-WP11swcg - CGMS contingency plan editorial updates

The presented and proposed updates to the document consist solely of specifying the update rate of the document as annually instead of every 4 years.

SWCG agreed the following actions.

CGMS-53 ACTIONS - SWCG				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
SWCG	SWCG/2	SWCG/A53.XX	Decide which NASA missions have sufficient commitment to include in baseline (e.g. JEDI, PUNCH, SDO)	CGMS-54

3. Updates on space-based observational capabilities

CGMS-53-CMA-WP-12 - The new-coming capabilities of FengYun satellites for space weather observation in 2025 (Weiguo Zong)

- In 2025, CMA/NSMC will launch two FengYun (FY) satellites—FY-4C in geostationary orbit and FY-3H in Sun-synchronous orbit (830 km, in afternoon orbit of 14:00 to replace FY-3D).
- There will be solar Extreme UltraViolet Imager (EUVI) (4 channels), solar X-ray and EUV Spectrometer (XEUVS) and Multiband Ultraviolet Spectrum Imager (MUSI) onboard FY-4C; Ionospheric PhotoMeter (IPM) and Wide-angle Aurora Imager-II (WAI-II) onboard FY-3H.
- The new space weather payloads onboard FY-4C and FY-3H will enhance CMA's capabilities for solar EUV imaging、solar X-ray flux and EUV spectra、ionospheric emission and spectrum、aurora monitoring.
- After the post-launch test for approximate six months to check the data validation, CMA/NSMC will provide these new space weather products to public in 2026, welcome to use these new observations in the operation and the science studies.

Discussion

Jim Spann enquired about the data latency. For FY-3H, latency is several hours, for FY-4C, it is about 10 minutes.

CGMS-53-ESA-WP-01 - ESA Vigil (L5) and D3S missions update (Juha-Pekka Luntama)

A summary of the implementation status of the space weather missions in the framework of the ESA Space Safety Programme was provided.

- Missions in development
  - Vigil: the EUV imager is now also confirmed (addition wrt last year). Launch 2031 with nominal mission lifetime of 7.5 years, but additionally consumables. Major objectives are:
    - Improved assessment of CME motion and density, in the corona and heliosphere, in combination with L1 observations
    - Observations necessary to improve solar activity onset detection and identification
    - Measure vector components of the IMF
    - Determine the characteristics of solar wind features rotating towards Earth

        - Enable assessment of developing solar activity, through the monitoring of active region development up to 4 or 5 days beyond the East limb
    - Radiation monitors and magnetometers flown as hosted payloads on a range of missions including lunar pathfinder and lunar gateway;
    - Space weather nanosatellites like SWING focus on radiation and plasma environments, with launches planned for 2026 and another mission in 2028;
    - Aurora: Single satellite demonstration mission is confirmed and planned to be launched 2029. Afterwards the vision is a 4-satellite constellation to be launched 2032 (TBC).
- New missions being proposed in the next ESA Ministerial Level Council: SWORD Space Weather Orbital Radiation Detector, a 2-satellite mission in GTO-like orbit.

Discussion

In the discussion it was clarified that the nanosatellites are making use of an already existing standard bus chosen by the industry.

CGMS-53-KMA-WP-01 - KMA update on its space weather activities (Daehyeon Oh)

- Using GK2A, Himawari-9, GOES-16 and -18, major space weather events from May and October 2024 were analysed.
- During magnetopause compression, satellites in the dayside were exposed to interplanetary space, showing sharp electron flux drops and Bz reversals.
- Satellites in the nightside were not exposed but showed gradual changes in Bz and electron fluxes due to magnetospheric deformation.
- This shows the value of multi-point observations in providing a more comprehensive view of magnetospheric responses in space weather events.
- To maximize the effectiveness of multi-point observations, continuous cross-calibration and validation of space weather data are essential.
- Well-calibrated data enhances the synergy of multi-point observations, improves space weather modelling, increases satellite operation stability, and strengthens forecasting capabilities

CGMS-53-NICT-WP-01 - NICT space weather observation update (Tsutomu Nagatsuma on behalf of S. Saito)

The space environment in geostationary orbit is at risk of various anomalies and malfunctions due to solar energetic particles, galactic cosmic rays, and magnetospheric energetic particles caused by substorms and geomagnetic storms. For sustainable and stable satellite operation, it is necessary to monitor in-situ space environment. If an anomaly happens, it is necessary to quickly analyse the cause of the anomaly based on this information and take the necessary measures. In addition, it is necessary to reduce the risk of satellite anomalies and interruption of space-based observations by utilizing space weather information using energetic particle data. NICT is developing Radiation Monitors for Space weather (RMS) onboard the meteorological satellite Himawari-10, which consists of a high-energy electron sensor and a high-energy proton sensor and is responsible for space environment measurements over Japan. The engineering

model of the new space weather sensors, RMS, was finished to develop July 2024. The proto-flight model of the RMS is in the critical design phase from April 2025 after confirming the compatibility of the interface and the design standard. RMS onboard Himawari-10 will contribute to the global network of operational space-based space weather observation.

CGMS-53-NOAA-WP-13 - NOAA space weather observations update (James Spann)

- CCOR-1 launched on GOES-19 on 25 June 2024 and NOAA publicly released a first image from the instruments on 22 October 2024. GOES-19 became operational early April 2025.
- SWFO-L1 is planned to launch in September 2025 and will feature CCOR-2 and numerous other space weather instruments including a Solar Wind Plasma Sensor (SWiPS), Suprathermal Ion Sensor (STIS), and the Magnetometer (MAG).
- The SOL project received Key Decision Point B (KDP-B) approval in December 2024.
- Space Weather Next GEO series requirement and concept definition work is ongoing

Discussion

- Concerning the GOES lifetime, it was noted that there is a long gap (10 years) before launching a new mission.

- X-ray flux is provided on GOES-19 – so no need to host on SWFO-L1, will be on SOL-A etc. This will be referenced as the Sun-Earth-Line in the CGMS Baseline.

4. Updates on space weather activities - agency reports

CGMS-53-EUMETSAT-WP-12 - EUMETSAT space weather activity status and planning update (Andrew Monham)

EUMETSAT presents the progress in implementing the space weather roadmap for an increasing role in delivery of operational space weather data services in support of European and global operational space weather services. A formal agreement with ESA is being considered for collaboration on operational space weather to be submitted for approval by Member States of both ESA and EUMETSAT in 2025. EUMETSAT has already embarked on limited low-cost activities such as supporting space weather data distribution from international satellite operators and the integration of the NOAA SEM-2 radiation monitor processor into the EUMETSAT Ground Segment. New activities in the framework of the proposed cooperation with ESA could include:

- Integration of a New Generation Radiation Monitor (NGRM) processor for one of the instances embarked on EUMETSAT satellites to demonstrate EUMETSAT capabilities.
- Potential for EUMETSAT to take full flight and ground segment operations for a new Aurora Constellation mission planned for launch in 2032 (one of the ESA D3S missions) and potential further operational roles.
    - Operationalisation of topside TEC products from Metop, Metop-SG and multi-mission products, including commercial RO, is envisaged if use case expressed by partners.

- Potentially implement processing in EARS stations to reduce latency for limited data sets if use case is confirmed.

CGMS-53-ISRO-WP-10 - ISRO space weather activity report: Aditya L1 performance (K. Sankarasubramanian)

The performance of the Aditya payload was discussed. The Aditya spacecraft at L1 is now in its science phase with scientific objectives including understanding the initiation of CME's. Aditya carries the following instruments:

- VELC: Visible Emission line Coronagraph
- SUIT: Solar Ultra Violet Imaging Telescope
- HEL1OS: High Energy L1 Orbiting X-ray Spectrometer
- SoLEXS: Solar Low Energy X-ray Spectrometer
- PAPA: Plasma Analyzer Package for ADITYA
- ASPEX: Aditya Solar wind Particle Experiment
- MAGNETOMETER

Aditya-L1 data are released in public domain on Jan 6, 2025. Second data sets released on Feb 14, 2025. More data release are planned with the Indian Space Science Data Center (ISSDC) acting as the primary data center for the payload data archives of Indian Space Science Missions. (https://www.issdc.gov.in/adityal1.html, https://pradan.issdc.gov.in/al1 https://pradan1.issdc.gov.in/al1)

Discussion

It was noted that Aditya is not designed to support operational forecasting, but rather science applications with data available once per day.

CGMS-53-JAXA-WP-04 - JAXA space weather activities for science and research update (Yugo Kimoto)

In May 2024, we experienced a harsh space environment, but there were no major problems with JAXA's satellite operations. This enabled to observe specific space environment data which could contribute to future space activities.
On the scientific side:

- JAXA contributes to international space weather observations by providing data obtained from the space solar observatory HINODE and the geospace explorer ARASE.
- JAXA will conduct extensive observations for heliospheric space weather from the Sun to Mars, integrating data from JAXA's planetary missions such as BepiColombo/MMO at Mercury and MMX at Mars along with those from HINODE and ARASE. JAXA is collaborating with Nagoya University to operate the Center for Heliospheric Science (CHS).

On the R&D side:

- JAXA has installed radiation monitors on several satellites and has contributed to satellite operations by providing radiation data.
- standardization activities in ISO and JAXA. These activities contribute to reducing the anomalies which is caused by the space environment in space projects.

CGMS-53-NASA-WP-01 - NASA space weather activities (Jamie Favors)

Jamie Favors presented an update on the NASA space weather activities. There are currently 30 missions in operation or development in the Heliophyiscs division and a common theme was highlighted towards a lot more presence on Mars.

Already 3 successful launches in the heliophysics division were concluded this year: LEXI, PUNCH, EZIE. With several more to follow TRACERS, IMAP, CARRUTHERS and ESCAPADE. Many missions relate to SWx but especially PUNCH and IMAP relevant for SWx including operations.

The new decadal survey and User needs survey are important documents for the path to follow in the near future in the Space Weather program. Space Weather for Human exploration is an increasing thematic.

Recent accomplishments include:

- Established Space Weather Centers of Excellence (Mar 2024)
- Participated in first multi-agency, end-to-end Space Weather Tabletop Exercise (May 2024)
- Launched NASA Space Weather Program Office at Langley (Oct 2024)
- Developed new approach to R2O2R Program Element based on prior successes and similar programs
- Made selections for multiple R2O2R Transition projects
- Open modelling through CCMC
- Radiation measurements demonstrated from balloon
- SEP score board
- Hermes instruments delivered
- SEP score board
- Largest Space Weather event on Mars detected by Curiosity rover as well as Maven orbiter (Solar Orbiter helped a lot to understand the origin)

Discussion

The action item on requirements for Human exploration is still open. SRAG did a study few years ago. Jamie Favors will confirm if still up to date applicable before submitting that report with respect to the HLPP action.

CGMS-53-NICT-WP-02 - NICT Space Weather Activities (Tsutomu Nagatsuma)

NICT Space Environment Laboratory routinely operate space weather services of Japan on 24/7 basis as a part of ICAO's global centers, ACFJ. Recent progresses about NICT's space weather activities include:

- NICT has developed a warning operation system for new criteria based on the report of "Study Group on the Advancement of Space Weather Forecasting" published in June 2022. Distribution to the public is scheduled for March 2025.
- NICT contributes to international activities such as ISES, WMO, COSPAR, ITU, ICAO, etc. and to facilitate information exchange among space weather forecasting organizations in the Asia-Oceania region through AOSWA.
- NICT has an internship program to support the travel fare to NICT and staying expense for students. We have received staffs for giving training as space weather forecasters since 2014, especially from South East Asian countries. Seven staff members were received in Feb. 2025.

Discussion

It was noted that warnings issued are for Japanese customers. But from website and emails, the information is also visible. It was further clarified that while Solar flare products are global products, for HF communication and geomagnetic disturbances they are tailored to the Japanese customers.

