SFCG-37 **SF37-46/I**
6 – 13 September 2017
Montreal, Canada

CGMS Liaison Officer
Report from CGMS-45

Abstract

This information document provides a summary of the discussion and outcome of the 45th meeting of the Coordination Group for Meteorological satellites (11-16 June 2017, Jeju Island, Republic of Korea) on issues of mutual interest and concern to CGMS and SFCG.

1 Background

In the input document EUMETSAT-WP-24 to CGMS-45, the CGMS/SFCG Liaison Officer provided a report on the discussions at SFCG-36 on all frequency management issues of mutual interest and concern and provided responses to CGMS-44 Working Group I actions A44.01, A44.02, A44.03 and A44.04.

The report to CGMS-45 covered the following issues:

- Possibility for the migration of the SFCG remote sensing disaster database (RSDD) into OSCAR;
- Yearly reporting of SFCG members on national regulatory issue;
- Information gathering of CGMS and SFCG members activities/plans/interests in space weather;
- WRC-19 agenda items of mutual interest.

2 Possibility for migration of the SFCG remote sensing disaster database (RSDD) into OSCAR

In response to the consideration of the possibility of migrating the SFCG Disaster database into the WMO OSCAR database as brought up by CGMS (WGI Action A44.01) and followed-up by SFCG Action Item 36/6 (Annex 1), it was concluded that first and foremost WMO will have to provide their feedback on their willingness and possibility to introduce the delta elements of the SFCG RSDD into OSCAR whilst retaining appropriately the functions and capabilities of the RSDD database.

WMO has reviewed the situation of serving the SFCG Disaster Database information from OSCAR and concluded the following:
OSCAR Space uses rules to relate data, usage and instrumentation. For instance microwave temperature sounders are used to observe vertical temperature profile of the atmosphere which may be used to determine the likelihood of severe thunderstorms or tornadoes. Similar rules can

be created to related types of observations and missions with different disasters. Although it is possible to create the rules for OSCAR Space to be able to provide much of information under the SFCG Disaster Database, gaining full functionality would be beyond WMO's current capabilities to be able to develop and implement it within the current financial period (2016-2019).

Considering the above, it is therefore recommended by WMO that no further action be taken on this issue. CGMS followed this recommendation and consequently closed CGMS action A44.01.

3 Yearly reporting of SFCG members on national regulatory issue

CGMS-44 brought for consideration to SFCG-36 (WGI Actions A44.03 and A44.04) the idea of a yearly reporting mechanism on national/regional regulatory changes/issue in their countries/region (e.g. to repurpose spectrum currently in use or planned for use by meteorological satellites).

SFCG endorsed the idea and agreed on Action Item 36/7 requesting SFCG members to provide such information on potential national/regional regulatory changes/issue that could be of interest to the SFCG/CGMS community. This closes CGMS WGI Action 44.03 which called for the SFCG liaison officer to propose to SFCG that its members will report yearly to SFCG on national regulatory changes/issue.

SFCG-36 also picked-up upon the request on the Liaison Officer in CGMS WGI Action 44.04 to summarize the regulatory issues reported to the next SFCG meeting that could be also of interest/concern to CGMS member agencies and report those issues to CGMS and imbedded this task in SFCG Action Item 36/7.

Since SFCG-37 takes place after CGMS-45, the first report on such issues can only be provided to CGMS by correspondence 4 weeks after SFCG-37, i.e. October 2017.

4 Space Weather

Already at CGMS-44 and SFCG-36 the need was identified for gathering information from its member agencies on activities/plans/interests in space weather.

CGMS issued a corresponding action item to CGMS agencies (Action A44.05) and has set up a recommendation to its member agencies to inform their administration about their space weather activities. Recommendation R44.01 asks CGMS agencies to inform their Frequency Managers on the space weather activities to ensure the necessary protection and coordination at frequency management level.

Also SFCG saw such a need for information gathering and agreed about Action Item 36/8 which calls for providing to ITU-R Working Party 7C inputs on the technical and operational

characteristics of systems listed in Annex 1 of document SF36-45/D as well as information on systems that may be missing in this referenced document.

