Commission GASS 2026 Report
Commission G

The Commission Coordination Activities (CCA) meetings for Commission G took place during the 2026 GASS in Kraków, Poland on Monday August 17th and Friday August 21st from 1800 to 1900 CEST.

Dr. Keith Groves, Chair of Commission G 2023-2026, led the first meeting and turned over the second meeting to Prof. Sean Elvidge, Chair for the 2026-2029 triennium. The meetings were exceptionally well attended, filled with lively and thoughtful discussion. The Commission G CCA meetings included a remembrance and moment of silence for the following friends and colleagues who passed away during the triennium:

- Bertram Arbesser-Rastburg (1951-2025)
- Sunanda Basu (1940-2026)
- Martin Friedrich (1945-2023)
- John Matthews (1947-2024)
- John MacDougall (1937-2026)
- Andrei Mikhailov (1945-2026)
- Kathryn McWilliams (1972-2025)
- Bodo Reinisch (1936-2025)
- Artur Yakovets (1940-2025)
- Yuri Yampolski (1946-2025)

There was a particular focus on the memory of Sunanda Basu, who passed away on August 18th, an internationally recognized physicist and pioneer in space physics, renowned for her cutting-edge research in ionospheric scintillation and ionospheric space weather. She endowed a gold medal and prize in memory of her husband Santimay, to be given to an early-career scientist at the GASS and established the Sunanda and Santimay Basu Chair for teaching and research in astrophysics at Ashoka University in India. A biography of these colleagues is provided in the URSI Commission G Triennial Report (2023–2026).

1. Elections of New Commission Officers

Voting for the new Commission G Vice-Chair (VC) and Early Career Representative (ECR) was conducted entirely online this triennium. Two excellent candidates for VC were nominated:

- Sigrid Elschot (USA),
- Haiyang Fu (China),

and three for ECR:

- Danielle Edwards (Australia),
- Marco Guerra (Italy),
- Giorgio Arlan da Silva Picanço (USA).

We are pleased to announce that Prof. Sigrid Elschot was elected as Vice-Chair of URSI Commission G for the 2026-2029 triennium, and Danielle Edwards as the ECR for 2026-2032. They join Prof. Sean Elvidge (Chair, 2026-2029) and Dr. David Themens (2nd ECR term, 2026-2029).

2. Review of Terms of Reference

The Commission G Terms of Reference remain unaltered for this triennium:

"The Commission deals with the study of terrestrial and extra-terrestrial ionospheres in order to provide the broad understanding necessary to support space and ground-based radio systems. Specifically, the Commission addresses the following areas:

- Global morphology and modelling of the ionosphere;
- Ionospheric space-time variations and the impacts of space weather on systems;
- Development of tools and networks needed to measure ionospheric properties and trends;
- Theory and practice of radio propagation in and through the ionosphere;
- Application of ionospheric information to radio systems.

To achieve these objectives, the Commission co-operates with other URSI Commissions, corresponding bodies of the ISC family (IUGG, IAU, COSPAR, SCOSTEP, SCAR, etc.) and other organizations (ITU, IEEE, etc.)."

3. Any changes/confirmation in Working Groups and other organizations

Commission G is fortunate to have a broad and active community which is demonstrated, at least in part, by our Commission Working Groups. Full reports are provided in the URSI Commission G Triennial Report (2023–2026), with only brief summaries of the WGs provided here:

Ionosonde Network Advisory Group (INAG)

INAG supports the international ionosonde community by coordinating observations, promoting common standards, and encouraging the exchange and effective use of ionosonde data. It provides a forum for addressing technical and scientific issues associated with ionosonde networks, instrumentation and data products, while helping to maintain the long-term value of these observations for ionospheric research and space weather applications.

Studies of the Ionosphere Using Beacon Satellites

The Beacon Satellite WG promotes and coordinates studies of the ionosphere using radio signals transmitted by satellite beacons, including measurements of total electron content, scintillation and other propagation effects. The group brings together researchers using beacon observations to improve understanding of ionospheric structure, variability and disturbances, and encourages international cooperation in observations, analysis techniques and scientific applications.