CGMS-53-WMO-WP-09 - WMO report on the Space Weather Expert Team priorities and activities (Jesse Andries)

An overview of space weather activities in the WMO, as described in the Four-year Plan 2024-2027 adopted by Executive Council. The presentation focussed on the activities to integrate SWx into the core infrastructure elements: WIGOS (WMO Integrated Global Observing System - observations), WIS (WMO Information System - data exchange) and WIPPS (WMO Integrated Processing and Prediction System - Modelling). It highlighted the work to be performed for including SWx into the various WMO documents and frameworks such as the WIGOS Manual and Guide, the Rolling Review of Requirements and Gap analysis based on OSCAR/Surface, OSCAR/Requirements and OSCAR/Space, the of Core and Recommended SWx satellite data, as well as data formats and metadata specifications.

Core activities to collaborate on with CGMS include

- Actions on (meta)data and WIS2.0 data provision require close collaboration with CGMS and CGMS agencies when concerned with space-based observations
- Update of the WIGOS Vision → 2050
- Space Traffic Coordination requirements to feed into requirements actions as one of the SWx application area

Discussion

It was clarified that Core and Recommended data should normally largely align with the CGMS baseline. But a rigorous process to determine the core data has not yet been followed for SWx data.

CGMS-53-NOAA-WP-14 - Update from the NOAA Space Weather Prediction Center (Steven Hill)

Steven Hill provided an update from SWPC with highlights of the past year:

- Customer engagement:
  - Space Weather Advisory Group's "User Needs" survey.
  - National Academies' Decadal Survey.
  - Revising the NOAA Space Weather Scales for clarity, relevance, and usability.
  - Testbed facility completed and first on-site exercise scheduled.
- New observations and products.
  - GOES-19 satellite and the CCOR-1 coronagraph.
  - Continued development of the SWFO-L1 satellite and ground system.
  - Other new space weather prediction products and models. Global TEC, Solar Cycle progression plot, >500MeV protons. Energetic heavy ion counts as well as SUVI flare locations will be available later this year.
- Operational improvements.
  - Achieved and maintained ISO 9001:2015 quality certification
  - Enhanced the Alternate Processing Site for improved system resilience.
- Space weather activity at solar maximum.
  - The Gannon Storm (May 2024 Storm), the first G5 event in 20 years.
  - Underscored the economic and operational impacts of space

Discussion

It was clarified that no detailed report of the impact of May event is planned from SWPC. Many other references exist (including inputs to the ISES report mentioned below). Jim Spann highlighted the impact on agriculture – in particular growing corn in the US. 400M-1.2B $ losses estimated. The losses were due to delays in planting at a critical time. The delays were caused by improper geolocation readings. The planting was halted to address the issue. At that time there was no awareness by the farmers of the space weather impacts on the geolocation systems. Impact studies are important.

CGMS-53-ESA-WP-03 - ESA space weather service network: progress and next steps (Alexi Glover)

The ESA Space Weather Service network consists of 29 user driven services in demonstration & testing available via SWE Portal supported by SWE helpdesk (8/5) and second line support from Expert Groups. The portal provides access to products, modelling, applications, underpinning R&D, as well as data via data browser and HAPI interface.

The SWE portal is utilized as a research to operations framework (performance monitored) and supported with webinars and dedicated user campaigns and questionnaires. It is also useful for identifying promising business cases.
A one week residential course targeting Master/PhD students organised by SWE Office together with ESA Academy team, ESEC-Galaxia, Belgium 24-28th March 2025. The course touches on topics from Fundamentals of space weather science through modelling, forecasting, different application areas and socio-economic impacts and includes hands-on tutorials using the SWE portal and key tools.

5. International space weather data user activities - Part 2

CGMS-53-GUEST-WP-01 - Update of International Space Environment Services (ISES) activities in 2024 (Mamoru Ishii)

Mamoru Ishii presented recent activities of ISES starting with a summary of the changes to ISES officials and highlighting the addition of Thailand as a Collaborative Expert Centre. ISES is preparing an overview paper about the May 2024 Storm events with compilation of observed impacts and inputs form all ISES centres.
ISES is also involved in an initiative to coordinate a Global Ionosonde Operation Network, which addresses one of the topics that was highlighted in the International Space Weather Coordination Forum: the coordination of operational ground based observations. The initiative grew out of one of the proposed pilot projects in the context of ISES-WMO-COSPAR collaboration.

Discussion

Jim Spann applauded the ISES group for the broad worldwide participation in the group which is very important.
Upon a question by Nagatsuma-san, Ishii-san clarified that the GION network has not yet taken any conclusions regarding whether full ionograms would be shared or only the scaled parameters.
Ishii-san clarified that the report on the May 2024 Storm events was not yet finalized but that it should be concluded in a month or two, and that it will include inputs from SWPC.

CGMS-53-NOAA-WP-15 - International L1 constellation collaborative research opportunity for solar wind spatial scales (Dimitrios Vassiliadis)

NOAA's Space Weather Follow On – Lagrange 1 (SWFO-L1) and NASA's Interstellar Mapping and Acceleration Probe (IMAP) are scheduled for launch this year. After they reach the Sun-Earth Lagrange 1 (L1) point and complete their commissioning, there will be a total of six spacecraft (including Aditya-L1 and the legacy ACE, DSCOVR, and Wind missions) in the same location of space and measuring the solar wind plasma, particle, and magnetic parameters simultaneously. This unprecedented spatial coverage of the solar wind can be the basis for improving our understanding of the solar wind and its structures (CMEs, CIRs, shocks, etc.) at 1 AU, particle acceleration processes, and their relation to their coronal and/or photospheric origins. For operational purposes, the dataset can be used to develop more accurate solar

wind/IMF time series; optimized numerical-propagation methods to the bow shock where the data can be used as inputs to geospace NWP models; and more effective coupling functions.
The need for coordination in data pre-processing and archiving procedures was highlighted and the steps taken among stakeholders up to this point were summarized.

The intercalibration of satellite data is one of the tasks coordinated by the SWCG. In addition, the activity is of interest to the GSICS SWx subgroup which has expanded its scope to include intercalibration among Lagrange-1 missions.
It is therefore proposed that project updates be regularly presented to an SWCG task group and/or the GSICS intercalibration subgroup for awareness/actions.

Discussion

Jim Spann thanked Dimitrios for taking the lead in this activity and taking advantage of this unique opportunity. He also pointed out that also IMAP, despite being a research directed spacecraft does provide a low latency datalink.

It was emphasized by Edmund Henley that these studies are not only about cross calibration issues and the turbulent scales, but also about assessing the models at the synoptic data scales, pointing out the L1 orbits are big enough to capture e.g. ENLIL grid size. A number of research projects were pointed out that could relate to this, e.g. based on IPS measurements, and about relations between the scales of variability of heliospheric structures and magnetospheric scales.

Andrew Monham pointed out that in addition to calibration, also the issue of data access to the suite of L1 constellation missions is of interest to the Space Weather Coordination Group.

Proposed action for the SWCG Data Access TG: Consider how to harness the suite of L1 constellation missions for operational space weather usage.

CGMS-53-NOAA-WP-16 - Data requirements for space weather services to civil aviation (Mike Bettwy)

ICAO Space Weather Centres were polled in late 2024 on their needs for space-based observational data to support the ICAO mission. The results can be summarised as follows
Near-real-time (or low latency) data in support of space weather operations and forecasting is essential

- GNSS observations, especially polar
    - GNSS with high sampling rates is needed for getting support for our ground-based scintillation measurements • Ideally, make plans for space-based ionospheric soundings with solutions that operate outside GNSS frequencies
    - EUMETSAT is pushing a solution of GNSS Radio Occultation (RO) data dissemination
    - There are restrictions in TEC estimates with ground-based instrumentation, but our space weather aviation partners need that information for all areas (above sea, etc.)
    - Some users appear to be using COSMIC-2 data to fill in GNSS data gaps, but this may not be readily available to many folks

- particle data:
    - At a minimum: future space-based solutions need to provide the information that we currently have today
    - ICAO space weather centres have expressed a need and interest in measuring solar energetic protons with higher-energy resolution for energies above 100 MeV
    - LEO observations of energetic protons and electrons are needed to support ground-based instrumentation for polar cap and auroral absorption efforts
    - LEO measurements of radiation, especially in polar areas, would be quite helpful
- Coronagraph data (multiple vantage points)
- Estimates of Coronal Mass Ejection (CME) speed
- L1, L5 data (solar surface, solar wind, flaring, Inter-planetary Magnetic Field, etc.)
- GOES satellite data (continuation):
- Although not currently covered by the ICAO SWx product portfolio, there may be a need for covering solar radio burst information since these can disturb airport secondary surveillance radars and an increase noise levels in GNSS. A space-based radio burst measurement capability would be a practical approach to supplement ground-based observations.

Additional details and specificities may be gathered by the ICAO Space Weather Centres in the coming weeks.

Discussion
Irfan Azeem questioned what was the bottleneck in the availability and the access to the COSMIC-2 data. SWPC has near-real time access to the data, and in principle it should be available to others, but the issue seems to be primarily technical complications in centres setting up that real time access to the data.

While from OSCAR/Space it seems there are very many observations of particles in LEO, also here there appears to be a problem in that the data is in general not available in near-real time to all centres.
Jim Spann further questioned if this is a regional issue or rather a global issue and it seems to be rather a regional issue which hence should be addressed regionally.

Jim Spann suggested the problem description needs to be more detailed such that the SWCG response can be addressed.

Proposed action on Data Access TG: Establish response to the ICAO space weather service identified needs.

SWCG agreed the following actions.

CGMS-53 ACTIONS - SWCG					
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**	**Status**

SWCG Data Access TG	SWCG/5	SWCG/A53.XX	Consider how to harness the suite of L1 constellation missions for operational space weather usage.	CGMS-54	OPEN
SWCG Data Access TG	SWCG/5	SWCG/A53.XX	Establish response to the ICAO space weather service identified needs presented at CGMS-53.	CGMS-54	OPEN

6. WIGOS Vision, OSCAR/Space and Gap Analysis for Space Weather

CGMS-53-WMO-WP-11 - WMO WIGOS Vision 2050 update activity – space weather aspects (Jesse Andries)

An effort has been kick started (January 2025) to update the WMO Integrated Global Observing System (WIGOS) vision for the 2050 timeframe. A representative (but small-enough to be agile) core team was put together by WMO to this end, with the purpose of finalizing the product in 2026. The scope will include space- and surface-based components and will envision a global system to measure the Earth, and address WMO-relevant applications. Many driving factors are expected to influence this vision including technology evolution, applications/users needs, the future landscape of observing systems providers including non-traditional systems and commercial providers, etc. This effort is expected to provide the community with a vision that will help coalesce efforts toward a cohesive, complementary global observing system. The vision, should be as well-informed and technically accurate as possible, and should inspire the community to design, evolve and deploy a complementary global observing system that addresses the needs of the future, and leverages the emerging opportunities.
The presentation at the SWCG highlighted the importance for the SWx community to contribute to this effort by providing inputs, thoughts, ideas, and other contributions. These inputs include both technical content but also strategic and institutional guidance.
A number of technical elements of SWx items within the Vision document were also discussed.
Members are invited to engage, provide inputs and assist in reaching out to the broader SWx community. A questionnaire will be sent out at a later stage and more concrete engagement would be requested from around June after the core drafting team has initiated a first draft.

Discussion
Edmund Henley supported the need to increase the extent to which the ground-based instrumentation is being addressed. These data are increasingly being utilized but the fact that these are often provided from research funding is something that should be raised and improved. An additional point of attention may be the data from research missions that can be leveraged operationally. Some of that is really useful, but some reflection is needed on how to approach the non-significant effort to setup the systems to actually be able to use that data.

Guidelines on that aspect would be very useful. In Europe in the context of the proposed ESA and EUMETSAT collaboration agreement it would be important as part of research missions to have a clear plan to assess the operational potential to then be followed up by EUMETSAT for longer term operational implementation (as is proposed for Aurora). In the US the NASA Earth science division has an established

focus when flying a research mission, to consider the application and build in the capability to support the application. The NASA heliosphysics division has picked up on this which is also mentioned in the decadal survey. NASA has addressed this through including Beacon data for real-time reception, whereas NOAA invests in receivers to ensure data acquisition.

