WGI key recommendations to CGMS plenary

Presented to CGMS-53 Plenary session, agenda item 5

Coordination Group for Meteorological Satellites

EUMETSAT CGMS

Executive Summary

CGMS-53 WGI meeting on 25 March 2025.

All Task Groups presented the progress of their activities since CGMS-52.

WGI Outcomes

Key recommendations to Plenary:

- Reports on *"Agency guidance for RFI detection monitoring and mapping for remote passive sensors"* and *"Agency existing and future uses of AI, ML for pattern recognition in RFI detection and mitigation in remote sensors"* for information / analysis
- Progress on Enhanced Data Collection Platform (EDCP) standard implementation for information
- Progress on assessing capabilities in Collision Avoidance / Space Traffic Coordination for information
- Invitation for WGI Task Group Co-Chair/Co-Rapporteur nominations

Other Informational:

- Overall progress for each WGI Task Group activities
- First engagement within WGI on the topic of antenna arraying techniques for LEO missions within CGMS
- Ongoing efforts on characterising RFI issues impacting DCS
- Investigation of Ionospheric Scintillation and its potential use with DCS signals

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Recalling WGI Scope

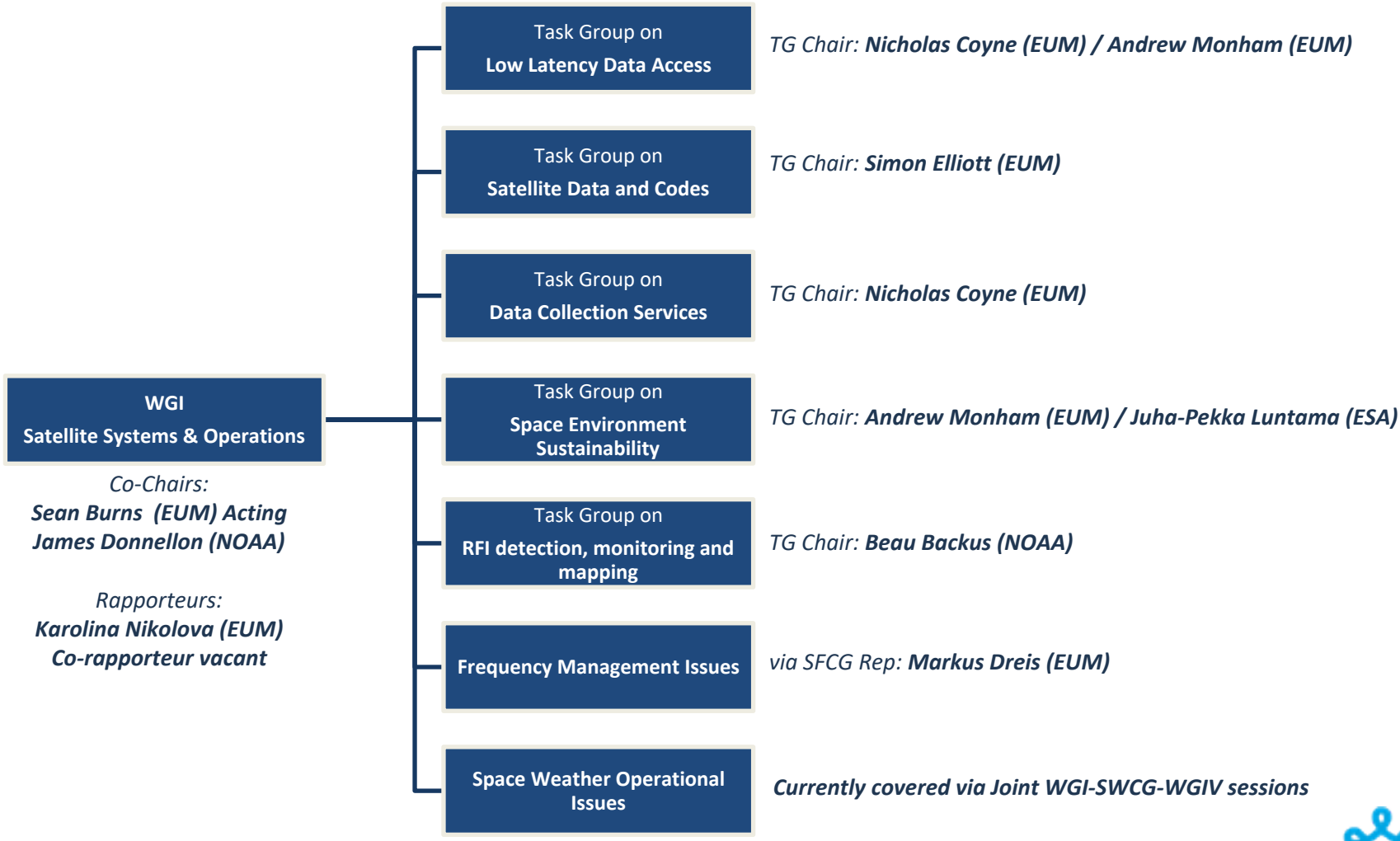
Aim of WGI on 'Satellite Systems and Operations': to keep CGMS aligned with the latest technological solutions that will operationally support the meteorological user community.