In the framework of ITU-R, in response to Question ITU-R 256/7 regarding RF-based space weather sensors, Working Party 7C is working on a Preliminary Draft New Report ITU-R RS.[SPACE_WEATHER_SENSORS] aiming at providing information on space weather sensors. This Preliminary Draft New Report must be completed at the October 2017 meeting of Working Party 7C. For reaching this goal still a significant amount of information is required in time for the April 2017 and October 2017 meetings of WP7C in order to reach this goal.

The WMO Steering Group for Radio Frequency Coordination (SG-RFC) also considered the issue of space weather at its yearly meeting in January 2017. The meeting reviewed a number of documents on space weather. It noted that the timeline to complete work in time for WRC-19 where a decision on the retention of WRC-23 Preliminary Agenda Item 2.3 is taken, is reaching a critical stage. WMO SG-RFC therefore agreed a number of actions (in particular issuing a survey to identified experts/entities) to ensure that the required information is gathered and can be made available in form of an input document from WMO to the October 2017 meeting of Working Party 7C.

CGMS Working Group I (WGI) discussed the status of preparation for the WP 7C meeting in October 2017 by the different CGMS members. WGI agreed to have a WebEx based inter-sessional meeting (7 September 2017 at 8:00am local time at Montreal = 12:00 UTC (second day of the SFCG-37 meeting)) to review the information available regarding the technical and operational characteristics of space weather related systems. WGI also considered that the outcome of the WMO survey is very relevant and an action was therefore assigned to WMO to share with all CGMS members the outcome of the survey prior to the inter-sessional meeting.

After CGMS-45 a meeting of WMO IPT SWeISS was held in Geneva, June 21-23. IPT SWeISS is the WMO expert team on space weather. Dave Franc (NOAA) attended this meeting to represent the interests of SG-RFC and to raise awareness on the efforts to obtain better regulatory protection for radio spectrum-reliant space weather sensors and the need for relevant and sufficient information to complete the Preliminary Draft New Report ITU-R RS.[SPACE_WEATHER_SENSORS]. The IPT established a number of Ad Hoc Task Teams, and the AH Task Team on Space Weather Basic Systems received an action item to provide the SG-RFC the needed system details. David Jackson (UK Met Office) will continue to lead the information collection efforts within WMO expert team on space weather. He already delivered to Dave Franc a compilation of material on several systems that should be included in the ITU-R Report. This material will be submitted by the WMO to the October Working Party 7C meeting.

5 WRC-19 agenda items of mutual interest

The CGMS-SFCG Liaison Officer informed CGMS-45 about the preliminary SFCG objectives on the relevant WRC-19 agenda items of mutual interest/concern.

CGMS confirmed the following issues on the WRC-19 agenda in its High Level Priority Plan to be regularly reviewed:

- Issues with relation to DCS (1.2, 1.3 and 1.7);
- Impact of 1.13 on the band 25.5 – 27 GHz;
- Passive sensor band protection under various agenda items;
- RLAN under 1.16.

In view of the status of preparation towards WRC-19, CGMS concurred that protection of passive sensing bands from adjacent bands under various agenda items is of paramount importance to CGMS and confirmed in this context its concerns associated to the WRC-19 agenda item in relation to spectrum allocations for IMT 2020 (5G). To express this concern CGMS developed and sent a letter to ITU Secretary-General (copy to the Secretary-General of WMO) emphasizing the need for protecting EESS and passive bands necessary for remote sensing (see Attachment 1). A response on this letter has already been received from the Director of the ITU Radiocommunication Bureau (Attachment 2).

WMO also agreed to take similar steps and informing the different members of WMO on the need of emphasising the importance of protecting the passive sensing bands. Furthermore, an action item (A45.14) was agreed on WMO to send a similar letter to ITU Secretary-General (Attachment 3) supporting CGMS in emphasising the need for protecting EESS and passive bands necessary for remote sensing. A response on this letter has also already been received from the Director of the ITU Radiocommunication Bureau (Attachment 4).

