



Commission H

2011-2014 Triennial Report

A. In Memoriam

Vladimir Fiala, former Chair of the URSI Commission H, died in Prague on September 8, 2012 at the age of 74. His research interests were in the theoretical space plasma physics, antenna-plasma interactions, and propagation and excitation of plasma waves. He had a gift to share his enthusiasm with colleagues and students and was always ready to help. Dr. Fiala was elected Vice-Chair (1993) to become the Chair (1996-99) of the URSI Commission H and worked also as the President of the Czech National Committee of URSI.

B. Meeting Support

During the 2011-2014 triennium, 9000 EUR has been allocated to each Commission to be spent for the support of meetings and the attendance at the GASS. Commission H spent 6000 EUR to support the following meetings financially (mode B) with a contribution between EUR 1000 – 2000:

1. ISROSES II - International Symposium on Recent Observations and Simulations of the Sun-Earth System II, Borovets, Bulgaria, 11-16 September 2011
2. VERSIM 2012 - 5th VLF/ELF Remote Sensing of Ionosphere and Magnetospheres Workshop 2012, Sao Paulo, Brazil, 2-8 September 2012
3. AP-RASC'13 - 2013 Asia-Pacific Radio Science Conference, Taipei, China SRS, 3-7 September 2013
4. VERSIM 2014 - 6th VLF/ELF Remote Sensing of Ionosphere and Magnetospheres Workshop 2014, Dunedin, New Zealand, 20-23 January 2014

Commission H has also allocated EUR 3000 to support participation of selected lecturers at the URSI GASS 2014. Propositions to support the presenters of papers in the Commission H-lead sessions were solicited from all session conveners. With only 3 propositions received, the Commission Chair and Vice-Chair have decided to support the participation of all three proposed distinguished colleagues.

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

1. ICEAA-APWC 2011, Torino, Italy, 12-17 September 2011
2. IRI 2011 Workshop, Hermanus, South Africa, 10-14 October 2011
3. ISEA 13 - 13th Int. Symp. On Equatorial Aeronomy, Paracas, Peru, 12-17 March 2012
4. AES 2012, Paris, France, 16-19 April 2012
5. META'12 - 3rd International Conference on Metamaterials, Photonic Crystals and Plasmonics, Paris, France, 16-19 April 2012
6. 39th COSPAR SA 2012 - Sessions D3.1 and PCB.1, Mysore, India, 14-22 July 2012
7. ICTRS 2012 - First Int. Conf. On Telecommunications and Remote Sensing, Sofia, Bulgaria, 29-31 August 2012
8. ICEAA - International Conference on Electromagnetics in Advanced Applications, Cape Town, South Africa, 2-8 September 2012
9. RADIO 2012 - Radio and Antenna Days of the Indian Ocean, Mauritius, 24-27 September 2012
10. ISAP2012 - 2012 International Symposium on Antennas and Propagation, Nagoya, Japan, 29 October 29 - 2 November 2012
11. ISSS-11 - 11th International School/Symposium for Space Simulations, Zhongli City, China SRS
12. Galileo Science Symposium, Prague, Czech Rep., 4-6 December 2013
13. Regional Conference in Radio Science, Pune, India, 2-5 January 2014
14. COSMOS - COSPAR 2014, Moscow, Russia, 2-10 August 2014
15. ICEAA - IEEE APWC conference, Aruba, 3-9 August 2014

C. Working Group Activities

C.1. Working Group of Commissions H,E, and J: Computer Simulations in Space Plasmas

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

The URSI WG of Computer simulations in Space Plasmas has contributed to organization of the ISSS-11 (The 11th International School/Symposium for Space Simulations), which was successfully held at Zhong Li, Taiwan, on July 21-28, 2013. A detailed conference report will be published in Radio Science Bulletin. The next meeting of the ISSS series will be held in July 2015 in Prague.

C.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: J. Lichtenberger (Hungary)

Co-chair for IAGA: C. J. Rodger (New Zealand) - until 2013; J. Bortnik (USA) – from 2013

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 regular VERSIM community workshop, and via the circulation of a newsletter. 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 100 scientists from about 26 different countries on the VERSIM mailing list. The VERSIM WG maintains a website which is currently hosted by the institution of the past VERSIM Co-chair C. J. Rodger at <http://www.physics.otago.ac.nz/versim/>). A VERSIM newsletter is regularly posted on this website. Two VERSIM workshops have been organized during the last triennium:

5th VERSIM Workshop, Sao Paulo, Brazil, 3-6 September, 2012.

