



Commission H

2014-2017 Triennial Report

I. In Memoriam

James Wynne Dungey (1923 – 2015) died on May 9th 2015. He is best known for his work on magnetospheric phenomena and geospace. He laid the foundation for our current understanding of solar-terrestrial coupling. He used his concept of “magnetic reconnection” to introduce the open magnetosphere model.

Maha Ashour-Abdalla (1944 - 2016) a professor of physics with expertise in space plasma physics and a passion for teaching, died on May 1, 2016. Maha Ashour-Abdalla was born and raised in Alexandria, Egypt. Maha excelled in mathematics and finished high school very young: She was in college at age 15. After completing her B.Sc. at Alexandria University in 1964, she pursued graduate studies at Imperial College in London where she was awarded her Ph.D. in 1971. She then became a research scientist at the Centre National d’ Etudes des Telecommunications in France, before moving to Los Angeles where she was a geophysics researcher in the UCLA Institute of Geophysics and Planetary Physics from 1976-1985. Maha was appointed as a Professor in the UCLA Department of Physics and Astronomy in 1985. She was elected a Fellow of both the American Physical Society (1986) and the American Geophysical Union (1993).

Richard ("Dick") Dowden died in Dunedin, New Zealand on 15 December 2016, after a short illness. Through his long career he worked on multiple different scientific topics spanning all the electromagnetic frequency range from ULF to HF. Near the start of this he worked at Macquarie Island just before the International Geophysics Year. Professor Dowden was an active member of the international scientific community, a member of the American Geophysical Union since 1966, Fellow of the Institute of Physics (UK) in 1968, Fellow of the Royal Society of New Zealand since 1983, and Fellow of the American Geophysical Union since 2003. He served as Vice President of the URSI from 1987-1993. Richard Dowden was one of the foremost geophysicists in the Oceania region. As such he was strongly involved in the organization of international meetings held inside this region, and served as the regional editor of the Journal of Atmospheric and Solar Terrestrial Physics (1990-1998). After retiring from the University of Otago in New Zealand in 1998, he remained scientifically active for more than a decade. In that period he developed the idea behind the "TOGA technique", which is at the heart of the global real-time World Wide Lightning Location Network (WWLLN).

Pierre Kaufmann passed away on Feb 17th, 2017 in São Paulo, Brazil. In addition to being a full professor at the Mackenzie Presbyterian University, he was also a part-time researcher at the Center for Semiconductor Components, CCS, at UNICAMP. Member of the Brazilian Academy of Sciences (ABC); Member of the Academy of Sciences of the State of São Paulo; Member of the Inamori Foundation Award nomination Committee, Kyoto, Japan, and associate member of the Royal Astronomical Society (UK).

II. Meeting Support

During the 2014-2017 triennium, Commission H spent 5000 EUR to support the following meetings financially (mode B) with a contribution between EUR 1000 – 2000:

1. URSI-ICTP School, URSI-ICTP School on Radio Physics, Miramare, Trieste, Italy, 27-31 March 2017
2. VERSIM VLF/ELF Remote Sensing of Ionospheres and Magnetospheres Workgroup Hermanus, Western Cape, South Africa, 19-23 September 2016
3. Geospace Revisited , Rhodes, Greece, 15-20 September 2014

Commission H also provided support in mode A (without financial aid) for the following meetings:

