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| **The 5th Meeting of the APT Conference Preparatory**  **Group for WRC-23 (APG23-5)** | **APG23-5/OUT-23** |
| 20 – 25 February 2023, Busan, Republic of Korea | 24 February 2023 |

Working Party 3

**PRELIMINARY VIEWs on WRC-23 agenda item 9.1 (topic a)**

**Agenda Item 9.1:**

*9.1 on the activities of the ITU Radiocommunication Sector since WRC 19:*

*– In accordance with Resolution* ***657 (Rev. WRC 19)****, review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services;*

**1. Background**

Space weather refers to the physical processes occurring in the space environment that ultimately affects human activities on Earth and in space. Space weather is influenced by the X-ray, ultraviolet (UV), high energic particles and strong solar wind generated by Coronal Mass Ejection (CME). Space weather observations are important for detecting and forecasting solar activity events that impact services critical to the economy, safety and security of administrations and their population. These observations are made from ground-based and space-based systems. Some of the sensors operate by receiving signals of opportunity, including, but not limited to, low-level natural emissions of the Sun, Earth’s atmosphere and other celestial bodies, and therefore may suffer harmful interference at levels which could be tolerated by other radio systems. However, no frequency bands have been documented in any manner in the Radio Regulations for space weather sensor applications.

Agenda item 9.1, topic a) was therefore established with a view to describing appropriate recognition and protection of space weather sensors in the Radio Regulations (RR) without placing additional constraints on incumbent services.

ITU-R Working Party (WP) 7C is designated as the responsible group for this topic and has undertaken the study of the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors in response to Resolution **657 (Rev.WRC-19)**.

WP 7C has finalised the CPM text, which is now incorporated into the draft CPM Report (Doc. [CPM23-2/1](https://www.itu.int/md/R19-CPM23.2-C-0001/en)). Specifically, the CPM Report includes:

* an example definition for space weather to be included in the RR Article **1** with the text “*space weather*: natural phenomena, mainly originating from solar activity and occurring beyond the major portion of the Earth’s atmosphere, that impact Earth’s environment and human activities;”
* potential radio service designation for space weather sensors by creating a subset of the meteorological aids service (*space weather*) and adding a new provision of RR Article **4** which reads“Space weather sensor systems may operate under the meteorological aids service (space weather) allocations;”
* need to finalise the frequency bands to be protected, which new allocations could be made at WRC-27 to the MetAids (*space weather*) for space weather sensors.

**2. Documents**

* Input Documents APG23-5/ INP-[10](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-10_Thailand-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1_TOPIC_A_and_9.1_TOPIC_D.docx) (THA), [16](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-16_Japan-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1A_9.1D_and_RES.655WRC-15.docx) (J), [38](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-38_Iran-WP3-Preliminary_Views_on_WRC_23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a.docx) (IRN), [58](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-58_Australia-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1Topics_a_and_d.docx) (AUS), [65](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-65_Rep_of_Korea-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topics_a_and_d.docx) (KOR),   
  [90](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-90_China-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a.docx) (CHN), [97](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-97_Malaysia-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a.docx) (MLA)
* Information Documents APG23-5/ INF-[01](https://www.apt.int/sites/default/files/2023/01/APG23-5-INF-01_WMO_Position_on_WRC-23_Agenda.docx) (WMO), [21](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-21_IARU_Views_on_WRC-23_Agenda_Items_1.2_1.12_1.14_1.18_and_9.1Topics_a_and_b.docx) (IARU), [33](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-33_Brief_on_AI_9.1a.docx) (DG Chair),   
  [39](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-39_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf) (CEPT), [43](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-43_CITEL_preparation_for_WRC-23.pdf) (CITEL), [45](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-45_Status_of_RCC_preparation_to_the_WRC-23.pdf) (RCC)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Thailand (Kingdom of)** - **Document APG23-5/INP-**[**10**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-10_Thailand-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1_TOPIC_A_and_9.1_TOPIC_D.docx)

Thailand is of the view that the definition of space weather as specified in the draft CPM text and the designation of space weather observation as an application of the meteorological aids service could be supported.

**3.1.2 Japan** - **Document APG23-5/INP-**[**16**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-16_Japan-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1A_9.1D_and_RES.655WRC-15.docx)

Space weather observations are vital for a wide range of areas, including stable use of radio in telecommunications, broadcasting, and positioning, as well as electric power grids, aviation and space applications, and their necessity is further increasing in the evolving ICT society. Japan supports the example definition of ‘space weather’ and the approach of designating the use of frequencies by space weather sensors under a subset of the meteorological aids service developed in the ITU-R studies. Japan also supports the issues relating to space weather sensors to be adopted as an agenda item of WRC-27, including the allocation for space weather sensors and the notification and registration procedures for the Master International Frequency Register, without any additional adverse effects on existing services to which the same and adjacent frequency bands are allocated.

