



Monthly Newsletter of International URSI Commission J – Radio Astronomy

February 2018

Officers

Chair: Richard Bradley

ECRs: Stefan Wijnholds

Vice-Chair: Douglas Bock

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Prepared by R. Bradley, Chair, Commission J, rbradley@nrao.edu

News Items

Greetings Commission J Members!

I would like to express my sincere thanks to our conveners of the 2018 URSI Atlantic Radio Science Conference (2018 AT-RASC) who have worked so diligently to assemble a wonderful set of interesting and informative sessions for you. We received a total of 87 abstracts for the Commission J sessions! Outstanding! I thank all of our members who submitted abstracts – your support of this URSI flagship conference is greatly appreciated. Your registration fees go toward assisting students and young scientists to participate in the URSI Conferences.

This month we highlight a special section in the current issue of the *Radio Science Bulletin* dedicated to the memory of Dr. Gianni Tofani. It traces the history and reviews current status in key areas of radio science technology in radio astronomy. Guest editors P. Bolli, N. D’Amico, and R. Nesti have assembled three invited papers for this issue, with more to come in a later issue. Please see the article below for additional information.

There were two omissions from the the January edition of the Newsletter that must be corrected:

1) In the list of radio astronomy papers published in the *Radio Science* journal - the paper entitled "From MAD to SAD: The Italian experience for the low-frequency aperture array of SKA1-LOW" which was published in the March 2016 issue and also got the cover page

2) The following credits for the beautiful photograph of the Greenland Telescope: “The Greenland Telescope Project is a joint project between the Academia Sinica Institute of Astronomy and Astrophysics and the Smithsonian Astrophysical Observatory, with collaborations with the MIT Haystack Observatory and the National Radio Astronomy Observatory.”

The International Council for Science (ICSU) and the World Data System (WDS) are calling upon partner organizations concerned with scientific data stewardship to nominate new members of the Scientific Committee since the current three-year term will expire in June 2018. Please see the article below for additional information. Submission deadline is March 5, 2018. Send me an email, if interested.

I hope you're finding the Newsletters both interesting and informative - your comments and suggestions are always welcome.

Submitted by R. Bradley

2018 URSI Atlantic Radio Science Conference (2018 AT-RASC)

28 May – 1 June 2018, ExpoMeloneras Convention Centre, Gran Canaria

Abstract submission closed

Registration is now open

<https://mailchi.mp/intec/at-rasc-2018-registration-is-now-open?e=6dc54cab9b>

- J.1 *Software Enabled Radio Astronomy*
Richard Prestage, Cedric Viou, Alessandra Zanichelli
- J.2 *Large N Aperture Arrays*
Eloy de Lera Acedo, Kris Zarb Adami
- J.3 *Pattern Recognition Applications in Radio Astronomy*
Abhi Datta, David Rapetti
- J.4 *Novel Instrument Concepts and Observational Challenges*
Douglas Bock, Richard Bradley
- J.5 *Detecting Hydrogen Near and Far*
Jackie Hewitt, Eloy de Lera Acedo
- J.6 *Instruments for Education*
Glen Langston, Kevin Bandura
- J.7 *Mm wave / sub-mm Wave Science and Technology*
Pepe Cernicharo, Juan Daniel Gallego, Rolf Gusten

Special Sessions:

S-JACEFG – *Applications for pattern recognition methodologies*

S-EACFJ - *Spectrum Management and Utilization*

Workshops:

JB - *Polarimetry of advanced antenna systems in radio astronomy*

JG - *3-D ionospheric models for radio interferometric calibration*

GJEFH - *Space Weather*

Additional information will appear here as the conference program is assembled.

2019 URSI Pacific Radio Science Conference (2019 AP-RASC)

9 -15 March 2019, New Delhi, India

Plans are underway for the 2019 AP-RASC in New Delhi, India. Please see <http://aprasc2019.com/> for details.

2020 URSI General Assembly and Scientific Symposium (2020 URSI GASS)

Rome, Italy

The site for the next URSI General Assembly and Scientific Symposium has been chosen! Stay tuned for details. If you like to organize a session or workshop at the 2020 URSI GASS please let me know.