A SWx research coordination group has been advocated, where funding agencies can come together and coordinate SWx activities. The relation between research missions and operational usage of the data would certainly also be a topic for that group to look into.

A discussion was also triggered regarding the apportionment of space and surface-based solutions. Which is not only a technical issue but also an issue of reliability and cost. OSEs and OSSEs would be needed to demonstrate the value of different components. Also in terrestrial weather, one only realizes how important weather balloons are when one sees the results of the studies. The space community is generally much better at performing such studies. Surface-based instrumentation is much easier to service and maintain, e.g. the GONG instruments. It is very important to keep this funded. Clearly, the surface-based space weather community could benefit a lot from more clearly presenting the value of these of these observations.

CGMS-53-WMO-WP-10 - Updates on Space Weather information in OSCAR/Space and WMO Gap Analysis (Heikki Pohjola)

The WMO gap analysis for space weather observation capabilities against the requirements presented in WMO Vision for WIGOS 2040 was provided. It compares space-based observation capabilities recorded in OSCAR/Space to the WMO WIGOS Vision for 2040 requirements for the period of next decade. In this working paper detailed descriptions of the missing observations capabilities related to the specific observation types in WIGOS subcomponent 1 and 2 were given. The work summarises 4 gaps for space weather observation types as main concerns non-compliant with WIGOS Vision 2040 requirements. Related to space weather it concludes gaps with regards to WIGOS subcomponents 1 and 2 in magnetograph, radiospectrograph, X-ray imager and LEO magnetometer observations.

The presentation highlighted the need for presenting and evaluating the gaps for solar and heliospheric remote sensing and in situ measurements differently from the Earth observation remote sensing, since in these cases the orbits are not related to spatial coverage of the Earth surface, but rather to Solar surface and heliosphere. This should also be improved in the presentation within the update or the WIGOS Vision. Additionally, a number of required improvements to OSCAR were pointed out:

- separate ionospheric RO from neutral atmosphere RO
- improve filters for analysis of energetic particle sensor capabilities

Discussion

Fundamental questions were raised, to what extent there is a similar process in WMO for a gap analysis for surface-based observing systems. An overall process exists which includes both surface and space-based components. It is called the Rolling Review of Requirements (RRR), which consists first of updating the requirements but additionally also identifying gaps in the current observing system to meet the

requirements. That gap analysis is not based on the WIGOS Vision but on OSCAR/Requirements. On the capabilities side it can make use of OSCAR/Space and OSCAR/Surface, but there is in no way any automated process to compare those databases. In addition, OSCAR/Surface contains only very incomplete information of observing systems for Space Weather. The gap analysis in the context of RRR is hence purely based on expert opinions and summarised in a report called the Statement of Guidance. It does not contain such detailed charts as those produced for the Space Weather gap analysis for space-based component presented here (which is moreover against WIGOS Vision and not OSCAR/Requirements).
It was pointed out that having such more elaborate gap analysis also for the surface-based component could be very beneficial to advocate for these surface-based systems and their funding. Making this process more mature would be considered very helpful. And this could not only be an issue of interest to Space Weather, but also to e.g. climate which depends on long term observations.

The analysis should be improved by better separating the contributions from operational missions and the contributions from research mission, though admitting that there is a big grey area of research missions that can be utilized operationally.

In the future, commercial providers would also need to be better captured in the analysis.

Jim Spann commented on the need to properly capture the transition of certain types of missions and data to becoming considered operational. An example is Auroral imaging. We had scientific missions earlier and we should now begin to see these observations show up operationally and hence in the gap analysis charts.
Auroral imaging is indeed not fully analysed here currently. Most properly because of the lack of its specification in the WIGOS Vision. This will need to be checked and improved.
More generally a good question to ask is which would be the next most valuable dataset to have in near real time.

Related to this, there is also a need to document more properly the data that are delivered in real-time and those that are retrospective or historical data. In the future the plan would be to make two separate analyses alongside each other. One with low-latency data/missions only, and one indicating the additional data.

It was pointed out that for terrestrial weather data streams well established monitoring systems exist (such as NWP SAF), from which performance, e.g. latency can be monitored and reported. This is not the case for space weather data in general. It would probably be good to flag this as something that needs to be invested in.
This relates a discussion about the recorded latency in OSCAR/Space. There are two different issues that need be kept separate: the declared latency by the agencies, the latency values reported from validation and monitoring activities. Currently some of the latency values in OSCAR/Space are sourced from NWP SAF, which can be useful but it mixes the functions of capabilities database with that of a monitoring tool, and may need to be reconsidered.

Edmund Henley commented that long-term, it might be worth thinking about "space climate" variables, although clearly a lower priority than "space weather".

7. Briefing from GSICS GRWG space weather subgroup on intercalibration

CGMS-53-SWCG-WP-07 - GSICS GRWG space weather sub-group report (Tsutomu Nagatsuma (NICT))

The GSICS GRWG Space Weather Subgroup has started a dialogue with COSPAR/PRBEM for standardization of mutual calibration and reported the results of its review of the Data Analysis Procedure document at COSPAR 2024@Busan in July 2024. COSPAR/PRBEM and GSICS SWx Sub-group will work together to further revise the document.
The group has reviewed the data level definitions employed by various CGMS members and noted differences between these definitions across agencies.
As an introduction to the results of past activities, GSICS published a Newsletter's special issue on space weather cross-calibration on Sept. 30, 2024. Six articles are included in this newsletter.
Based on the current and future status of solar and solar wind observations by various CGMS agencies at L1 point, GSICS SWx sub-group decided to also include the cross-calibration of solar wind measurements within their activities.
The SWx breakout session at the 2025 GSICS Annual Meeting included eight talks related to cross calibration.

Discussion
Edmund Henley praised the team for also taking up the L1 wind measurement cross calibration issue as the large variations and discrepancies between e.g. DSCOVR, ACE data is a real complication to research to operations transition. In general the SWx modelling research community is not sufficiently aware of the complexity of performing such measurements, in particular higher order moments such as the density, while many models exactly depend on exactly that value.

Further expert participation in the GSICS team would be very much welcomed, especially more from the research community, possibly outside the CGMS community.

8. Review of SWCG list of actions

CGMS-53-SWCG-WP-10 - Status of CGMS-52 SWCG list of actions (incl. review of any relevant CGMS-52 plenary actions) (Andrew Monham)

Please refer to the SWCG action list below, updated with proposals for action closure and new actions. Note, this includes actions generated within the Joint WGI-WGIV-SWCG meeting (see separate report chapter).

Actionee	AGN item	Action #	Description	Action feedback/closing document	Deadline	Status
				KEEP OPEN		**OPEN**

Actionee	AGN item	Action #	Description	Action feedback/closing document	Deadline	Status
CGMS Members	SWCG/6	SWCG/A50.01	Supply latency information to OSCAR DB with granularity of each relevant space weather sensor on their space missions.		CGMS-53	
SWCG (RO TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A50.03	Establish requirements for and recommend an implementation of an optimised system for radio occultation observations for ionosphere monitoring		CGMS-53	**OPEN**
CGMS Members	Joint WGI-WG-IV-SWCG/6	SWCG/A50.05	CGMS members are invited to support the WRC-23 preparatory process on agenda item 9.1 Topic A (space weather) through its national regulatory authorities, regional WRC-23 preparations or directly in the relevant ITU fora, as appropriate, i.e. identification of frequency bands requiring protection, with coordination with WMO-ET-SWx/WMO-ET-RFC	WRC-23 performed. RF standing agenda item	CGMS-53	**CLOSED**
GMS members (WGII and SWCG)	4.5	WGII+SWCG/(P)A50.05	CGMS WGII and SWCG members are invited to nominate candidates for a subgroup within GSICS on Space Weather Cal/Val and Intercalibration, which will be focused on providing intercalibration for Space Weather. Please provide nominations to cgmssec@eumetsat.int and mitch.goldberg@noaa.gov	Membership requests now managed by GSICS Subgroup	CGMS-53	**CLOSED**
SWCG (Anomaly TG)	Joint WGI-WG-IV-SWCG/2	SWCG/A51.01	Expand extent of anomaly data feedback	All CGMS members requested to provide updated anomaly data covering 2024.	CGMS-53	**OPEN**
SWCG (Anomaly TG)	Joint WGI-WG-IV-SWCG/2	SWCG/A51.02	Review current usage of space weather data for spacecraft operations and goals for improvement.	TRANSFERRED to SESTG of WG1	CGMS-53	**CLOSED (Transferred)**
SWCG (Data Access TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A51.03	Report Space Weather data gaps & discrepancies between providers and user surveys and OSCAR DB and related priorities for resolution.	Existing surveys reviewed. Is normal work going forward	CGMS-53	**CLOSED**

Actionee	AGN item	Action #	Description	Action feedback/closing document	Deadline	Status
SWCG (Data Access TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A51.04	Propose standardised Space Weather operational formats and CF convention metadata examples.	CGMS-53 Proposal from Edmund Henley	CGMS-53	**PROPOSE CLOSED (2 New actions from Edmund presentation)**
SWCG (Data Access TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A51.05	Implement improved data access through existing mechanism infrastructure	CGMS-53: Merge action with SWCG/A51.06:	CGMS-53	**PROPOSE CLOSED**
SWCG (Data Access TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A51.06	Review future landscape of operational data delivery mechanisms and coordination taking into account WIS 2.0 and other cloud-based data access mechanisms.	CGMS-53: Merge action with SWCG/A51.05:	CGMS-53	**PROPOSE CLOSED**
NOAA	SWCG/2	SWCG/A51.07	Report on the STEREO-A coverage implementation	Input to WGIII RA group made	RA Workshop 2024	**CLOSED**
NOAA	SWCG/4	SWCG/A51.08	Provide NOAA aviation and satellite industry testbed reports	Closed (see SWCG Report)	CGMS-53	**PROPOSE CLOSED**
SWCG	SWCG/5	SWCG/A51.09	Members to document any plans for NRT, operational thermospheric density measurements with consideration of observation requirements from atmospheric density models.	CMA Presentations / discussion made.	CGMS-52	**CLOSED**
SWCG/data access + RO TGs	SWCG/5	SWCG/A51.10	Consider ICAO PECASUS requirements for improved LEO RO observation, energetic (tens of Kev) electron precipitation flux from LEO orbit , SEP flux spectra (100s MeV to GeV)	Mike Bettwy, NOAA, presentation made to CGMS-53	CGMS-53	**PROPOSE CLOSED**
SWCG	SWCG/9	SWCG/A51.11	Produce a report of space weather observation requirements for improved STC services and space sustainability	**Transferred to WGI SESTG**	CGMS-53	**CLOSED (Transferred)**
SWCG	SWCG/5	SWCG/A52.01	Consider HLPP / Baseline updates on the following: Thermospheric density observations to be added to baseline (CMA observations) Assessment of thermospheric measurement means in HLPP	Updates proposed at CGMS-53	CGMS-53	**PROPOSE CLOSED**

