

# IUCAF, COSPAR, and Spectrum management:

Keeping our windows on the Universe clean

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# Spectrum management?

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The electromagnetic spectrum is a finite resource that needs to be shared by many different users, both “passive” (receive-only) and “active” (emitting).

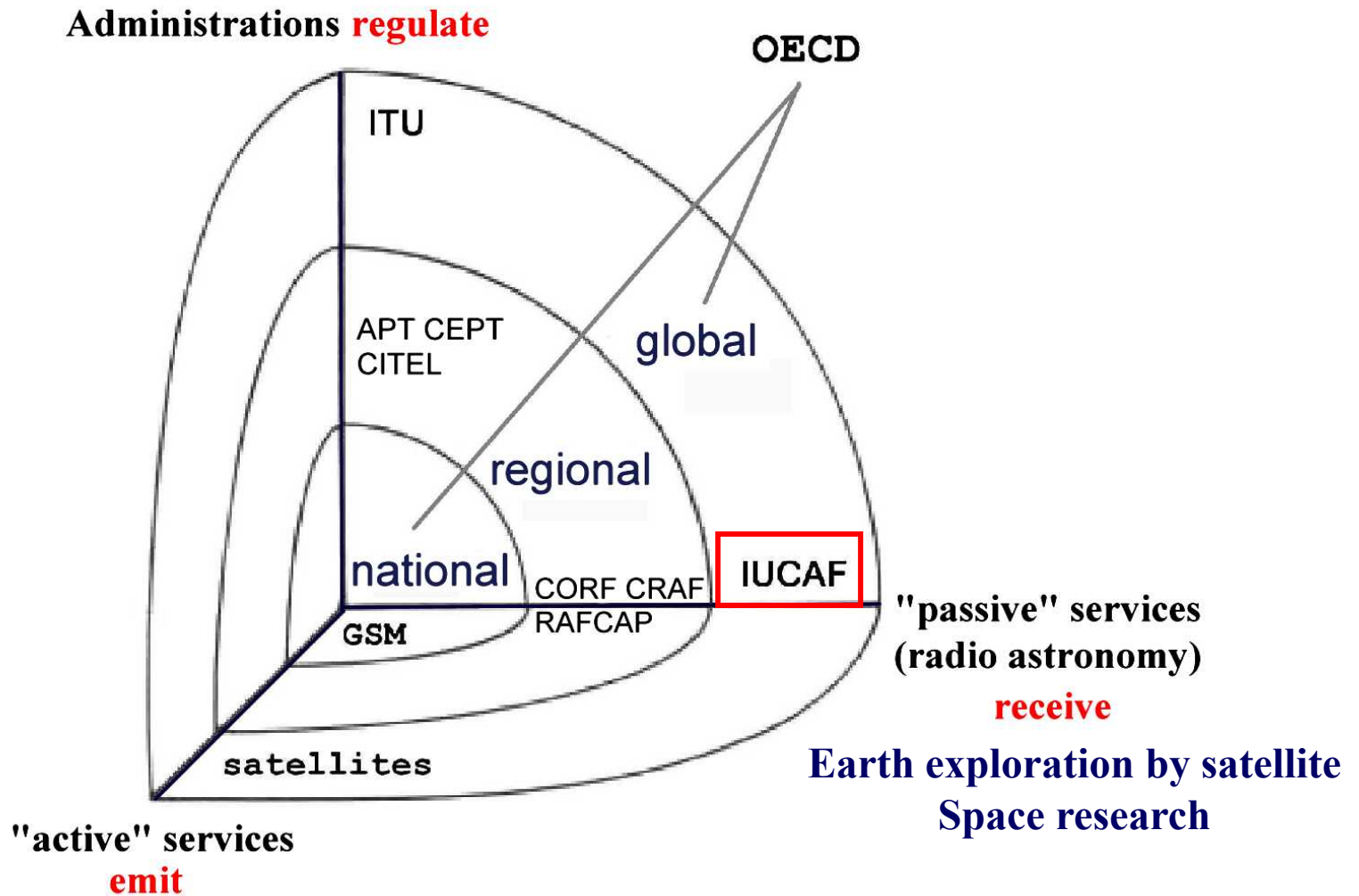
Spectrum management = planning, allocation, use, control of the radio frequency spectrum.