**3.1.3 Iran (Islamic Republic of)** - **Document APG23-5/INP-**[**38**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-38_Iran-WP3-Preliminary_Views_on_WRC_23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a.docx)

The Administration of Iran (Islamic Republic of) proposes that the following views be adopted as APT Preliminary Views:

2.1. APT Members support the ITU-R studies so far carried out relating to space weather sensors and appropriate radio service designations to which the space weather should be associated with a view to agree on a possible definition for space weather in Article **1** of the Radio Regulations.

2.2. APT Members are of the view that any changes to the Radio Regulations apart from those mentioned in paragraph 2.1 above are outside of the scope of Agenda item 9.1, Topic a). Therefore, any changes to the Radio Regulations such as identification of frequency bands used for providing data critical for space weather forecasting/warnings and necessary protection to be provided to the incumbent services need to be well studied through a possible new agenda item for WRC-27 in line with the preliminary agenda as decided by WRC-19 (item 2.6 of Resolution **812 (WRC-19)**). In this case, all sharing studies and possible identification of new allocations to the MetAids (*space weather*) could be studied in time for WRC‑27. Should the preliminary agenda of WRC-27 be approved as an agenda item for that Conference, it is necessary that studiesinclude, inter alia, protection of incumbent services to which the bands are allocated as well as services in the adjacent bands.

In this connection the following Preliminary APT Common Proposals (PACPs) are considered to be finalized for WRC-23:

*[DG Chair’s note: the following are excerpts from the proposals for the RR.]*

NOC ASP/9.1a/1

**ITU Radio Regulations**

ADD ASP/9.1a/2

RESOLUTION [Agenda for WRC-27] (WRC-23)

Agenda for the 2027 world radiocommunication conference

MOD ASP/9.1.a/3

RESOLUTION 657 (REV.WRC‑23)

Studies on recognition in the Radio Regulations of radio spectrum-reliant space weather sensors used for global prediction and warnings

**3.1.4 Australia** - **Document APG23-5/INP-**[**58**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-58_Australia-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1Topics_a_and_d.docx)

Australia supports studies addressing space weather sensors with a view to ensuring the Radio Regulations include appropriate recognition and future protection for space weather sensors. These studies should ensure that additional constraints are not placed on incumbent services.

Australia supports the definition of space weather as proposed in the draft CPM text and the inclusion of space weather systems under the MetAids, with a subset of the MetAids (space weather) in order to accommodate all space weather sensors.

**3.1.5 Korea (Republic of)** - **Document APG23-5/INP-**[**65**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-65_Rep_of_Korea-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topics_a_and_d.docx)

The Republic of Korea supports a new definition for space weather as presented in the draft CPM Report on the RR Article **1**.

The Republic of Korea does not oppose designation of space weather observations as an application of a subset of MetAids, MetAids (space weather), through the RR Article **4** as presented in the draft CPM Report, provided that there would be no impact on any space weather observations currently conducted under the radio astronomy service.

The Republic of Korea is of the view that further studies are required for the identification of the frequency bands which would require protection and the relevant protection criteria for space weather sensors.

**3.1.6 China (People's Republic of)** - **Document APG23-5/INP-**[**90**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-90_China-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a.docx)

China supports the studies addressing space weather sensors with a view to ensuring the Radio Regulations include appropriate recognition and future protection for space weather sensors, these studies should ensure that additional constraints are not placed on incumbent services.

China also supports the View B of the draft CPM text to establish a new resolution [XXX-SW importance] as the foundation for possible future studies on space weather sensors.

**3.1.7 Malaysia** - **Document APG23-5/INP-**[**97**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-97_Malaysia-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a.docx)

Malaysia recognizes the importance of space weather sensors systems, and support the studies to identify the technical and operational characteristics, spectrum requirements and appropriate radio service designations with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services.

**3.2 Summary of issues raised during the meeting**

The APT preliminary views were updated in the drafting group as presented in Section 4 below, based on input contributions for the preliminary views from APT Members.

The meeting discussed which direction a draft PACP could be developed for this agenda item, among two options envisaged: the two-step approach (possible changes to RR Articles **1** and **4** at WRC-23 and possible allocation at WRC-27) and the comprehensive approach (No changes to RR Articles **1** and **4** at WRC-23, but consider all necessary actions at WRC-27). There was a suggestion to merge these two approaches and reflect such merged approach in the development of PACP and revision of Resolution **657 (Rev.WRC-19)**. Based on this suggested approach, the draft PACP was developed as embedded below, and it will be further considered at the APG23-6 meeting.



**4. APT Preliminary View(s)**

APT Members support the ITU-R studies so far carried out relating to the definition of space weather and appropriate radiocommunication service designations (MetAids) for operation of space weather sensors, as proposed in the draft CPM Report for inclusion in Articles **1** and **4** of the Radio Regulations**.**

Should the agenda of WRC-27 include space weather as an agenda item, it is necessary that the supporting Resolution for this new agenda item includes, inter alia, protection of services to which the band is allocated as well as services in the adjacent band.

