

IEEE GRSS Frequency Allocations in Remote Sensing Technical Committee (FARS-TC)

Annual Meeting 2020

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Geoscience and Remote Sensing Society



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Agenda

- 1. Guest Talk
- 2. Summary of past and ongoing activities
- 3. New topics
- 4. Discussion







Guest Speaker

- Glenn Feldhake, NASA International
 Spectrum Program Manager
- Presentation on results of WRC-19 and Agenda Items of WRC-23 relevant to remote sensing







Past and Ongoing Activities

- Membership Survey
- RFI Workshop
- IGARSS
- ITU-R Meetings
- FARS Online Tools
- FARS TC Subcommittee in China
- Spectrum Management School for Remote Sensing
- US Federal Communications Commission Filing
- IEEE Standards Association Initiative







FARS TC Membership Survey

- 169 members from 24 countries
- majority (54%) is from USA, working in academic institutions and space agencies
- more members joining lately from Asia
- expertise in all frequency bands











RFI Workshop

- very successful RFI 2019 Workshop held in Toulouse, France, on September 23-26, 2019
- S0 participants mostly from radio astronomy and remote sensing communities, but also in the fields of GNSS, meteorology and space link communications
- 11 oral sessions, 1 poster session and 2 panel discussions
- follow-on tentatively planned next year in the United Kingdom on September 27-30, 2021











- The International Geoscience and Remote Sensing Symposium (IGARSS) is the main annual GRSS conference.
- At every IGARSS, FARS TC organizes a special invited session on *Radio Frequency Interference (RFI) in Microwave Remote Sensing* with presentations on interference detection and mitigation techniques for passive/active remote sensing, status of missions dealing with RFI, and spectrum management issues.
- IGARSS 2020 took place virtually on July 19-24, 2020.



IGARSS 2021 will take place in Brussels, Belgium, on July 11-16, 2021.



https://www.igarss2021.com









International Spectrum Management Activities

- GRSS is an international society, and FARS TC can represent only the remote sensing community without having to compromise its position with other interests
- FARS TC spectrum management international involvement:
 - ITU-R Study Groups
 - GRSS participates under IEEE
 - FARS TC has started attending meetings in Geneva in 2018
 - Space Frequency Coordination Group (SFCG)
 - IEEE GRSS is an observer
 - number of contributions have been increasing over the years
 - SFCG-40 in Cairns, Australia, postponed to 2021







ITU-R Study Groups Contributions

- contributions have focused on interference issues at 18.6-18.8 GHz:
 - WP7C May 2018: document on WRC-19 Agenda Item 1.5 (Earth Stations in Motion) turned into a draft report on "Analysis of reflected RFI caused to EESS (passive) in the 18.6-18.8 GHz band"
 - WP4A July 2018: contribution on draft CPM text for Agenda Item 1.5
 - WP7C September 2018: modifications to draft report on RFI caused by reflections in the 18.6-18.8 GHz band"
 - WP3J May 2019: contribution on Model for reflections from water surfaces in the 18.6-18.8 GHz band
 - WP7C May 2019: further modification to draft report on 18 GHz RFI
 - WP7C April 2020: discussion and related action items on 18 GHz RFI draft report
 - WP3J August 2020: discussion and related action items on Model for reflections from water surfaces in the 18.6-18.8 GHz band
 - WP7C September 2020: discussion and related items on 18 GHz RFI draft report
- more topics will be addressed during the WRC-23 study cycle







RFI Observations and Frequency Allocations Tools

Motivation:

- to raise awareness about the increasingly difficult regulations for remote sensing band operations resulting from higher allowable interference levels, along with documenting the actual interference observed in those bands
- to pinpoint regulation enforcement for different regions and countries and allow a free exchange of information between remote sensing scientists and engineers regarding potential interference hazards
- to be used by a community broader than IEEE GRSS
- to aid local authorities in mitigation of non-primary interfering sources globally
- The online interface still under development includes two distinct tools:
 - a searchable database of interference observed by some remote sensing instruments
 - a display system for frequency allocations, with particular focus on remote sensing (EESS) bands
- On the FARS TC webpage https://tinyurl.com/fars-tc under "TOOLS" tab







Database of RFI Observations

- RFI data can be selected by observing sensor, country or ITU region, frequency and time range
- RFI locations are shown on a map and listed in a table
- currently contains data for:
 - Soil Moisture Ocean Salinity (SMOS) radiometer
 - Soil Moisture Active Passive (SMAP) radiometer
 - 10 and 18 GHz channels of the GPM Microwave Imager (GMI)
- under development:
 - Aquarius (historical)
 - AMSR-2

http://www.grss-ieee.org/rfi_observations.html









Frequency Allocations Tool

- displays and lists frequency allocations from the Radio Regulations
- selection is possible by:
 - ITU region
 - frequency range
- footnotes are also included
- option to see only EESS band with adjacent allocations
- available on the GRSS website at http://www.grss-ieee.org/frequency_allocations.html









FARS TC Subcommittee in China

- The China subcommittee acts as a liaison between the main FARS TC leadership and the Chinese technical/scientific community.
- Inaugurated in August 2019 with a one-day seminar in Xi'an with lectures on various RFI and spectrum management issues and particular attention to the local national situation.
- Activities have been delayed by the current pandemic but have now resumed.