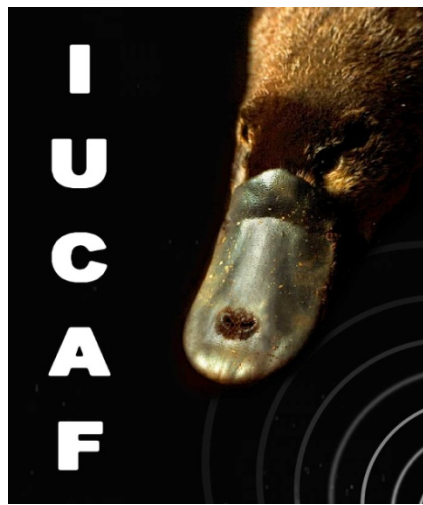
Conveying policy goals

Apportioning scarcity

Avoiding conflicts

# spectrum management problem space





Scientific Committee on Frequency Allocations for  
Radio Astronomy and Space Science

**formerly known as the**

**Inter-Union Commission on the Allocation of Frequencies  
for Space Research and Radio Astronomy**

<http://www.iucaf.org>

# The “Inter-Union” aspect of IUCAF

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- Created in 1960 by ICSU (International Council for Science), a non-governmental organisation, representing 101 national scientific bodies and 27 international Scientific Unions that coordinates interdisciplinary research
  - helps create international networks
  - in close relationship with, e.g., UNESCO

IUCAF is an interdisciplinary body of ICSU

Sponsoring ICSU Scientific Unions:

<b>COSPAR</b>	space science
IAU	astronomy
URSI	radio science

# The brief of IUCAF

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To study and coordinate

the requirements of radio frequency allocations for passive radio sciences, such as *radio astronomy, space research and remote sensing,*

in order to

make these requirements known to the national and international bodies that allocate frequencies.

# IUCAF activities

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- Participate in meetings:
  - International Telecommunication Union  
7D (Radio Astronomy), TG1/8 (UWB), 1/9 (unwanted emissions)  
& World Radiocommunication Conferences
  - Space Frequency Coordination Group (as observer)
- Organise (or support) three-yearly:

Workshop on RFI Mitigation (Germany 2000; Canada, 2004)  
Summer School on Spectrum Management (USA 02; Italy 05; Korea 09)

# IUCAF membership

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<b>COSPAR</b>	<b>J. Romney</b>	<b>RA</b>	<b>USA</b>
	<b>Y. Murata (COSPAR-08)</b>	<b>RA</b>	<b>Japan</b>
<b>IAU</b>	<b>H. Chung</b>	<b>RA</b>	<b>Korea</b>
	<b>D. Emerson</b>	<b>RA</b>	<b>USA</b>
	<b>M. Ohishi</b>	<b>RA</b>	<b>Japan</b>
	<b>K. Tapping</b>	<b>RA</b>	<b>Canada</b>
	<b>A. Tiplady</b>	<b>RA</b>	<b>South Africa</b>
<b>URSI</b>	<b>U. Shankar</b>	<b>RA</b>	<b>India</b>
	<b>A. Tzioumis (Vice-chair)</b>	<b>RA</b>	<b>Australia</b>
	<b>W. van Driel (Chair)</b>	<b>RA</b>	<b>France</b>
	<b>W. Swartz</b>	<b>IO</b>	<b>USA</b>
	<b><i>S. Reising</i></b>	<b>PI</b>	<b>USA</b>
<b>at large</b>	<b>W. Baan</b>	<b>RA</b>	<b>The Netherlands</b>
	<b>K. Ruf</b>	<b>RS</b>	<b>Germany</b>

**4 *ex officio* advisors (ITU)**

**+ Correspondents (geographical, optical)**

**IO: ionospheric studies, PI: Plasma physics, RA: radio astronomy, RS: remote sensing**



# ICSU review of IUCAF in 2004

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On its role as an *interdisciplinary* committee:

IUCAF noted the difficulty to find active COSPAR members, and that its members are mainly radio astronomers.

