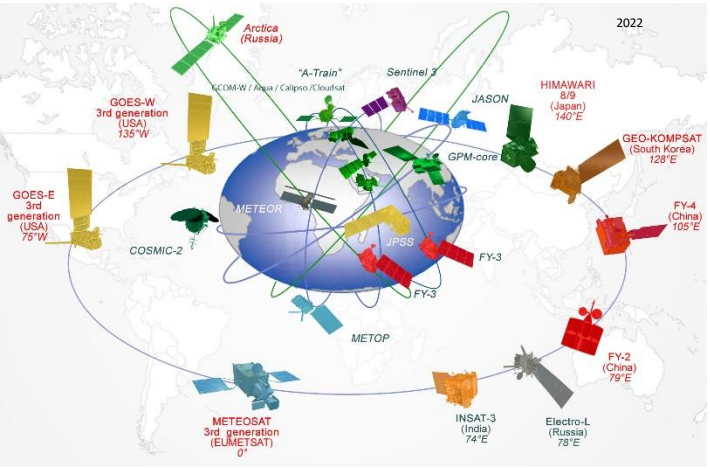

Satellite systems and operations - report WGI

Presented to CGMS-47 Plenary session, agenda item 5.1

Coordination Group for Meteorological Satellites

CGMS

Summary – Key Outcomes WG-1

- Frequency coordination and communication of key action items ahead of WRC-19
- Reinforcement of Best Practices for Direct Broadcast along with proposal for new Best Practices
- Enhanced coordination for International Data Collection System (IDCS) to include several proposed Best Practices and development of a DCS Handbook
- Coordination with SWCG on approach for initiation of a Space Weather Anomaly Database
- Discussion of CGMS agency approaches for Space Debris Collision Avoidance and need for Best Practices
- Initial discussion of harmonization of LEO orbit phasing

Summary of Working Group I – Frequency Coordination

Report from the CGMS Space Frequency Coordination Group (SFCG) outcome of SFCG-38 (22 – 30 August 2018, Moscow) on frequency matters of mutual interest/concern, namely:

- World Radio Conference (WRC)-19 issues of mutual interest/concern to SFCG and CGMS,
- Space agency reports on national/regional regulatory changes/issue,
- Space weather observations using radio frequencies (in preparation for a WRC-23 agenda item),
- RFI to EESS (passive) sensors and interference reporting,
- Optimisation of the use of the S-band (2025-2110 MHz and 2200-2290 MHz),
- SFCG-Recommendations related to the new EESS uplink allocation in 7190-7250 MHz.

Furthermore, information is also provided on consequential/resulting activities in WMO Steering Group for Radio Frequency Coordination (SG-RFC), ITU-R Working Parties (WPs) 7B and 7C and ITU-R Conference Preparatory Meeting (CPM19-02) on issues of relevance to CGMS.

Coordination Group for Meteorological Satellites

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Summary of Working Group I – Frequency Coordination

Overview on the WRC-19 preparations for agenda item 1.13 (International Mobile Communication (IMT)-2020 (5G)) and the divergent global situation/proposals/views with regard to the protection of passive sensors from IMT-2020/5G unwanted emissions as observed from the discussions and conclusions of the ITU-R Conference Preparatory Meeting CPM19-2 held in February 2019.

For the protection of the other, higher passive bands neighbouring to the bands under study for IMT-2020/5G identification, the question arose what could/would be appropriate 5G unwanted emission limits. Limits are proposed by ESA/EUMETSAT in the CEPT preparatory process for WRC-19, if and identification for IMT-2020/5G would be decided at WRC-19

Summary of Working Group I – Frequency Coordination

Two Recommendations made:

- CGMS members are recommended to take appropriate actions towards their national frequency regulatory authorities to support unwanted emission limits for IMT-2020/5G at 26 GHz in the order of -42 dB(W/200 MHz) for base stations and -38 dB(W/200 MHz) for terminal stations to protect passive sensors in the 23.6 – 24 GHz band

- CGMS members are recommended to propose to their national frequency regulatory authorities not to support an identification for IMT-2020/5G in the bands 47.2-50.2 GHz and 50.4-52.6 GHz in order to protect passive sensors in the neighbouring passive bands 50.2-50.4 GHz and 52.6-54.25 GHz

Summary of Working Group I – Meteorological satellites Space to Ground Interface (Direct Readout) and LHRIT Global Spec. Global Specs (CCSDS based) and Best Practices for DR processing Direct Broadcast