The 5th VERSIM Workshop took place in September 2012 at Mackenzie Presbyterian University (São Paulo, Brazil), organized by the Center for Radio Astronomy and Astrophysics Mackenzie (CRAAM), Engineering School, and supported by IAGA and URSI. This was a chance for the VERSIM IAGA/URSI joint working group to meet and discuss current issues, developments, and techniques, and was the first time the VERSIM workshop has taken place outside of Europe. The final day of the 5th VERSIM workshop was a special day devoted to Geophysical and Radio techniques to assess Natural Disasters and Space Weather Impacts on the Earth. This is part of a ICSU funded URSI/SCOSTEP-supported programme for South America. The workshop attracted 54 participants from 5 continents, although a significant number of participants were only present for the final day. A report on the 5th workshop was published in the Radio Science Bulletin issue No 344 March 2013 (pg 40) and IAGA News 49 (December 2012; page 9).

6th VERSIM Workshop, Dunedin, New Zealand from 20 - 23 January 2014.

The 6th VERSIM workshop took place in January 2014 at the University of Otago (Dunedin, New Zealand), organized by the Space Physics Group of the Department of Physics, and supported by IAGA, URSI and the Air Force Office of Scientific Research, Asian Office of Aerospace Research and Development. This was a chance for the VERSIM IAGA/URSI joint working group to meet and discuss current issues, developments, and techniques. The 6th VERSIM Abstract and Programme Book is available online. The workshop attracted 35 participants from 14 countries, with 58 abstracts.

C.3. Working Group of Commissions E,G, and H: Seismo-Electromagnetics

Co-chair for Commission H: M. Parrot (France)

Since the last GASS in Istanbul several dedicated meetings have been organized. An EMSEV (Electromagnetic Studies of Earthquakes and Volcanoes) workshop took place in Gotemba (Japan) at the end of September 2012. The next one is planned to be held in Poland in September 2014. Another team with Pulinet S. (RU) & D. Ouzounov (US) as leaders has been accepted by ISSI (ESA) with the following topic: "Multi-instrument Space-Borne Observations and Validation of the Physical Model of the Lithosphere-Atmosphere-Ionosphere-Magnetosphere Coupling", and regular working sessions have been held in Bern. Members of the WG and other interested scientists are still working with data from the DEMETER spacecraft mission which was in operation from July 2004 till December 2010. Many other satellite data are also used, in particular TEC measurements. The Chinese satellite CSES is scheduled to be launched in 2016.

C.4. Working Group of Commissions A,B,D,F,G,H,J, and K: An inter-commission working Group on Solar Power Satellites

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

An important progress has been reported in ITU-R Question on wireless power transmission (WPT) last year. A liaison statement was sent to many organizations including URSI. ITU-R WP1A meeting was held June 3-12, 2014. Report(s) or Recommendation(s) on Ground applications of WPT will be

compiled soon. A separate Report on Space application or Solar Power Satellite is planned to be compiled in the next few years. In order to make contribution for the Report, wide range of comments from the URSI commissions will be important.

C.5. Working Group of Commissions G and H: Active experiments in Space Plasmas

Co-Chair for Commission H: M. Kosch (UK, South Africa)

During the period from 2012 to 2014 there were a number of developments in active experiments in space plasmas. In particular, several rocket experiments were carried out at Kwajalein Atoll and new results continued to come in from the HAARP facility.

The Equatorial Vortex Experiment (EVEX) used tri-methyl aluminum (TMA) and lithium clouds released from sounding rockets as tracers in the equatorial dusk sector to examine neutral winds and plasma convection forming a vortex-like structure in the pre-reversal enhancement in the ionosphere. During this same campaign, the Metal Oxide Space Clouds (MOSC) experiment created artificial plasmas in the bottomside equatorial ionosphere in an attempt to prevent the natural Rayleigh-Taylor instability from occurring and generating plasma turbulence which adversely impacts radio-based communication and navigation systems. A variety of RF propagation measurements were also performed during the experiments.

The new 2-frequency heater at the Arecibo Observatory in Puerto Rico, which utilizes the large dish reflector to create a powerful vertically-oriented beam, has been mostly installed in the dish and is expected to be available for experiments by the end of 2014. Continuing research at the High-Frequency Active Auroral Research Program (HAARP) facility has resulted in creation of artificial layers that persist for long periods and optical measurements have allowed the energy spectrum of accelerated electrons to be estimated. However, based on media reports, the future of the HAARP facility is uncertain as the Air Force has indicated that it no longer intends to be the operator of the facility.

