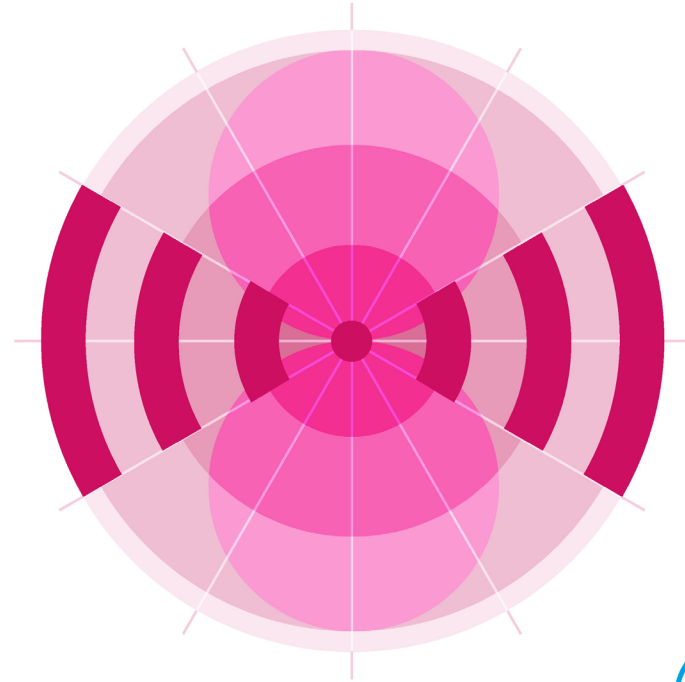


29<sup>TH</sup> WORLD RADIOCOMMUNICATION SEMINAR

**ITUWRS**  
ONLINE2020

30 November - 11 December 2020  
Online

[www.itu.int/go/wrs-20](http://www.itu.int/go/wrs-20)  
#ITUWRS



*ITU-R Study  
Group 7*

*Topics for the  
2019-2023  
Study Cycle*

*John Zuzek  
Chairman*



# Study Group 7

## “Science Services”



- **Working Party 7A (WP 7A) - Time signals and frequency standard emissions**
  - Chairman: Ron Beard, Vice-Chairman: Joseph Achkar
  - TF Series of documentation
- **Working Party 7B (WP 7B) - Space radiocommunication applications**
  - Chairman: Catherine Sham
  - SA Series of documentation
- **Working Party 7C (WP 7C) - Remote sensing systems**
  - Chairman: Markus Dreis
  - RS Series of documentation
- **Working Party 7D (WP 7D) - Radio astronomy**
  - Chairman: Tasso Tzioumis, Vice-Chairman: Dr. Haiyan Zhang
  - RA Series of documentation



# WRC-23 Agenda Items where Study Group 7 is Responsible



WRC-23 Agenda Item	Area of Interest	Responsibility
<b>1.12</b> Radar Sounders around 45 MHz	<ul style="list-style-type: none"><li>Space based active sensing to detect water tables below ground and ice thickness in polar regions</li></ul>	WP 7C
<b>1.13</b> Possible primary upgrade of the space research service in 14.8-15.35 GHz	<ul style="list-style-type: none"><li>Current space research links to data relay satellites are on a secondary basis and future systems also require use of this band</li></ul>	WP 7B (WP 7C & 7D to contribute)
<b>1.14</b> Adjustments to EESS (passive) allocations in 231.5-252 GHz	<ul style="list-style-type: none"><li>Envisioned Earth remote sensing operations are not properly aligned with scientific needs</li></ul>	WP 7C (WP 7D to contribute)
<b>9.1 a)</b> Space weather	<ul style="list-style-type: none"><li>Obtaining regulatory recognition of space weather sensors</li></ul>	WP 7C



