

**UNION RADIO-SCIENTIFIQUE INTERNATIONALE
INTERNATIONAL UNION OF RADIO SCIENCE**



**Rapports des Assemblées Générales de l'URSI
Records of URSI General Assemblies**

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XXIXth General Assembly**

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CONTENTS - TABLE DES MATIÈRES

Introduction	5
Acknowledgement	5
Outline of the Assembly	5
List of URSI Officers and Officers of Member Committees	7
Honorary Presidents	7
Board of Officers	7
Scientific Commissions and Committee	7
Regional URSI Network Committees	8
Standing Committees	9
URSI Representatives on other Scientific Organisations	9
Member Committees	10
Associate Member Committees	12
URSI Secretariat	12
Opening Meeting	13
Address by the President of URSI	13
Memorial Talk Dr. A.P. Mitra	18
Report by the Secretary General of URSI	20
Awards ceremony	24
Presentation of the Balthasar van der Pol Gold Medal	24
Presentation of the John Howard Dellinger Gold Medal	26
Presentation of the Appleton Prize	29
Presentation of the Booker Gold Medal	31
Presentation of the Issac Koga Gold Medal	33
Closing Meeting	36
Closing remarks by the Secretary General	36
Closing remarks by the outgoing President	38
Closing remarks by the incoming President	40
Reports of Meetings	43
Board of Officers	43
Council	45
Co-ordinating Committee	57
Treasurer's Report on URSI Finances	61
Reports of the Standing Committees	68
URSI Standing Committee on Publications	68
URSI Long Range Planning Committee	73
URSI Standing Committee on Developing Countries	92
URSI Standing Committee on Young Scientists	95

Detailed Report on the Scientific Program	96
Reports on Activities of Inter-Union Organisations	100
IUCAF, the Scientific Committee on Frequency Allocations for Radio As- tronomy and Space Science (URSI-IAU-COSPAR) (2005-2008)	100
Business transacted by Commissions	105
Commission A - Electromagnetic Metrology	105
Commission B - Fields and Waves	109
Commission C - Radio-communication Systems and Signal Processing	111
Commission D - Electronics and Photonics	114
Commission E - Electromagnetic Environment and Interference	116
Commission F - Wave Propagation and Remote Sensing	118
Commission G - Ionospheric Radio and Propagation	122
Commission H - Waves in Plasmas	134
Commission J - Radio Astronomy	138
Commission K - Electromagnetics in Biology & Medicine	141
Resolutions and Recommendations of the Council	148
Résolutions et Recommandations du Conseil	154

INTRODUCTION

ACKNOWLEDGEMENT

The XXIXth General Assembly of URSI was held at the Hyatt Regency Chicago Hotel in Chicago, IL, USA, from 7 to 16 August 2008. In introducing this account of the records, it seems appropriate to offer the warmest thanks of the Union to:

- the United States National Committee of URSI;
- the Local Organising Committee;
- the Coordinator and the Associate Coordinator of the Scientific Programme;
- the Chairs and Vice-Chairs of URSI Commissions, who planned the scientific sessions, and to the session Chairs and speakers;
- the organisations which provided funds in support of the Young Scientist Programme: the URSI Member Committees in Japan and the United States and the Royal Society of London.
- to the sponsors of this meeting : United States National Committee of URSI, Official Sponsor of the XXIX General Assembly; Summa Foundation, Albuquerque, New Mexico, USA, Official Co-Sponsor of the XXIX General Assembly; Aileen S. Andrew Foundation, Orland Park, Illinois, USA; Copivia Inc., Palo Alto, California, USA; Istituto Superiore Mario Boella, Torino, Italy; National Science Foundation, Washington, DC, USA; U.S. Army Research Office, Research Triangle Park, North Carolina, USA; University of Illinois at Chicago, Chicago, Illinois, USA.

OUTLINE OF THE ASSEMBLY

The URSI Council - which is composed of the official representatives of the Member Committees - met in Chicago on four occasions between 7 and 16 August 2008. The Resolutions and Recommendations adopted by the Council are reproduced at the end of this volume. Summary accounts of the business transacted by the Council are given elsewhere.

An abundant scientific programme, consisting of 1456 papers (786 oral communications and 670 posters had been prepared for the 1037 registrants (among them 124 official “Young Scientists”). The programme consisted of 3 General Lectures, 1 Public Lecture, 10 Tutorials, 79 Commission Sessions and 29 Joint Sessions.

The Public Lecture was entitled:

- * Seeing the unseen: from Polarization-Sensitive Eyes to Biologically Inspired Sensing and Imaging Science

The General Lectures, of interest to all participants, were entitled :

- * Microwave Imaging in Medicine: Promises and Future Challenges
- * Pulsars, General Relativity and Gravitational Waves
- * Wireless Communications: 2020

Each Commission had been asked to provide a Tutorial Lecture in its own sphere of interest. The titles of these Lectures were as follows :

- From Nanoscience to Nanometrology and its Impact on Electrical Metrology (Commission A)
- Negative-Refractive-Index Transmission-Line Metamaterials: Fundamentals and Applications (Commission B)
- Cooperative Communications (Commission C)
- Manipulating Light on a Silicon Chip (Commission D)
- An Introduction to Reverberation Chambers (Commission E)
- Ground Penetrating Radar into real world (Commission F)
- Ionospheric Data Assimilation: Techniques and Performance (Commission G)
- Wave Acceleration and Loss Processes in the Magnetosphere of Earth and Planets (Commission H)
- Phased Arrays in Radio Astronomy (Commission J)
- Epidemiological Studies of the Association Between Handheld Cellular Telephone Use and Cancer Risk (Commission K)

LIST OF URSI OFFICERS AND OFFICERS OF MEMBER COMMITTEES

Following the elections at the XXIXth General Assembly in Chicago, USA, the Officers of the Union and the URSI representatives on other Organisations are as given below. The list of Presidents and Secretaries of URSI Member Committees is based on information available at the URSI Secretariat up to the time of going to press.

HONORARY PRESIDENTS

Prof. W.E. Gordon (U.S.A)
Prof. J. Van Bladel (Belgium)

BOARD OF OFFICERS

President: Prof. Gert Brussaard (the Netherlands)
Past President: Prof. François Lefeuvre (France)
Vice-Presidents: Dr. Yahia Antar (Canada)
Prof. Martti Hallikainen (Finland) (Treasurer)
Prof. Umran Inan (U.S.A)
Dr. Phil Wilkinson (Australia)
Secretary General: Prof. Paul Lagasse (Belgium)

SCIENTIFIC COMMISSIONS AND COMMITTEE

Commission A:
Chair : Dr. Parameswar Banerjee (India)
Vice-Chair : Dr. William Davis (U.S.A)
Commission B:
Chair : Prof. Karl J. Langenberg (Germany)
Vice-Chair : Prof. Giuliano Manara (Italy)

Commission C:

Chair : Prof. Takashi Ohira (Japan)

Vice-Chair : Prof. Marco Luise (Italy)

Commission D:

Chair : Prof. Franz Kärtner (USA)

Vice-Chair : Dr. Smail Tedjini (France)

Commission E:

Chair : Prof. Christos Christopoulos (U.K.)

Vice-Chair : Prof. Alexander Van Deursen (Netherlands)

Commission F:

Chair : Prof. Madhukar Chandra (Germany)

Vice-Chair : Dr. Roger Lang (U.S.A.)

Commission G:

Chair : Dr. Michael Rietveld (Norway)

Vice-Chair : Prof. John Mathews (U.S.A.)

Commission H:

Chair : Prof. Yoshiharu Omura (Japan)

Vice-Chair : Dr. Ondrej Santolik (Czech Republic)

Commission J:

Chair : Prof. Subra Ananthakrishnan (India)

Vice-Chair : Dr. Donald Backer (U.S.A.)

Commission K:

Chair : Prof. Guglielmo D'Inzeo (Italy)

Vice-Chair : Prof. Masao Taki (Japan)

REGIONAL URSI NETWORK COMMITTEES

Regional Network for the Arabic and North-African region : Prof. Y. Antar (Canada)

Regional Network for Africa : Prof. U. Inan (U.S.A.)

Regional Network for Latin America : Prof. F. Lefeuvre (France)

Regional Network for South Asia : Dr. P. Wilkinson (Australia)

STANDING COMMITTEES

Standing Publications Committee

Chair : Dr. W. Ross Stone (U.S.A)

Standing Committee on Young Scientists

Chair : Prof. K. Schlegel (Germany)

Long Range Planning Committee

Chair : Prof. P. Cannon (U.K.)

Scientific Programme for the next URSI General Assembly

Coordinator : Prof. P.L.E. Uslenghi (U.S.A)

Associate Coordinator : Prof. H. Serbest (Turkey)

URSI REPRESENTATIVES ON OTHER SCIENTIFIC ORGANISATIONS

COSPAR (Committee on Space Research):

Dr. Z. Klos (Poland)

FAGS (Federation of Astronomical and Geophysical Data Analysis Services):

Dr. P.H. Wilkinson (Australia)

Dr. F. Clette (Belgium)

ICSU (International Council for Science):

Prof. G. Brussaard (the Netherlands)

Prof. F. Lefeuvre (France)

ICSU Panel on World Data Centres (Geophysical and Solar) :

Dr. D. Bilitza (U.S.A)

IGBP (International Geosphere-Biosphere Programme) :

Dr. P. Bauer (France)

ISES (International Space Environment Service) :

Dr. D. Boteler (Canada)(Director)

R. Pirjola (Finland, Com. E)

Dr. S. Pulinets (Mexico, Com. G)

Dr. P.H. Wilkinson (Australia)

ICG (International Committee on Global Navigation Satellite Systems

Prof. G. Brussaard (Netherlands)

IUCAF (Scientific Committee on Frequency Allocations for Radio Astronomy and Space Science)

Dr. W. Van Driel (France, Com. J.)(Chairman)

Prof. S. Ananthakrishnan (India, Com. J.)

Dr. W.A. Baan (ex officio)

Prof. I. Häggström (U.S.A., Com. G)
 Prof. S.C. Reising (USA, Com. F)
 Dr. A.T. Tzoumis (Australia, Com. J)
 IUGG / IAGA (International Union of Geodesy and Geophysics / International
 Association of Geomagnetism and Aeronomy) :
 Prof. F. Lefeuvre (France)
 Prof. K. Schlegel (Germany)
 SCAR (Scientific Committee on Antarctic Research) :
 Dr. M. Clilverd (U.K.)
 SCOR (Scientific Committee on Oceanic Research) :
 Dr. R.H. Lang (U.S.A.)
 SCOSTEP (Scientific Committee on Solar-Terrestrial Physics) :
 Prof. C. Hanuise (France)
 WHO EMF (World Health Organisation-Electromagnetic Field Programme)
 Prof. B. Veyret (France)

MEMBER COMMITTEES

AUSTRALIA	President : Prof. A.J. Parfitt
AUSTRIA	President : Prof. S.J. Bauer
BELGIUM	President : Prof. E. Schweicher Secretary : Prof. M. Piette
BRAZIL	President : Prof. P. Kaufmann Secretary : Prof. M.S. Assis
BULGARIA	President : Prof. N. Sabotinov Secretary : Prof. B.B. Shiskov
CANADA	President : Dr. F. Prato Secretary : Dr. J.P. Vallee
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FRANCE	President : Prof. M. Bellanger Secretary : Mr. J. Hamelin

GERMANY	President : Dr. W. Mathis Secretary : Dr. E. Bogenfeld
GREECE	President : Prof. J.N. Sahalos Secretary: Dr. T. Samaras
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INDIA	President : Prof. S. Ananthkrishnan Secretary : Dr. P. Banerjee
IRELAND	President : Prof. T. Brazil Secretary : Dr. C. Downing
ISRAEL	President : Prof. E. Heyman Secretary : Prof. R. Kastner
ITALY	President : Prof. R. Sorrentino Secretary : Prof. E. Bava
JAPAN	President : Prof. K. Kobayashi Secretary : Prof. T. Yamasaki
NETHERLANDS	President : Prof. A. van Ardenne Secretary : Prof. R. Strom
NEW ZEALAND	President : Dr. N.R. Thomson Secretary : Mr. E.R. Davis
NIGERIA	President : Prof. M.O. Ajewole Secretary : Dr. V.U. Chukwuma
NORWAY	President : Prof. J. Trulsen Secretary : Ms. N. Brynildsen
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 Secretary : Dr. C.C. Constantinou
USA President : Dr. Y. Rahmat-Samii
 Secretary : Prof. S.C. Reising

ASSOCIATE MEMBER COMMITTEES

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 Secretary : Ing. A. Garbini
CHILE President : Prof. J. May

URSI SECRETARIAT

Secretary General : Prof. Paul Lagasse
Assistant Secretary General : Prof. Peter Van Daele
 Dr. W. Ross Stone (Publications)
Secretary : Ms. Inge Heleu (Executive Secretary)
 Ms. Inge Lievens (Administrative Secretary)

OPENING MEETING

The Opening Ceremony was held on Sunday 10 August 2008 in the Grand Ballroom of the Hyatt Regency Chicago Hotel. The Ceremony started with the United States national anthem, after which the Honorary Presidents, Officers of the URSI Board and primary speakers took their seats on stage.

The first part of the programme was chaired by Professor P.L.E. Uslenghi, President of the US National Committee and Chairman of the Organizing Committee. Professor Uslenghi welcomed the participants and introduced the President of URSI, Professor François Lefevre, to deliver his presidential address.

ADDRESS BY THE PRESIDENT OF URSI

Prof. F. Lefevre

Chair of the Local Organising Committee, Prof. Uslenghi,
ICSU representative, Ms. Cynthia Beall
Dear Colleagues, Ladies and Gentlemen

After 27 years, i.e. since the General Assembly in Washington, URSI is back in US. Thank you to the local organizing Committee, thank you in particular to its Chair Professor George Uslenghi. For several reasons, the organisation of the GA was not easy at this precise period of time. Some colleagues could not get visas. But I may personally testify that you did all that was possible.

Bienvenue à tous. Welcome to everybody. C'est pour moi un grand honneur, en tant que Président de l'URSI d'ouvrir les travaux de cette ving-neuvième Assemblée Générale. It is indeed a great honour for me, as President of URSI, to open this 29th GA. Compte - tenu du rôle important joué par la Belgique et la France lors de la création de l'URSI, notre Union a deux langues officielles : l'Anglais et le Français. According to the importance of the role played by Belgium and France in the creation of URSI our Union has two official languages: English and French. Ceci doit nous aider à nous rappeler que quelque soit le domaine d'activité considéré, qu'il soit politique, économique ou

scientifique, il ne peut y avoir de développement stable au niveau mondial que si l'on tient compte des différences de langues et de culture de tous les pays participants. This must help us to remind us that, whatever the concerned activity domain: politic, economic or scientific, stable development at the worldwide level imposes to take into account languages and cultural differences. L'URSI se doit de veiller à cet aspect multiculturel dans toutes ses actions et en particulier dans la mise à disposition de nouveaux services via internet. URSI must take care of this multicultural aspect in particular when providing new services via internet.

Introduction

As you know, the main objectives of URSI are: (i) to encourage and promote international activity in radio science and its applications, for the benefit of humanity; (ii) to stimulate and co-ordinate studies of the scientific aspects of telecommunications and more generally studies of natural and man-made electromagnetic emissions; (iii) to represent radio science to the general public, and to public and private organisations. Each three years, the GA provides an opportunity: to examine the relevance of those Scientific Objectives as regards to the scientific and technical developments in progress, to review the actions taken in the last triennium, and to issue a road map for the next three years. This has allowed URSI to efficiently respond to new challenges in the past. It is up to us to prepare the future. The exercise has been formally started this morning with the first meeting of the Council. It will continue all week, in particular during the Business meetings of the Scientific Commissions. It will end on Saturday with the last Council meeting then the organisation of Committees. Everybody is concerned: the Official members of URSI but also all the scientists engaged in radio scientific activities and present here, i.e. the radioscintists. To this regard, please note that where the votes for new Vice-Chairs are restricted to the National delegates, all other discussions are open to all registered persons. Don't hesitate to attend the Business meetings and to contribute.

As it would be too long to review all the URSI activities in the last triennium, I have chosen to concentrate here on three points: the relevance of the URSI scientific activities, the development of radio science, the adaptation of the URSI modes of functioning. With the Secretary General, Professor Paul Lagasse, who has a comprehensive knowledge of the Union, and with whom I had the pleasure to work during the last triennium, we have tried to be complementary. Several elements will be more developed during his talk.

The relevance of the URSI scientific activities

The relevance of the scientific activities as regards to the emerging issues in radio science was examined by the Board, the Commission Chairs then the Long Ranged Planning Committee. I strongly encourage everybody to read the final written by Professor U.S. Inan, Chair of that Committee. Although very interesting remarks have been done for each Commission, I would like to draw your attention to two specific points: the evolution in the communication systems and the overlapping with other Unions and/or professional Societies.

As Professor Paul Lagasse will explain, applications implemented through radio communication are exploding. This trend is likely to accelerate and, accordingly, the operation of many passive and active radio services will become dependent on the reliability of the new communication systems. This had led to reorientate in some way Commission C activities. However, all scientists engaged in radio science activities must be aware of potential challenges and new developments, and be in a position to express their interest or/and concern. It is the reason why a Forum on Radio Science and Telecommunications is organized next Friday. Once again, please don't hesitate to come and contribute. The Forum discussions should result in the definition of follow-up actions (e.g. by one or more URSI working groups) to establish a more permanent role for URSI in representing the interests of radio science in worldwide discussions on the development of wireless communications.

As pointed out in the final report of the Long Range Planning Committee several Commissions have been relatively weakened because topics are extensively covered in the context of other organizations, in particular IEEE. Practical suggestions have been made: (i) for a focusing on subjects that are more related to radio science and are relevant for other Commissions, (ii) for transitioning the recognized emerging areas to concrete activities

The development of radio science

The development of radio science concerns all countries. All of them contribute to the international discussions about telecommunications. But only part of them has the competence to take care of the scientific aspects of telecommunications. URSI here has an important role to play. However, one may not expect an interest in radio science activities in the absence of clear relationships with national priorities.

The development of radio science in developing countries was a serious concern for Dr. A.P. Mitra who agreed to chair the standing Committee on developing countries after the 2005 New-Delhi GA. Thanks to his very energetic actions, an Indian Regional Facility on Radio Science - open to developing countries - was created in 2006. A few days before his death, in September 2007, he was still working on the preparation of a discussion meeting on the development of radio science in Latin America. From the numerous e-mails we exchanged I personally learned a lot from Dr. Mitra. However, he passed away before we could investigate other possible orientations like the establishment of networks of Universities. The actions initiated by Professor Mitra have been pursued by the Board. Presently we are at a stage where options which seem to be valid in Asia are probably not the best ones for Latin America and Africa, and where we propose the creation of URSI Regional Committees more or less linked to the ICSU Regional Offices recently set up in Africa, in Latin America and the Caribbean, and in Asia and Pacific. However this has to be discussed with the most involved National Committees. In that respect, discussion meetings with Latin America and African National Committees will take place during the week. Other initiatives will be probably taken in the context of the 2010 Asia-Pacific Radio Science Conference.

To answer the point about the need to develop radio science through activities related to National priorities, it must be noted that the three ICSU Regional Offices have as a common priority, the “Natural and Human-induced catastrophes and Disasters”. ICSU has engaged a programme on that particular topic. URSI is presently involved in that programme but at a low level. Professor Lagasse will come back on that subject in his talk.

The adaptation of the URSI modes of functioning

The conditions for URSI to fulfil its objectives in the present time period are to be more efficient and more visible. Several actions have been taken in those directions before the 2005 GA like the issues of URSI White papers. The major initiatives taken by the Board during the last triennium concern the URSI modes of functioning and the URSI integration to the geoUnions.

As regards the modes of functioning I would like to put forward two decisions: (i) the constitution of the Long Range Planning Committee from the Past Commission Chairs (which was already decided at the end of the 2005 GA) and from the Past Board members, which allows a continuity in the actions, (ii) the election of the next URSI President (the President elect) at the first Council meeting in order to allow him to constitute the URSI Committees and to organize face to face meetings during the GA. A future decision, to be taken after discussion with the Council is to define, before the call for candidates, precise functions for the positions of Vice Chairs, which would allow better task distributions among the Board.

As regards to the integration of URSI into the GeoUnions group, it was a direct consequence of an ICSU decision taken at the 2005 ICSU GA in Suzhou to organize Unions into science related clusters and so to balance the Union representation on the ICSU executive Board between the Science. URSI was placed in the Earth and Space Sciences cluster. There was no cluster for Engineering Sciences. The Geo Science Unions which are in the Earth and Space Sciences formed a GeoUnion group with the objective to better structure the ICSU/Union discussions. URSI joined them in April 2007. Participations to the two last GeoUnion meetings (once per year at least) demonstrated the efficiency of that group to facilitate collaborations between Scientific Unions and to increase the visibility of the actions taken by each Scientific Union at the ICSU level.

Ladies and Gentlemen,

I have now the sad duty to record the passing of distinguished colleagues during the last triennium.

Prof. Tor Hagfors, Norway, passed away on 17 Jan 2007 at the age of 76. He was radio astronomer, ionospheric physicist and plasma physicist, and moreover a theoretician as well as an experimentalist. He was both Director of Arecibo and of EISCAT, was subsequently one of the three co-directors of Max-Planck institute in Lindau. He was

awarded the Balthasar van der Pol Gold Medal in 1987 for his “Contributions to radar engineering and the theory and experimental development of the incoherent scatter techniques.”

Dr. Roger Gendrin, died on 21 April 2007 at the age of 76. He was a pioneer in space plasma physics and marked several generations of researchers working in this domain. He Chaired the URSI Commission H from 1975 to 1977, received in 1987 the John Howard Dellinger medal for his contribution to the “Study of waves of natural origin propagating in the surrounding of the Earth, and their influence on the behaviour of the magnetosphere”, and was President of IAGA from 1987 to 1991.

Professor Wilbur Norman "Chris" Christiansen passed away on 26 April 2007 at the age of 93. He was URSI President from 1978 to 1981, and subsequently honoured as Honorary President in 1984.

Dr. A.P. Mitra, Eminent Radio Scientist, passed away on 3 September 2007. He was URSI President from 1984 to 1987 and subsequently honoured as Honorary President in 2002. At the time of his death he chaired the Standing Committee on Developing Countries and was the URSI Representative at IGBP.

Professor Ron Bracewell, eminent radio scientist, had a major influence on developments in radio astronomy, and on imaging in particular.

We also mourn these distinguished colleagues :

- Raymond J Cohen, Official Member of Com J in the UK
- Don Dudley, USA
- Albert Guissard, past Commission F delegate in Belgium
- Fr. Eduardo Galdon of the Observatorio del Ebro Tortosa in Spain.

Let us stand for a moment to pay tribute to the memory of all these friends and colleagues. Thank you.

Let me conclude, Ladies and Gentlemen by thanking all those who organized the General Assembly and in particular: Dr Goel, Scientific Program coordinator; Prof. Uslenghi, Chair of the Local Organising Committee and Associate Co-ordinator of the Scientific Programme; Prof. Danilo Erricolo Vice-Chair of the Local Organising Committee, Sharad Laxpati, Treasurer; Steven Reising, in charge of the student competition, Susan Hagness, in charge of the Young Scientist programme; Bo Yu, webmaster. Their efforts and the huge amount of time spent for the organisation will surely make this General Assembly a success. I also would like to acknowledge the outstanding work of our colleagues of the URSI Secretariat: Inge Heleu and Inge Lievens who are the link between all URSI members, and Professor Paul Lagasse, Professor Femke Olyslager, and Dr. W. Ross Stone with their great experience and dedication.

Prof. P.L.E. Uslenghi introduces Professor Cynthia Beall (member of the ICSU Executive Board) who gave an introduction of the International Council of Science (ICSU) and its relation to URSI, after which he gave the floor to Dr. Sunanda Basu.

MEMORIAL TALK DR. A.P. MITRA

Dr. Sunanda Basu

The Early Years – and Success came early!

Dr. A.P. Mitra was born in Calcutta on 21 February 1927 to a Math High School teacher father and home-maker mother. In 1946 he graduated with honors at the Physics Presidency College and completed his D.Phil. in 1955 at the University of Calcutta. Dr. Mitra was an outstanding student of the late Prof. S.K.Mitra. He did early ionospheric research in CSIRO, Australia, and it was there in Australia (Sydney, 1952) that he attended an URSI GA for the first time. He joined the National Physical Laboratory in New Delhi, India, soon thereafter.

In 1956 he married Sunanda Ghosh, which became a wonderful 50-year partnership. He started the IGY Program in India in 1957 which was followed by a vigorous program in ionospheric research at NPL. His first national recognition came at the age of 34 when he was selected as fellow of INSA.

NPL – Mitra’s Home-base for over half-century

Dr. A.P. Mitra served NPL in various capacities: Head of the RPU up to 1982, Director of NPL during 1982-1986, Director General of CSIR during 1986-1991 and Scientist of Eminence up to his death in 2007.

At NPL he pioneered work on solar flares, D-region chemistry, tropo-scatter, microwave radiometry, HF propagation, payloads for balloon, rocket and satellite measurements and beacon studies.

Mitra was decisive, a good scientist & administrator and a tough taskmaster. He had no use for bureaucracy, had selling power and was very supportive of colleagues but expected them to deliver, banging his fists if necessary, but extremely kind & considerate.

Mitra – A Strong Proponent of the Young Scientist Program within URSI and of its expansion to Developing Countries

The Young Scientists Program was rejuvenated in 1981 and Mitra became its Chair. His search for external support was indefatigable which allowed about 120 scientists to attend URSI GA’s.

Mitra, President of URSI during the triennium 1984-87, gave a memorable speech at the Corsondonk Meeting in March 1987 outlining a possible role for URSI in enhancing original scientific thinking in developing countries – can URSI help in the symbiosis

between science, society, religion and philosophy? He strongly rejected the thesis that “Basic research is a luxury in a developing country”. Regarding “Global Change, in which mankind’s concern is increasing”, he asked what role should URSI play in involving developing countries and young scientists? He devoted the last two decades of his life to these issues.

“AirPort” Mitra Always on the Move

Mitra was associated with ICSU, COSPAR, SCOSTEP, IGBP-STARTSASCOM, APN in various capacities & their national counterparts. He utilized such programs to improve Indian scientific infrastructure – for instance, used the Middle Atmosphere Program to obtain the National MST Radar Facility in Tirupati.

Finally, it was issues of Global Change research (Methane, CO₂, Earth’s radiation budget, India’s Contribution to Global Change and Impacts on India) that led him to organize the huge Indian Ocean Experiment (INDOEX), with the help of scientists from US, many European nations and the Maldives.

At least 50 Indian scientists from 10 institutions and a research ship helped in clearly documenting, in a large number of publications, the role of air pollution in forming the Atmospheric Brown Cloud.

Mitra was a much Honored Scientist with his Heart in URSI

He was Fellow of the Royal Society of London since 1988 and Fellow of the Third World Academy of Sciences & the International Academy of Astronautics.

He received Padma Bhushan, a civilian honor awarded by the Gov. of India in 1989 & every possible Indian science award and was Honorary President of URSI since 2002.

Prof. Dr. Mitra, for the last two decades, tried to have the URSI GA in India – sometimes losing by a single vote but in 2002, at the URSI GA in Maastricht, finally the URSI Board voted to hold the XXVIII th URSI GA in New Delhi, India from 23-29 October, 2005.

The Sixtieth Birthday Celebration of NPL and the Eightieth Birthday Celebration of Mitra, from 21 to 24 February 2007, were held together with the Celebration of 50 years of Radio Science in India.

The ultimate honor of winning the Nobel Peace Prize as member of the IPCC Team in December 2007 came a little too late for this brilliant, multi-faceted scientist and a true citizen of the world who passed away on September 3, 2007.

This Memorial Talk, with substantial contributions from S. Ananthkrishnan (TIFR) P. Banerjee, K. K. Mahajan & V. Kumar (Director) (NPL), S. C. Chandra (GSFC, NASA), P. Crutzen (MPI, Nobel Laureate), W. E. Gordon (Honorary President URSI), F. Lefeuve (President URSI), C. H. Liu (ex-President, SCOSTEP), M.G. K. Menon (ex President, ICSU), U. R. Rao (ex-Chairman, ISRO), S. Radicella (ICTP, Trieste), V. Ramanathan (UCSD & PI of INDOEX) and J. Van Bladel (Honorary President and ex-Secretary General, URSI) was illustrated with lots of pictures.

After this Memorial Talk, the President took the Chair and invited Prof. P. Lagasse, the Secretary General of URSI, to present his Report.

REPORT BY THE SECRETARY GENERAL OF URSI

Prof. P. Lagasse

Ladies and Gentlemen

It is the traditional duty of the secretary general to present a concise report of the scientific activities, the finances and the general administrative situation of the Union. In the past triennium the board, under the proactive leadership of President Francois Lefeuvre, has worked hard to better position URSI and its scientific activities in a world that is fast changing while globalising in certain aspects. Let me try in the limited time available to summarise how URSI has evolved since our previous General Assembly in New Delhi.

I still have fond memories of the 1981 General Assembly in Washington where I presented an invited paper in a commission B session and I am really happy after so many years to be present again at a General Assembly here in the US.

The General Assembly is a complex meeting to organise because it is a scientific meeting with many parallel sessions that bring together radioscientists from research domains that can be quite different and that therefore have traditions and requirements that can also be quite different. On top of that we have Council, coordinating committee, Board, various committee and commission business meetings that require their own sometimes complex logistics.

Let me therefore first join our president Francois Lefeuvre in thanking the national committee from the United States for organising this general assembly. More specifically I would like to thank Prof. Ushlenghi, Chair of the Local Organising Committee and Associate Coordinator of the Scientific Programme, Prof. Erricolo, Vice Chair of the Local Organising Committee, Prof. Laxpati treasurer of the Local Organising Committee and Dr. Goel, Coordinator of the Scientific Programme. Looking at the quality of the scientific program and taking the numbers of registrants as a first indication, it will undoubtedly turn out to be a very successful general assembly.

Coming back to the past triennium let me also state that URSI has suffered a great loss in the untimely death of honorary president Dr. A. P. Mitra. Over a period of many many years he greatly contributed to URSI, notably as from 78 to 84 as vice president, from 84 to 87 as president and more recently as the driving force behind the very successful organisation of the 2005 New Delhi General Assembly. Working closely with him at this

occasion I admired his vast intelligence, enthusiasm and profound wisdom. Since the New Delhi General Assembly he was chair of the committee for developing countries and we had high hopes that under his expert leadership this part of the URSI activities would renew itself so as to get a new impetus. In line with the views of Dr. A. P. Mitra and in view of the fact that countries such as China, India or Brazil have become economic powerhouses that rival the current major economic powers the URSI Board as explained by the president has decided to replace the Committee for Developing Countries by Regional Committees. The URSI community misses Dr. A. P. Mitra.

For an organisation such as URSI repositioning its role and to a certain extent reinventing itself while maintaining a sense of continuity is necessary in order to remain relevant in this rapidly changing world. Just looking back over a period of 27 years to the time of the previous General Assembly held in the USA, we have witnessed the incredibly explosive growth of wireless communications. Currently the number of cellular phone subscribers in the world outnumbers the wire line subscribers by 3.5 billion to 1.3 billion. Considering wireless systems such as WIFI, Bluetooth or RFID we can estimate that the wireless links not only between people but also between things, I mean the Internet of Things, will number in the trillions in the near future. Over the same period a number global geophysical concerns have been raised such as global warming, sustainable development and energy, in the study and analysis of which radioscintists can and should play role. So what does this mean for a scientific organisation, funded by government funds, such as URSI which has the aim firstly to facilitate the interaction amongst scientists across all disciplines and from all countries, regardless of race, citizenship, language, political stance, or gender and secondly to identify and address major issues of importance to science and society.

Evidently URSI will continue to stimulate and enhance the exchange of scientific research results among radioscintists by organising and sponsoring conferences. This General Assembly bringing together researchers from a wide variety of radio science fields is a prime example of this endeavour. The publication of the Radio Science Bulletin is another important way pursued by URSI to be of service to radioscintists around the world. Thanks to the untiring efforts and competent leadership of our editor Dr. Ross Stone the Radio Science Bulletin has now established itself as valued and respected scientific publication. Let me here renew my triennial appeal to contribute papers to the Radio Science Bulletin. The quality of a scientific publication depends on the quality of the published papers. You are the best radio scientists so with your contributions we can make the Radio Science Bulletin the best publication. Keeping in line with the current trends we have moved the Radio Science Bulletin in the past triennium to a largely on-line publication with only a limited number of printed copies still distributed to the national committees and to some libraries. We hope that the on-line aspect with search facilities will enhance the outreach, the usability and the archival value of our Radio Science Bulletin. In general we are working towards enhancing the usefulness of our website. A major overhaul of the URSI website is under way and the renewed website should become

public shortly after this General Assembly. A new service to radioscintists that the Board decided to develop on the website are web based lectures. To start, for those lecturers who agree to it, the tutorials and general lectures of this General Assembly will be recorded and put on the URSI website. As a large fraction of the URSI community works in a university environment, I hope that many of you will be willing to contribute lectures.

Coming to the second aim namely addressing major issues of importance to science and society, a first initiative taken by the Board about 5 years ago was the publication of URSI White Papers in order to increase the visibility of URSI by providing the expert views of URSI scientists on subjects of great societal interest. Achieving a consensus within the URSI community on such a White Paper has proven to be quite difficult and especially time consuming. The publication of the White Paper on Solar Power Satellites was only possible thanks to the untiring efforts coming not only from the original authors but also from some board members and especially from our past president Dr. Kristian Schlegel. Currently work on a White Paper on “Wireless Communications and Health” is in progress and hopefully it will be finalised in the near future. Subjects for White Papers that were recently discussed in the Board are the “Development and use of global positioning systems” and “Spectrum usage”. May I suggest that these and possibly other subjects should be discussed in Commission meetings and that proposals for contributions should be made to the secretariat.

Mesdames et Messieurs

L’ambition d’URSI est de transformer son site web en une source d’information et surtout de d’éducation en matière de science radio. Etant donné qu’une grande partie de la communauté URSI a une fonction de chercheur / éducateur dans une université et que beaucoup de cours sont de nos jours disponibles sous forme électronique le bureau espère recevoir de nombreuses contributions. Une façon d’organiser ceci serait de créer des réseaux d’universités comprenant aussi des institutions dans des pays en voie de développement et de définir après concertation les sujets de cours présentant un intérêt commun. Comme les interactions se font par voie électronique ces réseaux ne seraient pas liés par des contraintes géographiques mais au contraire il me semble préférable de les fédérer par langue étant donné que la langue et la culture associée sont des éléments importants dans le processus d’éducation. Du point de vue du secrétariat le défi le plus important auquel URSI doit faire face est le fait que les chercheurs sont de plus en plus soumis à des pressions pour répondre soit à des critères de rentabilité dans des entreprises soit à des indicateurs de performance académique dans les universités. Ceci leur laisse de moins en moins de temps à consacrer à des activités URSI, à moins que celles-ci ne correspondent à ces indicateurs de performance académique. En pratique ceci limite les chances de succès des initiatives prises par URSI à des actions qui dans une certaine mesure contribuent aussi à la réussite d’une carrière académique.

Ladies and gentlemen,

Nowadays ICSU and its affiliated unions are expected to contribute to the study of major issues of global societal concern. For URSI this means that we should try to contribute to the research in specific areas such as how radio science can help in the case of “Natural and Human-Induced Catastrophes and Disasters” or more generally participate in interdisciplinary research on the consequences of natural and human-driven changes to the Earth’s environment, on what future changes they can be expected, and on what the nature of those changes and their impact on human livelihood will be. This is quite a challenge since it will require interdisciplinary collaboration with other unions and convincing radio scientists to participate in those programs without being able to really fund the research activities. Stimulating collaboration and to a certain extent coordination between locally funded research is very difficult to achieve and requires that one can provide by this global reach an added value to the local research efforts. This represents quite a challenge for the next URSI board. Speaking of the Board it is my pleasure to announce the results of the election which have already been held as explained by the President.