Actionee	AGN item	Action #	Description	Action feedback/closing document	Deadline	Status
			Auroral observations to be added to baseline (CMA observations)			
SWCG	SWCG/10	SWCG/A52.02	Consider observation requirements in support of interplanetary human exploration	CGMS-53: See links provided in CGMS Report, Keep Open for NASA response.	CGMS-53	**OPEN**
SWCG/ Data Access TG	Joint WGI-WG-IV-SWCG	SWCG/A52.03	Report on space weather product level definitions, identify any differences and propose steps for alignment.	Data Access Action CGMS53-TG#2-7	CGMS-53	**OPEN**
SWCG / Anomaly Database TG	Joint WGI-WGIV-SWCG/2	SWCG/A52.04	SWCG to seek feedback from space weather analysts on value of the collected EDAC 2023 data	Closed by NICT report and new action to collect 2024, historical and future data.	CGMS-53	**PROPOSE CLOSED**
SWCG	SWCG/2	SWCG/A53.XX	Decide which NASA missions have sufficient commitment to include in CGMS baseline (e.g. JEDI, Punch, SDO)		CGMS-54	OPEN
SWCG	SWCG/2	SWCG/A53.XX	Recommend to WGIII how to separate RO Ionospheric Electron Density profiles in the CGMS Baseline and Risk Assessment.		CGMS-54	OPEN
SWCG Data Access TG	SWCG/5	SWCG/A53.XX	Consider how to harness the suite of L1 constellation missions for operational space weather usage.		CGMS-54	OPEN
SWCG Data Access TG	SWCG/5	SWCG/A53.XX	Establish response to the ICAO space weather service identified needs presented at CGMS-53.		CGMS-54	OPEN
SWCG Data Access TG	SWCG/8	SWCG/A53.XX	Review usage plans and implementation status for improved data access through heritage, new and future mechanism infrastructures, learning lessons from terrestrial data access approaches.	Merged from A51.05/51.06	CGMS-54	OPEN
CGMS Spacecraft Operators	Joint WGI-WGIV-SWCG/2	SWCG/A53.XX	CGMS Members operating satellites to produce EDAC data covering 2024 and report on ability to supply historical and future data.		CGMS-54	OPEN
SWCG Anomaly TG	Joint WGI-WGIV-SWCG/2	SWCG/A53.XX	Assess suitability of SPARK database tool as repository for CGMS anomalies, including data access criteria, metadata needs and standardisation.		CGMS-54	OPEN

Actionee	AGN item	Action #	Description	Action feedback/closing document	Deadline	Status
SWCG TG on Improving User Data Access	Joint WGI-WGIV-SWCG/3	SWCG/A53.XX	Draft WMO-CF profiles with improved metadata in coordination with WMO ET-SWx, ISES, COSPAR and research community and proposed follow-up activities.		CGMS-54	OPEN
WGI SESTG & SWCG	Joint WGI-WGIV-SWCG/5	SWCG/A53.XX	Assess possibility to share satellite orbit data to estimate thermospheric drag.		CGMS-54	OPEN

Points of Note:

- SWCG/A51.02, A51.11 got transferred to the WGI Space Environment Sustainability Task Group
- SWCG/A50.05, 51.03 are now considered regular work of the data access TG and the actions were closed.
- SWCG/A51.04 ss proposed to be closed in favour of two new proposed actions (see the report of the joint WGI-WGIV-SWCG session)
- SWCG/A51.05 and SWCG/A51.06 are merged to become one comprehensive action on current status of dissemination mechanisms and future plans, including lessons learned from terrestrial weather
- SWCG/A51.08 is closed after receiving the following information as a full report is not likely to be expected.
    - Website for the satellite testbed with many available presentations: https://testbed.spaceweather.gov/exercises/2023-satellite-environment-testbed-exercise
    - Further presentation given at the Space Weather Workshop: https://www.swpc.noaa.gov/sites/default/files/images/u97/Fang-TzuWei.pptx_.pdf
    - For aviation testbed, there's brief discussion in a paper by Hazel Bain "NOAA Space Weather Prediction Center Radiation Advisories for the International Civil Aviation Organization", https://doi.org/10.1029/2022SW003346
    - Equivalent high level description for aviation to complement the paper mentioned above: https://testbed.swpc.noaa.gov/exercises/2022-testbed-exercise-aviation
    - Further presentation given at the Space Weather Workshop https://www.swpc.noaa.gov/sites/default/files/images/u97/Cash_Michele.pptx_.pdf
- SWCG/A51.10 regarding requirements for the aviation services is closed in favour of new action to compare in detail the extent to which each of the identified requirements for Aviation is being addressed
- SWCG/A52.04 action on EDAC data is closed in favour of a new action to collect the 2024 data and review more systematic collection. Backfilling data from earlier years should also be investigated.
- SWCG/A52.02 action on SRAG: for the SRAG work for interplanetary human exploration, refer to session from Gina DiBraccio at ISWAT - incl SRAG presentation from Katie Whitman
- Human exploration forecasting needs and gaps for Mars - Katie Whitman (NASA JSC/SRAG): https://docs.google.com/presentation/d/1_p6vvDUg7m9rmwFGtN_uedr8awWoyi6A/edit?usp=drive_link&ouid=115550485656956867570&rtpof=true&sd=true and https://iswat-cospar.org/wm2025_plenary_presentations > Plenary 2, Preparing for Mars Exploration

CGMS-53-CGMS-WP-14SWCG - Status of co-chairs/rapporteurs of the CGMS working groups, CGMS International Science Working Groups, VLab, and other groups (SWCG rapporteurs)

The document provided by CGMS secretariat was reviewed and the only item identified for action by the SWCG was to nominate a new co-chair which the meeting agreed on already under Agenda Item 1.2.

9. Review and updating of the HLPP

CGMS-53-CGMS-WP-07 - Status of implementation of CGMS High Level Priority Plan (2024-2028) (Mikael Rattenborg)

This working paper provides the status of implementation of CGMS High Level Priority Plan (2023-2027). It incorporates inputs from: - WG I, II, III and IV Chairs and rapporteurs - CGMS Space Weather Coordination Group - International Science Working Group chairs and rapporteurs - GSICS project - SCOPE-CM project - CEOS-CGMS Joint Working Group on Climate.

CGMS-53-CGMS-WP-08SWCG - Revised HLPP 2025-2029 - for recommendation to plenary (Mikael Rattenborg)

The meeting reviewed the items in the HLPP relevant to the SWCG. Several updates and edits were inserted in the document to be proposed to plenary. This includes all items in Section 6: ADVANCE OPERATIONAL SPACE WEATHER MONITORING FROM SPACE as well as in items 1.2.12, 1.2.14 and 1.2.15.

In particular a new item is proposed to be inserted in Section 6.

Ref	Target	Primary responsible for target in CGMS	Summary/highlights of progress (as reported at last CGMS)	Overall Status
6.8	Work on comparing different measurement strategies/techniques for characterising thermospheric environment.		New actions have been raised regarding the use of POD data for determination of thermospheric environment at satellite altitudes. CMA plans inclusion of mass spectrometer on FY3-J.	

There was some debate around the logic of including some items in Section 1 and others in Section 6. It was clarified offline after the meeting that items in Section 1 are those that would have immediate impact on the CGMS baseline.

10. Future CGMS SWCG meetings

CGMS-53-SWCG-WP-02 - Decision on dates on SWCG intersessional activities in 2024-2025 (CGMS-52 to CGMS-53)

The SWCG group refined the preliminary plan for the following intersessional meetings in 2025-2026:

- Wednesday 24 September 2025

- Tuesday 2 December 2025
- Thursday 29 January 2026
- Thursday 19 March 2026

11. Election of CGMS SWCG co-chair

This item was already addressed under Agenda Item 1.2.

12. Conclusions, preparation of the SWCG report for plenary

The SWCG Chairs and Rapporteurs thanked the SWCG members and external presenters for their active participation in the meeting and efforts throughout the year.

LIST OF SWCG ACTIONS

SWCG CGMS-53 list of actions						
Actionee	**AGN item**	**Action #**	**Description**	**Action feedback/closing document**	**Deadline**	**Status**
GMS Members	SWCG/6	SWCG/A50.01	Supply latency information to OSCAR DB with granularity of each relevant space weather sensor on their space missions.	**KEEP OPEN** **SWCG 53-IS#2.01 Jesse to organise discussion on latency definition needs in OSCAR with Elsayed etc.** Some latency info added, but further inputs still required by WMO - proposed to keep OPEN SWCG IS#2: Inputs needed before the CGMS Risk Assessment in February SWCG IS#1: CGMS Members to provide inputs on SWCG/A50.01 by IS#3 (26 January 2023)	CGMS-53	**OPEN**
SWCG (RO TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A50.03	Establish requirements for and recommend an implementation of an optimised system for radio occultation observations for ionosphere monitoring	**SWCG 53-IS#2**: Output from RO TG - Encourage the set up of a SWx ROMEX to the CGMS Plenary. NOAA will draft a plan – identifying metrics. 5 TG meetings taken place. Next steps identified in TG report	CGMS-53	**OPEN**

CGMS Members	Joint WGI-WG-IV-SWCG/6	SWCG/A50.05	CGMS members are invited to support the WRC-23 preparatory process on agenda item 9.1 Topic A (space weather) through its national regulatory authorities, regional WRC-23 preparations or directly in the relevant ITU fora, as appropriate, i.e. identification of frequency bands requiring protection, with coordination with WMO-ET-SWx/WMO-ET-RFC	WRC-23 performed. RF standing agenda item SWCG IS#2: Markus Dreis invited to SWCG IS#3 26 Jan 2023. o Action: Heikki (WMO) to send input from WMO-ET-SWx RF subgroup. SWCG IS#1: - WRC takes place 20 Nov-15 Dec. 2023. • Markus Dreis (EUMETSAT) to be invited to report latest developments and needs at SWCG IS#2, 30 November.	CGMS-53	**CLOSED**
GMS members (WGII and SWCG)	4.5	WGII+SWCG/(P)A50.05	CGMS WGII and SWCG members are invited to nominate candidates for a subgroup within GSICS on Space Weather Cal/Val and Intercalibration, which will be focused on providing intercalibration for Space Weather. Please provide nominations to cgmssec@eumetsat.int and mitch.goldberg@noaa.gov	Membership requests now managed by GSICS Subgroup Discussion on membership / Action status to take place under SWCG agenda point 7. 2023 3 Feb: CGMSSEC contacted M Goldberg for a status update.	CGMS-53	**CLOSED**
SWCG (Anomaly TG)	Joint WGI-WG-IV-SWCG/2	SWCG/A51.01	Expand extent of anomaly data feedback	Anomaly TG Action TG53#3-1: All CGMS members requested to provide updated anomaly data covering 2024. Template: • CGMS spacecraft space weather anomaly report template_v2.1 Action TG53#2-1: Andrew to discuss with Scott Leonard / Jim Spann on approach to filtering entries into the database. Action TG53#2-2: Andrew to contact @CGMSSEC to follow-up letter previous letter. CMA to enquire about status Action CGMS53-TG#2: Andrew to request CGMSSec to add the activity mapping to UN COPUOS LTSG to the CGMS website KEEP OPEN	CGMS-53	**OPEN**

SWCG (Anomaly TG)	Joint WGI-WG-IV-SWCG/2	SWCG/A51.02	Review current usage of space weather data for spacecraft operations and goals for improvement.	TRANSFERRED to SESTG of WG1	CGMS-53	**CLOSED (Transferred)**	2.5.1
SWCG (Data Access TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A51.03	Report Space Weather data gaps & discrepancies between providers and user surveys and OSCAR DB and related priorities for resolution.	Existing surveys reviewed. Is normal work going forward	CGMS-53	**CLOSED**	
SWCG (Data Access TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A51.04	Propose standardised Space Weather operational formats and CF convention metadata examples.	CGMS-53 Proposal from Edmund Henley Action 53-IS#2.02: Andrew to canvas CGMS operational agencies on formats used / planned for their Space Weather data. Data Access Action CGMS53-TG#2-1 (WMO): Connect the activity with the effort taking place at WMO-ET-SWx and further discussion would be useful between Edmund, Jesse and Christian in order to consider the action wording and CGMS-specific contributions.	CGMS-53	**PROPOSE CLOSED (2 New actions from Edmund presentation)**	6.6
SWCG (Data Access TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A51.05	Implement improved data access through existing mechanism infrastructure	CGMS-53: Merge action with SWCG/A51.06: Review usage plans and implementation status for improved data access through heritage, new and future mechanism infrastructures, learning lessons from terrestrial data access approaches. EUMETSAT Data Hub partnership agreements for EUMETCast NRT dissemination progressing Data Access Action CGMS53-TG#2-2: WMO (Heikki) to consider adding ionospheric RO specific variable to OSCAR.	CGMS-53	**PROPOSE CLOSED in favour of merged action with 51.06**	6.5