Objectives of CGMS WGI:

- Provide a regular forum for CGMS agencies to address topics of interest in areas related to **global coordination of satellite systems and telecommunication**;
- Allow agencies to **share experiences**, **lessons learnt,** to develop **best practices** and detailed technical standards where appropriate related to global/common aspects of satellite systems and operations;
- Support CGMS **in preparation of future generations** of meteorological satellite systems;
- Contribute to consolidation and updates of **interoperability and standardisation** imposed by technological evolution.

Objectives of WGI achieved via Task Groups: specific areas investigated in detail, with the aim of producing best practices and standards for current and future architectures and systems.

Current WGI Structure



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RFI detection, monitoring and mapping

- WGI Task Group on RFI has been very active since CGMS-52 and has made excellent progress by developing reports on:
  - "Agency existing and future uses of AI, ML for pattern recognition in RFI detection and mitigation in remote sensors“ [CGMS-53-WGI-WP-17] – *already presented on Day 1 of CGMS-53 Plenary*
  - “Agency guidance for RFI detection monitoring and mapping for remote passive sensors” [CGMS-53-WGI-WP-18] – *highlights on next slides + full report provided for offline information / analysis*

CGMS Agencies are invited to:
Take note of the reports of the TG on RFI for further analysis and consideration in their internal processes as appropriate.

RFI detection, monitoring and mapping

"Agency guidance for RFI detection monitoring and mapping for remote passive sensors" [CGMS-53-WGI-WP-18]

Problem: Increasing amounts and risk of RFI, especially from AWS (5G), impacting Earth observation data and applications like Numerical Weather Prediction (NWP).

- International regulations exist, but anthropogenic energy can still cause interference.
- New telecommunication services (satellite, broadband-aviation) in millimeter wave bands pose potential interference risks.
- RFI has various types, such as single-source (e.g. radar) and multiple-source (e.g. 5G), which we need to be able to distinguish.
- Commercial RF poses significant risk due to adjacent band use and uncertainty in interference impact.
- The current impact is somewhat limited, but there is significant potential for increased impact as technology advances.

Goal: Develop long-term solutions and guidance to assist in RFI management.

Agency guidance for RFI detection monitoring and mapping for remote passive sensors

Guidance	Who is responsible	When it should happen
Select frequencies, considering the level of regulatory protection	Project manager, supported by frequency managers & scientists	Phase 0
Set / update theoretical protection requirements and establishment of regulatory limits to be protected from RFI as globally as possible	Frequency managers [supported by scientists]	Continuous work
Define hardware and software for RFI detection	Project manager, supported by frequency managers & engineers	Phase A/B1
Map, monitor and report RFI	Agency personnel, supported by frequency managers	Phase E
Develop payloads/missions dedicated to RFI detection	Agency personnel, supported by frequency managers	Continuous work

EDCP Standard - Background

- EDCP Standard Proposal was endorsed by CGMS-52 Plenary, with the following timeline:

2025
Produce and test a **prototype transmitter** (requires modification of at least one agency reception site)

2026
Certify the EDCP transmitters from the manufacturers, **modify the reception systems** of agencies, **test** the reception

2027
Declare EDCP **standard operational**

Future
DCP transmitters can be **installed** in the field

- Benefits of EDCP Standard:

Increased **robustness and reliability** - use of forward error correction to protect against message corruption

Ability for user to dynamically select the **modulation type** on the DCP transmitter (400 BPS/BPSK and 800 BPS/OQPSK)

Additional data embedded in the header providing DCP transmitter health status

Ability to use **lower power modes** - especially useful for solar/battery powered installations

Improved use of **message length** - allowing better use of bandwidth

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EDCP Standard Implementation Progress - informational

- Good progress on implementation since CGMS-52:
  - NOAA incorporated the EDCP standard into ongoing communication protocol efforts.
  - Microcom updated software for GOES DCS-based ground infrastructure and demonstrated a prototype of the 400 baud EDCP standard.
  - Microcom now developing the 800 baud capability with plans to port this software to an existing DCP and conduct testing.
- Next steps:
  - EUMESAT now investigating how they may incorporate similar updates to their system for the same purpose.
  - Ongoing effort will be subject to the associated risk of relying on individual agency resources, but WGI 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.

CGMS is invited to:
Take note of the TG on DCS progress on EDCP Standard implementation.

