COORDINATION GROUP FOR METEOROLOGICAL SATELLITES

- CGMS –

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The objectives of CGMS are formalised within its Charter:

The CGMS' objective is to globally coordinate operational and R&D meteorological satellite systems, including protection of in-orbit assets, contingency planning, improvement of quality of data, support to users, facilitation of shared data access and development of the use of satellite products in key application areas. The coordination is pursued from an end-to-end perspective, through development of multilateral coordination and cooperation across all meteorological satellite operators and with the user community, in particular the WMO and IOC-UNESCO, but also other entities

The role of the rapporteur is to provide feedback and guidance to the co-chairs on how to best address relevant issues at CGMS meetings.

ITWG actions/recommendations are addressed by CGMS working groups and CGMS relies on ITWG to be responsive to CGMS actions

- Working Groups
  - Advanced Sounders
  - NWP
  - Climate
  - Radiative Transfer
  - Products and Software
  - International and Future Systems
- Technical Subgroups
  - Direct broadcast packages/ RARS
  - RTTOV
  - CRTM

Working groups

Working Group I: Satellite systems and operations

Working Group II: Satellite data and products

Working Group III: Operational continuity and contingency planning

Working Group IV: Data access and end user support

SWCG: Space weather coordination group

In addition, there are a few International Science Working Groups interacting with CGMS: The International TOVS Working Group - ITWG; the International Precipitation Working Group - IPWG; the International Winds Working Group - IWWG; the International Radio Occultation Working Group - IROWG and the International Clouds Working Group (ICWG). The last four Working Groups originate from CGMS WG II and plenary sessions.

International science working groups

International TOVS Working Group: ITWG

International Precipitation Working Group: IPWG

International Radio Occultation Working Group: IROWG

International Winds Working Group: IWWG

International Clouds Working Group: ICWG

Other relevant working groups or teams

CEOS-CGMS Joint Working Group on Climate


REPORT OF THE 50TH MEETING OF
The Coordination Group For Meteorological Satellites
50 YEARS 1972–2022
CGMS
CGMS-50 report, June 2022
25-29 April 2022
16-20 May 2022
15-17 June 2022

CGMS Key Documents

Title	Purpose and Revision cycle	Link to current version
CGMS Baseline	The 'Baseline' constitutes the commitments of CGMS members to provide particular observations. Reviewed annually.	CGMS Baseline
CGMS Risk Assessment	Identifies risks for CGMS members to meet the commitments of the Baseline over the next decade, and identifies actions for mitigating identified observational gaps	Summary in CGMS Plenary Report
CGMS High-Level Priority Plan (HLPP)	4-year rolling plan containing high-level priorities for CGMS activities. Aspirational targets for enhancing the CGMS response to the WIGOS Vision are included in the HLPP. Revised annually.	CGMS HLPP
WMO Gap Analysis	The latest WMO gap analysis of CGMS Baseline against the WIGOS 2040 Vision. Document provided to CGMS normally every year.	CGMS-50-WMO-WP-08
WIGOS Vision	Contains the overall vision for the complete observing system, based on WMO requirements. Document updated by WMO every 4 years.	Vision for the WMO Integrated Global Observing System in 2040

CGMS Baseline

Sensor Type	Orbit	Observation / Measurement	Attributes
Microwave Sounder	LEO	Atmospheric temperature, humidity, and precipitation	3 sun-synchronous orbits, nominally early morning, mid-morning and afternoon
Infrared Sounder	LEO, GEO	Atmospheric temperature, and humidity	LEO - Hyperspectral on 3 sun-synchronous orbits, nominally early morning, mid-morning and afternoon GEO - Hyperspectral at orbital positions 0° and 105° E.
Radio Occultation	LEO	Atmospheric temperature and humidity, Ionospheric Electron Density	3 sun-synchronous orbits, early morning, mid-morning, and afternoon as well as other designated orbits such as equatorial – A minimum of 6,000 globally distributed occultations

