



**Report on the Business Meetings of
Commission G: Ionospheric Radio and Propagation**

during the

**XXXIInd URSI General Assembly and Scientific Symposium
Montreal, Canada, August 19-26, 2017**

Prepared by Patricia Doherty, Commission G Chair (2017-2020)

The business meetings for Commission G were held on Monday, Wednesday and Friday – August 21, 23 and 25. Part of the 3rd business meeting was held in joint session with Commission H. Dr. Iwona Stanislawska, Chair of Commission G, led the first two business meetings and turned over the last business meeting to Patricia Doherty, Chair for the 2017-2020 triennium. The meetings were well attended with over 60 members attending the 1st and 2nd business meetings. The third meeting hosted fewer members as many participants were already departing for home.

The Commission G business meetings commenced with a brief remembrance and moment of silence for the following friends and colleagues who passed away during the triennium:

- P.V.S. Rama Rao (India)
- Thomas Dambolt (Germany)
- Ernst Dieter Schmitter (Germany)
- Andrzej Wladyslaw Wernik (Poland)
- Peter Antony Bradly (UK)
- Yury V. Chugunov (Russia)
- Staffan Ström (Sweden)
- Xueqin Huang (USA)

1. Results of Election of Vice Chair

Commission G held the election for Vice Chair during the 2nd business meeting. Three eminent scientists were nominated including:

- Giorgiana de Franceschi, INGV, Italy
- Michael Warrington, University of Leicester, UK
- Mamoru Yamamoto, Kyoto University, Japan

The votes were very close but we are pleased to announce that **Dr. Giorgiana de Franceschi** was elected Vice Chair of Commission G for the 2017-2020 triennium.

We thank all of the candidates for their generous offer to lead the Commission.

2. Results of Election of Early Career Representatives

Commission G also held the election for Early Career Representative. Three dynamic young scientists were nominated including:

- Sean Elvidge, Postdoctoral Fellow, University of Birmingham, UK
- Venkatesh Kavutarapu, Postdoctoral Fellow, Universidade do Vale do Paraibo, Sao Jose dos Campos, Brazil (originally from India)
- Joseph Olwendo, Lecturer, Pwani University, Kenya

The results of the vote revealed that **Dr. Sean Elvidge** will serve Commission G as an Early Career Representative of in the 2017-2020 triennium.

3. Appointment of Associate Editor for the *Radio Science Bulletin (RSB)*

Dr. Giorgiana de Franceschi, newly elected Vice Chair, will serve as the Associate Editor for the RSB.

4. Updates/Status of Working Groups

The following working groups are active. Full reports are included in the Chair's Triennium report.

- Ionosonde Network Advisory Group (INAG), report presented by Ivan Galkin (US)
 - Continued to sustain and expand community funded Global Ionosphere Radio Observatory (GIRO) that manages data from 100+ ionosondes worldwide.
 - 60 sites operate in real-time and provide input to the IRI-based Real-time Assimilation Model – providing global maps of density and height of the F2layer peak and profile parameters every 15 minutes.
 - More recent interests on using the network for TID detection and evaluation.
- Beacon Satellite Studies Group (BSS), report presented by Patricia Doherty (US)
 - Active in the exchange and dissemination of information with organizations of relevance –collaborations on request and carried out at conferences and other meetings
 - Held the 19th International Beacon Satellite Symposium 2016 at ICTP, Trieste, IT
 - Supported over 40 YS and students with external funds; 200 participants
 - The 20th International Beacon Satellite Symposium is planned for 2019 in Poland
- Incoherent Scatter Working Group, chairs not present but a report is included in the Triennium report
 - ISWG continues to coordinate the combined “World Day” operations for all global incoherent scatter radar facilities

- The Vice-chair will communicate with the chairs to determine their continued interest in supporting the working group.
- Seismo Electromagnetics (Lithosphere-Atmosphere-Ionosphere Coupling), report by Sergey Pulnits (Russia) – joint WG with Commissions E and H
 - Active in URSI related conferences – AT-RASC and Beacon Satellite Symposium
 - Won a contest and implemented the ESA Project INSPIRE
 - Currently working on 3 topics: physical mechanisms of pre-earthquake iono anomalies; statistical confirmation of the anomalies; technology development for automated detection.. Many papers have been published.
 - Dr. Pulnits proposed that this working group produce a technical handbook on detecting seismic activity using GNSS signals.
- USRI/COSPAR on International Reference Ionosphere (IRI), report presented by David Altadill (Spain)
 - Active group with 60+ researchers from 26 countries.
 - Currently working on a real-time IRI model
 - Workshop was held in Nov 2015 in Thailand – 120 participants including 35 students from southeast Asia.
 - Awards:
 - Bodo Reinisch received the International Kristian Birkeland Medal for Space Weather and Climate from the Norwegian Academy of Science
 - Dieter Bilitza received the first Karl Rømer Gold Medal from URSI
- Active Experiments in Space Plasmas, no report available at the time of the meeting but the group is active.