Were elected

As president: Prof. Brussaard

As vice presidents: Prof. Antar, Prof. Hallikainen, Prof. Inan, Prof. Wilkinson

And I thank Council for allowing me to continue to serve as secretary general.

Regarding its finances URSI is still, thanks to the careful management of the board and supervision of the treasurer Prof. Gert Brussaard, in relatively good shape with strong reserves. However I wish to emphasise that in general the funding from member committees and academies has a tendency to decline as globally government support for international scientific organisations tends to come under pressure. Let me therefore thank all the persons from various member committees for their efforts to persuade academies, governments or other institutions to pay the dues to URSI. The extra support received from the member committees from the USA, Japan and the UK for our Young Scientist program is also highly appreciated. Thanks to this support and thanks to the generous contribution from the member committee from USA organising this GA, URSI is able to support here 124 Young Scientist.

Finally I would like to express my deep gratitude to all the co-workers of the secretariat, Inge Heleu, Inge Lievens, Ross Stone and Femke Olyslager for their work and dedication on which the functioning of the secretariat is relying.

Let me conclude, Ladies and Gentlemen, by stating that our union is in an excellent shape, both scientifically and financially, and that I am confident that the growing importance of radio science in the world combined with your scientific excellence will ensure a successful future for URSI. I wish you all a most interesting and fruitful general assembly and a pleasant stay in the nice city of Chicago.

AWARDS CEREMONY

The Awards Ceremony took place on Sunday, 10 August 2008, just after the Opening Meeting of the General Assembly. The Ceremony was chaired by Professor P.L.E. Uslenghi. He gave the floor to Professor van Ardenne, Chairman of the Dutch URSI Committee.

PRESENTATION OF THE BALTHASAR VAN DER POL GOLD MEDAL

by Prof. Arnold van Ardenne, Chairman of the Netherlands URSI Committee

Ladies and Gentlemen,

Please allow a few words providing some background. The “Balthasar van der Pol Gold Medal” was initiated by the late Mrs. Petronetta Le Corbeiller (van der Pol) Posthuma in 1963 at the occasion of the 14th General Assembly in Tokyo to “keep alive the memory of her husband and to stimulate, to work patiently and seriously with the Officers of URSI for radio science in its widest scope”. I feel really honored with the request from URSI to present this scientific award today.

Balthasar van der Pol was born in the Netherlands in 1889 and in his career developed a keen interest in radiowaves. After graduating cum laude in physics from the University of Utrecht in 1916, he subsequently spent the next three years in England working first with John Ambrose Fleming (inventor of the thermionic vacuum tube) and later under J.J. Thomas at Cambridge in the famous Cavendish Laboratories. At this time he also became a good friend of the Nobel prize-winner Sir Edward Appleton also sharing an interest in radio waves. Back in the Netherlands, in 1920 he became the theoretical assistant of the great Nobel Prize Winner, Professor Lorentz for a period of three years. In 1922 Balthasar was appointed head of the Philips Research Laboratories in Eindhoven, a position he held until his retirement in 1949 partly in parallel with being Professor of theoretical electricity at the Technical University of Delft from 1938 until 1949. Since 1947 he mainly devoted himself to international activities e.g. as Director of the International Radio Consultative Committee (CCIR) at Geneva. He received the Medal of Honour of the I.R.E., the Poulsen Medal of the Danish Academy of Technical Science. He was a member of the Royal Netherlands Academy of Science, corresponding member

of the Academy of Science in Paris, Honorary Doctor of the Warsaw Polytechnics and of the University of Geneva and of course, he was an Honorary President of URSI.

Ladies and Gentlemen,

On behalf of the Union Radio-Scientifique Internationale it gives me great pleasure to reveal the name of the person to be honored with the Balthasar van der Pol Gold Medal 2005. The citation of URSI: "*Pioneer of millimeter wavelength interferometry to investigate astronomical objects ranging from solar system planets to galaxies at the edge of the Universe with spectral and angular resolution*". The 2008 recipient is Professor in Astronomy at the University of California, Professor William Jack Welch.

Professor Jack Welch started the field of millimeter-wavelength interferometry that is providing astronomy with a new window into the observable universe at high angular and frequency resolution. His key insight was that the opacity effects of both thermal gas and relativistic electrons that rise steeply at longer wavelengths could be overcome at millimeter wavelengths.

In the 1960's he and the talented and dedicated team that he directed at the UC Berkeley Radio Astronomy Laboratory designed and built the first interferometric, millimeter-wavelength telescope with two antenna elements at the Hat Creek Radio Observatory in northern California. He was the visionary leader of the Berkeley-Illinois-Maryland (BIMA) project, a ten-element array of 6-meter antennas that operated primarily at 3mm wavelength, now part of the larger CARMA array that also includes the former Caltech millimeter array. These pioneering millimeter-wavelength arrays their operation and the subsequent approaches to calibration and analysis, have been key developments for the Atacama Large Millimeter Array (ALMA) under construction in Chile to which Welch over the years has given his time and considerable insights generously.

His outstanding leadership in design and development was essential for the third world class instrument, the Allen Telescope Array (the ATA) and has many novelties and patents to which Professor Welch is a major contributor. These range from the exquisite broadband feed to passive cooling technique to save energy and complexity. The ATA is the first working pathfinder instrument for the astronomers dream instrument, the Square Kilometer Array.

Last but not least, Professor Welch's interferometric telescopes have had an extraordinary impact on astronomy over a broad range of topics ranging from solar system bodies to galaxies at the edge of the visible universe. Professor Welch's scientific contributions with collaborators include the discovery of the first complex radio-emitting molecules including the first water masers, seeing protostellar objects through the interstellar dust, observing gas jets and bubbles from stars, insight into large-scale kinematics in star formation, and more accurate measurements to discriminate among theories of star formation.

Taking all this together there is no doubt that William Jack Welch is a very dignified recipient of the URSI Balthasar van der Pol Gold Medal. May I invite Professor Welch to join me at the podium to receive the medal?

REPLY BY PROFESSOR WILLIAM JACK WELCH

It is a great honor to receive the van der Pol Gold Medal, named for a radio scientist of extraordinary instrumental skills and imagination, the initiator of modern experimental dynamics. He studied non-linear oscillators both in the laboratory and with his famous theoretical description, the van der Pol equation. His circuits employed non-linear resistors, vacuum tubes, and, later, solid state devices. These oscillators exhibited limit cycles, and, when driven with an external source, entrainment. He both calculated and built electronic models of the human heart to study its stability. These studies, with an external driving cycle, were precursors to the modern heart pacer. Perhaps one of his most important discoveries was what is now called “deterministic chaos”, a kind of noise that was produced in one of his driven non-linear oscillators. The further study of this phenomenon has helped explain many effects that are observed in nature. One is the explanation of the “Kirkwood Gaps”, the zones in the orbits of asteroids near Jupiter that are devoid of asteroids. The asteroid orbits are, of course, oscillatory, and those which would have an integral ratio of their period to that of Jupiter do not exist. Only chaotic orbits can exist at these radial distances from the Sun because of the gravitational perturbations of Jupiter. Professor van der Pol’s creativity is a model to which we all try to adhere, and it is a real pleasure to receive the Gold Medal in his name.

PRESENTATION OF THE JOHN HOWARD DELLINGER GOLD MEDAL

by Professor P.L.E. Uslenghi, Chairman of the U.S. URSI Committee

John Howard Dellinger was born in 1886 at Cleveland, Ohio and died in 1962 at the age of 76. He received the A.B. and Sc.D. degrees from George Washington University and the Ph.D. degree from Princeton University.

From 1907 to 1948, Dr. Dellinger was physicist, chief of radio section, and chief of the Central Radio Propagation Laboratory at the National Bureau of Standards in Washington, DC. During 1928-29 he was chief engineer of the Federal Radio commission. He was a representative of the United States at numerous international radio conferences from 1921 to his death. Among his many appointments, Dr. Dellinger was President of the Institute of Radio Engineers (IRE) in 1925 and Vice-President of URSI in 1934.

The IRE awarded Dellinger the Medal of Honor in 1938 “for his contributions to the development of radio measurements and standards, his researches and discoveries of the relation between radio wave propagation and other natural phenomena, and his leadership in international conferences contributing to the world-wide cooperation in telecommunications”.

In 1965, the United States National Committee proposed, and URSI approved, a triennial award named the “John Howard Dellinger Gold Medal”, to be given at each General Assembly of URSI to an outstanding radio scientist who, during the three-year period preceding the year of the General Assembly, will have made a valuable contribution in radio wave propagation.

The fifteenth recipient of the Dellinger award is Dr. Alan Rogers of the Haystack Observatory, Massachusetts Institute of Technology, United States. Dr. Rogers did his undergraduate work at the University of Zimbabwe and his graduate work at MIT in electrical engineering.

Among his many scientific achievements, Dr. Rogers contributed significantly to the development of very long baseline interferometry, in terms of both electronics and data analysis. His most recent and most outstanding contribution was the detection of deuterium, an atom that is the key to understanding the beginning of the universe. After gathering data for almost one year, a team directed by Dr. Rogers obtained a solid detection of deuterium on May 30, 2005. The detection of deuterium is of interest because its amount can be related to the amount of dark matter in the universe, but accurate measurements had been elusive.

Dr. Rogers, as the President of the United States national Committee of URSI, it is my privilege and pleasure to present you with the John Howard Dellinger Gold Medal “for your outstanding contributions to instrumentation in radio astronomy and its use to make fundamental discoveries about interstellar masers, superluminal expansion of quasars deuterium abundance in the galaxy, and plate tectonics”.

REPLY BY DR. ALAN E.E. ROGERS

I am most honored to receive the John Howard Dellinger medal. I find it especially appropriate to be receiving an award named for Dellinger since I owe my move from Zimbabwe to the United States and my subsequent career to the short wave propagation studied by Dellinger. In 1962, having just completed a bachelor degree in mathematics and physics at the University of Rhodesia and Nyasaland (UCRN) I made amateur radio contact with my amateur radio friend, Philip Carter in Hingham, Massachusetts, who set me on the path of entering MIT as a graduate student in electrical engineering. All the arrangements were made by several short-wave radio contacts over the next few days which were fortunately unimpeded by the absorption in the “D” layer known as a “Dellinger fade” which Dellinger had shown can be greatly enhanced by solar activity.

My interest in Radio came from my father, John Rogers. We built all our own electronics including a station for tracking and recording scientific data from early satellites which, prior to having on board recorders, required receiving stations around the globe. Later in 1965, when satellites had the ability to record data so that fewer tracking stations were needed, my father was invited to join the space science group at the University of Iowa by James Van Allen where he worked closely with Donald Gurnett, who received the Dellinger medal in 1978. Some of the data my father recorded in Africa became thesis material for one of Van Allen's graduate students, John Craven, who later married my sister.

At MIT it was my good fortune to work on a thesis in Radio Astronomy with Alan Barrett as my advisor. Alan taught me to combine my passion for electronics with astronomy, another love I had acquired from my high school French teacher, Charles Maxwell, who started the astronomy club at Prince Edward School in Harare.

In the 1960s I was privileged to work with Sander Weinreb, who is the recipient of the 2008 Grote Reber Medal for his innovative contributions to Radio Astronomy. Sandy taught me a whole lot more about electronics and radio astronomy instrumentation. Working with Bernard Burke, my fellow graduate student, James Moran, and the staff at MIT Haystack Observatory we developed Radio Astronomy instrumentation and techniques for Very Long Baseline Interferometry (VLBI) used for the study of interstellar masers, quasars and for making extremely precise measurements of the earth. In 1961, while an undergraduate at UCRN, I had built the electronics for a spinner magnetometer used by my teachers, Michael W. McElhinny, and D.I. Gough to add to the palaeomagnetic data used to infer how the earth's continents had moved over hundreds of millions of years. Little was I to know at that time that I would, one day, be part of the team lead by Irwin Shapiro to use VLBI to actually observe the contemporary tectonic plate motion of a few centimeters per year taking place today.

In 1994 industry approached M.I.T. for assistance developing methods of locating emergency, 911 calls from cellular phones. I helped improve the accuracy location which was based on the time difference of arrival of the cellular phone signals through a better knowledge of the propagation in the urban environment along with improved algorithms to combat the effects of multipath. While most of the location of cellular phones is now done using GPS, measurement of the time difference of arrival of the phone signals received at the cell sites is used to some considerable advantage in a dense urban environment where GPS reception is limited. Through this work I gained a better knowledge of the latest digital signal processing hardware which enabled us to build an inexpensive array of dipole antenna elements to measure the abundance of deuterium in the Galaxy, a long sought goal of radio astronomy. While the D/H ratio of 20 parts per million we measured was expected and close to the values already obtained by ultraviolet measurements from satellites, the result has added to our confidence in knowledge of the parameters of the big bang cosmology. The digital instrumentation we developed allowed us to measure extremely weak signals from deuterium at 327 MHz through very long integrations of several years.

I have indeed been very fortunate to have had great teachers and colleagues along with the opportunity to work on exciting science at the MIT Haystack Observatory where I have spent my entire career. I thank URSI for the organization that brings about the connections and interaction that helps make Radio Science such a worthwhile endeavor. It is a great pleasure to belong to an organization that fosters the collaboration of research groups around the world.

PRESENTATION OF THE APPLETON PRIZE

by Prof. Hall Strangeways, Chairman of the U.K. URSI Committee

The Appleton Prize is awarded by the Council of the Royal Society of London on the recommendation of the Board of officers of URSI and honours the memory of Sir Edward Appleton F.R.S., who was president of URSI for 18 years from 1934 to 1952 and who won the Nobel prize for physics in 1947 for his contributions to the knowledge of the ionosphere.

The 2008 Appleton prize is awarded to Prof. Umran Inan of Stanford University for his contributions on wave-particle interactions and electrodynamic coupling between thunderstorms and the ionosphere. His main research discoveries have been in the area of lightning discharges, wave propagation and scattering, VLF/LF remote sensing, satellite observations of plasma waves, dynamics of the radiation belts, planetary plasma waves, and active wave-injection experiments. His VLF group has carried out extensive observational programs at multiple sites across the continental United States, in Antarctica, in Canada, and on satellites. In addition, extensive theoretical modelling and interpretation work has been performed, on quantitative modelling of high-altitude optical emissions known as sprites, blue jets, and elves, on modelling the propagation and scattering of electromagnetic waves in the earth-ionosphere waveguide and on other related electromagnetic wave and plasma physics problems. He has more than 250 refereed papers in the ISI science citation database which have attracted nearly 5000 citations

He is nominated principally for his scientific contributions in three areas: cyclotron resonant interactions between electromagnetic waves and energetic charged particles, coupling between thunderstorms and the ionosphere via intense electric fields and ionization of the lower ionosphere by intense gamma ray bursts. He and his team provided the first rigorous analysis of nonlinear cyclotron-resonant scattering by VLF waves that leads to precipitation of electrons in the lower ionosphere causing ionization perturbations. They have made numerous experiments using VLF waves from ground transmitters to detect and map these ionospheric perturbations and hence also estimate the loss of radiation

belt electrons. As a result of this work, he has suggested that the radiation belt electron population could be controlled by injecting whistler mode waves from satellites. This would help remove these particles and protect orbiting satellites. This research has influenced policy makers to fly new satellite missions to test this idea.

Discharges between thunder cloud tops and the ionosphere were only recognized in the 1980s and opened up a new area of research. His team presented what has become the accepted physical mechanism for ‘sprites,’ (massive but weak luminous flashes that appear directly above an active thunderstorm system) that shows how they arise from quasi-static fields produced by the cloud-to-ground lightning discharges. He also found that signals from ground based VLF transmitters could heat the ionosphere, and estimated the heating and ionization of the ionosphere by electromagnetic pulses (EMPs) from lightning discharges. He then carried out the first fully kinetic calculation of the interaction between lightning EMPs and the lower ionosphere, and predicted that there should be brief flashes of optical emissions. These were detected and are now known as ‘elves’.

It has been discovered in the past 15 years from satellites in space that the Earth itself emits short duration gamma ray bursts, termed Terrestrial Gamma-Ray Flashes (TGFs). He linked a TGF to an individual lightning stroke occurring within 1.5 ms of the TGF event, proving for the first time that the TGF was of atmospheric origin and associated with lightning strikes. He proposed that they were created by runaway electrons at relativistic energies driven by electromagnetic impulses from lightning return strokes. He has also measured the intense ionization of the lower ionosphere as a result of gamma ray bursts from distant galaxies which has been widely reported in the media.

Amongst Sir Edward Appleton’s extensive research work on the ionosphere are three papers published in the Proceedings of the Royal Society of London in 1923 and 1926. In these recorded atmospheric wave-forms were presented as well as experimental observations made at Aldershot, Cambridge, Helwan (Egypt) and Khartoum of the net changes of the Earth’s electric field, resulting from lightning discharges. Thus, we can see that Sir Edward was also interested in explaining lightning phenomena and, like Prof Umran Inan, made observations of lightning discharges in many places worldwide, adding to the appropriateness of awarding Prof Inan the 2008 Appleton prize. I am sure that Sir Edward would delight in learning of all these new discoveries, as indeed we ourselves do.

REPLY BY PROF. UMRAN INAN

Thank you Dr. Strangeways, and my thanks also to the URSI Board of Officers, the Awards Panel, to the many who supported my nomination, and to the Council of the Royal Society for bestowing upon me this great honor.

Ladies and gentlemen and honored guests, I am deeply honored and humbled in receiving this Award, most especially this particular Award, which honors Sir Edward Appleton, the winner of the 1947 Nobel Prize in Physics, the longest serving Past President of URSI, and a pioneering giant of ionospheric physics. I am one of many who have made a career out of the usage/application of the famous Appleton-Hartree equation, describing one of the most complex dispersion relations for electromagnetic waves in anisotropic media. Receiving this Prize is thus a special honor, and I do hope “Appleton would have been pleased”, as was kindly and generously stated in one of my congratulatory e-mails.

As I look back on my career, I consider myself entirely lucky, having arrived at Stanford at the age of 22, for an opportunity to work with a group of marvelous people and truly dedicated scientists. Just as any other human endeavor, the pursuit of science is one which is built-upon a network of enduring friendships, and much of the fun is really in interacting and learning with others. In this connection, I am grateful to my mentors and colleagues at Stanford, Drs Bob Helliwell, Don Carpenter and Tim Bell, as well as many others outside Stanford. Above all, I cherish my interactions with my PhD students; both former and current, as the best time of my days at work are when I talk to them about their new ideas. I consider this Award as recognition of them as well as myself, and I thank them for their enthusiasm, perseverance, and hard work.

My journey in URSI has been exciting indeed. This marvelous and historic Union is truly among the best for fostering scientific excellence and international collaboration, in terms of both depth within each of its Commissions and breadth across its Commissions. URSI has much to offer in the coming decades, as radio science, telecommunications and electromagnetic applications continue to rapidly evolve and impact every aspect of our daily lives.

On a personal note, I thank my parents, for their sacrifices in raising and schooling me, and for their unrelenting love and support. I also thank my dear and beautiful wife Elif, without whose support I would not be here today, and without whom all this would not mean much anyway. Thank you all very much and best wishes for a rewarding and fun General Assembly.

PRESENTATION OF THE BOOKER GOLD MEDAL

by Professor Thomas B.A. Senior, Chair of the Booker Committee

Henry George Booker was a prominent radio scientist who served URSI in many capacities—as Commission Chair, Vice-President, and Honorary President until his death in 1988. During the early 1970s when even the continued existence of URSI was in some doubt, he was a strong voice for a Union in which telecommunications would have a prominent role.

As a result of conversations initiated at the 1978 General Assembly, some of his friends and colleagues established a fund to honor him on his retirement from the University of California in San Diego. The income from the fund was to be used to support the attendance of a young U.S. scientist at each General Assembly, and the first Booker Fellowship was awarded in 1981. The Booker Fellow this year is Professor Jonathan J. Makela from the University of Illinois, and if he is here today, I ask that he stand so that we may recognise him.

A few years ago the growing revenue from the fund made possible the establishment of the Booker Gold Medal to be awarded to any scientist for outstanding contributions to telecommunications. The first medal was awarded in 2002, and this year's winner is a former URSI President, Professor Hiroshi Matsumoto, the newly elected President of Kyoto University in Japan. The citation—and it is a lengthy one—reads: “For his outstanding contributions to the understanding of nonlinear plasma wave processes, promotion of computer simulations in space plasma physics, and international leadership in plasma wave research.”

It is now my pleasure to present the 2008 Booker Gold Medal to Professor Matsumoto.

REPLY BY PROFESSOR HIROSHI MATSUMOTO

Thank you, Tom and Kristian,

Mr. President, the Board of Officer of URSI, distinguished guests, Ladies and Gentlemen, I am deeply honored to receive the highly prestigious Booker Gold Medal for the year of 2008, bestowed to me by the Board of Officers of URSI. It brings me great satisfaction to be recognized by peer scientists in Radio and Space Plasma Physics. I am grateful for the nomination by my colleagues in Commission H.

I am especially pleased to receive the Medal named after the great radio scientist Prof. Henry George Booker for two reasons. One comes from the close relation of my specialty of plasma wave research with Prof. Booker's pioneering works on his ionospheric radio physics. As most of you are aware, ionospheric research was the origin of magnetospheric physics and space plasma physics. The interests of radio scientists in those days expanded from phenomena in the ionosphere to those in the mangetosphere and beyond, in accordance with the Space Era opening in the middle 1960's. I was a student at the time. My first Professor Ken-ichi Maeda at Kyoto University was also an ionoshperic radio physicist and often mentioned Prof. Booker's works. The subject of plasma waves in the magnetosphere and space plasmas have since then attracted me over the years. Many spacecraft probes were sent into this “space”, and have brought back a vast amount of unsolved problems on space plasmas. Those were my challenges. I was

partly a theoretician, and partly computer simulationist, and even an experimentalist on nonlinear wave-particle interactions in both the Lab and space through rocket and satellite experiments, such as the GEOTAIL spacecraft. My weak point as well as my strong point is my curiosity for many, sometimes too many things. Due to this personal nature I could not suppress my eagerness to pursue engineering radio researches, in addition to plasma physics, such as the wireless power transmission for the Solar Power Satellite, and for RFID technology.

The second reason for my special appreciation of the Booker Award is somewhat personal. Prof. Booker was invited in 1981 to join Wuhan University in China as an Honorary Guest Professor in the Division of Space Physics up until 1988 when he passed away. It was quite an honor, and incidental that I was invited to inherit his professorship at Wuhan University in China after his decease. This made me feel much closer to Prof. Booker.

These are two reasons for my special joy in receiving the Booker Gold Medal. I really enjoy my research on nonlinear plasma wave physics at Kyoto University, but I would not be where I am today if I did not have the chance to be involved in this wonderful scientific community of URSI. URSI has always stimulated my intellectual challenges, and has always been a big family for me and has provided international friends, rivals, and warm advisors. I have learned a lot through my URSI career, not only on my professional research subjects, but also on many aspects of human-relations in the international community. I would like to express my deepest appreciation to all of my dear colleagues in the URSI family, and URSI headquarters, especially for the many years after joining to serve as URSI Officer.

Finally, I would like to share this joy and honor with all of my closest supporters. They are my parents, my wife, my children and my teachers, my colleagues and my secretaries in Kyoto University and peer scientists in various academic societies, and last but not least, all of my ex-students.

Ladies and Gentlemen, I would like to close my words of thanks by expressing my strong belief. What I have learned through my professional career is “Academic deed is nothing but human-relations concerning truth!” and “Academic achievements strongly depend on human-relations around truth!”. Thank you.

PRESENTATION OF THE ISSAC KOGA GOLD MEDAL

by Prof. Hiroshi Matsumoto, President of the Japanese URSI Committee

Board of URSI officers, distinguished guests, ladies and gentlemen,

I stand here again and feel like a relay-runner, to hand-over the URSI tradition of friendship and vividness of Radio Science itself from the older generation to the younger one.

In 1982, the Japanese Member Committee of URSI proposed to establish a Gold Medal with the purpose of encouraging young scientists within the Union. The Gold Medal honors young scientists under the age of 35, who has made outstanding contributions to any of the branches of radio science covered by the ten Commissions of URSI. The Medal was named after Professor Issac Koga, who held young scientists in great affection. Prof. Koga was closely associated with the URSI, and he served as Vice-President of the Union from 1957 to 1963, and as President from 1963 to 1966. The first Issac Koga Gold Medal was awarded on the occasion of the Florence General Assembly in 1984. The award at this Assembly is the ninth.

Professor Koga's research covered a wide variety of topics in radio science. Particularly noteworthy was his invention, in 1932, of a Piezo-electric crystal oscillator having an almost zero frequency-temperature coefficient. This is widely known as the Koga cut crystal, and has been used in a wide range of applications, in particular in international radio communications and broadcasting.

It is indeed a great pleasure for me to introduce to you the 2008 awardee, Dr. Sievenpiper. Dr. Daniel Frederic Sievenpiper is an enthusiastic and creative young scientist. He has made significant contributions to several branches of science covered by URSI, in particular to Commission B – Fields and Waves. His invention and continued development in artificial impedance surfaces has resulted in breakthroughs in scattering and diffraction, conformal antennas, guided waves, and propagation of waves in specialized media. He has also taken artificial impedance surfaces a step further to develop holographic patterning techniques. These new conformal surfaces enable waves from a small antenna to wrap around solid objects, and to produce a controllable radiation pattern toward any angle. He has also made significant contributions in other areas of antennas and electromagnetics. These include the development of new kinds of tunable antennas, broadband wearable antennas, electrically small antennas, and rectennas for wireless power transmission. Throughout this work, he has produced more than 40 U.S. Patents, and more than 30 publications

Ladies and Gentlemen, it is my pleasure to award the 2008 Issac Koga Gold Medal to Dr. Daniel Frederic Sievenpiper from the USA, with the following citation: "*For contributions to the development of artificial impedance surfaces and conformal antennas*". May I ask the audience to join me in congratulating warmly Dr. Sievenpiper ? Daniel, would you please come up to the podium to receive this ninth Issac Koga Gold Medal? Unfortunately, he seems to be absent. May I, then, ask Prof. Uslengi to receive this medal for Dr. Sievenpiper and hand it over to him later? Thank you.

REPLY BY DR. DAN SIEVENPIPER

I am truly honored to accept the Isaac Koga gold medal, and I am humbled to be considered among the legacy that URSI represents. In the many decades since its inception, this organization has played an important role in both the scientific and practical aspects of electromagnetics. For a field with such a great heritage, I realize the importance of these early career recognitions such as the Isaac Koga gold medal, to continue to inspire and motivate future generations of scientists.

For me, this would not have been possible without the help of a large number of supporters. Those whom I would like to thank include my graduate school advisor, Eli Yablonovitch, to whom I owe many aspects of my current success; the many members of my team, who have done much of the important technical work that has made this possible; the management at HRL Laboratories, who have given me so many opportunities; and the many individual project champions and program managers in our parent companies and government sponsors, for supporting the continuing development of artificial impedance surfaces and conformal antennas. I regret that I was unable attend the awards ceremony personally, but I would like to sincerely thank all of my colleagues within URSI for considering me to be worthy of this recognition.

After the Opening Ceremony a reception was held in the Columbus Hall of the Hyatt Regency Chicago Hotel.

CLOSING MEETING

CLOSING REMARKS BY THE SECRETARY GENERAL

Prof. P. Lagasse

At the request of the President, I am pleased to recall the results of the elections of the Board of Officers and to announce the results of the elections of the Chairs and Vice-Chairs of the Commissions for the next triennium.

As I mentioned during the opening ceremony the incoming President is Prof. Gert Brussaard (the Netherlands) and the Vice-Presidents in alphabetical order are: Prof. Dr. Yahia Antar (Canada), Prof. Umran Inan (U.S.A.), Prof. Martti T. Hallikainen (Finland) and Prof. Phil Wilkinson (Australia), while I continue as secretary general

The election results of the Chairs and Vice-Chairs of the Commissions are as follows:

Commission A:

Chair : Dr. Parameswar Banerjee (India)

Vice-Chair : Dr. William Davis (U.S.A)

Commission B:

Chair : Prof. Karl J. Langenberg (Germany)

Vice-Chair : Prof. Giuliano Manara (Italy)

Commission C:

Chair : Prof. Takashi Ohira (Japan)

Vice-Chair : Prof. Marco Luise (Italy)

Commission D:

Chair : Prof. Franz Kärtner (USA)

Vice-Chair : Dr. Smail Tedjini (France)

Commission E:

Chair : Prof. Christos Christopoulos (U.K.)

Vice-Chair : Prof. Alexander Van Deursen (Netherlands)

Commission F:

Chair : Prof. Madhukar Chandra (Germany)

Vice-Chair : Dr. Roger Lang (U.S.A.)

Commission G:

Chair : Dr. Michael Rietveld (Norway)

Vice-Chair : Prof. John Mathews (U.S.A.)

Commission H:

Chair : Prof. Yoshiharu Omura (Japan)
Vice-Chair : Dr. Ondrej Santolik (Czech Republic)

Commission J:

Chair : Prof. Subra Ananthakrishnan (India)
Vice-Chair : Dr. Donald Backer (U.S.A.)

Commission K:

Chair : Prof. Guglielmo D’Inzeo (Italy)
Vice-Chair : Prof. Masao Taki (Japan)

I would like to inform you also of a few important decisions taken by Council:

- Council approved a resolution to establish a “Working Group on Natural and Human-Induced Hazards and Disasters” to study, within the URSI area of competence, methods and strategies related to natural and human-induced environmental hazards and disasters.
- Council approved a resolution to dissolve the URSI Standing Committee for Developing Countries and to create Regional URSI Network committees, including those covering the same geographical regions as the ICSU Regional Centres.
- Council approved a resolution to establish an inter-Commission WG on Radio Science Services (RSS), having as its mission
 - to provide, in close relation to IUCAF, URSI input to the ITU on all matters that may concern passive as well as active radio services;
 - to inform the URSI Commissions regarding the development of new communication systems, and to study with them the potential consequences for radio science research;
 - to contribute to inter-Union and/or inter-Organization activities related to passive and active radio services.
- Council approved a recommendation that URSI form an inter-Commission Data Committee to provide an oversight of URSI data interests and to provide an effective interface with other ICSU data communities.
- Council approved the new name of commission E which now reads as “Electromagnetic environment and interference” and of commission J which now reads “Radio astronomy”.
- Council approved a resolution to establish to change the title of the General Assembly to: “URSI General Assembly and Scientific Symposium”.
- Finally Council accepted the invitation of the Member Committee in Turkey to organise the next URSI General Assembly and Scientific Symposium. The venue will be Istanbul, 13-20 August 2011. The coordinator for the 2011 General Assembly and Scientific Symposium will be Prof. Uslenghi and the associate coordinator will be nominated later. Council decided for this time not to select the venue of the 2014 General Assembly and Scientific Symposium.

As in previous General Assemblies the quality of the scientific presentations was very high. There was a good balance between contributed papers, invited papers, tutorials, general and public lecture. At this point I would like to express the gratitude of the URSI community to Dr. Goel the scientific coordinator, Prof. Uslenghi the associate coordinator, the commission chairs, vice chairs and convenors who managed to put together the excellent scientific program of this General Assembly.

Allow me to conclude with some personal remarks. Before and especially during this General Assembly I have had the privilege to work closely with Prof. Uslenghi whose tireless dedication to the task of organising this General Assembly cannot be sufficiently stressed. The kind help of Prof. Laxpati for the practical financial problems during this General Assembly is greatly appreciated.

May I also express my sincere thanks to the US National Committee for agreeing to pay in full for the Chicago General Assembly the contribution to URSI from the registration fee. This will considerably help the current URSI budget.

Although I had very limited opportunity to visit Chicago, I heard from accompanying persons that they enjoyed very much the fantastic city of Chicago. Also my congratulations to George for arranging for nice weather during the past week. May I finally in the name of URSI express my deep gratitude to the US National committee and Local organising committee who worked as a close team to make this General Assembly a great success.

I look forward to welcome all of you 3 years from now in Istanbul.

CLOSING REMARKS BY THE OUTGOING PRESIDENT

Prof. F. Lefeuvre

Dear Colleagues, Ladies and Gentlemen

At the end of this very intense week, and at the end of my mandate of President of URSI, allow me to share with you my views on the present status of the Union.

Despite of no shows mainly due to visa problems, we had an excellent GA. Everybody appreciated the Chicago town. The Young scientist programme and the student competition were very successful. The scientific sessions were well attended. For most of the scientific Commissions very active Business meetings did a good job for preparing the future. The relay will be taken by the new Long Range Planning Committee which held its first meeting last Thursday. The General Lectures and the public lecture were excellent. The forum on radio science and telecommunication triggered very interesting debates in particular on the link to be revitalized between URSI and ITU. Discussions during the Council meetings and during formal and informal meetings with several

National Committees allowed to identify pertinent orientations to be taken for the future. Important resolutions on these orientations and on the functioning of URSI were voted. In brief, thanks to very dedicated colleagues, among which the Commission Chairs, the session Convenors and Chairs, the members of the local organization Committee, the Council members, the members of the URSI secretariat and the Board members, URSI is a living Union. However, I have several concerns for the future.

My first concern is on the financial aspect. If the Chicago GA will provide a balance which, for the first time since 10 years allows getting equilibrium between the URSI expenses and incomes during a triennium, it is clear that a strategy must be defined to keep that equilibrium during the future years.

My second concern is the vitality of URSI. It strongly depends on the vitality of the scientific Commissions and so on our ability to find dedicated Commission Chairs supported by dedicated National Delegates well aware of the new challenges and emerging issues. The nomination of the Delegates is under the responsibility of the National Committees which must find a way to attract young generations and to nominate active delegates for the Commissions.

My third concern is the development of radio science in developing countries. New actions have been taken, in particular during the discussion meetings the Board had during the week with the National Committees of Latin America and Africa. I strongly hope that these actions will be pursued and strengthened in the coming years.

My last concern is the development of radio science in developed countries and more generally the URSI link with industry. Although having Commissions clearly dedicated to engineering science, URSI is mainly an Academic Organisation. However, in order to stay the “scientific part of telecommunication”, as written in the initial objectives of the Union, or more generally to be the scientific part of the exploding number of applications based on the use of the radio spectrum, better links with the industry have to be found.

If you allow me, I would like to express my sincere thanks to several specific persons. First of all, in behalf of all the participants to this XXIXth GA, I would like to thank the Local Organisation Committee and in particular his Chair Professor George Uslenghi who spent a lot of his time to prepare the GA and to look at any detail including during the week. Thank you George, we really appreciated all what you have done for URSI. I also want to express my sincere thanks to the Scientific Programme coordinator Dr Goel. In behalf of all the participants at the GA I would like to acknowledge the outstanding dedication and hard work of our URSI secretariat during the week: Mrs Inge Heleu and Inge Lievens, Mrs Marleen Van Duyse, always on duty to help everybody with small and larger problems, Prof. Paul Lagasse who insures the continuity of URSI and carefully handle all delicate problems, Prof. Olyslager for her hard work to provide minutes of Board and Council meetings in near real time, Dr Ross Stone who dealt with all matter of publication issues. I would also like to sincerely thank all the Board members, who have taken an important part of their time to serve URSI. I appreciated the way we

have interacted all together I heartily thank the departing Board members: Chalmer Buttler for his advice and assistance and Kristian Schlegel for important initiatives, including on URSI visibility, taken during the time he was President and for his strong dedication to issue the first URSI White Paper. I am sure that URSI will still need him in the future years.

Before the closing remarks by the incoming President, Mrs. Noelle Lefevre gave a brief address of thanks to the members of the organizing committee for the program of the accompanying persons and a short impression of the architectural tour she made in Chicago.

