

ITUEvents

2nd ITU Inter-regional Workshop on WRC-23 Preparation

**29 November – 1 December 2022
Geneva, Switzerland**

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#ITUWRC

CHAPTER 3 - Science issues

**WRC-23 agenda items
1.12, 1.13, 1.14**

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STUDY GROUP 7 - SCIENCE SERVICES

Chairman Mr. John ZUZEK

WP 7B - Space radiocommunication applications

Chairwoman Ms. Catherine SHAM

1.13 Upgrade allocation *to the space research service* in **14.8-15.35 GHz**

WP 7C - Remote sensing systems

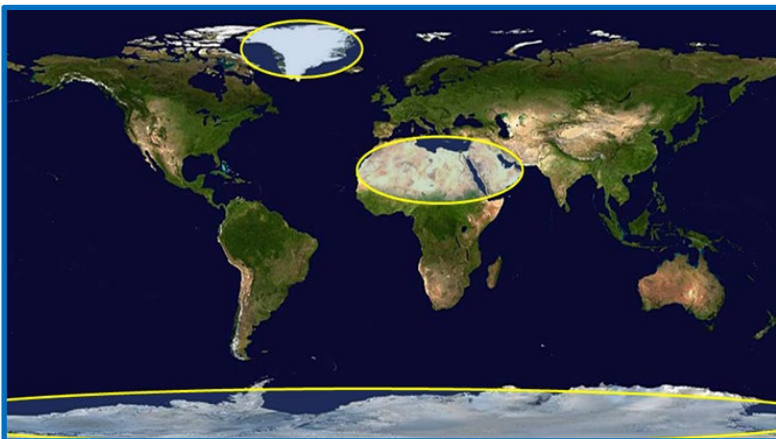
Chairman Mr. Markus DREIS

1.12 *new secondary allocation to the EESS (active) service* for spaceborne radar sounders **around 45 MHz**

1.14 primary frequency allocations to EESS (passive) in the frequency range **231.5-252 GHz**

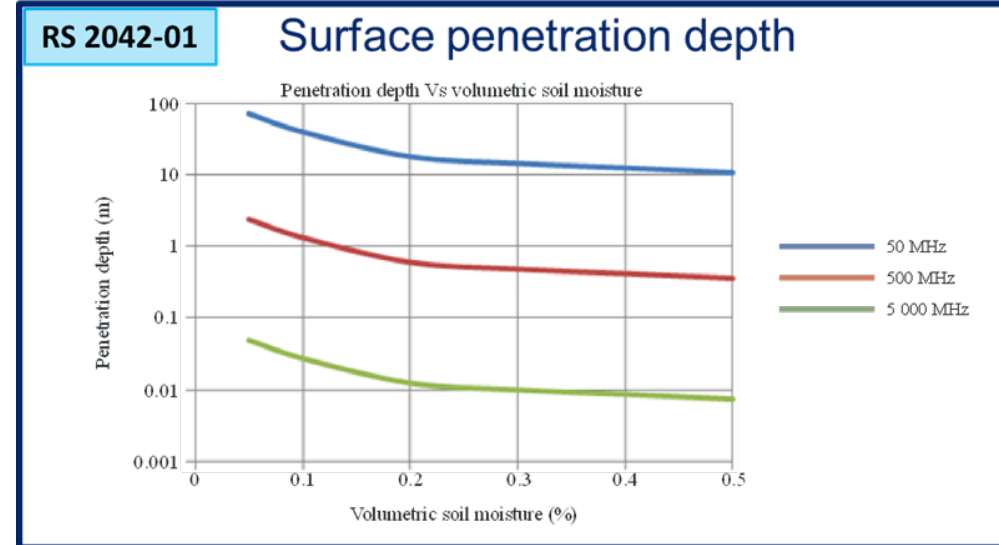
1.12 to conduct, and complete in time for WRC 23, studies for a ***possible new secondary allocation to the EESS (active)*** for spaceborne radar sounders within the range of frequencies ***around 45 MHz***, taking into account the ***protection of incumbent services***, including in adjacent bands, in accordance with **Res.656 (Rev.WRC 19)**

Spaceborne active sensors operating in the 45 MHz range can provide measurements of the Earth's sub-surface with the intent of locating water/ice/deposits and examining sub-ice glacial bed surfaces with better resolution than the current ones → Interests of climate researchers



RS 2042-01 - Typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz band

This sounding radars are to be operated exclusively over un-inhabited or sparsely populated areas of the ice sheets of Greenland and Antarctica and the deserts of northern Africa and the Arabian Peninsula and will operate for a period not to exceed 10 minutes in duration per 92.7 minute orbit



1.12 - New Sec.Alloc. EESS(a) for spaceborne radar sounders *around 45 MHz*

- *WP 7C Conclusion: Sharing is feasible with the incumbent services*

5 METHODS (all SUP Res. 656)

4 Methods to establish a global secondary allocation to the EESS for active emissions over the frequency band 40-50 MHz in the Table of Frequency Allocations of RR Article 5

