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INTRODUCTION

ACKNOWLEDGEMENT

The XXVth General Assembly of URSI was held at the Lille Grand Palais, Lille, France, from 28 August to 5 September 1996. In introducing this account of the proceedings, it seems appropriate to offer the warmest thanks of the Union to :
- the French Committee for URSI (le Comité national français de radioélectricité scientifique);
- the French Academy of Sciences;
- the French and Local Organising Committees;
- 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 : ICSU, the URSI Member Committee in Japan, the Royal Society of London, the European Space Agency, the Commonwealth Secretariat and the Copernicus programme.

OUTLINE OF THE ASSEMBLY

The URSI Council, which is composed of the official representatives of the Member Committees, met in Lille on five occasions between 27 August and 6 September 1996. The Resolutions and Recommendations adopted by the Council and by the URSI Commissions are reproduced at the end of this volume. Summary accounts of the business transacted by the Council and the Commissions are given elsewhere.

An abundant scientific programme, consisting of 1545 papers (invited or contributed - oral or poster), had been prepared for the 1200 registrants (among them 118 official "Young Scientists"). In addition, a Guest Lecture and three General Lectures of interest to all participants were given. The Guest Lecture was entitled : *Radio Science, Pulsars and Relativity* (by J.H. Taylor, Nobel Prize, USA).

The General Lectures were entitled :
- *From Coherence to Confusion : a Conservative SAR View* (by R.K. Raney, U.S.A.);
- *Nonlinear Physics and Chaos* (by W. Lauterborn, Germany);
- *Lightwave Communications* (by M. Joindot, France).

Each Commission had been asked to provide a Tutorial Lecture in its own sphere of interest. The titles of these Lectures were as follows :
A. *Counting of Single Flux and Single Charge Quanta for Metrology* (by J. Niemeyer, Germany)
B. *High Frequency Methods in Electromagnetics* (by R. Tiberio, Italy)
C. *Communications by Means of Low Earth Orbiting Satellites* (by R.L. Pickholtz, USA)
D. *Optoelectronics Integration* (by H. Burkhard, Germany)
E. *Topology-based Modelling of Very Large EM Systems* (by J.P. Parmentier and P. Degauque, France)

F. *Impact of Numerical Methods on Propagation Modelling* (by K.H. Craig, United Kingdom)
G. *The Equatorial Ionosphere and Radio Communications* (by B.M. Reddy, India)
H. *Radio Emission from Instabilities in Space Plasmas : Marginal Stability, Stochastic Growth and Fine Structures* (by D.B. Melrose, USA)
J. *Cosmic Masers - a Useful Tool in Radio Astronomy* (by J.M. Moran (USA)
K. *Personal Communication Services - Technology and Health Concerns - Is there a common solution?* (by M.A. Stuchly, Canada)

List of URSI Officers and Officers of Member Committees

Following the elections at the XXVth General Assembly in Lille, France, 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.

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FAGS (Federation of Astronomical and Geophysical Data Analysis Services) :
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ICSU (International Council of Scientific Unions) :
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ICSU Committee on the Free Circulation of Scientists :
Dr. P. Bauer (France)

ICSU Panel on World Data Centres (Geophysical and Solar) :
Prof. H. Rishbeth (U.K.)

IGBP (International Geosphere-Biosphere Programme) :
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ISES (International Space Environment Service) (formerly: IUWDS) :
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Dr. B.M. Reddy (India)

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SCOR (Scientific Committee on Oceanic Research) :
Prof. D. Gjessing (Norway)

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Opening Meeting

Wednesday, 28 August 1996, 3.30 - 5.30 p.m.

The Opening Meeting was held in the amphitheatre Vauban of the Lille Grand Palais. The first part of the meeting was chaired by Prof. Degauque, Chair of the French Organising Committee. Were also present the following distinguished personalities :

- *Mr. C. Sulman, Town Counsellor, representing Mr. P. Mauroy, Senator-Mayor of the City of Lille;*
- *Mr. B. Bigot, Director General for Research and Technology, Ministry for Education, Higher Education, and Research;*
- *Mr. J.-J. Gagnepain, Director of the Department of Engineering Sciences, National Centre of Scientific Research (CNRS).*

Prof. Degauque first welcomed the participants in the following terms :

Welcome by the Chair of the French Organising Committee

Prof. P. Degauque

Au nom du Comité National Français de Radioélectricité Scientifique, c'est à la fois un honneur et un plaisir d'accueillir les participants à la 25ème Assemblée Générale de l'URSI et de leur souhaiter la bienvenue chez nous. C'est à 1946 que remonte la dernière Assemblée Générale tenue en France, une époque où le monde émergeait de la guerre. Celle-ci avait eu comme corollaire d'entraîner des développements très significatifs dans notre secteur de recherche. Ceux-ci allaient contribuer à cette véritable révolution dont nous sommes témoins depuis 1945 dans les domaines de la radioélectricité scientifique et de l'électronique : le radar, le transistor, la microélectronique, les techniques hyperfréquences, la recherche spatiale, les communications par satellite, le maser et le laser, les ordinateurs, les fibres optiques - et cela n'en est que la liste partielle. Cette Assemblée de 1946 fut sans nul doute un évènement émouvant sur le plan humain : les membres de l'URSI, séparés par les hostilités, se retrouvaient réunis au sein d'une organisation qui affirmait son caractère non-politique.

L'allocution de bienvenue fut prononcée par ce géant de la mécanique ondulatoire, Louis de Broglie, alors Secrétaire perpétuel de l'Académie des Sciences française, dont je

citerai ici les paroles de conclusion : "J'ai tenté une rapide esquisse de l'Histoire de la radioélectricité. Histoire émouvante pour ceux qui peuvent la revivre ! On y voit converger les travaux désintéressés des savants et les efforts à but plus concret des ingénieurs et des techniciens. Comme des ruisseaux nés dans des contrées différentes viennent confluer pour former un grand fleuve, les découvertes de la science et les investigations de l'industrie sont venues se rejoindre pour donner naissance aux grandes réalisations de la radioélectricité. Dans notre temps troublé, en face d'un avenir incertain, il est réconfortant d'évoquer, comme prélude des travaux d'une réunion comme la vôtre, les diverses étapes d'une des plus belles réussites du génie humain". Et l'URSI s'engageait ainsi dans une ère nouvelle au cours de laquelle elle n'a cessé de s'affirmer comme le point de rencontre des physiciens et des ingénieurs radioélectriciens, mais aussi de scientifiques d'autres disciplines.

Le Comité français fut l'un des Comités fondateurs de notre Union et il s'enorgueillit de cette longue tradition. Puis-je vous faire remarquer à ce propos qu'il est probablement le seul à avoir fourni à l'Union un Président, Général de division, le Général Ferrié, et un Président Père jésuite, le Père Lejay. Notre Comité se plaît aussi à souligner que la première dame appelée aux fonctions de Président de Commission est une physicienne française.

Our Committee is very proud that the city of Lille, with its rich cultural heritage, has been selected as the venue for this Assembly. We do hope that the arrangements will prove satisfactory and that you will enjoy your stay here. Ahead of us is a rich and diverse scientific programme, which has been arranged by the Chairmen of Commissions and coordinated by Prof. Matsumoto and Dr. Hamelin.

I acknowledge with gratitude the support our Organising Committees received from government ministries and institutes, universities and industries. These are listed in the final programme. My own thanks are extended to my colleagues in France, who volunteered to assist with the organisation of our meeting. I wish to emphasise in particular the tremendous and demanding work accomplished by Mrs Martine Liénard, President of the Local Organising Committee and the skilful assistance provided by Miss Victoria Jull during this past year.

I wish you a fruitful and enjoyable General Assembly.

Prof. Degauque's address was followed by a message from Mr. J.-J. Gagnepain, Director of the Department of Engineering Sciences, National Centre of Scientific Research (CNRS).

Welcome by the Director of the Department of Engineering Sciences of the CNRS

Monsieur le Maire, monsieur le Président, monsieur le directeur, mesdames et messieurs, mes chers collègues,

L'électromagnétisme en général et la radioélectricité en particulier ont occupé, de longue date, et occupent toujours, une place importante ou une place de choix dans les objectifs de la recherche scientifique. Et pour cette raison je suis très heureux que se tienne à Lille la XXVème Assemblée Générale de l'URSI. Permettez-moi au nom du CNRS, principal organisme de recherche français, de vous souhaiter la bienvenue. A titre plus personnel, j'ajouterai qu'ayant participé pendant un certain nombre d'années aux travaux

de la Commission A de l'URSI (la toute première fois c'était, si je me souviens bien, en 1972 à Varsovie), je suis tout particulièrement heureux de me joindre à vous et de vous retrouver aujourd'hui. Je disais que les activités de l'URSI ont toujours été au coeur de nos préoccupations scientifiques. Faut-il rappeler, pour faire un peu d'histoire, que le lancement du premier satellite français - c'était au cours des années soixante - était l'aboutissement d'une initiative de plusieurs organismes: le Centre national d'études spaciales, le Centre national d'études de télécommunications et le CNRS. Ce satellite disposait d'une charge utile qui était consacrée au sondage électromagnétique de l'environnement ionisé de la Terre. Il est clair que la science ne peut désormais s'inscrire que dans un contexte international -c'est devenu une banalité de le dire et de le répéter. Il est difficile de citer rapidement aujourd'hui toutes les contributions de l'URSI, ou tous les programmes de qualité et d'importance qui se font à travers le monde. Je n'en prendrai que quelques exemples : je pourrais citer l'EISCAT, pour le sondage radar de l'environnement ionisé des hautes altitudes. L'extension récente de ce programme au Spitzberg ouvre de nouvelles perspectives de collaboration, non seulement avec les pays de l'Europe du Nord, mais aussi avec des pays plus éloignés géographiquement, comme le Japon.

De même l'association d'équipes allemandes, espagnoles, françaises permet le déploiement dans les Alpes et dans la Sierra Nevada, de moyens importants d'observation de l'univers en ondes milimétriques. Dans un autre domaine, celui de la métrologie, plus particulièrement du temps et des fréquences, les résultats obtenus (et attendus) des horloges à atomes froids sont tout à fait spectaculaires. On a vu la métrologie des fréquences faire des progrès étonnants, qui atteignaient encore, il y a un certain nombre d'années, un ordre de grandeur tous les sept ans. J'ignore si cette vitesse de progrès est encore la même aujourd'hui ...

Mais de la même façon, quel serait l'intérêt d'une horloge, même apparemment la plus stable, si elle n'était pas comparée à d'autres. Le rôle d'une comparaison sur le plan international, au sein d'un vaste réseau, est donc décisif. J'aimerais aussi souligner que le développement des horloges a un retentissement important, non seulement pour la science, mais aussi pour la société, car cette technique permet de déterminer avec une précision étonnante la forme du globe terrestre, et permet de suivre les déformations de la surface de celui-ci.

L'URSI, j'aimerais le rappeler, s'est engagée très tôt dans des domaines nouveaux, originaux, touchant aujourd'hui dans certains cas à de vastes enjeux. Je veux parler des travaux sur les effets biologiques des ondes électromagnétiques, et en particulier des microondes, initiés tres tôt au sein de votre Union. Je pourrais parler également du domaine de la Compatibilité électromagnetique, et il m'apparaît tout à fait judicieux qu'il ait été décidé d'organiser, en paralèlle avec l'Assemblée Générale, un colloque sur ce sujet. Il est très important de poursuivre de vigoureux efforts scientifiques dans de tels domaines. Le CNRS est déterminé à le faire et insistera plus précisément sur l'aspect pluridisciplinaire de ces recherches. Nous les soutiendrons parce que la pluridisciplinairité nécessite un investissement intellectuel important qui doit associer les mathématiques, la physique, la biologie, les sciences de l'univers, insi que les sciences de l'ingénieur. Je peux vous confirmer que, dans les futures programmes du CNRS, l'électromagnétisme et la radioélectricité occuperont toute la place qui leur est due. Pour terminer, je voudrais remercier l'URSI d'avoir choisi de tenir cette manisfestation en France. Ce choix nous honore. Merci aussi aux organisateurs, à notre collègue Degauque, merci à Madame Liénard d'avoir préparé cette grande réunion. Je voudrais dire à mon collègue et ami Pierre Bauer que c'est une grande satisfaction pour nous de le voir assurer la présidence de l'URSI. Nul

doute que vos travaux seront couronnés de succès. Les domaines que vous abordez sont d'importance; ils touchent à l'environnement, ils touchent à la santé, aux communications et à bien d'autres sujets. Ils touchent en fait à tous nos problèmes de société.

Je formule tous mes voeux de réussite pour les quinze jours pendant lesquels vous allez être réunis ici à Lille, et vous souhaite de profiter agréablement de votre séjour lillois et français.

Reply by the President of URSI

Dr. P. Bauer, President of URSI, subsequently replied as follows :

Monsieur le maire, monsieur le directeur, monsieur le président,

Au nom de l'URSI, permettez moi de vous adresser nos plus vifs remerciements pour vos allocutions de bienvenue. Notre union tient à exprimer toute sa gratitude au Comité national français de radioélectricité scientifique et à l'Académie des sciences, qui nous ont invité à tenir cette 25ème Assemblée Générale ici à Lille.

Le Comité National Français de Radioélectricité Scientifique, ou CNFRS, l'un des premiers membres de l'URSI, a depuis toujours développé des activités dans tous les domaines de la radioélectricité scientifique et a joué un rôle de premier plan au sein de notre Union. Comme vient de le rappeler le Professeur Degauque, il y a maintenant 50 ans que nous ne nous étions plus réunis en France, époque où les noms de Ferrier, d'Abraham, de Mesny et de Jouaux étaient encore frais dans les mémoires. Ces noms resteront pour toujours liés aux premiers pas de l'URSI. Mais il y en a encore parmi nous qui ont connu ces éminentes personnalités que furent Robert Buro, le Père Lejay, Bernard Decaux, Yves Rocard, Pierre Grivet et tant d'autres. A la tête du CNFRS, ils ont tous oeuvré en faveur de la coopération scientifique internationale et grandement contribué au prestige de notre Union. Nous sommes particulièrement heureux de nous retrouver rassemblés dans la métropole du Nord-Pas-de-Calais, dont l'atmosphère d'intenses activité de prospérité a déjà frappé bon nombre de participants. Nous tenons tout particulièrement à remercier le représentant du Sénateur-maire de Lille de sa présence parmi nous.

A reading of the programme of this Assembly shows the great amount of careful work that has gone into its preparation. This involved many people : the Coordinator and Assistant Coordinator of the scientific programme, the Officers of Commissions, the Convenors of the numerous sessions, and the Editors of the two volumes which you have found in your bags. But unless they have been involved personally in the organisational work themselves, participants cannot realise the amount of self-sacrificing labour on the part of the members of the Organising Committees, Prof. Degauque and Dr. Liénard. Before proceeding to the second part of this ceremony I would like to acknowledge the presence here of our Honorary Presidents, Prof. Christiansen and Prof. Gordon. On your behalf I should like to send messages of greetings to Prof. Dieminger and Prof. Stumpers, who were not able to attend this Assembly.

Mr. Duncan Balthasar Kenneth James Milnes, the grandson of Prof. van der Pol, does us the favour of being with us today. He will present the Gold Medal bearing his grandfather's name to this year's laureate.

It is indeed a great pleasure to report that the Peruvian Committee, which some years ago had to move to the associate membership category owing to some financial difficulties, has found it possible to accede again to full membership of our Union. Many

of us still remember the General Assembly held in Lima in 1975, a meeting which may be called historic because of the major decision made there regarding the future of URSI. May I warmly welcome the representative of the Peruvian Committee, Dr. Ron Woodman. Also, I must give a special word of welcome to the representatives of the other international organisations who do us the honour of being with us today : Dr. Michel Petit for the International Council of Scientific Unions; Mr. Réjean Grard for the European Space Agency; Prof. Sandro M. Radicella for the International Centre for Theoretical Physics; Dr. Willem A. Baan for IUCAF; Prof. S. Grzedzielski for COSPAR; Dr. Michel Menvielle for IAGA; Dr. D.R. Lakshmi for ISES (formerly IUWDS). Dr. Kevin Hughes from ITU will join us later and we will be happy to welcome him at the time. Again many thanks to our generous hosts. I now declare the 25th General Assembly of URSI open. Thank you.

Prof. Bauer then took the chair to preside over the second part of the Opening Meeting. He first gave the floor to the Secretary General, and thereafter to Prof. Matsumoto for a short introduction about the scientific programme of this assembly.

Report of the Secretary General

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.

URSI sponsored 78 meetings in 1993-1996. For 13 of those meetings, such as the triennial Symposium on Electromagnetic Theory, the initiative belongs to URSI, while the other meetings are co-sponsored by URSI. URSI undoubtedly has a debt of gratitude towards those of our colleagues who devoted so much time and energy to the organisation of those meetings, and who by doing so allowed the radioscience community to further prosper and develop.

Mesdames et messieurs,

Permettez-moi de m'attarder quelques instants sur le symposium organisé à Bruxelles en avril de l'année passée pour marquer le soixante quinzième anniversaire de l'URSI. Durant deux jours, treize contributions, toutes de très haut niveau scientifique ont brossé un tableau impressionant des divers aspects de la radio-électricité, et plus particulièrement des applications à l'Espace. La séance d'ouverture, honoré de la présence de sa Majesté le Roi des Belges, connut un vif succès et fut l'occasion de retracer l'histoire de l'URSI au sein du développement phénoménal qu'a connu la radioélectricité au cours de ce siècle. Je tiens à remercier le Comité belge qui a su organiser cette manifestation avec éclat et trouver les supports financiers nécessaires. Je voudrais aussi remercier plus particulièrement le Professeur Delogne qui entant que président du comité du programme, a grandement contribué à rassembler des contributions scientifiques interessantes et de grande valeur.

Les publications de l'URSI composent deux volets. Le volet "livres" est constitué essentiellement des deux volumes que nous venons tous de recevoir: la "Review of Radio Science" et le "Modern Radio Science". Ce dernier volume, édité par Monsieur Joël Hamelin, rassemble les textes des Conférences générales et des Exposés synthétiques des Commissions. Pour la deuxième fois consécutive Monsieur W. Ross Stone a pris sur lui la

lourde tâche d'éditer la "Review of Radio Science". La coordination des contributions provenant de toutes les commissions, et couvrant un domaine scientifique très étendu et multi-disciplinaire, est sans aucun doute une tâche complexe que Ross Stone est de nouveau parvenu à mener à bien, comme la fois précédente. Ces deux livres sont publiés par Oxford University Press, ce qui leur assure une présentation professionelle et une distribution efficace. Il est aussi important de mentionner que la seconde édition du "Handbook on Radiopropagation related to Satellite Communications in Tropical and Subtropical Countries", vient tout juste de paraître. Je tiens a remercier les professeurs Ajayi, Feng, Radicella et Reddy pour ce travail important, effectué sous l'égide de l'UNESCO, de l'International Centre for Theoretical Physics et de l'URSI.

Ladies and Gentlemen,

I just mentioned the special Symposium which was very successfully organised at the occasion of the 75th anniversary of URSI and I also discussed the two books "The Review of Radio Science" and "Modern Radio Science" which we all received at the registration.

The second part of the publishing activities of URSI consists of our quarterly magazine "The Radio Science Bulletin". You may recall that three years ago, at the Kyoto General Assembly, it was decided to try to merge the "Bulletin", which concentrated on administrative matters and 'The Radioscientist", originally conceived, launched and edited by Prof. Richard L. Dowden. The different traditions and purposes of those two publications, and the requirement to strictly limit the budgetary impact of the new publication, made the merger a complex and arduous task. Luckily URSI could count on the untiring effort and enthusiasm of Prof. Dowden to help us through the very difficult merging period . The Radio Science Bulletin is <u>your</u> magazine. Please let us know your opinion and your suggestions for improving its contents and presentation. We also warmly welcome your contributions, especially papers synthesising issues so as to make them interesting to the URSI scientific community at large. Currently the Radio Science Bulletin is directly air mailed to 2109 URSI correspondents. In addition 698 copies are mailed, in bulk form, to those Member Committees which prefer to distribute the Bulletin themselves to their local URSI community.

In a period when the Internet and the World Wide Web are rapidly becoming the backbone of the information society, URSI could certainly not stay on the sidelines. Our Union now has a home page on the Web containing a brief overview describing the history of the Union, its membership structure , its network of correspondents, its statutes, its scientific activities - including commission meetings, conferences and General Assemblies - and its publications. We look forward to receiving suggestions from you on how this new medium could be used to increase the scientific interaction between radioscientists from all over the world.

Thanks to the careful and prudent management of our treasurer, Prof. Peter J.B. Clarricoats, the URSI finances have remained quite healthy during the last triennium. This is no small achievement if one takes into account that the unit contribution of the Member Committees has remained constant since many years, that the budgets of the commissions for scientific activities have been raised substantially in this triennium, that URSI now publishes a quarterly with a much increased circulation and direct mailing and last but not least that URSI has continued its strong commitment to the Young Scientist programme. This was only possible by a very careful and sustained effort in cost cutting on all administrative activities.

May I conclude Mr. President, by saying that having passed its 75th anniversary, URSI seems in excellent shape to further flourish towards its 100th birthday.

Presidential Address

Dr. P. Bauer

Messieurs les présidents, messieurs les directeurs, chers collègues, mesdames et messieurs. C'est à la fois un honheur et un plaisir pour moi d'assurer la présidence de la 25ème Assemblée Générale de l'URSI à Lille, 50 ans après la dernière (et la seule) qui ait eu lieu en France, la première d'après guerre, en 1946.

It is both an honour and a pleasure for me to open this 25th General Assembly of URSI in Lille, 50 years after the last and only one held in France, namely the first post-war Assembly of 1946.

As you know, the General Assembly is convened every third year for the purposes of reviewing the developments that have taken place during the past triennium in the many fields of radio science, and of exploring the lines of research to be pursued in the future. Another objective has been added about 20 years ago : to allow everyone interested in radio science, whether or not from a country adhering to the Union, to participate in our work and activities, and to present the results of his own research. I should like to welcome particularly those of you who may perhaps be attending an URSI Assembly for the first time.

In my opinion, one of the most attractive features of our meetings is the opportunity to share the spirit of enquiry and research, as well as what is perhaps the sheerest of pleasures, that of discovery and knowledge.

I have already extended a warm welcome to the representatives of the many other scientific Organisations with which URSI works in a variety of ways and on a wide range of programmes.

Before trying to make a broad survey of the activities of URSI during the last three years, I have the sad duty to record the death of colleagues who have been strongly associated with our Union. Unfortunately our losses have been very heavy during the last period. Sir Granville Beynon, one of our Honorary Presidents; Prof. Takanori Okoshi, Vice-President of the Union; Prof. Hendrik Bremmer, the close collaborator of Prof. van der Pol, and many other friends and colleagues have left us.

- In 1981 the title of Honorary President was conferred on Sir Granville Beynon in view of his many contributions to the field of ionospheric research and the outstanding services he had given to the Union. Granville Beynon joined the National Physical Laboratory at Slough in 1937, and became the principal assistant of Prof. (later Sir) Edward Appleton, elected President of URSI in 1938. This set the scene for Beynon's future direction of research, and started a collaboration which continued until Appleton's death in 1965. In 1946, Granville Beynon returned to the University of Wales where he remained for the rest of his working life. He became involved with URSI affairs after the end of World War II and held various offices within the Union. Recognising his vast experience and expertise in the field of ionospheric physics, he was appointed by ICSU in 1964, as President of an ambitious project called "International Quiet Sun Years". He had been elected Vice-President of URSI in 1966, and President in 1972. We shall recall his friendliness and sense of humour, as well as the efficient way in which he conducted many of our meetings.

- Prof. Takanori Okoshi, who was elected Vice-President of our Union in 1990, passed away in 1994, at the age of 62. His research covered a wide range of topics relating to radio waves, ranging from the microwave region to optical frequencies. In the 1970's he

developed a number of new methods for analysing fiber propagation characteristics and for measuring fiber refractive index profiles as well as a computer-oriented method for synthesising the optimum refractive index profile. In 1979 he initiated research on coherent optical fiber communications. He also devised and developed a variety of novel fiber structures, polarisation-control techniques, and polarisation-independent receiving techniques. Prof. Okoshi was elected Vice-Chairman of Commission D in 1984, and Chairman of the Commission in 1987. As Chairman of the Organisation Committee for the 24th General Assembly in Kyoto, he did not spare any effort to make the meeting a memorable success. We shall treasure the memory of Prof. Okoshi, not only because he was a great scientist, but also because of his exceptional human qualities and his talent in many various fields, including music and architecture.

- Prof. Hendrik Bremmer was well known in URSI circles for his many outstanding contributions to radio science. In 1937, together with Prof. van der Pol, he developed a theory of propagation of electromagnetic waves round the Earth in terms of a diffraction problem of waves produced by a dipole near the surface of a sphere, dielectric and conducting. Again with Prof. van der Pol, he produced in 1950 a high-level mathematical treatise in which the modern form of calculus based on the two-sided Laplace integral was introduced.

We also mourn the death of :
- Prof. Kimpara, a past Chairman of the Commission on Atmospherics,
- Dr. Likhter, past Chairman of Commission E,
- Prof. Matthews, past Chairman of Commission C,
- Prof. Spaulding, Chairman of Commission E Working Group on Man-made Noise.

In addition to these former office-bearers in the Union, we lost a number of radio scientists who were active in URSI and have made great contributions to our science :
- Hannes Alfvén, Nobel Laureate (from Sweden)
- Dr. Bolton (from Australia)
- Prof. Carrara (from Italy)
- Prof. El-Sayed (from Egypt)
- Prof. Fedorov (from Belarus)
- Dr. Gringauz (from Russia)
- Prof. David Ryan (from Ireland)
- Prof. Siforov (from Russia)
- Dr. Trosky (from Russia)
- Dr. Unwin (from New Zealand)
- Dr. Woolliscroft (from the UK)
- Dr. J. Vickrey (from the USA)

May I ask you to stand in silence for a minute in memory of those who are no longer with us.

CENTENARY OF RADIO

I believe I do not need remind the audience that this year marks the centenary of radio. At the end of the past century, research was progressing simultaneously in several countries, benefiting from earlier work of scientists whose names are well known to all of us : Fresnel, Maxwell, Heaviside, Kennelly, Lorentz, Tesla, De Forest, Fessenden and others. But one might wonder who invented radio : Hertz, Branly, Lodge, Popov (all renowned scientists) or Marconi, the ingenious young Italian engineer. With the aim of developing wireless telegraphy, Marconi had investigated the factors influencing the efficiency of transmission

and reception of signals, such as aerial height, the earthing of one side of the spark gap, and different forms of coherer. In 1896, he achieved transmission over a distance of several hundred metres, using Hertz's spark gap, Popov's antenna and Branly's coherer.

In June the same year, Marconi took out in London his first patent for a practical wireless telegraphy system by means of electrical waves. Two years later, he made an experiment to show that France and Britain could be linked together across the English Channel, a distance of 46 km. The reason why special mention is made of that first liaison is that the station on mainland was located at Wimereux, about 100 km from our gathering place, Lille. Moreover, General Ferrié, who was to be elected in 1919 as Founder President of our Union, had joined the small group of French observers during that experiment.

According to available documents, Marconi was known for his modesty, and he used every occasion to reaffirm his debt of gratitude to those scientists whose work had allowed him to succeed. Indeed, when one tries to follow, as closely as historical documents permit, the slow but continuous development of modern radio technology, one is impressed by the extraordinary coherence of the effort devoted to research.

I just referred to the centenary of radio. This leads me to another anniversary : the 75th anniversary of the foundation of our Union.

75th ANNIVERSARY OF URSI

In early 1994, it was decided to Organise a two-day Symposium to mark that date, and it was agreed to put the emphasis on a central theme of interest to all URSI Commissions : Space and Radio Science. The Symposium was held in April 1995 at the Academy House in Brussels.