Attachment 1

Coordination Group for Meteorological Satellites

CGMS

Mr. ZHAO Houlin
Secretary-General
International Telecommunication Union (ITU)
Place des Nations
1211 Geneva 20
SWITZERLAND

Your reference	Your letter dated	Our reference	Date
		EUM/CGMS/LET/17/926178	6 July 2017

Subject: Need for protecting the 26 GHz EESS band and EESS (passive) bands for remote sensing

Dear Mr. ZHAO Houlin,

At its 45th plenary session on 15-16 June 2017 in Jeju, South Korea, the Coordination Group for Meteorological Satellites (CGMS) reiterated its appreciation of the continued support of the ITU on the protection of frequencies required for observations of weather and climate from space.

CGMS is made up of the world's operators of meteorological satellites and representatives of user communities, i.e. the Intergovernmental Oceanographic Commission of UNESCO, the World Meteorological Organization and the Group on Earth Observations. Meteorological satellites provide the environmental observations that are the backbone of weather forecasting to save lives, protect property and critical infrastructure, and support the worldwide economy. Populations and economies around the world are becoming ever more sensitive to the impact of weather, and this has resulted in steadily increasing demands being placed on meteorological satellites and associated services.

At this plenary session, CGMS expressed concerns regarding the increasing pressure on frequency bands identified that are critical to observations of weather and climate from space and unanimously stressed the need for continued adequate protection of critical frequency bands.

This concern is directly attributable to the ITU global spectrum allocation for IMT 2020 (5G) discussions as scheduled for the World Radiocommunication Conference in 2019.

Because CGMS recognises the importance of radio frequency spectrum throughout the global economy, it is concerned about the increased pressures for use of spectrum possessing unique characteristics indispensable to passive microwave observations of weather and climate that are indeed essential to our weather sensitive economy.

Indispensable passive microwave observations of weather and climate from space require access to uncontaminated frequency bands that each provides essential information on specific phenomenology. This is because passive microwave sensors use radio frequency spectrum in specific frequencies that uniquely correspond to resonances of important atmospheric molecules

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and cannot be changed, as they are fixed by nature. These frequency bands need to be free of radio interference to ensure the usefulness and correctness of the measurements.

CGMS notes that, in some instances, the provisions in the Radio Regulations are already not sufficient to ensure the necessary protection of these passive bands as given in Recommendation RS.515-5.

Furthermore, meteorological and Earth exploration satellite systems currently in operation or under development have to rely on the availability of the EESS frequency allocation in the band 25.5-27 GHz (26 GHz band) for ensuring that dedicated Earth stations are able to acquire the measurement data. To ensure that Earth stations are able to be deployed and protected in the presence of potential 5G deployments in this frequency band, appropriate regulatory conditions need to be agreed at WRC-19, and further on established in national/regional authorisation processes for 5G networks.

In this context, CGMS encourages the ITU, with its Member States, to be diligent in their efforts to ensure the necessary protection of the frequency bands used by space-borne passive microwave sensors (in particular those covered by Radio Regulations footnote 5.340) as well as the 26 GHz EESS band used for the downlink of the acquired measurement data to dedicated Earth stations.

It is vital for the protection of life and property and for our weather sensitive economy to keep the spectrum resources for these operations within the framework of the MetSat and EESS services globally available and effectively protected in the long term.

The CGMS Plenary invites the ITU Secretary-General to share this issue with the relevant working parties, such as TG 5/1, and encourage them to effectively protect the passive frequencies from harmful interference and to safeguard the long term usability of the 26 GHz EESS band for the downlink of measurement data. You will find additional detailed information in the enclosed annex, for use at your convenience in support of relevant discussions.

On behalf of CGMS, I thank you in advance of your understanding and support.