SWCG (Data Access TG)	Joint WGI-WG-IV-SWCG/4	SWCG/A51.06	Review future landscape of operational data delivery mechanisms and coordination taking into account WIS 2.0 and other cloud-based data access mechanisms.	CGMS-53: Merge action with SWCG/A51.05: Review usage plans and implementation status for improved data access through heritage, new and future mechanism infrastructures, learning lessons from terrestrial data access approaches. WMO ET-SWx-5 meeting (fall 2024) had an extensive session around WIS2.0 landscape WMO Study Group on Future Data Infrastructure (SG-FIT) Online Workshop (23-25 September 2024)	CGMS-53	**PROPOSE CLOSED in favour of merged action with 51.05**
NOAA	SWCG/2	SWCG/A51.07	Report on the STEREO-A coverage implementation	Input to WGIII RA group made	RA Workshop 2024	**CLOSED**
NOAA	SWCG/4	SWCG/A51.08	Provide NOAA aviation and satellite industry testbed reports to SWCG when available	Closed based on presentation links provided at CGMS-53 (see SWCG Report) Summary presentation made in CGMS-52. Full reports to be issued.	CGMS-53	**PROPOSE CLOSED**
SWCG/data access + RO TGs	SWCG/5	SWCG/A51.10	Consider ICAO PECASUS requirements for improved LEO RO observation, energetic (tens of Kev) electron precipitation flux from LEO orbit , SEP flux spectra (100s MeV to GeV)	Mike Bettwy, NOAA, representing ICAO Space Weather Centers Coordination Group) presentation made to CGMS-53 Data Access CGMS-52 TG#3-1 action : Mike Bettwy to obtain more detailed requirements and present to the SWCG / Joint meeting in China (remote presentation possible) Invite PECASUS, other advisory groups to state requirements in a coming SWCG meeting. Coordinate with WMO on WIGOS revision.	CGMS-53	**PROPOSE CLOSED in favour of new action based on Mike's presentation.**

SWCG	SWCG/9	SWCG/A51.11	Produce a report of space weather observation requirements for improved STC services and space sustainability	**Transferred to WGI SESTG** Coordinate with WGI and include coordination service providers, US Office of Space Commerce, EU SST and space weather service providers (ISES)	CGMS-53	**CLOSED (Transferred)**
SWCG	SWCG/5	SWCG/A52.01	Consider HLPP / Baseline updates on the following: • Thermospheric density observations to be added to baseline (CMA observations) • Assessment of thermospheric measurement means in HLPP • Auroral observations to be added to baseline (CMA observations)	Updates proposed at CGMS-53 SWCG 53 IS#2 Updates to baseline and HLPP will be addressed in the RA Workshop based on CMA progress and overall CGMS member commitment to provide sustained operational, globally available measurements of thermospheric density and Aurora. Definition of the measurements needs to be clarified	CGMS-53	**PROPOSE CLOSED**
SWCG	SWCG/10	SWCG/A52.02	Consider observation requirements in support of interplanetary human exploration	CGMS-53: See links provided in CGMS Report, Keep Open for NASA response. Data Access Action CGMS53 TG#3-2: Jim Spann, Jamie Favors to report on work of SRAG. See SRAG Home	CGMS-53	**OPEN**
SWCG/ Data Access TG	Joint WGI-WG-IV-SWCG	SWCG/A52.03	Report on space weather product level definitions, identify any differences and propose steps for alignment.	Data Access Action CGMS53-TG#2-7: Inputs from CGMS agencies on product level definitions requested	CGMS-53	**OPEN**
SWCG / Anomaly Database TG	Joint WGI-WGIV-SWCG/2	SWCG/A52.04	SWCG to seek feedback from space weather analysts on value of the collected EDAC 2023 data	Closed by NICT report and new action to collect 2024, historical and future data. Preliminary feedback positive. EUMETSAT to collect 2024 data and other agencies encouraged to do so.	CGMS-53	**PROPOSE CLOSED in favour of new action**
SWCG	SWCG/2	SWCG/A53.01	Decide which NASA missions have sufficient commitment to include in CGMS baseline (e.g. JEDI, Punch, SDO)		CGMS-54	OPEN
SWCG Data Access TG	SWCG/5	SWCG/A53.02	Consider how to harness the suite of L1 constellation missions for operational space weather usage.		CGMS-54	OPEN
SWCG Data Access TG	SWCG/5	SWCG/A53.03	Establish response to the ICAO space weather service identified needs presented at CGMS-53.		CGMS-54	OPEN

SWCG Data Access TG	SWCG/8	SWCG/A53.04	Review usage plans and implementation status for improved data access through heritage, new and future mechanism infrastructures, learning lessons from terrestrial data access approaches.	Merged from A51.05/51.06	CGMS-54	OPEN
CGMS Spacecraft Operators	Joint WGI-WGIV-SWCG/2	SWCG/A53.05	CGMS Members operating satellites to produce EDAC data covering 2024 and report on ability to supply historical and future data.		CGMS-54	OPEN
SWCG Anomaly TG	Joint WGI-WGIV-SWCG/2	SWCG/A53.06	Assess suitability of SPARK database tool as repository for CGMS anomalies, including data access criteria, metadata needs and standardisation.		CGMS-54	OPEN
SWCG TG on Improving User Data Access	Joint WGI-WGIV-SWCG/3	SWCG/A53.07	Draft WMO-CF profiles with improved metadata in coordination with WMO ET-SWx, ISES, COSPAR and research community and proposed follow-up activities.		CGMS-54	OPEN
WGI SESTG & SWCG	Joint WGI-WGIV-SWCG/5	SWCG/A53.08	Assess possibility to share satellite orbit data to estimate thermospheric drag.		CGMS-54	**OPEN**
WGII, SWCG	Plenary 6	53.07iv	Space weather AI readiness: SWCG and WGII to jointly hold 2–3 online meetings in order to address the prediction of solar flares and coronal mass ejections (CMEs), as well as tackling the challenges associated with real-time forecasting.		Q1 2026, April 2026	**OPEN**

LIST OF SWCG PARTICIPANTS

CGMS-53 - SWCG List of Participants			
Firstname	**Lastname**	**Organisation**	**Email**
Anne	Taube	CGMS Secretariat	anne.taube@eumetsat.int
Mikael	Rattenborg	CGMS Secretariat	mikael@rattenborg.eu
Weiguo	Zong	CMA/NSMC	zongwg@cma.gov.cn
Juha-Pekka	Luntama	ESA	juha-pekka.luntama@esa.int
Alexi	Glover	ESA	alexi.glover@esa.int
Andrew	Monham	EUMETSAT	andrew.monham@eumetsat.int
Edmund	Henley	EUMETSAT	edmund.henley@metoffice.gov.uk
Miruna	Stoicescu	EUMETSAT	miruna.stoicescu@eumetsat.int
Hui	Shao	IROWG/JCSDA	huishao@ucar.edu
Mohammad	Hasan	ISRO	mhasan@isro.gov.in
Sankarasubramanian	Kasiviswanathan	ISRO	sankark@ursc.gov.in
Yugo	Kimoto	JAXA	kimoto.yugo@jaxa.jp
Kazuki	Yasui	JMA	k_yasui@met.kishou.go.jp
Miki	Abe	JMA	abe.miki@met.kishou.go.jp
Nakayama	Ryuichiro	JMA	r-nakayama@met.kishou.go.jp
Norio	Kamekawa	JMA	orion-kamekawa@met.kishou.go.jp
Taro	Ono	JMA	taro.ono@met.kishou.go.jp
Tsuneyuki	Harada	JMA	t.harada@met.kishou.go.jp
Yumiko	Yamane	JMA	yamane.yumi@met.kishou.go.jp
Dohyeong	Kim	KMA	dolong@korea.kr
Daehyeon	Oh	KMA	oh.d.hyun@gmail.com
Jiyoung	Kim	KMA	aceasia@korea.kr
Yumi	Seo	KMA	hohoo11@korea.kr
Yeji	Hwang	KMA	yejihwang@korea.kr
Kwang Deuk	Ahn	KMA	stratus12@korea.kr
Jamie	Favors	NASA	james.e.favors@nasa.gov
Mamoru	Ishii	NICT	mishii@nict.go.jp
Shinji	Saito	NICT	s.saito@nict.go.jp
Tsutomu	Nagatsuma	NICT	tnagatsu@nict.go.jp
Mary Ann	Kutny	NOAA	mary.ann.kutny@noaa.gov
Lihang	Zhou	NOAA	lihang.zhou@noaa.gov
Melissa	Andersen Garcia	NOAA	melissa.garcia@noaa.gov
Erin	Lynch	NOAA	erin.lynch@noaa.gov
Steven	Hill	NOAA	steven.hill@noaa.gov

CGMS-53 - SWCG List of Participants			
Firstname	**Lastname**	**Organisation**	**Email**
James	Donnellon	NOAA/NESDIS	james.donnellon@noaa.gov
Melissa	Johnson	NOAA/NESDIS	melissa.c.johnson@noaa.gov
Mike	Bettwy	NOAA/NESDIS	Michael.Bettwy@noaa.gov
Irfan	Azeem	NOAA/NESDIS/SWO	irfan.azeem@noaa.gov
James	Spann	NOAA/NESDIS/SWO	james.spann@noaa.gov
Dimitrios	Vassiliadis	NOAA/NESDIS/SWO	dimitrios.vassiliadis@noaa.gov
Heikki	Pohjola	WMO	hpohjola@wmo.int
Jesse	Andries	WMO	jandries@wmo.int

SWCG

CGMS

Joint WGI-WGIV-SWCG

JOINT WGI-WGIV-SWCG REPORT

Co-Chairs: *Sean Burns, WGI / Tsutomu Nagatsuma, SWCG*
Rapporteurs: *Andrew Monham, EUMETSAT / Karolina Nikolova, EUMETSAT*

1. Welcome, objectives and review of agenda

The meeting Chair, Mr. Sean Burns supported by Rapporteurs Mr. Andrew Monham and Karolina Nikolova, welcomed the participants, consisting of representatives from CMA, ESA, EUMETSAT, ISRO, JMA, JAXA, KMA, NICT, NOAA, VLab/CIRA/CSU and WMO (see Annex 1 for full list of participants).

The draft agenda proposed by the CGMS Secretariat prior to the meeting was reviewed and adopted.

2. Space weather spacecraft anomaly report database

CGMS-53-SWCG-WP-03 - Report on progress of the Space Weather Spacecraft Anomaly Database Task Group

The Space Weather Spacecraft Anomaly Database Task Group objective is to promote the collection of spacecraft anomaly data as the data source for space weather actors, to analyse the impact of space weather on satellite systems. Particularly to improve:

- spacecraft design robustness
- support the spacecraft operations community with space weather warnings and improved post-event anomaly analysis
- tools modelling space weather effects

The Task Group has been active in promoting the sharing of anomaly data in various for involving the spacecraft operations community and has established strong links to similar activities on-going in NASA.

The compiled anomaly database since 2015 is available on the CGMS website on the SWCG page.
Strong backing for this activity is received from representatives of UN COPUOUS with the Long-Term Sustainability Guidelines specifically encouraging support to this CGMS activity. The CGMS/WMO compliance matrix is ready to be published on the CGMS website.

Study work under NASA/NOAA contract has continued and should form a useful basis for an anomaly database structure allowing security and confidentiality concerns to be addressed. This is described further in a dedicated presentation.

EDAC data compiled by EUMETSAT for 2023 has had some positive feedback, with a dedicated presentation from NICT providing further details. With some improvements in data clarity, it is proposed to produce 2024 data with a view to establish a systematic reporting of EDAC data if resources allow.