# Select WRC-23 Agenda Items where Study Group 7 is Contributing

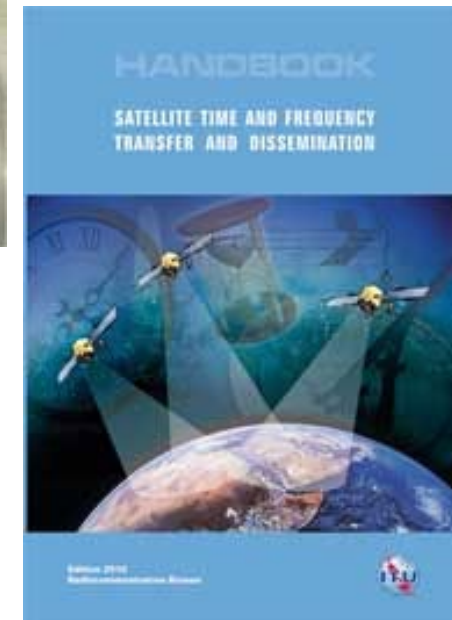
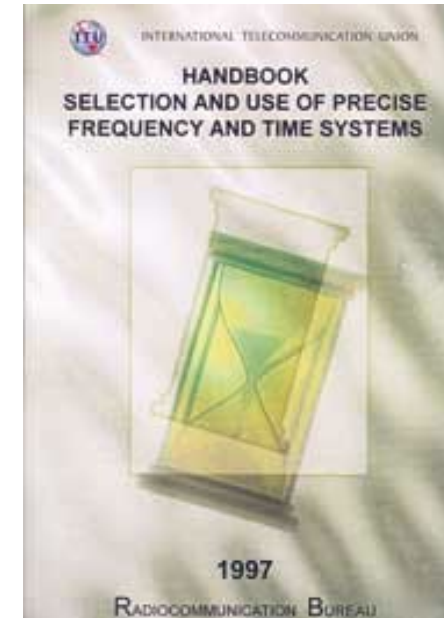


WRC-23 Agenda Item	Contributor	WRC-23 Agenda Item	Contributor
<b>1.2</b> International Mobile Telecommunications in 3300-3400 MHz, 3600 3800 MHz, 6425-7025 MHz, 7025-7125 MHz and 10.0-10.5 GHz	WP 7B, 7C, 7D	<b>1.16</b> Earth Stations in Motion (ESIMS) in 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) for NGSO Fixed-Satellite Service (FSS)	WP 7B, 7C
<b>1.4</b> Use of High Altitude Platforms (HAPS) in bands below 2.7 GHz identified for IMT	WP 7B, 7C, 7D	<b>1.17</b> Satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz	WP 7B, 7C
<b>1.6</b> Radiocommunications for sub-orbital vehicles	WP 7B, 7D	<b>1.18</b> Mobile-Satellite Service (MSS) in 1695-1710 MHz, 2010-2025 MHz, 3300-3315 MHz and 3385-3400 MHz	WP 7B, 7C
<b>1.10</b> Non-safety aeronautical mobile in 15.4-15.7 GHz and 22-22.21 GHz	WP 7C, 7D	<b>1.19</b> FSS (space-to-Earth) in 17.3-17.7 GHz in Region 2	WP 7C



# WP 7A Topics

- Work continues on a Report concerning the “Content and structure of time signals...” in response to Resolution 655 (Rev. WRC-15) which deals with Coordinated Universal Time (UTC) and the “leap second”
- A new Report on Protection Criteria for Standard Frequency and Time Services (SFTS)
- A Memorandum of Understanding (MOU) between ITU-R and the International Bureau of Weights and Measures (BIPM) completed 30-June-2020
- Two Handbooks
  - A new revision to the Handbook on “Selection and use of precise frequency and time systems”, previously published in 1997.
  - “Satellite Time and Frequency Transfer and Dissemination” (2010)

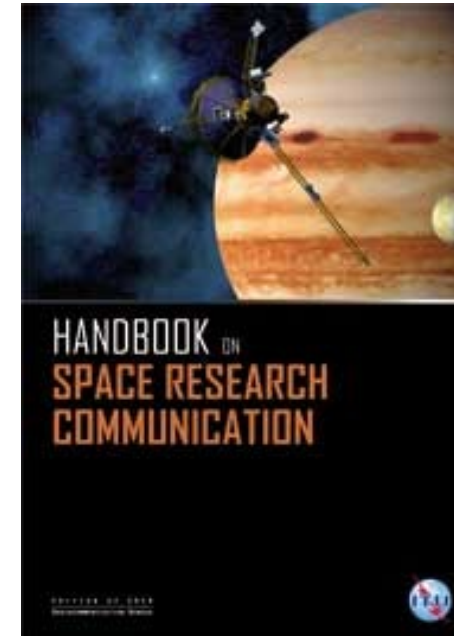




# WP 7B Topics



- Protection of space operation, space research, Earth exploration-satellite, and meteorological-satellite services for both the spacecraft and the earth stations which support them.
- Two current Handbooks
  - Space Research Communications (rev 2014)
  - Earth Exploration-Satellite Service (2011)  
(Jointly with WP 7C)