CLOSING REMARKS BY THE INCOMING PRESIDENT

Prof. G. Brussaard

Dear colleagues of the Board and Council, ladies and gentlemen, all of you who have shown an interest in attending this General Assembly, either professionally or as partners and friends,

Allow me to first express my gratitude to Council for electing me as the new President of URSI. I feel honoured to have been entrusted with this task. My home country, the Netherlands has a rich history of participation in the affairs of URSI. Great names like van de Pol, Bremmer and Stumpers immediately come to mind. This makes me feel humble and privileged.

The last three years I have participated in the activities of the Board with much pleasure and I am looking forward to continue in the same spirit. It was a great advantage for me to be elected at the start of the General Assembly rather than at the end. It allowed me to prepare for my task, making ample use of the experience of the parting President and other URSI colleagues.

Before closing this memorable event, let me say a few words about the Union, its area of work, its position in the world and its future. In the first place, URSI is a family of radio scientists. That is a strong point of URSI; there is deep friendship and close collaboration between highly motivated people. At the same time, such close-knit families may sometimes have a tendency to develop into closed societies. This is one of the challenges: to remain an open society, intent on expanding and motivating more and more people, in particular young ones. That does not come automatically; we all have to work on that.

The first priority item in the coming triennium will be to raise the visibility of URSI to the outside world, at various levels. Internationally, URSI is one of the 29 Unions

of the International Council of Scientific Unions. Although, unfortunately, we no longer obtain financial support from it, ICSU is nevertheless an important organization to coordinate contributions of different scientific disciplines to the problems areas and action plans defined by the United Nations. In the past triennium, our position inside ICSU has been strengthened thanks to the cooperation between the so-called group of GEO-unions within ICSU. Cooperation with and representation in other international organizations must be intensified in order to make us ourselves as well as the scientific world aware of the contributions that we can make.

At national level the work of URSI must be carried out by active National Committees. Inside your countries are the young people that you must motivate to carry out the research in the international context offered by our Union. A second priority item in the policy of the Board is therefore strengthening the existing Member Committees and expanding into countries that are potential new member by virtue of the fact that nuclei of research communities exist, often within universities. We have had several fruitful discussions with national representatives on this subject and are endeavoring to set up, with the help of existing national Committees, Regional URSI Networks to promote and facilitate the expansion of radio science, in particular in developing countries.

The scientific activities of URSI are carried out in its ten Commissions. Encouraging and supporting the Commissions in these activities during the interim period between General Assemblies is a third priority action. We must avoid that URSI becomes a giant who wakes up once every three years, walks about during a few months and roars during one week, only to go back to sleep until the next Assembly trumpet sounds.

The context in which radio science is carried out is a fast developing technological environment. Much radio research is experimental, carried out with advanced equipment and driven by technology. Exciting new projects are in progress in many different disciplines. Just to give a few examples:

- Extremely large radio telescope arrays, such as the low-frequency array LOFAR, presently under construction in the Netherland, and the Square Kilometer Array (SKA), which is in an advanced stage of preparation, will provide unprecedented information on the structure and the origins of the Universe.
- Remote sensing of the Earth and the atmosphere, with an ever expanding collection of advanced instruments, has great potential in monitoring our planet, and providing warning against, and relief in, disaster, both man-made and natural. The development of products for this purpose is highly dependent on scientific analysis and modelling of the interaction of radio waves with the environment.
- Precision positioning with GPS and other existing and new satellite systems such as Galileo also has much potential in the control of our environment and disaster management. Such high-precision information can only be obtained thanks to large-scale research in the modelling of the Earth's atmosphere.

- Ultra-wideband and intelligent radio networks will provide new opportunities for communication around the globe. Much effort is currently being put in R & D in this highly technological branch of radio science.

These examples show that much of our research is technology-driven or enabled by radio technology. Nevertheless, in many areas of radio research there is a “technology divide” between radio engineering and what we traditionally define as radio science. We must bridge that gap and enhance the communication between technologists, e.m. theory and radio experimentalists. URSI is the eminently suitable organization to foster such communication.

I hope that the XXIX General Assembly and its Scientific Symposium has been a step forward towards these ambitious goals. If we all work together, keeping the spirit of this Assembly alive, I am confident that we will be successful in achieving our common objective, the advancement of radio science for the wellbeing of mankind.

And now it is my duty to declare the XXIXth General Assembly of the International Union of radio Science closed. I wish you all a safe journey back to your homes, laboratories and offices.

After the closing remarks by the incoming President of URSI, Prof. P.L.E. Uslenghi gave some general concluding remarks on the XXIXth General Assembly and wished everyone a safe trip home.

REPORTS OF MEETINGS

BOARD OF OFFICERS

Summary Report

9 August 2008

The Board reviewed the agenda of the Council meetings and the Coordinating committee meeting. The Board also discussed matters concerning the opening ceremony, the Young Scientist Party and the Closing Ceremony. The Board decided to enhance the contacts of URSI with the African and Latin American member committees.

16 August 2008

The President, Prof. G. Brussaard, welcomed the officers of the Board and in particular the new members: Prof. U. Inan and Prof. Y. Antar. Prof. F. Olyslager was confirmed to continue as Assistant Secretary General and Dr. W.R. Stone as Assistant Secretary General responsible for publications. Prof. M. Hallikainen was appointed as Treasurer.

The Member Committee in Egypt had accepted to be the focal point for a Regional Network for the Arabic and North-African region. Prof. Antar will be the contact person in the Board for this network.

The Member Committee of South Africa will initiate contacts with other African countries in order to identify another African country that will be the focal point of a Regional Network for Africa. Prof. Inan will be the contact person in the Board for this network.

Peru will be the focal point for the development of a Regional Network in Latin America. Prof. Lefeuvre will be the contact person in the Board for this network.

India remains the focal point for the South Asian network and Dr. Wilkinson will be the contact person in the Board for this network.

The Board allocates 9000 Euro per Commission for the 2009-2011 triennium. The Commissions are requested to plan before June 2011 how they wish to spend the budget. This offers the possibility to the Board to transfer part of the budget before the General Assembly and Scientific Symposium to another Commission if there is some under spending.

On top of that the Commissions are requested to make a proposal to the Board how they wish to use the additional 3,000 Euro that is allocated for Young Scientists to attend the General Assembly and scientific Symposium.

No requests from Commissions were received to transfer their remaining budget to the next triennium.

The Board will meet in Ghent on 24-25 April 2009.

COUNCIL

Summary Report

The Resolutions and Recommendations adopted by the URSI Council are reproduced at the end of this volume.

Council met on Sunday 10 August (8 to 12.30 a.m.), Tuesday 12 August (5 to 6.15 p.m.), Thursday 14 August (5 to 7.30 p.m.) and Saturday 16 August (8 to 10 a.m.).

1. Membership of the Council

President : Prof. F. Lefeuve

Secretary General: Prof. P. Lagasse

Australia: Prof. A.J. Parfitt

Austria: no representative

Belgium: Prof. E. Schweicher

Brazil: Prof. P. Kaufmann

Bulgaria: no representative

Canada: Dr. Y. Antar (Alt. Prof. F. Prato)

China CIE (Beijing): Prof. M. Zhou

China SRS (Taipei): Prof. H.C. Yeh

Czech Rep.: Dr. O. Santolik (Alt. Dr. J. Boska)

Denmark: no representative

Egypt: Prof. Dr. K.H. Awadallah

Finland: Prof. A. Sihvola (Alt. Prof. I. Lindell)

France: Mr. J. Hamelin

Germany: Prof. K.J. Langenberg

Greece: Prof. J. Sahalos

Hungary: Prof. Ferencz (Alt. Prof. J. Lichtenberger)

India: Prof. S. Ananthakrishnan

Ireland: Prof. T.J. Brazil

Israel: no representative
 Italy: Prof. R. Sorrentino (Alt. Prof. E. Bava)
 Japan: Mr. K. Kobayashi
 Netherlands: Prof. A. Van Ardenne
 New Zealand: Dr. N. Thomson
 Norway: Prof. J. Trulsen
 Peru: Dr. R.F. Woodman
 Poland: Dr. T. Kosilo
 Portugal: Eng. M.L. Mendes
 Russia: Prof. Y.V. Guliaev... (Alt. Prof. E.V. Suvorov and Prof. V.E. Lyubchenko)
 Saudi Arabia: no representative
 Slovak Republic: no representative
 South Africa: Prof. M. Reineck
 South Korea: no representative
 Spain: no representative
 Sweden: Prof. G. Kristensson
 Switzerland: Prof. F. Rachidi
 Turkey: Prof. A. Serbest
 Ukraine: Prof. A. Pogorily
 United Kingdom: Dr. H.J. Strangeways
 USA: Prof. P.L.E. Uslenghi (Alt. Prof. Y. Rahmat-Samii)

Commission A: Acting Chair: Dr. P. Banerjee
 Commission B: Chair: Prof. Lotfollah Shafai
 (The Vice-Chair is the official delegate of Germany)
 Commission C: Vice-Chair: Prof. Takashi Ohira
 Commission D: Chair: Dr. Frédérique de Fornel
 Vice-Chair: Prof. Franz Kärtner
 Commission E: Chair: Prof. Flavio Canavero
 Vice-Chair: Prof. C. Christopoulos
 Commission F: Chair: Prof. Piotr Sobieski
 Vice-Chair: Prof. Madhukar Chandra
 Commission G: Chair: Prof. Paul S. Cannon
 Vice-Chair: Dr. Michael Rietveld
 Commission H: Chair: Prof. Richard B. Horne
 Vice-Chair: Prof. Yoshiharu Omura
 Commission J: Chair: Dr. Richard Schilizzi
 (The Vice-Chair is the official delegate of India)
 Commission K: Chair: Prof. Frank Prato
 Vice-Chair: Prof. Guglielmo D'Inzeo

The Officers of the Board, the Coordinator of the scientific program and the Assistants Secretary General attended in an advisory capacity. Some Chairs of standing committees and various URSI Officials attended the meetings partially or totally.

2. Elections

The Officers of the Board were elected during the first Council meeting. The result of the election was as follows:

a) President

Only one candidate was nominated for President: Prof. Gert Brussaard (the Netherlands). Council elected Prof. G. Brussaard as President of URSI by acclamation. Prof. Brussaard thanked the Council for its confidence and he assured to do his best to serve the Union.

b) Vice-Presidents

The result of the elections for Vice-President, conducted by secret ballot, was as follows: Dr. Yahia Antar (Canada), Prof. Martti Hallikainen (Finland), Prof. Umran Inan (USA), Dr. Phil Wilkinson (Australia).

c) Secretary General

Prof. P. Lagasse was elected for another term by acclamation.

d) Commission Chairs

According to the Statutes the Vice-Chairs automatically become Chair except in unusual cases. The Council votes that all the current Vice-Chairs become Chairs:

- Commission A: Parameswar Banerjee (India)
- Commission B: Karl J. Langenberg (Germany)
- Commission C: Takashi Ohira (Japan)
- Commission D: Franz Kärtner (USA)
- Commission E: Christos Christopoulos (U.K.)
- Commission F: Madhukar Chandra (Germany)
- Commission G: Michael Rietveld (Norway)
- Commission H: Yoshiharu Omura (Japan)
- Commission J: Subra Ananthakrishnan (India)
- Commission K: Guglielmo D'Inzeo (Italy)

e) Commission Vice-Chairs

- Commission A: William A. Davis (USA)
- Commission B: Giuliano Manara (Italy)
- Commission C: Marco Luise (Italy)

Commission D: Smail Tedjini (France)
Commission E: Alexander P.J. Van Deursen (the Netherlands)
Commission F: Roger H. Lang (USA)
Commission G: John D. Mathews (USA))
Commission H: Ondrej Santolik (Czech Republic)
Commission J: Donald C. Backer (USA)
Commission K: Masao Taki (Japan)

3. Establishment of temporary committees and ad hoc groups

Council approves the formation of a drafting committee with as members: Prof. H. Strangeways (English) and Dr. J. Hamelin (French).

4. Finances

Prof. S. Avery, Chair of the Finance Committee, was unable to attend the General Assembly. Council approved the proposal to dissolve the Finance Committee. The accounts will be closely monitored by the Secretariat, the Treasurer, the Accountant, and the Auditor from Ernst & Young.

Council approved the Treasurer's report. The Secretary General presented a proposal for the budget of the next triennium. Prof. Inan suggested keeping the special Commission budget for young scientists attending the General Assembly. The majority of the Council voted to allocate 3,000 Euro to each Commission for the support Young Scientists attending the 2011 General Assembly.

The amended budget was approved by Council.

Prof. Uslenghi announced that the income for URSI from the General Assembly in Chicago would be somewhat higher than the budgeted 110,000 Euro. Prof. Lagasse expressed his appreciation and sincerely thanked in the name of URSI the US Member Committee for honouring their commitments. He emphasised that the income from the General Assembly and Scientific Symposium is a crucial element for the financial equilibrium of URSI.

Council decided to increase the membership dues at the rate of the US inflation with a maximum of 2% per year.

5. URSI Membership

Nigeria has applied to become again Member of the Union. The Royal Society funded the dues of Nigeria for this year, and most probably for next year. The Membership of Nigeria to URSI is approved by a majority vote.

Chile requested for a continuation of Associate Membership. The Council unanimously approves the continuation of Associate Membership of Chile.

In Denmark the government has stopped funding scientific unions in general. Prof. Lagasse proposes that we continue the membership of Denmark and hope that they can find other sources of funding for the dues. Denmark has been a member for very long and has many active scientists. Council approves this proposition unanimously.

Ukraine has made an effort to reduce its arrears by somewhat less than half. Council agrees unanimously to keep Ukraine as a Member.

Prof Schlegel, Past President, mentions that initiatives have been taken to attract new members such as Singapore and the Baltic States. Prof. Lefeuvre requests the Member Committees to help with this.

6. Publications

For the next triennium the Standing Committee on Publications will be composed as follows:

- Paul Lagasse (Secretary General)
- W. Ross Stone (Chair, Editor of the Radio Science Bulletin)
- M.K. Goel
- Pierre Favennec
- Tarek Habashi (Editor of Radio Science)
- Smail Tedjini
- Steven Reising
- Phil Wilkinson

Prof. Lefeuvre thanks Dr. Stone for all his work and also expresses the gratitude of URSI to him for agreeing to continue as Editor of the Radio Science Bulletin for the next triennium.

The Council also expresses its sincere thanks to Dr. Stone by applauding.

7. White Papers

URSI recently published its first White Paper on Solar Power Satellites.

Commission K is preparing a second White Paper on Wireless Communication and Health. This White Paper is delayed because of a special European epidemiological publication on this issue that will soon be published and that needs to be studied first. In the next step the draft of the White Paper will then go for review to the Commissions and the Board.

The French Member Committee and Commission F announced a new White Paper

initiative on “Remote Sensing”. The White Paper will discuss all aspects of Remote Sensing and aims at providing input to the handbook on Remote Sensing that ITU will prepare. Commission K showed interest to participate.

8. Selection of venue of the XXXth General Assembly of URSI in 2011

From now on the term “General Assembly and Scientific Symposium” will be used, abbreviated GASS (see resolution at the end of this volume).

The representatives of China CIE (Beijing), Sweden (Gothenburg) and Turkey (Istanbul) gave a presentation about their proposal to host the 2011 General Assembly and Scientific Symposium.

A discussion was opened on whether URSI should require a minimum revenue of 150,000 Euro as proposed by the Board. The representative of Turkey said that they can only guarantee the 20% of the registration fee plus the 40 Euros per participant. The representative of Sweden said that they will do the same. The representative from China CIE said that they guarantee the 20% of the registration fee plus the 40 Euros with a minimum of 150,000 Euro. After a lengthy discussion Council voted to drop the requirement of a minimum revenue of 150,000 Euro for URSI. After this vote, Council proceeded with the election of the 2011 venue.

Istanbul was elected to host the XXXth General Assembly and Scientific Symposium of URSI in 2011.

9. Selection of venue of the XXXIth General Assembly and Scientific Symposium in 2014

Since there was only the proposal from Turkey for 2014, Council could not to elect a venue for the XXXIth General Assembly and Scientific Symposium in 2014.

10. Preparation of Scientific Program and designation of a Coordinator and an Associate Coordinator for 2011

Prof. Uslenghi accepted to become the Coordinator of the Scientific Program for the XXXth General Assembly.

Prof. Serbest, representative of Turkish Member Committee, said that he will suggest an Associate Coordinator of the Scientific Program after consultation with the Turkish National Committee. At the moment he is the contact person.

11. Paper handling for future General Assemblies

Sincere thanks were expressed to Dr. Bo Yu, developer of the paper handling software. Prof. Uslenghi confirmed that Dr. Bo Yu is willing to continue to support the paper handling software for the next General Assembly.

12. Long Range Planning Committee

Prof. Inan, Chairman of the Long Range Planning Committee, highlighted the following three points:

- A new constitution and composition of the Long Range Planning Committee was outlined. The Committee suggested having virtual meetings and possibly also a mid term face to face meeting.
- It is important to maintain a strong Young Scientist program and the Student Paper Competition should be continued. The special commission contribution to the Commissions for students attending the General Assembly should be maintained. URSI should put in place a mechanism to organize and co-ordinate all this.
- A mechanism has to be developed to closely follow emerging scientific areas.

Prof. Sorrentino, Delegate of the Italian Member Committee, noted a decline in the interest of the General Assembly especially in Commissions C and D due to the competition from other organizations. He proposes that URSI should focus more on the scientific aspects and less on the applications in order to avoid competition with other organizations.

13. Scientific Commissions

Council approved the updated terms of reference of the Commissions, which are:

Commission A - ELECTROMAGNETIC METROLOGY, Electromagnetic measurements and standards.

The commission promotes research and development in the field of measurement standards, in calibration and measurement methodologies, and the intercomparison of such. Areas of emphasis are:

- the development and refinement of new measurement techniques.
- primary standards, including those based on quantum phenomena.
- realization and dissemination of time and frequency standards
- characterization of the electromagnetic properties of materials.
- electromagnetic dosimetry.

The commission fosters accurate and consistent measurements needed to support research, development and exploitation of electromagnetic technologies across the spectrum.

Commission B - FIELDS AND WAVES, Electromagnetic theory and applications.

The interest of Commission B is fields and waves, encompassing theory, analysis, computation, experiments, validation and applications. Areas of emphasis are:

- Time-domain and frequency-domain phenomena;
- Scattering and diffraction;
- General propagation including waves in specialised media;
- Guided waves;
- Antennas and radiation;
- Inverse scattering and imaging.

The Commission fosters the creation, development and refinement of analytical, numerical, and measurement techniques to understand these phenomena. It encourages innovation and seeks to apply interdisciplinary concepts and methods.

Commission C - RADIO-COMMUNICATION SYSTEMS AND SIGNAL PROCESSING.

The Commission promotes research and development in:

- Radio-Communication and Telecommunication systems;
- Spectrum and Medium Utilisation;
- Information Theory, Coding, Modulation and Detection;
- Signal and Image Processing in the area of radio science.

The design of effective radio-communication systems must include scientific, engineering and economic considerations. This Commission emphasises research into the scientific aspects, and provides enabling technologies to other areas of radio science.

Commission D - ELECTRONICS AND PHOTONICS.

The Commission promotes research and reviews new development in:

- Electronic devices, circuits, systems and applications;
- Photonic devices, systems and applications;
- Physics, materials, CAD, technology and reliability of electronic and photonic devices down to nanoscale including quantum devices, with particular reference to radio science and telecommunications.

The Commission deals with devices for generation, detection, storage and processing of electromagnetic signals together with their applications from the low frequencies to the optical domain.

Commission E - ELECTROMAGNETIC ENVIRONMENT AND INTERFERENCE.

The Commission promotes research and development in:

- (a) Terrestrial and planetary noise of natural origin, seismic associated electromagnetic fields;
- (b) Man-made electromagnetic environment;

- (c) The composite noise environment;
- (d) The effects of noise on system performance;
- (e) The effects of natural and intentional emissions on equipment performance;
- (f) The scientific basis of noise and interference control, electromagnetic compatibility;
- (g) Spectrum management.

Commission F - WAVE PROPAGATION AND REMOTE SENSING (planetary atmospheres, surfaces and subsurfaces).

The Commission encourages:

- The study of all frequencies in a non-ionised environment:
 - Wave propagation through planetary, neutral atmospheres and surfaces;
 - Wave interaction with the planetary surfaces (including land, ocean and ice), and subsurfaces;
 - Characterisation of the environment as it affects wave phenomena;
- The application of the results of these studies, particularly in the areas of remote sensing and communications;
- The appropriate co-operation with other URSI Commissions and other relevant organisations.

Commission G - IONOSPHERIC RADIO AND PROPAGATION (including ionospheric communications and remote sensing of ionised media).

The Commission deals with the study of the ionosphere 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;
- Development of tools and networks needed to measure ionospheric properties and trends;
- Theory and practice of radio propagation via 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 ICSU family (IUGG, IAU, COSPAR, SCOSTEP, etc) and other organisations (ITU, IEEE, etc.).

Commission H - WAVES IN PLASMAS (including space and laboratory plasmas).

The goals of the Commission are:

- To study waves in plasmas in the broadest sense, and in particular:
 - . The generation (i.e. plasma instabilities) and propagation of waves in plasmas,
 - . The interaction between these waves, and wave-particle interactions,
 - . Plasma turbulence and chaos,
 - . Spacecraft-plasma interaction ;

- To encourage the application of these studies, particularly in the areas of solar/planetary plasma interactions, and an increased exploitation of space as a research laboratory.

Commission J - RADIO ASTRONOMY

The activities of the Commission include:

- observation and interpretation of cosmic radio emissions from the early universe to the present epoch and
- radio reflections from solar system bodies.

Emphasis is placed on:

- The promotion of science-driven techniques for making radio-astronomical observations and data analysis,
- Support of activities to protect radio-astronomical observations from harmful interference.

Commission K - ELECTROMAGNETICS IN BIOLOGY AND MEDICINE

The Commission is charged with promoting research and development in the following domains:

- Physical interaction of EMF* with biological systems;
- Biological effects of EMF;
- Mechanisms underlying the effects of EMF;
- Experimental EMF exposure systems;
- Assessment of human exposure to EMF;
- Medical applications of EMF.

* Electromagnetic fields (from static to optical)

14. Working Groups 2009-2011

Council approved the following *working groups*:

- E.1. Terrestrial and Planetary Electromagnetic Noise Environment
Co-Chairs: K. Hattori (Japan), M. Hayakawa (Japan), Y. Hobara (Japan), A.P. Nickolaenko (Ukraine) and C. Price (Israel);
- E.2. Intentional Electromagnetic Interference
Co-Chairs: M. Bäckström (Sweden) and W. Radasky (USA);
- E.3. High Power Electromagnetics
Co-Chairs: C.E. Baum (USA) and R.L. Gardner (USA);
- E.4. Lightning Discharges and Related Phenomena
Co-Chairs: Z. Kawasaki (Japan) and V.A. Rakov (USA);
- E.5. Interaction with, and Protection of, Complex Electronic Systems

- Co-Chairs: F. Sabath (Germany) and J-P. Parmentier (France);
- E.6. Spectrum Management
Chair: T. Tjelta (Norway);
- E.7. Geo-Electromagnetic Disturbances and their Effects on Technological Systems
Chair: A. Viljanen (Finland);
- E.8. Electromagnetic Compatibility in Wire and Wireless Communication Systems
Co-Chairs: J. Gavan (Israel) and A. Zeddami (France);
- F.1: Education and Training in Remote Sensing and Related Aspects of Propagation
Chair: M. Chandra (Germany) and J. Isnard (France)
- G1: Ionosonde Network Advisory Group
Chair: L-A McKinnell (South Africa), Vice-Chair: I. Galkin (USA), INAG Editor: P. Wilkinson (Australia)
- G.2. Studies of the Ionosphere using Beacon Satellites
Chair: R. Leitinger (Austria), Vice-Chairs: P. Doherty (USA), P.V.S. Rama Rao (India) and M. Hernandez-Pajares (Spain)
- G.3 Incoherent Scatter
Chair: W.I. Haggstrom (Sweden), Vice-Chair: M. McCready (USA)
- G.4 Ionospheric Research to Support Radio Systems
Chair: M. Angling (United Kingdom), Vice-Chair: D. Knepp (USA)
- J.1. Global Very Long Baseline Interferometry (VLBI)
Chair: to be nominated

Joint Working Groups

- EGH: Seismo Electromagnetics (Lithosphere-Atmosphere-Ionosphere Coupling)
for Commission E: M. Hayakawa (Japan)
for Commission G: S. Pulinets (Russia)
for Commission H: M. Parrot (France)
- FG: Atmospheric Remote Sensing using Satellite Navigation System
Co-Chair for Commission F: R. Lang (USA) and M. Chandra (Germany)
Co-Chair for Commission G: C. Mitchell (United Kingdom)
- GF: Middle Atmosphere
Co-Chair for Commission G: J. Röttger (Germany)
Co-Chair for Commission F: C.H. Liu (China, SRS)

GH1: Active experiments in Space Plasmas

Co-Chair for Commission G: K Groves (USA)

Co-Chair for Commission H: B. Thide (Sweden)

Inter-commission Data Committee

Interim Chair: P. Wilkinson (Australia)

Inter-commission Working Group on Natural and Human Induced Hazards and Disasters

Co-Chair for Com E: W A Radasky (USA)

Inter-commission Working Group on Solar Power Satellite

Co-Chair for Commission E: J. Gavan (Israel)

Co-Chair for Commission G: K. Schlegel (Germany)

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

Inter-Commission Working Group on Radio Science Services

Co-Chair for Commission E: T. Tjelta (Norway)

Co-Chair for IUCAF: W. Van Driel (France)(ex-officio)

HEJ: Supercomputing in Space Radio Science

Co-Chair for Commission H: Y. Omura (Japan) and B. Lembege (France)

Co-Chair for Commission J: K. Shibata (Japan)

Inter-Union Working Groups

URSI/IAGA VLF/ELF Remote Sensing of the Ionosphere and Magnetosphere (VERSIM)

Co-Chair for IAGA Commissions 2 and 3: C.J. Rodger (New Zealand)

Co-Chair for URSI Commissions G and H: M. Parrot (France) and H.J. Lichtenberger (Hungary)

URSI-COSPAR on International Reference Ionosphere (IRI)

Chair: B.W. Reinisch (USA), Vice Chair for COSPAR: M. Friedrich (Austria), Vice

Chair for URSI: L. Triskova (Czech Republic); Secretary: D. Bilitza (USA)

CO-ORDINATING COMMITTEE

Summary Report

The Co-ordinating Committee met on Saturday 9 August 2008 (1.40 to 4.30 p.m) and Saturday 16 August 2008 (2.40 to 5 p.m.).

1. First Co-ordinating Committee meeting

1.1 Local arrangements for the Chicago General Assembly (Prof. G. Uslenghi)

Prof. Uslenghi said that at the beginning of the GA 1037 people had registered. The Local Organizing Committee had produced the following 4 documents: a program booklet for the opening ceremony, a list of scientific sessions, a Book of abstracts (fully indexed), and a CD-ROM with the full papers and a searchable database. He apologised for the problems some people encountered in obtaining their visa to enter the US.

1.2 Scientific Program (Dr. M.K. Goel)

Dr. Goel thanked the Commission Chairs and Prof. Uslenghi for their help. Some Commission Chairs were somewhat less responsive probably due to their busy schedules. Dr. Goel mentioned that the paper submission software packet worked fine. 1456 papers were accepted.

1.3 Instructions to Commissions and matters for Business meetings

Professor Lagasse instructed the Commissions Chairs about the following matters :

- review and update of the terms of reference according to developments in recent years
- scientific report (by the incoming Chairs) on the business transacted during the General Assembly (for the Records of the General Assembly and the Radio Science Bulletin)

- resolutions and recommendations
- procedure for the election of Vice-Chairs
- responsibilities of Chairs and Vice-Chairs
- the Secretariat needs receipt for all financial transactions
- a dedicated Associate Editor for the Radio Science Bulletin is to be appointed
- reconstitution and creation of working groups for the following triennium
- proposed supported meetings for 2009-2011
- various scientific activities, web based lectures

1.4 The Young Scientist Program in Chicago

Prof. Lagasse mentioned that thanks to the generosity of various sponsors, URSI had been able to select 124 Young Scientists for this General Assembly. He also expressed the gratitude of URSI to Prof. F. Olyslager, Prof. H. Matsumoto and Prof. E.V. Jull for their efforts and for the outstanding job they did in managing the selection process for the Young Scientists. Around 20 Young Scientists were not able to attend the General Assembly, mainly due to visa problems.

1.5 Publications (Dr. W.R. Stone)

Dr. Stone highlighted three important tasks:

- Appointment of a Commission Associate Editor for the Radio Science Bulletin
- Selection of topics and authors for the Review of Radio Science
- Give thought about Tutorial Lecturers for the 2011 General Assembly. One should keep in mind that these lecturers should be prepared to write a paper for the Radio Science Bulletin.

Prof. Lefeuvre stressed the importance of the Commissions for the visibility of URSI. URSI will start with Web-based Lectures. Commission Chairs were required to check within the Commissions for material that is suitable for such Web-based Lectures and send it to the Secretariat. It will then be reviewed in the same manner as submissions for the Radio Science Bulletin. It will also be useful to have sets of lectures in other languages than English, such as Spanish and French. Hopefully URSI can build up a database of such Lectures that can act as a reference.

Finally Prof. Lefeuvre asked to send the Secretariat good high-resolution scientific illustrations to be included in an URSI poster.

1.6 URSI White Paper (input to Commissions)

In the business meetings new ideas for White Papers should be discussed. Prof. Prato mentioned that the White Paper by Commission K is delayed somewhat because of a special European publication on this issue that will come out soon and that needs to be studied first. Prof. Brussaard suggested thinking about White Papers on “Development and use of global positioning systems” and “Spectral usage”.

1.7. Long Range Planning Committee

The new Long Range Planning Committee will be composed of past Commission Chairs, past Board Members, Dr. Stone, Prof. Brussaard and possibly other people selected by the Chair. Prof. Cannon accepted to chair the Committee.

2. Second Co-ordinating Committee meeting

The Commissions highlighted the outcome of the discussions at the Business Meetings.

2.1 Statistics

In total there were 1284 registrants of which 1199 regular registrants.

2.2 General Comments

From this past General Assembly the following conclusions could be drawn on organisational issues:

- Almost no computer problems: PowerPoint presentations went quite well in general
- There were no capacity problems in the meeting rooms
- The poster arrangements were excellent but the posters should remain posted for at least 24 hours
- The preloading of the presentations went well
- The Student Paper Competition should take place during a regular session of the General Assembly and Scientific Symposium and not before the General Assembly and Scientific Symposium as was done this time.
- Invited speakers will be noted as such if the Conveners indicate them as 'invited'. This is to avoid the problem that speakers afterwards claim that they were invited. Such claims created lots of confusion.
- Invited speakers should pay the registration fee and should be notified in advance about this.
- It is important to identify those conveners that did not show up and to be careful whether or not to re-invite them.
- Open the possibility of parallel sessions: use parallel sessions within one Commission as was already done to some extent this time.
- Allow the Coordinator and Assistant Coordinator to make decisions on sessions.
- Many emerging issues come out just before General Assembly and Scientific Symposium. We should make provision for last minute sessions on these issues.
- To accommodate these last minute sessions, some Commission parallel sessions and the Student paper Competition session it would be useful to have an 11th parallel session. It will be investigated if there is physical space for that in Istanbul.
- As soon as an Associate Coordinator is identified a new time line will be worked out that allows defining the final program of the General Assembly and Scientific Symposium during a coordinating committee meeting 5 months in advance of the

General Assembly and Scientific Symposium. Dr. Stone will assist in this. All papers should be reviewed and assigned to sessions before the Coordinating Committee meeting.

2.3 Associate Editors of the Radio Science Bulletin

The following Associate Editors were nominated:

- Commission A: Bill Davis
- Commission B: Guiliano Manara
- Commission C: Marco Luise
- Commission D: Piere Favenec
- Commission E: Alex van Deursen
- Commission F: Roger Lang
- Commission G: John Mathews
- Commission H: Ondrej Santolik
- Commission J: Richard Strom
- Commission K: Joe Wiart

2.4 URSI White Papers (proposals from Commissions)

A White Paper on remote sensing will be initiated by Commission F. There was no firm plan yet on a White Paper on satellite navigation but there certainly is a willingness to investigate this further.

TREASURER'S REPORT ON URSI FINANCES

1. General

The state of URSI finances is reviewed in the attached balance sheets for the past triennium. URSI finances are audited annually by Ernst & Young.

In order to judge properly the results, it is best to consider the entire triennium 2005-2007. The most important aspect is the balance between expenditure and income. Over the period in question, income exceeded expenditure by approx. € 41,000. This result consists of two parts. Income from the General Assembly was approx. € 81,500, while expenditure was € 142,000, i.e. a deficit of € 60,500. This is offset by the regular income from contributions and bank interest exceeding the other expenditure by approx. € 101,500 (€ 635,500 vs. € 534,000).

Since both the booked value and the real market value of the assets have increased over the triennium, the overall financial status of the Union is healthy.

At the time of writing, only Ukraine has significant arrears in the fees.

2. Assets

Since long, the balance shows the purchase value of the investments. Moreover, since the Massachusetts Investor Fund has lost significant value over time the auditor deemed it necessary to book some of this loss. Gain on other investments is not booked, however. Moreover, provisions have been made for currency differences. As a result of this prudent approach, the booked value of the assets is much lower than the market value.

Over the period 2005-2007, the net total of URSI assets has, anyway, increased substantially. However, a significant part of these assets is allocated leaving a reserve of less than EUR 100,000 at the end of 2007. As happens every triennium, the decrease of the reserve is mainly due to the increasing provision for the GA. Still, the low reserve is a matter of concern.

3. Outlook to the next triennium

Although undoubtedly the GA is one of the most important scientific activities of the Union, the net cost to the Union of some € 60,000 is a matter of concern. Total expenditure on all other scientific activities is of the same order, i.e. € 65,000.

Other important activities will require additional funding in the next triennium. These include the support of the Regional Centre in Delhi, as well as increased cost of travel by the Board in its efforts to improve representation in international organisations and to stimulate regional activities in Africa, South America and S.E Asia.

In view of these developments, the Board is seriously considering means to limit the loss on future General Assemblies. There are three possibilities to accomplish this: reduce the travel cost of URSI Officials, increase the revenue, or reduce the cost of the General Assembly by requiring less infrastructural demands for organizing it.

Day-to-day handling of the finances of the Union has been executed very efficiently by the General Secretariat, for which we offer our sincere thanks.

