

# Space-Based Space Weather Observations: Coordination Group for Meteorological Satellites

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# CGMS

- Coordination body of space agencies operating meteorological, climate monitoring and environmental satellites in response to requirements formulated by WMO and other user communities.
- Forum for global planning coordination, technical harmonization, and exchange of information on geostationary, polar orbiting and other satellite systems with a particular focus on ensuring long-term continuity of space-based observations in support of operational applications (see [www.cgms-info.org](http://www.cgms-info.org)).
- Interest in space weather, both from the perspective of the impacts of space weather on satellite systems and to support the continuity and coordination of space-based observing capabilities for operational space weather products and services from sensors on meteorological satellites and on space weather satellites.
- In 2015, CGMS established a Space Weather Task Team (SWTT) purposed with identifying high-level priorities for CGMS space weather activities, and integrating space weather into the CGMS organisation.
- In 2016, near-term space weather objectives have been integrated into the 2016-2020 CGMS High-Level Priority Plan.

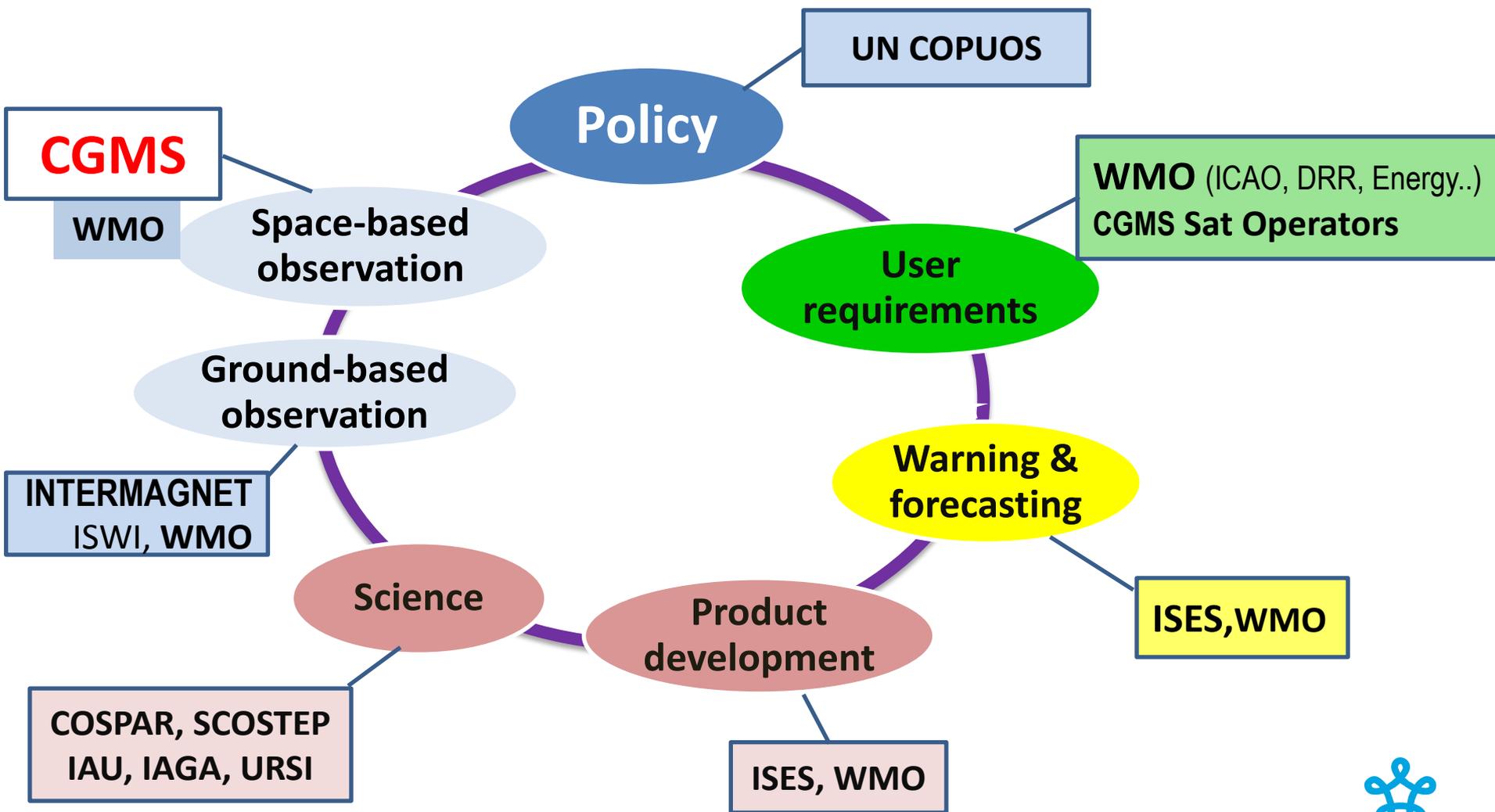


# Space Weather Task Team Objective

- To define the methodology by which we would implement space weather into CGMS in line with the CGMS Space Weather Activities Terms of Reference:

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

# CGMS Would Fill a Necessary Role



# CGMS plays a unique role

- CGMS recognizes and responds to WMO requirements through a longstanding and successful partnership
- CGMS involves most if not all operators of space weather payloads used in operations
- The needed coordination of observational assets and plans to ensure interoperability and continuity of space weather observations is a unique strength of CGMS
- CGMS bridges the gap between space weather forecasting and the tailored needs of spacecraft operators
- Decade-long experience of hosting space weather instruments on meteorological space craft
- Experience in GSICS, SCOPE-CM, Vlab, can either expand or inspire similar initiatives for space weather



World Meteorological Organisation



**CGMS**



Global Space-based Inter-Calibration System



**CGMS**

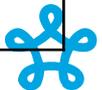
# International Organizations Engaged in Space Weather Activities



Numerous other groups are active in space weather research (COSPAR, ISWI, ILWS, IAU, URSI, SCOSTEP, etc.)

# Next Steps for HLPP Implementation

5.2	Space Weather	
5.2.1	Establish dialogue with Space Weather User Community and define the future framework for continuing this dialogue.	<p><i>Interactions between SWTT and Space Weather community were had at European Space Weather Week 2016 and at UN-COPUOS, where CGMS and its space weather activities were presented.</i></p> <p><i>Feb 2017, April 2017 UN-COPUOS Space Weather Expert Group Meeting</i></p> <p><i>2016 European Space Weather Week</i></p> <p><i>2017 US Space Weather Workshop (SWTT organized electron inter-calibration mini-workshop)</i></p> <p><i>2017 UN/US Workshop on the International Space Weather Initiative (invited presentation)</i></p> <p><i>2017 European Space Weather Week (dedicated CGMS topical discussion meeting)</i></p> <p>Engage ISES as an observer for CGMS plenary meeting and/or include with SWTT inter-sessional activities. (<b>Action 45.06</b>)</p>



# Next Steps for HLPP Implementation

1.1	<b>Coordination of observing systems</b>	<b>WG-III</b>
1.1.4	Investigate through IROWG how a coordinated and optimised system could be set up for radio occultation observations for atmosphere and ionosphere monitoring;	<i>Regarding an optimised atmospheric and ionospheric observing system: An international workshop was held to discuss aspects of radio-occultation analysis involving the ionosphere. The Ionosphere-Atmosphere Coordination Workshop was held in Boulder, Colorado on October 3, 2014. The workshop attendance exceeded 50 persons, from both operational and research organizations. A follow-on meeting was held during IROWG-5, Graz, Austria in September 2016.</i>
1.1.7	Identify the baseline space-based space weather observational system and review with respect to the WIGOS 2040 vision for space-based global observing system;	<ul style="list-style-type: none"> <li>• SWTT would define the space weather element for the CGMS baseline, via proposed <b>Action A45.01</b> to be finalized in the first SWTT inter-sessional.</li> <li>• WG III to include a space weather element in the CGMS Baseline, and to develop this notion further via a joint SWTT/WG III inter-sessional meeting prior to CGMS-46.</li> </ul>
1.1.8	Establish a coordinated approach to the reporting of space weather-related spacecraft anomalies;	<ul style="list-style-type: none"> <li>• <b>Action A45.04</b> CGMS operators report on internal procedures to determine if an anomaly results from a space weather event including what thresholds are used.</li> <li>• <b>Action A45.05</b> directs CGMS to engage WMO IPT-SWeISS to encourage incorporation of an analysis of anomaly collection, reporting, and resolution processes into their work plan</li> </ul>

# Next Steps for HLPP Implementation

2	<b>COORDINATION OF DATA ACCESS AND CONTRIBUTION TO THE WMO INFORMATION SYSTEM</b>	<b>WG-IV</b>
2.8	Document current data formats for space weather observations	WG IV actions ask CGMS members to report on current data formats for space-based space weather observations and the status of near real-time access of space weather data from instruments hosted on meteorological satellite.
2.9	Improve the near-real-time access to and global exchange of space weather data from instruments hosted on meteorological satellites	

