

CGMS Task Group on Space Environment Sustainability

Presented to IAA Space Debris Committee Meeting 13 October

Andrew Monham (EUMETSAT, CGMS SESTG Co-Chair)

Coordination Group for Meteorological Satellites - CGMS

CGMS: CGMS – Website – The Coordination Group for Meteorological Satellites <https://cgms-info.org>

The Coordination Group for Meteorological Satellites is the group for global coordination of meteorological satellite systems. The coordination is pursued from an end-to-end perspective between meteorological satellite operators and user communities such as WMO.

The CGMS meets in plenary session on an annual basis following meetings of five CGMS Working Groups: **satellite systems and operations**; satellite data and products; operational continuity and contingency planning; support for end users; **and SWCG on operational space weather coordination.**

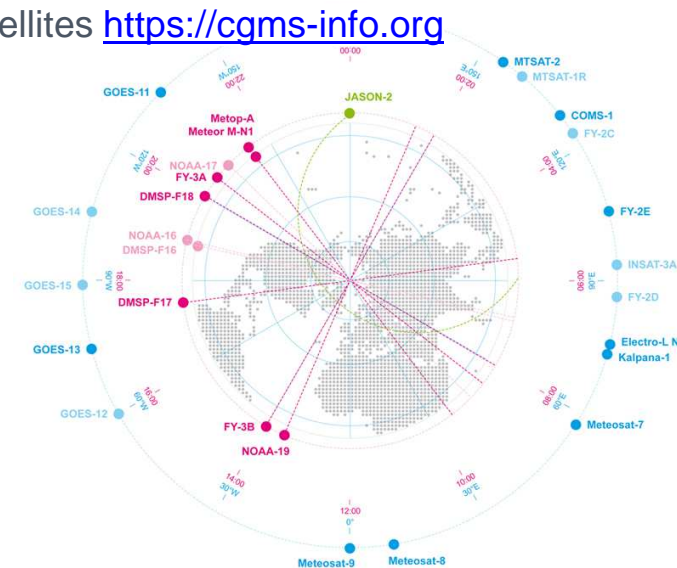
Members:

Members are those organisations and space agencies that are current and prospective developers and operators of meteorological satellites, **including those providing space weather data** ; Space agencies operating R&D satellites contributing to WMO programmes; WMO, because of its unique role as representative of the world meteorological **(and space weather)** data user community.

Current members:

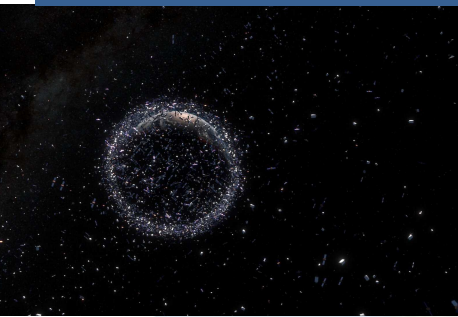
CMA, CNES, CNSA, ESA, EUMETSAT, IMD, IOC/UNESCO, ISRO, JAXA, JMA/NICT, KMA, NASA, NOAA, ROSCOSMOS, ROSHYDROMET, and WMO

**Coordination Group for
Meteorological Satellites**



Coordination Group for Meteorological Satellites - CGMS

CGMS Operational Space Environment Related Activities



Space Environment Sustainability



E2E Concepts



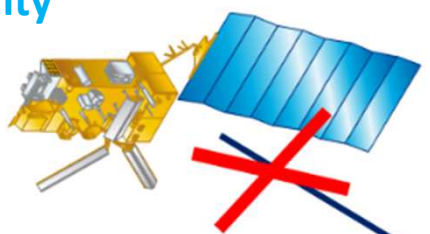
User Surveys



In-orbit Gap Analysis



Inter-calibration



SpWx Anomaly Reporting



The Coordination Group for Meteorological Satellites



Working Groups
 - Operations Best Practices
 - Space Weather Coordination

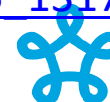
Coor Mete



SCOPE OF THE TASK GROUP TERMS OF REFERENCE

- The Terms of Reference (linked in this report: [CGMS-52-WGI-WP-05](#)) is
 - addressed to all CGMS participants and interested third-parties.
 - relevant for all management, engineering and legal functions responsible for ensuring the definition, implementation and operation of 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.
- Summary of activity is published in the UNOOSA, UN-Space Special Report on Space Debris, presented at UN-COPUOS in June 2024:

https://www.unoosa.org/res/oosadoc/data/documents/2024/aac_105/aac_1051317_0_html/AC105_1317_E.pdf



Coordination Group for Meteorological Satellites - CGMS

Currently confirmed membership

Role	Organisation	Function	Names
Co-Chair	EUMETSAT	Head of SES / LEO Satellite Operations	Andrew Monham
Co-Chair	ESA	Head of Space Weather, CGMS Future Project SSA lead	Juha-Pekka Luntama
Secretary	TBC		
Member	CMA	Space Weather	Cong HUANG
Member	CNES		
Member	CNSA		
Member	IMD		
Member	ISRO		
Member	JAXA		
Member	JMA		
Member	KASI	Chief Manager / Principal Researcher, Space Hazards Office	Dr. Eun-Jung Choi
Member	KMA	Senior Researcher of Satellite Operation Division	Jaeyoung Byon
Member	NASA	Director, NASA Space Weather Program Space Traffic and Awareness (TBC)	Jamie Favors (SWx) TBC (STC)
Member	NICT	Executive Researcher Space Environment Laboratory	Tsutomu Nagatsuma
Member	NOAA	Deputy Director at OSPO, NESDIS	Scott Leonard
Member	ROSCOSMOS		
Member	ROSHYDROMET		
Member	WMO	Scientific Officer at WMO Space Programme.	Heikki Pohjola
Member	ISES	Representatives of Space Weather Services	

Colour coding:

Participants confirmed

Participants to be nominated

- Effort on-going for increasing participation.

Several third-party agencies have expressed interest in joining and should be confirmed before end-of-year.

Note that formal members defined here are being backed up by expert teams to conduct dedicated offline coordinated actions.

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Objectives / Deliverables Highlights (abridged)

Full Terms of Reference available on WGI agenda [CGMS Agenda and Working Paper Tool \(cgms-info.org\)](#) *CGMS-52-WGI-WP-05*

- 1. Objective:** Stay abreast on the status, current events and foreseen evolutions of the space environment, together with related regulations, guidelines, approaches, tools and services with the potential to constrain or inform in-orbit and planned CGMS mission services – **this includes establishing links and sharing information with other efforts.**

Deliverable: Accessible Resource database

- 2. Objective:** Establish a Best Practice on Space Environment Sustainability aspects for CGMS member's missions covering:
 - i. Space Traffic Coordination
 - ii. Lifetime extensions and end-of-life disposal
 - iii. Break-up and atmospheric re-entry notification process
 - iv. Space weather forecast usage and mitigation of risks and effects

Deliverables:

- a) A best practice document on Space Environment Sustainability based primarily on existing practices, but also with a view to emerging technologies and concepts for long-term, system lifecycle sustainability
- b) A gap analysis on global Space Traffic Coordination capabilities and alignment
- c) Updated proposal for best practices based on outputs from (a), (b), targeting approval by CGMS for submission to UN COPUOS, with focus on Space Traffic Coordination

- 3. Objective:** Identify and act upon risks to sustained operations

Deliverable: A space environment sustainability SWOT analysis, with identified actions

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EUMETSAT CGMS

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Collection of LEO practices

Excel file sent to all agencies to collect info on their LEO and GEO SSA practices.

Initial priorities will be to establish contact points for active-on-active conjunction coordination and develop processes to commonly acceptable standard.