Gert Brussaard
Treasurer, URSI

**INTERNATIONAL UNION OF RADIO SCIENCE (URSI)
BALANCE SHEET: 31 DECEMBER 2007**

	EURO		
ASSETS	31.12.2007	31.12.2006	31.12.2005
Dollars			
Merrill Lynch WCMA	574.20	941.06	139.05
Fortis	1,310.50	1,449.96	773.80
Smith Barney Shearson	5,509.55	9,810.57	10,906.55
	<hr/>	<hr/>	<hr/>
	7,394.25	12,201.59	11,819.40
Euros			
Banque Degroof	2,483.33	144.76	1,389.55
Fortis	52,939.57	153,073.15	200,734.00
	<hr/>	<hr/>	<hr/>
	55,422.90	153,217.91	202,123.55
Investments			
Demeter Sicav Shares	22,681.79	22,681.79	22,681.79
Rorento Units	111,414.88	111,414.88	111,414.88
Aqua Sicav	63,785.56	63,785.56	63,785.56
Merrill-Lynch Low Duration (304 units)	3,268.17	3,268.17	3,268.17

Massachusetts Investor Fund	250,483.18	250,011.32	250,011.32
Provision for (not realised) less value	(7,472.37)	(26,307.20)	0.00
Provision for (not realised) currency differences	<u>(80,263.20)</u>	<u>(61,801.63)</u>	<u>(38,844.47)</u>
	363,898.01	363,052.89	412,317.25
684 Rorento units on behalf of van der Pol Fund	<u>12,414.34</u>	<u>12,414.34</u>	<u>12,414.34</u>
	376,312.35	375,467.23	424,731.59
Short Term Deposito	201,139.20	0.00	0.00
Petty Cash	942.15	337.68	889.82
Total Assets	<u>641,210.85</u>	<u>541,224.41</u>	<u>639,564.36</u>
Less Creditors			
IUCAF	10,778.95	5,951.45	14,676.70
ISES	11,110.14	10,657.73	9,807.73
	(21,889.09)	(16,609.18)	(24,484.43)
Balthasar van der Pol Medal Fund	(12,414.34)	(12,414.34)	(12,414.34)
NET TOTAL OF URSI ASSETS	<u>606,907.42</u>	<u>512,200.89</u>	<u>602,665.59</u>
The net URSI Assets are represented by:			
Closure of Secretariat			
Provision for Closure of Secretariat	90,000.00	90,000.00	90,000.00
Scientific Activities Fund			
Scientific Activities in 2008	45,000.00	45,000.00	45,000.00
Publications in 2008	40,000.00	40,000.00	40,000.00
Young Scientists in 2008	40,000.00	0.00	0.00
Administration Fund in 2008	85,000.00	85,000.00	85,000.00
Scientific paper submission software in 2008	30,000.00	0.00	0.00
I.C.S.U. Dues in 2008	3,600.00	3,600.00	3,600.00
	<u>243,600.00</u>	<u>173,600.00</u>	<u>173,600.00</u>
XXIX General Assembly 2008 Fund:			
During 2006 - 2007 - 2008	<u>180,000.00</u>	<u>35,000.00</u>	<u>15,000.00</u>
Total allocated URSI Assets	513,600.00	298,600.00	278,600.00
Unallocated Reserve Fund	93,307.42	213,600.89	324,065.59
	<u>606,907.42</u>	<u>512,200.89</u>	<u>602,665.59</u>

**Statement of Income and expenditure
for the year ended 31 december 2007**

	EURO		
I. INCOME	31.12.2007	31.12.2006	31.12.2005
Grant from ICSU Fund and US National Academy of Sciences	0.00	0.00	0.00
Allocation from UNESCO to ISCU Grants Programme	0.00	0.00	0.00
UNESCO Contracts	0.00	0.00	0.00
Contributions from National Members (year -1)	33,578.29	8,986.00	44,736.00
Contributions from National Members (year)	170,577.70	127,046.00	158,507.00
Contributions from National Members (year +1)	38,789.50	3,856.00	43,992.00
Contributions from Other Members	0.00	0.00	0.00
Special Contributions	0.00	0.00	0.00
Contracts	0.00	0.00	0.00
Sales of Publications, Royalties	0.00	0.00	0.00
Sales of scientific materials	0.00	0.00	0.00
Bank Interest	3,534.04	891.40	1,189.21
Other Income	46,173.50	0.00	35,289.62
	<u>292,653.03</u>	<u>140,779.40</u>	<u>283,713.83</u>
Total Income	<u>292,653.03</u>	<u>140,779.40</u>	<u>283,713.83</u>
II. EXPENDITURE			
A1) Scientific Activities	54,026.74	29,299.63	123,308.17
General Assembly 2005/2008	18,929.09	9,879.23	113,021.76
Scientific meetings: symposia/colloquia	33,897.50	17,847.17	9,268.01
Working groups/Training courses	0.00	0.00	0.00
Representation at scientific meetings	1,200.15	1,573.23	1,018.40
Data Gather/Processing	0.00	0.00	0.00
Research Projects	0.00	0.00	0.00
Grants to Individuals/Organisations	0.00	0.00	0.00
Other	0.00	0.00	0.00
Loss covered by UNESCO Contracts	0.00	0.00	0.00

A2) Routine Meetings	5,372.04	11,062.37	13,334.00
Bureau/Executive committee	5,372.04	11,062.37	13,334.00
Other	0.00	0.00	0.00
	<u> </u>	<u> </u>	<u> </u>
A3) Publications	34,266.58	48,153.34	45,929.43
B) Other Activities	10,682.00	5,749.50	10,530.23
Contribution to ICSU	4,682.00	3,749.50	3,530.23
Contribution to other ICSU bodies	6,000.00	2,000.00	7,000.00
Activities covered by UNESCO Contracts	0.00	0.00	0.00
	<u> </u>	<u> </u>	<u> </u>
C) Administrative Expenses	74,350.69	112,559.20	97,423.81
Salaries, Related Charges	61,956.64	67,453.01	64,947.34
General Office Expenses	3,313.14	5,729.83	6,587.77
Travel and representation	17,091.54	2,450.28	2,909.02
Office Equipment	3,081.30	2,640.19	911.35
Accountancy/Audit Fees	5,187.88	5,777.75	4,567.75
Bank Charges/Taxes	2,555.02	2,200.94	6,783.56
Loss on Investments (realised/unrealised)	(18,834.83)	26,307.20	10,717.02
	<u> </u>	<u> </u>	<u> </u>
Total Expenditure:	<u>178,698.05</u>	<u>206,824.04</u>	<u>290,525.64</u>
	<u> </u>	<u> </u>	<u> </u>
Excess of Expenditure over Income	113,954.98	(66,044.64)	(6,811.81)
Currency translation diff. (USD => EURO)	(786.88)	(1,462.90)	1,334.67
Bank Accounts			
Currency translation diff. (USD => EURO)	(18,461.57)	(22,957.16)	78,980.90
Investments			
Currency translation diff. (USD => EURO) -	0.00	0.00	0.00
Others			
Accumulated Balance at 1 January 2007	512,200.89	602,665.59	529,161.83
	<u> </u>	<u> </u>	<u> </u>
	<u>606,907.42</u>	<u>512,200.89</u>	<u>602,665.59</u>
	<u> </u>	<u> </u>	<u> </u>

ADDITIONAL INFORMATION

Rates of exchange

January 1, 2007	0.7590 EUR
December 31, 2007	0.6860 EUR

	31.12.2007	EURO 31.12.2006	31.12.2005
<u>Balthasar van der Pol Fund</u>			
684 Rorento Shares :	29,815.56	29,138.40	29,323.08
market value on December 31	<u> </u>	<u> </u>	<u> </u>
(Aquisition Value: USD 12.476,17/EUR 12.414,34)			

Market Value of investments
on December 31, 2006/2005

Demeter Sicav	60,201.90	59,126.10	59,736.60
Rorento Units (1)	566,670.00	553,800.00	557,310.00
Aqua-Sicav	85,579.79	82,597.00	80,524.49
M-L Low Duration	2,070.84	2,311.97	2,592.50
Massachusetts Investor Fund	163,944.94	162,858.69	170,391.12
	<u> </u>	<u> </u>	<u> </u>
	878,467.48	860,693.76	870,554.71
	<u> </u>	<u> </u>	<u> </u>

(1) Including the 684 Rorento Shares of v d Pol Fund

APPENDIX

Detail of Income and Expenditure

	31.12.2007	EURO 31.12.2006	31.12.2005
I. INCOME			
Other Income			
Income General Assembly 2002	0.00	0.00	5,440.00
Income General Assembly 2005	46,173.50	0.00	29,832.03
Revenu Taxes	0.00	0.00	17.59
	<u> </u>	<u> </u>	<u> </u>
	46,173.50	0.00	35,289.62
II . EXPENDITURE			
General Assembly 2005			
Organisation	0.00	8,621.23	75,356.34
Vanderpol Medal	0.00	0.00	1,474.90
Expenses officials	0.00	0.00	0.00
Young scientists	0.00	1,258.00	36,190.52
	0.00	9,879.23	113,021.76

	EURO		
	31.12.2007	31.12.2006	31.12.2005
Symposia/Colloquia/Working Groups			
Commission A	0.00	0.00	0.00
Commission B	9,000.00	0.00	0.00
Commission C	3,000.00	0.00	2,500.00
Commission D	2,500.00	0.00	1,500.00
Commission E	0.00	0.00	0.00
Commission F	3,500.00	1,000.00	0.00
Commission G	3,000.00	3,847.17	1,268.01
Commission H	2,000.00	7,000.00	1,000.00
Commission J	0.00	3,000.00	3,000.00
Commission K	9,000.00	0.00	0.00
Central Fund	1,897.50	3,000.00	0.00
	<u>33,897.50</u>	<u>17,847.17</u>	<u>9,268.01</u>
Contribution to other ICSU bodies			
UNESCO-ICTP	0.00	0.00	5,000.00
FAGS	4,000.00	0.00	0.00
IUCAF	2,000.00	2,000.00	2,000.00
	<u>6,000.00</u>	<u>2,000.00</u>	<u>7,000.00</u>
Publications			
Printing 'The Radio Science Bulletin'	12,708.78	16,809.46	14,431.73
Mailing 'The Radio Science Bulletin'	21,557.80	30,872.31	23,091.91
Ursi Leaflet	0.00	471.57	8,405.79
	<u>34,266.58</u>	<u>48,153.34</u>	<u>45,929.43</u>

REPORTS OF THE STANDING COMMITTEES

URSI STANDING COMMITTEE ON PUBLICATIONS

August 2008

1. *Radio Science Bulletin (and Reviews of Radio Science)*

The *Radio Science Bulletin (RSB)* continues to have strong technical content and to be well received. Our rate of paper submissions leveled off through the latter part of 2006 and the first half of 2007 at three papers per issue, and then dipped to two papers per issue for the last two issues of 2007. We were back up to three papers for the March 2008 issue. The June 2008 issue had the first of two special sections on “Ray Tracing in Plasmas Using the Haselgrove Equations.” It had four papers in the special section, plus one additional paper. December will have the second part of this special section. All of this will bring our level of submissions up. After that, we are hoping to start receiving some of the Tutorial and General Lecture papers from the Chicago General Assembly. We also started with a new set of Commission Associate Editors in August at the General Assembly. There is thus some basis for optimism.

Figure 1 shows the number of papers we have had in each issue since December 2001. Note that the June and September, 2003, issues were special issues in honor of Jean Van Bladel; the September and December, 2004, issues contained special sections on the SPSS Workshop; and the March and June, 2005, issues contained special sections in honor of Carl Baum.

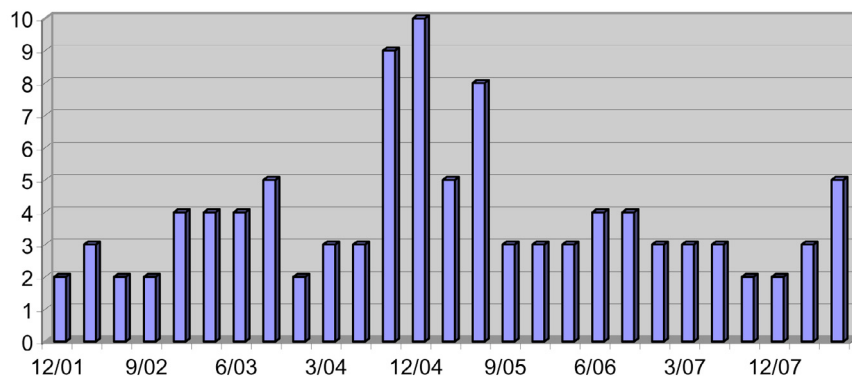


Figure 1. The number of papers published per issue in the *Radio Science Bulletin*.

Phil Wilkinson has been doing an outstanding job of coordinating the *Reviews of Radio Science*. The current schedule for the *Reviews* is available on the Web at <http://www.ips.gov.au/IPSHosted/NCRS/reviews/>. It can be seen that we have commitments out to the March 2009 issue. Actually, things are both better and worse than the schedule implies. Several of the *Reviews* shown for the and March 2009 and later issues have been delayed. While that is a problem, the good news is that most are expected to come in, and this will help fill the subsequent issues.

As noted above, the June and December 2008 issues of the *RSB* contained (and will contain) special sections: “Special Section on Ray Tracing in Plasmas Using the Haselgrove Equations.” Rod Barnes and Phil Wilkinson coordinated this. There were four papers for the June issue, and there will be four in the December issue, plus an additional non-special-section paper. Special issues and sections are good for the *RSB*, good for URSI, and good for the authors of the papers in them. We can be fairly flexible in organizing these, and we can publish the material in a reasonably prompt manner. Suggestions for topics and coordinators of special issues are most welcome.

As shown in Figure 2, we have had good participation in the *Reviews* from four of the 10 Commissions, and very good participation from an additional two Commissions, for the current triennium (this is based on both papers delivered and those well “in the works,” as well as commitments). Thanks to the efforts of Phil Wilkinson, there has been a notable improvement over the level of participation reported last year for Commissions B, C, D, G, and J. We have only obtained one contribution or commitment from Commission A. While Commission F has made a commitment, we have yet to receive anything, and the title of the promised paper keeps changing. While we have had a published paper from Commission K, we have been unsuccessful in getting any further response since then.

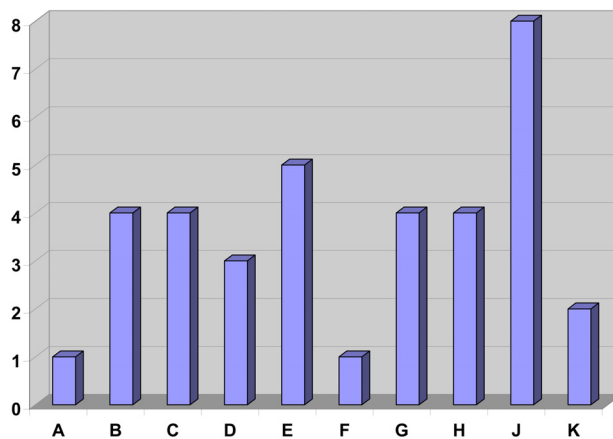


Figure 2. The number of published papers and commitments for *Reviews of Radio Science* for each Commission for the current triennium.

As I've noted previously, we have learned an important lesson with regard to the Tutorial and General Lecture papers. We need to make sure that the Commissions make it clear that a paper for the *RSB* is expected when an invitation to give such a lecture is made. For the coming triennium, we're actually going to encourage lecturers to provide papers as soon as possible, so that publication of them can begin immediately after the General Assembly (or perhaps even in the same timeframe, if papers are available). We've been successful with that: One of the Chicago General Assembly General Lecture papers appeared in the December 2007 issue.

The issues have been basically on schedule for this past year, and I believe this will continue. Inge Lievens continues to do an outstanding job in producing the *RSB*. The solution she was able to come up related to including color in the PDFs posted on the Web has proven to be robust, and all issues since March 2006 have had all color material in color on the Web.

We have continued to try to diagnose the problem with the PDFs not being searchable. They cannot be searched even using Acrobat's searching tools, and their contents are thus not indexed by search engines such as Google. Inge Lievens and I have been working on this, and she has enlisted the help of one of the university's computer people, as well. I have also sought help from outside consultants. As previously reported, the problem has something to do with an apparent font substitution that is occurring during the conversion to PDF. However, we have not been able to solve it. At this point, I am not optimistic about being able to solve it. Hopefully, we will take care of the problem if and when we can successfully convert production of the *RSB* to *InDesign* (see below).

John Volakis, our Senior Associate Editor, deserves our thanks for the excellent job he continues to do in coordinating the reviews of the papers.

Jim Lin has continued to regularly contribute a column on Radio Frequency Radiation Safety and Health. This is an important part of the *RSB*, both in terms of how well it has been received and because it provides welcome continuity.

Starting with the December 2006 issue, Peter Watson joined the *RSB* staff as Associate Editor for Abstracts. He has been able to generate a reasonable flow of abstracts of dissertations in Radio Science, with an average of about two abstracts per issue.

I am still looking for someone who would be willing to edit a regular column obtaining reviews of books in the radio science field. I would appreciate any suggestions or volunteers.

Per the decision of the Board and as approved by Council, the *RSB* will go to a system of primarily Web-based distribution starting with the March 2009 issue. All regular subscribers (those who register for the General Assembly, paying the subscription fee as part of their registration, or who register separately during the triennium) will receive an e-mail alert when the current issue is available on the URSI Web site, and will be able to download the current issue as a PDF. Individuals who wish to continue to receive the printed version of the *RSB* will be able to do so by paying an increased subscription fee, either as part of the registration for the General Assembly or separately. The additional

fee will help to cover the costs of printing and mailing the extra copies of the *RSB*. A limited number of printed copies will continue to be mailed to Member Committees and libraries. The reason for going to this two-tier system of subscription rates and emphasizing Web-based delivery is cost. The costs of printing, paper, and postage have risen dramatically over the past triennium. It is estimated that the new arrangement will save URSI over 25K€ per year.

2. Shifting Radio Science Bulletin Production to InDesign

As I reported last year, we are trying to convert the production of the *RSB* from using an outdated version of Adobe *PageMaker* to the much more current Adobe *InDesign* page-layout software. I gave a detailed discussion of our current and planned production process, including an explanation of why such a change would be desirable. I had hoped and planned that this change would have been made by now. Unfortunately, there has been a significant unanticipated problem with *InDesign*.

The changeover for the *RSB* is benefiting from a similar conversion to *InDesign* that I am undertaking for the *IEEE Antennas and Propagation Magazine*. About a year ago, I was able to demonstrate the preparation of a complete feature article for the *Magazine*, including a substantial number of equations (which is a large part of the challenge) and figures, using *InDesign*. At that point I thought the major problems were solved. However, when we tried to switch production from a test machine to a production machine running what was supposedly functionally identical Adobe software, we encountered font-substitution problems. Inge Lievens and Femke Olyslager encountered similar problems when they tried to transfer production of the *RSB* to *InDesign*. I have since spent more hours than I'm willing to admit, and a fair amount of consultant time, in trying to isolate and solve the problems for the *Magazine*. I have yet to be successful. I do believe that I have identified someone who should be able to solve this problem. However, it is likely to be several months before schedules will permit the level of effort that is going to be necessary. Once I can find a solution for the production of the *Magazine* using *InDesign*, the same solution will hopefully work for the *RSB*. [Note added after the General Assembly: In the latter part of 2008 I was able to identify a solution to the font-substitution problem, which was restricted to the equations. Unfortunately, a bug in the then-current version of *InDesign* made it impossible to implement the solution. I have since been able to verify that this bug is fixed in the latest version of *InDesign*, released at the end of 2008. I am currently working with the consultant to try to implement the solution, and we will hopefully be able to convert publication to *InDesign* in 2009.]

3. Radio Science

Tarek Habashy, of Schlumberger-Doll Co., in Cambridge, MA, USA, is the Editor of *Radio Science*. He kindly provided the following update for this report.

Radio Science continues to be one of the leading publications in its field, thanks to an excellent team of Associate Editors who continue to recruit some of the best experts in the field as reviewers. In 2007, there were 170 original manuscripts submitted with an acceptance rate of 62%, compared to 69% in 2006. The average number of days from receipt to first decision was reduced to 77 days, as opposed to 100 days in 2006, and the time to final decision was reduced to 120 days, from 160 days in 2006. Two special sections appeared in 2007, one on “Recent Advances in Studies of Schumann Resonances on Earth and Other Planets of the Solar System” and another on “Analytical Scattering and Diffraction.” Another special section on “2007 International Ottawa Symposium on Electromagnetic Theory” is in progress and will appear in 2008. Although the end of 2006 marked the official conclusion of Tarek Habashy’s (of Schlumberger-Doll Research) editorship of *Radio Science*, AGU has requested and he has agreed to stay on until the end of 2008 until AGU completes their process in searching for a new Editor.

In response to the AGU’s request, last year we provided the names of some URSI representatives to serve on the search committee for a new Editor. Although I followed up with the AGU in the later part of the year, they did not really appear to have much of search effort underway. [Note added after the General Assembly: A search committee has now been organized, and is actively evaluating candidates. It appears likely that a final choice for a new Editor will be available in the first half of 2009.]

4. New Standing Committee on Publications

The following people were proposed and approved by Council to serve on the URSI Standing Committee on Publications for the 2009-2011 triennium: Paul Lagasse (Secretary General), W. Ross Stone (Chair, Editor of *Radio Science Bulletin*), M. K. Goel, Pierre Fanvenec, Tarek Habashy (as Editor of *Radio Science*), Smail Tedjini, Steven Reising, and Phil Wilkinson.

W. Ross Stone, Chair

URSI LONG RANGE PLANNING COMMITTEE

The LRPC Members are Umran Inan (Chair), Masami Akaike, Makoto Ando, Quirino Balzano, Martti Hallikainen, Christian Hanuise, Paul Lagasse, Francois Lefevre, Chao-Han Liu, Peter Russer and Ross Stone.

I. Introduction

During this triennium, the URSI LRPC did not hold any meetings, since it is virtually impossible to bring together the members (consisting of Past Commission Chairs and exofficio members) at any meeting other than the General Assembly. Although no former gatherings of the LRPC were held, there were two rounds of EMAIL discussions, one with the Members of LRPC (i.e., Past Commission Chairs), and one with the current Commission Chairs. In addition, LRPC Chair attended the URSI Long Term Strategy Meeting held in Ghent on 14 April 2007, at which some LRPC members were also present. This report has been prepared as a compilation of these discussions, to provide guidance for the URSI Council.

Previous triennial reports by URSI LRPC has touched upon a very broad set of topics, ranging from URSI relationships with public and society at large, with professional societies, with industry, with developing countries, with governmental bodies (e.g., standardization), as well as new initiatives. The current LRPC decided to take a somewhat different approach this triennium, recognizing that the URSI Executive Board and Council already consider many of the broader issues, and that in most of these LRPC cannot do anything other than reiterate a list of suggestions. Keeping in mind that URSI interactions with developing countries and URSI regional centers were to be addressed by another URSI Committee headed by the late Prof. A. P. Mitra, the LRPC decided to concentrate its attention on

- (i) enhancing the participation in URSI by new generations of young students and scientists,
- (ii) new topical initiatives and areas, and
- (iii) strengthening of Commissions that are not very active.

In its deliberations, LRPC also did not explicitly discuss the matrix structure of URSI, although current Commission Chairs were asked by the URSI Board to comment/update their topics on the matrix structure. It is not clear that this matrix structure is useful at this point, especially as many of the topics in the matrix are intertwined with one

another. In this connection, it would seem that the terms of reference of the Commissions are determining in terms of Commission emphases, and there seems to be little to gain from trying to maintain this matrix. In any case, the present LRPC did not have any chance to do substantial work on this topic.

A discussion is presented next of the constitution of the LRPC and recommendations for maximizing its contributions in the future, followed by discussions of the three topics considered during this triennium, with concrete suggestions for moving forward.

II. Constitution of URSI Long Range Planning Committee

It is essential that more face-to-face meetings of the LRPC are facilitated in the future, possibly by appointing the Chair of the LRPC at the start (or ahead of) a General Assembly, so that at least one (possibly more than one) meeting of the LRPC can take place during the General Assembly. It would also be useful to try to arrange at least one additional meeting of the LRPC between the General Assemblies.

One possible way forward might be to invite the LRPC members (i.e., Past Commission Chairs) to a meeting in Ghent held in connection with the mid-triennium General Assembly planning meeting. Such a Long Term Strategy Meeting was held during the present triennium in Ghent on 14 April 2007, attended by the Chair of LRPC, but without any of the other LRPC members. An advantage of holding a fully attended LRPC meeting in connection with the mid-term General Assembly Coordinating Committee meeting in Ghent is that the Current Commission Chairs can then also attend. “virtual” meetings via e-mail can then also complement these meeting opportunities for the LRPC. The URSI Board has apparently had success with such meetings during the past triennium, although e-mail discussions between LRPC members were greatly inhibited by the lack of responsiveness of many members. However, this lack of e-mail response could have been due to the fact that the present LRPC was formed (and its Chair appointed) at the end of the General Assembly in India, thus leaving no opportunity for a face-to-face meeting to kick-off discussions and policy. Virtual meetings could/should be complemented by meetings of opportunity between 2-3 members at scientific conferences.

Concerning the constitution of the LRPC, there appears to be general consensus that its members should be the immediate past Commission Chairs, as they would have the most to contribute to the formulation of new ideas and resolution of problems for the future of URSI.

One possible augmentation of the LRPC membership could be to add past URSI Presidents as members. In this connection, it is essential that at the least the immediate past President should be an LRPC member, in addition to the current URSI President being an ex-officio member, for the same reason that the LRPC is constituted by past Commission Chairs rather than the current ones. For long-term continuity, and to most effectively carry forward institutional memory, it would actually be very useful to have all past URSI Presidents to be members of the LRPC.

It has also been suggested that the URSI Board consider the establishment of Past Presidents Council of URSI. Such a council could be extremely effective in concentrating on the much longer range strategic issues, and do so with continuity (as members would continue to be members through successive triennia), such as those issues that LRPC did not deal with during this triennium, including URSI relationships with public and society at large, with professional societies, with industry, with developing countries, with governmental bodies (e.g., standardization). These types of issues and others yet to be identified are much too broad and longer term for the LRPC to make effective progress in a single triennium. If URSI moves ahead with the establishment of Past Presidents Council, its activities would be separate from LRPC, but its members would also be members of the LRPC.

In summary, the LRPC recommends the following concerning the constitution and activities of the LRPC:

- Appoint the LRPC Chair and its membership (Consisting of Past Chairs of Commissions who choose to serve) very early during the General Assembly, and organize at least one face-to-face kick-off meeting of the LRPC during the week of the General Assembly
- Encourage “virtual” meetings of the LRPC by e-mail, as well as smaller gatherings of opportunity between 2-3 members at scientific conferences
- Facilitate a mid-term meeting of the LRPC, possibly in connection with the meeting of the General Assembly Coordinating Committee in Ghent, encouraging the attendance also of current Commission Chairs
- Include at least the immediate Past URSI President, and better yet all Past URSI Presidents as members of LRPC, to provide long-term continuity and institutional memory

III. Enhancing Participation of Young Students/Scientists

LRPC members were specifically asked for their ideas for encouraging participation in URSI by younger scientists, and specifically to comment on the possibility of providing travel support for students presenting papers as first authors at the General Assemblies. In this connection, the question to the LRPC was inspired by a program recently introduced within USNC (when LRPC Chair was the Chair of USNC) to provide travel support to all students presenting papers (as first authors). Within a few years, this new program increased student participation at the USNC annual meetings (every January in Boulder, Colorado) from ~25 to ~65-70, now constituting a significant fraction of the total numbers of ~300 papers presented at the Boulder meeting.

Nearly all LRPC members recognized the need for some kind of an initiative to enhance student participation, but nearly all also recognized that it would not be possible to fund all such students. It was also pointed out by several members that the General Assemblies are every three years, and thus maybe too rare in terms of typical duration of student PhD programs. Even if URSI could support every student presenting a paper,

many such students would be attending at the culmination of their dissertation studies, and thus may or may not stay in the fields of research, and may thus likely not remain active in URSI.

In hindsight, and in the light of the comments from LRPC members, a more limited and more targeted program may thus well be more suited for URSI. Quite serendipitously, the makings of such a program is already in place, and was initiated by the URSI council in its last meeting in India. At that time, it was decided that the Commission Chairs be provided additional funds of \$5000 (5000 USD) each to spend during their triennium, and the LRPC and URSI Secretariat has asked them to spend these additional funds specifically for support of graduate students attending the General Assembly (in Chicago) and presenting papers as first authors. Continuation of such a program for future General Assemblies would empower Commission Chairs to enhance student participation in their own Commissions, in ways that they see fit. In the end, relying on the Commissions to tailor programs to their own boundary conditions is the only real way to establish a healthy program that can be maintained in the long term. Each Commission Chair may develop his/her own criteria; for example, some may only fund those giving oral papers. Potentially, if each Commission could find 3 students worthy of support, a total of 30 students would be supported under this program. Some Commissions may not be able to find students, in which case the funds would remain at URSI, just as the unspent triennium Commission supports of 9000 Euros.

Other Commissions may have alternative ways of using the funds, such as Commission B using all of their triennial funds (9000 Euros) exclusively for Young Scientist Support for its own symposium every third year. These alternative methods may be encouraged as long as the people receiving the support are graduate students, who are likely to remain in the field.

In addition, another limited step for enhancing student participation and recognition would be to hold a Student Prize Competition program in connection with each General Assembly. Such a program is now underway for the upcoming General Assembly in Chicago. Full or partial travel support for the finalists (five or three) selected from among the applicants can be provided by URSI, at whatever levels that would be possible (e.g., 1000 Euro per student), with exceptions for more funding made at the discretion of the Secretariat based on need, for example. In considering the long term maintenance of such a program, it should be recognized one important effect of it is to help in the integration of Commissions with one another, since the Commission Chairs are forced to evaluate papers from authors outside their Commissions, and the presentations of the finalists have the same unifying effect as the plenary talks, hopefully attended by a broad audience. As these new programs for enhancing student participation are established, it is important to enhance the recognition of the recipients of Commission-selected Travel Support, as well as the finalists of the Student Paper Competition, by listing their names, affiliations, and a few sentence description of their research in the Radio Science Bulletin.

An additional limited step in enhancing student participation and recognition is already underway, with the long established Young Scientist Program also allowing applicants who are advanced graduate students. Outstanding students who have been active in their fields and in community outreach and who also have publications are recognized with Young Scientist Awards, which comes with, travel support.

In summary, the LRPC recommends the following for the enhancement of participation in URSI of new generations of students and scientists:

- Maintain a strong Young Scientist Award Program, and continue to facilitate/encourage outstanding graduate students
- Establish Student Prize Competitions as a permanent feature of future General Assemblies. Thought has to be given to the administration of this program, as it is likely that Local Organizing Committees may or may not be able to undertake such a load
- Maintain \$5000 (5000 USD) of targeted funds at the disposal of each Commission Chair for him/her to use for providing travel support to graduate students that they deem worthy, who are scheduled to present papers at the General Assembly.

IV. New Topical Initiatives and Areas (Emerging Issues)

Detailed inputs were received on this topic from the current Commission Chairs. The inputs from the Chairs are attached as Appendix I, but also are summarized below, together with an attempt to identify common themes that can be recognized by URSI at large.

Commission A Chair was changed in the middle of this triennium; so only limited opportunities for discussions were available concerning emerging opportunities. However, it is apparent that significant opportunities exist in the establishment of time standards, for example with the emergence of atomic clocks that may have stabilities of 1 in 10¹⁵. Another topic of interest is Nano metrology, for which a special Tutorial session has been scheduled for the upcoming General Assembly. Opportunities also exist in the area of characterization of electromagnetic properties of materials, especially with the preponderance of metamaterials with unprecedented properties. In the area of realization and dissemination on time and frequency standards, new technologies of navigation and time, based on combined usage of atomic clocks and GPS timing must constitute new opportunities. Precise time transfer techniques via GPS and two-way-satellite time/frequency transfer and antenna measurement techniques (joint with Commission B) are also seen as emerging opportunities.

Commission B sees three areas as having become or becoming dominant, including Simulated Materials, Microwave Imaging (Active and Passive) and Health Monitoring (Active and Passive). The first of these areas is rapidly expanding, including metamaterials, crystals and band gap materials, and in fact provides tremendous and unlimited opportunities not only for Commission B but also for Commissions D and A. At present, scientific sessions concentrating on these topics, for example at the National URSI meetings (e.g., USNC meetings in Boulder) are mostly under Commission B, but could just as

well be under Commission D or joint. This path of enhanced collaboration between Commissions B and D is in fact probably the path of salvation and expansion of Commission D, which has been increasingly inactive. The other two emerging areas for Commission B also provide opportunities for enhanced inter-Commission interactions, Microwave Imaging with Commission J, and Health Monitoring with Commission K.

Commission C has been relatively weak within URSI in terms of recent activity. The reasons for this include the fact that the topic of signal processing is so extensively covered in the context of other organizations, in particular IEEE. The strengthening of this Commission should be one of the priorities for the near future. In terms of emerging topics, propagation issues, extraction of channel parameters, multi-antenna technology, and analog-domain signal processing are seen as important concerns, but the topic of 'Cognitive Radio' is seen as a major new area that Commission C could lead in terms of its development. In this connection, opportunities exist for involvement of other Commissions, such as E and J, especially in terms of spectrum management, mobility, and sharing issues, and with Commission A, in terms of development of measurement standards.

Commission D notes that developing/improving components used in telecommunication systems as a major challenge for society and that research undertaken in the field of nanosciences is/will continue to be at the heart of evolution of many electronic/optical components, both in improvement of existing technologies and the development of new concepts. Control of electrons/photons at the nanometric scales, integrated in nanostructured materials (metamaterials, photonic crystals, plasmonics, carbon nanotubes...), creates new functions, such as Nanotube transistors with applications in microwaves, as nano-switches and nano-antennas. Molecular electronics has evolved to be an interesting alternative for future nanoelectronics, and opens a broad active field of investigation, ranging from quantum objects to hybrid devices molecular-silicon CMOS. Realization of nanometric scale optical/electronic components calls for a new approach, to fully account for the reliability of these components, and to determine the scaling factors between classical components and such future components. In the important area of energy, the structuring at nanometric scale paves the way for realization of solar cells with high efficiencies. The increase of the use of RFID is still an important topic for Commission D commission and will benefit directly from progress on nano-electronics/optics.

Commission E sees technological trends as the driver for emerging issues in the areas of EMI and EMC, including proliferation of microprocessors, and transmitters (e.g., Bluetooth), and higher operating frequencies and smaller wavelengths which can penetrate easier through seams and apertures. Development of standards for large equipment and systems, where individually tested components may nevertheless interfere is particularly challenging, especially since large test facilities are expensive. The development of such standards are nevertheless crucial for health and safety, both from the point of view of electromagnetic effects on humans, but also from the point of view EMI causing safety-

critical electronic systems to malfunction. Such issues are also important in terms of protection of critical systems from intended interference, such as in case of terrorism. Anticipation of new technologies, and development of consistent standards, and standardized tests for the functional safety of large systems are seen as important areas of emphasis for Commission E.

Commission F sees several areas as emerging issues and opportunities, including Terahertz propagation and scattering, free space optical/photonic and ultra-wide-band propagation and remote sensing, environmental remote sensing and monitoring, and propagation and nonmolecular interaction with biological matter. Interference problems, next generation of sensor development and synergy of multiple sensors are also recognized as important challenges. Opportunities for interaction with other Commissions exist in the context of the development of these areas, including Commissions K, D, B, and C.

Commission G identifies important emerging issues in two categories of Applied Science & Systems and Science. The former include radar remote sensing from space and in space, high integrity GNSS navigation systems, and assimilative models of ionospheric density and scintillation, and low frequency astronomy. The Science topics include increased emphasis on planetary ionospheres, anthropogenic effects (ionospheric modification by HF heaters and climate change), and plasmaspheric physics and models. As usual, significant opportunities for interaction exist with Commission F, H, and J.

Commission H recognizes a wide range of emerging issues and opportunities, including energy supplies, satellite propulsion (e.g., ion thrusters), protection of satellites (radiation effects on electronics) and power and communications systems (i.e., Space Weather), and solar variability and climate change (e.g., via wave-driven energetic particle precipitation).

Use of satellite constellations (small, micro-, nano-) to measure wave properties (temporal and spatial) and plasma wave applications involving other planets and solar physics are also recognized as new opportunities. Concerning the topic of energy, both the development of nuclear fusion and solar power satellites are seen as possible areas of renewed emphasis, with involvement of several other Commissions (e.g., B, E, F, G, J, and K).

Emerging issues recognized by Commission J include development of detectors (wideband dual polarized phased and focal plane arrays) with large field of view at mm wavelengths, data transport and handling (Tbyte/s), data distortions (ionospheric effects) and EMI mitigation, and extra-terrestrial radio astronomy (spacecraft-based, far-side of the moon).

Continuing issues and concerns include interference from telecommunication systems, protection of existing bands, and approval of radio quiet zones. In addressing emerging issues as recognized above, significant opportunities exist for interactions with Commissions B, C, D, E, F, and G.

Several emerging issues of heavy societal impact are encompassed by the terms of reference of Commission K, especially with the still rapid development of wireless

communication technologies and the emergence of new Departments of Bioengineering, Medical Imaging, Molecular Imaging and Molecular Biology at so many institutions.