Incoherent Scatter Radar

This WG provides an international forum for the incoherent scatter radar community, supporting coordination between facilities and the development and exploitation of incoherent scatter observations. These radars provide detailed measurements of key ionospheric parameters, and the group encourages collaborative experiments, methodological development and the use of observations to address ionospheric and geospace science questions.

Capacity Building and Training
The Capacity Building and Training WG aims to strengthen the international ionospheric and radio-science community through education, training and capacity-building activities. Particular emphasis is placed on supporting students, early-career researchers and communities in regions where access to specialist expertise or infrastructure may be limited, helping to broaden participation and develop sustainable scientific capability.

URSI-COSPAR International Reference Ionosphere (IRI) WG
The IRI Working Group, jointly sponsored by URSI and COSPAR, develops and maintains the International Reference Ionosphere (IRI), the internationally recognised empirical standard model of the ionosphere. The group coordinates the incorporation of new observations and scientific understanding into successive versions of IRI, evaluates model performance, and supports its wide use across research, engineering and operational applications.

IAGA-URSI Geospace Data Assimilation Working Group (GeoDAWG)
GeoDAWG is a joint IAGA–URSI working group focused on advancing the use of data assimilation across geospace science. It brings together observational, modelling and data-assimilation communities to exchange methods, establish good practice, identify common challenges, and improve the integration of diverse observations with models of the ionosphere, thermosphere and wider geospace environment.

Joint GJFEH: Interdisciplinary Space Weather
The Interdisciplinary Space Weather Working Group provides a cross-disciplinary forum connecting the different scientific communities needed to understand and address space weather. It promotes collaboration across solar, magnetospheric, ionospheric and atmospheric science, together with radio science and relevant applications, with an emphasis on linking physical understanding and observations to the impacts and practical challenges associated with space weather.

Three working groups have not provided updates since the 2021 GASS and Commission G is no longer involved in these groups. Following a vote at the CCA meeting, Commission G agreed to withdraw from:

- EHG: Solar Power Satellites
- GEH: Seismo Electromagnetics (Lithosphere-Atmosphere-Ionosphere Coupling)
- EFGHJ: RFI Mitigation and Characterization on Remote Sensing and Radio Astronomy

4. Technical Advisory Committee

Throughout the last triennium Commission G has not used a formal Technical Advisory Committee (TAC), instead relying on its experienced Commission Officers as well as the Chairs, and Vice-Chairs, of its Working Groups. The same approach is proposed to be used throughout the coming triennium.

5. Preparation of Future Meetings/Identification of meetings to be supported (cfr. Commission budget)

Within the last triennium Commission G has financially supported the following meetings:

- VERSIM 2026 Workshop in Sopron, Hungary (€1000)
- IRI 2024 Workshop in Kilifi, Kenya (€2000)
- MST16/iMST3 (2024) in Rostock, Germany (€1000)
- International Magnetosphere Coupling IV Workshop (2024) in Potsdam, Germany (€500)
- Beacon Satellite Symposium 2025 in Rome, Italy (€2000)
- MaSAG25 in L'Aquila, Italy (€1000)

- ISEA17 (2026) in Liberia, Costa Rica (€2000)

Additionally, Commission G provided partial travel support (€500-1000) to young scientists to enable their participation in flagship meetings as follows:

- 2024 AT-RASC 1 person (UK), Total: €500
- 2025 AP-RASC 2 persons (India, Ukraine), Total: €1396
- 2026 GASS 1 person (India), Total: €1000

Within the next triennium the Commission anticipates again providing support to young scientists to attend URSI's flagship meetings, as funds permit. We also expect to support the major international meetings of our Working Groups including the IRI Meetings, Beacon Satellite Symposium, and GeoDAWG. The Commission also hopes to have additional support for early career scientists to attend smaller meetings and workshops which address topics covered by the Commission G Terms of Reference.

6. Report and comments on the scientific program of the Commission for the current GASS

At the Kraków GASS Commission G was once again well represented, with 235 paper submissions (the second highest overall), making up 17.2% of all submissions (we had 17.8% at GASS 2023 and 18.2% at GASS 2021). In total there were 23 sessions involving Commission G, with 14 of those being solely by Commission G – these sessions were very well attended.