**5. Other View(s) from APT Members**

Some APT Members are of the views that there would be no impact on any specific observations currently conducted under the radio astronomy service.

**6. Issues for Consideration at Next APG Meeting**

APT Members are encouraged to contribute to the next APG meeting for further consideration on agenda item 9.1, topic a), especially with respect to finalization of the draft PACP embedded in Section 3.2 above.

**7. Views from Other Organisations**

**7.1 Regional Groups**

**7.1.1 ASMG** - **Document APG23-4/INF-**[**21**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-21_ASMG_Preparation_for_WRC-23.pdf)

Support studies to identify priority bands that provide necessary data for recognition and protection of space weather systems and to develop appropriate definitions in the Radio Regulations (RR) used by space weather sensors without imposing any additional restrictions on existing services.

**7.1.2 ATU** - **Document APG24-4/INF-**[**02**](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-02_ATU_preparation.docx)

Support the recognition and protection of the application given the importance of space weather system in human welfare and national security while ensuring that services, in the identified Broadcasting, Broadcasting and Fixed satellites, Radio Astronomy and other incumbent service are protected.

**7.1.3 CEPT** - **Document APG23-5/INF-****[39](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-39_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf)**

CEPT supports that the following definition for space weather is included in Article **1**, section VIII, of the Radio Regulations:

*space weather: natural phenomena, mainly originating from solar activity and occurring beyond the major portion of Earth´s atmosphere that impact Earth’s environment and human activities.*

CEPT also supports the:

* Designation of space weather observations (active and receive-only) as an application of the MetAids service, operated under a subset of this service called MetAids (space weather) through Article **4** as follows: Space weather sensor systems, may operate under the meteorological aids service (space weather) allocations;
* Draft New WRC Resolution on the importance of MetAids (space weather) service applications, in which the definitions of active and receive-only space weather sensors will be introduced.

In addition, CEPT supports the further processing of the related work under an agenda item of WRC-27 - see preliminary agenda item 2.6 in Resolution **812 (WRC-19)**, in order to study the appropriate protection of space weather in the priority frequency bands which will be defined for this purpose.

Finally, CEPT supports the development of ITU-R Recommendation(s) to provide the relevant protection criteria for receive-only and active space weather sensors.

**7.1.4 CITEL** - **Document APG23-5/INF-**[**43**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-43_CITEL_preparation_for_WRC-23.pdf)

* An Administration is of the view that changes to the Radio Regulations are outside the scope of Agenda Item 9.1.
* Some Administrations support conducting the studies called for in Resolution **657 (Rev.WRC-19)**. An Administration support these studies to develop appropriate description of how recognition could be made in the Radio Regulations (RR) for frequency bands used by space weather sensors without placing additional/undue constraints on incumbent service and to establish through studies which frequency bands provide data critical for space weather forecasting/warnings.

**7.1.5 RCC** - **Document APG23-5/INF-**[**45**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-45_Status_of_RCC_preparation_to_the_WRC-23.pdf)

The RCC Administrations are of the view that, the space weather sensors may be considered as application of the Meteorological aids service (MetAids).

The RCC Administrations are of the view that, it is not allowed to use the space weather sensors without identification of the frequency bands within MetAids allocations for such applications in the Radio Regulations.

The RCC Administrations are of the view that, changes to the RR Articles 1, 4 and 5 can be made only based on outcomes of ITU-R studies, carried out under agenda item of future WRC.

**7.2 International Organisations**

**7.2.1 IARU** - **Document APG23-5/INF-**[**21**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-21_IARU_Views_on_WRC-23_Agenda_Items_1.2_1.12_1.14_1.18_and_9.1Topics_a_and_b.docx)

The IARU notes that the scope of Resolution 657 is very broad. The systems described in Report ITU-R RS.2456-0 utilize radio frequencies from 13 kHz up to at least 15 GHz.

A significant proportion of amateur activity is directly affected by daily and longer-term variations in space weather. Consequently, amateurs have a significant interest in space weather and its impact on the ionosphere and radio wave propagation. At the same time, the amateur and amateur-satellite services are incumbent services with allocations in frequency bands ranging from 135.7 kHz to 250 GHz.

In considering potential new regulatory provisions for the recognition of space weather systems, additional constraints on incumbent services including the amateur and amateur satellite services must be avoided.

**7.2.2 WMO - Document APG23-5/INF-**[**01**](https://www.apt.int/sites/default/files/2023/01/APG23-5-INF-01_WMO_Position_on_WRC-23_Agenda.docx)

WMO supports the definition proposed by WP 7C for space weather and the approach regarding its recognition in the RR, through a subset of the MetAids service, called the MetAids (space weather).

WMO also supports the following actions:

* the recognition, at WRC-23, of space weather by modifications to RR Articles 1 and 4,
* the development of a new WRC-27 Agenda item on space weather to define regulatory provisions while not placing constraints on incumbent services.

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