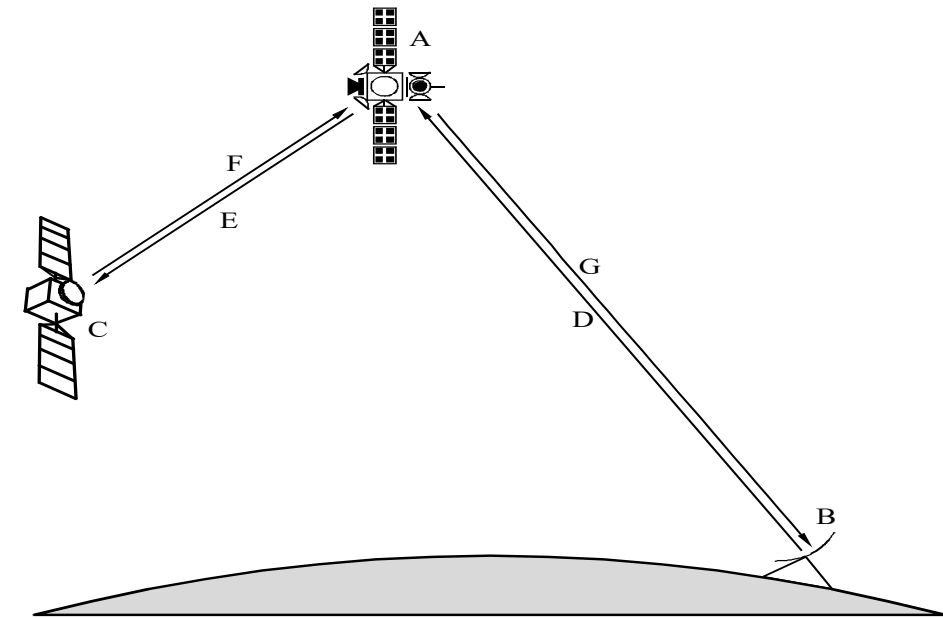




# WP 7B Topics



- WRC-23 Agenda Item 1.13 considers a possible upgrade of the secondary allocation to the space research service (SRS) in the frequency band 14.8-15.35 GHz
- Systems under consideration in the space research service may include:
  - **Direct data downlinks from spacecraft to earth stations**
  - **Earth-to-space links to data relay satellites (DRS)**
  - **Space-to-space links from spacecraft to DRS**



A: DRS  
B: DRS earth station  
C: DRS user spacecraft  
D: forward feeder link  
E: forward inter-orbit link (IOL)  
F: return IOL  
G: return feeder link

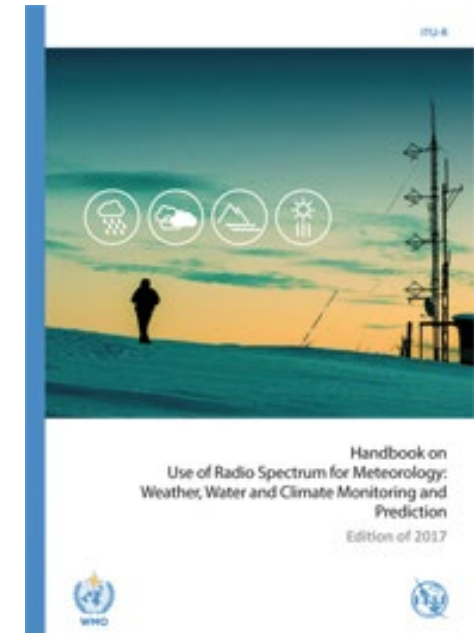




# WP 7C Topics



- Protection of active and passive remote sensors operating in the Earth exploration-satellite service and systems of the meteorological-aids (MetAids) service, as well as sensors operating in the space research service, including planetary sensors
- Two current Handbooks
  - **Earth Exploration-Satellite Service (2011)**  
(Jointly with WP 7B)
  - **Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction (2017)**  
(Joint publication of ITU and WMO)