The first part of the ceremony was honoured by the presence of His Majesty King Albert the Second of Belgians. The Belgian Organising Committee was chaired by Prof. Van Bladel, past Secretary General of our Union. Under the chairmanship of Prof. Delogne, the International Committee for the scientific programme selected a number of topics providing a good balance between the fields covered by the Commissions, and invited eminent specialists to accept the heavy task of preparing oral and written contributions. During the sessions we had the good fortune of listening to particularly exciting talks, ranging from Global satellite navigation systems to Cold atoms and Microgravity clocks.

On behalf of the Union, it is my pleasant duty to express once again our warmest thanks to all those who contributed to the success of that celebration, and also to those Member Committees which found it possible to send representatives to Brussels.

YOUNG SCIENTISTS PROGRAMME

The Young Scientists Programme, initiated as early as 1969, involves activities both at General Assemblies and at Scientific Meetings sponsored by URSI. This programme has developed into one of the most successful ventures of URSI, with a two-fold objective : bring to the Union fresh ideas and the idealism of young people, and help advance science in developing countries by making it possible for young scientists from these regions to participate in our meetings.

At this Assembly, the number of young scientists attending under that scheme is about 120, and I wish to welcome them most cordially. You will be interested to know that each of them will present a paper in a regular session of our Commissions.

The living expenses of these young colleagues here in Lille are being provided by our French hosts, and we thank them most warmly for their generosity. The support for the

travel expenses of some of the awardees, especially those from developing countries or countries in a difficult economic situation, comes from funds provided by the ICSU Committee on Science and Technology in Developing Countries, the Japanese URSI Committee, the Commonwealth Science Council, the Royal Society, by the European Union and the European Space Agency. In addition, the Board of Officers decided to allocate the whole of the UNESCO/ICSU subvention to the Young Scientists Programme. To those Organisations, may I express our warmest thanks for their contributions to the future careers of our young colleagues.

In order to honour the memory of their eminent members, the Indian and USA URSI Committees have instituted special fellowships for young scientists, under the respective names of J.S. Bose, S.K. Mitra and H.G. Booker. May I ask the Young Scientists to rise !

YOUNG SCIENTIST COMPETITION

I cannot leave the subject of young scientists without pointing to an initiative of the French, Belgian and Swiss URSI Committees. They have organised a competition involving French-speaking students of secondary schools, universities and engineering schools, who were invited to submit original projects in the fields covered by URSI. The groups of young people which were selected will present their achievements in a special session devoted to initiatives aiming at stimulating the interest of young students in Radio science. Prizes will be awarded to the best projects on that occasion.

NETWORK OF CORRESPONDENTS

As you know, the members of the Union are the Committees established by Academies of Sciences or similar Institutions. Although most of the Committees maintain contacts with the radio scientists in their respective territories and organise technical activities, for many years URSI has been seeking ways to associate more closely individuals with the Union and to keep them informed directly of its activities, especially in territories where these is no Member Committee. As a first step, the Council resolved in 1990 to create a Network of Correspondents and adopted a set of rules to that effect. These rules have been slightly modified in 1993, and it is my pleasure to report that we have now more than 2000 Correspondents all over the world.

INTER UNION COOPERATION

As we know, radio waves do not recognise national frontiers and, in a somewhat similar way, the pursuit of radio science leads us into other scientific fields. Furthermore, the boundaries between the sciences are becoming more and more fluid. Many URSI scientists are also involved in other international scientific Organisations dealing with a variety of domains such as the study of the earth environment, astronomy, precise measurements, biology and medicine, signal processing, etc. Here URSI acts as an attractive force for all those concerned with "electromagnetism one way or another. In some cases, no formal structures are given to the cooperation with scientists working in other disciplines. In other cases, URSI is represented officially on various bodies of the ICSU family, such as the Committee on Space Research, the Scientific Committee on Solar-Terrestrial Physics or the International Geosphere-Biosphere Programme. Moreover, Inter-Union Commissions or Inter-Union Working Groups are established to coordinate efforts in given fields as, for example, the protection of frequencies allocated to radio astronomy and space research, remote sensing of the ionosphere and magnetosphere, or adverse environmental impacts on astronomy. A recent example of such interaction is the proposal to establish closer links between our Commission D and the International Commission on Optics.

U.N. ORGANISATIONS

Regarding our relations with agencies of the U.N. system, I may say that our long-standing and friendly cooperation with the International Telecommunication Union has been maintained through our Scientific Committee on Telecommunication, and through the series of symposia called COMMSPHERE. These scientists, engineers, experts and administrators meet for discussions of the future of telecommunications and other usages of the electromagnetic radiation in view of the growing congestion of the spectrum.

On the other hand, it would seem desirable for URSI to take some action with the purpose of re-establishing closer links with the World Meteorological Organisation, with which URSI has had a consultative status since 1954. And our Union should perhaps offer the expertise of its Commission on Electromagnetics in Biology and Medicine to the World Health Organisation. Last, but not least, I am pleased to acknowledge the continued support provided to our Union by UNESCO, through the International Council of Scientific Unions.

SCIENTIFIC DEVELOPMENTS

One aspect of URSI which, year after year, remains its particular strength is the interdisciplinary nature of the scientific fields it covers. Indeed breakthroughs in metrology-clocks, precise positioning, in fiber components, optical devices, quantum electronics in systems for antennas, telecommunications and signals processing, lay the ground for new advances in the observation of the Earth and the and the Universe. Altimetric measurements have opened new avenues for monitoring the Oceans at centimetre level, thus offering better insight into the slow raise of the Ocean level, the currents distribution or the prediction of "El nino" phenomena. Similarly, synthetic aperture radar interferometry now allows the detection, at centimetre level, of changes in the Earth topography induced by earthquakes or changes in the diameters of volcanoes following eruptions... A new tool has just become available to the ionospheric and magnetospheric plasma community : the Svalbard incoherent scatter radar inaugurated last week in Spitzbergen. On the other hand, very long baseline interferometry from space is to become a reality this year.

The second aspect of our field of science, which is growing in importance is related to the societal impact of new techniques. Here, URSI has a role to play in some aspects of the monitoring of the environment. For example, the rapid growth of communications systems in space, intersatellites or with fixed and mobile systems, creates great concerns regarding accessibility, for scientific purposes to the frequency spectrum, in particular above 1 GHz, where the situation is deteriorating rapidly. And unfortunately, things have been difficult for quite a long-time with respect to frequencies below 1 GHz. URSI scientists can act on two planes : on the one hand, in improving the spectrum management with appropriate modulation schemes and, on the other hand, in expressing strongly, together with their colleagues in other Unions, the need to protect parts of the frequency spectrum for the well being of mankind.

Another example relates to both the mobile systems and computers [ELF modulation] and their effects on human health. This topic lies in the purview of our Commission on Electromagnetics in Biology and Medicine.

AWARDS TO URSI PERSONALITIES

In a moment, I shall ask Prof. Jull to chair the URSI Awards ceremony. However, it is really not unexpected that, from time to time, one or another of our distinguished colleagues should receive further international recognition and, on this occasion, it is indeed a great pleasure for me to record that, in 1993, the Nobel Prize for Physics was awarded to Prof.

Joseph Taylor and his former graduate student Russel Hulst from Princeton. According to the words of the Nobel Prize Committee, the Prize was awarded for the discovery of a binary pulsar which "has opened up new possibilities for the study of gravitation". It is my privilege to welcome Prof. Taylor and to announce that he has kindly accepted to deliver a lecture on "Radio Science, Pulsar and Relativity". This will take place on 3 September, and I am sure we shall be delighted to listen to his presentation

Further, Dr. Richard Moore, Chairman of our Commission F, was awarded the Australia Prize for his "pioneering achievements in radar remote sensing of the land and oceans, from air and space platforms.

Our past Secretary General, Prof. Van Bladel was presented with the 1995 IEEE Heinrich Hertz Medal for major contributions in fundamental electromagnetic theory and applications to electrical engineering.

The 1944 the von Karman Medal was awarded to Dr. Albrecht, one of our past Vice-Presidents for his contributions to wave propagation and telecommunications, the characteristics of propagation media and the aerospace environment.

Prof. Clarricoats was appointed CBE by the Queen of England and received his award in July of this year.

CONCLUSION

May I conclude by repeating, quoting Prof. Christiansen's words "URSI is always flowing over its previous boundaries" and by adding that our Union is facing new challenges in a world of global change, filled with man-made electromagnetic waves both in the sky and in our day-to-day environment.

J'espère que le programme scientifique, qui va vous être présenté par le professeur Matsumoto, qui en est le coordinateur, suscitera votre enthousiasme et stimulera votre curiosité scientifique.

Report on the Scientific Programme

Prof. H. Matsumoto

Mr. President, Honorary URSI Presidents, Distinguished Guests, Ladies and Gentlemen, mesdames et messieurs, it is a great pleasure to welcome you to the scientific activities of URSI at this General Assembly.

Following decisions made in 1975, our General Assemblies are now open to full participation by everyone interested and therefore, in most cases, our scientific sessions are based on Calls for Papers. The Coordinating Committee of URSI met, as it had in the past, at the mid-point of the three-year period between Assemblies to set plans for the present event, thus having the opportunity to assess the various fields of research and see the interconnections among the many areas of radio science. Prior to that meeting, the Chairmen of our Commissions had already established lists of topics to be dealt with in the various sessions, and invited renowned experts to act as conveners. Subsequently, Call for Papers were widely circulated together with the First Announcement issued by the French Organising Committee.

I am happy to report that, at this General Assembly, some 1,500 papers will be presented, either as oral papers, invited and contributed, or as poster papers. I would like to take this opportunity to announce that poster papers can be placed on poster boards from today until the end of our General Assembly. We have ahead of us more than a hundred scientific sessions arranged, either by a single Commission, or jointly by two or more Commissions on subjects of mutual interest. Great care has been taken to avoid, as far as possible, holding sessions in parallel, the topics of which could prove more or less overlapping. In addition, our programme includes three general lectures - one of which has just been delivered by Dr. Raney - and ten tutorials arranged by our ten Commissions. The Aim is to keep all participants informed of the state-of-the-art in the various areas of Radio Science. We tried to schedule these lectures in such a way as to allow all those interested to attend. Further, as already announced by the President, we will be fortunate enough to listen to a special guest lecture by Prof. J. H. Taylor, Noble Prize Laureate on the 3rd September, next week.

It is inevitable that some changes should occur in the detailed programme of the sessions: These will be announced in due course by the Chairmen of our Commissions.

The Secretary General has already reported on the symposia organised by our Commissions over the past three years. As for me, I would like to point to one of the key aspects of the General Assembly. It brings together all our ten Commissions, thus providing a unique opportunity for a grater exchange of ideas and more intensive interactions. Such trend, which has always been encouraged, has increased over the years, and you will note that about 30 joint sessions are included in our programme. One of them, which some of you may already have attended this morning, is rather special in that it has been organised jointly by our Commission on Electronics and Photonics and the International Commission on Optics, one of the affiliated Commissions of the International Union on Pure and Applied Physics. We shall follow with interest the development of this new cooperative effort.

The mechanics of arrangements is, of course, essential to the success of a scientific programme as ambitious as the one which we have in hand. This requires an extraordinary measure of service on the part of everyone involved. In my capacity as Coordinator of the scientific programme, may I express my deep appreciation to Dr. Hamelin, the Associate Coordinator, to the Chairmen and Vice-Chairmen of our Commissions, to the conveners of the scientific sessions and, of course, to all of you who came to Lille to present the most recent results of your research, and last but not least, to the French Organising Committees for their devoted and untiring efforts in support of our programme.

Radio Science provides very fascinating topics and problems for scientists and engineers, for theoreticians and experimentalists. I wish you all a most fruitful and successful meeting here in Lille.

Finally, again welcome to our scientific activities, which are the core and heart of our Union, URSI.

Thank you, merci beaucoup, and Arigato in my language.

Awards Ceremony

The presentation of the Awards took place right after the Opening Ceremony, under the chairmanship of Past President E.V. Jull, Chair of the Awards Panel.

Presentation of the Balthasar van der Pol Gold Medal

Mr. Duncan Balthasar Kenneth James-Milnes, a Grandson of Prof. Balthasar Van der Pol presented the Van der Pol Gold medal at this General Assembly. He gave some background information on his grandfather.

I was deeply honoured and proud earlier this year when I received a letter from Prof. Jull, who is Chairman of the U.R.S.I. awards panel, inviting me to present the Gold Medal initiated by my Grandmother in 1963 and dedicated to the memory of my Grandfather, Balthasar van der Pol. I am here as a representative of the family, in particular my mother, Irene, who was very disappointed not to be able to come due to my father's ill health.

I understand that it is traditional to present a short history of the person after whom the award is named so I have not only put together an outline of his distinguished career but also a few glimpses of the man himself from the family perspective.

My grandfather, who was born in Utrecht on 27th January 1889 and died in his home in Wassenaar, Holland, on 6th October 1959, was, during his lifetime, a man of many parts. He was a well known authority on pure and applied mathematics, a philosopher, a pioneer in natural sciences, a musician and composer and a personality of international renown in telecommunications.

During the First World War, he was for some years assistant to Sir J.A. Fleming in London and Sir J.J. Thomson in Cambridge. In 1919, he was awarded the degree of Doctor of Physics from the University of Utrecht and, after a period as assistant to H.A. Lorentz in Haarlem, he was associated with the Philips Laboratories in Eindhoven, where he became Director of Research. In 1938, he received the title of Prof. at the T echnische Hoogeschool in Delft and in 1945 he was, in addition, appointed Rector of the temporary University of Eindhoven.

After his retirement in 1949, he devoted himself, above all, to international activities, having accepted his election as Director of the International Radio Consultative Committee (C.C.I.R.), during its fifth Plenary Assembly in Stockholm in 1948. The C.C.I.R was, at that time, a permanent organ of the International Telecommunication Union (I.T.U.) and he dedicated himself to the service of this organisation, which was responsible, on a world-wide scale, for the preparation of scientific recommendations concerning communications of all types effected by the use of electromagnetic wave propagation.

From the purely scientific aspect, the predominating characteristic of his genius was a wide and comprehensive understanding of mathematical problems. For example, his extension of the theory of non linear oscillations in relaxation systems led to the construction of models which demonstrate the functions of the human heart under various conditions. It is well known that the basic non linear differential equation was called the van der Pol Equation and that his name is also closely linked with the development of the basic theory of frequency modulation. His development, assisted by K.F. Niessen, of the theories of J.R. Carson concerning the modification of Oliver Heaviside's operational calculus, led to a remarkable progress in the use of mathematical methods. My grandfather was impressed by the extraordinary work and character of Heaviside to such an extent that, on the occasion of his appointment as Prof. of the Technische Hoogeschool in Delft, he took the introduction of this solitary but celebrated man as the theme of his Prof.ial address.

He was also stimulated by Sommerfeld's enunciation of the problems of electric wave propagation and he undertook new studies in that area, first assisted by K.F. Niessen, then in collaboration with H. Bremmer. These studies were so successful that they permitted the calculation of field strength at any distance over the surface of the earth. The construction of this theory led, by analogy, to the solution of the problem of the rainbow.

He was also a member of the Royal Netherlands Academy of Sciences, correspondent of the Academy of Sciences in Paris, Honorary Doctor of the Warsaw Polytechnic and Honorary Doctor of the University of Geneva. He received the Medal of Honour of the I.R.E., the Poulsen Medal of the Danish Academy of Technical Science and was, for many years, an active and honoured member and, ultimately, honorary President of the Union Radio Scientifique Internationale (U.R.S.I.).

In his letter of invitation, Prof. Jull suggested that I might be in a different position to most of you here in the way in which I addressed Prof. Doctor Balthasar van der Pol. It was a title in which he took a great deal of pleasure; it was, of course, "Opa".

From the time I was born until my Grandfather's death, we lived right next door to each other in Wassenaar and in houses designed and built by my father. This privileged geographical position meant that I was able to destroy his concentration, even totally, on many occasions. However, all I can recall is a slow and purposeful bowing of the head and a pair of warm blue eyes peering over the top of a large pair of glasses doing their utmost to be stern but, it has to be said, failing miserably to do so.

Not only was his stature imposing (he was well over six foot) but his sense of humour was also immense. Any of you who might have had the good fortune to have met his son, also called Balthasar van der Pol, would be well aware that this wonderful man's father must have had a great deal of warmth coupled with a well developed sense of fun.

When Opa heard either me or my sister nearby, he would often emerge from his desk with that same way of looking over his glasses but, on these occasions, his eyes would be filled with total confusion. He would be holding an envelope in one hand and a stamp in the other. Then, this man, whose genius was recognised across many continents, would say "What do I do with these?" Some genius! Do you know, it was years after his death that I realised finally just how many times my sister and I fell for that one.

My mother recalls how infuriating it could be to have such a talented father. All three of the children did their best to learn to play the piano. Unfortunately, my Grandfather had "perfect pitch" and could shout down from upstairs not only that the wrong note had been struck but precisely which note it should have been.

But teasing did not always go his way. As a joke, when my Aunty Dora was about ten, my Grandfather asked her if she knew if there were any dirty words in the dictionary. Indignant, Aunty Dora told him she would never look for such a thing. Miraculously, however, she was able to assure him that there was none.

Sadly, my grandfather died when I was still a little boy and, although proud of his achievements, I most remember and miss the man, my Opa; a hard act to follow in every way.

When I was invited to come here today, I asked if it would be possible to have some information about the winner of the award. I was impressed by how full his career has been and how much he had achieved. But, what caught my eye in particular was a paragraph from the letter of nomination written by Prof. Susan Avery from the University of Colorado. It contained the following paragraph which I quote:

"As an indication of Prof. Harrington's influence on all of us in fields and waves, a distinguished scientist once told me the following anecdote. It seems that when he begins a new research problem, he clears his desk of all papers and books so that he can begin fresh and without clutter. Three days later, when he views his desk, it contains his work notes, two handbooks with his favourite integrals and special functions and his copy of Harrington's book Time-Harmonic Electromagnetic Fields. This is not an unusual story. His admirers are legion and his distinguished reputation richly deserved." I feel sure you will all agree that this is a powerful testimonial.

It is, therefore, with the greatest of pleasure and respect that I present the Balthasar van der Pol Gold Medal for "Contributions to electromagnetics and the development of the method of moments" to Prof. Roger Harrington.

Reply by Prof. Roger F. Harrington

I am honoured by your recognition of my work. It is very gratifying to be chosen from all the well-qualified workers in the field of radio science. I have worked in this field for many years and have enjoyed every moment of it.

I will use this opportunity to give a short history from my viewpoint of the origin and development of the method of moments for field computation. The basic idea of taking a linear functional equation and representing it by a linear matrix equation is relatively old. Galerkin, a Russian mechanical engineer, developed his method around 1915, before it had a firm mathematical basis. Quantum mechanics, developed in the 1920s, used many of the ideas of linear spaces and their extension to Hilbert spaces. However, before the advent of the high-speed computer, these methods were not popular because of the tedious computation required for their use. They were often thought of as last resort numerical methods, to be used if everything else failed. In truth, however, they are not more numerical than other so-called analytical methods, at least if used properly. They merely emphasise a different aspect of mathematics - that of linear spaces and orthogonal projections.

In the mid 1960s several researchers started solving the electromagnetic field equations by numerical methods. Mei and Van Bladel used a subsectional and point-matching method to compute the scattering from rectangular cylinders. The accuracy obtained from these numerical solutions was impressive, but, being brought up on variational solutions, I thought that even greater accuracy could be obtained by the latter method. I had been taught that "a parameter could be calculated correct to the second order if a function correct to the first order is used in a stationary formula." Hence, if I used a numerical

solution for the current in a stationary formula for the scattered field, I should get an order of magnitude higher accuracy for it than obtainable from a numerical solution. Or so I thought. I tried it for the simple case of scattering from a cylinder, and to my surprise I got exactly the same answer as obtained from the numerical solution.

Also during the early 1960s I was teaching a course on the use of linear spaces for applied mathematics, using Friedman's book. When it became available in the English translation, I also studied the Russian book by Kantorovich and Krylov. It became apparent to me that Galerkin's method was formally equivalent to the Rayleigh-Ritz variational method, and also to Rumsey's reaction concept. But the numerical method being used by researchers in electromagnetic theory was not really Galerkin's method. They used apparently cruder methods, such as subsectional expansion and point matching. Were these also variational methods?

The answer was yes, at least in concept. There was no good reason why one had to choose expansion and testing functions the same, as was done in both Galerkin's method and in the Rayleigh-Ritz variational method. It was easier to prove mathematical theorems when they were the same, but it made solutions more difficult to calculate. One was really free to choose expansion and testing functions separately for computational convenience, and still claim that the solution was stationary in form. Next came the question as to what to call the general method. Certainly others had used it in the past, and I didn't want to introduce new jargon. After a search of the literature, I decided that the exposition most closely analogous to what I was using was that given by Kantorovich and Akilov. They called it the "method of moments," and hence that is the name I chose.

I and my co-worker Dr. Joseph Mautz have been using this method for many years for many problems. Most of my graduate students have used the method in their Ph.D. dissertations. Many of my professional colleagues have used it in their work. Whole sessions on the method of moments have been scheduled for technical symposia. I am proud to have been instrumental in developing and popularising this powerful method.

Presentation of the John Howard Dellinger Gold Medal

Prof. David C. Chang, President of the URSI Committee in the United States of America, gave a short introductory speech :

The Dellinger Award was established in 1964 in honour of the memory of former URSI Vice-President and Honorary President, John Howard Dellinger. Dr. Dellinger was an eminent U.S. radio scientist who devoted his career to science in public service as a leading figure in the U.S. National Bureau of Standards.

The Dellinger Medal is presented triennially to a scientist who has distinguished himself or herself in an area of radio science within the purview of the Ten Commissions of URSI.

The 1996 recipient of the Dellinger Medal is Dr. Tomohiro Oguchi, "For theoretical work on the polarisation effects of non-spherical raindrops and the multiple scattering effects of hydrometeors."

On behalf of the United States National Committee for URSI, I take pleasure in presenting to you, Dr. Oguchi, the Dellinger Gold Medal and this certificate proclaiming you the awardee. Congratulations!

Reply by Dr. Tomohiro Oguchi

I am greatly honoured to receive the 11th John Howard Dellinger Gold Medal, and I want to thank the URSI Board of Officers for the recognition of my work which is in a little known branch of radio science.

Dr. Dellinger's prominent contributions to both the study of ionospheric propagation and the development of URSI were well known to me, because a very large number of people were concerned with ionospheric physics and ionospheric propagation when I joined the Radio Research Laboratory, which is presently the Communications Research Laboratory, in 1956. Although my specific research field is the propagation of microwaves and millimetre waves in rain, and my contribution is limited compared with Dr. Dellinger's many highly significant contributions, I feel very honoured in receiving the medal that bears his name since, in a broad sense, I am in the same research field of radiowave propagation.

During the course of my research, I have been influenced by and have benefited from valuable personal interactions with many scientists, including my supervisors and colleagues at the Communications Research Laboratory and those at the Commission F Meetings of the Japanese URSI Committee. I would like to extend my heartfelt gratitude to those people on this occasion. Unfortunately, they are too numerous to be named here. Nevertheless, if I were to be asked to mention the name of one person, that would no doubt be Prof. Sogo Okamura, who has continuously been involved in various matters of our Union, and was Vice President of the URSI from 1981 to 1987. When I joined the Millimetre Wave Research Section of the Radio Research Laboratory as an inexperienced young staff member, he served concurrently as Chief of that section, in addition to his Professorship at Tokyo University. He persuaded me to do research on the effects of rain on the propagation of millimetre waves. This has given me strong motivation and direction in my research until the present day. It gives me very great pleasure that Prof. and Mrs. Okamura have been able to attend this Award Ceremony in person.

My first experience of attending an URSI General Assembly was the Tokyo General Assembly in 1963. It was an exciting experience for a novice in the scientific community. From about 1973, I have had the opportunity of attending the General Assemblies and Commission F Open Symposia of the Union. Nothing is more important to me in the development of my research than free discussions which have allowed me to become acquainted with many excellent scientists from various countries. I wish to express my sincere gratitude to those scientists in accepting the Dellinger Gold Medal. Thank you very much.

Presentation of the Appleton Prize

The Appleton Prize was presented by Prof. T.B. Jones, President of the URSI Committee in the United Kingdom (U.K. Panel for URSI). He made the following comments :

The Appleton Prize is awarded to a distinguished scientist in the field of Ionospheric Physics by the Council of the Royal Society on the recommendation of the Board of Officers of URSI. The Prize commemorates the life and work of Sir Edward Appleton who was a former President of URSI and who received the Nobel Prize for his work in Ionospheric Physics and Radio Propagation.

The present recipient, Prof. Don Farley, is well known for his pioneering work on radar studies of the ionospheric and the underlying plasma physics necessary to interpret these observations. He was a student of Henry Booker, who was himself a student of Sir Edward Appleton. It was during a visit to Cambridge, where Sir Edward once held the chair, that Don Farley developed the correct plasma kinetic theory to account for the then newly discovered phenomena of incoherent radar backscatter. It was through this pioneering work that the incoherent backscatter technique has now become the most powerful radio method for studying the ionosphere and the magnetosphere.

Prof. Farley has contributed in many areas of radio science, for example: his long association with the incoherent scatter facility at Jicamarca, Peru; his work at Cornell on plasma theory, including the well known Farley-Buneman instability; and the application of coherent radars for observing auroral and equatorial zone irregularities.

Prof. Farley has made major contributions both to the experimental and the theoretical study of the ionosphere, thus continuing the tradition established by Sir Edward Appleton.

The citation for his award reads : "For contributions to the development of the incoherent scatter radar technique and to radar studies of ionospheric plasma instabilities."

Reply by Prof. Don T. Farley

I am enormously honoured and pleased to receive the Appleton Prize. I had the great good luck to be present when the incoherent scatter radar technique was first conceived. I was a graduate student at Cornell in 1958 and was one of the 10 - 15 people who heard Bill Gordon's first small colloquium on the subject. A few months later, Ken Bowles, an ex-Cornellian, made the first successful incoherent scatter observations in Illinois, and these indicated that the scatter was more complex than originally thought by Gordon ; the ions somehow controlled the Doppler shifts even though the electrons did the actual scattering.

In 1959 I went off for a post-doctoral year at Cambridge University, at the Cavendish Laboratory, where I met Jack Ratcliffe, Tony Hewish, Martin Ryle, Ken Budden, Philip Clemmow, and Basil Briggs, among others. I also met John Doughterty, a very talented senior graduate student at the time, and he and I tried to learn some plasma physics and think about Bowles' results. We managed to work out a proper theory of the scattering process, as did several others at about the same time. It was exiting to be at the cutting edge of a new field when we were still in our twenties.

During the following year, spent in Sweden on another postdoc, I met Ken Bowles at a conference. He was building a huge incoherent scatter radar in Peru, and asked if I would like to join him. Why not, I thought! I was enjoying seeing the world, and I thought Peru sounded like an exotic place to go - which it was and is - and it would be fun to see this scattering first hand. So off I went with my wife Jennie and our two small children for what turned out to be six fascinating years at the Jicamarca Radio Observatory. Bowles taught me about the real world of experimental radar, especially that you can't always trust the data ; there are always distortions that must be dealt with. Ken believed that there was no piece of equipment that he couldn't improve. He even drilled holes in our first computer a few days after it arrived and added some switches and diodes, after which it worked much better! My interests in the experimental side of incoherent scatter grew out of these years with Bowles. And he showed me the radar data that first suggested to me that the ionospheric plasma can be unstable and generate spontaneously growing waves.

All scientists know that we stand on the shoulders of those who have gone before us. Henry Booker, a wise and gracious man whom many of you knew, was my thesis advisor. Booker's advisor was Jack Ratcliffe at the Cavendish, who overlapped there with Sir Edward Appleton himself. And Appleton overlapped with J.J. Thomson, who first calculated the scattering cross section of an electron, a calculation that Bill Gordon actually repeated in his first musings about incoherent scatter. An interesting set of links, and in view of this prize, I find it pleasing, and only a slight stretch, to think of myself as a direct "descendant" of Appleton's - his great-grandstudent, you might say.