CGMS-53-SWCG-WP-04 - CGMS agency spacecraft space weather anomaly reports compilation

The compilation of new data covering 2024 has so far only been achieved for EUMETSAT satellites, so no specific presentation of the database was made. Especially in view of the significant space weather events of 2024, CGMS members operating satellites are encouraged to provide their anomaly lists prior to the CGMS Plenary such that the status can be presented on that occasion.

CGMS-53-NICT-WP-03 - Use of EDAC data as a potential risk analysis of satellite anomalies

The region of EDAC events and that of South Atlantic Anomaly are in good agreement, including the altitude dependence, suggesting that major cause of EDAC events are high-energy protons from a few MeV to several hundred MeV. Therefore, EDAC events might be used as proxies for high energy proton distribution.

Although Galactic Cosmic Rays are the most likely cause of the EDAC events occurring in the polar regions, it is necessary to statistically examine the relationship with space weather events using long-term, large numbers of EDAC event data, including extreme events during the recent solar maximum period.

An assessment of the degradation status of CPU and memories, and the potential risk of satellite anomalies may be realized by examining trends in the frequency of EDAC events over time using a long-term data set.

For the analysis of relationship between space weather events and errors of CPU and memory over time, and its potential risks, it is recommended that long-term EDAC data from many satellites be made public and shared.

Discussion

Edmund noted the map clearly dominated by South Atlantic anomaly. He suggested applying mask over it to mask out climatology and see if correlation can be found.

It was proposed that CGMS Members operating satellites produce EDAC data covering 2024 and report on their ability to supply historical and future data.

CGMS-53-GUEST-WP-02 - Spacecraft Anomaly Resolution Knowledgebase SPARK, exploring and analysing CGMS anomalies

The SPARK tool offers an extensible, interactive centralized database with the ability to keep sensitive data protected and cybersecure. Space weather data along with spacecraft anomalies from NASA and CGMS have been ingested. The user of the tool can perform analytical data computation including statistical analyses which could highlight relationships between anomaly data and the space weather effects on a time series dashboard.

The universal catalogue concept aims to aggregate anomalies from multiple providers for statistical power and analysis.

Discussion

Alec Engell gave an online demonstration of the tool which is nearing the end of its development phase.

The tool would be available in about 4 weeks.

Access to the tool will be granted based on registration, with different permissions for CGMS members and NASA data. Case-by-case registration would be required for access of CGMS members.

Data cleanup is needed for alignment of metadata fields to create a universal catalogue.

The CGMS anomaly data collection is currently being done in the Excel spreadsheet (see link in the Task Group Report). Edmund Henley asked if having a front-end part of the tool for entering data might be possible. Andrew Monham suggested that this should be discussed in the Task Group.

Andrew noted that the idea of the CGMS database is to be free and open. Currently the NASA data on this tool is not visible to CGMS members. Alec Engell clarified that they are hoping to make NASA data available for viewing and analysis by CGMS members.

Edmund asked if it is possible to get a view that will aggregate the catalogues. Alec confirmed this would be possible.

The question was raised on whether public access would be possible. The plan is for any CGMS member to be able to register and see each other's data freely. Overall, what is visible is dependent on the operator - they choose how much of their data is visible.

It was proposed to:

- provide feedback on use of SPARK within Task Group
- consider access rights of general users (not affiliated to CGMS member agencies).
- discuss and define criteria for access to the anomaly data of CGMS members.
- Follow up with NASA to discuss making their provided anomaly data publicly available.
- Assess and standardise the metadata required in the tool.
- Present results to other forums

Joint WGI, WGIV and SWCG agreed the following actions:

CGMS-53 ACTIONS – Joint WGI, WGIV and SWCG				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
CGMS Spacecraft Operators	Joint WGI-WGIV-SWCG/2	JSWCG/A53.01	CGMS Members operating satellites to produce EDAC data covering 2024 and report on ability to supply historical and future data.	CGMS-54
SWCG Anomaly TG	Joint WGI-WGIV-SWCG/2	JSWCG/A53.02	Assess suitability of SPARK database tool as repository for CGMS anomalies, including data access criteria, metadata needs and standardisation.	CGMS-54

3. Space weather data access

CGMS-53-GUEST-WP-03 - Formats and Metadata for operational space weather data: progress on clarifying scopes and next steps

As a discipline, space weather lacks some key standards on variable naming & coordinate reference frame identification which have helped terrestrial weather advance, and build ecosystem of tools able to automagically use & combine observation & model data from many sources.

The lack of standardised formats and metadata in operational space weather data from space incurs friction penalties on users, mainly hidden from providers. See CGMS-52 Presentation "*Formats and metadata for operational space weather data from space: considerations for any future design":* *PPT* for overview of details.

As more countries address space weather operationally, CGMS providers should consider what can be done to make their observation data more intercomparable. And how to balance aiming for compatibility with standards & practices in terrestrial weather, and the space weather research community (a key user).

Since CGMS-52, progress has been made to clarify / better understand:

- Focus of WIS2: discovery and transport, not datafile formats & metadata. Happily WIS2 is mostly agnostic to datafile formats, so compatible with formats deeply embedded in various space weather communities (RINEX, FITS, …)
- Scope of parallel work being undertaken via the WMO Expert Team on Space Weather (ET-SWx)
- Standardisation efforts in spacewx research community – quite isolated from operations, but keen to coordinate

Recommended scope for any CGMS work: refocus on datafile layer, engage & coordinate with research & WMO.

For endorsement:

- that users should be able to easily discover, access & use nominally intercompatible space weather datasets provided by CGMS (e.g. energetic particles at GEO from GOES, Himawari, Geo-KOMPSAT, FY, …)
- that it is desirable to lower barriers for uptake of CGMS space weather data by key users:
    - Operational space weather prediction centres
    - Space weather research community
    - Others (e.g. commercial space operators?)
- that the current state of space weather metadata and formats may be impeding goals above, and preventing CGMS members' space weather products from being as effective as their terrestrial weather products.

Proposed action:

- SWCG task group on Improving User Data Access to Space Weather Data from Orbital Sensors to draft WMO-CF profiles with improved metadata in coordination with WMO ET-SWx, ISES, COSPAR and research community and proposed follow-up activities.

Discussion

Sean noted that it is necessary to look at whether changes to the HLPP are needed.

Jim Spann asked whether there is one forecasting element that can be used by everyone to start tracking improvements in forecast improvement globally. Edmund explained that ISWAT are looking at this across many domains. CMEs arrival was looked at and no evidence was found of improvement in arrival time prediction. More analogues to terrestrial would probably best place to start. A common verification framework is still needed.

No space weather on WIS 2.0 yet, beyond the ESA/EUMETSAT demonstration. Simon strongly encouraged the community to consider what can be put on WIS 2.0 and how, and importantly who can get the data from WIS 2.0. The technical support from WIS 2.0 is available, but concrete examples are needed. Edmund said he'll be in touch to give worked examples of using WIS 2.0.

Edmund pointed out that ensuring the required latency of the service would be helpful/important. Simon will clarify if monitoring latency is within the scope of the global monitoring centres.

ESA is working on data policy for Space Weather data and one of the channels will be WIS2.0. ESA are also making their own API data interface.

CGMS-53-SWCG-WP-05 - Report from the CGMS SWCG Task Group on improving user data access to space weather data from orbital sensors (Andrew Monham)

Andrew Monham introduced the rationale for the Task Group, its background and recent activities.

The Task Group on Improving User Data Access to Space Weather Data from Orbital Sensors helps glue together the feedback obtained from the various outreach activities of SWCG:

- Data Provider and User Surveys conducted 2017-2019
- CGMS-User meetings held in space weather workshops in Europe, USA and Asia

The Task Group identifies the priorities for improving the provision of CGMS Agency space weather sensor data to operational users.

The Task Group has been active with wide participation of all representing relevant roles of data providers and users, holding 3 meetings and a number of outreach events to external parties in workshops in Europe, USA and Asia.

Furthermore, the group is cooperating closely with the WMO Expert Team on Space Weather.

Based on identification of priorities, the group has made significant strides in:

- updating the baseline of data provision to user needs and gap identification and correlating this with the OSCAR DB, which is now regarded as normal work
- Implementing improved SWx data access reliability through leveraging of existing cooperation agreements for meteorological data exchange
- Further developing the approach to format and metadata usage in coordination with the WMO-ET-SWx

Work is set to continue to mature these tasks before CGMS-54.

Regarding the Action SWCG/A51.03, it was noted that existing surveys were reviewed and this is now normal work for WMO and CGMS in support of the requirements review etc. The action will be closed.

CGMS-53-NOAA-WP-12 - GOES-19 SpWx product validation and transition to GOES East (Dimitrios Vassiliadis)

The Geostationary Operational Environmental Satellite – 19 (GOES-19) was launched as GOES-U on June 25, 2024 and renamed when it reached orbit.

After the Post-Launch Test (PLT) and commissioning, the NASA to NOAA handover took place on January 29, 2025.

The GOES-19 portfolio is common to all satellites of the Program, except for CCOR-1 which is hosted on the satellite but the products are developed by the Space Weather Follow On (SWFO) program.

Product validation started as part of PLT and culminated in two reviews for each instrument.

Reviews for the CCOR-1 coronagraph were held in January and February 2025 immediately after which the public release of imagery products started. First, the Space Weather Prediction Center (SWPC) released the real-time, preliminary products while the National Centers for Environmental Information (NCEI) made the archived versions of these products available provisionally at the NOAA Open Data Dissemination (NODD) until the NESDIS Common Cloud Framework (NCCF) is ready for hosting the data.

Second, NCEI has generated retrospective products and will make them available through NCCF as well.

Currently, the satellite is drifting to its operational location. On April 4 2025, it will be declared as GOES East and its products will then be considered operational.

Joint WGI, WGIV and SWCG agreed the following action.

CGMS-53 ACTIONS – Joint WGI, WGIV and SWCG				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
SWCG TG on Improving User Data Access	Joint WGI-WGIV-SWCG/3	SWCG/A53.	Draft WMO-CF profiles with improved metadata in coordination with WMO ET-SWx, ISES, COSPAR and research community and proposed follow-up activities.	CGMS-54

4. Ionospheric Radio Occultation system optimisation

CGMS-53-SWCG-WP-14 - Report from the CGMS SWCG Task Group on Ionospheric Radio Occultation System Optimisation

The Task Group on Ionospheric Radio Occultation System Optimisation was formed at CGMS-50 to address the full scope of HLPP (6.4).

In coordination with IROWG it establishes requirements for and recommend an implementation of an optimised system for radio occultation observations for ionospheric monitoring.

All documentation is available on the Google Drive:
https://drive.google.com/drive/folders/1JDFe4LJQOtvD0ld1jLWvJ5yl-mfz9znS

The task group benefits from the participation of ionospheric RO experts along with representatives of the CGMS RO data providers. Three meetings were actively supported.

Progress has been made in:

- Refining the capability table of ionospheric RO missions
- Developing a capability table of antenna assets that can support reduction of ionospheric RO latency

- Continuing Observing System Simulation Experiments (OSSEs) in support of requirement definition
- Enhancing coordination with the IROWG Space Weather Subgroup.

It can be expected that further progress to meet the high-level goal of the group can be made prior to CGMS-54.

The next steps would include continuing development of antenna capabilities table as well as maintaining RO missions capability table

- Working with ISES and other groups on documenting user needs and user requirement definitions to understand how those requirements might drive the definition of optimised systems.
- Continuing assessment of OSEs/OSSEs, including potential Space Weather ROMEX-like experiment to determine
    - The number of required occultations
    - Optimal distribution of orbital planes to achieve geographic and local time coverage
    - Sensitivity of operational applications to changes in counts and distribution

Ionospheric RO data is now being assimilated in NOAA operational models. Other space weather centers have interest in assimilative ionospheric models to support operation. A Space Weather ROMEX study can help articulate the benefit of RO measurements in improving ionospheric specification and advance the development of assimilative modelling capabilities.

Discussion

Edmund asked about the timeline of next steps for the ROMEX study. Proposal is to use next IROWG meeting in 2026 to have a working session.

