Commission J Triennial Report 2021-2023

Prof. Douglas Bock
Chair Commission J

This is a summary of the activities of Commission J and the developments in radio astronomy during this triennium. This report covers the two-year period between the URSI GASS in Rome in 2021 and the URSI GASS in Sapporo in 2023.

1 Officers of Commission J for this triennium

Chair:	Douglas Bock, CSIRO, Australia
Vice-Chair:	Stefan J. Wijnholds, ASTRON, The Netherlands
Past Chair:	Richard F. Bradley, NRAO, USA
ECR:	Jacki Gilmore, Stellenbosch University, South Africa Danielle Fenech, University of Cambridge, United Kingdom

2 Terms of Reference for Commission J

The activities of the Commission include:

- observation and interpretation of cosmic radio emissions from the early universe to the present epoch and
- radio reflections from solar system bodies.

Emphasis is placed on:

- the promotion of science-driven techniques for making radio-astronomical observations and data analysis,
- support of activities to protect radio-astronomical observations from harmful interference.

These terms of reference were reviewed at the 2021 GASS Commission business meeting and left unchanged.

3 Finances

The budget for Commission J has been used to support travel for officials and to support the participation of additional young scientists in the 2023 GASS (budget €20,212, forecast expenditure €19,870).

4 Support of meetings and workshops

With the impact of COVID-19 on meetings and travel, there were fewer in-person meetings in radio astronomy during the triennium. The Commission did not provide financial support to any physical meetings other than the GASS. Individual institutions were in general well-placed to give financial support to virtual meetings. The following meetings and workshops were provided with technical support.

Meeting	Country	Date	Support for YS
ISAP 2022 – International Symposium on Antennas and Propagation	Australia	31 October – 3 November 2023	Technical support
RADIO 2023 – Radio Days of the Indian Ocean	Mauritius	1 – 4 May 2023	Technical support
MaSAG23 - Mathematics for Signal processing and applications in Geophysics and other fields	Italy	15 – 20 May 2023	Technical Support
URSI GASS 2023	Japan	19 – 26 August 2023	€6,600

5 Vice-chair and Early Career Representative nominees

There were four nominations for Vice-Chair of Commission J:

- Domingos Barbosa (Portugal)
- Liang Dong (China)
- Yashwant Gupta (India)
- Anna Scaife (UK)

There were two nominations for Early Career Representative of Commission J:

- Mohamed Said Darwish (Egypt)
- Yuxiang Huang (China)

6 AT-AP-RASC 2022 at Gran Canaria, Spain

There were 14 sessions with 162 papers presented in regular and joint sessions led by Commission J. We also organized an open session in which conference participants could claim a slot to present latest results obtained after the abstract submission deadline. This was well received by the on-site participants and shows how we can benefit from the flexibility provided by an electronic conference program. A summary of the sessions and papers per session are given in the following table:

Session	Session Topic	Papers
J01	New Telescopes	12
J02	VLBI	5
J03	Time-domain astronomy – Observations and instrumentation	18
J04	Cosmological HI – Observations and instrumentation	16
J05	Wide-field radio astronomy	21
J06	Space-based radio astronomy	12
J07	Calibration and instrumentation	9
J08	CEM methods for radio astronomy	6
J09	Receiving systems and their components	13
J10	Big Data and AI in radio interferometry	25
J11	Latest news and observatory reports	3

JE	EMC issues in integration of analog and digital electronics	6
JG	Mutual benefit between radio astronomy and ionospheric science	6
JH	Solar, heliospheric and planetary physics	10

Commission J attendance was good and increased over that of AT-RASC 2018. The atmosphere of the venue facilitated discussion and collaboration amongst participants. Being the second URSI flagship meeting after the pandemic, it was also an experiment with the hybrid meeting format. As the experience with the URSI GASS 2021 showed that poster sessions do not work well with a significant fraction of the conference participants online, it was decided to increase the number of parallel sessions to three to enable all contributors to present in an oral session. Unfortunately, this diluted the attendance in the individual sessions and caused schedule conflicts for some participants attending physically, who had to watch recordings after all. Combined with the fact that offering a full-hybrid format enabling live interaction with remote participants effectively doubles the cost of a major conference, we anticipate a future model in which flagship meetings are predominantly physical and the full-hybrid or online model is used for smaller, more focused technical workshops and symposia.