An aspect of science that is particularly satisfying to those of us in academia is watching our students develop. We are pleased when they do well, and so I am happy to see that one of my ex-students, John Sahr, is the Booker Fellow at this General Assembly, and two others, Dave Hysell and John Cho, are URSI Young Scientists. Elaine Chapin, another URSI Young Scientist, was a student of one of my students, Erhan Kudeki. That makes Elaine something like Appleton's (great)-grandstudent! I am sure that many of our students teach us more than we teach them - especially about computers. I recently made the painful switch from a friendly Macintosh to a hostile Unix machine, with the help of much patient tutoring from several of my students and ex-students.

I would like to single out and particularly thank two of my colleagues, Wes Swartz and Ron Woodman, with whom I have worked for many years and who have contributed a great deal to incoherent scatter and other research at Jicamarca.

Finally, I would like to thank my wife Jennie, who has followed me around the globe during a total of 10 years overseas, at some cost to her own career, dealing with three new foreign languages and raising three children born in three separate countries. I am reminded of a story that she and I heard at an extremely elegant banquet in Sweden 11 years ago, but I won't burden you with that story here. Jennie tells it much better than I do anyway, and I am sure she will oblige anyone who is interested.

Thank you all for this honour. I have been to every General Assembly since 1960, and this is one I will not forget.

Presentation of the Issac Koga Gold Medal

The Medal was presented by Dr. Yoji Furuhama, President of the URSI Committee in Japan

It is a great pleasure for me, as the President of the URSI Committee in Japan, to present the 1996 Issac Koga Gold Medal to Dr. Zoya Popovic, Prof. of the University of Colorado in the United States of America.

I would like to start by describing briefly the rules for the Issac Koga Gold Medal, as well as the career of the late Prof. Koga. The Medal is endowed to a young scientist under age 35 who has made outstanding contributions to any of the branches of science covered by the ten Commissions of the URSI. It honours the memory of the late Prof. Issac Koga, who was Vice President of the URSI from 1957 to 1963, President of the Union from 1963 to 1966, and Honorary President from 1981.

Prof. Koga was born in Japan in 1899. He studied at the University of Tokyo, and became, first, Prof. at the Tokyo Institute of Technology; later, Prof. at the University of Tokyo; and finally, Dean of its Faculty of Engineering.

Prof. Koga's researches covered a wide variety of topics in radio science. Particularly noteworthy among these was the 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 variety of applications, in particular to international radio communications and broadcasting.

Prof. Koga was a strict educator of young students and researchers, but at the same time a warm-hearted research leader. When he passed away in 1982, the URSI Committee in Japan proposed the establishment of this Gold Medal for young scientists in commemoration of Prof. Koga as a great educator as well as a distinguished researcher. The first Koga Medal was awarded twelve years ago at the General Assembly in Florence, and this is the fifth award.

Let me now mention the distinguished scientific achievement of Prof. Zoya Popovic, for which she is receiving the 1996 Issac Koga Gold Medal today. The citation for the award mentions that she has made highly significant contributions to the field of active microwave circuits, in particular, the original demonstration of the planar grid oscillator, as well as continuing efforts with quasi-optical amplifiers and active antennas. Prof. Popovic, would you accept our hearty congratulations?

Reply by Prof. Zoya Popovic

Thank you very much, Mr. President, for this big honour. I am aware that there are many people who deserve it more than I do, but gladly accept the luck.

I would like to thank all of my teachers. I only dare to hope that one of my students will some day thank me in front of this audience. In particular, I thank my PhD advisor and friend David Rutledge from Caltech for showing me what good research is. Dave also convinced me that you can get a lot done if you start at 5 in the morning.

Another of my teachers, Branko Popovic from the University of Belgrade, Serbia, who I took my first EM course from, also happens to be my father. Dad, thanks to you and Mom for teaching us that work is fun (as well as Maxwell's equations). My two younger sisters, Milica and Sofija (both grad students in electrical engineering at the University of Toronto and Northwestern), trained me well throughout our childhood with hard questions I was expected to know all the answers to.

The University of Colorado is a wonderful school with extremely competent people and I have made many good colleagues and friends there - thanks go to Susan Avery, Ed Kuster, David Chang, KC Gupta, Lloyd Griffiths, Tim Brown, Alan Mickelson, Lucy Pao, Dana Anderson and many others.

My graduate students, of course, do all the work. They are busy now teaching my classes and maintaining the lab - in their absence I will admit that they are all excellent young people with bright professional futures ahead of them.

Finally, I thank my husband Srdjan Basta for his patience and my daughters Nina and Lena for helping me keep things in perspective.

Let me also thank our hosts : Je suis très heureuse de pouvoir remercier (en français) pour le prix que le jurie de l'URSI a trouvé bon de me décerner cette année. Ce prix, pour moi, sera à la fois un honneur et un encouragement dans mes futures recherches scientifiques. Merci encore une fois.

Prof. E.V. Jull asked the H.G. Booker Fellow, Dr. John D. Sahr, *the J.C. Bose Fellow,* Dr. Jayadeva, *and the S.K. Mitra Fellow,* Dr. Yashwant Gupta, *to rise. The three young awardees were warmly applauded by the audience.*

The Ceremony concluded with a performance of the Children's Choir "Les Petits Chanteurs du Comté de Flandre" who sang children's songs from all over Europe.

A cocktail followed this ceremony at 7 p.m. in the prestigious "Hall d'Honneur" of the Chamber of Commerce and Industry of Lille.

Closing Meeting

Thursday, 5 September 1996

Closing Remarks by the Secretary General

Prof. P. Lagasse

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

The incoming President is Prof. Thomas B.A. Senior and the Vice-Presidents are : Prof. Peter J.B. Clarricoats, Prof. Hiroshi Matsumoto, Dr. Joseph Shapira and Prof. Maria Stuchly. Although I am quite sure that most of you know Prof. Stuchly, I would like to point out that she is the first woman to be elected Vice-President in the history of URSI.

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

Commission A :	
Chair	Dr. M. Kanda (U.S.A.)
Vice-Chair	Prof. E. Bava (Italy)
Commission B :	
Chair	Prof. C.M. Butler (U.S.A.)
Vice-Chair	Prof. S.E.G. Ström (Sweden)
Commission C :	
Chair	Prof. J.G. Lucas (Australia)
Vice-Chair	Prof. E. Bonek (Austria)
Commission D :	
Chair	Prof. R. Sorrentino (Italy)
Vice-Chair	Prof. A. Seeds (U.K.)
Commission E :	
Chair	Prof. M. Hayakawa (Japan)
Vice-Chair	Dr. R.L. Gardner (U.S.A.)
Commission F :	
Chair	Mr. M.P.M. Hall (U.K.)
Vice-Chair	Dr. Y. Furuhama (Japan)
Commission G :	
Chair	Prof. B.W. Reinisch (U.S.A.)
Vice-Chair	Dr. P. Wilkinson (Australia)
Commission H :	
Chair	Dr. V. Fiala (Czech Rep.)
Vice-Chair	Dr. H.G. James (Canada)

Commission J :

Chair	Prof. R.S. Booth (Sweden)
Vice-Chair	Prof. J. Hewitt (U.S.A.)

Commission K :

Chair	Prof. J.C. Lin (U.S.A.)
Vice-Chair	Prof. S. Ueno (Japan)

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

(a) The Council accepted the invitation of the Member Committee in Canada to organise the next General Assembly. The venue will be Toronto, in August 1999.

(b) The Council has accepted, pending the usual commitment to ICSU rules and the URSI Statutes, the application to membership of the Academies of Sciences of Mexico.

(c) The Council also accepted, pending the usual commitment to ICSU rules and the URSI Statutes, the application for associate membership of the Serbian Academy of Sciences.

Council also approved a change in the statutes giving voting rights to the Commissions. In Council the scientific Commissions will be represented by the Commission Chairmen or their designates. Each Commission will have two votes. The scientific Commissions will participate in all votes except the election of the Board, the status of Members, the value of the unit of contribution and other matters affecting the dues.

Council also changed the Statutes in order to decide , at each Assembly, the year and the place of up to the next two Ordinary General Assemblies. This means that from now on the venue of a General Assembly can be decided up to six years in advance.

At the present General Assembly strong support was expressed to further strengthen the role of the Radio Science Bulletin as a link between the world-wide community of radio scientists. I am pleased to announce that the Commissions have each appointed an Associate Editor for the Bulletin. May I take this opportunity to warmly thank Prof. Delogne for his efforts as Editor. In the course of the next triennium his duties as Editor will be taken over by Prof. Sobieski.

Dr. Stone has kindly accepted again the heavy duty of editing the next Review of Radio Science. Dr. Hamelin will be the Coordinator of the Scientific programme of the next General Assembly and Prof. Stuchly will be the Assistant Coordinator. She will also edit Modern Radio Science.

During this Assembly we have also received useful suggestions for further expanding the URSI Web site. As the information highway continues to develop on a global scale we will endeavour to use it increasingly to enhance cost-effective scientific interactions and communications between radio scientists from all over the world.

The first thing one learns as Secretary General of URSI is the complexity of the Union. On the one hand one has the Member Committees, representing radio science research in their respective territories; on the other hand the Commissions regroup the research efforts in a sub-domain of radio science on a world-wide scale. As anyone who works in an organisation with a matrix structure knows, it is very difficult to make such a structure function properly. However, I think that the strength and the uniqueness of URSI lies in its complexity, in the wide range of its scientific activities and in its global nature. Improving the functioning of and the scientific interactions in this complex matrix structure of URSI represents in my view the major challenge of my duties as Secretary General. With the help of the secretariat team, Inge Heleu and Prof. Peter Van Daele, I look forward to this challenge.

En guise de conclusion je tiens à féliciter vivement les professeurs Degauque et Liénard pour l'organisation parfaite de cette assemblée générale. Je tiens à exprimer mon admiration non seulement pour le travail énorme qu'ils ont accompli, mais aussi pour le fait qu'à travers toutes les difficultés ils ont réussi à garder le sourire et à porter un aide appréciée au secrétariat de l'URSI.

I am looking forward to seeing you all in Toronto!

Closing Remarks by the outgoing President

Dr. P. Bauer

Mesdames, messieurs,

Au nom du Bureau que j'ai l'honneur de présider, je voudrais vous faire part des instants d'émotion et de joie, mais aussi parfois d'anxiété que nous ont apporté ces trois dernières années.

I would like to say a few words regarding those who are leaving the Board of Officers. I would not insist on the essential role played by our always smiling past President, Ed Jull, but rather point to the diplomatic way he chaired in the early eighties a working group entrusted with a somewhat difficult task, Jörgen Bach Andersen is also retiring from the Board, and I would like to mention the major steps he took in creating the extremely successful Commission K, in coordinating the scientific programme of the Kyoto General Assembly and in chairing the Long Range Planning Committee.

URSI science lies undoubtedly in the Commissions, and it depends strongly on the level of interaction which exists between them. I would like to thank heartily the outgoing Commission Chairmen for their work. I am glad to take this opportunity to mention (again) that the role of the Commission Chairmen has been increased considerably in the Council, a move which will benefit the whole URSI community.

Several innovative steps have been taken, such as the Junior scientific competition, or the prestigious public lecture by Prof. J.H. Taylor, Nobel laureate for Physics. I hope such initiatives will renewed and amplified in the future to mark, for example, the turn of a century of science which revolutionised our society.

The URSI Secretariat (Paul Lagasse, Peter Van Daele and Inge Heleu) are to be thanked for devoting so much of their time to well-being of our Union.

I believe, I may state that this 25th General Assembly has been an important event, which the participants will hopefully recall as a wonderful experience. No doubt this is largely due to the immense involvement of the members of the French Organising Committee : Prof. Pierre Degauque who, in spite of his many responsibilities, found it possible to prepare a superb tutorial on Electromagnetic Topology, Prof. Martine Liénard, who combines efficiency with gracefulness, but also - even if this is not so well known - Victoria Jull, Yela Stevanovitch, Geneviève Pillet, Christine Degauque, and all the children of the Degauque family.

I thank all the participants to what seems to be the largest General Assembly in the history of URSI, for their outstanding contributions.

Ladies and Gentlemen, I am very grateful to you for having allowed me to serve as President. It has been a great honour.

Mesdames, messieurs, je vous remercie de la confiance que vous m'avez accordée et de l'expérience enthousiasmante qui m'a ainsi été donnée.

Address by the incoming President

Prof. T.B.A. Senior

Mister President, Colleagues, Ladies and Gentlemen,

On behalf of the new Board of Officers, I wish to express our thanks for the confidence you have shown by electing us, and to assure you that we will do our best to serve you in the coming triennium. We are fortunate that we inherit a strong and successful Organisation, and this is due in large measure to the efforts of those who have preceded us, in particular:

- Ed Jull, our past President - soon to be our past-squared President - whose wise counsel has been so valuable;
- Pierre Bauer, who has led us so ably as President and who will now assist as past President;
- Jörgen Bach Andersen, who played a major role in the creation of Commission K, and who is now retiring from the Board,

and last but not least

- the Chairs of our 10 Scientific Commissions.

I know how hard they have worked on behalf of us all, and I ask you to join me in expressing our thanks for their efforts.

Times are indeed changing. As befits the growing role of women in science, the New Board has its first female member. She was also the first female recipient of an URSI Award, and at the Council meetings three years hence, we are assured of the presence of several women. In order to move with the times, any organisation should constantly re-examine itself to make sure it is best designed to serve the purpose for which it exists. In our case, the purpose is to support the needs of radio scientists throughout the world, and thereby advance the discipline of radio science in all its applications.

To cite some of the changes that have been noted in recent years :

- The Young Scientist Programme, which has brought almost 120 scientists to this Assembly, and is the largest programme in the ICSU family of Unions. We hope that these young colleaugues have enjoyed their stay in Lille and have found the scientific sessions beneficial. And to those young scientists from developing countries, we ask that you go back and spread the word about the excitement of radio science. If your country is not now a member of URSI, you might even encourage it to join !
- Then there is our Network of Correspondents - now membering over 2500 - to provide direct contact with radio scientists everywhere
- and the evolution of the Radio Science Bulletin, under the editorship of Paul Delogne, to include feature articles as well as announcements.
- Finally, at this Assembly, the modification of our Statutes to make Commission Chairs full voting members of Council.

– We hope to experiment a little in the format of the General Assembly to make it more efficient in the use of your time, but still consistent with the traditions and character of URSI. Individually, these are small changes, but their cumulative effect is an indication of the direction in which we are going. Whatever happens, rest assured that URSI will remain what it has always been : an association of scientists of good will devoted to the service of science.

Avant de clôturer cette Assemblée, cette semaine d'intense activité, je tiens, au nom de nous tous, à exprimer notre profonde gratitude aux organisateurs, des scientifiques comme nous tous, qui ont sacrifié plus d'une année de leur vie professionnelle pour assurer le plein succès de notre réunion. Nos remerciements vont aussi a tous ceux dont les travaux moins visibles nous ont permis de passer à Lille des journées mémorables.

Until we meet again, three years from now, in the city of Toronto, au revoir !

Concluding Remarks by the Chair of the French Organising Committee

Mister President, Ladies and Gentlemen,

At the end of this week, somewhat hectic for all of us, I wish to tell you how pleased we were to be able to host you in our city.

We have done our best to ensure the smooth running of the meeting which, according to figures now available, is the largest ever held by URSI. This, in itself, is very gratifying and demonstrates the vitality of our Union, but explains the fact that we were somewhat overwhelmed by the number of participants. We do apologise for the few inconveniences which have occurred, in particular regarding the allocation of rooms for sessions.

We nevertheless hope that you will keep good memories of this 25th General Assembly, and wish you "bon voyage".

Reports of Meetings

Board of Officers

Summary Report

The Board of Officers met on three occasions, respectively on 26 August, 4 and 6 September 1996.

During the 23 August meeting, which lasted from 9 a.m. to 1 p.m., miscellaneous items were discussed (such as the details of the Opening Ceremony of this Assembly). Most of the time, however, was devoted to an overview of the agendas of the Council and of the Coordinating Committee. Prof. E.V. Jull gave some general information on the Young Scientist Programme.

During the second meeting, which lasted from 4 p.m. to 6.30 p.m., the Board discussed possible nominations for the various standing committees and representatives of URSI in other scientific bodies. The Board also discussed the details of the Closing Ceremony.

During the third meeting, which lasted only one hour, the following assignments (involving the new Board) were agreed upon for the next triennium :

Dr. P. Bauer will be the URSI representative on the ICSU Committee on the Free Circulation of Scientists, the Liaison of the Board with the IGBP Committee, and the Chairman of the Awards Panel for the 1999 Awards.

Prof. P.J.B. Clarricoats will stay on as Treasurer and as Member of the Standing Publications Committee.

Prof. H. Matsumoto will be the Chairman of the Long Range Planning Committee.

Prof. T.B.A. Senior will be the Liaison of the Board with the Membership Committee.

Dr. J. Shapira will be in charge of wireless communications and the interactions with developing countries.

Prof. M.A. Stuchly will be the Assistant Coordinator of the Scientific Programme for the XXVth General Assembly.

The Board appointed Prof. P. Van Daele as Assistant Secretary General for the next triennium.

COUNCIL

Summary Report

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

The Council met on Tuesday 27 August (9 a.m. to 6.10 p.m.), Friday 30 August (6.30 p.m. to 9.10 p.m.), Tuesday 3 September (6.30 p.m. to 8 p.m.). Wednesday 4 September (6.45 p.m. to 8.30 p.m.) and Thursday 5 September (1.20 p.m. to 5.15 p.m.).

1. Membership of the Council

President : Dr. P. Bauer
Secretary : Prof. P. Lagasse

Representatives of Member Committees (alternate representatives are mentioned between parentheses) :

Argentina : Prof. S.M. Radicella
Australia : Prof. D.J. Skellern
Austria : Dr. R. Leitinger
Belgium : Prof. E. Schweicher
Brazil : Prof. P. Kaufmann
Bulgaria : Prof. B. Shishkov
Canada : Dr. G.Y. Delisle (Prof. K. Balmain, Dr. Y.M.M. Antar)
China CIE : Prof. S. Feng
China SRS : Prof. Yinn-Nien Huang
Czech & Slovak Rep. : Dr. V. Fiala (Prof. J. Vokurka)
Denmark : Prof. P. Høeg
Egypt : Prof. I.A.M. Salem
Finland : Prof. V.I. Lindell
France : Prof. P. Degauque (Dr. J. Hamelin)
Germany : Dr. K. Dorenwendt
Greece : Prof. J.G. Fikioris
Hungary : Prof. K. Géher
India : Prof. G. Swarup
Ireland : Prof. M.C. Sexton
Israel : Dr. J. Shapira
Italy : Prof. G. Tofani
Japan : Dr. Y. Furuhama
Netherlands : Prof. F.W. Sluijter (Mr. H.C. Kahlmann)
New Zealand : Prof. R.L. Dowden
Nigeria : Prof. G.O. Ajayi
Norway : Prof. D. Gjessing
Peru : Dr. R.F. Woodman
Poland : Prof. S. Hahn
Portugal : Mr. J.F. Patricio
Russia : Prof. V.V. Migulin
South Africa : Prof. K.M. Reineck
Sweden : Prof. S. Ström

Switzerland : Prof. M. Ianoz
Thailand : Mr. P. Chooncharoen
United Kingdom : Prof. T.B. Jones
USA : Prof. D.C. Chang

Honorary Presidents W.E. Gordon and W.N. Christiansen, the members of the Board, the Chairs and Vice-Chairs of Commissions, the Chair of the Scientific Committee and the Assistant Secretary General attended in an advisory capacity. An Observer from Mexico and representatives from ITU and IUCAF and various URSI officials also attended the meetings, partially or totally.

2. Approval of the Agenda

The agenda had been split into two parts, termed A and B. In Part B were grouped items which could be approved automatically, unless there were questions, in which case they could be discussed more extensively and shifted to Part A. The subdivision in Parts A and B, a procedure initiated in Kyoto, worked well, and increased the efficiency of the deliberations of the Council.

The Council decided to move the item about the Young Scientists Programme from part B to Part A, and accepted to add the proposal from the UK Member Committee to create "Fellows of URSI" to the agenda. With these two changes the agenda was approved.

3. Formation of Temporary Committees

(a) Ad hoc Group to recommend final revision of the Statutes
Dr. J. Hamelin , Prof. E.V. Jull and Dr. W.R. Stone

(b) Drafting Committee
Prof. L. Barclay, Prof. J. Evans and Dr. J. Hamelin.

4. Organisation of the XXVth General Assembly

Prof. P. Degauque presented an extensive overview of the arrangements for the XXVth General Assembly in Lille and Prof. H. Matsumoto, Coordinator of the Scientific Programme, outlined some details of the scientific programme. In total 1662 papers were submitted, of which 1545 were accepted (967 oral presentations, 578 poster presentations). In total 607 invited papers were presented. The papers were distributed amongst the Commissions as follows:

Commission A	111	Commission F	149
Commission B	200	Commission G	215
Commission C	93	Commission H	287
Commission D	132	Commission J	117
Commission E	142	Commission K	95

The President thanked Prof. H. Matsumoto and Dr. J. Hamelin for the excellent work in setting up the scientific programme of the General Assembly.

5. Election of Board of Officers, and of Chairs and Vice-Chairs of Commissions

The results of the elections were as follows :

(a) Board of Officers :

President :	Prof. T.B.A. Senior (U.S.A.)
Vice-Presidents :	Prof. P.J.B. Clarricoats (U.K.) (Treasurer)
	Prof. H. Matsumoto (Japan)
	Prof. J. Shapira (Israel)
	Prof. M.A. Stuchly (Canada)
Secretary General :	Prof. P. Lagasse (Belgium)

Dr. P. Bauer remains a member of the Board as Past President.

(b) Chairs and Vice-Chairs of Commissions :

Commission	Chair	Vice-Chair
A	M. Kanda (U.S.A.)	E. Bava (Italy)
B	C.M. Butler (U.S.A.)	S.E.G. Ström (Sweden)
C	J.G. Lucas (Australia)	E. Bonek (Austria)
D	R. Sorrentino (Italy)	A. Seeds (U.K.)
E	M. Hayakawa (Japan)	R.L. Gardner (U.S.A.)
F	M.P.M. Hall (U.K.)	Y. Furuhama (Japan)
G	B.W. Reinisch (U.S.A.)	P. Wilkinson (Australia)
H	V. Fiala (Czech Rep.)	H.G. James (Canada)
J	R. Booth (Sweden)	J. Hewitt (U.S.A.)
K	J.C. Lin (U.S.A.)	S. Ueno (Japan)

6. Admission of Member Committees. Resignation of Member Committees

The Council unanimously accepted the application to full membership in category one of the National Academy of Sciences of Mexico (see Resolution U.2). It also accepted the application to associate membership of the Serbian Academy of Sciences of Yugoslavia (see Resolution U.2), and confirmed the associate status of the committees in Belarus, Chile and Kazakhstan (see Resolution U.2).

The Council discussed the problem of the Member Committees with arrears extending to more than two years, Nigeria and Uzbekistan, and decided to maintain the committee in Nigeria in category one and to transfer the committee in Uzbekistan to the status of associate member (see Art. 9 of the Statutes).

7. Membership

Prof. T.B.A. Senior, Chair of the Standing Committee on URSI Membership, officially welcomed Peru as a full member of URSI. The Committee in Peru was re-established as a full member on 1 January 1996, with the consent of the Member Committees.

Council acknowledges the decision of the Royal Society to change the category of the UK Member Committee from category 5A to category 5.

In order to increase the number of Member Committees, letters will be sent to recruit new members.

In the next triennium reduced registration fees will be implemented for URSI correspondents who attend URSI-sponsored meetings. The Commission Chairs will be asked to play an active role here.

8. Finances

The Standing Committee on Finances recommended Council to approve the accounts as presented by the Treasurer. Council formally accepted the Treasurer's report.

Prof. K. Geher presented the three budget proposals made by the Treasurer for the next triennium. These proposals differ in the annual increase in unit contribution :

1. 0% increase;
2. linking the unit contribution to the inflation rate of the U.S. as published by the OECD (2.38 %);
3. an increase of 2% above the inflation rate (4.38 %).

Council accepted - upon recommendation of the Standing Finance Committee - the second proposal by which the unit contribution is raised annually by a percentage equal to the inflation rate of the US, as published by the OECD (this is 2.38% for 1997; the unit contribution for 1997 is therefore set at 30,714 Belgian francs).

At the next ICSU General Assembly the URSI President should mention that the URSI Council has difficulties in accepting an annual increase higher than the inflation rate. The grant URSI receives from ICSU is currently significantly larger than the contribution URSI pays to ICSU, but the Secretary General remarks that the grant from ICSU-UNESCO is expected to decrease.

The Standing Committee on Finances also strongly recommends that any new activities should be properly costed and the financial consequences thoroughly considered.

9. XXVIth General Assembly

There were three invitations before the Council, from the Member Committees in Canada, China (CIE) and India. As a result of the vote, the XXVIth General Assembly will be held in Toronto, Canada, in the middle of August 1999 (see Resolution U.29). The Coordinator of the Scientific Programme will be Dr. J. Hamelin, assisted by Prof. M.A. Stuchly, Associate Coordinator.

10. Format of future General Assemblies

The Commissions discussed the length of future General Asssemblies in their business meetings. The result was that seven out of ten had a strong preference for a shorter format.

Prof. Senior proposed a format of a shorter General Asssembly, with most of the technical sessions on Monday through Friday (or Saturday, if needed) and the administrative meetings on Sunday.

After some discussion the Council decided to refer the matter to the Coordinating Committee for a more elaborate discussion and detailed proposal. It was decided to maintain the present format for the 1999 General Asssembly.

11. Publications

Dr. W.R. Stone, Co-Chair of the Publications Committee clarified the report which had been distributed prior to the General Assembly. The Council approved this report (see page 64-69).

The Editor of the Radio Science Bulletin, Prof. P. Delogne, will retire at the beginning of the next triennium. His successor will be Prof. Piotr Sobieski, a colleague from the Université Catholique de Louvain. During the Business Meetings of this Assembly each of the ten scientific commissions was asked to appoint an Associate Editor, who will provide at least two scientific articles per year for publication in the Radio Science Bulletin.

The Review of Radio Science 1993-1996 was distributed at this Assembly. The President expressed the gratitude of Council to Dr. W. Ross Stone for his excellent work as Editor in Chief of the Review of Radio Science. Council graciously welcomed and accepted the offer of Dr. Stone to continue as Editor in Chief of the next Review of Radio Science. In response to several suggestions, and with the approval of Oxford University Press, the content of the reference disk will be put on the URSI Homepage. Some Japanese references, which were - by mistake - not included in the reference disk will also be put on the Web, and search engines will be installed.

Modern Radio Science 1996 was distributed at this Assembly. The President expressed the gratitude of Council to Dr. J. Hamelin for his excellent work as Editor in Chief of Modern Radio Science. The next Editor in Chief will be appointed after consultation with the Organising Committee of the next General Assembly.

At this moment two scientific journals carry the URSI logo, namely "Radio Science" and "The Journal of Atmospheric and Solar-Terrestrial Physics". The Standing Committee on Publications supports the idea to let "Wireless Networks" carry the logo as well.

12. Scientific Committee on Telecommunications

Prof. L.W. Barclay presented the report of the Scientific Committee on Telecommunications as distributed to Council prior to the General Assembly and clarified the role of the Committee as a conduit for coordination and information exchange on telecommunication studies between the URSI Commissions and ITU Study Groups.

Prof. L. Barclay also clarified the important changes that have taken place within ITU over the past few years. ITU Council now consists of 41 Members and meets annually. Three sectors have been identified : Radio communication (ITU-R), Telecommunication Standardisation (ITU-T) and Telecommunication Development (ITU-D). Each sector has its own Study Groups, an Advisory Group and a supporting Bureau.