Sensor Type	Orbit	Observation / Measurement	Attributes
Multi-purpose meteorological imagers (multispectral, visible, and IR)	LEO, GEO	Sea Surface Temperature, Aerosols, Land surface temperature, Cloud properties, Feature tracking winds (AMV), Flood mapping, Fires, Cryosphere applications (sea ice, snow cover, etc.)	LEO - 3 sun-synchronous orbits, nominally early morning, mid-morning, and afternoon GEO - Global coverage, nominally 6 evenly spaced satellites
Narrow Band Visible and Near Infrared Imager	LEO, GEO	Ocean colour	LEO - 2 orbits GEO - 1 slot located 128.2°E
High Resolution Visible Infrared Imager	LEO	Land use, Vegetation type and status	LEO - 1 orbit
Microwave Imager	LEO	Sea surface temperature, Ocean surface winds, Precipitable water, Soil moisture, Snow and ice properties, Sea ice properties	LEO - 3 sun-synchronous orbits, nominally early morning, mid-morning and afternoon
Radar Altimetry	LEO	Ocean surface topography	LEO - 2 sun-synchronous orbits, early morning and mid-morning orbits as well as reference mission on a high-precision, inclined orbit
Scatterometer	LEO	Ocean surface winds	LEO - 3 sun-synchronous orbits, early morning, mid-morning and afternoon orbits
Lightning Mapper	GEO	Lightning mapper	GEO - In certain slots, 0°, 75.2°W, 137°W 86.5°E, and 105°E

The ‘Baseline’ constitutes the commitments and plans of CGMS members to provide observations, measurements, and services. CGMS members plan to maintain the capabilities and services described to support the WMO Integrated Global Observing System (WIGOS).

Example of WMO Gap Analysis

1. Geostationary infrared sounding	Hyperspectral sounding from GEO is basic for high-vertical-resolution, frequent temperature and humidity profiling, and derived winds.

Analysis of the scenario	• Hyperspectral sounding has started with FY-4 (GIIRS) and is planned by Electro-M (IRFS-GS) and MTG (IRS). Foreseen coverage: range of longitudes from ~ 30°W to ~ 130°E at the equator. • Hyperspectral sounding currently is not implemented on GOES, Himawari, INSAT and GEO-KOMPSAT. Uncovered range of longitudes from ~ 100°E to ~ 40°W at the equator, i.e. over ~ 55% of the Earth surface. The gap will last up to at least ~ 2036 (GOES), ~ 2031 (Himawari), ~ 2030 (GEO-KOMPSAT) and ~ 2029 (INSAT).
Recommendation	**It is recommended that ISRO, JMA, KMA and NOAA implement hyperspectral sounding on the next generations of INSAT, Himawari, GEO-KOMPSAT and GOES satellites.**

HLPP priorities relevant to ITWG

- **ENSURE OPERATIONAL CONTINUITY AND PERFORM CONTINGENCY PLANNING**
  - 1.1.1 Ensure continuity of passive microwave imager observations;
  - 1.2.2 Advance the new generation of GEO satellites, including advanced imaging, lightning mapping and IR sounding for the whole geostationary ring;
  - 1.2.4 Work towards ensuring optimised high spectral resolution 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;
  - 1.2.6 Work towards ensuring low frequency microwave imagery for all-weather SST and ice monitoring from at least 2 sun-synchronous orbits;

HLPP priorities relevant to ITWG

- **ENSURE OPERATIONAL CONTINUITY AND PERFORM CONTINGENCY PLANNING**
  - 1.2.7 Establish observational requirements for microwave observations (sounder and imager) for NWP and precipitation and perform gap analysis against CGMS baseline;
  - 1.2.11 Work towards operational infrared/µwave limb sounding for climate monitoring and NWP applications
  - 1.4.1 Support satellite impact studies, including in particular impact of data latency and the impact of the early morning orbit;

HLPP priorities relevant to ITWG

- **ENHANCE THE QUALITY OF SATELLITE-DERIVED DATA AND PRODUCTS**
  - 4.2.6 Establish together with the user community a commonly agreed approach for retrieval of Principal Component scores and associated parameters from hyperspectral infrared data, minimising information loss including the mutually acceptable update strategy for the principal component basis and to implement such an approach in a coordinated manner.
  - 4.3.3 Conduct an intercomparison study between the different methods to derive level 2 data from infrared hyperspectral sounders, recognising that there are several software packages available that utilize AIRS/IASI/CrIS data;
  - 4.4.1 Establish a common vocabulary and methodology with appropriate error propagation to include the errors associated with validation data (e.g. radiosonde temperature, water vapour, precipitation and winds);
  - 4.4.2 Agree on standardised procedures to derive NedT estimates for microwave sounders, and include such estimates in the disseminated BUFR data.