While the underlying opportunities and applications in this connection are extremely broad, and cannot possibly be captured by URSI, or any other single organization, the relatively small but important component of the research thrusts of such departments, namely ‘Electromagnetic Effects in Biology & Medicine’ can be uniquely and most effectively captured by URSI. The main emerging issues today are new EMF-emitting devices (e.g., WiFi, Wimax, RFID) linked with dosimetric and standardization issues, and the biomedical applications of biomedical imaging (e.g., very high field MRI, microwave imaging, thermal imaging, near infrared imaging, optical imaging and hybrid imaging including optical/acoustic and microwave/acoustic), electrical mapping (e.g., electrical encephalography or EEG and electrical magneto encephalography or EMG) and electrical simulation (e.g., direct electrical stimulation and inductive non-invasive stimulation). Realization of such opportunities should be a new thrust of Commission K, with significant interaction with other Commissions, namely commission A (e.g., field and SAR metrology), commission B (e.g., numerical methods and modeling of electromagnetic propagation in tissues, EM and statistics), commission E (e.g., development of EMI standards), commission F (e.g., terahertz propagation in tissue), and commission H (electromagnetics in conducting media). Commission K thus has the dual important roles of (i) risk assessment role as “hand maiden” to other Commissions, and (ii) leading and asking other commissions to lend their expertise to develop new technologies such as the understanding of EM field transmission characteristics for microwave breast imaging.

The following set of suggestions are offered as a means of transitioning these recognized emerging areas to concrete activities:

- Encourage each Commission Chair to organize at least one Special Session in their recognized emerging areas, preferably a joint session with another Commission
- Encourage each Commission Chair to raise awareness within his/her Commission of the newly emerging topic area, by asking members to identify colleagues within their departments/schools who are not currently active in URSI, but could well be in the context of the new area
- Each Commission should report back on their work on fostering emerging areas at the next meeting of the LRPC, so that the recognition and development of emerging areas is an evolving process, building upon what is put forth in the previous triennium, rather than having a fresh start each time.

V. Strengthening Commissions that are not very active

At present, URSI Commissions that appear to not be as active as they can be are Commissions C, D, and K. Commissions C and D are held back primarily because of the fact that they represent very broad constituencies that are actually very active under other societies, primarily IEEE. The challenge for these would thus appear to properly identify

and nurture particular ‘niche’ sub-areas best suited for URSI. Commission C has been brainstorming on this, and has identified the subject of ‘Cognitive Radio’ as one such subarea niche. For this initiative to be successful, all Member Committees should be encouraged by URSI to enhance activity at their own national meetings, so that the fruits of those may carry over to the General Assemblies. It is not clear what the mechanism for doing so is; however, one possibility may be a presentation by the current Commission Chair at one of the Council meetings at the GA.

The clear niche sub-area for Commission D is metamaterials, crystals, and band-gap materials. URSI is currently rather active in these topics, but this activity is more apparent in Commission B. Since Commission B is so broad in terms of topics and in terms of sheer size of membership, it probably can afford to start pursuing these topics as Joint Sessions with Commission D, and/or even may relinquish some aspects entirely to Commission D. It is not clear what mechanisms exist within the URSI structure for encouraging such a development; however, examination of the Commission D Sessions and organizers for the upcoming GA indicates that the trend of migration of some topics from Commission B to Commission D is already happening. It is yet to be seen whether these sessions will attract enough numbers of papers; however, it is clear that the Commission leaders are already intent to move in this direction, and should be encouraged to do so by URSI.

The nature of the inactivity problem for Commission K is probably similar to that in Commissions C and D, in that potential participants in these areas have many other outlets within the context of other societies, and in particular IEEE. It also appears that at least some of the Commission K sessions at URSI General Assemblies are quite popular, even though Commission K activity at national meetings (e.g., in the United States) is quite low.

Even though LRPC is not in a position to make recommendations for this Commission due to our lack of knowledge and understanding of the issues and emphases, it would appear that the nice for URSI in the very large topic of Engineering in Medicine and Biology (EMBS) may be captured in the name of the Commission, in that it emphasizes ‘Electromagnetic’ effects, rather than the enormously broad set of topics covered by IEEE/EMBS, ranging from MRI, to biomedical signal analysis/processing, biological system theory, etc. .

VI. URSI Dialogue with Society, Capacity Building, Interactions with other Scientific Organizations and Regional Centers

The LRPC members were also asked in general to comment on other aspects of the charge to the Committee, specifically capacity building, dialogue with society, reaching out to all countries, and interactions with other scientific organizations (e.g., ICSU). Members were also asked to comment upon ways to link telecommunications and radio science encourage URSI participation by developing countries, and the merits of regional URSI centers.

While the responses on these topics were widely scattered and diverse, we try to capture the essence below.

Establishment of URSI Regional Centers was seen as a very good idea, and there was general recognition of the value of the one setup in India by the late Dr. A. P. Mitra. It was recognized that such centers would be useful also in South America and Africa. However, doubts were expressed as to the feasibility of such organizations without being shepherded by a highly respected and influential person, with command also of financial resources.

It was also recognized that some of the capacity building and dissemination objectives of Regional Centers may be realized with Regional General Assemblies, such as the Asia Pacific Radio Science Conference (AP-RASC), held between the URSI General Assemblies.

In terms of dialogue with society, it was recognized that URSI so far is not very visible, even among colleagues in Electrical Engineering departments, unless they are involved in radio frequency engineering. Generally understandable books edited by and contributed to by our members should somehow be encouraged, and the URSI web page should be more like a media presentation center, possibly with animations, and highlights of applications or issues.

The development of URSI White Papers was seen as a step in the right direction, even if the effort of having all Commissions sign up is huge.

Related to the dialogue with society and to the general relevance of and awareness about URSI is the need to give greater emphasis to societal applications of RF and microwaves. It was recognized that students do not want to study antennas (for example) unless there is application to a useful device. Suggested areas of new emphasis in this connection include relief of human handicaps using RF, RF applications to health maintenance (e.g., for old folks), targeted drug delivery, noninvasive medical imaging, and invasive RF treatments.

Detection of global change signals, monitoring of natural hazards, and better understanding of interaction of EM waves with the natural environment were also recognized in this connection. As the required monitoring would be worldwide, such a new URSI thrust would necessarily involve scientists from other countries, thus helping also in the area of capacity building.

A possibly new opportunity exists for enhancing URSI visibility, involvement by underdeveloped countries, and capacity building. Under the auspices of the International Heliophysical Year (IHY) program, and in the context of the United Nations Basic Space Science (UNBSS) initiative has facilitated the deployment of low cost and easy-to-use radio science instruments (e.g., low frequency receivers) at countries such as Morocco, Algeria, Libya, and Tunisia, which have not had been active within URSI. The Principal Investigators involved in these programs could be encouraged to invite the scientists they work with to have their countries join URSI and be more active within it.

In terms of URSI mission statement, it was recognized that paragraph (c) should also refer to ‘systems and electronic components’.

Although there was not much discussion of URSI interactions with other scientific organizations, the fact that the STC initiative failed was noted to be symptomatic. There was yearning for another mechanism for achieving such connections. As mentioned in the Introduction, LRPC believes that the URSI Board, and/or a possible Past Presidents of URSI Council, as discussed in Section II, best addresses such issues.

APPENDIX I: Emerging Issues for each Commission

Commission A Input from Dr. P. Banerjee/March 19, 2008

I. Emerging opportunities

- i. Developments of Atomic clocks with ultra high stabilities (10-15)
[chiplevel atomic clock is for moderate accuracy of 1 in 1011]*
- ii. Nano metrology (a special Tutorial session has arranged during GA08)*
- iii. Characterization of electromagnetic properties of Materials*
- iv. Precise Time transfer Techniques via GPS and Two Way Satellite Time Frequency Transfer(TWSTFT)*
- v. Antenna Measurement Techniques (jointly with Commission B)*

II. There is the serious lack of awareness on the scope of URSI. Particularly many of very senior and active researchers who are involved in Commissions A to D are of opinion that their interests are not in the category of Radio Science (i.e. URSI).

This is my experience during the organization of GA05. So, young scientists of these groups are not exposed to the activities of URSI. India has taken some initiatives in this direction.

Emerging Topics in Commission B

Four different research areas have become or are becoming dominant in Commission B. They are:

- Simulated Materials

This is the general area dealing with new materials with unusual physical properties like *Metamaterials, EM crystals and EM band gap materials*. They are generated using natural materials with ordinary physical properties, but by enforcing certain EM relationships, thus can be categorized under the general term of “Simulated Materials”. They have potential for unlimited innovations and impact in scientific and industrial applications.

- Microwave Imaging (Active and Passive)

A number of needs and concepts have stimulated research on “Microwave Imaging”. They are the needs for developing “low cost, portable and miniaturized” alternatives for conventional methods in medical Imaging and industrial applications. The security issues have encouraged a wide range of microwave imaging applications and research for developing suitable prototypes.

- **Health Monitoring (Passive and Active)**

Remote sensing has become a new area of research for monitoring the health of biological systems of all kinds and structures like buildings, bridges roads and rail lines. New devices are being investigated and developed, and are influenced for great extent by innovations in “NanoTechnology, MicroMachining and MicroElectroMechanical (MEMS) devices. The medical application promises to have a major impact in scientific research and personal care.

- **Visibility and Resources**

URSI visibility suffers from the fact that, its mandate and potential service to science and Engineering are not widely publicized and by in large are unknown to public. It is considered as a mysterious society controlled by mysterious people. For these reasons URSI suffers a great deal from public support.

Emerging Issues for Commission C

Proposed initiatives

Thematic	Interest or concern	Consequence
Cellphone coverage	propagation laws in different environments	Experimental and simulation investigation
Wireless high-speed internet access	System development and cost issues	Deployment in developing countries Developing an URSI standard?
Propagation aspects: channel models for system development	Need good propagation models	Develop URSI models? Would get in competition with many other bodies
Sensor networks	Low-power signal processing	
Multi-antenna technology		
Codec design		
Analogue-domain signal processing		
Standardized measurement technology for propagation channels, and extraction of channel parameters	Get results that are comparable from different campaigns	Make an initiative for comparison (but failed in previous attempts)
Speech and video coding		

Cognitive radio was seen as major new area for Commission C. It was emphasized that Commission C should be leading, but heavily involve other commissions.

Emerging Issues for Commission D

Developing and improving the components used in telecommunication systems is a major challenge for society in general. The URSI is well aware that research undertaken in the field of nanosciences is and will continue to be at the origin of the evolution of many electronical and optical components. While this trend is due in part to the improvement of existing technologies, it is essentially based on the development of new concepts. Indeed, the control of either electrons or photons at the nanometric scale may reveal particular properties.

Moreover, these particles are no longer considered in simple environments, but they are now being integrated in nanostructured materials (metamaterials, photonic crystals, plasmonics, carbon nanotubes...), thereby creating new functions. Nanotube transistors will then be more specifically described through the consideration of their applications in the field of microwaves, including nano-switches and nanoantennas. Molecular electronics has turned out to be an interesting alternative for future nanoelectronics. Molecular electronics opens a broad active field of investigation, ranging from quantum objects to hybrid devices molecularsilicon CMOS. The realization of nanometric-scale components for optics and electronics calls for a new approach, where the reliability of these components will be fully taken into account. The scaling factor between classical components and these future components is but an aspect of this problem, and a whole new thinking must be developed in order to account for the nanometer scale. The problem of energy management becomes also a main issue in the future. Here again, the structuring at nanometric scale paves the way for the realization of solar cells with high efficiencies. At last the increase of the use of RFID is still an important topic of the D commission and will benefit directly from the progress on nano-electronics and nano-optics..

Emerging Topics in Commission E

We live in a world dependent on electrical and electronic devices or equipment for our safety, security, quality of life, health and well-being. Each day, advances in technology produce new applications with added economic and social benefits to more people in more countries around the world. As this trend continues, we must be aware of unintended consequences, such as potential interaction that could affect the performance of electrical and electronic devices that permeate our lives.

Electromagnetic compatibility (EMC) and electromagnetic interference (EMI) involve the potential for the normal operation of some devices to be disrupted by exposure to electromagnetic fields. Such fields may come from any number of sources, not limited to wireless phones or other radio products.

Technological Trends and EMC

- Proliferation of Microprocessors.
That there will in the future be many more emitters and “victims” within a small electronics-rich environment raises a concern. Clearly, the cell phone will continue to develop, and the number of instruments in use will increase. And now the possibility

of a new set of transmitters being placed in nearly every piece of electronics arises with Bluetooth technology.

- Higher Operating Frequencies.

Another trend is the continual increase in operating frequency of products coming into the market. While cell phone technology has exceeded 1 GHz and Bluetooth will operate at 2.4 GHz, products involving satellite communications operate near 10 GHz and automobile radar systems involve frequencies above 40 GHz. The new frequencies are not in themselves necessarily a concern, but one aspect of the higher frequencies could be a problem. Higher frequencies have smaller wavelengths and are able to penetrate equipment enclosure seams and apertures more easily than lower frequencies. In addition to the increase in the disturbing environment that comes with higher operating frequency, the development of new microprocessors operating at clock speeds in excess of 1 GHz introduces the possibility of more-direct interference in the operation of electronic systems, in terms of both immunity and emissions.

- Large Equipment and Systems.

The EMC standardization process has succeeded in producing test methods to evaluate the acceptability of equipment and small systems built by manufacturers. It has been difficult, however, to develop standard methods for evaluating the immunity of large equipment or of systems that are installed together for the first time. Size is a seriously problematic factor: test facilities of large sizes are expensive to build, and immunity testing performed at open-area test sites can threaten other equipment that are not under test. Problems occur even with emissions testing. To establish the level of emissions from a particular piece of equipment can be difficult after the unit has been installed in an operating factory due to simultaneous emissions from other equipment not under test.

- Health and Safety.

The first concern is about the direct effects EM fields may have on human health. (This is in common with Commission K). A related area of interest involves the possibility of electromagnetic disturbances causing electronic systems to malfunction and thus present a safety risk, as, for example, a cell phone in a factory causing an industrial robot to behave so as to injure a worker. A third area of concern is referred to as intentional EMI. In such a scenario, high-level EM transients are directed at electronic systems in a commercial building in order to stop the equipment from operating properly. This capability could threaten the safety of people if criminals or terrorists targeted modes of transportation such as airplanes or automobiles.

Solving Future EMC Problems

- Anticipation of New Technologies.

The first objective is to evaluate emerging technologies that may have EMC impacts, focusing on the scientific literature, as new ideas are formulated.

- Consistency of Standards.

One major strategy is to continue and even intensify the focusing of EMC standards.

This effort should involve even closer cooperation with ISO and the ITU in order to put limited EMC expert resources to the most efficient use. The principal goal should be to develop a single set of emission and basic EMC test standards.

- Standardized Tests for High Frequencies.
Development of standardized test methods for higher frequency disturbances, i.e., those above 1 GHz. Work to fully develop the reverberation test method, the transverse electromagnetic (TEM) test cell method, and ancillary standards for sensor calibrations should go forward rapidly.
- EM Disturbances and Functional Safety.
More attention should be paid to the complex functional problems caused by electromagnetic disturbances that may lead to a loss of safe operation. Although this may appear to be a classic safety problem, the ability of EM fields to interact, in a complex way, with systems that are exchanging electronic data in real time requires the attention of EMC experts. A key difficulty is that the points of entry of an EM disturbance may be widely distributed throughout a system.
- Testing Large Systems.
With regard to the challenge of testing large systems and pieces of equipment, there is a need to develop a better understanding of the interaction processes.

Emerging Topics in Commission F

Terms of reference

- (a) The study of all frequencies in a non-ionised environment :
 - (i) wave propagation through planetary, neutral atmospheres and surfaces;
 - (ii) wave interaction with the planetary atmospheres, surfaces (including land, ocean and ice), and subsurfaces;
 - (iii) characterisation of the environment as it affects wave phenomena;
- (b) The application of the results of these studies, particularly in the areas of remote sensing and communications;
- (c) The appropriate co-operation with other URSI Commissions and other relevant organisations.

New Thematics

- Terahertz propagation and scattering
- Photonic propagation in open media and remote sensing
- UWB propagation (selectivity) for fast data rates
- UWB remote sensing methods (shift from military to civil applications)
- Interference problems (*and passive radio services protection*)
- Environmental issues and monitoring : next generation sensor development
- Multisensor synergy
- Propagation in and non-molecular interaction with biological matter (comm. K-combinability of interests)

Interest or/and concern

Why is this important for Comm F?

The above topics reflect the recent developments. Terahertz techniques evolves rapidly but new propagation problems need to be addressed, UWB systems are now emerging and the associated propagation and scattering effects need to be investigated.

Photonic sensors are entering remote sensing scenarios

Consequences for the Commission

Promote and keep these developments under way.

Other Commission Potentially Involved

K, D, B, C

*Emerging Topics in Commission G***Thematic Priority**

Applied Science and Systems

1. Radar remote sensing from space and in space
2. High integrity GNSS navigation systems
3. Assimilative models of the ionospheric electron density and scintillation
4. Low frequency astronomy Science
5. Planetary ionospheres
6. Anthropogenic effects (eg modification by heaters and climate change)
7. Plasmaspheric physics and models

Interest or/and concern

1. Distortion and shifts in images
2. Loss of lock, especially in high precision systems
3. Promises (perhaps in long term) improved modelling capability
4. Fundamental limitation and new data source
5. Basic science

Consequences for the Commission

1. Further links to engineering community needed
2. Ditto
3. Better links to Meteorological community required
4. New focus for scintillation studies
5. Strengthens Science base of Commission for the long term

Other Commission Potentially Involved

Fand J

*Emerging Topics in Commission G***Thematic Priority**

A) Energy supplies

Object

Power generation by solar power satellites

Interest or/and concern

Solar power satellites offer one opportunity to supply some of our future energy needs, but there are significant technological problems to be overcome.

Consequences for the Commission

URSI could take a lead to identify the critical issues where research is needed to make the system efficient.

Other Commission Potentially Involved

All

B) Satellite propulsion

Object

Plasma thrusters used for satellite propulsion work by accelerating ions out of the thrusters. A new generation of thrusters is now being developed that use nonlinear wave-particle interactions to accelerate the ions (double layers), and has been used by the latest ESA mission to the moon – SMART 1. These systems provide long endurance and potentially high power, relevant to planetary exploration, and to station keeping for commercial satellites.

Interest or/and concern

URSI could help stimulate research into new methods of wave acceleration relevant to plasma thrusters for commercial interest. This is directly relevant to Commission H.

URSI should also stimulate research into spacecraft-plasma interactions as a result of these new plasma thrusters, to ensure they do not damage satellites, or significantly affect the natural environment.

C) Satellite protection and space weather

Object

a) To protect satellites by develop methods of specifying risk from changes in the natural space plasma environment

b) To protect satellites after a nuclear detonation in space by developing ways to remove energetic particles trapped inside the Earth's magnetic field using waveparticle interactions

Interest or/and concern

Satellites, and other technological systems, are damaged by energetic charged particles, and by changes in the plasma medium. Models to specify and predict periods of high risk caused by variations in the plasma environment would enable satellite operators and satellite construction, and insurance to reduce risk of damage.

Similarly, it is estimated that if the high altitude starfish nuclear detonation of 1962 happened today then energetic electrons from the blast would become trapped inside the Earth's magnetic field for years and destroy all satellites in low Earth orbit within a period of a few months. URSI could help stimulate research into using waves to scatter energetic particles and remove them from the Earth's magnetic field into the atmosphere.

4) Solar variability and climate change

Object

Galactic cosmic rays, solar energetic particles, Van Allen radiation belt electrons and auroral electrons can penetrate the atmosphere, change atmospheric chemistry, and hence change heating and cooling rates of the atmosphere which may affect climate. The need is to evaluate these mechanisms and determine whether they are important for climate change. They are not included in any IPCC report.

Interest or/and Concern

Particle precipitation inside the Earth's magnetic field is caused by wave-particle interactions, and interactions with auroral electric field. URSI could stimulate research in this area.

Emerging Topics in Commission J

Detectors

- Wide-band dual-polarized phased arrays for large Field of View (with B): Calibration of phased arrays
- Dual-polarization focal plane arrays at mm wavelengths: Data transport and handling
- Transport and processing of huge datasets (Tbyte/sec, 10-100 Pflop)
- Image analysis of huge datasets (PetaBytes): Handling data distortions
- Ionospheric effects on low frequency astronomy (with G)
- RFI mitigation (with F): Extra-terrestrial radio astronomy
- Spacecraft navigation
- Far side of the moon

Commission J: continuing issues

- Interference: telecommunication systems (UWB, with F), (microwave transmission of power (with H))
- Protection of existing frequency bands
- Approval of Radio Quiet Zones: Connection to OECD Global Science Forum

URSI Commission K emerging issues

The driving issue behind the creation of Commission K was health risk assessment mainly related to mobile telephony. Since then, several emerging issues of heavy societal impact have been encompassed by the terms of reference for Commission K, especially in view of the still rapid development of wireless communication technologies and the emergence of the areas of "bioengineering" as a new area of emphasis at so many institutions, with new Departments of Bioengineering, Medical Imaging, Molecular Imaging and Molecular Biology being created. It is significant in this regard that the chair ship of Commission K has alternated between world leaders in risk assessment and biomedical engineering and imaging over the last 4 cycles.

While the underlying opportunities and applications in this connection are extremely broad, and cannot possibly be all addressed by URSI, or any other single

organization, the relatively small but important component of the research thrusts of such departments, namely ‘Electromagnetic Effects in Biology & Medicine’ can be uniquely and most effectively captured by URSI.

The main emerging issues are today the new EMF-emitting devices (e.g., WiFi, Wimax, RFID) linked with dosimetric and standardization issues, and the biomedical applications of biomedical imaging (eg, very high field MRI, microwave imaging, thermal imaging, near infrared imaging, optical imaging and hybrid imaging including optical/acoustic and microwave/acoustic), electrical mapping (eg, electrical encephalography or EEG and electrical magneto encephalography or EMG) and electrical simulation (eg, direct electrical stimulation and inductive non-invasive stimulation). It must be acknowledged in this regard that Commission K members must remain current in employing the latest in technology no matter where in the spectrum of these disciplines they work. For example they must use the latest in molecular biology regardless of whether research is in the traditional area of risk assessment (eg use of gene c-DNA arrays) or biomedical (eg developing reporter probes for molecular imaging).

Realization of such opportunities should be a new thrust of URSI, especially in view of their societal importance. In that context, significant interaction with other Commissions do exist already, namely commission A (e.g., field and SAR metrology), commission B (e.g., numerical methods and modeling of electromagnetic propagation in tissues, EM and statistics), commission E (e.g., development of EMI standards), commission F (e.g., terahertz propagation in tissue), and commission H (electromagnetics in conducting media).

In order to strengthen its role in health risk assessment and standard setting, commission K has built strong links with WHO and ICNIRP.¹

Hence Commission K has two important roles to play within URSI. The risk assessment role is that of “hand maiden” to the other commissions where, for example, Commission K members use the latest tools to test for safety of a new wireless technology. The second role is where Commission K leads and asks other commissions to lend their expertise to develop new technologies such as the understanding of EM field transmission characteristics for microwave breast imaging. It is this second role that has the capacity of explosive growth but it is also the area most likely to be taken over once it reaches a level of commercialization for medical application by large well funded medical imaging societies. However Commission K can achieve a novel niche by leveraging the strengths of the other URSI commissions.

¹ International Commission on Non-Ionizing Radiation Protection

U.S. Inan, Chair

URSI STANDING COMMITTEE ON DEVELOPING COUNTRIES

As mentioned in the review of the Board activities, Dr. A.P. Mitra, Chair of the standing Committee on developing countries passed away, in September 2007. The URSI President considered it was his duty to pursue and extend the Actions engaged. For the sake of convenience, the report is organized according to the regions defined by ICSU to set up Regional Offices. The main conclusions have been copied in the review of the Board activities.

Asia and the Pacific

The activities in Asia and the Pacific concern: (i) a meeting in New Delhi with young scientists from Bangladesh and Nepal, (ii) the creation of a Regional Facility on Radio Science (RFRS) in India, (iii) relationships with the ICSU Regional Office of Asia and the Pacific.

The meeting with young scientists from Bangladesh and Nepal was organized on February 26 2007 in the context of the New-Delhi conference on “50 years of Radioscience in India”. Demands for support concerned: rural communications, disaster management system, remote sensing system. Help had been already provided by the Abdu Salam International Centre for theoretical Physics (ICTP, Trieste) where the teaching programme is based on the examination of specific projects brought by young scientists. It was suggested that for that type of demand the access to a Regional Centre could be complementary and that more general education tools and contacts between scientists from develop and developing countries could be provided by URSI.

The New Delhi Regional Facility on Radio Science (RFRS) was created in February 2007. A MOU was signed with URSI. It mainly concerns the sponsorship of regional scientists and/or lecturers. The RFRS Centre has been presented in an international conference on “Electronics, Computers and Communication (ICECC-2008)” in Rajshahi University, Bangladesh (June 2008).

Dr. Mitra was the URSI representative to the ICSU Regional Office of Asia and Pacific created in 2006. He was not replaced so far. URSI Members from this very broad region are asked to propose a strategy to the URSI Board, including suggestions for a suitable new URSI representative.

Latin America and the Caribbean

A meeting with the Brazilian URSI Committee was requested by Dr. Mitra since February 2007. Finally, two important discussion meetings took place in parallel to the Commission F Symposium in Rio de Janeiro (October 30 – November 2, 2007).

The main conclusions of those meetings were as follows:

- discussions are needed with the other Committees from Latin America and the Caribbeans
- the creation of a Brazilian Radio Centre for the training of scientists from neighbouring developing countries is probably less pertinent than a network of Universities,
- competences exist in Brazil to contribute to the ICSU Regional program on “Natural and Human-Induced Catastrophes and Disasters”., but existing networks on ionospheric and radioastronomy studies deserve to be consolidated,
- the status of the URSI radioscientists and their relationship to the National Committees has to be clarified.

Professor Emanuel Costa is the URSI representative to the ICSU Regional Office of Latin America and the Carribean.

The Board has invited representatives from URSI Members and Associated Members from Latin America for a discussion meeting in Chicago. The objective is to define a strategy for the development of radio science in Latin America and the Caribbean.

Africa

The URSI activities in Africa were limited to:

- e-mail discussions with the Egyptian and South African Committees (the only two URSI Members in Africa), and the Nigerian Committee (in the process of re-integrating into URSI),
- presentation of the paper “URSI activities in Developing Countries: Questions about the Development of Radio Science in Africa” by F. Lefeuvre in the IHY (International Heliospheric Year)-Africa workshop in Addis Abeba (Ethiopia).

Discussions at the Addis Abeba workshop have shown that networks of radioscientists are active in Africa (contacts have been taken with the “International Geophysical Research Group Europe Africa” gathering African radioscientists from 22 African countries). Common Actions could be taken with ITU to set up network of Universities.

The Board has invited representatives from the Egyptian, South-African and Nigerian Committees to join a discussion meeting in Chicago about the development of radio science in Africa.

Main conclusions

The main conclusions are the following ones:

- Actions on the development of radio science in developing countries must be conducted at regional level
- Regional strategies must be defined with the URSI Member Countries present in the regions,
- Collaborations with radio scientists or/and existing networks having activities in radio science are welcome,
- Interactions with ICSU Regional Centres must be looked for
- Creation of Radio Regional Centres, like the Indian one, can be a response to regional demands. The support which may be asked from URSI concerns the sponsorship of regional scientists and/or lecturers
- Another way to respond to regional demands is the creation of international networks of Universities based on the identification of relevant curricula and exchanges at the teaching and at the research levels. This applies to developed as well as developing countries. URSI may help to initiate such networks and may offer organisational assistance.

The URSI Board submits to the Council a resolution on the dissolution of the standing Committee for Developing countries and the creation of Regional Committees.

F. Lefeuvre, Chair

URSI STANDING COMMITTEE ON YOUNG SCIENTISTS

The call for applicants for the YS Awards was announced in the Radio Science Bulletin, on the URSI web page and elsewhere, with a deadline for receipt of 31 January 2008, later extended to mid February. For the first time this process was synchronized with the new web based paper submission system streamlining the administrative process considerably. In total there were 279 applicants which is an enormous increase compared to the 2005 GA in New Delhi where there were 173 applicants.

The Young Scientist program receives funding from the following Member Committees: USA (USD 10,000), Japan (USD 6,000) and the United Kingdom (GBP 1500). URSI is grateful for this generous support.

On top of this support the US National Committee sponsors 25 US Young Scientists allowing the selection of a total of 124 Young Scientists. Of these 124 Young Scientists 41 come from developing countries and receive travel support for a total budget of 40,800 Euro. Twenty-eight female Young Scientists have been selected.

The selection of the Young Scientist Panel took into account the following considerations:

- Quality of the Curriculum Vitae
- Acceptance of the paper
- First time Young Scientist
- Ranking by the Member Committee
- Developing or developed country, favoring the former
- Distribution over the Member Committees
- Distribution over the Commissions
- Gender distribution

It can be concluded that the Young Scientist program was very successful due to a historic high number of applications and due to the high quality of the applications. The Young Scientist Panel especially thanks the URSI Secretariat for all the work they have done to make the selection process efficient and smooth.

H. Matsumoto, Chair
E.V. Jull
F. Olyslager

DETAILED REPORT ON THE SCIENTIFIC PROGRAM

First of all I would like to congratulate Prof P.L.E. Uslenghi, Convener URSIGA 2008 for the successful General Assembly held at Chicago. From our experience of arranging the previous General assembly (Oct 2005 in New Delhi), we know that it is a huge task to arrange such a big assembly. I will focus mainly on scientific part on the assembly.

I feel that the paper submission software was excellent and the same could be adopted in the next General Assembly. I would like to mention that we had the provision of the option of Invited or Contributory paper by author. I think we should delete this option from paper submission and the commission chair in consultation with session chairs should decide about the Invited papers.

In URSIGA 2008, we had kept the slot for oral presentation to be 89 for each commission. However, most of the commissions could not fill this slot. This is a point of concern. All commission chairs along with the country representatives should have a look at it to increase the participation. Given below is the no. of papers in URSI 2008 as compared to URSI 2005. In fact if we look at the table given below, we will find that the no. of papers in some commissions has gone down from the URSIGA 2005.

Comparative Table of Papers in 2005 and 2008								
	2005			2008				
	Oral	Poster	Total	Oral	Poster	Total	Tuesday	Thursday
Com A	48	9	57	59	3	62	3	0
Com B	89	124	213	109	196	305	89	107
Com C	79	94	173	61	28	89	18	10
Com D	87	6	93	62	14	76	9	5
Com E	80	38	118	81	26	107	13	13
Com F	89	52	141	68	22	90	11	11
Com G	89	134	223	92	145	237	95	50
Com H	89	120	209	81	90	171	46	44
Com J	74	84	158	91	116	207	59	57
Com K	74	55	129	82	30	112	15	15
Total	798	716	1514	786	670	1456	358	312
Tutorial			10			10		
Gen Lecture			3			3		
Public Lecture			2			1		
Total			1529			1470		

There were some session proposed at the time of paper submission by the respective commission chair where there was not even a single paper submitted (Not even from session chair's group). **The commission chairs must be more vigilant while proposing the scientific sessions for the next General Assembly.**

The situation is still worse if we add the No shows to this. There were 269 No Shows. The Table below gives the No Shows for each commission for oral as well as for Poster (I have submitted the detailed list of No Shows earlier).

No Shows List			
	Oral	Poster	Total
Com A	11	3	14
Com B	6	26	32
Com C	5	11	16
Com D	13	3	16
Com E	10	15	25
Com F	14	10	24
Com G	10	61	71
Com H	9	29	38
Com J	5	16	21
Com K	5	7	12
Total	88	181	269

The table below gives the total no. of papers presented for each commission both in oral and poster.

	Proposed		No Shows		Presented		Total Presented
	Oral	Poster	Oral	Poster	Oral	Poster	
Com A	59	3	11	3	48	0	48
Com B	109	196	6	26	103	170	273
Com C	61	28	5	11	56	17	73
Com D	62	14	13	3	49	11	60
Com E	81	26	10	15	71	11	82
Com F	68	22	14	10	54	12	66
Com G	92	145	10	61	82	84	166
Com H	81	90	9	29	72	61	133
Com J	91	116	5	16	86	100	186
Com K	82	30	5	7	77	23	100
Total	786	670	88	181	698	489	1187

It can be very much evident from the table that out of the 890 slots for proposed oral presentations only 698 could be filled up. This figure is including the parallel held by com. G and com B.

For URSIGA 2008, it was proposed in the coordinating committee meeting in Ghent, Belgium in April 2007 that preferably the submitted papers should be reviewed by two or three referees and on their recommendations, the papers should be accepted. Given below is table giving the statistics of the papers reviewed by referees

Papers Referee Report Details in 2008									
	Total Papers	Referee Report Total	% Total	Oral	Poster	Referee Oral	Referee Poster	% Referee Oral	% Referee Poster
Com A	62	38	61%	59	3	37	1	63%	33%
Com B	305	63	20%	109	196	28	35	26%	18%
Com C	89	56	62%	61	28	45	11	74%	39%
Com D	76	14	19%	62	14	13	1	21%	7%
Com E	107	56	52%	81	26	52	4	64%	15%
Com F	90	87	97%	68	22	65	22	96%	100%
Com G	237	78	33%	92	145	35	43	38%	30%
Com H	171	145	85%	81	90	67	78	83%	87%
Com J	207	7	4%	91	116	2	5	2%	4%
Com K	112	39	35%	82	30	23	16	28%	53%
Total	1456	527	37%	786	670	367	216	47%	32%

It may be noted that the papers refereed varies from 4% to 97% in different commissions. Even in the case of 97% refereed papers, there was proper referee's report but all the papers were not refereed by external referee. **My suggestion is that in future general assemblies, the papers should be reviewed by external referees and the paper should be accepted only on the basis of these reports. In case it is not possible in all cases, this should be implemented at least in the Young Scientist Award applicants.** The table below gives the details about the submitted, withdrawn and rejected papers.

Papers Details in 2008				
	Submitted	Withdrawn	Rejected	Accepted
Com A	78	13	2	62
Com B	350	44	0	305
Com C	110	9	11	89
Com D	94	16	1	76
Com E	113	5	0	107
Com F	110	15	4	90
Com G	258	18	2	237
Com H	183	11	0	171
Com J	229	21	0	207
Com K	123	8	2	112
Total	1638	160	22	1456
Tutorial	10	0	0	10
Gen Lecture	4	1	0	3
Public Lecture	1	0	0	1
Total	1653	161	22	1470

I would like to point out that in this general assembly, late submissions were allowed and some officials were given the liberty to allow them. In fact in most of the cases, if some one requested for late submission, we allowed it. But some commission chairs did not accept these late submissions at all. They rejected the late submissions. **I would like to point out that in the next general assembly, one policy should be adopted and the commission chairs should agree to that.**

The most crucial thing that I would like to point out is that the commission chairs should always try to meet the given deadlines. In case of their extremely busy schedule, they can take help of Commission vice-chairs.

In one of the coordinating committee and Council meeting, it was pointed out by Prof. Uslenghi that a meeting of all commission chairs should be held nearly 5 months prior to the General Assembly so that all the issues regarding the change in presentation schedule etc. could be sorted out. It was a very good suggestion but the meeting nearly one and a half years prior to the General Assembly should be continued since in that meeting all the joint sessions are decided along with the General Lectures.

In my opinion the student paper competition introduced in URSIGA 2008 should be continued in the next GA also.

The attendance in the Lecture Halls is a matter of great concern. There were instances when in some commission there was hardly any audience. Com. B and com. G had very good audience even at the time when they had parallel session. I do not know how to increase the attendance in the Lecture halls but at least one thing can be introduced. Let the certificates to YS awardees be distributed in the closing ceremony so that they will attend the Lectures in their commission till last day.