The role of ITU is very broad and through the efforts of this organistaion, several bodies and decisions can be influenced, to wit:

* telecommunication agencies,
* market economy and competition,
* growth of telecommunications,
* zero-growth budget,
* status of ITU Members / members,
* paper satellites,
* regionalisation,
* frequency sharing,
* non-GSO systems and networks,
* WRC agendas.

Looking at the importance of all the above mentioned issues, Prof. Barclay expressed some personal recommendations concerning the Scientific Committee on Telecommunications:

1. The Committee should be maintained over the next period;
2. An agreement in principle should be reached to maintain a "Characterisation" Task Group and to establish a "Wireless Communication" Task Group, but the detailed arrangements should be left to the Scientific Committee on Telecommunications;
3. URSI should continue to serve as a Member of ITU;
4. URSI should endeavour to establish a presence at ITU Study Group and regulatory meetings;
5. URSI should seek to make authoritative contributions;
6. URSI should establish a way to prepare and approve "policy" statements.

The President thanked Prof. Barclay for his report and contributions as Chairman of the Scientific Committee on Telecommunications. The matter of changes in ITU and the careful interaction between URSI and ITU has been discussed at the Board Meetings. After consideration of this matter, the Board proposed to have one of its members, Dr. J. Shapira, acting as coordinator for the relations between URSI and ITU. Dr. Shapira accepted this responsibility and further clarified his views on the situation.

URSI can be seen as a matrix organisation consisting of Member Committees on the one hand and Scientific Commissions on the other hand. There is also a third dimension, which is the axis of the needs, being much broader than the coordination between the Commissions. It is necessary to cater to the needs and to bring the needs as soon as possible to the scientific Commissions. A scientific body such as URSI, with a wide range of knowledge, has a place in ITU and contributions to ITU can bring additional relevance to URSI and to scientists in the Commissions.

Prof. G. Tofani endorsed the proposal of the President for Dr. Shapira to be in charge of revising and strengthening the relationship between URSI and ITU. Prof. E. Schweicher seconded this proposal. Council subsequently unanimously decided to discontinue the Scientific Committee on Telecommunications and to ask Dr. Shapira to reorganise the relationship between ITU and URSI.

Prof. T.B.A. Senior thanked Prof. Barclay for his report and his efforts as Chairman of the Scientific Committee on Telecommunications.

Coordinating Committee

Summary Report

The Coordinating Committee met on two occasions, on 26th August and on 6th September 1996. The main topics raised at these meetings are given below. The items that were discussed at Council are not duplicated here.

1. Scientific Programme of the Lille General Assembly

Prof. H. Matsumoto, Coordinator of the Scientific Programme, presented the outlines of the scientific programme of the General Assembly.

It is generally felt that the timing schedule which was used in preparing this scientific programme was very tight but successful and this schedule should also be used for the '99 General Assembly.

2. Young Scientists programme.

The final number of selected Young Scientists is 118 with approximately 50% coming from developed countries, 30% from Eastern European countries and 20% from developing countries. 15% of the Young Scientists are women. All Young Scientists will be presented a certificate and an URSI tie or scarf.

In total 238 applications have been received of which 120 were selected, the first filter being the selection of a paper in the scientific programme. The geographical distribution of the Young Scientists is also taken into consideration. The distribution of applications ofYoung Scientists amongst the Commissions is approximately the same as the distribution of Young Scientists awards:

	Applications	Awards
Commission A:	3.3%	3%
Commission B:	24.6%	25%
Commission C:	9.2%	9%
Commission D:	9.6%	10%
Commission E:	4.2%	4%
Commission F:	13.8%	14%
Commission G:	14.6%	15%
Commission H:	9.1%	9%
Commission J:	7.3%	7%
Commission K:	4.2%	4 %

Of all applications, 88% were ranked by the Member Committees, which turned out to be of great help during final selection.

In complement to his written report, Prof. E.V. Jull also presents an overview of the resources of the Young Scientists programme: Japanese URSI Committee, ESA, the Royal Society, the Commonwealth Science Council, COSTED, European Union (Copernicus Programme), ... In the past support was received from the International Science Foundation (ISF). It is not clear why the application for support for the Lille General Assembly was turned down.

The estimate of the total of travel costs for the Young Scientists programme is about $80,300.

3. URSI Publications

Associate Editors for the Radio Science Bulletin

The Radio Science Bulletin currently includes scientific papers on topics of interest to the URSI community. In order to continue this, the Editor needs to receive enough quality papers, covering all URSI Commissions and which are of interest to a wide range of URSI scientists. Up to now most papers were taken from the presentations given at the 75th anniversary of URSI but for future issues, it is proposed that each commission should contribute 2 or 3 papers per year. The Commission Chairs will appoint an associate editor to take care of this. This item should be discussed during the Commission business meetings.

The Secretary General also mentions that, as decided by the Board, the list of addresses of URSI Officials is updated once a year in the December issue and that no addresses will be put on the URSI World Wide Web-pages. One can contact the URSI Secretariat for an update at any time.

Review of Radio Science

Dr. W.R. Stone has kindly accepted to edit for a third time the "Review of Radio Science". He has prepared a set of guidelines and attention points for the Commissions to discuss during their business meetings.

The diskette which is distributed together with the Review of Radio Science is found to be of significant added value by Oxford University Press, the publisher of the Review. The content of the diskette will be put on the URSI WWW-pages, administrated by the URSI Secretariat.

4. Voting in Council by Commission Chairs

A proposal to increase the involvement of Commission Chairs in Council by granting them a vote on all matters except election and finances will be made to Council. It will be proposed to set up a drafting committee for an eventual change in statutes.

5. Post Mortem of this General Assembly

Commission B

- Commission B is strongly in favour of publishing the timing of the papers and presentations in the programme to allow switching between sessions.
- Commission B is strongly in favour of publishing the timing of the papers and presentations in the programme to allow switching between sessions.
- The technical sessions of Commission B were very good, with few "no-shows" and a relatively large audience.
- The success of the joint sessions was very large and considered more impressive than at the previous General Assembly.
- Commission B encourages other Commissions to use a similar evaluation process for the submitted papers as was used within Commission B. 68 papers out 117 were rejected to increase the level of the presentations.

Commission C

- In setting up the programme of the sessions, care should be taken to place possible "no-shows" towards the end of the sessions. Commission C is not in favour of rejecting papers of non-registered authors. Reviewers have been very tolerant with respect to the selection of papers from developing countries.

- Commission C feels that spreading the technical programme of the General Assembly over a period of 2 weeks is too long, as most of the attendees only stay for 2 or 3 days.
- The most successful sessions of Commission C covered topics such as "wireless and personal communications". Some of these sessions were scheduled in parallel with analogue sessions organised by Commission F.

Commission D:
- Commission D was very satisfied with the attendance at the sessions with only one "no-show" of a convenor. The programme was very attractive.
- Commission D is also suffering from the broad area covered by the different sessions and which makes the General assembly not very attractive for specialists in the area. This can be very different for other Commissions.
- Co-ordination with other Commissions is required and contacts should be improved between the Commission Chairs. More information needs to be distributed to the convenors.
- On the issue of length and duration of the papers, Commission D feels that 20 minutes is suitable for contributed papers, but too short for invited papers, while a double time-slot of 40 minutes for invited papers is too long. A reduction of a fixed time-slot to 15 minutes looks attractive, or the idea of having a fixed time-slot should be abandoned.
- The poster session is sometimes used to include papers of potential "no-shows". This works well and the combination of having a poster session combined with a reception and refreshments is attractive.

Commission E:
- Most of the technical sessions were well organised, but as some of the sessions were too specific, the number of attendees was rather low. Lessons have to be learned from this for future General Assemblies. At this General assembly, Commission E had fewer invited papers compared to previous General Assemblies.
- The tutorial lecture, organised by Commission E was extremely good.
- Poster papers should be promoted as having the same level as oral presentations to overcome the problem of a large number of "no-shows" at the poster session, as was the case at this General Assembly.
- Commission E is in favour of increasing the number of inter-Commission sessions, including even tutorials.

Commission F
- The technical sessions organised by Commission F at this General Assembly only included invited papers (which is different from the Commission F Open Symposium). The contributed papers were all presented as posters. Few of the papers were rejected.
- The technical sessions were of a good standard and well attended with very few "no-shows".
- The poster session was very successful.

Commission G:
- The overall impression of the technical sessions was quite good. The few "no-shows" did not cause significant problems as this problem was dealt with in an elegant way by the convenors. Commission G is not in favour of having a fixed time-schedule for the technical sessions.
- Very few papers were rejected because the convenors found it too difficult to judge the quality of the paper from the short abstract. Convenors could call upon authors to improve their abstracts but this would be difficult to implement.

- Commission G is in favour of having the posters on display during several days. Commission G is in favour of combining the poster session with refreshments and drinks. It should be stressed that posters are not inferior to oral presentations. Posters should be listed in the programme together with the oral papers.
- Invited papers should not be restricted to review-type papers but can also deal with new ideas and hot topics.

Commission H
- The overall impression of the technical programme was quite good with some very well established sessions. A balance between established and new topics should be sought.
- A short course on presentation of papers would be appreciated as many papers were not very well presented.
- It is not obvious to Commission H how to solve the problem of "no-shows" at the poster session. Either a longer poster session or a split of the poster session in 2 parts would be appreciated.

Commission J:
- Commission J had a full programme at this General Assembly with well attended technical sessions and very interesting joint sessions with few "no-shows". Shorter technical sessions could be an advantage.
- The timing of the tutorials could be improved, perhaps by scheduling them around lunch-time.
- Commission J is in favour of including a poster preview in the programme.

Commission K
- The overall quality of the technical sessions was very good with a satisfying attendance and very few "no-shows". The joint sessions were also very successful.
- Commission K is in favour of scheduling the poster session in 2 parts to allow authors to see other posters too.
- Commission K is in favour of a larger number of tutorials and joint sessions with an increase in number of posters to compensate for this.
- Commission K is in favour of publishing the abstracts on a CD-ROM.

General comments:
- The poster session turned out to be a large success and having the posters on display during several days was widely appreciated, although it was not clear why so many authors were not present at the poster sessions. Both location and timing were appreciated. A poster preview session can be considered in the future as well as having the poster session in combination with a reception. Posters should not be considered of lower quality compared to oral papers and should be listed together with the oral papers in the programme.
- Seeking a balance between invited and contributed papers is left to the Commissions.
- The normal standard of courtesy to let the organiser know the inability of the author to attend the session, does not stand anymore. This can be overcome, as was the case within Commission G, by using e-mail communication with the authors prior to the General Assembly.
- Some convenors were not very successful at this General Assembly and the outcome of the questionnaire which was distributed (and which was returned very well) will be used and distributed to the Commission Chairs for planning future sessions.

- Conflicts in the scheduling of technical sessions have to be discussed at the meeting of the Coordinating Committee in the Spring of '98, but contacts have to be established between Commission Chairs prior to this date.
- At this General Assembly, 12 time slots were available in the technical programme, allowing up to 110 papers per Commission. If a scheme is used for the next General Assembly with technical sessions running from Monday through Saturday with an extra Monday-Tuesday programme in the second week, the main scientific sessions can be scheduled during the first 5 days and special events can be scheduled during the last 2 days. This yields 9 time slots or 80 papers per Commission with one afternoon for poster session. If the 2 days of the second week are also used, an extra 30 papers per Commission can be included. Saturday is also available for technical sessions. As such a schedule could result in many people leaving during the weekend, the programme for the second week, should be very attractive.
- It is advised to use the same room for all Tutorials and General Lectures during whole General Assembly.
- Scheduling tutorials around lunch-time can limit the possibilities for people to get in contact with each other and can limit the time for discussions.
- Three Business meetings can be scheduled in the programme, with the last Business Meeting scheduled on Friday.
- The last meeting of Council can be scheduled on Sunday.
- Longer abstracts could lead to a better judgement of the quality of the paper, of a better selection and consequently a reduction in number of papers. As convenors have the freedom to concentrate the technical sessions on fewer days, this could improve the quality of the sessions.
- Publishing the abstracts on a CD-ROM is supported by several Commissions, but should be well budgeted and can not replace the publication of the book.
- Timing of papers remains an open issue. Using a fixed time slot schedule, can lead to open gaps which can be filled with questions or discussions or this can be left to the convenors. Differences exist between the Commissions : some Commissions see attendees hopping from one session to the other, while other Commissions seem to a have a fixed audience per session. The Secretary General will ask, via e-mail the opinions of the Commissions on this prior to the meeting of the Coordinating Committee in '98.

Round Table Discussion

Summary Report

A Round Table Discussion was held in Lille on Saturday 31 August 1996. It was chaired by Prof. J.B. Andersen.

1. Purpose of this meeting

Prof. J.B. Andersen, Chairman of the Long Range Planning Committee, welcomed the participants to the Round Table Discussion and outlined the scope of the discussion referring to Art. 1 of the URSI Statutes

Prof. J.B. Andersen expressed his concern that the URSI activities in between General Assemblies are not very strong. To increase this activity specific actions will have to be taken. The Round Table Discussion should consider the following points:

- The Long Range Planning Committee recommends the use of URSI funds to stimulate the interaction with other organisations by e.g. organising workshops. The Committee calls upon the new Board to investigate this idea.
- The contacts between URSI and regulating bodies, administrative bodies and industry should be established or further increased.
- Meetings should be organised on a regular basis to reconsider the stategy of URSI.

The Long Range Planning Committee also suggests to create a new Working Group on wireless communications, because this is currently one of the fastest growing areas in telecommunications.

2. Presentations per Commission

Commission A

It is felt that the relationship and the interaction between Commission A and the other URSI Commissions can be further strengthened and stimulated. Communication can be improved via the organisation of joint sessions at the General Assembly. There are few specific conferences in the field covered by Commission A but it is advisable that Commission A should try to get more influence in other Commissions.

The Commission Chairs should ask their Official Members to gather information on where Commission A may have some influence and to try and find ways to improve the activity of this Commission in the "smaller" Member Committees.

Different channels can be used to disseminate information to a wider audience, for example via the WWW or by stimulating activities and contacts with other bodies. In this framework, it is crucial that people accept the importance of the work carried out within URSI.

It is very important that the Member Committees play an active role here, they can influence on a national, domestic domain, which is obviously the more direct way.

Commission B

It is recognised by Commission B that results can only be achieved by people who are strongly committed to URSI. There is need to develop a strategy to stimulate people's commitment to and interest in URSI. Very valuable in this framework is the Young Scientists programme, which has grown to a level where these Young Scientists will form the core of URSI in the future.

Although the interaction of Commission B with other Commissions has been limited so far, joint sessions were organised during this General Assembly and efforts are made to enhance the interaction. The interaction has to be stimulated in both directions: Commission B is eager to learn about the activities of other Commissions and about possibilities to work on problems brought foreward by other Commissions. As stated by Dr. W.R. Stone, this can be done by using existing channels such as URSI publications. Specific pages in the "Review of Radio Science" can be used for this purpose.

Commission B has a tradition of issuing newsletters and a Web-site is currently being established. There is need for more interaction and collaboration between the different Commissions with respect to the preparation of both the "Review of Radio Science" and the "Radio Science Bulletin". The Electromagnetic Theory symposium, which is held every 3 years also serves as a platform to present results.

Commission C

Commission C also feels the need for strong commitment and involvement in URSI. Commissions can only operate successfully when dedicated people are involved. If we want to have people interested in URSI, we need activities in the period between General Assemblies. These activities should form a platform to present results to a broader community, through the existing channels (ISSSE, Commsphere,...).

Communications is a very broad area of interest that involves many people and the question arises whether URSI feels the need to continue to deal with such a broad area or whether it has to orient itself towards more specific topics. During the course of this decade, wireless communications have become a major trend in telecommunications, and it is felt that focusing on these specific topics will attract more interested people, while the general goals do not have to be changed.

Use of the spectrum

Platforms such as Commsphere deal with policy issues but they exist on their own and cover policies on a broad area. Commsphere should therefore reach a larger forum where people can hear the message. As emphasised by Prof. R. Struzak, the use of the available spectrum is of key importance in every domain of electromagnetic waves. Long term benefits risk to be sacrificed to short term, immediate benefits. To overcome this, closer interaction between bodies and scientists should be encouraged. The Scientist must also be heard, but to be heard by policy makers the scientists should use organisations to formulate their ideas and they attend the meetings of these policy makers.

Commission D:

Commission D covers a wide range of research topics but is not an important platform for scientists to present results. It is clear from the sessions at the General Assembly that the broad area covered by its programme does not attract many attendees. Commission D must therefore identify its own goals and specific topics and organise forums (such as ISSSE) in its own field. These forums should be topic-oriented and held frequently. They are organised by Commission D, possibly in collaboration with other Commissions or with other bodies such as IEEE, the ICO,... The visibility of URSI is a problem in this field and this could be improved by stimulating activities in between General Assemblies.

Relation to developing countries

URSI differs from other organisations in its relation to developing countries. URSI sends distinguished lecturers to developing countries to give workshops.

Commission E:

The Commission Chair should try to establish a daily contact with its members. Commission E starts to be successful here but the interaction with its Official Members can still improve.

Commission E sees the scientific Commissions of URSI as the central part of URSI and would like to see these Commissions have a larger influence in Council.

Commission is very active within URSI and has several active Working Groups and Open Commission E meetings (Zurich, Wroclaw,....). Commission E still tries to improve the existing interaction with other Commissions via different channels;

- Commissions A, B and E: numerical methods and measurement methods in EMC
- Commissions H, E, G : seismo-electromagnetic phenomena
- Commissions E, K : bio-electromagnetics
- Commissions E, C, D : transients on equipment

The number of joint sessions at General Assemblies and the number Inter-Commission Collaborative Conferences, Inter-Commission Working Groups should also be further increased.

Via several channels dissemination of results is sought within Commission E:

- A Newsletter is issued, together with extensive e-mail contacts to establish a closer contact between the Commission Chair and the Official Members of Commission E. This includes reports of international conferences, reports of meetings at the General Assembly, and reports on Scientific sessions.
- Commission E sponsored and supports sessions at different international conferences.
- Commission E recognises the importance of the "Radio Science Bulletin", together with the "Review of Radio Science" with active participation.

Commission E collaborates with other societies such as IUGG (IAMAP, IAGA) and IEEE.

Commission F:

Interaction with other Commissions within URSI is possible on specific topics such as pattern recognition. This problem covers many areas. A strong and stimulated interaction and communication among the Commission Chairs is felt to be of great importance.

The open symposium held in between General Assemblies is very popular and interaction will be maintained with other symposia such as CLIMPARA. A strong relationship is maintained with IGARSS, the premier meeting on remote sensing.

Commission F is strongly in favour of putting the "Review of Radio Science" on the URSI Web-pages.

The possibility of creating a new Working Group between Commission C and Commission F on personal communications is announced.

Commission G:

It is felt by Commission G that the URSI Commissions should have an influence on the selection of the venue of the next General Assembly. Between General Assemblies, the organisation of joint workshops and conferences by Commission G will be continued. Currently 4 Working Groups exist, together with joint Working Groups with other Commissions. All of these Working Groups will continue in the next triennium.

A lot of effort is already going on within Commission G to disseminate results from work within the Commission. Several Working Groups issue a newsletter and some are available on the WWW.

The feeling within Commission G is that the "Radio Science Bulletin" is very useful and of importance to the URSI community. It is advised to have the "Radio Science Bulletin" sent to libraries over the world.

In view of the rapid growth and rapid increase in availability of data on the WWW, it is stated by Prof. B.W. Reinisch that the need to publish available data is very strong. If data is not made available freely, nobody will be interested to use this data. People might loose resources now, but it can be of benefit in the future.

The Official Members are currently serving without responsibility over national organisations. The Board of URSI should issue recommendations to the Member Committees to limit the term of their National Representatives to 3 or 6 years.

A slightly earlier timing of the General Assembly (before the end of August) would be preferred.

Commission H

An obvious connection already exists between Commission G and Commission H and results in Working Groups and joint sessions. Interactions with other Commissions can also be set up and are ongoing.

The role of Commission H is to stimulate the organisation's meetings and sessions where results are presented, which can act as a forum to address any problem. The area of interest of Commission H should be extended to the field 'dusty plasma's'. The scientific work in between General assemblies should be further strengthened. This can be done by setting up Working Groups and workshops which originate from discussion groups. The structure of URSI should react and adapt to the demands from the Commissions.

Dissemination of results and information to a broader public and to "the man in the street" is felt to be of increasing need. Initiatives such as the Young Scientist Contest at the Lille General Assembly are greatly appreciated.

Making the content of the diskette of the "Review of Radio Science" available on the Web is also encouraged.

Commission H strongly supports the Young Scientists programme, also in between the General Assemblies.

It is recognised that some Member Committees are not very active, but URSI can act on this by trying to introduce changes and try to increase the interest in the activities of URSI. As pointed out by Prof. P.J.B. Clarricoats, in some countries Member Committees can be very active but are sometimes linked to a single university or body. It is advisable to try to establish better links within these Member Committees. The emphasis should however not lie on the Official Members, but on the scientists within URSI who are most active. This message should be brought to both delegates and Commissions.

Commission J

Commission J deals with the interaction between people and the universe. It sees an increasing problem in the gradually disappearance of this window. It is very difficult to explain to the "decision makers" that this window is so important for radio science. The ITU should be contacted to convince them of this. URSI and Commission J can come up with advice on modulation techniques, avoiding inter-modulation effects and with advice on filters.

Collaboration with other Commissions is of increasing importance, especially now with the new evolution in the field. As frequencies increase, issues such as antenna construction and properties of the atmosphere become increasingly important. Collaboration is therefore required. Commission J however has frequently been seen as having opposite interests with respect to other Commissions, but since all Commissions support spectrum allocation, this should not be the case in the future.

The importance of the Young Scientists programme is felt to be very large. The host country should therefore be urged to keep finding resources to support the programme.

Commission K

Commission K looks with optimism to the next triennium, because a lot of interesting and good research was done during the triennium. Lots of activities were organised and contributions made relating to wireless communication.

The ties with Commissions A and B have been further strengthened. There is for example the concern about the safety of medical equipment and particularly devices implanted in or attached to the human body when used in the proximity of portable and mobile communication devices. This brings us to closer co-operation with Commission E and the proposal to establish a new joint working group.

The main area of interest of Commission K lies in the interaction with the human body of low frequency and extremely low frequency, such as power-line frequency fields or amplitude modulated fields and their biological effects. A lot of new studies, both biological and engineering techniques have become increasingly sophisticated and though many animal studies were conducted, we still cannot give definitive, but only qualified assurances of safety.

Perhaps the main challenge for Commission K (and for the scientist and engineers working in the fields of Commission K) is the problem of financial support of the research activities. With the decrease in governmental research budgets, the involvement is sought of industries interested in technological innovation. This issue of research support should be more deeply discussed within URSI; it will occupy scientists, perhaps as much as the more rewarding and interesting actual research activities.

Scientific Committee on Telecommunications

Prof. L. Barclay recalls the resolution of the creation of the Scientific Committee on Telecommunications, to "interrelate work of URSI Commissions on telecommunications". The Scientific Committee on Telecommunications has tried to respond to the questions of the Commissions and it has created mechanisms to interact with Task Groups between the Commissions and Task Groups between the URSI Commissions and the ITU Working Groups.

The Scientific Committee on Telecommunications should therefore continue to look into topics identified by the ITU as open questions and issues on radio science (see ITU Web-page). All Commissions could have interests in ITU-R Working Groups and the Scientific Committee on Telecommunications is the proper channel to communicate the information from the URSI Commissions to the ITU, using and including the URSI logo.

As pointed out by Dr. W.R. Stone, URSI should interact with other bodies. Many decisions with major consequences are taken at conferences such as WARC without the presence of representatives from the field of radio. This should change. This motion is seconded by Prof. R.S. Booth. URSI should try to convince the specific governments of the importance

of the radio spectrum as a limited natural resource. A suggestion is therefore made that the URSI President take these resolutions to ICSU for distribution to the concerned governments.

3. Comments by the Secretary General

- The URSI Web-pages have been set up and the diskette will be included
- Commissions are urged to set up Web-sites and forward the information to the secretariat in order to establish the necessary links.
- Setting up electronic workshops in between General Assemblies to stimulate interaction is considered of great value and the URSI Secretariat can provide support for server and software or other technical means. The scientific content remains with the Commissions.

4. URSI Publications

URSI Web-pages.

The addresses of individuals will not be published on the URSI Web-pages as this is in conflict with privacy laws in Belgium, but a solution could be to place them on a server in the USA, if Council so wishes.

"Review of Radio Science"

Dr. W.R. Stone would like the Commissions to discuss the following issues at their business meetings:

- Do we have to put a page-limit on the "Review of Radio Science" ?
- Do we accept electronic information without editing?
- Do we put the information on the URSI Web-pages?

The "Radio Science Bulletin"

In order to ensure a continuing high level content of the "Radio Science Bulletin", Prof. P. Delogne, urges the Commissions to forward names of Associate Editors.

5. Wireless Communications

Prof. J. B. Andersen raises the issue, brought forward by the Long Range Planning Committee on the creation of a Committee on "Wireless Communications". Dr. J. Shapira supports this idea, but states that this topic can be very broad and has to be focused on specific issues within this field to be more successful. Prof. P. Wittke expresses the interest of Commission C in this proposal. Prof. J. B. Andersen will draft a proposal of Terms of Reference which will be forwarded to the Commissions for comments.

6. A new Corsendonck-meeting

If a new Corsendonck-type meeting is to be held (preferably together with the meeting of the Coordinating Committee in '98) this meeting should be well focused and well prepared in order to be successful. The previous Corsendonck-meeting, as pointed out by Prof. P. Delogne, was very successful, but the follow up and the incorporation of its results into the structure of URSI could have been better. To increase its success and possible impact, it is felt advisable to let the Commission Vice-Chairs participate in this new Corsendonck meeting.

The idea of such a meeting is supported by Prof. W.E. Gordon. The organisation of the meeting should allow discussions in a relaxed way with business focused by an agenda but leaving plenty of time to discuss in small groups and look ahead over several years.

7. Closing remarks by the President

As an outcome of this Round Table discussion, the President can identify several issues which are to be considered and which are of importance to URSI as a whole and to its scientists which are part of a good working organisation:

- The role of URSI is to serve science and scientists. Although we need resources, its role is not oriented towards serving industry.
- Communication and interaction amongst scientists is continuously needed and has to be stimulated. Channels for this interaction being the "Radio Science Bulletin" of which the quality has to assured and the WWW. This interaction can be increased by publishing reports on Working Groups in the "Radio Science Bulletin". This "Radio Science Bulletin" should include readable material of high quality and of interest to a large community.
- Concerning the activities between General Assemblies, these should focus on Working Groups and on fewer meetings with a larger impact for a broad community.
- Results of the work and discussions carried within URSI should be carried back to the organisations that send people to URSI. Via its members and people, URSI can carry weight on issues within its field of activities.
- The supporting material should be mailed earlier to the Council members.
- The Young Scientists programme has grown over the past few years and should be further announced to a larger community. Through its Young Scientists programme, URSI should establish links with new Member Committees.

8. Closing remarks

It is generally felt that a Round Table discussion, such as the present discussion, can lead to very fruitful discussions and is a better forum to discuss issues about the structure of URSI than Council.

TREASURER'S REPORT ON URSI FINANCES

Introduction

The Treasurer inherited a satisfactory balance sheet following the General Assembly in Kyoto and he first expressed his thanks to the Japanese organising committee for the financial success of the 1993 event in addition to the scientific contribution of the Assembly. He also paid tribute to Dr. Bauer for his outstanding work as Treasurer from 1990-93 and to the URSI Secretariat for having managed the day-to-day financial affairs of our Union so expertly and for introducing a spreadsheet format in 1993 which enabled a close scrutiny of the Union's financial health to be regularly maintained.

The audited accounts for the period 1993-95 are at Annex I (p. 56). The accounts for 1996 will be audited following the year end and will be included in the Treasurer's Report for 1996, to be published in the June issue of Radio Science Bulletin in 1997.