7 Sapporo, Japan URSI GASS 2023 Scientific Sessions (planned)

Session	Session Topic	Papers
J01	New telescopes and major upgrades to existing telescopes	36
J02	Spaceborne Radio Astronomy	13
J03	Very Long Baseline Interferometry	28
J04	Antennas and receivers	32
J05	Real-time processing for radio astronomy	21
J06	Scientific data processing in radio astronomy	27
J07	Machine learning and AI in radio astronomy	16
J08	21-cm Cosmology: Dark Ages, Cosmic Dawn, and the Epoch of Re-ionization	37
J09	Survey science	14
J10	Millimeter and sub-millimeter wave astronomy	26
J11	Time-domain radio astronomy	16
J12	Modern techniques for radio technosignature (SETI) searches	11
J13	Use of the radio spectrum and radio astronomy: risks and opportunities	14
J14	Observatory reports and latest results	14
JG1	Mutual benefit between radio astronomy and ionospheric science	8

8 Working Group activities

Commission J members are regular participants in the URSI/IAU Inter-Union Working Group on Historical Radio Astronomy and the URSI/IUCAF Inter-Union Working Group on Radio Science Services. Reports from these WGs have been provided separately to Council in advance of the 2023 GASS.

Commission J also supports working groups on RFI Mitigation and Characterization (FGHJ) and Interdisciplinary Space Weather (GJFEH). Reports have been invited for the GASS and will be provided in the Commission's meeting report.

9 Communication and Membership

Discussions continued about the 'average youth' of the URSI membership and the role for URSI in the life and career of the radio scientists. URSI can be attractive for radio scientists as an organization providing places for discussions, presentations, and for meeting colleagues. While there may be some overlap in covering certain radio science research fields with other organizations, URSI covers the broad radio science fields like no other. Still, it is important to make URSI more a part of the 'daily life of the radio scientists.' In addition, the new generation of radio scientists needs to be attracted to URSI. The answers to such issues are complex but the leadership of Commission J has been discussing these issues and considering changes that may be made within URSI.

One heavily debated topic, which also has a significant impact on the previous concern, is the format of meetings. The pandemic showed that the possibility to participate remotely in meetings facilitates participation by people with limited travel funding. It was also realized across the globe that less traveling reduces the carbon footprint of science and, therefore, organizations around the world started to look more carefully at the necessity of travel. Hybrid and online meeting models are expected to stay. However, the experience with organizing the URSI GASS 2021 in Rome and the AT-AP-RASC 2022 in Gran Canaria also showed that offering a good hybrid meeting experience for a flagship meeting is very costly. It is therefore expected that future flagship meetings will provide a forum for in-person interaction, while the hybrid and online meeting format is used for smaller, topical meetings.

The Commission has also received feedback about parallel sessions. These can be useful for providing an opportunity for more oral presentations and possibly higher meeting participation. On the other hand, parallel sessions within the Commission are disliked by some participants (see comments on AT-AP-RASC meeting above). The Commission will review the GASS format during the business meetings and anticipates asking for a maximum of two parallel sessions during future flagship meetings, with at least one "plenary" day.

A Commission J Newsletter had been distributed to members regularly during the previous triennium but became sporadic due to lack of input from members. Although the newsletter was warmly received, feedback during and following the Rome GASS did not indicate strong support for reinvigorating the newsletter. Accordingly, the Commission has relied on ad hoc communications and the URSI flagship meetings for most interactions.

Dr. Richard Bradley served as the Associate Editor Comm. J of the Radio Science Bulletin.

10 Other Matters

In 2022, AUT University (New Zealand) proposed to discontinue support for the Warkworth Radio Astronomy Observatory following New Zealand's withdrawing from the SKA Project. The Commission provided the University with input on the significance of global collaborations with Warkworth (including as part of Very Long Baseline Interferometry) in support of a review of the proposed decision.