Radio Science Bulletin

You may download a copy at http://www.ursi.org/content/RSB/RSB_362_2017_09.pdf

The special section, “Radio Astronomy: A Continuous Demand for Breakthrough Technology” traces the history and reviews the current status of key areas of radio science technology in radio astronomy. Guest Editors, P. Bolli, N. D’Amico, and R. Nesti, have brought us three invited papers in this issue (see “Activities Spotlight”).

The tremendous growth in wireless communications has led to a nearly insatiable demand for spectrum. That has led to the need for spectrum sharing. The requirement for radar and wireless communications systems to share spectrum in the 5 GHz band in the US is one example. Methods for doing this are considered in detail in the paper by Mina Labib, Vuk Marojevic, Anthony Martone, Jeffrey Reed, and Amir Zaghoul. They first introduce the general background of spectrum sharing. They then review the regulations related to spectrum sharing and radar systems. This is followed by an overview of the two main tasks associated with spectrum sharing: spectrum awareness and dynamic spectrum access. Detailed approaches are then presented, including cognitive communications systems, cognitive radar, waveform shaping, waveform design, and joint cognition. This paper provides a very nice introduction to of the major issues associated with and an overview of the major solution approaches for spectrum sharing between communications systems and radar.

This issue contains the texts of the speeches given by URSI President Paul Cannon and URSI Secretary General Paul Lagasse at the opening ceremony of the URSI XXXIInd General Assembly and Scientific Symposium (GASS) in Montreal, Canada, August 20, 2017. They contain important information about URSI, including the names of the officers elected for the new triennium.

Stefan Wijnholds' Early Career Representatives column has two reports. The first summarizes the Young Scientist Awards for the Montreal GASS. The second, by Sembiam Rengarajan, gives the winners of the Student Paper Competition at the GASS.

In their Ethically Speaking column, Randy Haupt and Amy Shockley look at the practice of selling bridges. They offer some thoughts on how to identify potential scams.

Özgür Ergül's Solution Box considers an optimization problem involving a nanowire transmission line with a coupler. The example solution, provided by Aşkın Altınoklu and Özgür Ergül, may not be optimum from several standpoints. Other solutions are sought.

In his Telecommunications Health and Safety column, Jim Lin looks at the "sonic health attacks" that have allegedly been made on diplomats in Havana. He suggests that the reported effects could have been caused by acoustic effects resulting from exposure to high-intensity microwave fields. There are some interesting possibilities.

In her Women in Radio Science column, Asta Pellinen Wannberg brings us the story of Iwona Stanislawski, the outgoing Chair of URSI Commission G, and a professor and the Director the Space Research Centre of the Polish Academy of Sciences. She provides an interesting perspective on her career in radio science.

Submitted by R. Stone

Activities Spotlight

Preface to the Special Section

"Radio Astronomy: a continuous demand for breakthrough technology"

Radio astronomy is a relatively young science: about an average human lifetime has passed since Karl Jansky's measurement campaign took place at Holmdel, New Jersey in the early 1930s, now celebrated as the birth date of Radio Astronomy.

Most people working in the field today can claim to have personally known the pioneers in their countries. In the case of Italy, one such pioneering fellow was Gianni Tofani who passed away in February 2015. He fully devoted his professional life to scientific and technological research in astrophysics, mainly from the wonderful Arcetri hill of his beloved city Florence. Furthermore, his management style was highly respected, bringing him to held leadership positions such as the Director of the Institute of Radio Astronomy.

Among his memberships to different scientific councils, Gianni was also President of the Italian section of URSI, and it is here, in a Special Section of this journal, that we celebrate his memory and acknowledge his contributions to the field.

The Editors of this Special Section have worked closely with Gianni over the past twenty years and have appreciated his professional and human qualities. It has been easy and satisfying to receive enthusiastic “Yes” when calling for a contribution to this session from worldwide authors, not only top quality researchers in their respective fields but also, mainly, very good friends. The Editors wish to kindly thank them all for their valuable contributions, which show complementary perspectives of technological advances in radio astronomy.