1. CEM'17, Computing and Electromagnetics International Workshop, Barcelona, Spain 21-24 June 2017
2. 3rd URSI – RCRS, URSI Regional Conference on Radio Science 2017, Tirupati, Andhra Pradesh, India, 1-4 March 2017
3. SCOSTEP/ISWI, SCOSTEP/ISWI International School on Space Science, Sangli, India, 7-17 November 2016
4. ISAP 2016, 2016 International Symposium on Antennas and Propagation, Okinawa, Japan, 24-28 October 2016
5. RFI 2016, Radio Frequency Interference 2016, Socorro, NM, USA, 17-20 October 2016
6. RADIO 2016, IEEE Radio and Antenna Days of the Indian Ocean 2016, Réunion Island, 10-13 October 2016
7. ICEAA 2016, Eighteenth edition of the International Conference on Electromagnetics in Advanced Applications, Cairns, Australia, 19-23 September 2016
8. EMTS 2016, 2016 URSI Commission B International Symposium on Electromagnetic Theory, Espoo, Finland, 14-18 August 2016
9. MMET 2016, 16th International Conference on Mathematical Methods in Electromagnetic Theory, Lviv, Ukraine, 5-7 July 2016
10. MSMW 2016 and TeraTech 2016, 9th International Kharkiv Symposium on Physics and Engineering of Microwaves, Millimeter and SubMillimeter Waves and Workshop on Terahertz Technologies, Kharkiv, Ukraine, 20-24 June 2016
11. URSI-RCRS 2015, 2nd URSI Regional Conference on Radio Science, New Delhi, India, 16-19 November 2015
12. CEM'15, Computational Electromagnetics International Workshop, Izmir, Turkey, 2-4 July 2015
13. International Conference on Foundations and Frontiers of Computer, Electrical Engineering : commemorating 150 years of Maxwell's Equations, Hooghly, West Bengal, India, 9-10 January 2015

III. Working Group Activities

III.1. Working Group of Commissions H and J: Computer Simulations in Space Plasmas

Co-Chairs for Commission H : Y. Omura (Japan) and B. Lembège (France)

Report received from B. Lembège

Activity of this working group between August 2014 and August 2017 can be summarized as follows :

- a) Sessions at URSI 2014 (Beijing) and URSI 2017 (Montreal).
 - b) International School for Space Simulation has been organized during summer 2015 (ISSS-12, Prague, Czech Republic). The next one ISSS-13 will be organized in UCLA (USA) in summer 2018.
- The group plans to continue to be active in the next triennium.

III.2. Working Group of URSI and IAGA: VLF/ELF remote Sensing of the Ionosphere and Magnetosphere (VERSIM)

Co-Chair for URSI Commissions H and G: M. Clilverd (UK)

Co-chair for IAGA: J. Bortnik (USA)

Report received from J. Bortnik

This very active group aims to promote research in the ELF/VLF field by facilitating the exchange of ideas, information and experience between active research workers and other interested scientists. This is done through regular meetings at IAGA and URSI Assemblies, a VERSIM workshop held every 2 years, and the publication of an end-of-year newsletter that summarizes member activity. The group has also been active in sponsoring scientific symposia at IAGA and URSI Assemblies, in areas relevant to its field of interest, and in coordinating observational campaigns. At present the main subjects of interest include Plasma structures and boundaries - morphology and dynamics, Wave-particle and wave-wave interactions, Wave-induced particle precipitation, Wave propagation in magnetosphere and ionosphere, Sprites and the effects of lightning on the ionosphere. There are currently over 150 scientists from about 26 different countries on the VERSIM mailing list. The VERSIM WG maintains a website which is currently hosted by IAGA here:

http://www.iugg.org/IAGA/iaga_ursi/versim/index.html

VERSIM hosted its 7th biennial workshop in Hermanus, South Africa, over the period 19-24 Sept 2016. The workshop attracted 55 participants from 16 different countries, and accommodated 69 abstracts. The workshop was held in conjunction with a radiation belt meeting, devoting the last 2-3 days to synergistic discussions of wave-particle interactions involved in radiation belt physics. A historical overview of the VERSIM group by Prof. Craig Rodger was recorded and hosted here:

https://www.youtube.com/watch?v=27Xf8k7_jzQ.

III.3. Working Group of Commissions E,G, and H: Seismo-Electromagnetics (Lithosphere-Atmosphere-Ionosphere Coupling)

Report by Co-chair for Commission H: H. Rothkaehl (Poland)

Members of the working group finished and successfully reported the ESA EMITS project "IoNosphere Sounding for Pre-seismic anomalies Identification Research" (INSPIRE). The INSPIRE project was dedicated to the study of physical processes and their effects in ionosphere which could be determined as earthquake precursors together with detailed description of the methodology of investigation of ionospheric pre-seismic anomalies. The detailed classification of the pre-seismic

anomalies was presented in different regions of the ionosphere and signatures of the pre-seismic anomalies as detected by ground and satellite based instruments were described what clarified methodology of the precursor identification from ionospheric multi-instrumental measurements. The results of INSPIRE project have demonstrated that the ionospheric anomalies registered before the strong earthquakes could be used as reliable precursors. INSPIRE consortium highlights that for the short time forecast model, it is important to have access for real-time data of rapid changes of the key ionospheric and meteorological precursors.