Commission G only sessions:

- G01: Novel radio instruments and techniques for Space Weather model validation and assimilation – 15 oral papers, 1 poster
- G02: International Beacon Satellite Studies – 10 oral papers, 2 posters
- G03: Ionosondes in their distributed, coordinated, advanced measurement modes – 9 oral papers, 4 posters
- G04: International Reference Ionosphere: Improvement, Validation and Usage – 17 oral papers, 1 poster
- G05: Thermosphere-Ionosphere Coupling Under Disturbed and Quiet Geomagnetic Conditions – 17 oral papers, 1 poster
- G06: LEO topside and radio occultation measurements for ionosphere and plasmasphere estimation and modelling – 13 oral papers, 0 posters
- G07: The High Latitude Atmosphere – 15 oral papers, 2 posters
- G08: Monitoring Global Space Weather with the International Meridian Circle Program – 21 oral papers, 3 posters
- G09: Machine Learning methods for ionospheric modelling – 9 oral papers, 2 posters
- G10: Advances in Irregularities and Scintillation Studies – 22 oral papers, 1 poster
- G11: HF Radar Applications: Modelling, Observations, Phenomenology, and Propagation – 12 oral papers, 4 posters
- G12: Open Session – 9 oral papers, 1 poster
- G13: Ionospheric Space Weather: From Scientific Understanding to Operational Services – 21 oral papers, 3 posters
- G14: Natural and Anthropogenic Sources of Transient Plasmas and Radio Emissions in the Near-Space Environment – 7 oral papers, 0 posters

Common sessions with other commissions, led by Commission G:

- GF: Electromagnetic Seismic precursors and radio remote sensing of Earth – 6 oral presentations, 2 posters
- GH: Planetary Space Weather – 2 oral presentations, 1 poster

Joint sessions involving Commission G led by other Commissions:

- EFGH: Natural electromagnetic noise and radio sensing applications terrestrial and planetary environment
- FG: Innovations in space surveillance and environmental interaction
- HG1: Small satellites, orbital experiments and new instruments for near-earth space science
- HG2: Active experiments in Space Plasmas
- HGE: Atmospheric, ionospheric, magnetospheric, and high energy effects of lightning discharges
- HGJ: Panel Discussion for Early Career Researchers
- JG: Mutual benefit between radio astronomy and ionospheric science

In addition to these sessions, the Commission also organised a training workshop on "Ionosonde Scaling", which was well attended. The Commission Chairs thank Tobias Verhulst, Ivan Galkin, David Themens and Austin Egert for their exceptional work in preparing and delivering this invaluable workshop. We are delighted that they will run it again at the AT-RASC 2027 meeting. The Commission would also like to thank David Themens for delivering the tutorial 'Being responsible in the age of Big Data: Remote sensing the ionosphere and magnetosphere'. In this dawning age of AI, with machine-learning models increasingly prominent, this excellent tutorial on the appropriate use of data was particularly timely and well received. The Commission was especially fortunate this GASS, with a second tutorial, on "Refraction versus Diffraction: A Multiscale Perspective on Ionospheric Scintillation" by Luca Spogli which was widely praised for its clarity of thought and description of ionospheric scintillation.

There were some initial challenges with the conference centre for Commission G, with our 'second' room for parallel sessions being far too small to hold the number of people who wanted to attend them. However, thanks to hard (and fast) work by the venue staff a workable solution was found, moving us to a different room with much larger capacity. Overall feedback on the Kraków GASS was positive, with many members commenting on the excellent and well-attended program. Some comments were made about the inclusion of recorded talks in the oral program – many felt that the session chairs should decide if they would allow this, or rather move a poster presentation to an oral slot if necessary. As has been mentioned in previous GASS reports, some comments suggested that Saturday morning sessions should be removed since they are poorly attended compared with other sessions throughout the week.