ICSU Report:

“ICSU should encourage IAU, URSI and COSPAR to organize a joint meeting to define specific procedures and actions that will ensure that IUCAF becomes a truly interdisciplinary committee that has the necessary expertise to coordinate the efforts of *all* the passive radio sciences in frequency management matters”

# Common interests of space science and astronomy

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- Passive science services (receive-only)
- Special “passive only” frequency bands
  - often threatened by the same commercial radio application
  - common position on protection strengthens both cases
- Radio astronomy in space (WMAP, VSOP, PLANCK, ...)
- Shielded Zone of the Moon
  - plans for lunar low frequency radio interferometer
- COPUOS – UN Comm. on the Peaceful Uses of Outer Space

## Examples:

New active allocation around 1.4 GHz band proposed for ITU WRC-07

Ultra-Wide Band applications (car collision radar at 24 GHz)

New spectrum allocations above 275 GHz (ITU WRC-11)

# IUCAF initiatives towards multidisciplinary

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## Workshops and Summer Schools:

### **Active Protection of Passive Radio Services: towards a concerted strategy**

Cagliari, Sardinia, Italy, 28-29 October 2004 (ESF/EU funding)

Representatives from radio astronomy, remote sensing, meteorology, atmospheric and ionospheric research

- need to work closer together
- to start with on specific, common issues (use of 275-3000 GHz bands)

### **IUCAF Summer School in Spectrum Management for Radio Astronomy**

Castel san Pietro, Italy, June 2005

- invited representatives from SFCG and atmospheric research

### **IUCAF Summer School in Spectrum Management for Passive Radio Sciences**

Korea, 2009

# Different spectrum management cultures

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Radio astronomy:

only 2 full-time spectrum managers (US NSF, European ESF)  
the 10 others are scientists/engineers first,  
links with the IAU and URSI

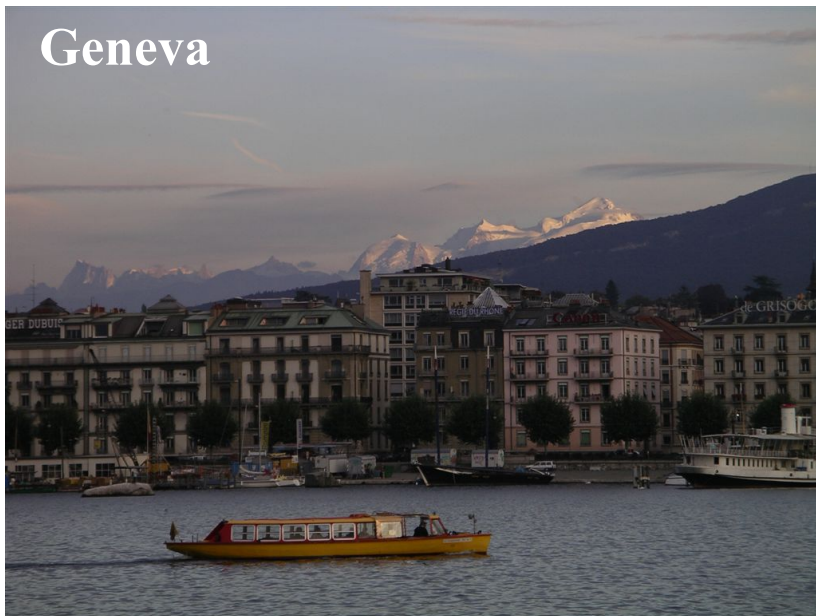
Space science:

spectrum managers of space agencies  
sometimes mission-related only  
in general not scientists,  
*no links with COSPAR*

Good collaboration between the two communities,  
on case-by-case basis and through the SFCG