D. Preparations for the XXXIth URSI General Assembly and Scientific Symposium in Beijing, China, 16-23 August 2011

D.1. Scientific Sessions

Commission H has arranged:

1. Wave-particle Interactions and Their Effects on Planetary Radiation Belts - 17 oral presentations (H01, H02, H03, H05), 3 posters (HP3)
2. Laboratory simulations of space plasma waves - 3 oral papers (H04)
3. Boundary layers in terrestrial and planetary environments: Macro/micro-scale kinetic processes - 11 oral presentations (H06, H07), 14 posters (HP5)
4. Plasma interactions with solar system bodies - 9 oral presentations (H09, H10, H11), 4 posters (HP6)
5. Remote Sensing of the Plasmasphere - 10 oral presentations (H11, H12)
6. Commission H: Open session and latest results -13 oral presentations (H08, H13, H14)

Common sessions with other commissions, lead by Commission H:

1. Active Experiments - 7 oral presentations (HG01, HG02), 5 posters (HP1)
2. Ionospheric, magnetospheric and high energy effects of lightning - 11 oral presentations (HGE01, HGE02), 9 posters (HP2)

3. Drivers, detection, and ionospheric impacts of precipitation from the radiation belts - 11 oral presentations (HG03, HG04), 4 posters (HP4)

Other sessions related to Commission H:

1. Terrestrial and Planetary Electromagnetics - 6 oral presentations (EGH01)
2. Plasma Waves - 6 oral presentations (GH01)
3. Radio sounding in magnetospheres and ionospheres - 5 oral presentations (GH02, GH03)
4. The Geospace Environment and Meteors - 10 oral presentations (GH04, GH05)
5. Electromagnetic Effects in Lithosphere-Atmosphere-Ionosphere Coupling - 7 oral presentations (GHE01, GHE02)

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

For the upcoming URASI GASS in Beijing Commission H accepted 132 papers (93 oral presentations and 39 posters). Every effort has been made to maximize the number of scheduled oral presentations and to use all available time slots in the program. There is a slight decrease in the total number of papers compared to the last URSI GASS in Istanbul in 2011 where Commission H accepted 144 papers (86 oral presentations and 58 posters).

D.3. Tutorial Lecture

Commission H tutorial lecture on "Theory and simulations of nonlinear wave-particle interactions in the planetary radiation belts" will be given by Prof. Yoshiharu Omura from the Research Institute for Sustainable Humanosphere, Kyoto University, Japan. The paper will be published in the Radio Science Bulletin before the 2014 General Assembly and Scientific Symposium.

D.4. Young Scientist Awards

The 2014 Young Scientists Awards will be given to 7 young scientists from Commission H: Dr. Huishan FU (China CIE), Dr. Wenlong LIU (China CIE), Dr. Eva MACUSOVA (Czech Republic), Dr. Sebastien CELESTIN (France), Dr. Aaron T. HENDRY (New Zealand), Dr. Wen LI (USA), and Dr. Lunjin CHEN (USA). Two of these young scientists are being considered for an additional grant from URSI to cover part of their travel expenses to the 2014 General Assembly and Scientific Symposium.

D.5 Student Paper Competition

Three 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 2014 General Assembly and Scientific Symposium.

E. Recipients of the URSI Awards 2014 related to Commission H

Appleton Prize

Dr. R.F. BENSON, USA

Citation: "For fundamental contributions to knowledge of the interactions of space borne radio sounders with the Earth's plasma environment and to the use of sounders as diagnostic probes of that environment."

Santimay Basu Prize

Dr. M.B. COHEN, USA

Citation: "For contribution to ELF/VLF radio wave instrumentation, propagation, and generation, in the ionosphere and magnetosphere, and for initiating and fostering an international network of young scientists in developing countries."

The URSI awards will be presented to the awardees during the Opening Ceremony of the XXXIth General Assembly and Scientific Symposium at the Beijing Convention Center in Beijing, China, on August 17, 2014.

F. Commission H Vice Chair Election

The call for nominations for the new Commission H Vice Chair was sent out in December 2013. Two excellent candidates have been nominated and voting is in progress. The final vote counting will take place during the first Commission H business meeting, which will be held on Monday, August 18, 2014 at the URSI GASS in Beijing.

G. Election of the Commission H Early Career Representative

The call for nominations for the newly introduced Commission H Early Career Representative was sent out in December 2013. Four excellent candidates have been nominated and voting is in progress. The final vote counting will take place during the first Commission H business meeting, which will be held on Monday, August 18, 2014 at the URSI GASS in Beijing.

H. Election of the Commission H Chair

The current Commission H Vice-Chair Meers Oppenheim would, under usual circumstances, automatically become a Chair after the 2014 URSI GASS in Beijing. In February 2014, he decided not to take this responsibility for serious personal reasons. After the decision of the URSI Board, the call for nominations for the Commission H Chair has been sent out in May 2014 and one candidate was nominated. URSI President Phil Wilkinson will attend the first Commission H business meeting, which will be held on Monday, August 18, 2014 at the URSI GASS in Beijing, and organize the Chair election according to the URSI Statutes.

I would like to take this opportunity to thank the Commission H Vice-Chair Meers Oppenheim, 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