Spectrum Management School for Remote Sensing

- modeled after the successful IUCAF School on Spectrum Management for Radio Astronomy whose 5th edition was held in South Africa in March 2020
- the FARS TC has received interest and support for the idea by the remote sensing community and is now moving into the organization
- in the process of identifying potential lecturers, attendees (students) and sponsors
- pandemic permitting, it will be held at DLR in Oberpfaffenhofen, Germany, in the second half of next year







US Federal Communications Commission Filing

- FARS constantly monitors the requests for comments on frequency regulatory matters from the US Federal Communications Commission (FCC).
- In May 2020, a new Notice of Proposed Rule Making (NPRM) was issued to solicitate comments on possible future uses of the 70/80/90 GHz bands:
 - "We initiate a proceeding to explore innovative new uses of the 71-76 GHz, 81-86 GHz, 92-94 GHz, and 94.1-95 GHz bands (collectively, the "70/80/90 GHz bands"). In particular, we seek comment on potential rule changes for non-Federal users to facilitate the provision of wireless backhaul for 5G, as well as the deployment of broadband services to aircraft and ships, while protecting incumbent operations in the 70/80/90 GHz bands." (from FCC 20-76)



FARS did not file direct comments to the NRPM, but provided a reply to the CORF comments, mostly supporting its position regarding the importance of protecting the 86-92 GHz EESS band for remote sensing use and insisting on the need to ensure the ITU-R Resolution 750 emission limits.







IEEE Standards Association Initiative

- initiative supported by the IEEE Standards Association to standardize the evaluation of the RFI impact on remote sensing frequency bands
- two areas of focus:
 - potential standards/recommendations for RFI measurements
 - quality assessment of EESS bands with respect to presence of inteference
- complemented by coordination with space agencies, ITU-R, etc.
- meeting planned at IGARSS 2020 cancelled due to Covid-19
- tentative first discussion and formation of initial working group during MicroRad 2020 Virtual Symposium in November







Acknowledgments

A big thanks to the following FARS-TC members who have dedicated time to actively participating in this year technical committee activities:

- Ian Adams
- Mohammad Al-Khaldi
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- Joel Johnson
- Ed Kim
- Steen Savstrup Kristensen
- Rashmi Shah
- Yan Soldo
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New Topics

- Document on GRSS Views on WRC-23 Issues
- Spectrum Innovation Initiative of the US National Science Foundation
- International Mobile Telecommunications (IMT) sharing studies for 6425-7250 MHz [related to AI 1.2]
- Revision of Recommendation ITU-R RS.1861







GRSS Views on WRC-23 Issues

- Document prepared by FARS-TC to be approved by GRSS to represent the society official views on WRC-23 issues
- Very first draft already prepared
- Working group to be formed to complete and review the document at FARS level
- Representation from all different fields affected by WRC-23 is needed







US National Science Foundation Spectrum Center



Spectrum Innovation Initiative: National Center for Wireless Spectrum Research (SII-Center) PROGRAM SOLICITATION NSF 20-557

"The SII-Center will serve as a **focal point for sustained spectrum research** ... that benefit(s) society... A key expectation is establishing harmony between scientific uses of the electromagnetic spectrum with technological advances ..."

TWO STAGE PROCESS

SII-Center Planning Grant Proposals (up to \$300K)

"...facilitating the formation of appropriate teams with representation from multiple stakeholders to prepare a compelling and comprehensive SII-Center proposal."

• Full Proposal Deadline:: June 12, 2020 (Panel review process completed)

SII-Center Proposals (up to \$5M/yr for 5 years; potentially renewable)

"SII-Center proposals must convey clear and concrete plans for foundational spectrum research, useinspired motivation and technology transition opportunities, the education and workforce development activities to be undertaken, and plans for multidisciplinary research and community-building appropriate to the proposed SII-Center's vision and mission."

•Full Proposal Submission Window: March 01, 2021 - April 01, 2021

NSF: Spectrum Innovation Initiative presentation at MicroRad 2020







IMT sharing studies for 6425-7250 MHz

WRC-23 Agenda Item 1.2: Identification of the frequency bands 3300-3400 MHz, 3600-3800 MHz, 6425-7025 MHz, 7025-7125 MHz and 10.0-10.5 GHz for use by International Mobile Telecommunications (IMT)

- This AI considers potential new allocations to the mobile service in several bands
- Among them is the 6425-7025 MHz frequency range where a number of instruments operate or are planned (e.g, AMSR-2 at 6750-7100 MHz and 7145-7475 MHz)

No EESS (passive) allocation at 6425-7025 MHz, but remote sensing operation is covered by RR Footnote 458: "In the band 6425-7075 MHz, passive microwave sensor measurements are carried out over the oceans. In the band 7075-7250 MHz, passive microwave sensor measurements are carried out. Administrations should bear in mind the needs of the Earth exploration-satellite (passive) and space research (passive) services in their future planning of the bands 6425-7075 MHz and 7075-7250 MHz."







Revision of Recommendation ITU-R RS.1861

- Important ITU-R
 Recommendation under review
 by ITU-R WP 7C
- Several instruments at risk of being removed
- Input needed on future sensors and applications



Recommendation ITU-R RS.1861 (01/2010)

Typical technical and operational characteristics of Earth exploration-satellite service (passive) systems using allocations between 1.4 and 275 GHz









Closing Remarks

- Thank you for your partcipating in the Annual Meeting!
- Please e-mail fars_chairs@grss-ieee.org if you would like to join a working group or become more involved in any of the activities
- Focused meeting during the MicroRad 2020 Symposium, announcement coming soon