Note that:

- 1) some of the chairs have changed for the working groups. They are updated in the Chair's Triennium report and will be reflected on the website.
- 2) the working groups on Ionospheric Research to Support Radio Systems; Middle Atmosphere; and Atmospheric Remote Sensing using Satellite Navigation Systems are no longer active. These groups will be removed from the website.

Dr. Iwona Stanislawska also discussed the possibility to establish a new joint Commission Interdisciplinary Space Weather working group to include Commissions GJFEH. The attendees were in favor of this development.

5. Updates to Terms of Reference of Commission G

The terms of reference for Commission G, listed below, were reviewed and discussed. At this time, the Commission agrees that these terms continue to be relevant. No updates are recommended.

Scope: Ionospheric Radio and Propagation (including ionospheric communications and remote sensing of ionised media)

The goals of Commission G are to study the ionosphere and provide the broad understanding to support the use of radio by society on Earth and in Space

Specific areas of focus include:

- Observation of ionospheric structure, variability, coupling and trends at all relevant scales
- Modeling of the ionosphere to enable understanding and prediction of its properties
- Development of the tools, techniques, and instruments necessary to measure ionospheric properties
- Theory and practice of ionospheric radio propagation and scattering
- Applications to radio systems, global navigation, communication, space weather, and situations of global concern.

To further these objectives, the Commission collaborates within URSI and with other concerned organizations and scientific unions.

6. Meetings Proposed to be Supported in the Coming Triennium

The Commission anticipates providing support to URSI centered meetings in the coming triennium. As funds permit, this includes young scientist support to attend the flagship meetings AT-RASC, AP-RASC and GASS. Funds permitting, we may also support the IRI meetings in 2018 or 2019 and the Beacon Satellite Symposium in 2019. In the last triennium, the Commission also led and supported the multi-commission ICTP-URSI School in 2017. Funds permitting, we will try to plan and host a similar multi-commission school in the next triennium.

7. Comments on the Scientific Program of the Commission for the current GASS

The Montreal GASS program includes 23 sessions involving Commission G with approximately 400 abstracts from Commission G members. This was a welcome result for the program. There were some last minute cancellations but most of the sessions were well attended. There was considerable interest in the Workshop on Extreme Space Weather Environments. Unfortunately, some of the conveners were not able to attend. The Commission chairs thank Phil Wilkinson and Sean Elvidge for stepping in to expertly lead the workshop.

Feedback on Montreal GASS from Commission members was mostly positive including comfortable meeting rooms that were well lit and close by to each other. The technical program also received high praise. Negative comments were made about the on-line program being incorrect, the lack of wireless microphones in the presentation rooms, too many parallel sessions and the limited refreshments at the coffee breaks. Other suggestions were to eliminate Saturday morning sessions on the last day of the conference. Some also thought that 8AM was a bit too early to begin each day.

Comments were also made on the impressive tutorial by Tim Fuller-Rowell on “Will we ever be able to model and forecast the ionosphere well enough to support the needs of radio wave users?”. The Commission thanks Tim for this impressive tutorial.

8. Proposed Sessions for AT-RASC and GASS 2020

It is also important to note that the Commission held an active role in the URSI flagship meetings of AT-RASC in 2015 and AP-RASC in 2016. For AT-RASC in 2015, the Commission hosted 8 sessions with 102 oral presentations and 13 Young Scientist papers. For AP-RASC in 2017, there were 56 Commission papers in 11 sessions including joint sessions.

In preparation for the next AT-RASC meeting to be held in Gran Canaria on 28 May – 1 June, 2018, the Commission hopes to attract more participation from its members. Thus we have proposed more special sessions (listed under G.8 below) in addition to our general interest sessions G.1 – G.7:

- G.1 Ionospheric imaging
- G.2 Global morphology and modeling of the ionosphere
- G.3 Ionospheric modeling and data assimilation
- G.4 Radar and radio techniques for ionospheric diagnostics
- G.5 Space weather – radio effects
- G.6 Transionospheric radio propagation and systems effects
- G.7 Other
- G.8 Special sessions
 - S-G1 – Ionospheric impact on remote sensing: challenges and opportunities
Organizers: G. De Franceschi, L. Alfonsi, N. Bergeot
 - S-G2 – Progress in ionospheric modeling and data assimilation
Organizers: D. Bilitiza, B. Nava, D. Themens
 - S-G3 – Advances and challenges in the use of GNSS in ionospheric monitoring
Organizers: C. Rino, A. McCafferty
 - S-G4 – Advances in space-born GNSS receiver techniques for monitoring the topside ionosphere
Organizers: R. Langley, M. Hernandez-Pajares
 - S-G5 – Ionospheric response to the solar eclipse of 2017
Organizers: N. Jakowski, A. Coster
 - S-G6 – New advances in scintillation monitoring
Organizers: J. Morton, C. Mitchell
 - S-G7 – Sensor networks for ionospheric weather nowcast
Organizers: I. Galkin, A. Beleaki, C. Borries
 - S-GH – Meteors, collisional EMPs, and other highly-transient space plasma events
Organizers: A. Pellinen-Wannberg, J. Mathews, and M. Campbell-Brown
 - S-GE – Global Electric Circuit and the Ionosphere
Organizers: S. Pulinets, E. Mareev