In the General assembly site, the main hall was partitioned to make the Lecture Halls for commission presentations. There were complaints that voice of one commission was interfering with the other commission since they were temporary partitions. This perhaps was due to the choice of the Venue of GA where separate Lecture Hall of required capacity could not be available. In the next General assembly, there should be proper Lecture Halls. In addition, apart from a mike for the speaker, there should be a mike for the audience as well with a Volunteer.

Dr. M.K. Goel, Coordinator Scientific Program

REPORTS ON ACTIVITIES OF INTER-UNION ORGANISATIONS

IUCAF, THE SCIENTIFIC COMMITTEE ON FREQUENCY ALLOCATIONS FOR RADIO ASTRONOMY AND SPACE SCIENCE (URSI-IAU-COSPAR) (2005-2008)

1. Introduction

The Scientific Committee on Frequency Allocations for Radio Astronomy and Space Science, IUCAF, was formed in 1960 by its sponsoring Scientific Unions, URSI, the IAU, and COSPAR. Its brief is to study and coordinate the requirements of radio frequency allocations for passive (i.e., non-emitting) radio sciences, such as radio astronomy, space research and remote sensing, in order to make these requirements known to the national and international bodies that allocate frequencies. IUCAF operates as a standing interdisciplinary committee under the auspices of ICSU, the International Council for Science. IUCAF is a Sector Member of the International Telecommunication Union (ITU).

2. Membership

In the period following the 2005 URSI General Assembly, the composition of membership for IUCAF was:

URSI	S. Reising (Com F)	USA
	U. Shankar (Com J)	India
	W. Swartz (Com G)	USA
	A. Tzioumis (Com J)	Australia
	W. van Driel (Com J, Chair)	France
IAU	H. Chung	Korea
	R.J. Cohen [... 11/06]	United Kingdom
	D.T. Emerson	USA
	M. Ohishi	Japan
	K.F. Tapping	Canada
COSPAR at large:	A. Tiplady	South Africa
	J. Romney	USA
	W.A. Baan	Netherlands
	K. Ruf	Germany

IUCAF also has a group of Correspondents, in order to improve its global geographic representation and for issues on spectrum regulation concerning astronomical observations in the optical and infrared domains.

3. International Meetings

Since the 2005 URSI General Assembly, IUCAF has been represented by its members and correspondents in the following international meetings:

11/2005	ITU-R Working Party 7D (radio astronomy), Geneva, Switzerland
04/2006	ITU-R Task Group 1/9 (Compatibility between passive and active services), Geneva, Switzerland
07/2006	36 th COSPAR Scientific Assembly, Beijing, China
08/2006	XXVI th General Assembly of the International Astronomical Union, Prague, Czech Republic
08/2006	ITU-R Working Party 7D (radio astronomy), Geneva, Switzerland
09/2006	ITU-R Task Group 1/9 (Compatibility between passive and active services), Geneva, Switzerland
09/2006	Space Frequency Coordination Group meeting SFCG-26, Bonn, Germany
02/2007	ITU-R Working Party 7D (radio astronomy), Geneva, Switzerland
02/2007	ITU-R Conference Preparatory Meeting, Geneva, Switzerland
09/2007	Space Frequency Coordination Group meeting SFCG-27, Maspalomas, Spain
10/2007	ITU World Radiocommunication Conference WRC-07, Geneva, Switzerland
04/2008	ITU-R Working Party 7D (radio astronomy), Geneva, Switzerland

IUCAF has face-to-face committee meeting before each of these meetings, with the purpose of discussing issues on the agenda of the meetings in preparation for the public sessions. During these sessions ad-hoc meetings of IUCAF were held to discuss further its strategy.

Although such face-to-face meetings have been convenient and effective, throughout the year much IUCAF business is undertaken via e-mail communications between the members and correspondents.

Additionally, many IUCAF members and Correspondents participated in numerous national or regional meetings (including CORF, CRAF, RAFCAP, the FCC etc.), dealing with spectrum management issues, such as the preparation of input documents to various fora.

4. Contact with the Sponsoring Unions and ICSU

IUCAF maintains regular contact with its supporting Scientific Unions and with ICSU. The Unions play a strong supporting role for IUCAF and the membership is greatly encouraged by their support.

URSI: IUCAF members have played an active role in the redaction of the URSI White Paper on Solar Power Satellites (SPS). IUCAF's objective was to ensure that it presents a balanced discussion of the SPS technology, including an evaluation of the risks involved, in particular to radio science. Unwanted radio emissions from SPS systems must be suppressed sufficiently to avoid interference with other radio services and applications, in accordance with the provisions of the Radio Regulations of the ITU.

IUCAF members have been actively involved in the work of the URSI Scientific Commission on Telecommunication (SCT), whose brief is to form a liaison in matters of spectrum management between URSI and the International Telecommunication Union (ITU).

For the 2008 URSI Scientific Assembly, IUCAF has been organizing its open meeting during session J07, and IUCAF members have been actively involved in the organization of the session on Solar Power Satellites. Each year, IUCAF members also actively participated in national URSI meetings.

IAU: In view of a the possibility of including frequency allocations in the infrared and optical wavelength domain in the ITU-R Radio Regulations, which form the framework for international spectrum management, IUCAF continued its consultations with members of the optical/infrared astronomy community.

The IUCAF Chair, W. van Driel, is a member of the Organizing Committee of IAU Commission 50 on the Protection of Existing and Potential Observatory Sites, IUCAF member A. Tzioumis is Chair of the Working Group on Radio Frequency Interference of IAU Division X (radio astronomy), and IUCAF member M. Ohishi chairs the Working Group on Astrophysically Important Spectral Lines of Division X.

COSPAR: Pursuing its brief, IUCAF continued its activities towards strengthening its links with other passive radio science communities, in particular in space science, and defining a concerted strategy in common spectrum management issues. At the 2006 COSPAR Scientific Assembly, IUCAF organized an open session on its activities and potential links with COSPAR, and at the 2008 COSPAR Scientific Assembly, IUCAF will organize Scientific Event E110 on "Spectrum Management and COSPAR: Keeping Passive Radio Observations Free of Interference".

5. Protecting the Passive Radio Science Services

At the ITU, in the period 2005-2007 the work in the various Working Parties of interest to IUCAF was focused largely on the preparations for WRC-07, the ITU World Radiocommunication Conference, which lasted for 4 weeks, from October 22nd to November 16nd, in Geneva, Switzerland. WRC-07 was attended by well over 3000

delegates from over a 180 nations and accredited organizations, including 7 IUCAF members and correspondents, and 9 other astronomers and astronomical spectrum managers.

The main goal of a WRC is the revision of the ITU Radio Regulations, which define the worldwide framework for spectrum management, including protection criteria for the radio astronomy service from unwanted emissions into its allocated frequency bands. WRCs are held every 3 to 4 years, and its agenda items are adopted at the previous WRC.

Of greatest relevance to IUCAF was an agenda item on the protection of the radio astronomy service and the Earth exploration-satellite (passive) service from unwanted emissions of active services in adjacent and nearby bands. This has resulted in an update of the tables of threshold levels used for consultation between the passive and active radio services in Resolutions 738 and 739. Of particular, and long-standing, concern to IUCAF was the case of the 1610.6-1613.8 MHz band, which contains important spectral lines of the interstellar OH molecule. It was decided that “The protection of the radio astronomy service in the 1 610.6-1 613.8 MHz band is ensured and will continue to be in accordance with the bilateral agreement between the Russian Federation, the notifying administration of the GLONASS/GLONASS-M system, and IUCAF, and subsequent bilateral agreements with other administrations.”

Among the preliminary agenda items adopted for the next WRC in 2011, the one most relevant to radio astronomy concerns the use of the radio spectrum between 275 and 3000 GHz. No allocations for the use of this frequency band will be made at WRC-11, but the radio astronomy community has to identify a list of specific bands of interest.

IUCAF member M. Ohishi is Chair of ITU-R Working Party 7D (radio astronomy) and IUCAF member H. Chung is Vice-chair of ITU-R Study Group 7 (Science Services).

IUCAF members participated actively in the Task Force on Regulatory Issues of the international Square Kilometre Array (SKA) project, advising on criteria for a Radio Quiet Zone for this future giant global radio telescope.

6. IUCAF-sponsored Meetings

IUCAF organizes and sponsors international meetings on spectrum management and RFI mitigation. Following the first Summer School in Spectrum Management for Radio Astronomy, held in Green Bank, USA, in 2002, and the second School held in Castel San Pietro, Italy, in 2005, IUCAF has been working towards its 2009 Summer School on Spectrum Management for Passive Radio Sciences, planned to be held in Korea.

7. Publications and Reports

IUCAF has a permanent web address, <http://www.iucaf.org>, where the latest updates on the organization's activities are made available. All contributions to IUCAF-sponsored meetings are made available on this website.

8. Conclusion

IUCAF interests and activities range from preserving what has been achieved through regulatory measures or mitigation techniques, to looking far into the future of high frequency use and giant radio telescope use. Current priorities, which will certainly keep us busy through the next years, include the use of satellite down-links close in frequency to the radio astronomy bands, the coordination of the operation in shared bands of radio observatories and powerful transmissions from downward-looking satellite radars, the possible detrimental effects of ultra-wide band (UWB) transmissions and high-frequency power line communications (HF-PLC) on all passive services, and studies on the operational conditions that will allow the successful operation of future giant radio telescopes.

IUCAF is grateful for the moral and financial support that has been given for these continuing efforts by ICSU, COSPAR, the IAU, and URSI. IUCAF also recognizes the support given by radio astronomy observatories, universities and national funding agencies to individual members in order to participate in the work of IUCAF.

Wim van Driel, IUCAF Chair

BUSINESS TRANSACTED BY COMMISSIONS

COMMISSION A - ELECTROMAGNETIC METROLOGY

Acting Chair: Dr P. Banerjee

1. Commission A Business Meeting 1, Monday 11 August 2008

Dr P. Banerjee called the Business Meeting 1 to order at 1720 Hrs. Those present introduced themselves giving their name and affiliation, and added their details to the list of participants. 16 members and 10 voting members were present.

1.1 Approval of agenda

Dr P. Banerjee proposed an agenda for the meeting. The agenda was approved unanimously.

1.2 Election of new Vice Chair

Dr. Schlegel, past president of URSI attended the meeting to help Dr. Banerjee to conduct the election of Vice Chair.

There were four candidates for the post of Vice Chair. They were

1. Nuno Borges Carvalho (Portugal)
(could not attend the meeting)
2. William A. Davis (USA) (was present)
3. Min Liu (China CIE)
(could not attend for not getting visa to enter USA)
4. Andrew Charles Marvin (UK) (was present)

Dr. Banerjee showed the biodata of all four candidates one by one through the LCD projection.

The Acting Chair had received 5 ballot papers by mail prior to the meeting. Received ballots were confirmed by respective representatives those were present in the meeting. The other voting members voted by paper ballot at the meeting. The ballots were counted by the Acting Chair and Dr. Schlegel. The result was:-

- | | |
|------------------------------------|----|
| 1. Nuno Borges Carvalho (Portugal) | 10 |
| 2. William A. Davis (USA) | 17 |
| 3. Min Liu (China CIE) | 3 |
| 4. Andrew Charles Marvin (UK) | 11 |

Dr. Schlegel left the meeting immediately after the election process was over. The members expressed thanks to Dr. Schlegel for his help and for sparing his time.

Young Scientist Party was supposed to be attended by the Chairs of all ten commissions. To attend the party the Business Meeting was supposed to be ended by 1800 hours. So no other agenda could be taken up. The Chairman adjourned the meeting at 1800Hrs.

2. Commission A Business Meeting 2, Wednesday 13 August 2008

Business Meeting 2 was started at 1720 Hrs. Those present introduced. 13 members were present.

2.1 Approval of agenda

Dr Banerjee proposed an agenda for the meeting. The agenda was approved unanimously

2.2 Summary of Council Meeting of August 12, 2008

The Chairman informed the audience of the outcome of the election of the Chairs and Vice-Chairs of the URSI Commissions. The council approved the election of Dr. William A. Davis as Vice Chair and Dr. P.Banerjee as Chair of Commission A at the meeting of August 12, 2008.

- There were only 62 papers in Commission A out of total paper of 1456 in the current GA. This reflects that there was lack of encouraging response from Commission A. There was discussion on how to increase Comm A participation. Dr. Banerjee requested members to generate awareness of URSI in their respective countries and promote activities on Electromagnetic metrology. This effort would make the participation in URSI GA more useful and meaningful. It is also desired that all delegates interested in commission should attend the business meeting.
- Associate editor for the Radio Science Bulletin for Commission A: should be the duty of the vice chair. There should be more contribution from Commission A for the bulletin -at least 2 papers per commission per year.
- URSI would like to increase visibility. URSI has selected to develop white papers on areas of impact to society. (EM effects on human health and Power from Satellites are two examples)
- URSI formed a long-range planning committee to develop long-term goals from each commission to have an impact on the society. Long-Range planning committee composed of past chairs. Prof Cannon has been selected the chair for 2008-2011.
- the Chairman informed the members that there were three (3) countries bidding for the venue of the 2011 URSI GA e.g. China (CIE), Sweden and Turkey. Venue is to be decided at the Council meeting of August 14, 2008.

2.3 Topics of discussion

The website of commission A has been a longstanding issue. Dr Davis kindly offered to host a Web-site for Commission A. He gave a detailed presentation on his plan. This was followed by a discussion. All members of the Commission are expected to contribute to the site.

2.4 Activity Reports of Members

- a. Portugal organizes National symposium on URSI matters
 - Last year had participation from Spain.
 - This year it is being tried to get participation from A f r i c a
and Brazil.
- b. Dr. Banerjee asked to report country activities to the chair and to others.
- c. France Published “Measurements in Electromagnetics,” part of a series for URSI. More information on this should be given to the chair.
- d. Italy will also have a meeting in 2012.
- e. Belgium and Netherlands are having joint meetings every 2 year. The next meeting in 2010 focuses on nonlinear device measurements.

2.5 AP-RASC 2010

Dr. Hosokawa of Japan informed the members that Asia Pacific Radio Science Conference (AP-RASC 2010) would be held in Toyama, Japan 2010. AP-RASC of 2007 was postponed by Australia.

2.6 Discussion on Technical sessions of Next GA

Chairman requested all members to make spadework for discussions on the themes of Technical sessions of Next GA. The skeleton of technical programme for Commission A may be worked out in the Business Meeting 3.

2.7 AOB

No other business was tabled. Chairman adjourned the meeting at 1815 Hrs.

3. Commission A Business Meeting 3, Friday August 15, 2008

The Business Meeting 3 was started at 1720 Hrs with the introduction of members. 11 voting members were present.

3.1 Approval of Agenda

Dr Banerjee proposed an agenda for the meeting that was accepted unanimously.

3.2 Report of Council Meetings

Dr. P.Banerjee reported the result of the venue of 2011 to be Istanbul, Turkey.

A note submitted by Dr. E. Bava past Chair of Commission A was read out by Dr. Banerjee in the meeting for the consideration of members.

“ At the international level it has been recognized that, beside the traditional metrology mainly concerned with measurements of physical quantities, new areas have emerged where measurement methodology, improved accuracy and traceability are needed. These areas are health, ambient and climate where measurements rather complex are required and electromagnetic metrology already plays an important role”.

Moreover the International Committee of Weights and Measures (CIPM) has recommended that the National Metrology Institutes increase their efforts in the determination of a few fundamental physical constants in view of a possible decision, to be taken at the next

General Conference of Weights and Measures (CGPM) in 2011, on new definitions of SI fundamental units based on fixed values of physical constants.

Moreover at the European level a coordinated research program has recently started organized along 4 targeted programmes:

1. fundamental metrology including determination of fundamental physical constants and optical frequency standards and optical frequency comparisons
2. health including diagnostics, therapy and biotechnology
3. mechanics including nanotechnology
4. electromagnetics including nanotechnology

The above description suggests that links with Commissions D, E and K should be maintained and possibly strengthened. Moreover the proposed joint session on optical standards with Commission D is a positive proposal, however this JAD session does not fit completely the important topics of Comm. A

- a. expected new results obtained with Cs fountains operation at liquid nitrogen temperature (accuracy 10-16?)
- b. contributions of metrology to science such as determination of physical constants (not only those of interest for a redefinition of SI units) “

3.3 Discussion on Technical sessions of Next GA

The outline/programme of 2011 GA was presented by Dr. Banerjee. Many joints sessions like AC, AB, AD, AG AKC, AJ and AE are being planned. Dialogue with many of the chairs has been initiated. It has been felt that Joint sessions will generate better participation and interest. Skeleton of Technical programme for 2011 GA emerged as

AC Measurement related to Wireless Communications
AE EMC Measurements
AB Antenna Measurement
AD Optical Metrology
AK EM Exposure and Human Health
AJ Pulsar Timing/VLBI
AG Ionosphere in GNSS Timing
A EM Materials
A Time Scale Generation and Distribution
A Quantum Standard
A Nano Metrology
A THz Measurements
A Microwave Measurements

Based on the above plan the final programme will be evolved.

3.4 AOB

Dr Banerjee on behalf of members of Commission A thanked all session's conveners for their excellent cooperation and all speakers for their kind participation in Commission A. No other business was tabled. The Chairman adjourned the meeting at 19:00.

COMMISSION B - FIELDS AND WAVES

Chair: Professor Lot Shafai

Vice-Chair: Professor K.J. Langenberg

Commission B held two Business Meetings on Monday, August 11th and on Wednesday, August 13th.

1. Student Awards at the URSI GA

Five Student Paper Prizes have been awarded to:

1. Christian Sohl for paper #1162 “Some Paradoxes Associated with a recent Summation Rule in Scattering Theory” by C. Sohl, M. Gustafsson, A. Bernland, Lund University, Lund, Sweden.
2. Yvonne Weitsch for paper # 1651 “A Non-Radiating Composite Right-/Lefthanded Transmission Line derived from Substrate Integrated Rectangular Hollow Waveguide” by Y. Weitsch, T.F. Eibert, Universität Stuttgart, Stuttgart, Germany.
3. Thomas H. Hand for paper #1856 “Controllable Magnetic Metamaterial using Digitally Addressable Split-Ring Resonators” by T.H. Hand, S.A. Cummer, Duke University, United States.
4. Jurgen de Zaeytjij for paper #2415 “Three-Dimensional Linear Sampling applied to Microwave Breast Imaging” by J.G. De Zaeytjij, C.L. Conmeaux, A. Francois, Ghent University, Ghent, Belgium.
5. Taeyoung Yang for paper #2769 “The Design of Ultra-Wideband Antennas with Performance close to the Fundamental Limit” by T. Yang, W.A. Davis, W.L. Stutzman, Virginia Tech, United States

2. Vice-Chair Election

Two candidates for Vice-Chair have been nominated:

- Giuliano Manara, Italy and
- Man-Fai Wong, France.

Giuliano Manara has been elected (and approved by the Council).

3. URSI Commission B International Symposium on Electromagnetic Theory

Two bids to hold the triennial URSI Commission B International Symposium on Electromagnetic Theory in 2013 have been presented:

- Hiroshima, Japan
- Toulouse, France

Hiroshima has been elected.

The above International Symposium 2010 will be held in Berlin, Germany; Symposium location will be the Steigenberger Hotel.

4. Terms of Reference

The terms of reference of Commission B were extensively discussed during the previous General Assembly in New Delhi, therefore, no further changes have been proposed.

5. Commission B paper statistics for GA 2008

- Oral Session Papers 109
- Poster Session Papers 214
- Total Accepted Papers 323

5.1 Oral Sessions (B-Core)

- B01 – Electromagnetic Theory, 11 papers
- B02 – Scattering and Diffraction, 10 papers
- B03 – Inverse Scattering, 7 papers
- B04 – Antennas and Arrays, 10 papers
- B05 – Numerical, Asymptotic and Hybrid Methods, 7 papers
- B06 – Transient Fields and Ultra Wide Band Antennas, 7 papers
- B07 – Wave Field Imaging for Homeland Security, 7 papers

5.2 Oral Sessions (Joint Core)

- BCD – Physical Limitations of Electromagnetic Metamaterials, 8 papers
- BCK – Body Area Networks, 6 papers
- BK – Future Challenges of Computational Electromagnetics, 11 papers
- BKF – Stochastic Modeling and Uncertainty Management in Electromagnetics, 6 papers

5.3 Oral Sessions (Joint from other Commissions)

- HBDGJK – Solar Power Satellites, 7 papers
- EB – EM Modeling for EMC, 10 papers
- KBE – Biomedical Applications: Microwave Breast Imaging, 10 papers

5.4 Oral Sessions (New – Extra)

- B08 – UWB Antennas, 6 papers
- B09 – Compact and Wideband Antennas, 6 papers
- B10 – Frequency Domain, 7 papers

5.5 Poster Sessions

- General – BP1, BP2, ..., BP23, 146 papers
- BPS1, BPS2, ..., BPS5, 40 papers
- BDPS1, BDPS2, ..., BDPS4, 28 papers
- HP – HBDGJK – Solar Power Satellites, 4 papers

5.6 Tutorial

Transmission Line Metamaterials: Fundamentals and Applications, by George Eleftheriades and Ashwin Iyer, University of Toronto

5.7 General Lecture

Microwave Imaging in Medicine: Promises and Future Challenges, by Susan Hagness, University of Wisconsin-Madison

The triennial report given by B Chair Lot Shafai covered Meetings and Symposia (EMTS 2007, Ottawa, Canada; CNC/USNC 2007, Ottawa, Canada; URSI GA 2008, Chicago, USA) and Emerging Issues in Commission B (equal voting rights, inactive national chairs, Young Scientist support, Commission and URSI visibility, new scientific research areas, new applied research areas).

COMMISSION C - RADIO-COMMUNICATION SYSTEMS AND SIGNAL PROCESSING

Chair: Prof. Andy Molisch

Vice-Chair: Prof. Takashi Ohira

1. Welcome to URSI General Assembly in Chicago

The commission held open business meetings on 11th and 13th, August 2008. The following persons were present at least at one meeting, but mostly at both: Takashi Ohira (Chair); Kenji Itoh (Japan); Sana Salous (UK); Robert Bultitude (Canada); Marek Amanowicz (Poland); Jacques Palicot (France); Alain Sibille (France); Maurice Bellanger (France); Andrew Parfitt (Australia). At the opening of the first business meeting, the Chair welcomed everyone to the meeting and attendees introduced themselves.

2. Election of the next Vice-Chair

Four candidates, Marco Luise (Italy), Robert J.C. Bultitude (Canada), Palicot Jacques (France), and Igor V. Zavislyak (Ukraine), for the next Vice-Chair were nominated. Marco Luise was elected as a result of 14 points against runner up of 12 points.

3. Commission Editor for the new Radio Science Bulletin

Although Marco Luise, new vice chair, did not attend the meetings, he later indicated his willingness to serve as Commission Editor for RSB.

4. Review of the Last Triennium

The chair reported the activity of Commission C in this triennium as follows:

4.1 International Events Sponsored by URSI/URSI-C

- (i) General Assembly (URSI-GA2008)
- (ii) International Symposium on Signals Systems and Electronics (ISSSE2007)
- (iii) International Symposium on Radio Systems and Space Plasma (ISRSSP2007)

4.2 Website: <http://www.ursi.org/C/Index.htm>

4.3 Radio Science Bulletin (RSB)

Associate Editor: Takashi Ohira

The following two papers were published.

- [1] T. Kaizer et al, "Ultra-wideband wireless systems: A broad overview, RSB320, pp.25-40, March 2007.
- [2] E. Taillefer and J. Cheng, "Reactance-domain signal processing for adaptive beamforming and direction-of-arrival estimation: An overview," RSB323, pp.14-25, Dec. 2007.

4.4 The Terms of Reference: "Radio-Communication Systems and Signal Processing"

The Commission promotes Research and Development in:

- a. Radio-Communication and Telecommunication Systems;
- b. Spectrum and Medium Utilization;
- c. Information Theory, Coding, Modulation and Detection;
- d. Signal and Image Processing in the area of radio science.

The design of effective radio-communication systems must include scientific, engineering and economic considerations. This Commission emphasizes research into the scientific aspects, and provides enabling technologies to other areas of radio science.

5. Role of National Representatives of "C"

Further enhancement of the national and international activity of Commission C should strongly be prompted for the next triennium. While National Representatives are desired to have close contact with Commission C, Commission C also is encouraged to try to cooperate with radio scientists in each country in parallel to National Representatives

6. Plan for the Next Triennium

6.1 Meetings and Symposia

- (i) General Assembly (URSI-GA2011), August 2011, Venue: Istanbul, Turkey
- (ii) International Symposium on Signals Systems and Electronics (ISSSE2010)
Sponsors: Commissions C and D
Organizer candidate: Prof Wei Hong, China South East Univ.
- (iii) Asia-Pacific Radio Science Conference (APRASC2009)
Local organizer: Prof Toshimi Okada, University of Toyama Prefecture

6.2 Website: <http://www.ursi.org/C/Index.htm>

6.3 Radio Science Bulletin (RSB)

The commission continues to contribute to RSB. Marco Luise, Associate Editor, will call for papers.

6.4 Development of New National Members

Through our activities, the commission is willing to recruit new national members.

7. National Representatives Roster

Following is the national representatives of the commission. If there is a change for next triennial, it should be contacted to Takashi Ohira.

ARGENTINA:	Prof. A. QUIJANO
AUSTRALIA:	Prof. A.J. PARFITT
AUSTRIA:	Prof. S.J. BAUER
BELGIUM:	Prof. L. VANDENDORPE
BRAZIL:	Prof. H. WALDMAN
BULGARIA:	Prof. B.B. SHISHKOV
CANADA:	Mr. C. DESPINS
CHILE:	Dr. R. FEICK
CHINA (CIE):	Dr. Zhi-Hua WANG
CZECH:	Prof. D. BIOLEK
DENMARK:	Dr. K.J. LARSEN
EGYPT:	Prof. S.E. ELKHAMY
FINLAND:	Mr. J. AURINSALO
FRANCE:	Dr J. PALICOT
GERMANY:	Dr. W. MATHIS
GREECE:	Prof. N. KALOUPTSIDIS
HUNGARY:	Dr. L. NAGY
INDIA:	Dr. S.K. KOUL
IRELAND:	Dr. L. DOYLE
ISRAEL:	Dr. S. LITSYN
JAPAN:	Prof. S. KOMAKI
NETHERLANDS:	Dr. F.M.J. WILLEMS
NEW ZEALAND:	Dr. P.T. GOUGH
NORWAY:	Prof. B. FORSSELL
PERU:	Dr. M. F. SARANGO
POLAND:	Prof. M. PIEKARSKI
PORTUGAL:	Prof. J.N. LEITAO
RUSSIA:	Dr. A.B. SHMELEV
SLOVAKIA:	Prof. P. FARKAS
SOUTH AFRICA:	Dr. D.D. MASHAO
SPAIN:	Prof. M. S. PEREZ
SWEDEN:	Dr. E. ENGLUND
SWITZERLAND:	Prof. M. RUBINSTEIN
TAIWAN:	Dr. Y-K TU
TURKEY:	Dr. E. PANAYIRCI

UKRAINE: Prof. V.V. DANILOV
UK: Prof. S. SALOUS
USA: Dr. D. PALMER

8. Wrap Up

- (1) Joint sessions will be organized in next GA
- (2) Ideas and topics will be collected to chair
- (3) Students are important for promote our activities.
- (4) We will make advertisement on website
- (5) Special commission C student award should be considered.
- (6) Make invited student papers on RSB
- (7) Prepare specific call for papers

COMMISSION D - ELECTRONICS AND PHOTONICS

Chair: Dr. Frédérique de Fornel
Vice Chair: Prof. Franz X. Kärtner

Commission D Business meetings were held by Dr. Frédérique de Fornel (Chair) on the following two days:

Meeting 1: Monday, August 11th, 17:20-18:40

Meeting 2: Wednesday, August 13th, 17:20-18:20

The following issues were discussed and decided upon.

1. Triennial Activity for 2005 – 2008

Dr. Frédérique de Fornel reported on:

1. Commission D has supported several new areas of research related to the Nanosciences and thus, a few issues have emerged. The URSI community in this area is still too dispersed. Commission D needs a concerted effort to have a common action plan together with the other commissions and scientific organizations active in this area.
2. The emergence of Nanotechnology in the domain of RFID has changed sensor technology. Increasingly collaboration with other commissions, active in this area becomes important.
3. Microwave and millimeter wave imaging is a research area in full development.

The following conferences were supported by Commission D during the triennium 2005-2008:

1. APMC 2006 Asia-Pacific Microwave conference , Yokohama, Japan, 12-15 December 2006.
2. Telecom& JFMMA, Fes, Morocco, 14-16 March 2007.
3. Zurich 2007, München, Germany, 24-28 September 2007
4. Metamaterial's 2007, The first International Congress on Advanced Electromagnetic Materials for Microwaves and Optics, Rome, Italia, 22-24 October 2007.
5. ISSSE 2007, Montreal, Canada, 30 July- 2 August 2007.
6. EMC 2009 VIII International Symposium and Exhibition on Electromagnetic Compatibility and Electromagnetic Ecology, St Petersburg, Russia, June 2009

2. New Chair and Vice Chair for 2008-2011

Election of the new Vice-Chair

Two candidates were presented :

1. Smail Tedjini, Professor, Department of Electrical Engineering, Grenoble-inp/lcis Grenoble, France
2. Josef Lazar, PhD, Institute of Scientific Instruments, Academy of Sciences of the Czech Republic, Brno, Czech Republic

Voting was held for the incoming Commission D Vice-Chair 2008 – 2011. The successful candidate was: Smail Tedjini

3. Appointment of Commission D Editor for Review of Radio Science

URSI Publication: Commission D Editor for RSB will be, Prof. S. Tedjini (incoming Vice-Chair)

4. Scientific Program of Next General Assembly

The tentative topics of interest to Commission D for the General Assembly 2011 are:

- RFID Technology and Applications
- Signal Processing Antennas, jointly with Commissions B and C
- Modeling of High Frequency Devices and Circuits
- Electronic Analog to Digital Conversion and Mixed Signal Systems, jointly with Commission C
- Photonic Analog to Digital Conversion
- Microwave Optical Links
- Low Noise Microwave Generation
- Optical Frequency Metrology jointly with Commission A
- Optical Devices and Guided Waves
- Plasmonics
- Metamaterials
- Terahertz technology
- MEMS and NEMS Components

- Micro- and Nanophotonics
- Numerical Methods and Modeling in Integrated Optics
- Hyperspectral Sensing and LIDAR

COMMISSION E - ELECTROMAGNETIC ENVIRONMENT AND INTERFERENCE

Chair: Prof. Flavio Canavero (Italy)

Vice Chair: Prof. Christos Christopoulos (UK)

1) Terms of reference

After some discussion, Commission E voted the following amended version of ToR.

Commission E - ELECTROMAGNETIC ENVIRONMENT AND INTERFERENCE.

The Commission promotes research and development in:

- (a) Terrestrial and planetary noise of natural origin, seismic associated electromagnetic fields;
- (b) Man-made electromagnetic environment;
- (c) The composite noise environment;
- (d) The effects of noise on system performance;
- (e) The effects of natural and intentional emissions on equipment performance;
- (f) The scientific basis of noise and interference control, electromagnetic compatibility;
- (g) Spectrum management.

2) Working Groups

The Commission E activities are based on the work conducted by the working groups (WG). After some discussion, Commission E voted the following amended list of WG.

2.1 Working Groups 2008-2011

E.1. Terrestrial and Planetary Electromagnetic Noise Environment

Co-Chairs : M. Hayakawa (Japan), A.P. Nickolaenko (Ukraine) and C. Price (Israel),
K. Hattori (Japan);

E.2. Intentional Electromagnetic Interference

Co-Chairs : W. Radasky (USA) and M. Bäckström (Sweden);

E.3. High Power Electromagnetics

Co-Chairs : C.E. Baum (USA) and R.L. Gardner (USA);

E.4. Lightning Discharges and Related Phenomena

Chair : Z. Kawasaki (Japan);

E.5. Interaction with, and Protection of, Complex Electronic Systems

Co-Chairs : F Sabath (Germany) and J-P. Parmentier (France);

E.6.Spectrum Management

Chair : T. Tjelta (Norway);

E.7.Geo-Electromagnetic Disturbances and Their Effects on Technological Systems

Chair : A. Viljanen (Finland);

E.8.Electromagnetic Compatibility in Wire and Wireless Communication Systems

Co-Chairs : J. Gavan (Israel) and A. Zeddami (France);

Also, Commission E designated its representatives to WG jointly operated with other Commissions as follows:

2.2 Joint Working Groups

- Inter-commission working group on Solar Power Satellites
Co-Chair for Commission E: Zen Kawasaki (Japan), Jacques Gavan (Israel)
- EGH. Seismo Electromagnetics (Lithosphere-Atmosphere-Ionosphere Coupling)
Co-Chair for Commission E : M. Hayakawa (Japan)

3) Sponsorship of Conferences

Commission E sponsors on average twelve meetings in the period between general assemblies. At the business meetings it was decided that a more proactive approach should be adopted focussing on the sponsorship of at least one major conference in Europe, the Americas and Asia. For these targeted meetings the intention is to organise and lead a session under the URSI label. The Commission will continue to respond positively to requests to sponsor other meetings relevant to its terms of reference. A provisional list of meetings to be sponsored in the next three-year period is given below. This list will be continuously updated and will appear in the Commission's web page:

- International Conference on Electromagnetics in Advanced Applications (ICEAA09), Torino, Italy, Sept 14-18, 2009.
- EMC Europe, Wroclaw, Poland, 13-17 Sept. 2010.
- EMC Europe Workshop "Materials in EMC Applications", Athens, Greece, 11-12 June 2009.
- Asia-Pacific EMC Week, Beijing China, 12-16 Apr 2010.

National Representatives are invited to inform the Chair well in advance of meetings suitable for sponsorship in order to be able to plan a budget for future years.

4) Vice Chair Election

Prof Alexander P J van Deuren (Technical University of Eindhoven, Netherlands) was elected as Vice-Chair. He will also serve as the Commission E Editor of the Radio Science Bulletin.

COMMISSION F - WAVE PROPAGATION AND REMOTE SENSING

Chair: Prof. P. Sobieski

Vice-Chair: Prof. M. Chandra

Commission F held three Business Meetings on Monday, August 11th, Wednesday, August 13th and Friday, August 15th.

Topic 1: Agenda (A)

Action: The agenda was tacitly agreed. No additional points were raised

Topic 2: Verification of credentials

Action: The credentials of the voting members were verified.

Topic 3: Election of Vice Chair for 2008-2011

Action: Prof. R. Lang (USA) was elected as the new incoming vice-chair. At the following council meeting this result of the election was confirmed.

Topic 4: Scrutiny of the 2008 GA programme

Action: The rule that paper contributions of up to four pages were required was not clearly understood by the authors. The commission members suggested a better and clearer wording of author instructions for the next GA. All members however agreed that the maximum length of four pages per paper was appropriate and acceptable.

Topic 5: Consider the request from Coordinating Committee and Council to propose ideas towards white papers and the inclusion of scientific activities in the area of navigation and global positioning systems (GPS/GNSS).

Action:

1. The incoming chair (Prof. M. Chandra) detailed to the members the suggestion, initiated by the URSI president Francois Lefeuvre and other French members (Jean Isnard and Joel Hamelin), namely, that Commission-F took lead in creating a white paper on the subject of remote sensing and disaster management. All members agreed to support the idea. It was suggested that Prof. M. Chandra, in consultation with Jean Isnard and Francois Lefeuvre, should embark on this project. It was also suggested that during the first half of 2009 the three named persons should meet and identify a work plan in achieving this goal. The three named persons agreed to meet regularly (opportunity permitting) either in France or in Germany or on the sidelines of URSI conferences. M. Chandra suggested that for logistic ease, the region of Strasbourg lends itself as a suitable venue for meetings directed towards this action.