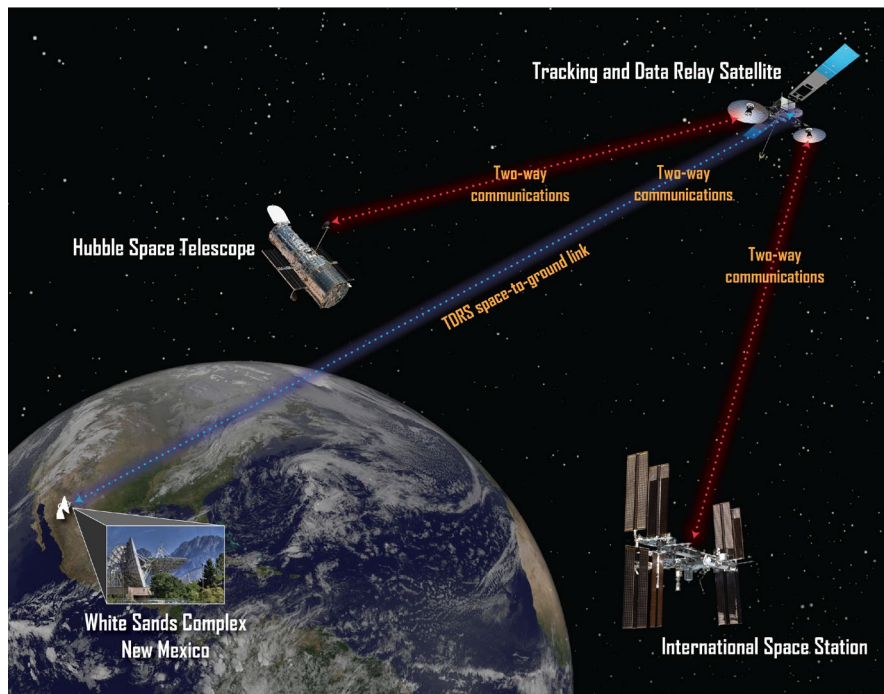
- **Met.A1:** The new secondary allocation is proposed to be limited through a *dedicated footnote* which would reference a proposed *new WRC Resolution to protect incumbent services in the frequency band 40-50 MHz and in the adjacent frequency bands*
- **Met.A2:** The new secondary allocation is proposed to be limited through a *dedicated footnote* including *technical conditions (2 opts)* addressing the *protection of incumbent serv. in 40-50 MHz*
- **Met.B:** The new secondary allocation is proposed to be limited through a *dedicated footnote* addressing the *protection of the secondary RLS in 42-42.5 / 46-68 MHz.*
- **Met.C:** to establish a global secondary allocation to the EESS for active emissions over the frequency band 40-50 MHz in the Table of Frequency Allocations of RR Article 5

- **Met.D: NOC**

1.13 to consider a possible upgrade of the allocation of the frequency band *14.8-15.35 GHz to the SRS*, in accordance with **Resolution 661 (WRC 19)**

The frequency band 14.8-15.35 GHz is currently allocated to the SRS on a secondary basis:

- The International space agencies have identified broadband need for future scientific data return
- An upgrade to primary status provides certainty for investment in developing long term capabilities
- Support existing and planned future systems of high-speed data links from non-GSO / SRS



- **Space research Programmes require long-term effort and investment that span across decades**
 - from the time when the programme is officially decided, through the development period and the launch phase to the time when they are in operation
 - the space agencies are investing resources in the continuation of these programmes, providing subsequent satellites and payloads, links, which permits the establishment of communications with non-GSO satellites, including manned flights in the SRS

1.13 to consider a possible upgrade of the allocation of the frequency band ***14.8-15.35 GHz to the SRS***, in accordance with **Resolution 661 (WRC 19)**

7 METHODS (all SUP Res. 661)

(Methods B-F may be combined in part or taken alone to satisfy portions or all of this agenda item)

- Differing deployment assumptions beyond REC ITU-R SA.2141-0 (Characteristics of SRS systems in the frequency range 14.8 -15.35 GHz), interference geometries, and incumbent system characteristics that were not liaised from contributing WPs led to diverging study results
 - Two (2) transmit PFD masks were developed as a result of the studies to ensure protection of incumbent primary services (in-band and in adjacent bands) or specific applications of the incumbent services.
 - Issues associated with no specific notification and registration procedures for frequency assignments of LMS mobile and AMS aircraft resulted in proposed provisions where new entrant (SRS) shall not claim protection from these applications of incumbent primary services.