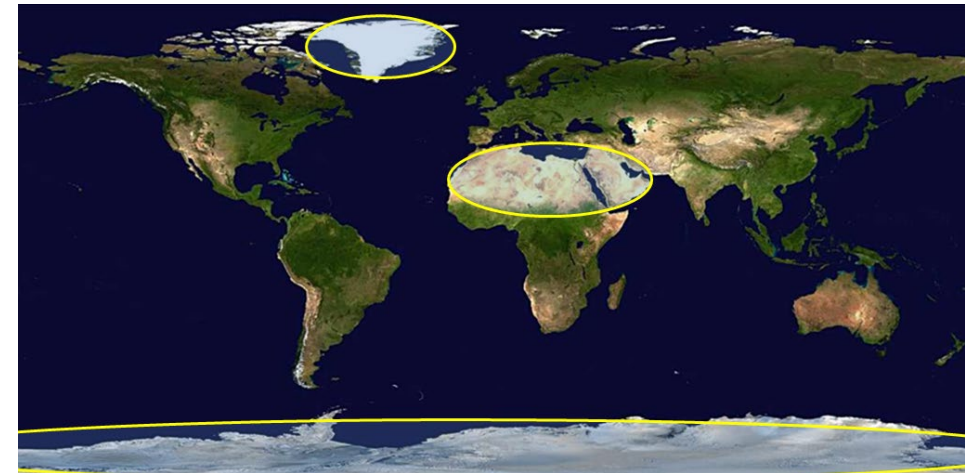




# WP 7C Topics



- **WRC-23 Agenda Item 1.12 considers a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders around 45 MHz**
- **Space based active remote sensing to detect water tables below ground and ice thickness in polar regions**
- **Propagation of radio waves at these frequencies is very complex**



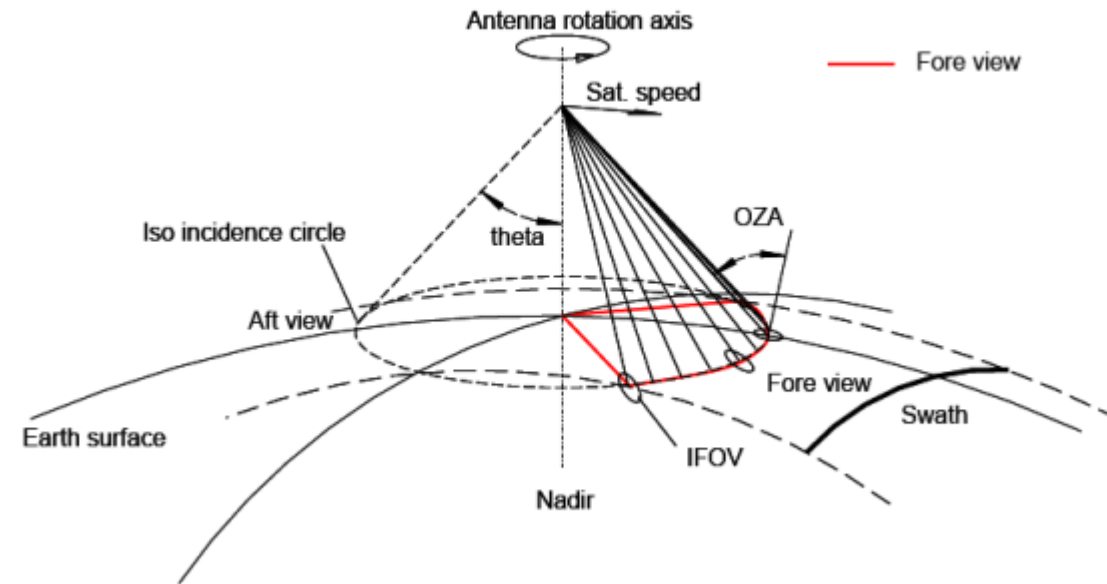
Radar Sounder Possible Coverage Areas



# WP 7C Topics



- **WRC-23 Agenda Item 1.14 considers reviewing and adjusting, if necessary, the allocations to EESS (passive) in the range 231.5-252 GHz**
- **Allocations were previously adjusted at WRC-2000 when not as much was known about the remote sensing observation requirements in this range**
- **New observation requirements for study of cloud ice have been the impetus for this work**