2. The members of the commission agreed to promote the inclusion of GPS/GNSS topics in the scientific activities at national level and at international level (particularly Commission-F conferences and Commission-F sponsored conferences).

Topic 6: Discussion about the Radio Science Bulletin.

Action: The new incoming vice-chair, Roger Lang, in keeping with URSI tradition, was named the next editor and facilitator for Commission-F contributions to the Radio Science Bulletin. The presenters of the Commission-F review talks were reminded that they are expected to make submissions to the RSB. M. Chandra and Roger Lang agreed to follow this action.

Topic 7: Request for proposals of web-course in Commission-F competence directed toward developing countries.

Action: The members agreed to come up with suggestions for improving the visibility of Commission-F activities on the official website. The members suggested that paper contributions of major Commission-F conferences should be posted on the commission's official website. The possibility of offering web courses on Commission-F topics was also briefly discussed. There were no immediate offers. M. Chandra suggested that short web courses could be offered as a prelude to major URSI-F conferences.

Topic 8: Discussion of terms of reference (B).

Commission F comprises two closely related fields, wave propagation and remote sensing and, based on the Terms of Reference updated at the 2005 General Assembly, encourages research in these fields at all frequencies, in particular, the Commission encourages :

- (a) The study of all frequencies in a non-ionised environment :
 - (i) wave propagation through planetary, neutral atmospheres and surfaces;
 - (ii) wave interaction with the planetary atmospheres, surfaces (including land, ocean and ice), and subsurfaces;
 - (iii) characterisation of the environment as it affects wave phenomena;
- (b) The application of the results of these studies, particularly in the areas of remote sensing and communications;
- (c) The appropriate co-operation with other URSI Commissions and other relevant organisations.

Action: No change was deemed necessary.

Topic 9: Anticipated inter-assembly meetings

Action:

Type A meetings

- MicroRAD2009
- COSPAR
- IGARSS2009
- IGARSS2010

- AP-RASC2009
- ISMOT-2009
- ISAP'2009
- MicroRAD2010
- EUSAR 2010

Type B meetings

- Commission F Open Symposium Nov 2010
- Commission F specialist Meeting on remote sensing
- AP-RASC09 (in addition for sponsorship "A")
- Climm'Diff 2009

Topic 10: Proposed meetings for next triennium

Action:

1. Commission F Triennium Open Symposium (type B)
 Madhu Chandra proposed to organize it. The proposal was unanimously accepted.
 venue: Garmisch-Partenkirchen, Germany
 period: Nov 2010
2. Specialist meeting on remote sensing (type B)
 Proposal: No firm decision was reached. Bertram Arbesser-Rastburg and Roger Lang agreed to consider the possibility of hosting this meeting in tandem with other URSI-sponsored meetings organized by them.
 Venue: pending
 Period: pending

Members sited that conference may face stiff competition from IGARSS. This action continues!

Topic 11: Comm-F proposals for sessions at the next URSI GA in 2011

Action: Suggested (tentative) list of topics:

- Channel characterization
- Channel models
- GPR and UWB applications
- Terahertz propagation
- Propagation effects in GPS/GNSS
- UWB indoor propagation,
- Active and passive remote sensing systems
- SMOS Aquarius related topics
- Global observation of the earth surface
- Cryosphere and Arctic sphere
- Multiparameter radar applications
- Education in the area of remote sensing (e-learning)
- Propagation and RS of vegetation, moisture RS,

- Rain and the atmosphere
- Ocean surface RS
- Irregular terrains
- Open sessions 1 and 2
- Theoretical developments common to radiocomm and RS

Topic 12: Inter-commission working groups (C)

Action: The WGs automatically end at the GA and must be renewed by resolution

Working Groups suggested:

- The Group on Mitigation of Ionospheric and Tropospheric Effects on GNSS (Bertram Arbesser-Rastburg continues)
- Education and training in RS and related aspects on propagation (M. Chandra and Jean Isnard) to be linked to the activity on the proposed white paper (disaster management and remote sensing)

Topic 13: Representatives to other organizations

Action:

- SCOR: Scientific Committee on Ocean research (Delaware)
The incoming vice-chair: D. Weissman
- IUCAF (SCIENTIFIC COMMITTEE ON FREQUENCY ALLOCATIONS FOR RADIO ASTRONOMY AND SPACE SCIENCE)
Steven Reising, Colorado State University, USA
- COSPAR: COMMITTEE ON SPACE RESEARCH (Paris)
Bertram Arbesser

Madhu requested to be kept informed

Topic 14: Publications and Publicity

Action:

- a. Radio Science Bulletin
Roger Lang, Madhu Chandra and Ian Glover agreed to serve as referees and facilitators
- b. Information dissemination
All commission members were requested to regularly visit the URSI webpage of Commission-F and to pass on their suggestions to Madhu Chandra.

Topic 15: Any other business

Action: All commission members were requested by Piotr Sobieski and Madhu Chandra to support commission activities even more strongly than in the past and to maintain close contact with the commission chair.

COMMISSION G - IONOSPHERIC RADIO AND PROPAGATION

Chair: Prof. Paul Cannon

Vice Chair: Dr. Michael Rietveld

1. Commission G Business Meeting 1, (Monday 11 August 2008, 17.20h to 18.40h)

At least 34 were present (34 signed an attendance list)

Paul Cannon presided over the meeting with the following agenda:

1. In Memoriam and Introduction
2. Election of new Commission G Vice-Chair for 2008-2011.
3. Terms of reference
4. Commission G triennium report by Chair
5. Reports by working group chair
6. Publications
7. Comment on GA 2008 organization and programme
8. proposals for session at GA in 2011 (Mike Rietveld)
9. Resolutions

1.1 In Memoriam

The business meeting commenced with a brief moment remembering past friends of Commission G:

- Jean-Paul Villain (France)
- A.P. Mitra (India)
- Pietro Dominici (Italy)
- Tor Hagfors (Norway)
- Ludmila Logvinova (Russia)
- Roy Piggott (UK)
- Paul Argo (USA)
- Others known personally

1.2 Election of new Commission G Vice-Chair for 2008-2011

Concerning the election for Vice-Chair it was explained

- a. What the Commission G Vice-Chair duties are.
- b. Who nominates the Vice-Chair candidates.
- c. When were the nominations called.
- d. How many candidates can there be.
- e. Who votes for Vice-Chair candidates.

To date, 15 postal votes were cast. These and paper ballots from designated international commission delegates were counted by Mike Rietveld (VC) and Christian Hanuise

(previous chair)

The candidates:

- Manuel Hernandez Pajares – Spain
- John Mathews – USA
- Jian Wu – China

The first two candidates introduced themselves in a 2-minute statement. Prof. Jian Wu explained in a letter to the Chairman and colleagues of Commission G that he could not attend the meeting due to the problem with obtaining the visa. John Mathews was the successful candidate.

1.3 URSI Commission G Terms of Reference

- The Commission deals with the study of the ionosphere in order to provide the broad understanding necessary to support space and ground based on radio systems.
 - To achieve the objectives, the Commission cooperates with other Commissions, corresponding bodies of the ICSU family (UIGG, IAU, COSPAR, SCOSTEP, etc.) and other organizations (ITU, IEEE, etc.) Chair report is available on URSI Website.
- The terms of reference of Commission G were reviewed and it was decided that no amendment was necessary.

1.4 Commission G triennial report

Funding to Commission G

- €9000 have administered for the good of the community.
- €4500 was spent in supporting various meetings, typically at the €500 or €1000 level.
- €4500 has been used to support seven scientists, from a number of countries, to attend the general assembly this being the flagship meeting.
- \$500 was also made available to support the attendance of non-US students of the meeting.
- The chair decided to make 5 awards, each of \$1000 to those students who submitted to the Student Paper Competition. Other support was given to different schools, workshops, meetings, sessions, seminars, etc.

1.4.1 Website hosted by URSI: <http://www.URSI.org/G/Homepage.htm>

- Commission G also has an electronic mailing list hosted by Phil Wilkinson (URSI-commission-g@ips.gov.au)
- Chicago GA Programme- 250 papers at the GA. A centralized paper submission process was used.
- Christian Hanuise is the representative to the long range planning committee.
- Young scientists support (long standing)
- New scheme for support of the graduate students outside of the USA.

- Student paper competition.
- Strengthening of the Commissions that are not very active
- New topical initiatives and areas

1.4.2 Commission G papers which made it to the 10 finalists of the Student Paper competition

- GEOMETRIC MODULATION: A NEW, MORE EFFECTIVE METHOD OF STEERABLE ELF/VLF WAVE GENERATION WITH CONTINUOUS HF HEATING OF THE LOWER IONOSPHERE (*Commission G/H/E*), M. B. Cohen, U. S. Inan, Stanford University, Stanford, CA, United States
- COORDINATED ANALYSIS OF DELAYED SPRITES WITH HIGH SPEED IMAGES AND REMOTE ELECTROMAGNETIC FIELDS (*Commission E/G/H*), J. Li, S. A. Cummer, Duke University, Durham, NC, United States
- DEMETER OBSERVATIONS OF A COLUMN OF INTENSE UPGOING ELF/VLFRADIATION EXCITED BY THE HAARP HF HEATER (*Commission H/G*), D. Piddyachiy¹, U. S. Inan¹, T. F. Bell¹, M. Parrot², N. G. Lehtinen¹, ¹Stanford University, Stanford, CA, United States; ²CNRS, Orleans, France

Commission G has ~250 papers at the GA, an excellent turn out against a background of many other meetings being held this year.

Conclusion

- Commission G is in a pretty good shape
- Vice-Chair election Result: John Mathews (USA) has been elected the International Commission G Vice-Chair for 2008-2011
- Concern: Profile of URSI (squeezed by IEEE, COSPAR)

1.4.3 New topical initiatives and areas

Canvassed the Commission G National Representatives: Identified important emerging issues in categories of “Applied” Science & Systems and “Pure” Science.

Applied:

Radar remote sensing from space and in space, High integrity GNSS navigation systems, and assimilative models of ionospheric density and Scintillation, and low frequency astronomy.

Pure:

Planetary ionospheres, Anthropogenic effects (ionospheric modification by HF heaters and climate change), plasmaspheric physics and models

As usual, significant opportunities or interaction exist with Commissions F, H, and J. This should flow through into session choice for 2011

1.5 Commission G Working Groups and Joint Working Groups

All Working Groups triennium reports were included in the Commission triennium report. These reports are the responsibility of the lead commission representative. A very brief verbal report was provided at the Business Meeting.

- *G.1. Ionosonde Network Advisory Group (INAG)*. Chair: Terence. Bullet (USA), Vice-Chair: Lee-Anne McKinnell (South Africa), INAG Editor: P. Wilkinson (Australia) Recommend continuing with Lee-Anne McKinnell (SA) replacing Terence Bullet as Chair and Ivan Galkin replacing Lee-Anne McKinnell as Vice-Chair. Will propose a new data exchange format.
- *G.2. Studies of the Ionosphere Using Beacon Satellites*. Chair: R. Leitinger (Austria), Vice-Chairs: J.A. Klobuchar (USA; until October, 2004); P. Doherty (USA, since October, 2004) and P.V.S. Rama Rao (India). Recommend continuing with the same team. R. Leitinger was still unwell after a stroke, but is slowly recovering. The group wants 3 things: Meeting support, Student support for the meeting, and agreement to continue with current leadership.
- *G.3. Incoherent Scatter*. Chair: W. Swartz (USA), Vice-Chair: J.P. Thayer (USA). Recommend continuing with Ingemar Häggström (Sweden) as chair and Mary McCreadie (USA)
- *G.4. Ionospheric Research to Support Radio systems*. Chair: P. Wilkinson (Australia); Co-Chair: M. Angling (UK). Recommend disbanding because of a lack of interest. Reasons were too much overlap with other groups and too much commercial interest.. Some objection was voiced and will be discussed in WG on Thursday– see record of third business meeting.
- *GF. Middle atmosphere*. Co-Chair for Commission G: J. Röttger (Germany), Co-Chair for Com. F: C. H. Liu (China, SRS). Recommend continuing with the same officers.
- *FG: Atmospheric Remote Sensing using Satellite Navigation System*. Co-chair for Commission G: C. Mitchell (UK). Co-Chair for Commission F. Bertram Arbesser-Rastburg. Recommend continuing with the same officers.
- *Inter-commission Working Group on Solar Power Satellite*. Co-Chair for Commission G: M. Rietveld (Norway). Recommends replacing M. Rietveld with someone else.

1.6 Publications

The Chair, P. Cannon, on behalf of the Commission, thanked Mike Rietveld as the Commission G editor and Vice-Chair for Reviews of Radio Science, for his hard work. Commission G had two reviews and another paper accepted during the triennium which was slightly less than its quota.

- Space Weather Impacts of the Subauroral Polarization Streams by Anthea Coster and John Foster, RSB 321, June 2007
- The impact of high resolution radar on meteor studies: the EISCAT perspective by Asta Pellinen-Wannberg, Gudmund Wannberg, Johan Kero, Csilla Szasz and Assar

Westman RSB no 324, March 2008.

- A collection of papers on ionospheric raytracing to remember the pioneering work of Jennifer Haselgrove. June 2008 of RSB.

John Mathews will be the Commission G editor for the Radio Science Bulletin. At <http://www.ips.gov.au/IPSHosted/NCRS/reviews> you can find the guides to the style and format used for the Radio Science Bulletin and specifically for the reviews of the RSB, as well as the check list for authors submitting a paper in final form for the bulletin.

1.7 Discussion on GA 2008 organisation and programme

Submission of abstracts. There was once again a general agreement on having a one-step only submission. People were generally satisfied with the present abstract submission software. A list of Commission G sessions of the GA 2008 is given in Appendix A.

1.8 Proposals for sessions in 2011

A call for proposals was made.

Proposed G-related sessions for the next GA 2011 include:

- Radar techniques
- Radio occultation
- Active experiments in plasmas

Proposed HG sessions:

- Modification of the ionosphere and magnetosphere (2 sessions)
- Dusty plasmas
- Electric field antennas in plasmas
- Ionospheric modifications from space
- Ionospheric effects of lightning
- Plasma irregularities and turbulence

Proposed GH sessions

- Radio Sounding Techniques for the Ionosphere and Magnetosphere

Proposed EGH sessions

- Terrestrial and planetary EM disturbances and effects
- Seismo-electromagnetics: lithosphere, atmosphere, ionosphere coupling
- VERSIM – ULF/ELF remote sensing of the ionosphere and magnetosphere

1.9 Resolutions

- COSPAR endorsed and adopted the new COSPAR International Reference Atmosphere (CIRA 08) **COSPAR further invites**
- URSI to review CIRA 08 during its assembly to be held in August 2008 and to approve and adopt CIRA 08 jointly with COSPAR
- CIRA 08 is anticipated to be published in late 2008 or early 2009 as a special issue of Adv. Space Res.

- The members of CIRA working group will take responsibility for the preparation of the individual chapters of the work, following approved guidelines.

2. Business Meeting 2: Joint between Commissions G and H

Wednesday, 13 August 2008

Chairs: Paul Cannon (G) and Richard Horne (H)

About 70 people in attendance

2.1 Agenda

1. Introduction
2. Resolutions from board and impact on Commissions G and H
3. Reports by working group chairs
4. Commission G and H delegates to committees (updates)
5. First discussion on proposals for sessions in 2011 (Mike Rietveld and Yoshi Omura)

2.2 Resolutions

1. To create an inter-commission working group on Natural and Human-Induced Catastrophes and Disasters with the following objectives:
 - To study methods and propose strategies related to Communication systems to set up the time of and after disaster
 - To the use of remote sensing and other data for monitoring and alerting, describing the disturbed environment at the time of disaster and after it
 - To take into account the work of the ITU and other similar bodies
 - To provide support to initiatives taken on natural and human-induced catastrophes and disaster, particularly by developing countries (floods, earthquakes, space weather)

There was a discussion, initiated by Francois Lefeuvre on the usefulness of radio techniques in the areas of floods, earthquakes, space weather. The EGH seismo-e/m working Group, and the Demeter spacecraft are relevant. Richard H and P Cannon will provide inputs.

2. To establish an inter-Commission WG on radio science services (RSS) with the mission:
 - In agreement with the IUSAF, to analyze and if needed, react to ITU recommendations and resolutions that may concern passive and active radio services
 - To inform the URSI commissions regarding the development of new communication systems, and to study with them potential consequences for specific passive and active radioscience services
 - To contribute to inter-union or/and inter-organization activities related to passive and active radio services
3. From the March 2009 issue of the Radio Science Bulletin onwards
 - URSI Radioscientists and officers no longer receive a free copy of the Radio Science Bulletin
 - A limited number of issues will be sent in bulk mailing to the academics (10 copies per dues category)

- There will only be one such mailing per member committee
 - Those who wish to receive a printed version of the Radio Science Bulletin need to pay a subscription fee of 100 Euro per triennium (or 60 Euro on top of the registration fee at an URSI general assembly)
 - Libraries can take a subscription at the current rate of 50 Euro per year
 - 4. It was recommended that URSI forms an inter-Commission Data Committee
 - To provide an oversight of URSI data interests
 - To provide an effective interface with other ICSU data communities including overarching groups such as GEOSS (Global Earth Observing System of Systems). And the proposed WDS, and the Committee on Data for Science Technology (CODATA) which URSI recently joined
 - That the initial membership include the current WDC, FASS and ISES representatives, together with representatives proposed by the Commissions
 - That the Data Committee will provide regular reports to the URSI Board and Council and respond to questions from the commissions, the Board and the Council
 - That the Data Committee will develop its own terms of reference and propose these to the Board for further development prior to the next general assembly in 2011
- Several people felt this was important, for example to address the problem of long term data storage (Wes Swarz). Amongst others, interested were Dieter Bilitza/ Phil Wilkinson/ Rod Redmon.

2.3 Working Group Reports

- GH: Active experiments in plasmas - Co-Chairs
For commission G: K. Groves (UK)
For commission H: Bo Thide (Sweden), Recommend continuing with the same officers
- EGH: Seismo Electromagnetics (Lithosphere-Atmosphere-Ionosphere-Coupling) Co-Chairs
For commission G: S. Pulinetz (Russia)
For commission H: M. Parrot (France), Recommend continuing with the same officers
- Inter-Commission working group on solar power satellites
Chair: Hiroshi Matsumoto (Japan)
Co-Chair for commission G: M. Rietveld (Norway)
Co-Chair for commission H: N. Shinohara (Japan), Recommends replacing M. Rietveld with K. Schlegel (Germany)
- URSI/IAGA VLF/ELF remote sensing of the ionosphere and magnetosphere (VERSIM) Co-Chair
For commission H/G: M. Janos Lichtenberger (Hungary), Recommend continuing with the same officers

The working group report appears in the Commission H report

3. Commission G Business Meeting 3 (Friday, 15 August 2008, 17:20 to 18:30)

Chair Michael Rietveld, vice-chair John Mathews

Approximately 38 people were in attendance.

Agenda

1. Introduction by outgoing Chair Paul Cannon
2. The next GA, in 2011, will be held in Istanbul, Turkey
3. Reports from Working Group business meeting earlier in the week (Wednesday, 13 August 2008)
 - International committee on global navigation satellite systems
4. Commission G resolutions
 - Ionosonde data exchange
 - COSPAR international reference Ionosphere
5. Commission G: 2011 assembly
 - Commission G tutorial lecture for 2011
 - Sessions for GA 2011
 - Suggested general lectures for 2011
6. Publications J. Mathews
7. Review of GA 2008
8. White papers

3.1 Opening Comments

The outgoing Chair, Paul Cannon, thanked the Commission for the support they have given to him during his tenure and especially for the assistance given by the incoming Chair, Michael Rietveld. The incoming Chair, Michael Rietveld, then acknowledged the work put by Paul Cannon and thanked him for his efforts and expressed the pleasure he had working with him, as well as expressing his pleasure at being the new Chair. Michael Rietveld then took over chairing the meeting and the Commission.

3.2 The next GA 2011: Commission G sessions

Istanbul (Turkey) has been selected for 2011 general assembly

Working Group 4 will remain as a working group through the Radio Techniques Conference in Edinburgh next year

3.3 Working Groups

G1: Ionosonde Network Advisory Group

Chair: L-A McKinnell (South Africa), Vice-Chair: Ivan Galkin (USA), INAG Editor:
P. Wilkinson (Australia)

G2: Studies of the Ionosphere using Beacon Satellites

Chair: R. Leitinger (Austria), Vice-Chairs: P. Doherty (USA), P.V.S. Rama Rao (India)
and M Hernandez-Pajares (Spain)

G.3 Incoherent Scatter

Chair: W. I Haggstrom (Sweden), Vice-Chair: Mary McCready (USA)

G.4 Ionospheric Research to Support Radio Systems

Chair: M. Angling (United Kingdom), Vice-Chair: Denis Knepp (USA)

GF Middle Atmosphere

Co-Chair for Commission G: J. Röttger (Germany), Co-Chair for Commission F:
C.H. Liu (China, SRS)

GH1 Active experiments in Space Plasmas

Co-Chair for Commission G: K Groves (USA), Co-Chair for Commission H: B. Thide
(Sweden)

URSI-COSPAR on International Reference Ionosphere (IRI)

Chair : B.W. Reinisch (USA), Vice Chair for COSPAR : Martin Friedrich (Austria),
Vice Chair for URSI: Lida Triskova (Czech Republic); Secretary: D. Bilitza (USA),

FG: Atmospheric Remote Sensing using Satellite Navigation System

Co-chair for Commission G: C. Mitchell (United Kingdom)

EGH: Seismo Electromagnetics

for Commission G: S. Pulnits (Russia)

Inter-commission Working Group on Solar Power Satellite

Co-Chair for Commission G: K Schlegel (Germany)

URSI/IAGA VLF/ELF remote Sensing of the Ionosphere and Magnetosphere (VERSIM)

Co-Chair for Commission H and G: M. Parrot (France)

3.4 Commission G Resolutions

The following two resolutions from Commission G were presented, explained and passed unanimously.

Commission G Resolution: CIRA08

Considering

The development of the new COSPAR International Reference Atmosphere (CIRA08)
And the importance of CIRA to URSI Commission G related activities, especially in
regard to the International Reference ionosphere (IRI)

Resolves

To encourage COSPAR to continue with the development of the model
(At COSPAR 2008 it was decided to publish CIRA08 as a stand-alone book of Adv.
Space Res, with chapters dedicated to:

- four primary models of JB2008, NRLMSISE-00, HWM07, and GRAM-07 developed by AFSPC, NRL, and MSFC respectively,
- energy and momentum inputs from solar, geomagnetic, dynamic and advective sources,
- middle atmosphere composition and structure, especially the minor (metal) species,
- a summary of physics-based and data assimilative models,
- in-progress issues including,
- drag coefficients,

- trends such as thermospheric cooling,
- error analysis,
- appendices including data output examples and reference atmospheres.)

Commission G Resolution: Adoption of a New Ionosonde Data Exchange Format

Considering:

That the capabilities of ionosondes have grown in the last decade.

And that the numbers of new data elements have increased while retaining historical data elements.

And that advances in the state of the art in information technology have occurred which make practical the use of extensible, self defining formats.

And that a new data format, SAO-XML, has been developed, documented, tested and reviewed.

And that the members of the Ionosonde Network Advisory Group (INAG), Commission G Working Group 1 have requested the recognition of SAO-XML as a new standard format for ionosonde data exchange.

Recommends:

That the data format known as SAO-XML be recognized as a format for the exchange of ionogram scaled characteristics and derived data elements from ionosondes.

3.5 The following topics for the GA 2011 sessions were proposed

- Tutorial topics
 - Satellite missions to observe lightning and gamma-ray flashes
 - ISR modeling
 - Equatorial Plasma Bubbles
 - Solar maximum effects on radio systems
- General Lectures
 - Meteor echoes
 - Sprites, lightning, x-rays
- Sessions
 1. Practical applications and techniques for the use of ionosonde data (Lee-Ann McKinnell, Paul Cannon)
 2. Distributed observatories for space weather studies (A. Coster, L. McKinnel, P. Doherty)
 3. Ionospheric research for Radio Systems Support (I. Stanislawska, H.S. Strangeway)
 4. Communications and radar systems (waveforms, frequency management, raytracing), Paul Cannon
 5. Irregularities and Scintillations, new measurement techniques and results
 6. New Science Initiatives Using Beacon Satellites: Studies over the next few years will increase with the new satellite missions of COSMIC, C/NOFS and others. Perhaps we can consider a session focused on these topics. Proposed chairs: someone from COSMIC and someone from C/NOFS.

7. Measuring and Modeling the Ionospheric Electron Density Profile (D. Bilitza, B. Zolesi, B. Reinisch)
8. CAWSES-2 Ionospheric Campaigns and Results (C. Hanuise and J. Thayer)
9. Coordinated studies with multiple incoherent scatter radars (I. McCrea and A. Strømme). covering radar as well as satellite (Cluster, Themis ...) data sets.
10. Technical developments for incoherent scatter radars (Mike Nicholls and Assar Westman or Ingemar Häggström)

The following sessions with other commissions have been variously proposed:

1. GH Ionospheric modification (K. Groves (G) and M. Sulzer or R. Moore suggested (H))
2. HG Space-borne sounding and Remote Sensing of Structures in the Plasmasphere (active & passive) (B. Reinisch (G), R. Benson (H)) Planetary, lunar surface, subsurface and ionospheric sounding
3. HG Active experiments in Plasmas with Electric Antennas and other means (G. James, V. Sonwalker (H))
4. GH Ionospheric effects of Lightning (M. Fullerkrug (G) and U. Inan (H))
5. HABCDEFGK Solar power satellites (?(G), K. Hashimoto (H))
6. J/G Ionospheric Calibration for Radio Astronomy ?? ((J) and C. Mitchell (G))
7. GHJ Turbulence and vorticity (suggested by B. Thide) ??(G)
8. HGE Electromagnetic effects in Lithosphere-Atmosphere-Ionosphere Coupling (S. Pulinets, M. Parrot)
9. CFG Radiolocation Covers all aspects (applications, technology) of radiolocation (M. Warrington)
10. C/G MIMO at HF (H. Strangeways)

3.6 Publications

The incoming Vice-Chair, John Mathews was confirmed as the Commission G editor for the new Radio Science Bulletin, incorporating the Review of Radio science. Contributions are requested.

3.7 Comments on 2008 GA

The General Assembly was considered quite successful for Commission G based on the number and variety of papers and attendance at sessions

Some comments were:

- Paper quantity at registration about right
- Laser pointers really good.
- Bags: some find them unnecessary, others don't
- Print Business meetings time/place in programme
- Poster board size excellent, time scheduled bad (should be >1 day)
- Better web page conference details just before the meeting

- Biscuits, (diet)-softdrinks at coffee breaks
- Wireless microphones needed
- Internet access should be better in conference rooms
- Noisy room (Grand E): Sounds like hotel deliveries and other work behind the partition walls.

3.8 *White Papers*

- . Solar power satellite (issued)
- . Wireless effects on health (being drafted)
- . Suggested Commission G -led “Space weather effects on technology” but little enthusiasm from the meeting

Appendix A: Sessions held at the 2008 General Assembly

G01: Open Session and Latest Results

7 oral plus 20 posters

Conveners: C. Hanuise, A. Coster,

G02: Density Profiling and Models

10 oral plus 16 posters

Conveners: B. Reinisch, D. Bilitza, B. Zolesi,

G03: Irregularities and Scintillation

11 oral plus 34 posters

Conveners: P. Doherty, A. Bhattacharya, E. de Paula,

HG1a and b: Wave-particle Interactions and Radiation Belt Remediation

15 oral plus 11 posters

Conveners: J. Albert, G. Ganguli, K. Groves,

G04a&b: Assimilation and Imaging of the Ionosphere and Plasmasphere

12 oral plus 7 posters

Conveners: G. Bust, N. Jakowski, M. Codrescu,

GHE: Modification of the Ionosphere and Magnetosphere

7 oral plus 21 posters

Conveners: K. Groves, Y. Ruzhin, M. Kosch, O. A. Molchanov,

FG: Mitigation of Ionospheric and Tropospheric Effects in Precision GNSS.

7 oral plus ?? posters

Conveners: B. Arbesser-Rastburg, M. Hernández-Pajares,

GF: Radio Occultation – Techniques, Validation, Science and Applications

10 oral plus 4 posters

Conveners: C. Mitchell, C.-H. Liu, T. Schueler,

EGH: Terrestrial and Planetary Electromagnetic Disturbances and Effects

10 Oral plus posters

Conveners: M. Hayakawa, C. Price, M. Füllekrug,

GH: Radio Sounding Techniques for the Ionosphere and Magnetosphere.

11 oral plus 7 posters

Conveners: L.-A. McKinnell, G. James,

HG2: Dusty Plasmas

6 oral plus 4 posters

Conveners: M. Rosenberg, P. Bernhardt,

JG: Low Frequency Radio Astronomy and the Ionosphere

6 oral plus posters

Conveners: G. de Bruyn, P. Rao, B. Junor, <bjunor@lanl.gov

G05a&b and c: Radar Studies I

21 oral plus 30 posters

Conveners: W. Swartz, M. Lester, J. Chau,

HGE: Seismo-electromagnetics

10 oral plus 27 posters

Conveners: M. Parrot, S. Pulinets, O. Molchanov,

G06: Improving Radio Systems through Ionospheric Radio Science

7 oral plus 8 posters

Conveners: M. J. Angling, C. Coleman, A. Bourdillon,

HBDGJK: Solar Power Satellites

7 oral plus 4 posters

Conveners: K. Hashimoto, R. Dhillon, W. van Driel, R. J. Pogorzelski

COMMISSION H - WAVES IN PLASMAS

Chair: Dr. Richard Horne

Vice-Chair: Prof. Y. Omura

1. Commission H Business meetings

Commission H Business Meetings were held three times during the GA on the following three occasions.

- Business Meeting 1: Monday 11 August 17:20 – 18:40 in room Grand F, chaired by Richard Horne
- Joint Business Meeting G & H: Wednesday 13 August 17:20 – 18:40 in room Grand E, chaired by Paul Cannon and Richard Horne
- Business Meeting 3: Friday 15 August 17:20 – 19:00 in room Grand F, chaired by Yoshiharu Omura

The chair of Commission H, Richard Horne appointed the vice-chair Yoshiharu Omura as the new Chair. Ondrej Santolik was appointed as the new vice-chair after voting from

the member committees. The details of the votes are the followings: Ondrej Santolik (Czech Republic) 25, David Nunn (UK) 7; Meers Oppenheim (USA) 6, Craig Rodger (New Zealand) 9. The vice-chair has been confirmed to become an Associate Editor of Radio Science Bulletin.

2. Terms of reference of Commission H

No change required.

3. Abstract

The current form of abstract up to 1 page summary, optional 4 page paper was supported by the majority. The abstracts should be published in the form of CD and online.

4. Working Groups

Activities of the working groups related to Commission H were reviewed and their organization has been renewed as in the following.

4.1 Joint Working Groups

- ABDFGHJK: An inter-commission working Group on Solar Power Satellites: Co-chair for Commission H: K. Hashimoto (Japan), Co-chair for Commission G: K. Schlegel.
- EGH: Seismo-Electromagnetics. Co-chair for Commission G: S. Pulnits (Russia), H: M Parrot (France)
- GH1 Active experiments in Space Plasmas: Co-Chair for Commission G: Keith Groves (USA), Co-Chair for Commission H: B Thide (Sweden)
- HEJ: Computer Simulations in Space Plasmas (Co-chair for Commission H: Y. Omura (Japan), B. Lembege (France)

4.2 Inter-Union WG

- URSI/IAGA VLF/ELF remote Sensing of the Ionosphere and Magnetosphere (VERSIM), URSI Rep: H. Janos Lichtenberger

5. Science Session Proposals for 2011

- H1 Nonlinear waves and turbulence in plasmas, M. Oppenheim (USA), H. Usui (Japan) (TBC), and David Shklyar (Russia)
- H2: Wave-particle interactions and their effects on planetary radiation belts: Jacob Bortnik (USA), Craig Rodger (New Zealand), and Richard Horne (UK)
- H3: Micro/macro-scale kinetic processes at boundary layers in terrestrial and planetary environments: B. Lembège (France), G. Lakhina (India), and I. Shinohara (Japan)
- H4: Laboratory simulation of space and dust-related phenomena William Amatucci (USA) and Toshiro Kaneko (Japan)
- H5: Waves as signatures of neutral-plasma interactions in the environment of solar

system bodies” , Christian Mazelle (France), (USA)TBC

- H6: Plasma waves and ion thrusters (R. Horne)
- H7: Open session (Y. Omura and O. Santolik)

Note: Because of the limited time slots for oral sessions at the next GA, the commission will decide later on reduction of the number of sessions.

6. Science Session Proposals for 2011

(joint with other commissions)

- HG1: Space-borne sounding and remote sensing of structures in the plasmasphere (active & passive)” (B. Reinisch (G), R. Benson (H))
- HGB: Active experiments in plasmas with electric antennas and other means (Gordon James and Vikas Sonwalkar)
- GHE1: Lightning induced effects in the ionosphere and magnetosphere Com H. Victor Pasko
- GH1: Ionospheric modification, K. Groves(Com G: USA) and B. Thide (Com. H: Sweden)
- GHE2 Seismo-electromagnetics, Com G: S. Pulinets, and Com H: M. Parrot
- HBDGJK: Solar Power Satellites Com H. Kozo Hashimoto

7. Proposed Meetings sponsored by URSI Commisison H

- ISSS-9, near Paris, France, July 3rd-10th 2009
Bertram Lembege (Mode B)
- International Chorus Workshop, California, Feb, 2009 Bruce Tsurutani
- VERSIM, Hungary, September, 2008 (Mode B)
Janos Lichtenberger
- 2nd International Workshop on Radio Methods for Studying Turbulence 2009, Warsaw, Poland
A. W. Wernik (Mode B)
- The International Heliophysical Year (IHY) Africa 2009 workshop, Livingstone, Zambia, Lee-Anne McKinnell (Mode B)

8. Commission H Tutorial

Gordon James will give a tutorial at the next GA.

“Review of wave excitation, propagation, and detection, and new observation by E-POP satellite mission”

9. Discussion - Emerging Scientific Issues

9.1 Possible areas for new emphasis

New Frontiers

- Turbulence - Satellite constellations to measure wave properties
- Plasma waves at the planets

- Nonlinear waves in radiation belts
- Export knowledge to solar and astrophysical plasmas
- Space Weather
- Satellites, man in space – particle acceleration and loss by waves
- Ionosphere
- Canadian E-POP Satellite Mission and ground-based observation “Back-to-Ionosphere”
- Coupling of waves in the magnetosphere with the upper ionosphere
- Microwave interaction with the ionosphere regarding future SPS
- Climate
- Particle precipitation by waves and atmospheric chemistry
- Energy
- Solar power satellites – propagation and instabilities
- Fusion – wave heating of plasmas
- Satellite propulsion
- Ion propulsion for space travel
- Plasma thrusters – wave acceleration, nonlinear wave-particle interaction Measurement techniques of waves
- Calibration of electric field antenna Ground observations
- Multiple ground observations as discussed at VERSIM workshop
- Encourage Long-term continuous monitoring in space and from the ground
- Numerical simulations
- Simulation studies on inhomogeneous plasmas with massively parallel codes
- Combination of wave-particle interaction and wave propagation in 3D model
- Database
- NASA’s virtual wave observatory will be evolving over the next two to three years as the one website to go to for information about and access to wave data obtained around earth, other planets and the sun, with initial emphasis on IMAGE and Cluster data.
- Automatic event identification and derivation of electromagnetic plasma environment for huge wave data sets

10. Summary of raised problems

(1) Emerging new area: (session for next GA)

Plasma waves and ion thrusters

(2) Joint Working Groups

a) HJE: “Supercomputing in space radio science”

The title of the working group should be changed to the more general one: “Computer simulations in space plasmas”

b) ABDFGHJK: An inter-commission working Group on Solar Power Satellites: Co-chair for Commission H: K. Hashimoto (Japan), Co-chair for Commission: K. Schlegel.