1.13 to consider a possible upgrade of the allocation of the frequency band ***14.8-15.35 GHz to the SRS***, in accordance with **Resolution 661 (WRC 19)**

- **Met.A: NOC**

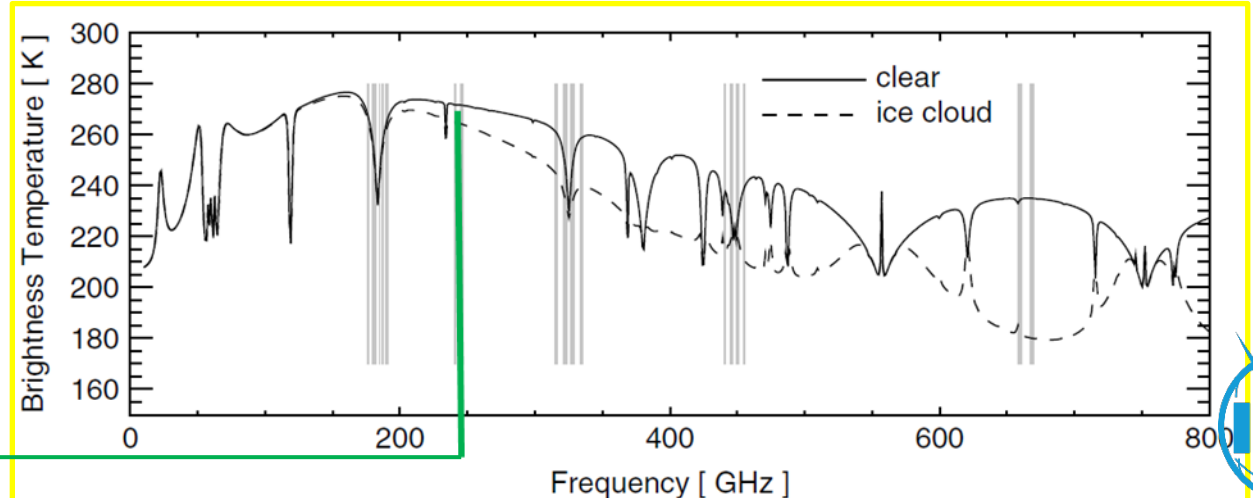
6 Methods to upgrade the status of the SRS allocation to primary

- **Met.B1:** Subject to TBD WRC-23 Resolution
- **Met.B2:** Subject to the existing PFD limits in ITU-R SA.1626, and existing adjacent band sharing conditions to ensure protection of current uses and future development of incumbent primary services
- **Met.C:** Excluding deep-space missions, active and passive applications, with provisions to avoid imposing constraints on aircraft stations operating in the MS. Nos. 5.43A and 9.18 do not apply. A fixed PFD limit by an earth station in the SRS is established to protect AMS, HTTS in neighbouring countries. No. 9.17 does not apply. Further protection to RAS
- **Met.D:** Excluding deep-space missions, active and passive applications, with provisions to ensure no harmful interference to, nor claim protection from, existing and future stations of incumbent in-band primary services (FS and MS) and primary services in adjacent bands
- **Met.E:** Footnote provision to protect the RAS in adjacent band 15.35-15.4 GHz through maximum power received from SRS (E-s) operation and PFD limits from SRS (s-s and s-E) operations. Resolution 739 (Rev. WRC-19) as revised applies
- **Met.F:** excluding deep-space missions, active and passive applications, with provisions to avoid imposing constraints on the current use and future development of incumbent in-band primary services (FS and MS). Nos 5.43A and 9.18 do not apply. A fixed PFD limit from any space research service earth station at the border of the territory of any other administration is imposed. No. 9.17 does not apply. NOC, 5.339.

1.14 to review and consider *possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz*, to ensure alignment with more up-to-date *remote-sensing observation requirements*, in accordance with **Resolution 662 (WRC 19)**

- Ice clouds, covering more than 33% of Earth's surface, have important effects on Earth's climate and hydrological cycle by affecting precipitation, atmospheric structure, and cloud processes.
- Clouds and their interaction with the circulation are therefore one of the biggest sources of uncertainty in climate predictions.
- Today, numerical weather and climate models are not fully able to represent the effects of ice clouds; this is especially problematic because these effects couple to the global circulation.

- The set of frequencies for the measurement of ice clouds centers around:
- 183 / **243** / 325 / 448 / 664 GHz



1.14 possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz

3 METHODS (all SUP Res. 662)

- 2 Methods for adding new primary allocations to the EESS (passive) in the frequency bands 239.2-242.2 GHz and 244.2-247.2 GHz
- **Met.A:** power limits to the FS and MS in the frequency band 239.2-241 GHz (ADD footnote) and no change to the current allocations in the frequency band 239.2-242.2 GHz (This method may not be in conformity with Resolution 662 (WRC-19) since it imposes constraints on the FS and the MS)
- **Met.B:** shift of the current FS and MS allocations in the frequency band 239.2-241 GHz (1.8 GHz) to the frequency band 235-238 GHz (3 GHz) (ADD footnote)
 - Opt1: The use of 235-238 GHz by the EESS (p) is limited to the operation of limb sounding passive sensors.
 - Opt2: In the 235-238 GHz, stations in the EESS (p) shall not claim protection from stations of the FS / MS.
 - Opt3: The use of 235-238 GHz by the EESS (p) is limited to the operation of limb sounding passive sensors. In this band, stations in the EESS (p) shall not claim protection from stations of the FS and MS
- **Met.C: NOC**

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