# Next Steps for HLPP Implementation

3	ENHANCE THE QUALITY OF SATELLITE-DERIVED DATA AND PRODUCTS	WG-II
3.1.3	Pilot implementation of a consistent inter-calibration for energetic particle measurements using instruments with adequate in-orbit calibration and vicarious methods as reference.	<p>GSICS has had a first discussion about the possible relationships.</p> <p>SWTT members review GSICS activities and deliver recommendations for its use as a framework for space weather sensor inter-calibration activities. (<b>Action A45.02</b>)</p> <p>SWTT to invite a GSICS representative (<b>Action A45.03</b>) to the next SWTT inter-sessional meeting; and to a topical discussion during the European Space Weather Week Nov-Dec 2017 in Oostende, Belgium.</p>
3.6.4	Evaluate existing operational space weather products and services in support of CGMS members' spacecraft operations, and recommend additional services as appropriate.	Survey to be provided to CGMS member operators regarding if and how actions are undertaken by satellite operators in response to space weather threats and/or conditions ( <b>Action A45.07</b> ).

# Next Steps for HLPP Implementation

4	<b>OUTREACH AND TRAINING</b>	<b>SETT and Plenary</b>
4.1.1	Assess and implement credible methodologies for assessing the socio-economic benefit of investment in EO and Space Weather missions	<p><i>Several agencies are conducting studies on SE for space weather missions. Following CGMS-44, 3 SWTT members have be appointed to SETT, but have not yet participated in SETT activities.</i></p> <p>The next SETT WS will be in autumn 2017. Inputs requested for the next SETT case study to be undertaken. SWTT members will participate.</p>
4.1.2	Engage in communication and outreach activities to promote EO and Space Weather observations benefits	<p><i>Actions proposed by NOAA endorsed at CGMS-42, and NOAA together with CGMSSEC will lead these improvements.</i></p>

# Summary

- CGMS' unique role in space weather has been socialized amongst space weather international organizations and its potential role recognized.
- Discussions in the SWTT with the WG leads have established paths forward on many of the space weather related HLPP items and presented them in the WG meetings.

# BACKUP

## Overview of Session

~35 participants  
Sunday 12.00-19.00  
13 Agencies participated

SWTT/1: Objectives and Chairmanship

SWTT/2: SWTT Chairmanship

SWTT/3: Review of actions and recommendations from previous meetings - **1WP**

SWTT/4: Updates by CGMS members and partner organisations on current and planned dedicated space weather satellite missions - **7 WPs**

*- Two dedicated space weather missions planned for L1 and L5*

SWTT/5: Updates by CGMS members and partner organisations on their space weather activities and plans - **8 WPs**

*- Electron Sensor Intercalibration mini-workshop proposed at CGMS SWTT last year and organized by SWTT*

SWTT/6: UN COPUOS Update - **1 WP**

*- Recognition of CGMS as important element of international space weather framework*

SWTT/7: WMO Update on 4 Year Plan - **1WP**

*- Recommendation for WMO to invite CGMS representation on IPT-SWeISS*

SWTT/8: Review of space weather component of WIGOS 2040 version 1.1 and feedback by CGMS Members - **1 WP**

SWTT/9: Review and updating of the HLPP - **2WPs**

SWTT/10: Review status of the SWTT and plan for integration of SWTT topics into the other CGMS WGs (WGI -- WGIV)

SWTT/11: Anomaly reporting and database discussion - **1WP**

# Recommendation

- Continuation of SWTT until CGMS-46
  - Currently, some actions do not have a home in the Working Groups, we recommend the SWTT continue to address these.
  - Internal efforts to incorporate HLPP targets within the Working Groups have been initiated. Currently, we have several actions planned as joint efforts between the SWTT and the Working Groups. We recommend the SWTT continue to aid in maturation of these efforts into the Working Group structures.
  - To effectively advance its space weather HLPP items, CGMS must have a interface with the space weather community. **The SWTT will present a recommendation to CGMS-46 regarding the nature of this interface.** This will be accomplished by assessing the extent to which the identified CGMS space weather priority items have been successfully translated into the Working Groups through work in the inter-sessionals, and how much activity is still outside of the current Working Group infrastructure.

# Space Weather Observing System