5. Space environment sustainability Space Weather aspects

CGMS-53-SWCG-WP-08 - Space weather issues addressed by the Space Environment Sustainability Task Group

The CGMS future direction 2022+ conclusions contained four short- and medium-term recommendations for SSA objectives:

- Review of CGMS Member Agencies' satellite operations for collision avoidance and reentry prediction, and establish best practises to support improvement
- Establish space weather observation requirements for improved Space Traffic Coordination services and space sustainability
- Establish CGMS best practises for long term space sustainability, considering a "Zero Debris Policy"
- Engage with UN-COPUOS to achieve global standardized approach for STC based on CGMS proposal.

Based on and aligned with this, the Space Environment Sustainability Task Group priorities are to:

1. Produce best / acceptable practices for Space Traffic Coordination (collision avoidance, active on active satellite coordination practices).
2. Produce a report of space weather observation requirements for improved STC services and space sustainability
3. Review current usage of space weather data for spacecraft operations and goals for improvement.

The Task Group noted that currently good propagation products using space weather inputs come from US 18th Squadron. However, their starting point (knowledge of operator orbit) is based on their own measurements, rather than operator supplied orbit. If the owner/operator orbit and future manoeuvres could be supplied, then the propagation may be more accurate. Recommended to follow up with TraCSS (US DoC).

Action proposed:

- Define the requirement for supplying owner/operator orbit and manoeuvre information to TraCCS and identify steps for implementation.
- Identify steps to coordinate modelling of thermospheric density impacts and perform inter - comparison of model results.

The following challenges were highlighted:

- Forecasting of space weather inputs (solar and geomagnetic indices)
- Advanced thermospheric density models using directly solar observations

Discussion

US has released of user survey for Space Weather to get commercial feedback. Jim Spann shared a link to the results of the 2024 National (US) survey on user needs for space weather. https://www.swpc.noaa.gov/news/results-first-national-survey-user-needs-space-weather

CGMS-53-NOAA-WP-11 - Thermospheric Density Measurements from Satellites With GNSS Precise Orbit Determination (POD)

The population of objects in Low Earth Orbit (LEO) has grown significantly in the last 5 years, particularly with the rise of mega-constellations. Growing need for improved space traffic coordination and management.

Thermospheric density is important for space traffic management/space situational awareness.

Satellite drag is the largest source of uncertainty for orbit predictions at altitudes below ~600 km.

Near real-time density observations could help mitigate the accuracy issues of thermosphere models for satellite drag estimation.

Currently, there is a gap in thermospheric density observations for operational users.

There is a need to:

- Advance GNSS POD applications to atmospheric density estimation
- Global collaboration among space agencies, research groups, and satellite operators for cross-verification and data sharing.
- Open-source software and databases supporting POD-based thermospheric density retrievals.
- Expand POD-equipped LEO satellite constellations for continuous global coverage of the thermosphere

Discussion

Irfan Azeem asked that CGMS discusses ability to share the POD data from their EO satellites.

Proposed Action:

- SWCG to assess possibility to share satellite orbit data to estimate thermospheric drag.

Mohammad Hasan asked if thermospheric density can be used for forecast extrapolation. Irfan explained that global thermospheric density can rather help remove/improve bias and lead to forecast improvement.

Edmund asked if this is viable depending on the cadence and noting that the data is likely treated as engineering data. Irfan explained that the data is routinely downloaded anyway, so from experience there has not been a need for them to do anything special.

Joint WGI, WGIV and SWCG agreed the following action.

CGMS-53 ACTIONS – Joint WGI, WGIV and SWCG				
Actionee	**AGN item**	**Action #**	**Description**	**Deadline**
WGI SESTG & SWCG	Joint WGI-WGIV-SWCG/5	SWCG/A53.	Assess possibility to share satellite orbit data to estimate thermospheric drag.	CGMS-54

6. Review of actions

Please refer to the consolidated action list in the SWCG Report including actions relevant to the Joint WGI-WGIV-SWCG Meeting

7. Next steps, conclusions and reporting to plenary

The CGMS-53 reports from the working groups will be prepared ahead of CGMS-53 and sent out for review.

LIST OF JOINT WGI-WGIV-SWCG PARTICIPANTS

CGMS-53 – Joint WGI, WGIV and SWCG List of Participants			
Firstname	**Lastname**	**Organisation**	**Email**
Anne	Taube	CGMS Secretariat	anne.taube@eumetsat.int
Mikael	Rattenborg	CGMS Secretariat	mikael@rattenborg.eu
Weiguo	Zong	CMA/NSMC	zongwg@cma.gov.cn
Huang	Cong	CMA/NSMC	huangc@cma.gov.cn
Juha-Pekka	Luntama	ESA	juha-pekka.luntama@esa.int
Sean	Burns	EUMETSAT	sean.burns@eumetsat.int
Andrew	Monham	EUMETSAT	andrew.monham@eumetsat.int
Karolina	Nikolova	EUMETSAT	karolina.nikolova@eumetsat.int
Paolo	Ruti	EUMETSAT	Paolo.ruti@eumetsat.int
Edmund	Henley	EUMETSAT	edmund.henley@metoffice.gov.uk
Miruna	Stoicescu	EUMETSAT	miruna.stoicescu@eumetsat.int
Mohammad	Hasan	ISRO	mhasan@isro.gov.in
Kurino	Toshiyuki	JAXA	tkurinowmo@gmail.com
Akihiro	Shimizu	JMA	aki-shimizu@met.kishou.go.jp
Kazuki	Yasui	JMA	k_yasui@met.kishou.go.jp
Miki	Abe	JMA	abe.miki@met.kishou.go.jp
Kotaro	Bessho	JMA	
Norio	Kamekawa	JMA	orion-kamekawa@met.kishou.go.jp
Taro	Ono	JMA	taro.ono@met.kishou.go.jp
Tsuneyuki	Harada	JMA	t.harada@met.kishou.go.jp
Yumiko	Yamane	JMA	yamane.yumi@met.kishou.go.jp
Dohyeong	Kim	KMA	dolong@korea.kr
Jiyoung	Kim	KMA	aceasia@korea.kr
Song	JEONG-MI	KMA	s36121@korea.kr
Yumi	Seo	KMA	hohoo11@korea.kr
EUN JEONG	Cha	KMA	kenkyukan@korea.kr
Minjoung	Joung	KMA	mjjoung@korea.kr
Yeji	Hwang	KMA	yejihwang@korea.kr
Joel	Scott	NASA	joel.scott@nasa.gov
Sid	Boukabara	NASA	sid.a.boukabara@nasa.gov
Shinji	Saito	NICT	s.saito@nict.go.jp
Tsutomu	Nagatsuma	NICT	tnagatsu@nict.go.jp
Lihang	Zhou	NOAA	lihang.zhou@noaa.gov
Melissa	Andersen Garcia	NOAA	melissa.garcia@noaa.gov

CGMS-53 – Joint WGI, WGIV and SWCG List of Participants			
Firstname	**Lastname**	**Organisation**	**Email**
Erin	Lynch	NOAA	erin.lynch@noaa.gov
Steven	Hill	NOAA	steven.hill@noaa.gov
Beau	Backus	NOAA/NESDIS	Beau.Backus@noaa.gov
James	Donnellon	NOAA/NESDIS	james.donnellon@noaa.gov
Irfan	Azeem	NOAA/NESDIS/SWO	irfan.azeem@noaa.gov
James	Spann	NOAA/NESDIS/SWO	james.spann@noaa.gov
Dimitrios	Vassiliadis	NOAA/NESDIS/SWO	dimitrios.vassiliadis@noaa.gov
Bernadette	Connell	VLab/CIRA/CSU & WMO VLab	bernie.connell@colostate.edu
Heikki	Pohjola	WMO	hpohjola@wmo.int
Jesse	Andries	WMO	jandries@wmo.int
Alec	Engell		aengell@nextgenfed.com
Mary Ann	Kutny	NOAA	mary.ann.kutny@noaa.gov

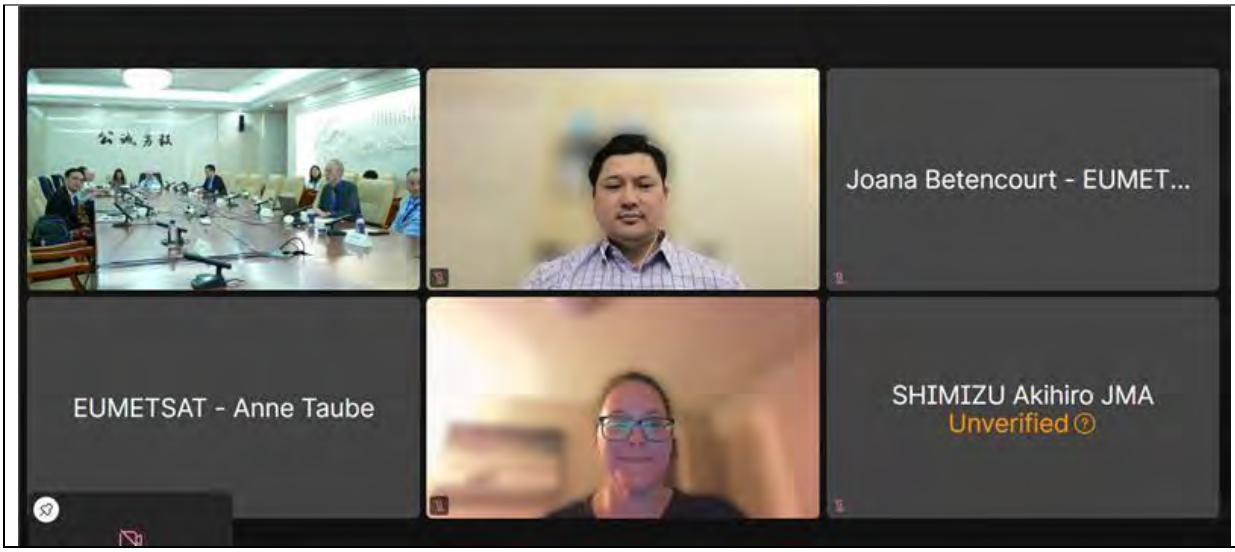
Annexes

CGMS

Photographs

CGMS-53 working groups

Working Group I



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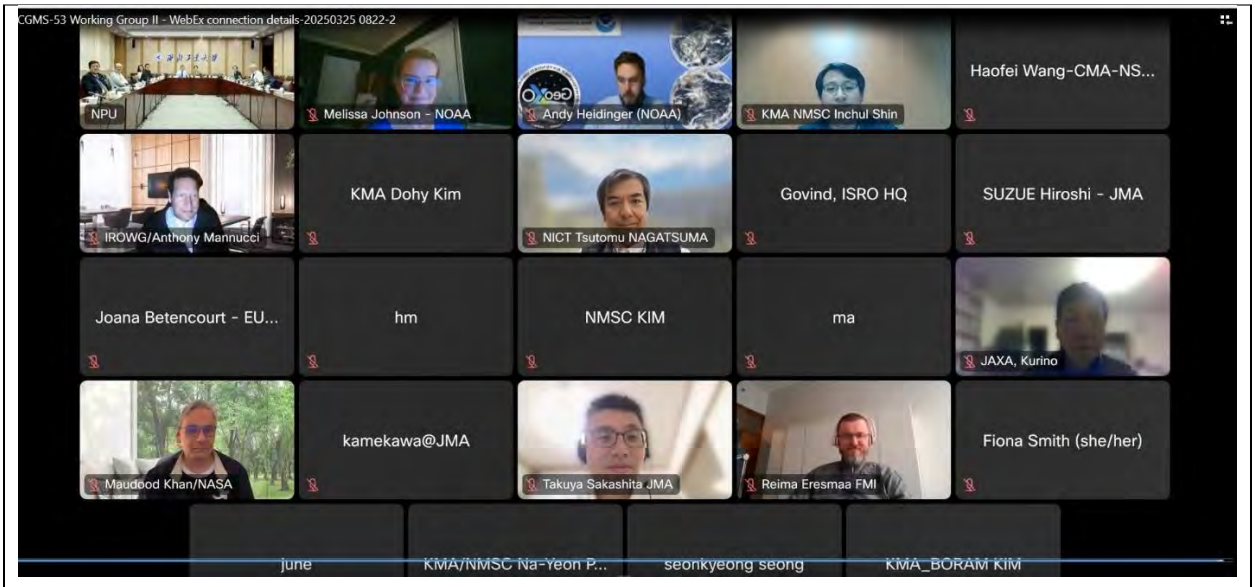