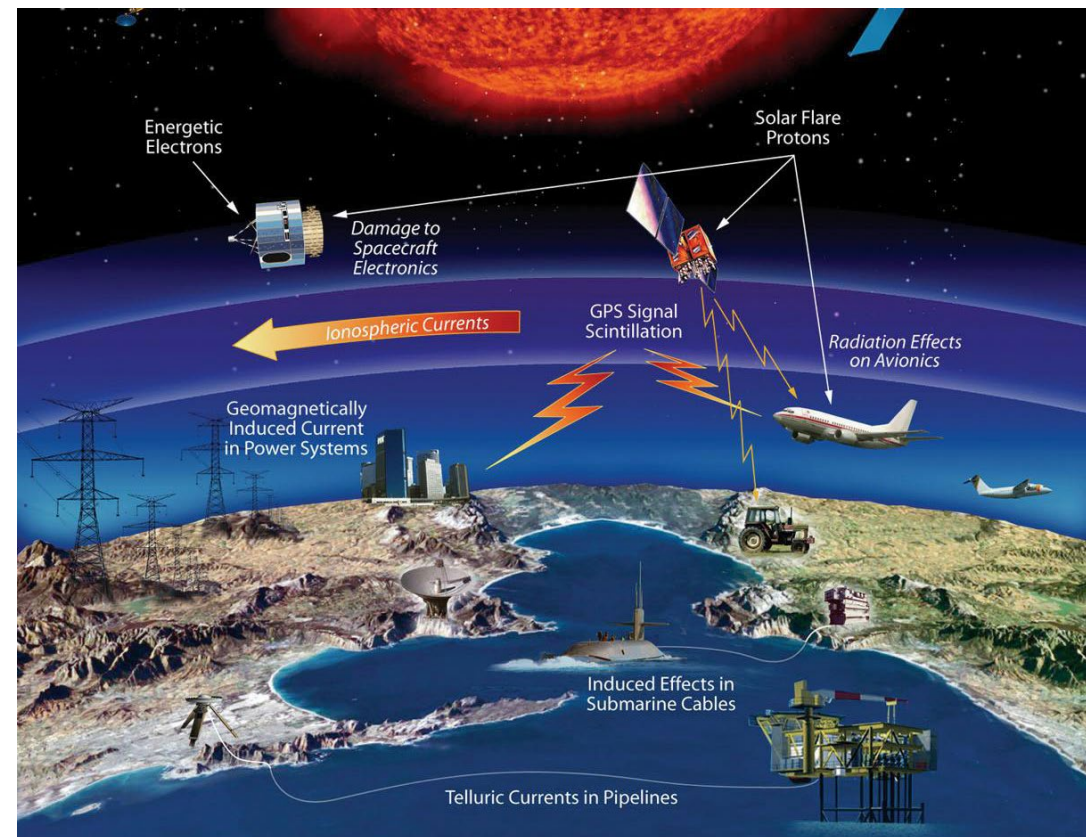
Geometry of Ice Cloud Imager instrument



# WP 7C Topics



- WRC-23 Agenda Item 9.1 topic a) considers the protection and possible recognition of radio spectrum-reliant space weather sensors used for global prediction and warnings
- Systems used for observations
  - Solar activity such as coronal mass ejections (CME)
  - Geomagnetic storms
  - Solar radiation
  - Solar winds



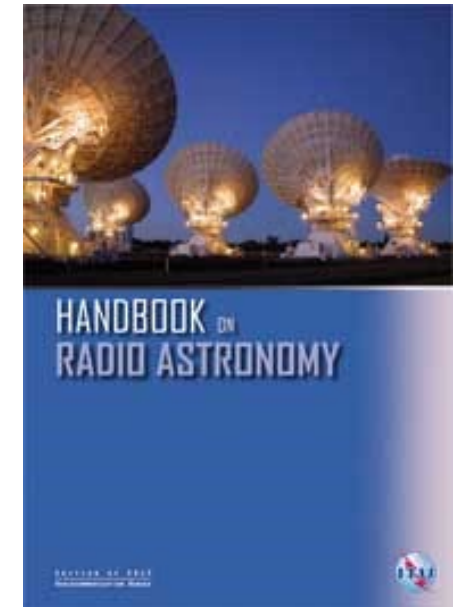
Possible Effects of Space Weather



# WP 7D Topics



- **Protection of radio astronomy and radar astronomy sensors, both Earth-based and space-based, including space very long baseline interferometry (VLBI)**
- **As radio astronomers observe the entire radio spectrum, WP 7D has an interest in a large number of WRC-23 Agenda items**
- **New work on the VLBI Global Observing System (VGOS)**
- **Continuing work on Radio Quiet Zones (RQZ)**
- **Current Handbook**
  - **Radio Astronomy (rev 2013)**





# Economic Value of Space Science



- **Report ITU-R RS.2178 “The essential role and global importance of radio spectrum use for Earth observations and for related applications”**
  - **Weather prediction and warnings**
  - **Natural disaster prediction and warning**
  - **Monitoring of climate and environmental changes**
  - **Geodesy**
  - **Space weather monitoring and warning**
- **ITU News Magazine on “Space science in achieving the Sustainable Development Goals: spectrum, applications, impact”**

**Thank You!**