With my best regards,

Alain Ratier
EUMETSAT Director-General
Head of the CGMS Secretariat

Annex: Information on passive frequencies and satellite remote sensors designed to observe them

Cc: Prof. P. Taalas, Secretary-General, WMO
CGMS Members

ANNEX

WRC-15 decided to identify (under WRC-19 agenda item 1.13) a number of frequency bands between 24 GHz and 89 GHz, namely the frequency bands 24.25-27.5 GHz, 31.8-33.4 GHz, 37-40.5 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz and 81-86 GHz, to be studied for the implementation of IMT-2020 (5G) mobile broadband.

Since then, huge pressure is applied by the mobile industry to policy makers worldwide to make frequency spectrum available (even before WRC-19) for a fast implementation of 5G mobile. Here in particular the frequency band 24.25-27.5 GHz is targeted by industry for 5G deployment as fast as possible.

The consideration of the frequency bands targeted by this WRC-19 agenda item 1.13 involves a number of neighbouring EESS (passive) bands used by passive microwave sensors on meteorological and Earth exploration satellites of space agencies from around the world.

The following Table 1 illustrates which frequency bands, allocated and used for passive microwave sensing, could potentially be affected by unwanted emissions of 5G mobile systems. Considering the focus of industry and regulatory authorities on the lowest frequency band for 5G deployment, namely 24.25-27.5 GHz, the impact would first be on the passive sensors using the band 23.6 – 24 GHz.

Table 1

5G (IMT2020) bands under study (WRC-19, AI 1.13)	EESS (passive) bands (as allocated in the Radio Regulations)
24.25-27.5 GHz	23.6-24 GHz
31.8-33.4 GHz	31.3-31.8 GHz
37-43.5 GHz	36-37 GHz
47.2-50.2 GHz & 50.4-52.6 GHz	50.2-50.4 GHz
50.4-52.6 GHz	52.6-54.25 GHz
81-86 GHz	86-92 GHz

As part of the preparatory activities for WRC-19, initial compatibility assessments have been performed by ESA and EUMETSAT. They were presented to the responsible group in the ITU-R for this agenda item, namely Task Group 5/1, in May 2017. The presented results indicate that the filtering of the unwanted emissions of the currently envisaged design of

5G equipment (information made available by the mobile industry in March 2017 and since then not improved in this aspect) would, by far, not be sufficient to protect passive sensors in the above listed bands.

According to this analysis, already very low density of 5G base stations could potentially interfere with most of the EESS (passive) sensors considered. This is due to the high sensitivity required for sensing, in these frequency bands, the atmosphere and the Earth surface. This necessary sensitivity makes the sensor extremely vulnerable to interference within the band in which the senor is performing its measurements.

When considering the EESS (passive) sensors footprints, these study results available so far, indicate that the maximum tolerable density of 5G cells/km² is at such a low level that it would not allow for a realistic deployment density of 5G networks in the 24.25-27.5 GHz, 31.3-31.8 GHz, 50.2-50.4 GHz, 52.6-54.25 GHz and 86-92 GHz bands. Thus, only a significant reduction of 5G unwanted emissions in the passive bands could ensure the protection of EESS (passive).

However, the level of the necessary unwanted emission limits, that would provide protection to the passive sensors within the abovementioned passive bands is still to be determined and requires further studies considering further assessment of 5G systems and networks characteristics and hopefully refinements/improvements in the unwanted emissions reduction capabilities.

The effect of such interference on the measurements is very difficult to predict and detect. It is considered difficult to predict the effect, as this implies to model the impact that those interferences will have in the instrument performance and this might need very complex instrument models and performance degradation analysis. It is also considered difficult to detect early enough, as the level of interference would slowly rise over time with the increasing density of 5G deployment. The degradation of the measurements would consequently increase unnoticed until a point is reached at which the measured data in certain areas can no longer be considered adequate and are rendered unusable in forecasting or in climate monitoring models. Unfortunately, when such a level of interference is reached, the deployment of the interfering service, in this case 5G mobile systems, would already be so far advanced that no realistic mitigation action could be applied to reduce the interference to acceptable levels. Therefore, it is of outmost importance that appropriate unwanted emissions limitations are established in international regulations.