Also providing national contact points / middle-man for coordination with other agencies (e.g. defence agencies)

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LEO Satellites			
Collision Avoidance / Space Traffic Coordination	NOAA Approach	EUMETSAT Approach	CGMS Agency_3...X Approach
Situational awareness data sources	Prime: CARA Sec: Commercial	Prime: CARA/18 th SPCS moving to TraCCS (DoC) Sec: EUSST	
Risk assessment: LEO	CARA + Commercial Static Hard Body Radius	CARA + EUSST + Internal Dynamic Hard Body Radius	
Manoeuvre decision: LEO	If Pc risk ≥ 4.4e-4 and operational concerns	If Pc risk ≥ 1.0e-4 for EPS If Pc risk ≥ 3.0e-5 for S3/6	
Manoeuvre Timing	As late as possible	As late as possible, but anticipation considered	
Mitigating nominal mission impact	Optimization of satellite maneuver ops	Usage of routine maneuvers if possible	
Background risk analysis	Mitigation target: 1.0e-7	Mitigation target: 3.0e-6 Less acceptable	
Non-Manoeuvrable satellites	Monitoring for high risk Notification: Pc ≥ 1.0e-3	Not applicable	
Active on Active conjunctions	No case experienced: one to one coordination Direct de-orbit of maneuverable satellites	Several cases observed: one to one coordination	
EOL Debris Mitigation		Uncontrolled de-orbit except for next EPS generation (controlled)	
Applicable Space debris mitigation standards and guidelines		ISO 24413 operationally, ESA SD requirements alignment for missions to be developed in the future.	
Applicable International and regional regulations			
Usage of Space Weather Data in orbit prediction		NOAA SWPC predictions (averaged)	

Coordination Group for Meteorological Satellites - CGMS

Collection of GEO practices

Excel file sent to all agencies to collect info on their LEO and GEO SSA practices.

Initial priorities will be to establish contact points for active-on-active conjunction coordination and develop processes to commonly acceptable standard.

Also providing national contact points / middle-man for coordination with other agencies (e.g. defence agencies)

Coordination Group for Meteorological Satellites

GEO Satellites			
Collision Avoidance / Space Traffic Coordination	NOAA Approach	EUMETSAT Approach	CGMS Agency_3...X Approach
Situational awareness data sources	Prime: 18 th SPCS Sec: SDA + Commercial	Prime: 18 th SPCS moving to TraCCS (DoC). Sec: EUSST + SDA + Commercial (primary)	
Risk assessment: GEO	Internal	Internal	
Maneuver decision: GEO	Miss-distance < 2km	Miss-distance < 1km and Radial < 500m	
Maneuver Timing	As late as possible	As late as possible, but anticipation considered	
Mitigating nominal mission impact	Usage of routine maneuvers if possible	Usage of routine maneuvers if possible	
Background risk analysis	Mitigation target > 2km	Mitigation target > 5km	
Non-maneuverable satellites	Not applicable	Not applicable	
Active on Active conjunctions	Coordination via SDA	Coordination via SDA	
EOL Debris Mitigation	Re-orbiting to graveyard	Re-orbiting to graveyard	
Applicable Space debris mitigation standards and guidelines		ISO 24413 operationally, ESA SD requirements alignment for missions to be developed in the future.	
Applicable International and regional regulations			
Usage of Space Weather Data in orbit prediction		NOAA SWPC predictions (averaged)	

Summary

- CGMS has initiated Task Group on Space Environment Sustainability
- Membership is being increased among CGMS members and third-party agencies will be added.
- Top priority is to agree on and propose acceptable space traffic coordination practices that can be submitted for consideration by UN COPUOS.
 - Within this, a goal is to identify contact points and the process for active-on-active conjunctions impacting CGMS agencies and other national agencies of members.
- Space Weather experts also contributing through:
 - Review current usage of space weather data for spacecraft operations and goals for improvement.
 - Produce a report of space weather observation requirements for improved STC services and space sustainability
- Group shall interface with other bodies performing similar activities to learn and share.
 - IAA committee members involved in these issues are invited to engage with the TG for improved coordination.