Highlights from the accounts

- The assets of URSI are satisfactory and have appreciated substantially when reported in US dollars. The possibility of reinvesting US holdings in Belgium was examined but found disadvantageous because of the conditions agreed at the time of investment. Thus the Board resolved in 1994 to leave the holdings as established for the remainder of the triennium but to gradually reduce the value of the dollar account as a result of necessary dollar expenditure. There has been a significant reduction in the expenditure of the URSI Secretariat for which Council is indebted to the Secretary General and his staff for their constructive approach. There was a significant reduction in publication expenditure in 1995 following the transfer of the publication of the Radio Science Bulletin to Belgium under the Editorship of Prof. Delogne. The Council is indebted to Prof. Dowden for creating the Radio Science Bulletin, which is perceived as a flagship for URSI.
- Council is asked to note the minimum expenditure incurred in the celebration of the 75th Anniversary of URSI due to the successful acquisition of Grants and the considerable efforts by Prof. Delogne, Prof. Van Bladel, Prof. Van Daele and members of the Secretariat in the efficient organisation of this prestigious event.
- Council should note the unusually high income in 1995 due to efforts made to recover back dues from Member Committees and the income received from three successive IGARSS events which were paid in one year.
- There has been an increase in the triennial allocation to Commissions from 10,000 dollars to 12,000 dollars. This has proved of benefit in terms of activities and in provisions for Young Scientists. However, it is essential for Commission Chairs to plan their triennial expenditure and to recall the need for a growth in expenditure in the year of the General Assembly.

Comments

It is noteworthy that the accounts have been computerised and it is now easy to determine the balance of account at short notice. Council should again thank the Secretariat for their efforts in achieving this situation.

Future Developments

Looking to the future, the Treasurer is presenting the Standing Committee on Finance with three budget scenarios (Annex II, p. 69) for the next triennium and their report will be presented to Council during the Assembly.

The Dues have remained constant for six years. The first scenario continues this trend. The second scenario is based on the annual adjustment from 1997 on of the unit contribution to the inflation rate (OECD Annual Consumer Price Index, USA), i.e. 2.38% for 1997. In the third scenario, the annual adjustment is similar to the one used by ICSU, i.e. 2.00 % above this inflation rate.

It is considered desirable to have small increases on a more regular basis than a large increase occasionally which might prove counter-productive if some Member Committees sought to reduce their category of adherence.

The Treasurer asks Council to recognise that any new initiatives must be properly costed and if resources are required these must be either provided by the initiator or a budgetary estimate for the resources supplied.

Any substantial additions to resources may require an increase in membership dues beyond those due to inflation.

The Treasurer concludes by again thanking all those who have helped him over the period of the triennium.

PROF. P.J.B. CLARRICOATS

BALANCE SHEET ON 31 DECEMBER 1993

ASSETS

Dollars		US$
Bank Degroof	35,201.63	
Merrill Lynch WCMA	47,594.31	
Smith Barney Shearson	0.61	
Traveller Cheque	1,000.00	
		83,796.55
Belgian francs		
Bank Degroof	14,084.31	
Generale Bank	8,803.32	
		22,887.63
Investments		
Demeter Sicav shares	20,547.38	
Rorento Units	111,806.17	
Merrill Lynch Fund	60,019.95	
Aqua Sicav	57,783.18	
Smith Barney Shearson Utilities Fund	81,764.00	
Reinvestment S.B. Shearson Utilities	6,081.50	
Smith Barney Shearson Grade Bond	49,300.00	
Reinvestment S.B. Shearson Grade Bond	2,695.05	
		389,997.23
Other		
Petty cash	312.11	
Debtors	214.25	
		526.36
Total Assets		497,207.77
		=========
Less creditors		
IUCAF	18,946.94	
IUWDS	5,189.73	
Audit fees	1,549.30	
Salary and Social Security	3,699.32	
		(29,385.29)
Balthasar van der Pol Medal Fund (1)		(13,381.97)
NET TOTAL OF URSI ASSETS		454,440.51
		=========

The net URSI Assets are represented by :

		US$
Closure of Secretariat :		
Provision for Closure of Secretariat		19,185.21
Scientific Activities Fund :		
Scientific Activities in 1994	60,000.00	
Young Scientists in 1994	30,000.00	
		90,000.00
XXIVth General Assembly Fund during 1996 :		
Scientific	-	
Young Scientists	-	
Organisation	-	
		109,185.21
Unallocated Reserve Fund		345,255.30
		454,440.51

Statement of Income and Expenditure for the year ended 31 December 1993

I. INCOME		US$
Grant from ICSU Fund	21,200.00	
Contributions from Member Committees	209,005.73	
Sales of Publications	22.54	
Bank Interest	19,245.76	
Gain of Exchange	257.95	
Other Income	27,520.48	
Total Income		277,252.46
II. EXPENDITURE		
a) Scientific Activities		140,163.49
General Assembly - Organisation	3,180.13	
General Assembly - Scientific	42,163.98	
General Assembly - Young Scientists	40,507.30	
Symposia/Colloquia/Working Groups	40,565.10	
Representation at scientific meetings	6,930.08	
Grants to Organisations	6,816.90	

b) Routine Meetings		
Bureau/Executive committee		16,316.58
c) Publications		35,922.93
d) Administrative Expenses		70,929.54
Salaries, Related Charges	41,655.75	
General Office Expenses	10,745.83	
Office Equipment	4,649.69	
Accounting and Audit Fees	9,296.90	
Bank Charges	4,571.37	
e) ICSU Dues		5,953.00
Total Expenditure		269,285.54
		=========
Excess of Income over Expenditure		7,966.92
Accumulated Balance on 1 January 1993		461,973.81
Balance on 31 December 1993		469,940.73
Appreciation of Belgian Franc		-15,500.22
Accumulated Balance on 31 December 1993		454,440.51
		=========

Rates of exchange :
1 January 1993 : $1 = 33,00 BF
31 December 1993 : $1 = 35,50 BF

Observation :
The account indicated with (1) is represented by :
376 Rorento Shares : market value on 31 December, 1993 =$19,428
Market value of investments on 31 December 1993 ($1 = 35,50 BF) :

- DEMETER SICAV :	39,618.59
- RORENTO (2) :	335,885.77
- MERRILL LYNCH	65,861.00
- AQUA-SICAV :	63,672.20
- SMITH BARNEY SHEARSON :	140,466.06
	645,503.62

(2) including the 376 Rorento of v. d. Pol Fund

Detail of Income and Expenditure

I. INCOME		US$
Other Income :		
Royal Society of London	1,531.83	
EMC Symposium	750.00	
ISSSE Symposium	4,982.50	
Spectrum Management	3,994.00	
Profit on Realisation Alpine Shares	13,914.94	
Profit on Realisation Aqua-Sicav	2,347.21	
		27,520.48
II. EXPENDITURE		
Symposia/Colloquia/Working Groups :		
START	2,600.00	
ICC'93	1,000.00	
ISAE'93 - Nanjing	1,500.00	
Ravenscar	2,000.00	
Air Sea Interface	2,000.00	
Int. Microwave	5,000.00	
IGARSS'93	5,000.00	
Electr. Medicine - Rome	1,000.00	
Theoretical Physics - Trieste	6,665.10	
ICPIG	800.00	
ISSSE'95	13,000.00	
		40,565.10
Grants to Organisations :		
RADIO SCIENCE PRESS	2,816.90	
Contribution URSI to FAGS	2,000.00	
Contribution URSI to IUCAF	2,000.00	
		6,816.90
Publications :		
Radio Science Journal	1,500.00	
Bulletin No. 263	2,453.83	
Transportation Cost	2,730.54	
Bulletin No. 264	1,179.13	
Transportation Cost	39,77.00	
Bulletin No. 265	1,352.14	
Radio Science Press	22,519.16	
Transportation Cost	1,424.87	
Bulletin No. 266	1,189.01	
Transportation Cost	1,534.48	
		35,922.93

BALANCE SHEET ON 31 DECEMBER 1994

ASSETS

Dollars		US$
Bank Degroof	15,067.57	
Merrill Lynch WCMA	20,354.33	
Generale Bank	27,663.00	
Smith Barney Shearson	(49.39)	
		63,035.51
Belgian francs		
Bank Degroof	2,865.69	
Generale Bank	69,746.47	
		72,612.16
Investments		
Demeter Sicav shares	22,794.75	
Rorento Units	124,034.97	
Aqua Sicav	64,103.22	
Merrill-Lynch Short Term	30,012.85	
Merrill-Lynch Global Utility	13,492.10	
Smith Barney Utilities Fund	81,764.00	
Reinvestment S.B. Utilities	10,078.33	
Smith Barney Grade Bond	49,300.00	
Reinvestment S.B. Grade Bond	7,019.40	
		402,599.62
Other		
Petty cash		420.81
Total Assets		538,668.10
Less creditors		
IUCAF	14,047.75	
IUWDS	6,007.88	
Salary and Social Security	3,672.53	
Audit fees	1,718.75	
		25,446.91
Balthasar van der Pol Medal Fund (1)		(13,381.97)
NET TOTAL OF URSI ASSETS		499,839.22

The net URSI Assets are represented by :	US$
Closure of Secretariat :	
Provision for Closure of Secretariat	24,131.25

Scientific Activities Fund :		
Scientific Activities in 1995	80,000.00	
Young Scientists in 1995	30,000.00	
Administration Fund in 1995	80,000.00	
I.C.S.U. Dues in 1995	5,000.00	
		195,000.00
XXIVth General Assembly Fund :		
During 1995 :		
	30,000.00	
		249,131.25
Unallocated Reserve Fund		250,707.97
		499,839.22
		=========

Statement of Income and Expenditure
for the year ended 31 December 1994

I. INCOME		US$
Grant from ICSU Fund	21,200.00	
Contributions from Member Committees	175,273.38	
Special contributions	1,635.94	
Sales of Publications	106.25	
Royalties	52.84	
Bank Interest	13,108.04	
Gain of Exchange	1,110.00	
Other Income	10,078.00	
Total Income		222,564.45
		=========
II. EXPENDITURE		
a) Scientific Activities		54,444.94
General Assembly 1993 - Scientific	4,406.88	
Symposia/Colloquia/Working Groups	30,959.97	
Representation at scientific meetings	11,678.09	
Grants to Organisations	7,400.00	
b) Routine Meetings		8,800.18
Bureau/Executive committee		

c) Publications		70,124.31
d) Administrative Expenses		59,527.37
Salaries, Related Charges	38,443.09	
General Office Expenses	6,361.38	
Office Equipment	1,695.97	
Accounting and Audit Fees	10,236.56	
Bank Charges	2,659.97	
Loss on Exchange	130.40	
e) ICSU Dues		7,052.00
Total Expenditure		199,948.80
Excess of Income over Expenditure		22,615.65
Accumulated Balance on 1 January 1994		454,440.51
Balance on 31 December 1994		477,056.16
Appreciation of Belgian Franc		-22,783.06
Accumulated Balance on 31 December 1994		499,839.22

Rates of exchange :
1 January 1994 : $1 = 35,50 BF
31 December 1994 : $1 = 32,00 BF

Observation :
The account indicated with (1) is represented by :
376 Rorento Shares : market value on 31 December 1994 = $17,960
Market value of investments on 31 December 1994 ($1 = 32,00 BF) :

- DEMETER SICAV :	35,510.06
- RORENTO UNITS (2) :	310,470.81
- AQUA-SICAV :	74,605.06
- M-L SHORT TERM :	25,800.00
- M-L GLOBAL UTIL. :	14,858.00
- SMITH BARNEY UTIL. :	77,302.42
- SMITH BARNEY GRADE :	48,145.13
	586,691.48

(2) including the 376 Rorento of v. d. Pol Fund

Detail of Income and Expenditure

I. INCOME		US$
Special Contributions		
Commonwealth Science Council		1,635.94
Other Income		
Reimbursement YS Adimula	8,503.00	
Profit on Sale Merrill-Lynch Fund	1,575.00	
		10,078.00
II. EXPENDITURE		
Symposia/Colloquia/Working Groups :		
COSPAR , Hamburg	800.00	
ESGAP, Aussois	2,800.00	
Com. F. Specialist meeting, Lawrence	2,000.00	
EMC'94, Rome	2,500.00	
CPEM'94, Boulder	3,000.00	
Solar Terrestrial Physics, Sendai	800.00	
MMET'94, Kharkov	1,000.00	
Physics & Eng. (sub)mm, Kharkov	2,150.00	
Beacon Satellite, Aberystwyth	1,345.78	
ISAE'95, Bali	1,300.00	
EMC'94, Wroclaw	2,500.00	
APT MEETING, Urumqi	2,000.00	
JINA '94, Nice	532.38	
SUZDAL, Uppsala	1,631.81	
IGARSS'95, Firenze	5,000.00	
ISSTA'96, Mainz	1,600.00	
		30,959.97
Grants to Organisations :		
COSPAR	400.00	
ICTP-ITU-URSI	3,000.00	
FAGS	2,000.00	
IUCAF	2,000.00	
		7,400.00
Publications :		
KLM Transmail Services	27,771.56	
Gift Prof. Cullen	277.16	
The Radio-Scientist Bulletin	28,034.56	
Bulletin No. 267	4,064.19	
Prof. Van Bladel	223.44	
Oxford University Press	5,814.65	
Report General Assembly	3,938.75	
		70,124.31

BALANCE SHEET ON 31 DECEMBER 1995

ASSETS

Dollars		
Bank Degroof	29,867.57	
Merrill Lynch WCMA	9,484.40	
Generale Bank	54,114.11	
Smith Barney Shearson	682.72	
		94,148.80
Belgian francs		
Bank Degroof	9,743.25	
Generale Bank	159,424.34	
		169,167.59
Investments		
Demeter Sicav shares	22,794.75	
Rorento Units	124,034.97	
Aqua Sicav	64,103.22	
Merrill-Lynch Short Term	30,012.85	
Smith Barney Utilities Fund	81,764.00	
Reinvestment S.B. Utilities	14,593.30	
Smith Barney Grade Bond	49,300.00	
Reinvestment S.B. Grade Bond	10,978.06	
		397,581.15
Other		
Petty cash		953.83
Total Assets		661,851.37
Less creditors		
IUCAF	12,427.13	
IUWDS	7,070.09	
Social Security	5,290.95	
Administration	6,658.85	
Audit fees	1,864.41	
		33,311.42
Balthasar van der Pol Medal Fund (1)		13,381.97
NET TOTAL OF URSI ASSETS		615,157.98

The net URSI Assets are represented by :		US$
Closure of Secretariat :		
Provision for Closure of Secretariat		35,100.00
Scientific Activities Fund :		
Scientific Activities in 1996	80,000.00	
Publications in 1996	70,000.00	
Young Scientists in 1996	40,000.00	
Administration Fund in 1996	80,000.00	
I.C.S.U. Dues in 1996	8,000.00	
		278,000.00
XXIVth General Assembly Fund :		
During 1996 :		200,000.00
Total allocated URSI Assets		513,100.00
Unallocated Reserve Fund		102,057.98
		615,157.98

Statement of Income and Expenditure for the year ended 31 December 1995

I. INCOME		US$
Grant from ICSU Fund	19,800.00	
Contributions from Member Committees	256,007.49	
Correspondents fees	59.59	
Sales of Publications	1.29	
Bank Interest	4,076.06	
Return loan (Support to Symposia under mode C)	14,799.15	
Other Income	21,549.49	
Total Income		316,293.07
II. EXPENDITURE		
a) Scientific Activities		79,747.47
General Assembly 1996 - Scientific	450.03	
Symposia/Colloquia/Working Groups	61,721.59	
"Space and Radio Science" URSI 75th Anniversary	8,224.65	
Representation at scientific meetings	5,232.76	
Grants to Organisations	4,118.44	

b) Routine Meetings		
Bureau/Executive committee		14,742.32
c) Publications		38,680.03
d) Administrative Expenses		67,887.31
Salaries, Related Charges	53,575.69	
General Office Expenses	7,161.83	
Office Equipment	431.66	
Accounting and Audit Fees	4,942.54	
Bank Charges	1,775.59	
e) ICSU Dues		7,405.00
Total Expenditure		208,462.13
		=========
Excess of Income over Expenditure		107,830.94
Accumulated Balance on 1 January 1995		499,839.22
Balance on 31 December 1995		607,670.16
Appreciation of Belgian Franc		-7,487.82
Accumulated Balance on 31 December 1995		615,157.98
		=========

Rates of exchange :
1 January 1995: $1 = 32.00 BF
31 December 1995: $1 = 29.50 BF

Observation :
The account indicated with (1) is represented by :
376 Rorento Shares : market value on 31 December 1995 = $22,151.90

Market value of investments on 31 December 1994 ($1 = 32,00 BF) :	
- DEMETER SICAV :	42,703.12
- RORENTO UNITS (2) :	382,945.12
- AQUA-SICAV :	84,386.78
- M-L SHORT TERM :	25,833.00
- SMITH BARNEY UTIL. :	100,320.07
- SMITH BARNEY GRADE :	64,067.81
	700,255.90

(2) including the 376 Rorento of v. d. Pol Fund

Detail of Income and Expenditure

I. INCOME		US$
Return loan (Support to Symposia under mode C)		
Return "Loan to IGARSS'93"	4,799.15	
Return "Loan to IGARSS'94"	5,000.00	
Return "Loan to IGARSS'95"	5,000.00	
		14,799.15
Other income		
Reimbursement YS (non participating EMC'95)	954.07	
Reimbursement insurance	86.00	
Reimbursement (bank transfer in '94)	2,332.20	
Reimbursement social security	79.00	
URSI share in profit IGARSS'93	4,381.25	
URSI share in profit IGARSS'94	10,684.96	
Profit on Sale Merrill-Lynch Global Utility	3,032.01	
		21,549.49
II. EXPENDITURE		
Symposia/Colloquia/Working Groups :		
EM Theory Symposium	9,361.42	
IRI Workshop	300.00	
COMMSPHERE'95	5,000.00	
CO25-Symposium	2,000.00	
Radio Emissions from the Stars and the Sun	500.00	
Extra Galactic Radio Sources	2,000.00	
URSI and STEP/GAPS Workshop	2,200.00	
ISRAMT'95	2,000.00	
IAU Colloquium 160 Pulsars, Sydney	1,000.00	
Atmosphere Research and Applications using...	500.00	
COST 244 Meeting, Helsinki	1,000.00	
Large Telescope WG Meeting 3 and Workshop	800.00	
EMC'96, Wroclaw	1,000.00	
10th Int. Conf. on Atmospheric Electricity	1,900.00	
CPEM'96	7,000.00	
Biophysical Aspects of Coherence	1,000.00	
Satellite Studies of Ionosphere and Magnetospheric...	1,000.00	
EMC'95, Zurich	3,000.00	
Bioastronomy (EUV Astrophysics), Capri	1,000.00	
MST/2nd Int. School of Atmospheric Radar	1,000.00	
Physics and Engineering of mm and Sub mm Waves	2,000.00	

Commission F Open Symposium, Ahmedabad	5,000.00	
EM Theory Symposium (St. Petersburg)	350.00	
Fourth Trieste College & Workshop	10,810.17	
		61,721.59
Space and Radio Science - URSI 75th anniversary :		
Publications	3,078.14	
Travel expenses	1,798.17	
Administrative costs	3,348.34	
		8,224.65
Grants to Organisations :		
FAGS	2,000.00	
IUCAF	2,000.00	
Union Int. Associations '94	59.22	
Union Int. Associations '95	59.22	
		4,118.44
Publications :		
Printing RSB (No 271-272-273-274)	20,439.66	
Mailing RSB (No 271-272-273-274)	18,115.56	
Transfer to Radio Science Press	72.54	
Printing New Correspondents Cards	52.27	
		38,680.03

In order to avoid the effects of currency exchange fluctuations and to allow easy comparison, the past accounts and the budget models were calculated in Belgian francs. However, for ease of comprehension, they have been converted in the following tables into US$ at a constant exchange rate of 1 US$ = 32 BEF.

The accounts are presented in such a way to clearly show the operating income and expenses, exclusive of the realisation of assets.

Budget scenario I (0.0% increase in unit contribution)

	US$	US$	US$
Scenario: 0.0% increase in unit contribution $1 = 32.00 BEF	Budget '97	Budget '98	Budget '99
Income			
Member Committees	193,750	193,750	193,750
Profit on Symposia	0	0	0
Return from Loans	0	0	0
Other Sources	18,750	18,750	18,750
Total	**212,500**	**212,500**	**212,500**
Expenditure			
General Assembly	0	1,563	93,750
Symposia	53,125	53,125	53,125
Grants to Organisations	14,531	15,000	15,469
Young Scientists	3,125	3,125	50,000
Publications	45,656	47,483	49,382
Board & Coordinating Committee	10,938	25,000	10,938
Administrative expenses	70,131	72,890	75,783
Special events	0	0	0
Total	**197,506**	**218,185**	**348,446**
Surplus (+) / Deficit (-)	**14,994**	**-5,685**	**-135,946**
Cumulative Surplus (+) / Deficit (-)	**-31,525**	**-37,210**	**-173,156**

Budget scenario II (2.38% increase in unit contribution)

	US$	US$	US$
Scenario: 2.38% increase in unit contribution $ 1 = 32.00 BEF	Budget '97	Budget '98	Budget '99
Income			
Member Committees	198,361	203,082	207,916
Profit on Symposia	0	0	0
Return from Loans	0	0	0
Other Sources	18,750	18,750	18,750
Total	**217,111**	**221,832**	**226,666**
Expenditure			
General Assembly	0	1,563	93,750
Symposia	53,125	53,125	53,125
Grants to Organisations	14,531	15,000	15,469
Young Scientists	3,125	3,125	50,000
Publications	45,656	47,483	49,382
Board & Coordinating Committee	10,938	25,000	10,938
Administrative expenses	70,131	72,890	75,783
Special events	0	0	0
Total	**197,506**	**218,185**	**348,446**
Surplus (+) / Deficit (-)	**19,605**	**3,647**	**-121,780**
Cumulative Surplus (+) / Deficit (-)	**-26,914**	**-23,267**	**-145,047**

Budget scenario III (4.38% increase in unit contribution)

	US$	US$	US$
Scenario: 4.38% increase in unit contribution $1 = 32.00 BEF	Budget '97	Budget '98	Budget '99
Income			
Member Committees	202,236	211,094	220,340
Profit on Symposia	0	0	0
Return from Loans	0	0	0
Other Sources	18,750	18,750	18,750
Total	**220,986**	**229,844**	**239,090**
Expenditure			
General Assembly	0	1,563	93,750
Symposia	53,125	53,125	53,125
Grants to Organisations	14,531	15,000	15,469
Young Scientists	3,125	3,125	50,000
Publications	45,656	47,483	49,382
Board & Coordinating Committee	10,938	25,000	10,938
Administrative expenses	70,131	72,890	75,783
Special events	0	0	0
Total	**197,506**	**218,185**	**348,446**
Surplus (+) / Deficit (-)	**23,480**	**11,659**	**-109,356**
Cumulative Surplus (+) / Deficit (-)	**-23,039**	**-11,380**	**-120,736**

Comments to the budget models:

Income

Membership :
comprises membership contributions from all URSI Committees (in '95 important arrears were paid)

Other sources:
comprises ICSU grants, Bank interests, Sales of Publications, extra support from Academies, etc...

Expenditure

General Assembly:
comprises all costs except Young Scientists Programme

Symposia:
comprises budget allocation to Commissions, attendance of URSI representatives at scientific meetings,.....

Grants to Organisations :
comprises ICSU dues, FAGS dues, IUCAF dues,....

Young Scientists :
Young Scientists programme at General Assembly, contingency fund for Young Scientists

Publications :
comprises printing and mailing of Radio Science Bulletin, URSI electronic News, URSI WWW-Homepage

Board & Coordinating Committee Meetings :
comprises all costs for Board and Coordinating Committee meetings

Administrative Expenses:
comprises salary, office expenses, insurance, bank charges,....

Special events:
comprises costs for URSI'75 celebration

Reports of Standing Committees

Standing Finance Committee

The Finance Committee met on 28 August and 2 September 1996 under the chairmanship of Prof. Geher.

1. Accounts for the years 1993-1995

Based on the Treasurer's report the Standing Finance Committee discussed the financial situation of the Union. The accounts have been audited by an independent institution in accordance with international accounting standards. The Standing Finance Committee recommends that Council accept the accounts for the three year period. This should be confirmed by Council.

2. Budget for 1997-1999

The Treasurer's report contained three different scenarios for the next triennium :

a) no change in the existing contribution unit;
b) an annual adjustment (commencing in 1997) of the contribution unit in accordance with the inflation rate (as specified by the OECD annual consumer price index);
c) an annual adjustment in accordance with the ICSU practice which adds an additional 2% to the inflation rate.

The Standing Finance Committee recommends that URSI accept the second of these options which will result in an increase of 2.38% to the unit contribution of 1997.

This should be formally accepted by Council.

3. The UK contribution in 1997

Following a special submission from the UK Member Committee the Standing Finance Committee notes that from 1997 onwards the Category of Membership of the United Kingdom will be changed from category 5A to category 5.

4. Activities

The Standing Finance Committee recommends the continuation of the cooperation - within the URSI budget - with the International Centre for Theoretical Physics in Trieste. Plans have been made for workshops in Trieste in both 1997 and 1998 and these plans have been approved by the Committee for Developing Countries.

URSI should continue to financially support the operations of the Scientific Committee on Telecommunications.

The main message of the Standing Finance Committee, however, is that ANY PROPOSALS FOR NEW INITIATIVES SHOULD INCLUDE A DETAILED BUDGET.

5. Acknowledgement

The Committee wishes to record its thanks to Prof. P.J.B. Clarricoats and Prof. P. Lagasse and to commend them for the financial health of the Union.6. Membership of the Standing Finance Committee for the next triennium

All members of the Standing Finance Committee have served two terms with the exception of Prof. Suchy and Prof. Taylor who served just one. The selection of the membership of the Standing Finance Committee should be at the discretion of the new President of URSI.

K. GEHER, CHAIR

LONG RANGE PLANNING COMMITTEE

The Committee met on 29 August 1996, with Vice-President J. Bach Andersen as chairman. The following items were discussed :

1. Corsendonk

The chairman initiated the meeting by reviewing the written contributions briefly, and gave a reminder of the recommendations from the Corsendonk strategy meeting in 1987. Past President Jull mentioned that the recommendations had been important for the succeeding boards, and that many of the recommendations had been carried out, such as a closer individual connection to the Union, and improved newsletters and other publications. On the scientific side Communications and Remote Sensing were highlighted at that time, and in both cases it was felt that URSI had much to offer, but that we had somewhat missed the boats. Concerning a new, possible Corsendonk meeting in 1998, there were no strong recommendations from the Committee, although there was agreement on the need for an updating of the URSI visions and the creation of new ideas in a rapidly changing world.

In addition to the written comments from others, Dr. Y. Furuhama stressed the importance of joint activities between the Commissions, that the applications oriented activities should be strengthened, especially around Commissions C and D, and noted that in the physics area the URSI involvement in Remote Sensing had not been successful. Dr. R.D. Ekers explained the Commission J viewpoint that the radio astronomers had IAU for the science, but that URSI was needed for the technology. The interaction with other URSI commissions in this respect was highly appreciated. He also pointed out that although many stressed the communications aspects, this would be too narrow a scope for URSI.

2. Commissions C and D

Concerning the 'problems' of Commissions C and D, where enormous activities are taking place in other organisations and in industry, the chairman mentioned that it would be important to have a more clear, and limited scope for these Commissions with limited expectations, such that the task of running them successfully would be eased. They should be seen in the context of work supporting and complementing other Commissions. Examples were mentioned in the field of signal processing, mobile satellite communications and others.