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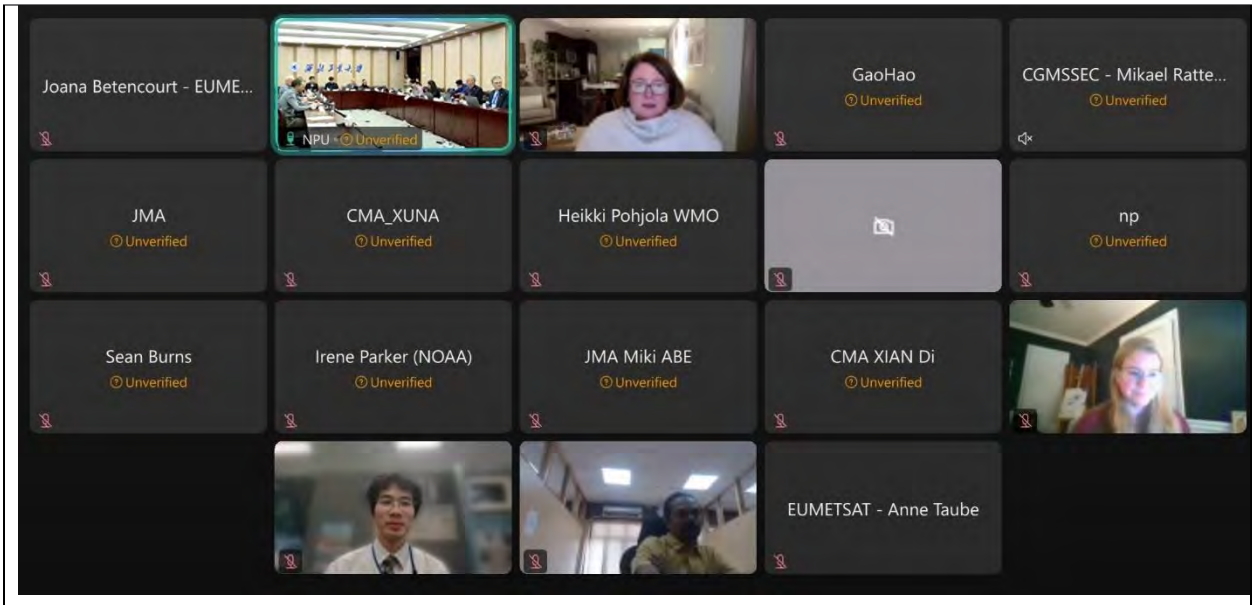

Working Group IV

SWCG


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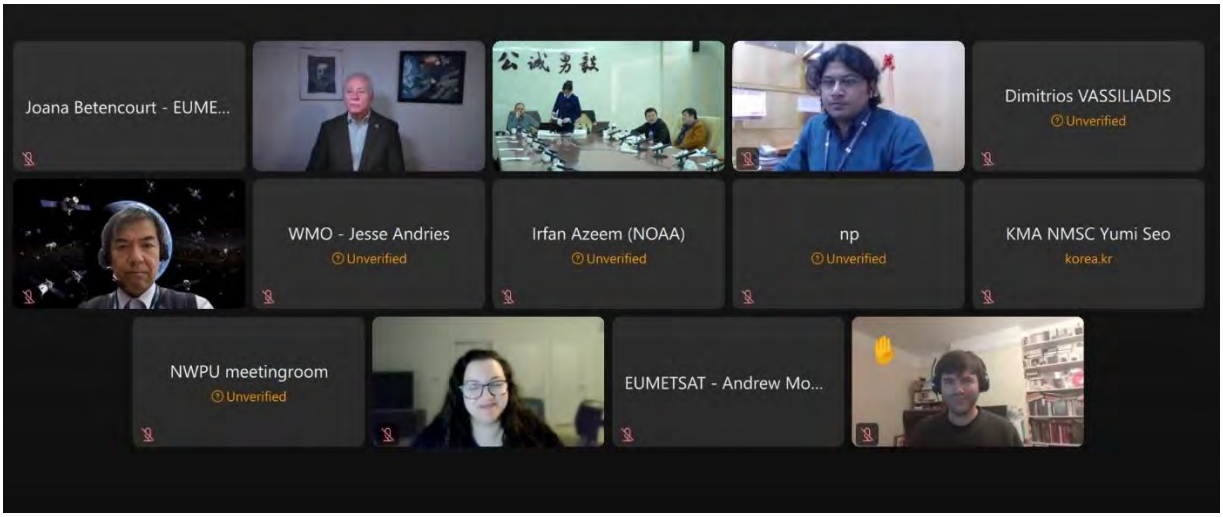
Joana Betencourt - EUME...
Dimitrios VASSILIADIS
Unverified
WMO - Jesse Andries
Unverified
Irfan Azeem (NOAA)
Unverified
np
Unverified
KMA NMSC Yumi Seo
korea.kr
NWPU meetingroom
Unverified
EUMETSAT - Andrew Mo...

Joint WGI, WGIV and SWCG Working Group

Plenary session

ABBREVIATIONS

Abbreviation	Meaning
ACE	Advanced Composition Explorer
AMV	Atmospheric Motion Vector
AOD	Aerosol Optical Depth
AWS	Automatic Weather Station
CAMS	Copernicus Atmosphere Monitoring Service
CCI	Convective Cloud Information
CCOR	Compact Coronagraph
CDR	Climate Data Records
CFOSAT	Chinese-French Oceanography Satellite
CRC	China-Russia Consortium
CSR	Clear Sky Radiance
D3S	Distributed Space Weather Sensor System
DCP	data collection platform
DCS	Data Collection Service
DRS	Direct Relay Satellite
DRT	Data Relay Transponder
DWL	Doppler Wind Lidar
E-DCP	Enhanced DCP
EARS	EUMETSAT Advanced Retransmission Service
ECV	essential climate variables
EO	Earth Observation
EORC	JAXA Earth Observing Research CenteR
EOSC	Earth-observing satellite constellation
EOTEC DevNet	Earth Observation Training, Education, and Capacity Development Network
ERSA	ESA Radiation Sensor Array
ESA PB-EO	ESA Programme Board for Earth Observation
ESC	Expert Service Centres
ESD	NASA's Earth Science Division
ET-SWx	Expert Team on Space Weather
EUVST	Extreme Ultraviolet HighThroughput Spectroscopic Telescope
EZIE	Electrojet Zeeman Imaging Explorer
FCDR	fundamental climate data record
FDR	Fundamental Data Records
FOC	Full Operational Capability
FRP	Fire Radiative Power
FY	FengYun
FY_ESC	Emergency Support Mechanism of FY Satellite
GAW	WMO Global Atmospheric Watch
GBON	Global Basic Observation Network
GEO-XO	Geostationary and Extended Orbits
GeoHSS	Hyper Spectral Sounding instrument on a geostationary satellite
GNC-A	GEONETCast Americas broadcast

Abbreviation	Meaning
GNSS	Global Navigation Satellite System
GOES	Geostationary Operational Environmental Satellites
GOLD	Global-scale Observations of the Limb and Disk
GSICS	Global Space-based Inter-Calibration System
GST	2024 Global Stocktake
GTS	Global Telecommunication system
HAPS	High Altitude Platform Systems
HERMES	Heliophysics Environmental and Radiation Measurement Experiment Suite
HSS	Hyperspectral IR Sounder
ICON	Ionospheric and Connection Explorer
IDA	Internal Dosimeter Array
IDCS	international DCS channels
INFCOM	WMO Commission for Observation, Infrastructure and Information Systems
INPE	Brazilian Ministry of Science, Technology, and Innovations
IOC	Initial Operational Capability
IODC	Indian Ocean Data Coverage
IPWV	Integrated Precipitable Water Vapour
IS40e	Intelsat Commercial Satcom mission
ISCCP-NG	Next Generation of the International Satellite Cloud Climatology Project
ISES	International Space Environment Service
KSEM	Korean Space wEather Monitor
MAP	Multi-mission Aerosol product
MMDRPS	Multi-Mission Meteorological Data Receiving and Processing System
MODIS	Moderate Resolution Imaging Radiometer Suite
MOSDAC	Meteorological and Oceanographic Satellite Data Archival Center
MTG-S	Meteosat Third Generation Sounding
NCMRWF	National Centre for Medium Range Weather Forecast (India)
NGRM	Next Generation Radiation Monitor
NKN	National Knowledge Network
NREN	National Research and Education Network
NSF	National Science Foundation (USA)
NWP	Numerical weather prediction
OGC	Open Geospatial Consortium
OMI	Ozone Monitoring Instrument
OSOS	First International Operational Satellite Oceanography Symposium
OSSEs	Observing System Simulation Experiment
OSW TG	Ocean Surface Wind Task Group
OVW	ocean vector winds
PMAp	Polar Multi-mission Aerosol product
PSTEP	Project for SolarTerrestrial Environment Prediction
RDCA	rapidly developing cumulus areas
RO	radio occultation
ROSES	Research Opportunities in Space and Earth Science
RRR	Rolling Requirements Review

Abbreviation	Meaning
RTSWnet	Real-Time Solar Wind network
S2P	Space Safety Programme
SAN	SWFO Antenna Network
SAS & R	satellite aided search and rescue
SBIR	Small Business Innovation Research
SCO	Space Climate Observatory
SDR	sensor data records
SETT	Socio Economic Tiger Team
SOHO	Solar and Heliospheric Observatory
SOSMAG	Service Oriented Spacecraft Magnetometer
SSA	single scattering albedo
SST	Sea Surface Temperature
STEREO	Solar Terrestrial Relations Observatory
SWCEM	WMO Space-based Weather and Climate Extremes Monitoring
SWFO-L1	Space Weather Follow-On – Lagrange 1
SWO	Space Weather Observations
SWORM	the Space Weather Operations, Research and Mitigation team
SWOT	Strengths, Weaknesses, Opportunities, and Threats
SWxSA	Space Weather Science Application
TANSO-FTS	Thermal And Near-infrared Sensor for carbon Observation Fourier-Transform Spectrometer
TEMPO	Tropospheric Emissions: Monitoring of Pollution
ToR	Terms of Reference
VLab	WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology
VLMG	VLab Management Group
WIS	WMO's Information System
WSI	WIGOS Station Identifiers

GENERAL CGMS INFORMATION

CGMS Agenda and Working Papers

The agenda and Working Papers (WPs) are available at: CGMS Agenda and Working Paper Tool (cgms-info.org)

List of actions and recommendations

Please contact the CGMS Secretariat for the latest status of actions and recommendations.

CGMS List Servers

There are currently nine CGMS list servers:

- Plenary, WGI, WGII, WGIII, WGIV, and SWCG; and
- WGI Task Group on direct broadcast systems, Task Group on data collection services and Task Group on data access.

Information on points of contact and list servers is available upon request from the CGMS Secretariat at CGMSSec [at] eumetsat.int.

CGMS Charter, members and observers

Other information such as the CGMS Charter and the current list of members and observers are available at https://cgms-info.org/about-cgms/.

General enquiries

Please contact the CGMS Secretariat at CGMSSec [at] eumetsat.int in case of any enquiries related to CGMS.

CGMS

Report edited on behalf of CGMS by:
CGMS Secretariat, EUMETSAT

EUMETSAT
Eumetsat-Allee 1
D-64295 Darmstadt
Germany

www.cgms-info.org
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