# IUCAF in Action (in Geneva, Switzerland)

Geneva



ITU -WRC



IUCAF & Friends



# **The Space Frequency Coordination Group (SFCG)**



Based on a presentation by Edoardo Marelli (ESA), SFCG Chair

<http://www.sfcgonline.org/>

**Many remarks made here on the SFCG apply to IUCAF as well**

# What is the SFCG?

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The SFCG is an **informal** group federating all the main space agencies and related national and international organizations. Its main objectives are:

1. To provide working level coordination of international radio spectrum usage among the science services users.
2. To adopt agreements that optimise the use of the allocated bands.
3. To agree common policies and identify long-term targets related to potential changes to the international regulations.

Develops and adopts common resolutions and recommendations on, e.g.:

spectrum masks, deep-space channels plans, inter-agency frequency coordination procedures, interference criteria, use of specific bands, common objectives wrt the next WRC.

# The SFCG scope

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The radio services covered by the SFCG activity are:

- Space Research (data communications and sensors)
- Space Operations
- Earth Exploration Satellite (data communications and sensors)
- Meteorological Satellite
- Inter-Satellite

It is therefore clear that

- Passive sensing is only one (important) element of the SFCG activity
- Passive sensing not from satellite is not within the SFCG scope, but the presence as observer of an organisation like IUCAF has proven very beneficial.



# Some SFCG achievements in the passive sensing area

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1. **In general SFCG is effective in raising early alarm bells when one of the members discovers regulatory evolutions that may have impacts on the community** – new technology, pressure from other services, ...
2. Successful world-wide agreement by the satellite passive sensing community on the requirements for the revision of passive allocations above 71 GHz (WRC-2000). This proved decisive in convincing the national delegations that our requirements were scientifically and technically sound.
  - IUCAF did the same for the radio astronomy community
3. Agreement on the mechanisms to coordinate the future cloud radar missions at 94 GHz with the radio astronomy operations – with IUCAF

# SFCG international recognition

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Although the SFCG is an informal group, its positions on regulatory aspects have an impact on the decision makers.

Its Resolution covering the SFCG position on the various WRC Agenda Items is widely known and used as a “lobbying tool”.

The fact of representing a contact point to reach the whole satellite science service community is seen as a key element by the regulators.

# SFCG limitations

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- SFCG is an informal group. As such
  - it doesn't have legal authority to speak on behalf of a community
  - it doesn't have staff to work full-time outside meeting dates.
- Some member agencies are bound to policy decisions taken by their national regulatory authority and therefore these members cannot always support the SFCG positions when attending ITU meetings as part of their national delegation.
- The SFCG and, more in general, the representatives of passive services, have not been able to be heard at all in some areas (e.g. the European Commission, certain regional groups like the Arab Group)

# How can the SFCG (IUCAF) improve its effectiveness?

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SFCG and IUCAF are completely interchangeable here:

- Making its voice heard, also in those areas not reached yet.
- Identify similar groups with common interests to exchange information on policies (e.g., terrestrial passive sensing users)
- The availability of SFCG staff would surely help a lot in attending regional meetings, breaking into areas where our community is not well known and keeping contacts with other groups with common interests (e.g IUCAF, etc..).

But this presents economical and organisational problems and may result in a less informal operating mode.

# COSPAR in spectrum management -1

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Many remarks made on the SFCG apply to IUCAF as well:

- informal, recognized, has effect, looking for partners, ...

A continued role for COSPAR in spectrum management:

- through SFCG: members from space agencies
- through IUCAF: members from scientific community

Ultimate common goal: keep our observations interference-free

(URSI is also re-thinking its role, with IUCAF)

# COSPAR in spectrum management -1

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Strengthening links between COSPAR and IUCAF:

- for COSPAR:

- stronger (scientific) links with other passive science services
  - better overview of issues in spectrum management
  - help develop common strategies and positions

- for IUCAF:

- interdisciplinarity: ICSU aegis, funding

- for common Summer Schools

- **Need to identify active COSPAR representatives for IUCAF**