3. New Working Groups

In general it was felt by the Committee that a greater coherence in URSI between the Commissions was needed, and that the creation of active interdisciplinary Working Groups could be improved. Dr. P. Bauer mentioned the necessity to identify some interdisciplinary topics for the Working Groups. They should have a clear mandate, be supported economically by the Board, and administratively by the Secretariat. They should have the possibility of meeting physically between General Asssemblies, and be supported electronically as well. The output should be clearly stated, probably in the form of a written report, which would be of value for external Organisations. It should be ensured that the Working Groups were active in the triennium. As a fruitful starting case the problems surrounding Wireless Systems would be taken, and it would be based on a contribution from Prof. W.E. Gordon to be circulated later. Another closely related suggestion was Mobile Satellite Communications, where Dr. J. Shapira mentioned the need for impartial evaluations. A further suggestion circled around Signal Processing and Radio Imaging Systems, the proposal being carried forward to the Commissions. In order not to fall into the URSI three-year-delay trap, the Working Group should be initiated at this General Asssembly, if at all possible.

4. Electronic Working Groups

The Committee recommends that modern possibilities of facilitating the interaction between scientific groups be exploited by URSI. The Secretariat had promised earlier to deliver expertise and machinery for this purpose, and Dr. V. Khaikin expressed willingness to chair this activity. The chairman mentioned that some ICSU actions were under way and should be explored.

5. Relations to industry

Dr. J. Shapira had experience from Commsphere, that support could be obtained from large industries without strings attached, if they could see the need for impartial advice to administrations. The chairman mentioned that it could destroy the credibility of a scientific organisation, if the investigations were paid by industry. Concerning the experience with exhibitions the present General Asssembly had been a disappointment, since the industry did not see scientists as customers. In a broader context Dr. P. Bauer thought there was potential for growth, and that an exhibition could also serve an image creating process.

6. Conclusion

The Long Range Planning Committee will be putting forward a recommendation of
- setting up a Working Group on Wireless Systems (to be specified)
- strengthening the electronic cooperation facilities within URSI
- asking the Board to consider the need for planning a 1998 'Corsendonk'.

J. BACH ANDERSEN, CHAIRMAN

PROPOSAL TO CREATE AN URSI WORKING GROUP ON WIRELESS COMMUNICATION

Preamble

Advances in wireless and information technology are changing the way we live, the way we work, and the way we play. The impacts of these advances may be compared with those of the invention of the printing press or the industrial revolution.

Cellular telephones and global positioning systems are two examples of new wireless technologies whose remarkable features are not just their economic impacts, spawning new services, businesses, and jobs, but also the rapid rate of development of the technologies. "The success of cellular telephony and other mobile communication products and services, such as messaging and personal digital assistants, has pointed to a fundamental shift in communications in the U.S." (and the world, WEG) "Personal Communications Services - from voice and video to people on the move, rather than to places will be the norm." (T.P. Stanley at COMMSPHERE 95).

The Personal Communication System (PCS) has shown the commercial value of small bands in the radio spectrum, formerly allocated in the U.S.A. by a political process, and now auctioned for ten billion plus (US) dollars. PCS competing with the highly successful cellular phones will connect people and exchange voice and data messages.

Radio advances are driven by information technologies, the globalisation of industries and banking, and by the creativity of bright minds in the right place, at the right time, and with the proper preparation. Secrets of the universe are uncovered in part by radio observations that are being swamped by the interference that grows as technologies advance. Prudent regulation on an international basis is essential. URSI participation at the national and international levels is required.

A working group on wireless communication and regulation, composed of commission representatives as appropriate and one or more representatives of the industry and the regulatory agencies, should be established by URSI and charged with:

1) Encouraging participation in URSI sponsored radio science meetings of representatives from industry and from regulatory agencies to add (a) a problem-oriented aspect to URSI, (b) interactions between the Commissions and the engineering technologies, and (c) provision of a 'home' for open discussions for the constituencies: radio scientists, industry and regulation agencies.
2) Organising meeting sessions focused on problems (e.g. PCS, GPS) with participation by all relevant commissions, and with the session preparations being provided primarily by the working group.
3) Encourage participation in the General Assembly and in COMMSPHERE.
4) Strengthen the URSI and ITU relation.
   The committee further recommends that financial support for the working group's activities be provided by the Board.
5) The working group will terminate after six years.

Standing Publications Committee

The Committee met on 29 August and 2 September 1996 under the Co-Chairmanship of Prof. R.L. Dowden and Dr. W.R. Stone and discussed the following items :

1. Additions to report of the Committee on 1993-96 activities of the Committee

The report of the Committee, which was submitted to the Board in April, 1996, was reviewed. Other than the items noted in connection with specific agenda items, below, there were no additions to the report.

2. *The Radio Science Bulletin*

a. It was noted that Prof. Delogne will partially retire in September 1996, and that he has requested that the Editorship of the Radio Science Bulletin (RSB) be transferred before the end of this year. As stated in his report to the Board and accepted by the Board, Prof. Piotr Sobieski, of UCL, has agreed to take over as Editor. He will be assisted by Luc Vandendorpe, also of UCL. Prof. Delogne stated that he would work closely with Prof. Sobieski to facilitate the transition.

b. Prof. Delogne stated a need for a reconsideration of the Associate Editors of the RSB. He noted that there were not enough technical articles being submitted, and that a broader representation of the technical interests of URSI's Commissions was needed. He recommended that each Commission appoint an Associate Editor representing that Commission, ideally someone having a good knowledge of the interests of the Commission, the scientists in the Commission, and someone who would be attending most of the symposia of the Commission. The merits of this idea were discussed, and there was general agreement. Prof. Delogne is going to request of each Commission Chair that such an appointment be announced and made in the Commission's business meeting(s), before the end of this General Assembly. A major responsibility for each Commission's Associate Editor will be to solicit at least two to three technical articles per year in areas of interest to his or her Commission.

c. There was a discussion of the role of the RSB Associate Editors, vis-a-vis the Editor, in coordinating reviews of technical articles. The consensus was that the Associate Editor may solicit articles. Whether articles are solicited by an Associate Editor, or assigned to him or her by the Editor, the Associate Editor is responsible for coordinating the peer-review process for the articles. The results of the peer-review process should be communicated to the Editor, who has the final decision regarding acceptance, rejection, or other disposition of the article. It was the consensus of the Committee that Prof. Delogne should work with Prof. Sobieski to develop a written set of guidelines for Associate Editors. Furthermore, the fact that the technical articles are peer-reviewed, and other information useful to those seeking support for institutional subscriptions to the RSB, should be published in the editorial portion of the RSB each year. It was noted that this should include a statement of the relationship of the RSB to its predecessor publications.

d. Prof. Clarricoats commented on the type of articles which were appropriate for the RSB. It was noted that in contrast to papers published in the journal of a learned society, articles for the RSB, while having significant technical content, should be understandable by and appeal to those outside the Commission of the field of the article.

e. Prof. Clarricoats recommended, and the Committee adopted by unanimous consent, that the Secretary General should explore possible ways of lowering the production cost of the RSB. One example discussed was the use of a lighter weight, but still high-quality, paper. This could reduce both the cost of the paper, and the cost of shipping the copies of the RSB, by reducing the weight of a copy.

3. *The Review of Radio Science*

a. Dr. Stone reviewed the experiences associated with producing The Review of Radio Science, 1993-1996 (RRS). He noted that there were significant problems caused by Commissions submitting sets of papers which exceeded their page budget by anywhere from 10% to a factor of 2, with some of the Commissions that were the most over their page budget being the latest with their submissions. This left only the choice of totally omitting a chapter, or going ahead with publishing the extra pages. The total book was about 25% over the page budget. In addition to increasing the cost of the book, the amount of time that it took to prepare the camera-ready manuscript was far too great a burden.

b. In discussing the changes recommended for the next RRS, it was recommended that a budget for some technical support be included. Approximately 200-300 hours of technical-writing student help would make a significant difference, and it is believed that this can be obtained for less than $5000, and possibly for substantially less than this. It was also recommended that the due date for submission of final manuscripts be set for 1 August, two months earlier than has been used for the previous two books.
c. In action affirmed following the meeting, the Committee accepted Dr. Stone's offer, and recommended that he be named Editor-in-Chief of the Review of Radio Science, 1996-1999.
d. It was noted that Oxford University Press has indicated a willingness to publish the next RRS and Modern Radio Science under an arrangement similar to that used this triennium. A discussion of this will be initiated with their representative while they are exhibiting at this General Assembly.
e. Prof. Matsumoto noted that a significant portion of the Japanese national committee's contribution to one Commission's section of the Disk was omitted from the Disk. It was agreed that the omitted references would be included on the URSI Web Page, and that their presence there would be publicised in the RSB and in the IEEE Antennas and Propagation Magazine. It was further agreed that the step of having a confirmation copy of each Commission's contribution be sent back to all those who coordinated the submission of material to that contribution, would be added to the procedure of preparing the disk for the next triennium.

The recommendation that Ross Stone serve as the Editor-in-Chief of the Review of Radio Science, 1996-1999, was confirmed at the second meeting.

Peter Clarricoats noted that several Commissions had discussed participation in the Disk of Collected References for the next triennium. He suggested that those Commissions which do not decide to participate because they believe the information on the disk is already readily available, be asked to provide information as to what is available and how it can be accessed. A short discussion of the Disk followed.

4. Modern Radio Science

The problem encountered by Editor Joel Hamelin in producing the final camera-ready copy for the printer was discussed. It was noted that the French firm he contacted quoted $10,000 to $12,000 to do the job, until Peter Clarricoats asked Ross Stone to get an estimate. When Joel took Ross' estimate of $2,000 - $3,000 to do the job to the French firm, they agreed to do it for that amount. After some discussion, it was agreed that the budget for the next MRS should include provision for the costs of producing the camera-ready copy. It was noted that if the next Editor were associated with a university, it was likely that the facilities available there would permit this to be done for even less than it cost this time.

The process of selecting an Editor for MRS was discussed. It was noted that the Editor for MRS has traditionally been an associate coordinator of the Organising Committee for the next General Assembly. The Committee recommends an Editor, and the Board appoints him or her. After some discussion, it was decided to discuss the issue with Keith Balmain and Joel Hamelin. It seemed likely that it wouldn't be possible to identify someone at this meeting, so it will be necessary to poll the Committee when someone is identified, in order to make a recommendation to the Board.

Paul Delogne brought up the question of combining the MRS with the RSB (that is, publishing the tutorial and general lectures as articles in the RSB, instead of as the MRS). During the ensuing discussion, the following points were made:

1. There probably would not be a significant cost savings as a result of combing them. Furthermore, there was considerable prestige associated with the MRS as a book, and Oxford University Press (OUP) valued having it as a separate book.
2. It was believed that there is probably a difference in the way the two publications are perceived by those contributing to them. More specifically, contributors to the MRS might be less inclined to contribute, were it not going to be published as a separate book.
3. There is a difference in the purpose and tenor of articles in the RSB, as compared with the chapters in the MRS, and there should be. Specifically, the chapters in the MRS are more in keeping with the papers of a learned society, while the articles in the RSB are intended to be of more general interest.

The final consensus of the Committee was that the recommendation should go to the Board to continue Modern Radio Science in its current form for the next triennium.

5. URSI logo and scientific journals

Dick Dowden reviewed for the Committee how the agreements under which the URSI logo was attached to the two non-URSI publications which now carry it, the AGU's Radio Science and The Journal of Atmospheric and Terrestrial Physics, were negotiated, and the basic terms of these agreements. The following were considered to be the key aspects of these agreements:

1. There is no financial commitment nor responsibility on the part of either the journal or URSI;
2. In return for the use of the logo, the journal offers individual subscriptions to all URSI Correspondents at a substantially reduced rate;
3. The RSB agrees to run complementary advertisements for the journal from time to time, on a space-available basis;
4. Either parties can cancel the arrangement with reasonable notice to the other.

This opened a discussion of the request by the journal Wireless Networks to have an agreement under which it could carry the URSI logo. It was noted that before such an agreement should be made, there should be some clear benefit for URSI. Examples included reduced subscriptions for Correspondents, and the added visibility gained within the field of the journal for URSI. Paul Delogne expressed concern about the apparent fact that the editorial board of Wireless Networks was not particularly international in scope - 26 out of the 31 members are from the US - and noted that this is a concern, since URSI is inherently an international organisation. He also noted that there are two other commercial journals in the field.

After extensive further discussion, it was moved by Dick Dowden and seconded by K. Geher, that it be recommended to the Board that negotiations, incorporating the items of concern listed below, be entered into with Wireless Networks. If these negotiations can be completed satisfactorily, then an agreement should be drafted, patterned on the two similar existing agreements, for Wireless Networks to use the URSI logo. This draft agreement should then be submitted to the Committee for consideration, with the intent that if it is then found to be acceptable, the Committee would then recommend to the Board that the agreement be accepted. The following are the items which need to be addressed in the negotiations and, to the extent necessary, in the agreement:

1. A mechanism for establishing a coupling between URSI and the editorial board of Wireless Networks should be established. The URSI Working Group on Wireless Systems, believed to be currently in formation, might be a good mechanism for establishing and maintaining this coupling.

2. The journal needs to address the issue of making sure that it reflects the international nature fundamental to URSI, and that it will continue to do so, particularly in the makeup of its editorial board.
3. There should be no financial responsibility for URSI. However, there should be a clear, substantial financial benefit to URSI, most probably through a significant reduction in individual subscription price for URSI Correspondents.

The above motion was passed on a vote of four in favour, none against, with one abstaining. It was the consensus that it be recommended that Dick Dowden, having been involved in negotiating the previous two agreements, should have an active role in working on this one. It was further decided that, at a minimum, the input of Commissions C and J be sought regarding this.

6. URSI News

It was the consensus of the Committee that it be recommended that URSI News be continued in its current form, on the URSI Home Page on the World Wide Web. However, there was also a strong feeling that some mechanism should be found to alert as many URSI Correspondents as we have e-mail addresses for when a change occurs in either URSI News or the home page. It should be possible to do this using a list server, such that it is only necessary to enter a sentence or so, identifying the reason for the notification of the change, and the resulting "alert" would then be sent to all those whose e-mail addresses are included in the list.

7. Designation of members for the next triennium

Dick Dowden announced that he wished to withdraw as Co-Chair for the coming triennium, and that he felt that it should be recommended that Ross Stone should be the Chair of the Committee for the coming triennium. The Committee agreed. The Committee also agreed that the following members should be recommended to the Board for the next triennium, because of the positions/affiliations noted:
- Paul Delogne, outgoing Editor of RSB
- Richard Dowden, former Co-Chair, founder and former Editor of the Radioscientist
- K. Geher, member
- Robert Hunsucker, Editor of Radio Science
- Ross Stone, Chair
- Piotr Sobieski, incoming Editor of RSB.

It was noted that the Board has traditionally identified one of its members to be a direct liaison person, and an ex-officio member of the Committee. This is in addition to the Secretary General, who has always been a valued ex-officio member of the Committee, and who has responsibility for URSI publications. There was strong, unanimous consensus that the presence of a Board liaison person had been very valuable, and it was strongly desired that this continue. In particular, the very valuable corporate memory and excellent contributions of Peter Clarricoats were noted. It was also felt such a liaison was particularly important because of the significant potential financial implications of decisions relating to publications, and because of the value in having insight into the Board's thinking, when considering publications issues. It was therefore the unanimous agreement of the Committee to request and recommend that the Board continue having one of its members as an ex-officio member of the Committee, and to further request and recommend that this be the Treasurer, because of the financial implications of the Committee's work.

After some additional discussion, it was noted that those proposed as members for the next triennium do not really provide adequate representation for Commissions C, D,

and J. The Committee will seek to determine an appropriate way to address this, and this may well result in a supplementary recommendation to the board to add one or more members, in the future.

W.R. STONE, CO-CHAIR

STANDING COMMITTEE ON YOUNG SCIENTISTS

The Committee met on 2 September 1996 under the Chairmanship of Dr. S. Feng and discussed the following items :

1. Report on the Young Scientist Programme

The Committee agreed with the comments made in Council that more complete data on the support to Young Scientists were to be gathered through the Commissions between General Asssemblies.

The report to Council was circulated with the addendum on financial support of Young Scientists at the Lille General Assembly.

2. Some problems of the URSI Young Scientist Programme

The Committee discussed whether the age of a "Young Scientist" should be reduced. Several of our Young Scientist awardees from western and north America appear to have little need for support of our YS programme. Member Committees were asked to take this into account in their ranking. If the age limit for young scientists from developed countries were to be reduced from 35 to 30, about 40% of the 1996 awardees from developed countries would be eliminated. It may be better to emphasise perceived need to support as a criteria for an award.

The reduction in the relative number of awards to people from "developing countries" is affected since 1990 by the movement of several countries from the developing to the developed category and by the necessity for the acceptance of a paper in the regular scientific programme of the General Asssembly. An indication that a certain abstract originates from a young scientist may lead to a higher acceptance rate, and this may affect the status of the award and eventually reduce the availability of travel support from outside sources. The aim is to have about 50% of the awards from developing and former socialist countries and 50% from the rest of the world.

The French Organising Committee has generally refused to provide any support for accommodation of young scientists who decline to stay in the university residences. Exception was made for female young scientists with infants who require convenient washing facilities.

3. Recommendations for the number of Young Scientists at the next General Assembly.

- There should be no attempt to increase the number of young scientists beyond the present level of 120.
- It should be made clear to young scientists that their only accommodation support will be with all the other young scientists in university residences or hostels. Only in exceptional circumstances will any support for other accommodation be made.
- Very few young scientists should receive the award twice. That should happen only where there is a benefit to URSI in maintaining contacts which are otherwise almost certainly lost.

- Chairmen of Commissions that were under-represented in the 1996 URSI Young Scientist programme should make sure that there are more applicants in the 1999 competition.
- The travel reimbursement should be simplified. Purchase of group air fares from Moscow to Toronto should be investigated for young scientists form the countries of the former Soviet Union.

4. Young Scientist Committee for 1996-1999

A smaller Young Scientist Committee is proposed with more involvement. The Committee proposed to have Dr. F. Lefeuvre on the Committee with a few current members who are willing to continue.

E.V. JULL, MEMBER

STANDING COMMITTEE ON DEVELOPING COUNTRIES

The Committee met on 2 September 1996 under the chairmanship of Dr. B.M. Reddy. Were also present : Prof. S.M. Radicella (Secretary), Prof. G.O. Ajayi, Mr. P. Chooncharoen, Prof. S. Feng and Prof. I.A. Salem.

The chairman welcomed the members and briefed the Committee on the activities of the Committee during the last three years. He requested Prof. Radicella to give additional inputs to the report already submitted to the URSI; these new inputs will cover the activities of ICTP for developing countries. The committee agreed to Prof. Ajayi's suggestion regarding better communication in the future. The agenda items were taken up for discussion and the following recommendations were made :

(1) The committee expressed concern about the problem faced by the delegates from developing countries with the high registration fees at the URSI General Asssembly as well as some of the other URSI-sponsored conferences. The Committee recommends that for delegates from developing countries, the registration fee should be reduced to half the amount, so that participation from the developing world can be substantially increased.

(2) The committee appreciates the seed money that is already being given to ICTP to help in organising working shops relevant to developing countries. However, the Committee recommends an additional outlay of 10,000 US dollars exclusively for at least one event in the next triennium. The event will be a workshop on 'Rural telecommunications' to be organised at an appropriate venue in 1998.

(3) The *Handbook on Radiopropagation Related to Satellite Communications in Tropical and Subtropical Countries* is ready. The Committee expressed great satisfaction with this event and appreciated the efforts of Prof. Ajayi and others who helped bring out this excellent book. Prof. Feng in particular was appreciative of the variety of datasets in the book that are not available from any other source. The Committee takes this opportunity to express its gratitude to the International Centre for Theoretical Physics for its financial and logistic support in the reproduction of the handbook.

(4) The committee requests the URSI Council to explore all possibilities to bring in all the developing countries into its fold as URSI provides the appropriate international platform to educate half the world's population in the developing world about the benefits of Radio Science in the exploding information revolution.

B. M. REDDY, CHAIRMAN

Reports on Activities of Inter-Union Organisations

Inter-Union Commission on the Allocation of Frequencies to Radio Astronomy and Space Science (IUCAF)

1. Dr. W.A. Baan prepared a report on the most recent activities of IUCAF and on current issues of interest for the scientific spectrum users.
"IUCAF, the Inter-Union Commission on the Allocation of Frequencies to Radio Astronomy and Space Science, was set up in 1960 by URSI, IAU and COSPAR. Its brief is to study and coordinate the requirements for radio frequency allocations for radio astronomy, space science and remote sensing, and to make these known to the national and international bodies responsible for frequency allocations. IUCAF also takes action in relation to harmful interference into allocated passive bands and caused by radio services operating outside those bands. IUCAF is particularly concerned about radio transmissions from aircraft and space vehicles.
IUCAF has maintained a network of Correspondents in 35 countries to facilitate the interactions with national authorities responsible for frequency allocations.
During the period January to September 1996, IUCAF held a meeting in Nancy, France and participated in:
   - The fourth meeting of the ITU-R Task Group 1-3 on Spurious Emissions in Paris (April). IUCAF provided several input papers.
   - One meeting of ITU-R Working Party 7D in Nancy, France in March.
   - The Annual Meeting of CORF, the Committee on Radio Frequencies of the USA National Research Council, in Washington, DC in February.
   - One meeting of CRAF, the Committee on Radio Astronomy Frequencies of the European Science Foundation, in Manchester, U.K. in April.

2. *Statement of Income and Expenditure for the year ended 31 December 1996.*

INCOME (in USD)			
Contribution from :	URSI ('96)	2,000.00	
	IAU ('95 + '96)	11,677.75	
	COSPAR ('95)	1,000.00	
TOTAL INCOME			14,677.75
EXPENDITURE (in USD)			
- Expenses Baan	WRC95, CRAF, URSI	3,250.51	
- Expenses Doubinsky	ITU-R	400.00	
- Expenses Roger	WRC95	919.10	
- Expenses Sinha	WRC95, SFCG-15	3,965.00	
- Expenses Thompson	WRC95	638.54	
- Operating Expenses		1,267.70	
- Bank Charges		64.88	
TOTAL EXPENDITURES			10,505.73

3. Two general IUCAF meetings were held during the URSI General Assembly in Lille, on 29 August and 3 September 1996. The following items were discussed:

(1) Intense discussions were held on issues related to the Mobile Satellite Services and the interference to be caused by Motorola's IRIDIUM. In particular, the value and significance of a Memorandum of Understanding signed by the IRIDIUM system and the National Radio Astronomy Observatory in the USA. There were concerns that this MoU was not discussed within the larger RA community before its signing. Another major concern was that the MoU represents a local solution that is being applied to a global interference problem. In response, IUCAF Working Party 1 presented an IUCAF position document during the second IUCAF meeting for future use (see IUCAF Home Page).

(2) Working Party 2 tasked IUCAF with preparing scientific and technical arguments and recommendations on the 95 GHz Cloud Radar. In response, IUCAF submitted a position statement to the recent Space Frequency Coordination Group SFCG16 Meeting in Moskow (see IUCAF Home Page).

(3) Considerable time was spent on an action plan to introduce mmwave band allocations on the WRC99 agenda or possibly WRC01.

(4) WP2 also tasked IUCAF to compile documentation on spectrum use at mmwave radio astronomy telescopes. In response to this item and item 3.3, IUCAF has created a 15-member "mmWave Working Group" to study mmwave spectrum use and to prepare IUCAF positions for spectrum allocation requests for the radio astronomy service. A first meeting is planned at the IAU General Assembly in August 1997.

(5) IUCAF was urged to collaborate with ITU-R WP7D on propagation studies and models for mmwave frequencies.

(6) The protection of the 12.2 GHz methanol line and the 1720 MHz OH line was discussed but the chances for success are considered small.

(7) During the General Assembly, IUCAF and members of Commission J participated in the drafting of six resolutions relating to the passive radio services, three of which relate to radio interference.

(8) The following changes were made to the IUCAF membership: Klaus Ruf (Germany) replaces Hans Kahlmann (The Netherlands) for Commission J; were elected as new members : Tony van Eyken (Norway) for Commission G and Wolfgang Keydel (Germany) and Pedro Poiares Baptista (The Netherlands) for Commission F .

W.A. BAAN, CHAIRMAN

Business Transacted by Commissions

Commission A - Electromagnetic Metrology

Chair: Prof. U. Stumper (Germany)
Vice-Chair: Dr. M. Kanda (USA)

Report on the Open Commission meetings (Business Meetings)

The Commission held three Open Commission Meetings, respectively on 29, 30 August and 3 September 1996. Dr. W.J. Klepczynski kindly volunteered his services as rapporteur for the first two business sessions, and Mr. R.W. Yell for the third.

First Open Commission Meeting (29 August 1996)

1. The first item of business was the approval of a list of 18 items for the agenda of the meeting. This was followed by the distribution and brief discussion of the minutes of the last Business Meeting, held at the XXIVth General Assembly (Kyoto, 1996)
2. The discussion next centred on the Chair's report. The Chair pointed out that while Commission A is a small commission, it was involved in a lot of activity at this General Assembly. It organised four scientific sessions and was involved in 6 joint sessions which contained 111 papers.
   Commission A along with Commission G nominated one of the General lecturers, W. Lauterborn (Germany), who lectured on Non-linear Physics and Chaos. The work of the Vice-Chair was recognised.
3. Discussion of the CPEM conference followed. This conference was sponsored by Commission A of URSI and four other organisations (BIPM, IEEE Instrumentation and Measurement, NIST and NRC). CPEM 94 was held in Boulder, CO, and CPEM 96 was held in Braunschweig, Germany. Another conference sponsored by Commission A, the EM Compatibility Conference, was also discussed. EMC 94 was held in Rome (September 1994) and EMC 96 was held in Zurich (March 1996). Since the aims of these conferences are acceptable and consistent with the aims of URSI, it was agreed to recommend continuing sponsorship of these Conferences.
4. Representatives of URSI Commission A to other activities gave their reports. Prof. S. Leschiutta (Italy) reported on the activities of IMEKO. Dr. Stumper reported on the CPEM Conferences. Dr. Lundén (Norway) reported on IEC and ISO. It was recommended that these gentlemen continue as URSI representatives to these activities.

It should also be pointed out that the Chair of Commission A is automatically the representative to the CPEM, CIPM, CCDS, CCDM and CCE. It was also agreed to have James Mc Steele as the Commission A representative to the CCDS in place of the Chair. A report on the CIPM/CCE Meeting of 14-15 June 1995 was also given by the Chair. One of the major items at this meeting was the establishment of key comparison criteria for the demonstration of the equivalence of all national standards in order to reduce the number of comparisons now taking place.

5. The Chair distributed a copy of the current terms of reference for Commission A. These would be discussed at a later meeting.
6. The names of the two candidates for Vice-Chair were read: Dr. Bava (Italy) and Dr. Mathur (India); the Chair then explained the procedure for voting.
7. The meeting closed with a lengthy discussion on the Young Scientist Programme. Dr. Kanda (USA) reported that there were 283 applicants for Young Scientist Grants. 120 were awarded and Commission A received only 3% of those awarded. It was recommended that Commission A National Members do more to encourage applicants. During the discussions it was pointed out that a large number of applications were denied because of formalities, i.e., application had not been properly or fully submitted. It was also mentioned that Commission A members favour that Young Scientists be considered at any age below 35 regardless of educational background.