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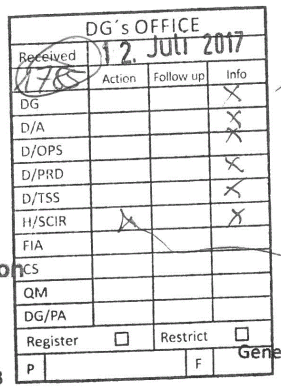
Attachment 2



90th Anniversary
CCIR/ITU-R Study Groups
(1927-2017)

Director of Radiocommunication Bureau (BR)

Geneva, 11 July 2017

Our Ref.: 60(DIR)O-2017-003233

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Subject: **Need for protecting the 26 GHz EESS band and EESS (passive) bands for remote sensing**

Y/Ref.: **EUM/CGMS/LET/17/926178 dated 6 July 2017**

Dear Mr Ratier,

I thank you for your letter to Secretary General Houlin Zhao highlighting the need for protection of the frequency bands allocated at 26 GHz to EESS and EESS (passive) for remote sensing.

Firstly, I would like to express my appreciation to you personally and to the Coordination Group for Meteorological Satellites (CGMS) for your interest and participation in ITU-R activities, in particular in the preparation of the World Radiocommunication Conference.

Current societal and technological developments increase the demand on spectrum from all radiocommunication services. ITU-R Study Groups are engaged in development of technical and regulatory provisions to face this challenge. The current ITU-R process, driven by contributions from ITU membership and consensus building, provides the best possible way to find the right balance between the need to accommodate new systems, applications and technologies as they arise and the need to protect existing services.

In this spirit, the ITU recognizes that timely warning of natural and environmental disasters, accurate climate prediction and a detailed understanding, conservation and efficient management of scarce resources such as biomass, biosphere, mineral resources, water, energy, are essential requirements for sustainable economic development of modern society.

With this in mind, protection of Earth observation spectrum represents one of the highest priority tasks of ITU-R in order to achieve the UN SDGs. In close cooperation with World Meteorological Organization, the ITU continues to work to increase awareness of the ITU membership on the importance of protecting the use of

spectrum by meteorological services, including passive bands. This is highlighted by our latest joint initiatives in this area, such as the publication of the revised WMO/ITU Handbook "Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction" and the preparation of a WMO/ITU seminar on this subject. I believe that such measures will help membership to make more balanced decision during next WRC-19 taking into account the specific needs of the meteorological satellite community.

I will therefore bring your letter to the attention of the ITU-R concerned bodies, in particular ITU-R TG 5/1. I also would like, through you, to invite CGMS membership to continue to participate and contribute actively in the WRC-19 preparatory process.

I look forward to continuing our fruitful cooperation in future activities of common interest.

Yours sincerely

François Rancy

Attachment 3

WMO OMM

World Meteorological Organization
Organisation météorologique mondiale
Organización Meteorológica Mundial
Всемирная метеорологическая организация
المنظمة العالمية للأرصاد الجوية
世界气象组织

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Ref.: 27975/2017-L3 OBS-WIS

Our ref.: 27975/2017/OBS/WIS/ITS/RF

Annex: 1

Mr Zhao Houlin
Secretary-General
International Telecommunication Union (ITU)
Place des Nations
1211 GENEVA 20
Switzerland

Geneva, 31 July 2017

Subject: Need for protecting the 26 GHz Earth Exploration Satellite Service (EESS) and EESS (passive) bands for remote sensing

Dear Mr Zhao,

During the Seventeenth World Meteorological Congress (Cg-17, Geneva, Switzerland, June 2015), attended by 167 Members of WMO, serious concern regarding the continuous threat to radio frequency bands allocated for meteorological and related environmental systems were confirmed. Resolution 29 (Cg-17) – Radio frequencies for meteorological and related environmental activities – was adopted in which all WMO Member countries are urged to make all efforts to do their utmost to ensure the availability and protection of suitable radio frequency bands required for meteorological and related environmental operations and research.