Finally, the Commission was delighted that Anthea Coster, a very active and supportive member of Commission G was awarded the Appleton prize during the GASS for "pioneering research in GNSS [Global Navigation Satellite System] science, developing techniques to provide global-scale view of storm responses in the ionosphere, operationalizing novel algorithms, and providing novel ionospheric products to the community."

7. Proposed sessions and conveners for AT-RASC 2027

Commission G has always had a large and active presence at AT-RASC meetings, and we expect the same at the fifth edition in 2027. To ensure that our Session list remains current and representative of the Commission's interests, during the GASS we 'disbanded' all sessions and asked people (in the room and via the mailing list) to suggest which sessions they would like to see at AT-RASC 2027 via an online form. This online form remained open until Friday morning when the Commission Officers went

through the list, merged similar suggestions, and made recommendations to the proposers about additional conveners to increase diversity (in nationality, gender and career status).

The current draft list of sessions for AT-RASC 2027 from Commission G is therefore:

- G01 - Ionosondes in their distributed, coordinated, advanced measurement modes - Ivan Galkin, Tobias Verhulst
- G02 - International Beacon Satellite Studies - Bruno Nava, Andrzej Krankowski, Seebany Datta-Barua
- G03 - In-Situ Measurements of the Ionosphere - Junk Wilson, Jonah Colman
- G04 - Forecasting the Ionosphere - Sean Elvidge, Keith Groves
- G05 - HF Modelling, Observations and Propagation - Joseph Malins, Kate Zawdie, Dima Paznukhov, Joshua Ruck
- G06 - Thermosphere-Ionosphere Coupling Under Disturbed and Quiet Geomagnetic Conditions - Dario Sabbagh, Loredana Perrone
- G07 - Machine Learning methods for ionospheric modelling - Ivan Galkin, Yenca Migoya-Orue, Matthew Proctor, Claudio Cesaroni
- G08 - The High Latitude Atmosphere - Liliana Macotela, Ralph Latteck, Giorgiana De Franceschi, Wojciech Jacek Miloch, Lucilla Alfonsi
- G09 - Towards Ionospheric Space Weather applications and services - Vincenzo Romano, Iwona Stanislawska, Anthea J Coster
- G10 - Travelling Ionospheric Disturbances: From Modelling to Nowcasting and Forecasting - Marco Guerra, David Altadill, Sivakandan Mani, Zama Katamzi-Joseph
- G11 - Novel radio instruments and techniques for Space Weather model validation and assimilation - David Themens, Pauline Teysseyre, Victoriya Makarevich
- G12 - Advances in Irregularities and Scintillation Studies - Daria Kotova, P. T. Jayachandran, Kshitija Deshpande, Rebecca Ghidoni, Luca Spogli
- G13 - International Reference Ionosphere: Improvement, Validation and Usage - Andrzej Krankowski, Ivan Galkin, Dieter Bilitza
- G14 - LEO topside and radio occultation measurements for Ionosphere: data provision, Retrievals, Tomography, Data Assimilation, and Machine Learning - Mainul Hoque, Riccardo Notarpietro, Manuel Hernandez Pajares, Tibor Durgonics

We are also keen to “rejoin” three joint sessions, proposed and led by Commission H:

- HG01 - Small Satellites, suborbital experiments and new instruments for near-Earth space science
- HG02 - Atmospheric, ionospheric, magnetospheric and high energy effects of lightning discharges
- HG03 - Active experiments in space plasmas

8. Other Business

Noting the United States National Committee’s resolution 2026 R.07 “Establishment of the International Antennas and Electromagnetics Day” Commission G proposes an amendment to the resolution, moved by Pasha Ponomarenko and seconded by Anthea Coster, to rename it “International Radio Science Day” so that it more broadly encompasses the range of activity done by URSI.

The Commission also notes that the URSI website is an important resource for the community, but we feel it could be used more effectively by being modernised, easier for Commissions to update directly, and better able to provide resources for established Working Groups

Commission G Officers for 2026-2029:
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ECR (2nd term): David Themens, University of Birmingham, UK, email: d.r.themens@bham.ac.uk
ECR (1st term): Danielle Edwards, Defence Science and Technology Group / University of Adelaide, Australia, email: danielle.edwards@adelaide.edu.au