III.4. Working Group of Commissions EHG on Solar Power Satellites

Co-chair for Commission H: K. Hashimoto (Japan)

No reports on activities of this WG have been received.

III.5. Working Group of Commissions G and H on Active experiments in Space Plasmas

Report by Co-Chair for Commission H: M. Kosch (South Africa)

The EISCAT Heater has recently received a technical upgrade to permit frequency modulation schemes, see Rietveld et al., Radio Science, doi:10.1029/2016RS006093, 2016. Significant experimental progress has been made on the theoretically unexpected artificial optical emissions from X-mode pump waves. The Arecibo heater performed its first scientific experiments in 2016. The HAARP heater has been taken over by the Geophysical Institute at University of Alaska, Fairbanks, and the first experiments under new management were executed in 2017. The Sura heater in Russia continues to operate. The South African National Space Agency hosted the 7th VERSIM VLF workshop in conjunction with the Radiation Belt Symposium in Hermanus 19-24 September 2016. The meeting attracted about 60 participants

III.6. Working Group of Commissions E, F, G, H and J on RFI Mitigation and Characterization

Report by Co-chair for Commission H: H. Rothkaehl (Poland)

Radio Frequency Interference (RFI) has become a critical issue for many users of the electromagnetic spectrum. This is especially true for observational sciences such as radio astronomy, microwave remote sensing of the Earth, and Solar and ionospheric studies where highly sensitive measurements are necessary. The most important event of the time was the organization of the conference "Coexisting with Radio Frequency Interference" RFI 2016 hosted by NRAO in Socorro, New Mexico, USA during October 17-20, 2016. RFI 2016 brought together around 100 scientists and engineers from all horizons to discuss the impact of Radio Frequency Interference in Astronomy, Earth Remote Sensing, and other passive or active fields exploiting the electromagnetic spectrum.

IV. Preparations for the XXXIInd URSI General Assembly and Scientific Symposium in Montreal, Canada, 19-26 August 2017

IV.1. Scientific Sessions

Commission H has arranged:

1. Macro/micro-scale kinetic processes at natural boundary layers in terrestrial and planetary environments - 13 oral presentations, 7 posters
2. Remote Sensing and Modeling of the Earth's Plasmasphere and Plasmopause:- 9 oral papers, 1 poster

3. Wave-particle Interactions and Their Effects on Planetary Radiation Belts- 21 oral presentations, 6 posters
4. Drivers, detection, and ionospheric impacts of precipitation from the radiation belts - 10 oral papers, 2 posters
5. Radio Science for Space Weather- 8 oral papers
6. Open Session and latest results - 12 oral papers, 6 posters

Common sessions with other commissions, lead by Commission H:

1. Joint HJ session on Solar, Planetary, and Heliospheric Radio Emissions- 27 oral papers, 12 posters
2. Joint HG session on Active experiments and radio sounding - 15 oral presentations, , 2 posters
3. Joint HGE session on Atmospheric, Ionospheric, Magnetospheric and High Energy Effects of Lightning Discharges -26 oral papers, 6 posters

Other sessions related to Commission H:

1. Joint GEH session on Seismo Electromagnetics (Lithosphere-Atmosphere-Ionosphere Coupling) – 19 papers
2. Joint EFGH session on Natural Electromagnetic Noise and Radio Sensing Applications in Terrestrial and Planetary Environments - 16 papers
3. Joint GH session on Meteors, collisional EMPs, and other Highly-Transient Space Plasma Events – 12 papers
4. Joint GH session on Plasma Instabilities in the Ionosphere – 12 papers
5. Joint JFGH session Characterisation and Mitigation of Radio Interference – 14 papers
6. Joint EFGHJ workshop on RFI Mitigation and Characterization – 11 papers
7. Joint GHJ Workshop on Extreme Space Weather – 15 papers

IV.2. Total number of papers and trends from the last GASS

For the upcoming URSI GASS in Montreal Commission H accepted 183 papers (141 oral presentations and 42 posters). Every effort has been made to maximize the number of scheduled oral presentations. There is a substantial increase of the total number of papers compared to the last URSI GASS in Beijing in 2014 where Commission H accepted 132 papers (93 oral presentations and 39 posters), as well as to the preceding URSI GASS in Istanbul in 2011 where Commission H accepted 144 papers (86 oral presentations and 58 posters).