Presentations by Members on the implementation of Direct Broadcast Best Practices

Several potential Best practices were identified for future work as well as updates to existing Best Practices, these include:

- Consider the advantages of using RHCP/LHCP against the simplicity/affordability of the Direct Broadcast stations

- Analyse possible solutions to address the expected increase in instrument data from future polar orbiting satellites and to propose new DB standards and/or Best Practices as required

Coordination Group for Meteorological Satellites

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Summary of Working Group I – Meteorological satellites Space to Ground Interface (Direct Readout) and LHRIT Global Spec. Global Specs (CCSDS based) and Best Practices for DR processing Direct Broadcast

At CGMS-46 a WGI liaison between CGMS and the governing bodies of the netCDF Climate and Forecast (CF) Conventions was appointed to represent the interests of CGMS members within the CF community

To support interactions with the CF community a survey of intersessional work group participants was conducted in order to ensure full visibility of members' needs. The feedback provided indicated that:

- Standardisation of the use of netCDF-4 groups and the encoding of data products in satellite viewing geometry (swaths) has a high priority;
- Good CF compliance checkers are considered useful in confirming the validity of new data products, especially as standards continue to be refined; and
- The CF governance process has been experienced as slow and difficult to navigate by multiple organisations in the past.

Set goals for the CGMS coordination with the NetCDF CF community for this next year

Summary of Working Group I – Data collection systems

The DCS sub-group(formed at CGMS-46) made progress in several areas including:

- A CGMS Best Practice for DCP Certification
- Work toward a CGMS Best Practice for DCP data access
- Discussions of the Enhanced DCP (E-DCP) standard
  - The discussions of a new DCP standard indicated there is a possibility to once again have a truly international DCP standard that could be used with either EUMETSAT, NOAA or JMA satellites, and could extend to other DCS satellite providers. Discussions of the micro satellite experiment which is being conducted by NOAA have also highlighted the need for an international standard.
- The creation of a DCS Handbook

The DCS sub group helped to organise Satcom 2018, which included a dedicated DCS Workshop, with participation of Users, Industry as well as DCS satellite operators.

Summary of Working Group I – Data collection systems

Future work of the DCS sub group includes:

- Completion and publication of the DCS Handbook
- Further development of a new International DCP standard – establishing the user requirements, the technical specifications, and potential applications for a new DCP Standard
- A Best Practice on Data Access including DCP Data Formats.

Summary of Working Group I – System and operations aspects – Space Weather

There was a **Joint WGI & SWCG meeting** with presentations on progress of the Space Weather Anomaly Database, Space Weather user needs, and also the capabilities of the space weather services that are currently available in the ESA SSA Space Weather Service Portal supporting satellite operations.

To progress further on the Space Weather Anomaly database, it was proposed to create a Task Group with WGI members. The initial tasks for the Group are:

- Establish the requirements of the Space Weather Database parameters
- Establish the requirements for the Security / Confidentiality aspects
- Establish the process and rules for access the Database content

Summary of Working Group I – System and operations aspects – Space debris and collision avoidance

Presentations made by EUMETSAT and NOAA on their processes and procedures for Collision Avoidance

The WG proposed that a Best Practice on Collision Avoidance practices should be prepared for endorsement at CGMS-48 that would provide guidance for other CGMS Members.

This would help ensure CGMS members are best-placed to implement state-of-the-art CA approaches, thereby reducing the risk of CGMS member satellites loss and contamination of critical operational orbits.

- A Task Group focussed on Space Debris and Collision Avoidance formed to produce this Best Practice

Summary of Working Group I – System technical aspects (sharing/rationalisation of orbits) and operational aspects on the implementation of contingency plans

Presentation made regarding an analysis of the coordination of LEO orbits.

To reduce pass scheduling conflicts and maximising the amount of instrument observation collected, it is beneficial to coordinate the orbital phasing of satellites within and between satellite operating agencies.

A preliminary analysis is provided of the drivers and constraints in coordinating LEO satellite orbits and potential gains in improving overall mission return and improved efficiency in usage of ground resources. This work should continue, the Working Group proposed to:

- Develop a Best Practice on the considerations to be made on orbital phasing between satellites, as a measure for reducing pass scheduling conflicts and maximising the amount of instrument observation collected.

To be considered by CGMS:

- Vacant position of Co-Chair for WGI. CGMS Members are requested to provide nominations to the CGMS Secretariat by end of Q2 2019