Second Open Commission Meeting (30 August 1996)

1. Dr. Stumper opened the meeting by reporting that the ballots were coming in and that the results of the election would be announced at the final Business Meeting.
2. Mr. Yell (UK) gave the report on the CCDS Meeting in place of Mr. Steele who could not attend the Lille General Assembly. The CCDS Meeting was held at the BIPM in Sèvres on 12th-13th March 1996. At the meeting the advances in commercial cesium beam frequency standards were reported, as well as the developments in cesium fountains. Also reported were the results of the CCDS Working Group on Relativity and the Working Group on Two-Way Satellite Time Transfer, the adoption of the Black Body Correction and the efforts made to coordinate the navigation satellite system used to distribute time.
3. Dr. O. Lundén gave a report on the IEC activities with interest to URSI Commission A. During the last three years there has been a rather limited activity in the technical committees that concern commission A. Copies on relevant pages from the IEC yearbook 1994 and the Catalogue of IEC Publications are enclosed in the Appendix. These show issued IEC publications from IEC Technical Committee 77 Electromagnetic Compatibility and IEC Technical Committee 85 Measurement Equipment for Electromagnetic Quantities. A draft circulated as a final committee draft of interest to commission A is IEC 1786: "Definition and Methods of Measurement of Low Frequency Magnetic and Electric Fields with Particular Regard to Effects on Human Beings", and a subject under consideration is the measurement and evaluation of high frequency (9 kHz to 300 GHz) electromagnetic fields with regard to human exposure.
4. Dr. M. Kanda (USA) reported on the efforts of Commission A with regard to the Reviews of Radio Science. Prof. D'Amore (Italy) was proposed as the next editor. He was subsequently elected. Dr. Celozzi (Italy) was proposed as editor of the Disk Reference for Commission A. It was requested that the National Chairs for Commission A should give him a list of significant references of articles from their countries, in order to include them in the Disk Reference List.

5. Next, Dr. B. Mathur (India) was proposed and elected as Commission A Associate Editor for the Radio Science Bulletin. His duties include soliciting 2-3 pages per year on topics concerned with Commission A. He will also organise the reviewing of papers for the Radio Science Bulletin. Commission A members are requested to cooperate as much as possible with Dr. Mathur. Commission A members expressed their agreement with the new format of the Radio Science Bulletin and support its continuation.
6. The Terms of Reference of Commission A were reviewed. It was recommended that item 1.g of the Annex be revised to read:
"Measurements and standards from dc to optical frequencies."
7. The duration of future URSI General Assemblies was discussed next. Several alternatives were proposed, but those present agreed that the current meeting format and length should be continued.
8. Prof. S. Leschiutta (Italy) presented an Opinion to be passed on to the Council. It was approved with some minor changes by those present. The essence of the opinion was that Metrological Organisations should be aligned with the decisions of the CIPM and its Consultative Committees.
9. The meeting closed with a lengthy discussion on topics that the Chair, Vice-Chair, and nominated Vice-Chair should bring up at the Round Table Discussions to be held on Saturday 31st August. These included: (a) to distribute items of interest to URSI members covered at other scientific conferences; (b) to encourage URSI membership in developing countries; (c) to disseminate metrology work to other Commissions; (d) to stimulate discussions on certain topics among the various National Commission A groups; (e) to stimulate meetings among National Commission A groups; and (f) to stimulate interaction with other Scientific Unions.

Third Open Commission Meeting (3 September 1996)

1. Selection of Vice-Chair for 1996-99

Of the 20 votes cast, 13 were in favour of Dr. Bava (Italy) and 7 in favour of Dr. Mathur (India). Thus Commission A will recommend to the URSI Council that Dr. Bava be the next Vice-Chair for Commission A.

2. Resolutions or Opinions

No further Resolutions or Opinions were forthcoming from the Official members, hence the Opinion proposed by Prof. Leschiutta (Italy) will be the only one to forward to Council.

3. Coordinator for 1999 URSI Assembly

Commission A representatives agreed to recommend that Prof. David Olver (UK) be asked to act as Coordinator for the 1999 General Assembly in Toronto.

4. Working Groups

Prof. Tapan Sarkar (USA) was invited to comment on the progress of the Working Group on "Time Domain Waveform Measurements". He said that the Working Group, started by Dr. Nahman nine years ago, had now outlived its purpose and much of the field was being covered in other Commissions' activities. It was proposed and agreed that this particular initiative should be allowed to lapse. With a new Mission Statement and new leadership this technical topic could be revived.

Intercommission Working Group AFG1 "Scientific Uses of GPS Signals" based on a Resolution passed in Kyoto from Commission A, F, and G, needed to be re-validated. Dr. Mathur (India) commented on the growing importance of GPS and proposed that this Working Group should continue. The Chairman was agreeable to this but commented that we would need to recommend someone to take the lead for the Commission and that this person should be identified this week. Dr. Kanda (USA) commented that the person proposed would need to be pro-active in support of this work. The proposal was endorsed by the members subject to these provisions.

A further Working Group was proposed with the title "Wireless Commission Regulations" in which URSI Commission Representatives would be joined by members from industry and regulation agencies. The details of membership and the agenda of this Working Group were not entirely clear and more may emerge as a result of discussion in Council (on 3 September 1996.) It was agreed that Commission A would want to participate in this initiative and that the national representatives would be contacted by e-mail as soon as more information was available.

5. Introduction of Incoming Chairman

Dr. Stumper (Germany) introduced Dr. Kanda (USA) as the proposed incoming Chairman for Commission A and thanked him for the considerable support he gave the present Chairman.

Dr. Kanda expressed sincere thanks to Dr. Stumper for his work with, and guidance of Commission A throughout the last three years. This had not been an easy period with the loss of continuity of the Chairmanship after the events at the Kyoto Assembly, Dr. Stumper had to "re-build" Commission A and put it on to a sound footing. This he had done most successfully, and the Commission could look forward to a progressive future. Dr. Kanda asked that this be recorded in the minutes. Dr. Kanda then discussed the development of the Commission in the next period. The proposed structure of the Commission would be:

Chairman : Dr. M. Kanda (USA)
Vice-Chairman : Dr. E. Bava (Italy)
Editor of Review of Radio Science : Prof. M. D'Amore (U Roma)
Editor of Disk References : Dr. Celozzi (U Roma)
Assistant Editor for Radio Science Bulletin : Dr. B.S. Mathur (India)

Dr. Kanda outlined his plans for the 1999 General Assembly in Toronto.

He plans to suggest a Tutorial Lecture on the theme of "EM Metrological Issues in Wireless Communications" and the principal Sessions for Commission A would be based on the following:

A1 Time and Frequency Metrology
A2 Materials Measurements
A3 Lightwave Communications Metrology
A4 New RF to Submillimetre-wave Standards and Measurements
A5 Quantum Metrology
A6 Laser Stabilisation

also a number of joint sessions were proposed as follows:

AB1 Antenna and EM Field Measurements
AB2 Time Domain Measurements
AD Optical Measurements
AE EMC Measurements

DA Interconnect and packaging in High Speed Devices
DA Advances in Cryoelectronics
EA EMC and EM Pollution
KA Human Exposure Assessments and Related Measurements

The Commission Representative were invited to note these proposals, and to suggest other ones if appropriate.

6. URSI Sponsorship Requests

Dr. Mathur asked about sponsorship for other conferences under the URSI "umbrella". Dr. Kanda commented that the Commission A Chairman has some (limited) funds for sponsorship, which can be used at his discretion; he will consider each case on its merits.

As there was no further business the meeting adjourned at 5.50 p.m.

COMMISSION B - FIELDS AND WAVES

1. Chair and Vice Chair (1994-96 triennium)

Chair: Professor A. David Olver (UK)
Vice Chair: Professor Chalmers M. Butler (USA)

2. General

Commission B has had another active triennium with a format of events similar to that of previous triennia. The worldwide Commission B community is large, active, and participates regularly in international events. The study of electromagnetic theory and practice through microwaves and antennas benefits from international collaboration, and URSI provides an excellent forum for the exchange if ideas and dissemination of information. URSI has always been strongly supported by Commission B engineers and scientists. This continues in many ways. Conferences have been sponsored by both international URSI and national societies. The national sponsorships tend to go unreported but provide an important feeder of committed people for the international events. Particularly notable is the US National Committee for URSI which sponsors the annual summer APS/USNC meeting and the winter Boulder meetings. This triennium has also seen much greater interaction between electromagnetic scientist from the former Soviet Union countries and western countries. The commission B community in Russia and Ukraine is very large and URSI has contributed in the last three years to developing contacts between scientists.

3. Electromagnetic Theory Symposium

The main event which Commission B organizes between General Assemblies is the International Symposium on Electromagnetic Theory. The 15th Symposium in the series took place over four days in St. Petersburg, Russia from 23-26 May 1995. The decision to hold the 15th Symposium in Russia was made in 1992 shortly after the end of the Cold War and the collapse of the Soviet Union. This led Commission members to warmly embrace the invitation from the Russian Commission B. The organization presented considerable challenges but the results showed that it was successful, beneficial to participants and particularly rewarding to those in Russia and Ukraine who do not have adequate funds to travel to conferences.

A total of 348 participants took part in the 1995 Symposium from 33 countries with the largest contingent from the host country. The Technical Program Committee received 456 synopses which led to the final presentation of about 270 papers. There were many novel and original presentations which were published in a 894 page proceedings. A popular feature was the invited lectures which provided a good opportunity to hear from experts.

A Young Scientist Award Program at the symposium enabled 25 young scientists to participate who would not otherwise have been able to go to St. Petersburg. Funds for the awards came partly from the Commission B triennial allocation from URSI and partly from the general registration fees. The enthusiasm of the young scientists was very evident. They fully participated and availed themselves of every opportunity to make the best use of their time to interact with other participants.

Initial plans are in place for the 1998 Electromagnetic Theory Symposium to be held in Thessaloniki, Greece, during 25-28 May 1998. Local Organizing and Technical Program Committees have been formed and are engaged in the early stages of making plans for the meeting. A new feature is a web site that has been set up for the symposium: http://www.ursicommb.eng.clemson.edu.

Proposals to host the 2001 Electromagnetic Theory Symposium were submitted by Canada, China, and Japan. The official members of Commission B elected Victoria, BC, in Canada as the venue of the 2001 symposium.

4. Meetings Sponsored by Commission B

During the triennium, Commission B sponsored a number of meeting that addressed topics within the purview of its terms of reference. A table reflecting the meetings sponsored and the mode of sponsorship is provided below.

Meetings Sponsored by Commission B (Budget 1994-1996: $12,000)

Details Meeting	*Amount of Sponsorship*		*Remarks*
	Requested	*Approved*	
European Microwave Conference, 1993, 1994, 1995	$0	$0	Mode A
Physics and Engineering of mm and submm Waves, Kharkov, Ukraine, 7-10 June 1994	$0	$0	Mode A
Int. Conference on Mathematical Methods in EM Theory, Kharkov, Ukraine, 7-10 Sept. 1994	$1,000	$1,000	Mode B
PIMRC '94, The Hague, The Netherlands, 19-23 Sept. 1994	$0	$0	Mode A
Int. Conference on Computational Electromagnetics and Its Applications, Beijing, China, 1-4 Nov. 1994	$0	$0	Mode A
JINA-94, Nice, France, 8-10 November 1994	$500	$500	Mode B
Asia Pacific Microwave Conference, Tokyo, Japan, 6-9 December 1994	$0	$0	Mode A
Int. Conference on Antennas and Propagation ICAP, Eindhoven, The Netherlands, 1995	$0	$0	Mode A

URSI Symposium on EM Theory, St. Petersburg, Russia, 23-26 May 1995	$9,000	$9,000	Mode B
Int. Conference on Radio Science, Beijing, China, 10-12 August 1995	$0	$0	Mode A
Int. Workshop on Direct & Inverse EM Scattering, Turkey, 17-24 September 1995	$0	$0	Mode A
ISAP, Chiba, Japan, 24-27 Sept. 1996	$0	$0	Mode A
	Grand Total:	$10,500	

5. Terms of Reference

The Commission terms of reference have been refined over the years yet they were modified by action of the Commission at the Lille General Assembly. They are now judged to be more in tune with modern-day electromagnetics and they allude to the applications embraced by Commission activities. The amended terms of reference are listed below.

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

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

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

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.

6. Fellows of URSI

At the Commission B Business Meeting held on Thursday, 29 August, 1996, there was a discussion of the proposal to establish the Fellows of URSI program as proposed by the United Kingdom. The members present at the meeting were unanimous in supporting the proposal with the understanding that Fellows should be awarded for distinguished scientific contributions to URSI.

7. Election of Commission B Officers

In Commission B the Vice Chair succeeds to the Chair for the triennium to follow and the Vice Chair is elected by the member nation representatives. An election was conducted and Prof. Staffan Ström (Sweden) was elected Vice Chair, with Prof. Karl Langenberg (Germany) elected alternate vice chair.

8. Review of Radio Science

At the Commission B Business Meeting of Friday 30 August, 1996, the Review of Radio Science was discussed extensively. It was decided that

The Commission should publish review articles for the Review of Radio Science. There was a preference for broad reviews of interest to a wide readership.

The Commission should participate in the bibliography. This was decided on a straw vote. There was a sizeable minority against participating, due to the considerable

effort involved in compiling the list of references. It is suggested that consideration should be given to reducing this effort. It is also strongly recommended that future bibliographies are placed on the World Wide Web.

The Commission Editor designated for the next triennium is Professor Yahya Rahmit-Samii (USA)

The Commission Editor of the bibliography is to be Professor Makato Ando (Japan).

9. The Radio Science Bulletin

Member nation representatives at the 30 August, 1996, Commission B Business discussed the Radio Science Bulletin and supported the idea of associate editors who are charged with the responsibility of finding articles of general interest to URSI. The view was expressed that administrative information pertaining to the Bulletin should go on the WWW. There was some concern that safeguards be put in place to prevent the Bulletin from becoming yet another scientific and engineering journal. And there was general agreement that a deliberate attempt be made by the editorial board to determine those topics within the expertise of a given commission that are of interest to other commissions and have a series of articles published on such topics. Wider distribution of the Bulletin was encouraged with consideration given to placing issues on the WWW.

The Commission B Associate Editor for the next triennium will be Professor J. M. Arnold, Department of Electrical and Electronic Engineering, University of Glasgow, Glasgow G12 8QQ, United Kingdom. E-mail: j.arnold@glasgow.ac.uk.

10. General Assembly

At the end of the triennium, the preparations for the Lille General Assembly took up considerable, but worthwhile, Commission B effort. Twenty convenors put together a wide ranging and comprehensive program selected from over 260 contributions submitted to the Commission B sessions - the largest number to any Commission. In addition the Commission participated in nine joint sessions. B session organization was guided by the desire to focus on fundamentals of fields and waves, while the needs of the applications-oriented commissions dictated the topics of joint sessions. Poster sessions served partially as "overflow" for oral sessions but many of the poster-session papers were selected because their contents were appropriate for this mode of information transfer. In numerous cases authors requested that their papers be in poster session. In general the papers in the poster sessions were of high quality. The URSI Young Scientist Program has supported the attendance at Lille of 120 young men and women, thirty (25%) of whom are designated Commission B.

Recommendations

At the Commission B Business Meeting held on Thursday, 29 August, 1996, there was general discussion of the program, dates, and format of general assemblies. There is general support for the format of single sessions covering specific Commission B topics together with joint sessions covering applications and interdisciplinary topics. There was a preference expressed for more reviews by both invited and contributed authors. Commission B feels strongly that the printed program should contain the times for delivery of the papers. This is essential if participants are to be able to move between sessions. There continues to be opposition in Commission B to having general assemblies that begin on a date that falls in the last two weeks of August, which point has been made repeatedly to the Council by member countries and by Commission B but which seems to have fallen

on deaf ears. The general assembly attendance in recent years has been impacted by this unfortunate choice of dates, especially among those from North America who otherwise would have attended. The Commission, by a show of hands, voted overwhelmingly (about 60 to 3) for shorter duration general assemblies as proposed by the Long Range Planning Committee, with the technical program contained within one week.

Better access to e-mail and telnet facilities at general assemblies is highly desirable and should be brought to the attention of the Long Range Planning Committee and of the attention of future host committees. The hosts at Lille took a good first step by making e-mail available but the lines were long and facilities for access to telnet are not provided.

11. Communications

The Official Members were kept informed of Commission B activities during the triennium by means of three news letters reporting meetings and highlighting information relevant to Commission B.

Commission B has created a web page (http://ece.clemson.edu/cem/ursi/) which is still under development and which contains information at this stage devoted primarily to the 1998 Electromagnetic Theory Symposium.

Commission C - Signals and Systems

Chair : Prof. P.H. Wittke (Canada)
Vice-Chair : Prof. B.J. Evans (United Kingdom)

Report on the Open Commission meetings (Business Meetings)

Prof. Wittke welcomed the delegates and provided the agenda.

1. Introduction and report on 1994 - 96

Commsphere

Dr. J. Shapira presented the background to Commsphere meetings. This conference met in 1989, 1991 and 1995. It was never intended to become a regular meeting, but rather a discussion forum which would endeavour to bring different disciplines together. It aims to provide a bridge between technologists and administrators, as well as between administrators and industry. It does aim to arrange plenary sessions on hot topics.

Typically: Global information, the super highway, wireless applications
Developments in spectrum management
Radioastronomy and Communication
Personal Communication satellites - the different programs

Workshops: Biological effects
Wave orientation - Space / time
Signal Processing

Smart antennas
UMTS / IMT 2000
GSM-European vis-a-vis US
Multiple access schemes - the future
Globalisation -protocols
Multimedia / Multiservices
Enabling Technologies

International Symposium on Signals Systems and Electronics (ISSSE)

This is a joint Commission C and D meeting in between two URSI General Assemblies. Meetings in 1989 (Germany), 1992 (Paris) and 1995 (San Francisco) - typically 200 attendees.

Commission C allocated $4,000 and made a profit, which has been returned in the form of Young Scientist awards. The total budget is about $80,000.

An Inter Commission Steering Committee was agreed upon, which would include three members each from Commissions C and D.

Commission Chairs would be ex-officio members of this Committee.

2. Elections: Chairmanship and Vice -Chairmanship.

There were four nominees for these functions : Bonek, Dutta Roy, Lucas and Shishkov.
Appointment of tellers : P. Delogne and K. Geher.
The result of the election was : Prof. J.G. Lucas (Chair) and Prof. E. Bonek (Vice-Chair)

3. Publications:

Radio Science Bulletin : Prof. Tartar has undertaken the responsibility of Associate Editor for Commission C.

Review of Radio Science 1999 : Prof. Bonek has undertaken the responsibility of Editor for Commission C.

Feedback on publications - requested nationally.

Author Disk : will depend on developments.

4. Terms of Reference for Commission C

There were no recommendations for change, but there was a general feeling that each meeting (General Assembly or in between) should have a definite focus.

5. Future General Assemblies

Length:the consensus centred on a solid week of business which could usefully include a weekend.

Session topics and convenors : discussions have been held with Commission F with the likely aim for two joint sessions on mobile-radio topics which would NOT be paralleled by either Commission. There is the possibility of a joint session with Commission G on HF radio. There are a number of international programs on Ionosphere propagation and systems. Commission F is keen for a session on Modulation techniques, with particular emphasis on the suppression of intermodulation products.

6. Budget

Sponsorship of meetings

The Commission is really obligated to support meetings between General Assemblies, for example ISSSE, Commsphere and a possible joint workshop with F. The Commission is also interested in the possibility of sponsoring the presentation of a high power lecture in a number of developing countries.

7. Other Business

Prof. Lucas proposed a motion of immense appreciation to Prof. Wittke for his outstanding contributions during the triennium. This was passed with acclaim.

The goal of the new Chairman will be to thoroughly involve all national Commission C representatives in developments and debates during the next triennium. Commisson C would like to see each of these representatives attend and contribute to the sessions at the next General Assembly in Toronto.

The Commission will establish good e-mail contacts as well as develop a site for Commission C on the World Wide Web.

SCIENTIFIC PROGRAMME

At Lille the lecture programme addressed the general status of issues associated with mobile communication.

The programme for Commission C commenced on Thursday 29 August with the tutorial lecture by Prof. R.L. Pickholtz which provided a comprehensive review of the state of the art of low earth-orbiting satellites. This has been included in the 1996 edition of Modern Radio Science edited by Dr. J. Hamelin.

"Multiple user satellite techniques" were then explored, and this topic was followed by a lively session on mobile and personal communications. The challenges and opportunities of personal communications in North America were discussed with several standards vying for market share, specifically in the 1900 MHz band.

The opportunities of seamless mobile services which combine DECT at home and in the workplace with GSM while on the move, were discussed.

The new angular or space domain for multiple access was discussed with its potential for a 300 to 400% increase in capacity. The associated problems and limitations were described, as well as the achievement of the EC project "SAINT" in extending functionalities defined for terrestrial mobile radio by project MONET to satellite services.

NTT plans for a third generation mobile system which would employ a flexible high bit rate CDMA interface were described.

The Korean CDMA system which is in commercial operation was discussed, together with their plans for a new air interface to ITU.R.

ETSI's policy in the evolution of second generation GSM to third generation UMTS was described. The enormous growth in the GSM customer base to some 20 million world wide was noted together with the way that Phase 2 GSM developments will preempt many desirable features of UMTS/IMT 2000.

There is doubt whether standardisation procedures which have worked so well in the past will be able to cope with the challenges of Internet development. An important contribution was reported on the development of ultra low power RF IC technologies for mobile use.

New work on channel coding was discussed together with proposals for new modulation schemes.

A very interesting session considered recent developments in millimetre and sub millimetre devices and their applications, which was later supported by consideration of systems which integrate microwaves and light waves.

The programme concluded with a joint session which considered the important effects of Electromagnetic interference.

Commission C organised ten Scientific Sessions, namely

C1 High-frequency Technology for Mobile/Personal Communications (I+C)
I. Ohtomo (Japan)

C2 Recent Research and Development Activities in Millimetre and Submillimetre waves (I+C)
K. Mizuno (Japan)

C3 Synthesis and Analysis of Systems (I+C)
B. Shishkov (Bulgaria)

C4 Mobile and Personal Communications (I+C)
A. Sumakic (Belgium) and E. Bonek (Austria)

C5 Wavelets, Time-frequency Analysis and Modal Decomposition (I+C)
D. J. Thomson (USA)

C6 Advances in Channel Coding and Modulation (I+C)
M. G. Battail (France)

C7 Multimedia and Broadband Networking (I+C)
A. Danthine (Belgium)

C8 Multiple User Satellite Communications Techniques (I+C)
L. J. Mason (Canada)

C9 Digital Signal Processing in Telecommunications (I+C)
P. Delogne (Belgium)

The Commission was also the leading organiser of the following joint sessions :

CD Integration Technology of Microwaves and Lightwaves-Systems and Devices (I+C)
C: M. Akaike (Japan) and T. Berceli (Hungary)

CE Electromagnetic Interference to the New Generation of Digital Radio Systems above 1 GHz (I+C)
C: T. Kobayashi (Japan) and E: B. Despres (France)

The Commission further participated in the following joint sessions :

DC Microwave/Optical Interactions (I+C)
C: H. Ogawa (Japan)

HCJ Signal Processing Techniques with Space Radio and Plasma Wave Data (I+C+P)
C: W. Kofman (France)

HGCJ Turbulence and Wave Analysis for Non Gaussian Signals (I+P)
C: J.L. Lacoume (France)

JCE Interference Problems in Radio Astronomy and Communications -or Cosmic Ecology (I+C+P)
C: L.W. Barclay (UK)

COMMISSION D - ELECTRONICS AND PHOTONICS

Chair: Prof. T. Itoh (U.S.A.)
Vice-Chair: Prof. R. Sorrentino (Italy)

REPORT ON THE OPEN COMMISSION MEETINGS (BUSINESS MEETINGS)

The Commission held two business meetings, respectively on 28 and 29 August. This is a report on the main business transacted as well as on the scientific programme organised at the XXVth General Assembly of URSI.

1. New Chair and Vice Chair for 1996-1999

At the conclusion of the General Assembly, Prof. Roberto Sorrentino, former Vice Chair, took over the Chair from Prof. Tatsuo Itoh. Three candidates had been nominated for the position of Vice-Chair of Commission D for 1996-99, viz.:

Prof. B.N. Biswas, India
Prof. Peter Russer, Germany
Prof. Alwyn Seeds, United Kingdom

According to the URSI rules, at the second business meeting, any official member who was present was given the opportunity to change his vote (if previously cast by mail). As a result of the ballot, Commission D recommended to Council the candidates for Vice-Chair in the following order:

1.	Prof A. Seeds	United Kingdom
2.	Prof P. Russer	Germany
3.	Prof B.N. Biswas	India

Prof. Seeds was consequently appointed by the Council Vice Chairman of the Commission D for the triennium 1996-1999.

2. Terms of reference

The Commission noted that its scope is extremely broad. The Commission was originally formed in part to provide URSI input on new technology, but its status was enhanced to "stand-alone". With increased emphasis of URSI on telecommunication issues, Commission D has strengthened its traditional coverage on electronic and photonic devices, circuits and components, many of which are key ingredients for the modern telecommunication, wired and wireless.

It was resolved unanimously to keep the present terms of reference, which are as follows: The Commission promotes research and reviews new development in:

(a) Electronic devices and applications;
(b) Photonic devices and applications;
(c) Physics, materials, CAD, technology and reliability of electronic and photonic devices, with particular reference to radio science and telecommunications.

The Commission deals with devices for the generation, detection, storage and processing of electromagnetic signals together with their applications, covering all frequencies, including those in the microwave and optical domains."

3. Radio Science Bulletin

At the first business meeting, Prof. Itoh informed the Commission that each URSI Commission should appoint an Associate Editor. His duties are to solicit and select two or three papers per year for the Radio Science Bulletin. The Commission agreed to postpone the appointment of Associate Editor to the 2nd Business Meeting after the Vice Chair had been chosen. Dr Zoya Popovic (USA) was then appointed Associate Editor for Commission D of the Radio Science Bulletin.

4. Review of Radio Science and Disk of Reference

At the proposal of Prof. Itoh, the Commission resolved that, as customary, the incoming Vice Chair will serve as Commission Editor for the Review of Radio Science.

Regarding the participation of the Commission in the Disk of Reference, Prof. David Skellern (Australia) made motion to cease participation. Prof. Zoya Popovic seconded the motion. It was then resolved unanimously not to participate in Disk. The Commission approved recommendation D.1.

5. ICO (International Commission for Optics)

Prof. Itoh informed that ICO belongs to the International Union of Pure and Applied Physics Union (not URSI), but that the area it covers overlaps with that of URSI. Commission D was charged to review the issue of joint activities between ICO and Commission D. Prof. Seeds wrote a recommendation that ICO and Commission D should keep each other informed of their respective activities. Recommendation D.2. was subsequently approved.

6. International Symposium on Signals, Systems and Electronics: ISSSE'98

Prof. Itoh reported on the history of the International Symposium on Signals, Systems and Electronics (ISSSE), a conference organised by URSI Commissions C&D. In accordance with the recommendations made to the URSI General Assembly in Tel Aviv in 1987, it was decided to initiate a series of triennial international symposia with the aim of covering all the fields of telecommunications (in particular the activities of Commissions C&D), and of promoting the exchange of experience and results among scientists and engineers working in these multidisciplinary areas. The first ISSSE in the series was held in Erlangen, Germany. The Symposium then moved to Paris (France) in 1992 and San Francisco (USA) in 1995. There was discussion on where to hold the 1998 meeting. Italy, Japan, Ireland, Australia and the Netherlands were suggested as possible venues. Discussion on the location and scope of ISSSE followed. It was recommended that the scope of the conference should be focused on specific subjects, which could be changed from one meeting to the other.

The meeting resolved to form a Joint Working Group with Commission C for the organisation of the ISSSE meetings. It was agreed that the composition of the group should be such that major thematic areas of Commission D were represented so that a balanced view could be presented in determining joint technical themes for ISSSE.

Prof. Tatsuo Itoh (microwave devices and circuits), Prof. Bohdan Mroziewicz (optical devices and systems) and Prof. David Skellern (digital & radio systems) were nominated for membership of the Joint Working Group.

Prof. Sorrentino and Prof. Itoh agreed to work together with Commission C regarding establishment of the working group.

The working group was then formally established, together with Commission C, as the Steering Committee for ISSSE, and the joint resolution U.14 was made.

Membership will be up to three representatives from each Commission. In addition, Commission Chairs will serve as Ex Officio members. The Coordinator for the Steering Committee will be selected for a three year term, and he will be the point of contact.