With additional 99 papers in sessions organized by other commissions with participation of our commission the total number of Commission H related papers for the Montreal meeting jumps to 282.

IV.3. Tutorial Lecture

Commission H tutorial lecture on “Drivers, detection, and wider significance of precipitation from the radiation belts” will be given by Prof. Craig J. Rodger from The University of Otago, Dunedin, New Zealand.

IV.4. Young Scientist Awards

The 2017 Young Scientists Awards will be given to 12 young scientists from Commission H:

Dr. Chen Zhou (CHINA CIE), Dr. David PISA (Czechia), Dr. Lilla Juhasz (HUNGARY), Dr. Rubia R.(INDIA), Dr. Israel Silber (ISRAEL), Dr. Masahiro Kitahara (JAPAN), Dr. Yuko Kubota(JAPAN), Dr. C. Martinez-Calderon (JAPAN), Dr. Emma Douma (NEW ZEALAND), Dr. Evgenii Shirokov (RUSSIA), Dr. Vratislav Krupar (USA), Dr. Ali H. Sulaiman (USA). Two of these young scientists are being considered for an additional grant from URSI to cover part of their travel expenses to the 2017 General Assembly and Scientific Symposium. Congratulations to all awardees!

IV.5 Student Paper Competition

Eleven student papers were submitted through Commission H. After the review process, one of the submitted papers will be selected for the final round of the competition where the students present their work during the 2017 General Assembly and Scientific Symposium.

V. Recipients of the URSI Awards 2017 related to Commission H

Appleton Award– Yoshiharu Omura

For significant contributions to nonlinear wave-particle interaction theory, simulations of chorus and ion cyclotron emissions and the associated acceleration and precipitation of relativistic electrons in the radiation belts.

Rawer Award – Dieter Bilitza

For leading the development of the empirical International Reference Ionosphere (IRI) climatology model and making it the international ISO standard, and for advancing the Real-Time Assimilative IRI model.

Basu Award– Jamesina Simpson

For advancing three-dimensional finite-difference time-domain (FDTD) solutions of electromagnetic wave propagation within the global Earth-ionosphere waveguide applied to space weather, remote-sensing, and very low-frequency propagation.

The President's Award – W Ross Stone

For his leadership as the Assistant Secretary General for Publications, his editorship of the Reviews of Radio Science and the Radio Science Bulletin, and for his pivotal roles in the organisation of many GASS.

The URSI awards will be presented to the awardees during the Opening Ceremony of the 2017 General Assembly and Scientific Symposium. Congratulations to all awardees!

VI. Commission H Vice Chair Election

The call for nominations for the new Commission H Vice Chair was sent out on January 1, 2017. Six excellent candidates have been nominated and a group of four candidates have been selected by an ad-hoc committee composed of former Commission H Chairs for the election by Official Members of Commission H. Voting is now in progress. The final vote counting will take place during the second Commission H business meeting, which will be held on Wednesday, August 23, 2017 at the URSI GASS in Montreal, Canada.

VII. Election of the Commission H Early Career Representative

The call for nominations for the second Commission H Early Career Representative was sent out on January 1, 2017. Four excellent candidates have been nominated and voting is in progress. The final vote counting will take place during the second Commission H business meeting, which will be held on Wednesday, August 23, 2017 at the URSI GASS in Montreal, Canada.

I would like to take this opportunity to thank the Commission H Vice-Chair János Lichtenberger, the Commission H Early Career Representative Wen Li, as well as the Commission H past Chair Yoshiharu Omura, for their valuable advice and support during the last triennium.

Ondrej Santolik,
Chair, Commission H