HLPP priorities relevant to ITWG

- **ENHANCE THE QUALITY OF SATELLITE-DERIVED DATA AND PRODUCTS**
  - 4.6.1 Continue support for line-by-line (LBL) reference model development and enhanced characterization of spectroscopy to ensure that product development teams and users of level 1 data have access to the latest updates in LBL forward modelling and the uncertainties involved;
  - 4.6.2 Perform validation and intercomparison of LBL models/spectroscopy to assess the impact of spectroscopic uncertainties and the differences between line-by-line and fast radiative transfer models;
  - 4.6.3 Through coordination between IPWG, ITWG and ICWG, continue to improve microwave radiative transfer models to include complex surfaces (e.g. snow, desert, etc.) and scattering atmospheres (e.g. frozen hydrometeors) to support improved algorithm development for current and future sensors.

HLPP priorities relevant to ITWG

- **ENHANCE THE QUALITY OF SATELLITE-DERIVED DATA AND PRODUCTS**
  - 4.7.1 Conduct studies to investigate the technical feasibility to reduce the field of view sizes for future microwave sounders to keep in line with the spatial resolution expected for future global NWP models.
  - 4.7.2 Conduct trade-off studies regarding the benefits of spectral, radiometric, and spatial resolution of infrared sounders, taking into account aspects such as scene inhomogeneity and uncertainties in spectroscopy

Other CGMS-50 actions of relevance to ITWG

- Plenary
  - CGMS review and discuss the International Earth Surface Working Group (IESWG) Terms of Reference and once finalised, bring to CGMS-51 Plenary for endorsement.
- WG-I (Satellite Systems and Operations)
  - Continue SWOT analysis on Low Latency Data Access from LEO meteorological satellites

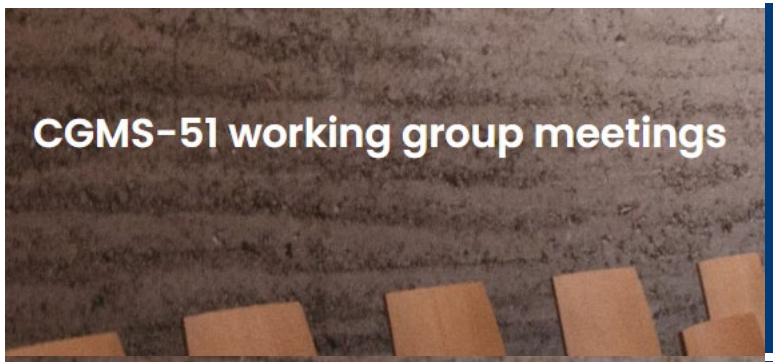
Other CGMS-50 actions of relevance to ITWG

- WG-II (Science and Products)
  - ITWG to send a report demonstrating the value of temperature sounding of the upper stratosphere and mesosphere (as for the SSMIS UAS channels)

ITWG working group instructions

- Review and respond to relevant CGMS-50 actions
- Review HLPP and report status and progress

CGMS-51 face-to-face meetings

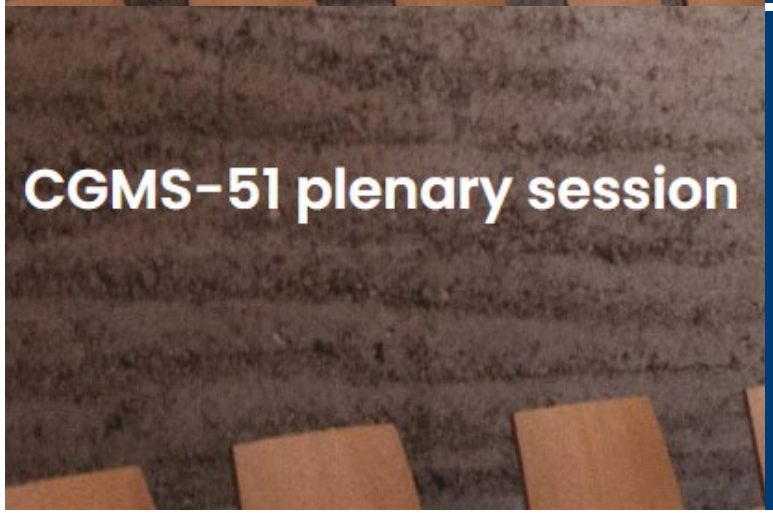


Information

Date: 24-28 April 2023

Location: EUMETSAT, Germany

Host: EUMETSAT



Information

Date: 26-28 June 2023

Location: Tokyo, Japan

Host: JMA and JAXA