Radio-frequencies represent scarce and key resources used by National Meteorological and Hydrological Services to measure and collect the observation data which are required for weather forecasting, climate monitoring, protection of the environment, economic development (transport, energy, agriculture, ...) and the safety of life and property . Nowadays radio-based remote sensors (active and passive) are the main tools for environment and climate monitoring, disaster prediction, detection and mitigation. These sensors obtain environmental data by measuring level and parameters of natural and artificial radio waves that inherently contain information about the environment with which they have been in contact.

WMO elaborated a preliminary WMO position contribution on WRC-19 agenda items of prime interest for meteorology and climatology which was already provided to the related ITU-R working parties and task groups in charge of these issues.

One of the main concerns on WRC-19 agenda items is regarding the global new spectrum allocations/identifications to mobile service (5G (IMT 2020) under agenda item 1.13).

Due to the crucial importance of the usage of the EESS and EESS (passive) frequency bands as mentioned above, their physical properties, and the potential negative impact of new mobile service allocations/identifications in particular in the 26 GHz band, WMO wants to express its full support of the Coordination Group for Meteorological Satellites (CGMS) letter (see in the Annex attached), and would appreciate the ITU Secretariat-General to inform the relevant working parties, in particular TG5/1, in order to ensure a long term protection of the frequency bands potentially affected by this WRC-19 agenda item 1.13.

Based on close cooperation between WMO and ITU organizations, I thank you in advance for your support and actions regarding this issue.

Yours sincerely,

(E. Manaenkova)
for the Secretary-General

Attachment 4

90th Anniversary
CCIR/ITU-R Study Groups
(1927-2017)

Director of Radiocommunication
Bureau (BR)

Geneva, 14 August 2017

Our Ref.: 60(DIR)O-2017-003648

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Subject: Need for protecting the 26 GHz EESS band and EESS (passive) bands for remote sensing

Y/Ref.: Your letter 27975/2017/OBS/WIS/ITS/RF dated 31 July 2017

Dear Mrs Manaenkova,

I thank you for your letter to Secretary General Houlin Zhao highlighting the need for protection of the frequency bands allocated at 26 GHz to EESS and EESS (passive) for remote sensing.

Firstly, I would like to express my appreciation to the World Meteorological Organization and to the Coordination Group for Meteorological Satellites (CGMS) for your interest and participation in ITU-R activities, in particular in the preparation of the World Radiocommunication Conference.

A similar letter was received from the EUMETSAT Director-General, Mr Alan Ratier. In my reply to him, I indicated that current societal and technological developments increase the demand on spectrum from all radiocommunication services. ITU-R Study Groups are engaged in development of technical and regulatory provisions to face this challenge. The current ITU-R process, driven by contributions from ITU membership and consensus building, provides the best possible way to find the right balance between the need to accommodate new systems, applications and technologies as they arise and the need to protect existing services.

In this spirit, the ITU recognizes that timely warning of natural and environmental disasters, accurate climate prediction and a detailed understanding, conservation and efficient management of scarce resources such as biomass, biosphere, mineral resources, water, energy, are essential requirements for sustainable economic development of modern society.

With this in mind, protection of Earth observation spectrum represents one of the highest priority tasks of ITU-R in order to achieve the UN SDGs. As you may know, in close cooperation with WMO, the ITU continues

to work to increase awareness of the ITU membership on the importance of protecting the use of spectrum by meteorological services, including passive bands. This is highlighted by our latest joint initiatives in this area, such as the publication of the revised WMO/ITU Handbook "Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction" and the preparation of a WMO/ITU seminar on this subject. I believe that such measures will help membership to make more balanced decision during next WRC-19 taking into account the specific needs of the meteorological satellite community.

I will therefore bring your letter to the attention of the ITU-R concerned bodies, in particular ITU-R TG 5/1. I also would like, through you, to invite WMO and CGMS membership to continue to participate and contribute actively in the WRC-19 preparatory process.

I look forward to continuing our fruitful cooperation in future activities of common interest.

Yours faithfully,

François Rancy