Due to the high number of papers constituting this Special Section, it will be divided in two issues of the *Radio Science Bulletin*. The first part, published in this issue, opens with two remembrances of Gianni Tofani from distinguished authors, A. van Ardenne (ASTRON, The Netherlands) and G. Pelosi (University of Florence, Italy). Then, several different technological topics applied to the radio astronomical research are authoritatively encompassed and reviewed: from mechanical engineering to digital and analog electronics, from very low frequency receiving systems to submillimeter wavelengths cameras, from metrology to signal processing techniques. However, there is a common thread among all of them: developing advanced technology for improving the knowledge of the Universe. This was exactly what Gianni Tofani pursued throughout his professional life. In this issue, we have the following papers:

J. W.M. Baars (MPIfR, Germany) and H. J. Kärcher (MT Mechatronics, Germany), “Seventy years of Radio Telescope Design and Construction”

R. F. Bradley (NRAO, USA), “The Precision Array for Probing the Epoch of Reionization (PAPER): A Modern Scientific Adventure”

P. F. Goldsmith (JPL, USA), “Submillimeter Heterodyne Focal Plane Arrays for High Resolution Astronomical Spectroscopy”

The next issue will contain contributions on the Sardinia Radio Telescope, the Square Kilometer Array, and the Atacama Large Millimeter Array respectively from N. D'Amico (INAF, Italy), P. Diamond (SKA Organization, UK) and L. Testi (ESO, Germany).

Submitted by P. Bolli(1), N. D'Amico(2,3), and R. Nesti(1)

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Request for Nominations: Scientific Committee of the World Data System

On behalf of Professor Sandy Harrison – the Chair of the World Data System (WDS, <http://www.icsu-wds.org/>) Scientific Committee – I would like to bring to your attention that the term of the current Scientific Committee will expire in June 2018 and several members will not be able to continue serving on the Committee.

Therefore, the International Council of Sciences (ICSU) and the World Data System would like to call their respective members, partners organizations concerned with scientific data stewardship to nominate new members of the Scientific Committee. Following the recommendation from the ICSU General Assembly, nominations of early career and female scientists or experts are strongly encouraged.

The Scientific Committee is the governing body of the WDS as defined in its Constitution (https://www.icsu-wds.org/organization/constitution_and_bylaws). It is composed of internationally recognized and leading researchers and experts in all aspects of scientific data. Members are appointed in their personal capacity normally for a three-year term renewable once by the ICSU Executive Board with attention to geographical, disciplinary and gender balance. In addition, at least four members are drawn from representatives of WDS Member Organizations. The list of current committee members are available at <https://www.icsu-wds.org/organization/scientific-committee>

Roles of the Scientific Committee Member:

- To ensure that the WDS supports ICSU's mission and objectives
- To define, develop and prioritize plans for the WDS
- To establish and oversee the review of existing and new members
- To establish and maintain a mechanism for oversight of WDS activities
- To facilitate cooperation and integration with relevant national, regional and international programmes, organizations, and institutions
- To mobilize funds for the implementation of WDS and related activities of the SC and Working Groups
- To publicize and promote the activities of WDS

Responsibilities of Scientific Committee Members:

- Attend face-to-face meetings twice a year, usually in Paris and Tokyo (travel support provided by ICSU and WDS International Programme Office) as well as monthly web conferences
- Represent WDS at relevant meetings around the world
- Guide and convene WDS Working Groups and appropriate work plans
- Assist in mobilizing financial and human resources for WDS

Submitted by Mustapha Mokrane, Executive Director

Photo from the Field



In order to explore new techniques for the instrumental calibration of radio astronomical low-frequency aperture array, an UAV-mounted artificial test source has been developed within a collaboration between Italian research institutes (INAF, CNR-IEIIT and the Politecnico di Torino). The main target of this system will be the huge aperture array SKA1-LOW. In the meantime, in April 2016, a measurement campaign was performed in the Netherlands on LOFAR (Low Frequency Array), built and operated by ASTRON, to collect reliable data on the response of the individual antennas including the coupling effects with other antennas and with the terrain. The picture shows the hexacopter mounting a dipole to illuminate the Low Band Antenna array of LOFAR (visible in the background) during the taking off.

Submitted by P. Bolli

If you have an interesting photograph that you wouldn't mind sharing with others in the public domain I encourage you to please send a copy to me along with a brief caption and the person's name to whom I should credit.