- (3) Joint Sessions: HBDGJK: Solar Power Satellites Com H. Kozo Hashimoto. The session is led by H, but the oral session should be taken as a separate session from Commission H time slots.
- (4) Program Book: Identification of invited papers is necessary.
- (5) Encouragement for young people: It is necessary to encourage young people to participate in the URSI GA. Since we only have a finite number of oral sessions, everyone should go to the poster sessions to discuss with young people.

COMMISSION J - RADIO ASTRONOMY

Chair: Dr. Richard Schilizzi

Vice-Chair: Prof. S. Ananthkrishnan

Commission J meetings were held by Prof. Richard Schilizzi on the following two days:

Meeting 1: Monday, August 11, 17:20 – 18:40

Meeting 2: Wednesday, August 13, 17:20-18:40

Meeting 3: Friday, August 15, 17:20-19:00

1. Business Session I

1.1 URSI Awards

(i) Jack Welch

Balthasar van der Pol Gold Medal

Citation: “Pioneer of millimeter wavelength interferometry to investigate astronomical objects ranging from solar system planets to galaxies at the edge of the Universe with spectral and angular resolution”

(ii) Alan Rogers

John Howard Dellinger Gold Medal

Citation: “For his outstanding contributions to instrumentation in radio astronomy and its use to make fundamental discoveries about interstellar masers, superluminal expansion of quasars, deuterium abundance in the galaxy, and plate tectonics”

Commission J members congratulated both members on their well deserved awards.

1.2 Election of Vice-Chair

Candidates

(i) Don Backer – USA

(ii) Justin Jonas – South Africa

(iii) Marat Mingaliev – Russia

(iv) Shang-Cai-Shi - China

Votes received from:

Australia, Canada, China, Czech Republic, Finland, France, Greece, Hungary, India, Israel, Netherlands, New Zealand, Poland, Russia, South Africa, Sweden, Taiwan ROC, USA

Dr. Don Backer of USA was elected as Vice-Chair.

1.3 Commission J Budget, report on 2005-8 triennium

A. Budget 2005-2008 (Commission J activities)	€11000
Expenditure 2005-2008 for Commission J activities	
i) Astrophysics in the LOFAR era” Emmen Netherlands, April 07	€3000
ii) From Planets to Dark Energy: the Modern Radio Universe”, Manchester, UK, Oct. 2007	€4000
iii) Travel grants to URSI GA Bob Frater (special invitation) Jayanta Roy (India) Peeyush Prasad (India)	€3450

TOTAL €10450

Balance carried forward €550

B. Extra grant of \$5000 for travel grants for Young Radio Scientists to GA2008
\$1000 each to J.L. Du (China), Stefan Wijnholds (NL), Peter McMahon (SA)
\$500 each to A. Parsons, R. Shannon, B. Barrott, N. Paravastu (all USA)

TOTAL \$5000

1.4 Discussion of issues arising from 10 August meeting of the URSI Council

Reactions to White paper on Solar Power Satellite system – Many members expressed their concern about the possible implication of the SPS to radio astronomy observations.

1.5 Resolutions discussed in the Council

Item 1: Inter-Commission WG on Natural and Human-Induced Catastrophes and Disasters: Coronal Mass Ejections (with Comm. H). A discussion on how the CME propagation could be observed using radio astronomy techniques was done.

Item 3: Inter-Commission WG on Radio Science Services: Work with IUCAF.
Forum on Radio Science and Telecommunications.

- Item 5: Change name of GA to “URSI General Assembly and Scientific Symposium”
Item 8: Inter-Commission Data Commission: ICSU initiative.

Comm J rep should be an expert on the Virtual Observatory.

1.6 IUCAF

A presentation by Wim van Driel, IUCAF Chairman on its activities during the past 3 years. The WRC 2007 conference was used by IUCAF to bring more protection to some of the radio astronomy bands.

1.7 Terms of Reference for Commission J

Changes were introduced in the terms of reference for Commission J, in keeping with the changing times as well as to reflect the changing nature of radio astronomical observations.

RADIO ASTRONOMY (including remote sensing of celestial objects)

- The activities of the Commission are concerned with
 - 1) observation and interpretation from the early universe to the present epoch and
 - 2) radio reflections from solar system bodies
- Emphasis is placed on:
 - The promotion of science-driven techniques for making radio-astronomical observations and data analysis,
 - Support of activities to protect radio-astronomical observations from harmful interference.

1.8 Other topics

Triennium report, Posters, Commission J Resolution, Editor RSB, GA2011, visit to Wheaton. The Chairman noted, as part of the record, that Prof.A.van Ardenne gave the Commission J tutorial and Prof. Jim Cordes gave one of the General lectures.

2. Business Session 2

2.1 Report on 12 August URSI Council meeting

2.2 Commission J Resolutions

2.3 Editor for Radio Science Reviews, topics for the next triennium.

2.4 Report from GVWG (Jon Romney)

- continuation of GVWG was emphasised. A sub-committee was formed to elect the next Chair of GVWG.

2.5 URSI Long Range Plan

2.6 Other topics: Young Scientist Awards, Student Prizes

- The need to strengthen: the YS programme was emphasised.

2.7 Presentation of Grote Reber Gold Medal to Sandy Weinreb was highly appreciated.

3. Business Session 3

Chairman: Prof.R.Schilizzi (first half) / Prof.S.Ananthakrishnan (second half)

Vice-Chairman: Prof.Don Backer

3.1 Report on 14 August URSI Council meeting

3.2 Terms of Reference for Commission J

3.3 URSI Recommendation on the SKA

3.4 GVWG

3.5 URSI Long Range Plan/Emerging issues in omission J.

3.6 General Assembly 2011, Commission J Program – Suggestions:

- (a) Low Frequency Radio Astronomy;
(LOFAR, LWA, MWA, GMRT, any other)
- (b) SKA –Technology Development;
- (c) ALMA - mm and sub-mm science & technology;
- (d) Signal Processing, Calibration and Imaging in radio astronomy;
- (e) Sun and solar system science;
- (f) Space and Moon ‘Science & Technology’;
- (g) Observatory reports – same format ?;
- (h) Joint sessions ? Suggestions? ;
- (j) Splinter/WG meetings during lunch time;
- (k) New Observations and results.

3.7 Budget 2008-11 was briefly discussed.

3.8 Topics for Radio Science Bulletin 2008-2011.

- a) “Phased arrays in Radio Astronomy”, A. van Ardenne (Commission J Tutorial, 2008), in preparation.
- b) “Paths to Discovery in Radio Astronomy”, R. D. Ekers (in preparation?)
- c) “Calibration of High Frequency Telescopes” TBD
Editor: Dr. Richard Strom has agreed to take it up.

3.9 Meetings to be supported by Comm. J, 2008-11 – a list to be made.

3.10 Communication with Comm. J members – the existing email list needs to be improved.

COMMISSION K - ELECTROMAGNETICS IN BIOLOGY & MEDICINE

Chair : Dr. Frank Prato

Vice-Chair. Prof. G. D’Inzeo

1. Welcome and Introductions

Dr. Frank Prato welcomed the national representatives and the observers.

2. Acceptance of Agenda

The agenda was accepted and it was agreed that at the Wednesday and Friday meetings agenda items will be added as needed.

3. Election of Commission K Vice Chair

Prof. Guglielmo D'Inzeo reviewed the guidelines for vice chairs and chairs. Then he introduced the two candidates for Vice Chair of Commission K. Then Dr. Masao Taki made a short presentation and that was followed by a presentation by Dr. Joe Wiart. Then after answering questions the vote was held. Dr. Prato announced that the election was extremely close but that Dr. Taki received a few votes more than Dr. Wiart.

4. Review and Update of Commission

Terms of Reference

The following are the terms of reference for Commission K: Commission K - ELECTROMAGNETICS IN BIOLOGY AND MEDICINE

The Commission is charged with promoting research and development in the following domains :

- (a) Physical interaction of electromagnetic fields* with biological systems;
- (b) Biological effects of electromagnetic fields;
- (c) Mechanisms underlying the effects of electromagnetic fields;
- (d) Experimental electromagnetic fields exposure systems;
- (e) Assessment of human exposure to electromagnetic fields;
- (f) Medical applications of electromagnetic fields.

* (frequency range from static to terahertz)

Proposal to replace:

* (frequency range from static to terahertz) with:

* (frequency range from static to optical)

Moved by Susan Hagness (US) and seconded by Rafi Korenstein (Israel). After discussion the motion passed 11 to 4.

5. 2005 – 2008 Triennium Report

5.1 Contributions to the Radio Science Bulletin

5.1.1. Published Invited Reviews:

- Ahlbom, A., Feychting, M, and Lonn, S., 2005. Mobile Phones and Tumor Risk: Interpretation of Recent Results. Radio Science Bulletin. 314: 30-33.

- Lin, J. 2005. Interactions of Wireless Communication Fields with Blood-Brain Barrier of Laboratory Animals. *Radio Science Bulletin*. 315: 33-38.

5.1.2 Invited Reviews in Preparation

(Waiting for Guglielmo D'Inzeo email)

5.1.3 Radio – Frequency Radiation Safety and Health

- Lin, J. 2005. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 315: 44-46.
- Lin, J. 2006. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 316: 42-44
- Lin, J. 2006. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 318: 67-68.
- Lin, J. 2006. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 319: 67-68.
- Lin, J. 2007. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 320: 48-49.
- Lin, J. 2007. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 321: 54-55.
- Lin, J. 2007. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 322: 41-42.
- Lin, J. 2008. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 324: 41-42.

5.1.4 Published Commission K Tutorial Lecture

- Vecchia, P. 2006. Assessment of Health Effects Associated with Electromagnetic Fields by WHO, IARC, and ICNIRP. *Radio Science Bulletin*. 318: 30-33.

5.2 Sponsoring Scientific Meetings

The following scientific meetings received non-financial i.e. moral support from Commission K.

- International Symposium on Space THz Technologies (ISSTT), Paris, France, May 10-12, 2006
- International Conference on Ultrawideband, Waltham, MA, USA , September 24-27, 2006
- VIIth International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, St. Petersburg, Russia, June 26-29, 2007
- 2007 Asia-Pacific Microwave Conference, Bangkok, Thailand, December 11-14, 2007
- ICMARS-2006, Jodhpur, India, December 20-22, 2006
- Millimeter Waves in Medicine and Biology, Moscow, Russia, April 2-5, 2007
- The Sixth International Kharkov Symposium on Physics and Engineering of Microwaves, Millimeter and Submillimeter Waves (MSMW'07), Kharkov, Ukraine, June 25-30, 2007

- Electromagnetic Compatibility EMC Europe 2008, Hamburg, Germany, September 8-12, 2008
- Microwave-08, Jaipur, India, November 2008
- 20th International Zurich Symposium on Electromagnetic Compatibility, Zurich, Switzerland, January 12-16, 2009
- Electromagnetic Compatibility – EMC-2009, St. Petersburg, Russia, 2009

5.3 International Symposium Held July 22-26, 2007, Ottawa, Canada

URSI International Commission K and CNC-URSI ran four symposia associated with the North American URSI Meeting in Ottawa, Canada, July 22-26, 2007 (see <http://ursi2007.ee.umanitoba.ca/Home.html>). Two were associated with Commission E CNC and US-NC. Three of the four sessions had an overarching theme: toward visualization of electromagnetic brain stimulation through electromagnetic brain imaging and mapping.

The first session (K2) focused on Neuronal Stimulation by both inductive and capacitive coupling including presentations on theory, simulations and/or experimentation. The third session (EK2) was a joint session on Electromagnetic Brain Imaging and Mapping with Commission E and focused on brain MRI, photo-acoustic imaging and current density imaging as well as brain mapping with EEG and electrical impedance tomography. The fourth session (K3) brought together the ideas in K2 and EK2 and covered Bioelectromagnetic Brain Imaging and Mapping of Effects from Electromagnetic Stimulation.

The second session was also with Commission E and this session (EK1) focused on breast imaging using microwaves - a very exciting, new and exploding field for URSI.

The success of these sessions allowed Commission K to decide on including similar sessions at the URSI GA08 in Chicago. These sessions especially the ones on Breast Imaging, Brain Imaging and imaging the effects of EMF brain stimulations have been oversubscribed suggesting that imaging will be a new large part of Commission K activities in the future.

The cost of this Symposium was about \$40,000 CAN/USD. This was raised from the \$8,000 EU available from URSI/Commission K, \$5,000 CAN from a research grant from CIHR, \$2,000 CAN for students from CNC/URSI and the remainder was generously provided by the Lawson Health Research Institute.

5.4 White Paper on Wireless Communication and Health

Dr. Bernard Veyret is preparing this white paper, requested by URSI. He has identified the authors for the different sections and will have a draft of the white paper soon after the general assembly in August 2008. The delay has been caused by the delay in the publications of the results from the interphone study.

*5.5 Two Meetings of National Representatives of Commission K**

- June 12, 2006: A meeting was held in Cancun, Mexico at the 2006 Bioelectromagnetics

Meeting.

- June 9, 2008: A meeting was held in San Diego, California at the 2008 Bioelectromagnetics Meeting.

* Minutes of these two meetings can be found at <http://www.ursi.org/K/Index.htm>

5.6 URSI Commission K Emerging Issues, Prepared by Bernard Veyret and Frank Prato

The driving issue behind the creation of Commission K was health risk assessment mainly related to mobile telephony. Since then, several emerging issues of heavy societal impact have been encompassed by the terms of reference for Commission K, especially in view of the still rapid development of wireless communication technologies and the emergence of the areas of “bioengineering” as a new area of emphasis at so many institutions, with new Departments of Bioengineering, Medical Imaging, Molecular Imaging and Molecular Biology being created. It is significant in this regard that the chair ship of Commission K has alternated between world leaders in risk assessment and biomedical engineering and imaging over the last 4 cycles.

While the underlying opportunities and applications in this connection are extremely broad, and cannot possibly be all addressed by URSI, or any other single organization, the relatively small but important component of the research thrusts of such departments, namely ‘Electromagnetic Effects in Biology & Medicine’ can be uniquely and most effectively captured by URSI.

The main emerging issues are today the new EMF-emitting devices (e.g., WiFi, Wimax, RFID) linked with dosimetric and standardization issues, and the biomedical applications of biomedical imaging (e.g., very high field MRI, microwave imaging, thermal imaging, near infrared imaging, optical imaging and hybrid imaging including optical/acoustic and microwave/acoustic), electrical mapping (e.g., electrical encephalography or EEG and electrical magneto encephalography or EMG) and electrical simulation (e.g., direct electrical stimulation and inductive non-invasive stimulation). It must be acknowledged in this regard that Commission K members must remain current in employing the latest in technology no matter where in the spectrum of these disciplines they work. For example they must use the latest in molecular biology regardless of whether research is in the traditional area of risk assessment (e.g. use of gene c-DNA arrays) or biomedical (e.g. developing reporter probes for molecular imaging).

Realization of such opportunities should be a new thrust of URSI, especially in view of their societal importance. In that context, significant interaction with other Commissions do exist already, namely commission A (e.g., field and SAR metrology), commission B (e.g., numerical methods and modeling of electromagnetic propagation in tissues, EM and statistics), commission E (e.g., development of EMI standards), commission F (e.g., terahertz propagation in tissue), and commission H (electromagnetics in conducting media).

In order to strengthen its role in health risk assessment and standard setting, commission K has built strong links with WHO and ICNIRP.¹

Hence Commission K has two important roles to play within URSI. The risk assessment role is that of “hand maiden” to the other commissions where, for example, Commission K members use the latest tools to test for safety of a new wireless technology. The second role is where Commission K leads and asks other commissions to lend their expertise to develop new technologies such as the understanding of EM field transmission characteristics for microwave breast imaging. It is this second role that has the capacity of explosive growth but it is also the area most likely to be taken over once it reaches a level of commercialization for medical application by large well funded medical imaging societies. However Commission K can achieve a novel niche by leveraging the strengths of the other URSI commissions.

5.7 Preparations for GA08, August 9-15, 2008, Chicago

Commission K will lead in 11 specific sessions and one poster session. This includes one session with Commissions B and E on microwave breast imaging and one with commissions A and E on exposure assessment of new emerging technologies. Commission K has combined with Commission B on a session with the title “Future Challenges of Computational Electromagnetics” and with Commission B and F with the title “Stochastic Modeling and Uncertainty Arrangement in Electromagnetics”. All 13 of these oral sessions have been filled and in addition there are a total of 31 posters and 1 Commission K Tutorial on Wireless Communication and Health. Hence there are a total of 134 Commission K presentations with 31 of these being posters.

5.8 Nomination of Dr. Shoogo Ueno for the Balthasar Van der Pol Gold Medal of URSI Society

Dr. Shoogo Ueno was nominated for a Gold Medal of the URSI Society. Although Dr. Ueno was more than deserving for an extensive career in research, teaching and administration his nomination, through no fault of his own, was not successful. Dr. Ueno has served our community unselfishly as a former Chair of Commission K and President of BEMS. Although not successful, Commission K members would like Dr. Shoogo Ueno to realize that his associates and colleagues hold him in the greatest regard.

5.9 Student Support at URSI

Commission K had \$5,000 US for student support and decided to use it to offset student travel costs by giving \$300 US to each of the 16 students. Three Commission K students received Young Scientific Awards. One Commission K student’s manuscript was selected in the 10 finalists for the URSI student paper competition.

6. Commission K RSB Associate Editor for the next Triennium – Dr Guglielmo D’Inzeo

Prof. Guglielmo D’Inzeo proposed that Dr. Joe Wiart become the Associate Editor of the Radio Science Bulletin for Commission K. This motion was seconded by Dr. Frank Prato and was unanimously approved by the National representatives.

7. Emerging Issues and GA11 – Dr. Guglielmo D’Inzeo

Prof. Guglielmo D’Inzeo proposed that the issues for the next GA in 2011 would be discussed through out the next triennium.

8. Other Business

8.1 Proposed Resolutions

Dr. Frank Prato read over the proposed resolutions being considered by the URSI council this included the WG on Catastrophes and Disasters, the establishment of regional committees at the same location as those to be set up by ICSU, the reduction in the distribution of paper copied of the RSB and the change of GA11 name to GA11 and Scientific Symposium or GASS.

8.2 Long Range Planning Committee

Dr. Frank Prato indicated that the board has suggested that there by a Long Range Planning Committee to be made up of immediate past commission chairs.

8.3 Location of 2011 meeting: Beijing, Goteborg, Istanbul

The location of the 2011 meeting was discussed. Preference for location was voted on as suggested by Dr. Neils Kuster (Switzerland). The vote was Istanbul – 1 vote, Goteborg – 12 votes and Beijing – 2 votes. At the next council meeting Istanbul won the election.

8.4 2010 Asia-Pacific RS Conference in Toyama, Japan

Frank Prato quickly reviewed the Japanese proposal for the Asia-Pacific Radio Science Conference in Toyama Japan.

8.5 Continuation of the Inter-Commission Working Group on Solar Power Satellites

As requested by Commission H chair Kozo Hashimoto there was a discussion of continuation of the SPS ICWG and the inter commission session on SPS. It was decided that Dr. Guglielmo D’Inzeo would ask Dr. James Lin if he would continue to serve as commission K’s representative on this Working Group.

8.6 Proposal for White Paper on Remote Sensing

There was a discussion on the French proposal to have a white paper on Remote Sensing. Dr. Joe Wiart proposed that Commission K should have input into the first draft and Prof. Guglielmo D’Inzeo will appoint some one.

8.7 Proposal from Commission A Chair P. Banerjee to have a A,K,C combined session at the GA11 on “EMF Exposure and Health”.

Prof. Guglielmo D’Inzeo will contact Dr. Banerjee on this proposal

1 International Commission on Non-Ionizing Radiation Protection

RESOLUTIONS AND RECOMMENDATIONS OF THE COUNCIL

U.1 Working Group on Natural and Human-Induced Hazards and Disasters

The URSI Council,

considering

1. the multidisciplinary approach adopted by ICSU for its program on “Natural and Human-Induced Environmental Hazards and Disasters”;
2. URSI competences in the development of models and tools in earth observation and remote sensing of the environment as well as the use of global data bases for various applications;
3. the importance of the evaluation and management of risk (linked, for example, to climate change), particularly in developing countries;
4. opportunities of interaction and collaboration with committees from other Unions (ITU, GEO, ISRPS), and Interdisciplinary Bodies (COSPAR);

resolves

1. to create an Inter-Commission Working Group, the main objectives of which shall be:
 - a. to study, within the URSI area of competence, methods and strategies related to natural and human-induced environmental hazards and disasters, such as:
 - (i) communication systems suitable for fast-response disasters relief;
 - (ii) the development and application of remote sensing products and other global data for monitoring and alerting;
 - (iii) the evaluation of long-term and short-term risks of disasters, and
 - (iiii) the description of the environment disturbances resulting from disasters;
 - b. to provide support to initiatives taken in the area of risk management and relief related to natural and human-induced catastrophes and disasters, particularly by developing countries.

U.2. Regional Network Committees

The URSI Council,

considering

- 1) the need to involve more countries in radio science;
- 2) the new opportunities opened by the ICSU Regional Centres;
- 3) the need to adopt different approaches for different regions;
- 4) the need to establish clear collaborative structures from the regional URSI members and the Board;

resolves

- 1) to dissolve the URSI Standing Committee for Developing Countries;
- 2) to create Regional URSI Networks, including those covering the same geographical regions as the ICSU Regional Centres (presently Africa, Latin America & the Caribbean, Asia-Pacific),
- 3) to constitute Regional URSI Network Committees based on agreement between the regional URSI members and the Board;
- 4) that each Regional URSI Networks be assisted and supervised by an URSI Board member;
- 5) to have as a first objective the formation of action plans, including actions associated with the corresponding ICSU Regional Centre;
- 6) to use the opportunity of URSI General Assemblies to hold meetings with the URSI Board members and with other Union Members involved in similar action plans.

U.3. Inter-Commission Working Group on Radio Science Services

The URSI Council,

recognizing

- 1) the fast development of new communication systems and their potential consequences for passive and active radio science services;
- 2) the leadership taken by IUCAF (the Scientific Committee on Frequency Allocations for Radio Astronomy and Space Science) for the protection of passive radio science services;
- 3) the involvement of URSI in the study and development of new communication systems and the importance of passive and active radio services for several URSI Commissions;

- 4) the interactions to be developed with ITU and with other Unions (ISPRS) and organizations (GEO, IEEE, ...) on the use of passive and active radio services;

resolves

- 1) that an inter-Commission WG on Radio Science Services (RSS) be established, having as its mission:
- 2) in close relation with IUCAF, to provide URSI input to the ITU on all matters that may concern passive as well as active radio services;
- 3) to inform the URSI Commissions regarding the development of new communication systems, and to study with them the potential consequences for radio science research;
- 4) to contribute to inter-Union and/or inter-Organization activities related to passive and active radio services.

U.4. Distribution of “*The Radio Science Bulletin*”

The URSI Council,

Considering

- 1) that *The Radio Science Bulletin* (published quarterly in March, June, September and December) is an important information channel for the radio science community;
- 2) that all issues of *The Radio Science Bulletin* have been posted on the URSI Website since September 2002;
- 3) that the printing and mailing of *The Radio Science Bulletin* is a major cost for URSI;

resolves

that from the March 2009 issue of *The Radio Science Bulletin* onwards:

- a) URSI Radioscientists and Officers no longer receive a gratis paper copy of *The Radio Science Bulletin*;
- b) a limited number of issues will be sent in bulk mailing to the academies (4 copies per dues category) (which ranges from 1 to 6), with a minimum of 10;
- c) there will be only one such mailing per Member Committee;
- d) those who wish to receive a printed version of *The Radio Science Bulletin* will need to pay a subscription fee of 100 euros per triennium (or 60 euros in addition to the registration fee for the General Assembly);
- e) libraries will be able to take a subscription at the rate of 100 euros per year.

U.5. Visibility of URSI General Assemblies by scientists and medias

The URSI Council,

considering

that the General Assembly of URSI is much more than the General Assembly of one major scientific union; that it is also a great scientific symposium covering the whole spectrum of radio sciences;

resolves

that its title be changed to: “URSI General Assembly and Scientific Symposium”.

U.6. Formation of an Inter-Commission Data Committee

Considering

1. That ICSU (International Council for Science), through its recent SCID (Strategic Committee on Information and Data) will recommend to the ICSU General Assembly that a new Interdisciplinary Body is formed, called WDS (World Data Systems), that FAGS (Federation of Astronomical and Geophysical Data analysis Services), WDC (World Data Centre) will no longer exist and the current FAGS Services and World Data Centres applying for membership of the WDS;
2. That URSI currently has representatives for the WDC, the FAGS, and ISES (International Space Environment Services), a FAGS Service;
3. That through the SCID report, ICSU has proposed all Unions and National bodies to form committees to deal with data and information;
4. That all URSI Commissions have varied data needs and interests, which are expected to grow in complexity and importance;

Resolves

- 1) That URSI form an inter-Commission Data Committee;
 - a) to provide an oversight of URSI data interests;
 - b) to provide an effective interface with other ICSU data communities, including over-arching groups such as GEOSS (Global Earth Observing System of Systems), the proposed WDS and the **Committee on Data for Science and Technology** (CODATA), which URSI recently joined;

- 2) That the initial membership include the current WDC, FAGS and ISES representatives, together with representatives proposed by the Commissions;
- 3) That the Data Committee provide regular reports to the URSI Board and Council and respond to questions from the Commissions, the Board and Council;
- 4) That the Data Committee develop its own terms of reference and propose these to the Board for further development prior to the next General Assembly, in 2011.

U.7. Radio Science and the Square Kilometre Array

The URSI Council,

considering

1. The Square Kilometre Array (SKA) will be the next generation radio telescope operating at cm – and m- wavelengths;
2. the unprecedented potential of the SKA for transformational radio science and technology;
3. the coordinated global development of the SKA; and
4. the involvement in the Square Kilometre Array programme by the international community of Radio Scientists represented by URSI;

recommends

that URSI, through its Commissions, fosters the scientific and technical development of the SKA through its meetings, publications and other means.

U.8 XXXth General Assembly 2011

The URSI Council,

Having considered the invitations for the XXXth General Assembly which had been submitted by the URSI Member Committees in China CIE (Beijing), Sweden (Göteborg) and Turkey (Istanbul);

resolves

1. to accept the invitation of the Turkish URSI Committee to hold the XXXth General Assembly in Istanbul from 13 to 20 August 2011;
2. to record its thanks to the Member Committees in China CIE and in Sweden for their invitations.

U.9 Vote of Thanks to the US URSI Committee

The URSI Council,

resolves unanimously to convey to the US URSI Committee its warm thanks and appreciation for the organisation of the XXIXth General Assembly in Chicago.

RÉSOLUTIONS ET RECOMMANDATIONS DU CONSEIL

U.1. Groupe de travail sur les risques et catastrophes, naturels ou dus aux activités humaines

Le Conseil de l'URSI,

considérant

1. l'approche multidisciplinaire adoptée par l'ICSU pour son programme sur les « risques environnementaux et catastrophes qu'ils soient naturels ou dus aux activités humaines » ;
2. les compétences de l'URSI dans l'élaboration de modèles et d'outils en l'observation de la terre et télédétection de l'environnement ainsi que dans l'utilisation de bases de données globales ceci pour des applications diverses;
3. l'importance de l'évaluation et de la gestion des risques (liés, par exemple, aux changements climatiques), en particulier dans les pays en développement;
4. les possibilités d'interactions et de collaborations avec des comités d'autres unions (UIT, GEO, ISRPS) et de structures interdisciplinaires (COSPAR);

décide

1. de créer un groupe de travail inter-commissions, dont les principaux objectifs devront être :
 - a) d'étudier, dans les domaines de compétence de l'URSI, des méthodes et stratégies relatives aux risques environnementaux et catastrophes qu'ils soient naturels ou dus aux activités humaines, tels que:
 - (a) des systèmes de communication adaptés à une réaction rapide des secours aux catastrophes;
 - (b) l'élaboration et l'application des moyens de la télédétection, et autres données globales, au suivi et l'alerte;
 - (c) l'évaluation à long terme et à court terme des risques de catastrophes, et
 - (d) la description des perturbations de l'environnement résultant de catastrophes;

- b) de fournir un appui aux initiatives prises dans le domaine de la gestion des risques et des secours liés aux risques et catastrophes qu'ils soient naturels ou dus aux activités humaines, en particulier aux pays en développement.

U.2. Comités réseaux régionaux

Le Conseil de l'URSI,

considérant

- 1) la nécessité d'impliquer davantage de pays dans les radio sciences ;
- 2) les nouvelles possibilités offertes par les centres régionaux de l'ICSU ;
- 3) la nécessité d'adopter des approches différentes par régions ;
- 4) la nécessité de définir des structures de collaboration claires prenant appui sur les membres régionaux de l'URSI et le Bureau ;

décide

- 1) de dissoudre le Comité permanent de l'URSI pour les pays en développement;
- 2) de créer des Réseaux régionaux de l'URSI, comprenant ceux couvrant la même région géographique que les centres régionaux de l'ICSU (actuellement l'Afrique, l'Amérique latine et les Caraïbes, et l'Asie - Pacifique) ;
- 3) de constituer les Réseaux régionaux de l'URSI sur la base d'accords entre les membres régionaux de l'URSI et le Bureau ;
- 4) que chaque Réseau régional de l'URSI soit assisté et supervisé par un membre du Bureau de l'URSI ;
- 5) d'avoir pour premier objectif la définition de plans d'action, prenant en compte les actions associées avec les centres régionaux de l'ICSU ;
- 6) d'utiliser les possibilités offertes par les Assemblées générales de l'URSI pour tenir des réunions entre les membres du Bureau de l'URSI et des membres d'autres Unions engagées dans des plans d'action analogues.

U.3. Groupe de travail inter-Commission sur les services radio scientifiques

Le Conseil de l'URSI,

reconnaissant

1. le développement rapide de nouveaux systèmes de communication et leurs conséquences potentielles pour les services radio scientifiques actifs et passifs;

2. le leadership pris par l'IUCAF (le comité scientifique sur l'attribution des fréquences pour la radio astronomie et les sciences spatiales) pour la protection des services radio scientifiques passifs ;
3. la participation de l'URSI dans l'étude et le développement de nouveaux systèmes de communication et l'importance pour plusieurs commissions l'URSI des services radio actifs et passifs
4. les relations à développer avec l'UIT et autres unions (ISPRS) ou organisations (GEO, IEEE,...) sur l'utilisation des services de radio actifs et passifs;

décide

qu'un groupe de travail inter-commission sur les Services Radio Science (SRS) soit établi, ayant pour mission :

- 1) en étroite collaboration avec l'IUCAF, de fournir des informations et données à l'UIT sur tout sujet qui peut concerner tant les services radio actifs que passifs ;
- 2) d'informer les commissions de l'URSI en ce qui concerne le développement de nouveaux systèmes de communication, et d'étudier avec elles les conséquences potentielles pour la recherche en radio science;
- 3) de contribuer aux activités inter-unions ou inter-organisations relatifs aux services radio actifs et passifs.

U.4. Distribution du «Radio Science Bulletin»

Le Conseil de l'URSI,

considérant

- 1) que le Radio Science Bulletin (revue trimestrielle publiée en mars, juin, septembre et décembre) est un important canal d'information pour la communauté radio scientifique;
- 2) que tous les numéros du Radio Science Bulletin ont été publiés sur le site depuis l'URSI septembre 2002 ;
- 3) que l'impression et l'envoi du Radio Science Bulletin représente un coût important pour l'URSI;

décide

que, dès le mois de mars 2009 les numéros du Radio Science Bulletin :

- 1) les radioscientifiques et les dirigeants de l'URSI ne recevront plus gratuitement une

- copie papier du Radio Science Bulletin ;
- 2) un nombre limité de numéros sera adressé groupé aux académies 4 exemplaires par catégories de cotisations (lesquelles vont de 1 à 6), avec un minimum de 10 ;
 - 3) il n'y aura plus qu'un envoi postal par membre ;

Ceux qui souhaitent recevoir une version imprimée du Radio Science Bulletin devront payer un abonnement de 100 euros par période triennale (ou 60 euros en plus des frais d'inscription pour l'assemblée générale);

Les bibliothèques pourront s'abonner au taux de 100 euros par an.

U.5. Visibilité des Assemblées générales de l'URSI par les scientifiques et les médias

Le conseil de l'URSI

considérant

que l'Assemblée générale de l'URSI est bien plus que l'Assemblée générale d'une des grandes unions scientifiques, qu'elle est aussi un grand symposium scientifique couvrant tout le spectre des radio sciences ;

décide

que son intitulé soit changé en : « Assemblée générale et Symposium scientifique de l'URSI »

U.6. Comité inter-commission sur les données

Considérant

1. que l'ICSU (Conseil international pour la science), par l'intermédiaire de son récent SCID (Comité stratégique sur l'information et les données) recommandera à l'Assemblée générale du ICSU qu'une nouvelle structure interdisciplinaire soit formée, appelé WDS (World Data Systems), que la FAGS (Federation of Astronomical and Geophysical Data analysis Services) et le WDC (World Data Centre) soit supprimés, et que les actuels services FAGS et les centres mondiaux de données soit candidats aux WDS;
2. que l'URSI a actuellement des représentants au WDC, à la FAGS, et à l'ISES (International Space Environment Service), un service de la FAGS;

3. qu'avec le rapport SCID, l'ICUS a proposé à toutes les unions et les structures nationales de former des comités pour traiter des données et de l'information ;
4. que toutes les commissions de l'URSI ont, s'agissant de données diverses, des besoins et intérêts, qui sont appelés à croître en complexité et importance ;

Décide

- 1) que l'URSI forme un Comité inter-commission sur les données :
 - a) manifestant l'intérêt de l'URSI pour les données ;
 - b) permettant une interface efficace avec d'autres communautés de données de l'ICSU, y compris des groupes plus globaux tels que le GEOSS (Global Earth Observation System of Systems), le projet de WDS, et le Comité sur les données pour la science et la technologie (CODATA), que l'URSI a récemment rejoint ;
- 2) que les premiers membres soient les représentants actuels au WDC, à la FAGS et à l'ISES ainsi que des représentants proposés par les commissions;
- 3) que le Comité sur les données présente des rapports réguliers au Conseil et au Bureau de l'URSI et réponde aux demandes des Commissions, du Bureau et du Conseil
- 4) que le Comité sur les données élabore ses propres termes de référence et les propose au Bureau pour une mise en oeuvre avant la prochaine Assemblée générale,

U.7. Radio science et la Square Kilometer Array (SKA)

Le Conseil de l'URSI,

considérant

1. que la Square Kilometer Array (SKA), sera la prochaine génération de radio télescope opérant dans les longueurs d'onde centimétrique et métrique;
2. le potentiel sans précédent de la SKA pour l'évolution des sciences et technologies radio;
3. la coordination mondiale du développement de la SKA, et
4. la participation dans le programme « Square Kilometer Array » de la communauté internationale Radio scientifiques représentées par l'URSI;

recommande

que l'URSI, par l'intermédiaire de ses commissions, favorise le développement scientifique et technique de la SKA par le biais de ses réunions, publications et de tout autres moyens.

U.8. XXXe Assemblée Générale 2011

Le Conseil de l'URSI,

Ayant examiné les invitations pour la XXXe Assemblée générale soumises par les comités membres de l'URSI en Chine (Beijing), la Suède (Göteborg), et la Turquie (Istanbul);

Décide

1. d'accepter l'invitation du comité turc de l'URSI pour organiser la XXXe Assemblée générale à Istanbul du 13 à 20 août 2011;
2. d'adresser aux comités membres en Chine et en Suède ses remerciements pour leurs invitations.

U.9 Remerciements au Comité américain de l'URSI

Le Conseil de l'URSI,

décide à l'unanimité de transmettre au comité américain ses vifs remerciements et son appréciation pour l'organisation de la XXIXe Assemblée générale à Chicago.