Regarding the discussion on a program for GASS 2020

All agreed that it was too early to consider program development for special sessions. Thus, we will simply hold the discussion for another time. Meanwhile, for a placeholder we will use our general interest sessions listed above for the AT-RASC 2018 under G.1 – G.7.

9. Other Business

Proposal for an URSI Capacity Building Program

Dr. Iowna Stanislawski, Chair of Commission G, presented some thoughts on proposing an URSI Capacity Building program. The prime goal of this program is to attract young scientists to URSI. The actions suggested to reach this goal include URSI support to significantly reduce registration fees for Young Scientists (YS) for all 3 URSI flagship meetings; establishing special trainings in institutions which agree to access the URSI Capacity Building Program (example is COSPAR which could use URSI

support for YS expenses); seeking additional support funds from other organizations such as the United Nations; establishing YS interdisciplinary working groups guided by senior scientists of each Commission; and finally assisting YS and YS working groups in the development of proposals for funding from national agencies such as ESA, European Commission and NASA.

Dr. Stanislawska asked for Commission G members to send comments regarding this proposal. It would be presented to the Council in the 2nd Council meeting during the GASS.

Commission Resolutions sent to the Council

Two resolutions were sent to the council for consideration. Resolution 1 is from Commission G. Resolution 2 is from Commission G and H.

- 1) **Considering** the crucial importance of the ionosonde data record for the understanding of the long-term changes in Earth's ionosphere, and considering NOAA/NGDC's recent discontinuation of its SPIDR ionosonde data archive and service system, **be it resolved** that URSI Commission G recommends that URSI urges national agencies to ensure the archiving and long-term availability and accessibility of this valuable data source.
- 2) **Considering** 1) renewed interest in pursuing ionospheric heating and interaction science at Arecibo and HAARP in recent years, the results of which are presented time and again during Commission G and H sessions (joint or otherwise); 2) sponsorship by Commissions G and H of multiple vibrant and successful sessions on ionospheric modification in each of at least the last three URSI General Assemblies and Scientific Symposia; 3) that Commissions G and H actively support a Working Group on Active Experiments in Space Plasmas **be it resolved** that URSI Commissions G and H recognize the scientific value of active ionospheric experiments, including nonlinear wave-wave and wave-plasma interactions driven by high power radio transmitters, and strongly encourage the relevant funding bodies to support this research

Recognition to a Commission G Young Scientist

The Commission also presented a certificate and cash award to Dr. David Themens of the University of New Brunswick, Canada for conducting outstanding ionospheric research early in his career. Dr. Themens was a finalist for the URSI 2017 GASS student paper competition.

Handover to New Commission G Officers for 2017-2020 Triennium

Commission G business meetings concluded with the handover to the new officers. Following the handover, P. Doherty presented Iwona Stanislawska with a Certificate of Appreciation from Commission G.

Commission G Officers for the 2017-2020 Triennium

Chair: Patricia Doherty, Boston College, USA, Email: Patricia.Doherty@bc.edu
Vice-Chair: Giordiana de Franceschi, INGV, Italy, Email: Giordiana.deFranceschi@ingv.it
ECR (2nd term): Seebany Datta-Barua, University of Illinois, USA, Email: sdattaba@iit.edu
ECR (1st term): Sean Elvidge, University of Birmingham, UK, Email: s.elvidge@bham.ac.uk

Technical Advisory Committee (TAC)

P. Doherty explained the purpose of this committee and announced that the following people have agreed to support Commission G as part of the technical advisory committee. She also asked that the Commission G members advise the Chair, Vice Chair and ECRS at any time. The TAC includes:

Ivan Galkin, University of Massachusetts, USA

Dieter Bilitza, George Mason University, USA

Andrzej Krankowski, University of Warmia and Mazury, Poland

Mamoru Yamamoto, Kyoto University, Japan

Natasha Jackson-Booth, QinetiQ, UK

Bruno Nava, ICTP, Italy

John Bosco Harabulema, SANS, South Africa