Space Environment Sustainability - informational

- The membership of the WGI Task Group on Space Environment Sustainability (SES) has increased since CGMS-52, allowing meaningful exchange to take place.
- The Task Group achievements on Space Traffic Coordination since CGMS-52 include:

Matrices of capabilities in Collision Avoidance/Space Traffic Coordination exist for LEO, GEO, HEO, Extra-Terrestrial

Expert, offline analysis to identify commonalities, gaps, potential for improvement

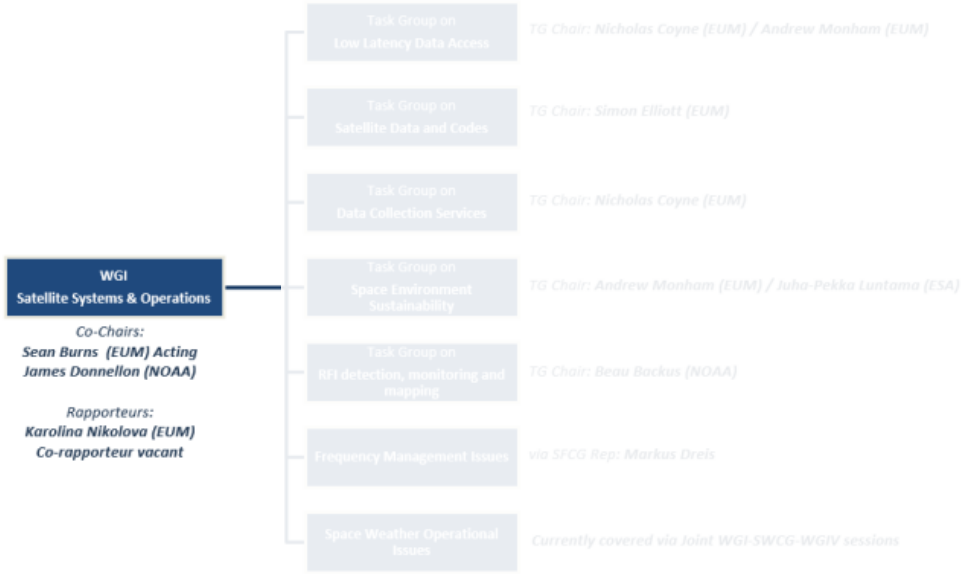
Assessment on-going of active-on-active conjunction contact points , data formats and 3rd party operator access

- Additionally, the Task Group is looking at Space Weather Requirements supporting Space Traffic Coordination and Safe Spacecraft Operations, for which inputs from CGMS agencies are welcome.

CGMS Agencies are invited to:
Take note of the Task Group on SES progress in assessing capabilities in Collision Avoidance / Space Traffic Coordination

WGI Co-Chair & Co-Rapporteur - Nominations welcome

- WGI thanked Dohyeong Kim (KMA) for his contributions as WGI Co-Chair
- Sean Burns (NOAA) is now the acting WGI Co-Chair, replacing Dohyeong Kim (KMA)
- CGMS Agencies are invited to consider nominations for WGI Co-Chair
- CGMS Agencies are also invited to consider nominations for Co-Rapporteur, alongside Karolina Nikolova (EUMETSAT)



CGMS Agencies are invited to:
Consider nominations for WGI Co-Chair and WGI Co-Rapporteur

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Other Informational topics

Task Group on Low Latency Data Access (LLDA)

SWOT Analysis of Low Latency Data Access from LEO Meteorological Satellites" [CGMS-52-EUMETSAT-WP-13]

- Requires further analysis through subject matter experts, in order to propose priority areas and concrete steps for demonstrations.
- Next step is engage with technical /programmatic teams in respective organisations on identified priorities, planned demonstrations of new technologies and operations paradigms, expected outcomes in terms of improved low latency data delivery

Task Group on Satellite Data and Codes (SDC)

Ongoing successful development of new BUFR encoding sequences and Common Code Table entries

Other Informational topics

Task Group on DCS – beyond EDCP

Ongoing efforts on characterising RFI issues impacting DCS:

- Collaboration with TG on RFI to produce an RFI Register, documenting existing RFI issues being experienced by CGMS DCS operators.

Investigation of Ionospheric Scintillation and its potential use with DCS signals:

- 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).
- Could be of interest to groups dealing in space weather, particularly ionospheric scintillation, given that the pre-existing DCS infrastructures provide significant data gathering potential.

Antenna Array Techniques

First engagement within WGI on the topic of antenna arraying techniques for LEO missions within CGMS – exploring potential for further exchanges

To be considered by CGMS:

- CGMS is invited to:
  - Take note of the WGI Task Group activities and progress since last plenary.
- CMGS Agencies are invited to:
  - Take note of the reports of the TG on RFI for further analysis and consideration in their internal processes as appropriate.
  - Consider nominations for WGI Co-Chair and WGI Co-Rapporteur