Prof. Tatsuo Itoh was designated as the point of contact of the Steering Committee. He then decided that the Call for Proposals to Run ISSSE'98 would be due by 15 December 1996 at his address.

The Steering Committee is now soliciting proposals for ISSSE'98 consistent with the following guidelines :

1. ISSSE'98 should be held in the period September to December 1998.
2. The duration should be 2-3 days.
3. ISSSE'98 should include a significant number of sessions on a focused theme, while also remaining open to papers in other areas of interest to Commissions C and D. Note that this is a departure from previous ISSSE meetings. The focused theme should feature prominently in the call for papers.
4. Association of ISSSE'98 with another meeting of interest to Commission C and/or D is encouraged.
5. A suggested format is a combination of invited plenary talks - say one each morning and afternoon - plus two parallel sessions at other times.
6. A Young Scientist Programme should be included.

Proposals should address each of these guidelines and include the following information:

a) Names of the Chairperson and members of the local Organising committee (the Commission Chairs are joint conference Vice-Chairs).
b) Names of the Technical Programme Chairs (one each for Commissions C and D).
c) Venue.
d) Dates.
e) Budget based on conservative break-even number of attendees.

7. Nomination for URSI Committees

At the second business meeting, the Commission D representation in the Committee on Developing Countries and the Long Range Planning Committee was discussed. It was unanimously resolved to put forward the following nominations :

Prof B.N. Biswas (India) was nominated for the Committee on Developing Countries.
Prof D. Skellern (Australia) was nominated for the Long Range Planning Committee.

8. Scientific Programme and Length of Next General Assembly

The Commission discussed possible topics for the Scientific Programme of the next General Assembly. Prof. Sorrentino reminded attendees that they should respond to the form "Commission D Suggested Topics for 1999 GA". This form should be sent to Prof. Sorrentino. It was noted that some titles of the present GA's Commission D sessions caused confusion e.g. Wide Band Devices and Band Gap Devices. More descriptive titles were recommended. Regarding the duration of the General Assembly, the meeting unanimously agreed that the URSI GA Technical programme should be reorganised to occupy one week instead of two weeks.

9. Scientific Programme at the XXVth URSI General Assembly

The Commission organised nine technical session, and co-organised ten additional sessions in cooperation with other Commissions or other Organisations, such as ICO and IWGP. In five of such sessions Commission D was the principal organiser.

Most of the sessions were very well attended, particularly those covering topics of broad interest, such as MMIC's, wide band gap devices, etc. A few of them were focused on specialised topics, in which case the attendance was somewhat reduced.

Here is a summary of the technical sessions held during this General Assembly :

D-Tutorial : Optoelectronic Integration. Prof. H. Burkhard (Germany) presented an excellent overview of optoelectronic integration. Main emphasis was technology and devices, but their places in the system ware discussed too.

Session D1 : Advances in MMIC. Chairperson: R.J. Trew (USA). MMIC's have advanced from the research stage to the point where they are finding acceptance in many system applications. In particular, they are finding use in products that are directed towards commercial markets such as mobile communications, automobile electronics, etc. Although compound semiconductors dominate MMIC's that operate at microwave and millimetre-wave frequencies, SiGe-based devices demonstrate performance that could permit Si-based high MMIC's to be fabricated. This session focused on some of the recent advances in MMIC technology, such as millimetre-wave MMIC for military and commercial applications, HFET/HBT for power MMIC applications and nonlinear behaviour in microwave transistors.

Session D2 : Advances in III-V Devices. Chairperson: D. Skellern (Australia), R. Brodersen (USA).
This session dealt with low-power devices and circuits for radio systems. The four papers addressed design topics from a new low-power hetero-transistor to full integrated radios in CMOS technologies. Transistor design techniques for operating CMOS with optimised low power and high speed as well as system-level design trade-offs for low-power were presented.

Session D3 : Advances in III-V Devices. Chairperson: H. L. Hartnagel (Germany). Advances in III-V devices have been presented based both on power handling as well as on new material solutions for high breakdown voltages. These two basic papers were followed by contributed concepts of complementary logic for portable electronics, harmonic power extraction from Electron Transfer devices and a new material scheme by GaAsN.

Session D4 : Wide Band Gap Devices. Chairperson: M. Shur (USA). Wide band gap devices based on SiC and GaN have a long and illustrious history going back to 1907 (if not before), when the first SiC Light Emitting Diode was reported. However, it is only relatively recently that the dramatic advances in the growth and doping technologies of these materials made it possible to demonstrate a new generation of wide-band-gap semiconductor devices that promise to find many important practical applications, ranging from consumer electronics, power industry, and medicine to avionics and defence. The papers in this session reviewed the state of the art of this rapidly developing technology and presented new original results on wide-band-gap electronic and optoelectronic devices.

Session D5 : Advances in Device Modelling. Chairperson: C.M. Snowden. The success of the first pass design of MMIC and RF circuits critically depends on the accuracy of the model of the devices. This session reported recent developments of the device modelling for microwave active devices including MESFET, HFET and HBT. Both empirical and

physical models were considered. Innovative approaches to make the model efficient, such as quasi-two dimensional models as well as those on noise and thermal phenomena were presented.

Session D6 : Optical Interconnects. Chairperson: B. Mroziewicz (Poland). The programme of the Session covered most of the topics that now constitute the domain called "Optical Interconnects". They extended from the integrated optoelectronic devices up to the large optical communication links and systems.

Session D7 : Optoelectronic Devices and Integration. Chairperson: K. Tada (Japan). In the first three invited talks the most recent results were reported on monolithic integration in vertical (surface-normal), horizontal (waveguide) and free-space micro-optic configurations. Similarly, newest results were presented in the latter two invited talks for hybrid integration based on silica and polymer . Two contributed papers were concerned with high-speed MQW waveguide modulators and gain-coupled DFB laser diodes.

Session D8 : Squeezed Light and Photonic Band Gap Devices. Chairpersons: W.N. Cheung (Australia) and J. Arnaud (France). Papers presented were related to squeezed light: theory, generation and system application. There were some interesting discussions after each presentation. The final paper was on the use of finite-difference time domain method of analysis for photonic band gap devices.

Session D9 : Wireless Circuits and Components. Chairperson: J. Hénaff (France). Wireless applications have shown an impressive increase over the last few years with the development of personal communication services (PCS) and wireless local area network (WLAN) as well as wireless access for intelligent highway systems. The session reviewed the situation regarding the main problems raised by mobile communications and automobile collision avoidance radar systems: - millimetre-wave components, circuits and systems, - improvement in low-power electronics, and SAW devices like intermediate-frequency filters and duplexers. Such devices are very useful owing to their compactness, planar nature and low cost.

Session DB1 : Comprehensive Electromagnetic Modelling. Chairpersons: R. Sorrentino (Italy) and P. Russer (Germany). As the frequency of operation becomes higher and higher, and the packing density of microwave circuits (including passive and active devices) is increased, a comprehensive or global simulation is required. Comprehensive simulations account for electromagnetic interaction phenomena among various components of the circuit itself as well as between the circuit and the package. The session reviewed the state of the art in this rapidly developing area, including both time domain and frequency domain modelling.

Session DC: Microwave/optical Interactions. Chairpersons: C. Someda (Italy) and H. Ogawa (Japan). Microwave/Optical interactions are one of the emerging technologies for wireless applications. A microwave (MW) and millimetre-wave (MMW) signal distribution over fiber, MW and MMW signal generation by optical devices, MW and MMW optical simulators and detectors, and optical beamforming networks were presented in the session.

Session D-ICO: Nonlinear Optical Phenomena and Devices in Transmission Systems. Chairperson: A. Seeds (UK). The session comprised five invited papers covering both applications of, and limitations due to non-linearity, in optical transmission systems. Subjects covered included non-linear gain in semiconductor lasers, use of quantum-well saturable absorbers in soliton lasers, dispersion management in soliton transmission systems and effect of fibre non-linearities on wavelength division multiplex optical transmission systems.

Session D-IWPG: Wideband Characterisation of Printed Circuits. Chairpersons: T.K. Sarkar (USA), D. Jaeger (Germany), and E. Miller (USA). The objective of this session was to present an overview of the various signal processing techniques to speed up numerical computations. In this way wideband characterisation of printed circuits can be effectively achieved in reasonable time. The papers of the session were divided into time-domain and frequency-domain techniques.

Commission E - Electromagnetic Noise and Interference

Chair: Prof. V. Scuka (Sweden)
Vice-Chair: Prof. M. Hayakawa (Japan)

Report on the Open Commission meetings (Business Meetings)

The Commission held three Open Commission meetings (Business meetings), respectively on 29, 30 August and 3 September 1996. They were attended by about 30 delegates and members.

1. Election of Vice-Chair

Four candidates had been nominated for the position of Vice-Chair for the next triennium: R. L. Gardner (USA), F. G. Canavero (Italy), M. Ianoz (Switzerland) and R. Struzak (Poland). The mail ballots by Official Members were collected before the General Assembly by the outgoing Chair. At the first business meeting any Official Member who was present and had previously voted was given the opportunity to change his vote, and any Member who had not voted was allowed to do so. The result of the ballot was as follows in order of preference, and was submitted to the Council.

1. R. L. Gardner
2. F. G. Canavero

2. Terms of Reference

The Terms of Reference were slightly modified so as to include a few additional items.

3. Working Groups

Commission E, considering the reports of its various Working Groups established in the previous General Assembly, has resolved to establish, with Commissions G and H, a Joint Working Group entitled "Electromagnetic effects associated with seismic activity". Commission E has also resolved to establish the following Working Groups within the Commission (E1 - E7 are continued, but the last two, E8 and E9, are newly established).

E1 Spectrum Management/Utilisation and Wireless Telecommunication
Co-chairs: R. D. Parlow (USA) and R. Struzak (Switzerland)

E2 Non-Gaussian Noise in Communication
Chair: J. Pawelec (Poland)

E3 High Power Electromagnetics
Chair: R. L. Gardner (USA)

E4 Terrestrial and Planetary Lightning Including Generation of Electromagnetic Noise
Co-chairs: Z. Kawasaki (Japan) and V. Gooray (Sweden)
E5 Interaction with, and Protection of, Complex Electronic Systems
Co-chairs: C. Baum (USA), P. Degauque (France) and M. Ianoz (Switzerland)
E6 Effects of Transients on Equipment
Co-chairs: V. Scuka (Sweden) and B. Demoulin (France)
E7 Extra-Terrestrial and Terrestrial Meteorologic-Electric Environment with Noise and Chaos
Co-chairs: H. Kikuchi (Japan) and S. S. Moiseev (Russia)
E8 Terrestrial Electric and Magnetic Fields, Propagation, Global Circuit and Geomagnetically Induced Currents
Co-chairs: R. Pirjola (Finland) and D. Ll. Jones (UK)
E9 Interference and Noise at Frequencies above 30MHz
Chair: J. Gavan (Israel)

4. New Inter-Commission Working Group on Safety of Medical Devices

This is a newly established Working Group to be run jointly with Commission K. The main emphasis of this Inter-Commission Working Group is to study (1) what is specific in the case of implanted medical equipment, (2) modelling methods, (3) specific measurements etc. with the intention of organising sessions on this subject at the next General Assembly and at a few Symposia.

5. Resolution

Considering that there is increasing evidence for a variety of electric and magnetic variations associated with earthquakes, and that these variations are important for short-term prediction, Commission E and the Council recommend that studies should be undertaken of the relationship between electric and magnetic field changes and earthquakes.

6. Review of Radio Science

The Commission E Editor of the Review of Radio Science for the last triennium, Prof. M. Hayakawa, reported on the procedure he had used to select the topics and authors of the four Commission E chapters. The four topics were chosen by taking into account the areas covered by our seven Working Groups, and he thought that the result was four good reviews of important EMC topics. The disk Editor, Dr. Gardner, subsequently reported on the process of compiling the bibliography diskette. The meeting warmly thanked Prof. Hayakawa and Dr. Gardner for their hard work. The Editor of the Review of Radio Science explained that the format for the 1999 Review would be similar to that for the present triennium. The new Commission Editor, Dr. Gardner, would be responsible for the book chapters, and an Assistant Commission Editor, Dr. Z. Kawasaki, would be responsible for the bibliography diskette. There was general support for the database of references, on the basis of a feeling that Commission E needs the diskette.

7. Radio Science Bulletin

The Chair informed the meeting that each Commission was asked to appoint an Associate Editor for the Radio Science Bulletin, and to provide an opinion on the usefulness of the Radio Science Bulletin. Dr. D. Ll. Jones (UK) was recommended as Commission E Associate Editor, and the Chair asked the meeting to submit at least a few papers a year to Radio Science Bulletin in order to advertise the Commission E activities.

8. Co-sponsorship of Meetings

The meeting decided to support the applications for co-sponsorship from "EMC Roma" in Italy in 1996, the "International Zurich Symposium and Exhibition on Electromagnetic Compatibility" in Zurich, Switzerland in 1997, and the "International Wroclaw Symposium and Exhibition on EMC" in Wroclaw, Poland, 1998. The Chair suggested to contact him whenever the co-sponsorship is required.

9. Triennium report, 1993-1996

The outgoing Chair, Prof. V. Scuka made extensive efforts to organise the report of Commission E activity during the last triennium (1993-1996), and asked the Working Group Chairs to revise his text. Finally, the incoming Chair, Prof. M. Hayakawa, accepted to summarise the triennium report with a view toward including it in the Proceedings of the Zurich EMC Symposium and Commission E Newsletter.

10. Commission E opinions in the Round Table Discussion

The outgoing Chair, Prof. Scuka was asked to present in the Round Table Discussion his general review of the activity during the last triennium. The incoming Chair, Prof. Hayakawa subsequently presented his ideas on how to run the next triennium. His most essential point was to enhance the identity of Commission E by activating the Working Groups, and to increase the opportunities to create bridges with other Commissions and other scientific communities, thus making full use of the wide coverage of the research field of Commission E. He also suggested the creation of a "Commission E Newsletter" in order to enhance the communication of URSI and Commission E with Official Members and Commission E individuals. The use of the Radio Science Bulletin was also recommended.

11. Commission E Programme in the next General Assembly

The Chair initiated a discussion on the Commission E programme in the next General Assembly. Candidates for tutorial and general lectures were suggested and the organisation of sessions was left for future discussion. There was strong praise for the local Organisers in the Conference Centre, who had made all the arrangements work very smoothly. However, it was claimed that it would be helpful to hold each session in a room that had solid walls and a ceiling rather than simple cloth enclosures.

At the present Assembly some Commission E sessions accepted both contributed and poster papers, and the inclusion of the latter was judged to have been a success. However, some convenors stressed the importance of sessions consisting of invited papers only. The Chair and Vice-Chair initiated a discussion on the duration of the General Assembly, and many delegates expressed the view that the technical part of the General Assembly stretched over too long a period of time and should be compressed into about one week.

12. Vote of Thanks

The incoming chair, Prof. M. Hayakawa, proposed a vote of thanks to the outgoing Chair, Prof. V. Scuka, for the excellent way in which he had led the Commission during the last triennium.

SCIENTIFIC PROGRAMME

Commission E organised the following Scientific Sessions, which were well attended and led to lively discussions.

E1.1 Dusty Plasmas, Meteorologic-Electric Environment and EHD
Convenors; H. Kikuchi (Japan) and E. Mareev (Russia)
E1.2 Self Organisation and Chaos in Meteorologico-Electric Environment
Convenors: S. S. Moiseev (Russia) and H. Kikuchi (Japan)
E2.1 Terrestrial Electromagnetic Environment
Convenors: M. Hayakawa (Japan) and A. P. Nickolaenko (Ukraine)
E2.2 Electric Discharges from Cloud-top to the Ionosphere
Convenors: Z-I. Kawasaki (Japan) and V. Cooray (Sweden)
E3 Planetary Lightning and Related Phenomena
Convenors: W. J. Borucki (USA) and M. Hayakawa (Japan)
E4 Spectrum Management and Utilisation
Convenors: R. D. Parlow (USA) and R. G. Struzak (Switzerland)
E5 High Power Electromagnetics
Convenors: R. L. Gardner (USA) and C. Baum (USA)
E6 Electromagnetic Topology for Electromagnetic Interference Analysis and Control
Convenors: P. Degauque (France) and J. B. Nitsch (Germany)
E7 Coupling to Multiwire Cables
Convenors: F. Canavero (Italy) and J. L. ter Haseborg (Germany)
E8 Susceptibility of Electronic Devices or Equipment to High Amplitude Electromagnetic Interference
Convenors: V. Scuka (Sweden) and B. Demoulin (France)

The Commission further participated in joint sessions, EA, EB, EF, EK, AE, CE, HEG, and JCE. The incoming Chair asked the Chairs of both the Commission E's own sessions and of the joint sessions to send him the session reports. The summary of those sessions will be included in the Proceedings of Zurich EMC Symposium as well as in the Newsletter.

Commission F - Wave Propagation and Remote Sensing

Chair: Professor R.K. Moore (USA)
Vice-Chair: Mr M.P.M. Hall (UK)

Report on the Open Commission meetings (Business Meetings)

The Commission held three Open Committee Meetings, respectively on 29 and 30 August and 3 September 1996. The following items were discussed at the meetings:

1. Election of Vice-Chairman

National Chairs had voted for Vice-Chair by mail and were given the opportunity to change their vote. Credentials of those voting were checked. (A marking of two points for the first choice and one point for the second choice was used.) The following names were proposed to the Council, in order of preference:

Y. Furuhama (Japan)
M. Hallikainen (Finland)

Prof. Moore confirmed that Mr Hall would become Chairman at the conclusion of the General Assembly. {The Council subsequently confirmed the appointment of Dr Furuhama.}

2. 1996 General Assembly Programme

Commission F organised ten scientific oral-prediction sessions of invited papers (and a poster session), namely (with convenors shown in parentheses):

F1 Remote sensing of cloud and precipitation (K. Okamoto (Japan), Y. Testud (France)
F2 SAR interferometry and polarimetry (J. van Zyl (USA)
F3 Remote sensing of the ocean (P.W. Sobieski (Belgium)
F4: Remote sensing for ecology (M. Hallikainen (Finland)
F5 Gaseous absorption from 10 to 1000 GHz and remote sensing of water vapour (A.J. Gasiewski (USA), H.J. Liebe (USA)
F6 Remote sensing of ice sheets (S.P. Gogineni (USA)
F7: SIR-C/X SAR results (H. Ottl (Germany)
F8 Climatic parameters in radiowave propagation prediction (M.P.M Hall (UK), J.P.V. Poiares Baptista (The Netherlands)
F9 Depolarisation due to hydrometeors (A. Paraboni (Italy)
F10 Mobile and personal communications (J. Bach Andersen (Denmark)

Having invited papers distinguishes Commission F sessions at the General Assembly from those at the Triennial Meetings (which are held in the year before General Assemblies). No session was considered appropriate for a special issue of a journal.

Joint sessions were:

AF Spaceborne SAR: Techniques, technology and applications for Earth observation (W. Keydel (Germany)
EF Radio noise and interference above 30 MHz (E.K. Smith (USA), J. Gavan (Israel), E.R. Westwater (USA), A.J. Gasiewski (USA)
Commission F tutorial lecture: Impact of numerical methods on propagation modelling (K.H. Craig (UK)

3. Council, Coordinating Committee and Round Table issues, etc.

3.1 Commission Assistant Editors

Prof Moore said Dr W.R. Stone sought from each commission an Associate Editor for the Radio Science Bulletin to solicit two papers per year (e.g. radiowave propagation and remote sensing for Commission F), and to arrange full refereeing. No one volunteered at the time, but Mr J.P.V. Poiares Baptista later offered his services, which were accepted.

3.2 Duration of future General Assemblies

All commissioners have been invited to consider whether to retain the present duration of Assemblies (seven working days comprising opening session, twelve oral sessions, Ω day poster session and closing session) or to support a proposed change (registration and opening session on Sunday, twelve oral sessions (Monday-Saturday), parallel poster sessions and closing Saturday evening). It was felt that poster sessions should be at a time when authors could be present without clashing with other sessions. On a show of hands, 12 were in favour of retaining the current length and 16 in favour of shortening by some means; this was communicated to the Council (who later decided on a seven working days event). It was agreed that it was better to mix the order of sessions rather than to have radiowave propagation and remote sensing at opposite ends of the period. Prof A. Paraboni stressed

the need to retain tutorials; Prof. A.R. Holt felt a lower registration fee resulting from a shorter meeting would encourage more people to come. Mr J.P.V. Poiares Baptista sought single-day registrations.

3.3 Terms of Reference

After some discussion, all attendees agreed to maintain the current Terms of Reference. This was communicated to the Council.

3.4 Publicity for Young Scientists' Grants

The Coordinating Committee pressed all who could to give publicity to the Young Scientists Scheme. There had been 120 this time. Awards were given only to successful applicants who were also on the programme. All Young Scientists received a certificate. Prof. P.A. Watson sought reduced registration fees for all under 35, whether awarded Young Scientist grants or not. Dr A.R. Webster sought for Young Scientist funding to be available only when essential. Prof. Moore felt Young Scientists funding was needed both for developing and developed countries.

3.5 Publicity for the Radio Science Bulletin

Prof Moore urged all those present to encourage their libraries to subscribe to the Radio Science Bulletin and other URSI publications.

4. Inter-assembly meetings

4.1 Commission F meetings in last triennium

Commission F was sponsor or co-sponsor of fourteen meetings between the 1993 and 1996 URSI General Assemblies. Below are shown meetings, locations, dates and Modes (where Mode A has the name of URSI and logo, but no URSI money; Mode B has a grant (typically 2000 USD) from Commission F, but only for participation of individual scientists; Mode C is a major conference with direct involvement of URSI headquarters in management and budget with significant support (typically 5000 USD), and share in any profits).

The main Commission F meeting between URSI General Assemblies is the Commission F Open Symposium, held this time in Ahmedabad, India in November 1995 (Mode B).

Commission F, as usual, co-sponsored with IEEE Geoscience and Remote Sensing Society three International Geoscience Remote Sensing Symposia (IGARSSs); these, the largest remote sensing meetings, continue to draw more than 1000 papers. IGARSS'94 was held in Pasadena, Ca., USA in August 1994 (Mode B), IGARSS'95 was held in Florence, Italy in July 1995 (Mode C), and IGARSS'96 was held in Lincoln, Ne., USA in July 1996 (Mode A).

In addition, Electromagnetic Scattering from Gasses and Plasmas was held in Aussois, France in March 1994 (Mode B) and Microwave Signatures was held in Lawrence, Ka., USA in May 1994 (Mode B).

Climpara'94 was held in Moscow, Russia in May-June 1994 (Mode B) and Climpara'96 in Oslo, Norway in June 1996 (Mode B).

Other meetings co-sponsored with other groups, including other URSI Commissions, were Physics and Engineering of mm and submm Waves held in Kharkov, Ukraine in June 1994 (Mode A), International Conference on Antennas and Propagation (ICAP'95) held in Eindhoven, the Netherlands in April 1995 (Mode A), Workshop on Atmosphere Research

Applications using Observations based on the GPS/GLONASS System held in Copenhagen, Denmark in June 1995 (Mode A), International Conference on Radio Science (ICRS'95) held in Beijing, China in August 1995 (Mode A), International Workshop on Direct and Inverse EM Scattering held in Turkey in September 1995 (Mode A) and Retrieval of Geo- and Bio-Parameters from SAR Data for Land Applications held in Toulouse, France in October 1995 (Mode A).

4.2 Proposed Commission F meetings for next triennium

Most of the following meetings were mentioned during Commission F business, but a few have been added since.

- ISAP'96	Chiba, Japan,24-27 Sept'96	Mode A
- ICAP'97	Edinburgh, UK, 14-17 April'97	Mode A
- IGARSS'97	Singapore, 4-8 August'97	Mode A
- URPS'97	Tomsk, Russia, 2-4 Sept'97	Mode A
- ISRP'97	Qingdao, China, 12-16 August'97	Mode B
- MST8 (WG FG1)	Bangalore, India, December'97	Mode A
- Microwave Sigs	Moscow, Russia, 11-13 March'98	Mode B
- Climpara'98	Ottawa, Canada, 27-29 April'98	Mode B
- EUSAR'98	Friedrichshafen, Germany, May'88	Mode A
Retrev Atmos Parm using		
- GPS/GLONASS	Spain or Italy, in '98	Mode A
- IGARSS'98	Seattle, Wa, USA, 6-10 July'98	Mode C
- Comm F Triennial	Aveiro, Portugal, October'98	Mode B
- ICAP'99	Venue to be decided, Spring'99	Mode A
- IGARSS'99	Venue and date to be decided	Mode A

No clear opinion was expressed as to the venue for the Commission F Triennial meeting. A joint meeting with Commission C on Mobile and Personal Communications was being considered.

4.3 Responsibilities of URSI representative at meetings sponsored by Comm. F

Prof Moore emphasised the importance of the role of Commission F representatives. This is:

- For all modes: ensure URSI involvement is clear (logo etc.), especially in Call for Papers, etc.; participate in organising committee, especially for technical programme; provide Call for Papers and report on the meeting for URSI's Radio Science Bulletin and keep Commission F Chairman fully informed of developments.
- For Modes B and C: organise invitation of URSI-funded scientists (if Mode B); possibly speak in opening session, banquet, etc; report to URSI Bulletin and Secretariat, copied to Commission F Chairman.
- For Mode C and for major Mode B events: arrange for registration fees to be increased by 40 USD for all non-URSI correspondents, to be remitted to URSI headquarters with a list of those who paid it. Those paying then become URSI correspondents and receive the Radio Science Bulletin, etc. This is agreed not to apply to IGARSS'97 in Singapore, but should apply for other "large" meetings, such as IGARSS.

5. 1999 General Assembly

5.1 Proposals for sessions and organisers

Many proposals for sessions were put forward (some after the Business Meetings) by Mr B. Arbesser-Rastburg, Prof. W.-M. Boerner, Prof. D.T. Gjessing, Mr M.P.M. Hall, Prof.

M.T. Hallikainen, Dr H. Ottl, Dr D.A. Noon, Mr J.P.V. Poiares Baptista, Mr T. Tjelta and Prof. P.A. Watson. These proposals would need rationalisation and grouping together.

In view of the Triennial Open Symposia (covering all Commission F topic areas), it was agreed to maintain the Commission F tradition of compact invited-paper sessions on specific subjects and allow a broader allocation of contributed papers for posters.

Statements were made for and against parallel sessions. This might depend on the length of the Assembly and the number of rooms available.

5.2 Proposals for joint sessions with other commissions

Several people expressed concern about Sessions C4 and F10 being in parallel on "Mobile and Personal Communications". This was an unfortunate accident. Proposals for joint activity were reported to Commission F. It was felt that time would allow only one session on this.

Mr J.P.V. Poiares Baptista reported that Commission G had held Session G3 relevant to Working Group FG1. He suggested sessions from Commissions F and G on aspects of using GPS. Again there may be room for only one session, possibly led by Commission G.

Dr D.A. Noon subsequently suggested a joint Commission F and G session led by Commission F on Techniques and Applications for Sub-surface Remote Sensing.

5.3 Proposals for tutorial topics and speakers : none were proposed, but Prof. Moore requested proposals be sent to Mr Hall.

5.4 Proposals for general lectures and lecturers : Prof. Moore recommended that Dr K.H. Craig be invited to give a General Lecture.

6. Intercommission Working Groups

Prof Moore mentioned that these automatically end at a General Assembly unless renewed by Resolution to Council (see below). It was felt that results from Working Groups should be made known through the Radio Science Bulletin, E-mail or URSI www pages, as well as in reports to the Council.

6.1 Working Group FG1 (Middle Atmosphere)

Resolution U16 established the continuity of Working Group FG1. Prof. Moore outlined the position. Copies of Resolutions F1 and F2 were distributed, discussed and agreed on a show of hands, nem. con. (Commission G passed Resolutions G3 and G2, which are of a rather different form.) The Commission F representative would continue to be Prof C. H. Liu.

6.2 Working Group AFG1 (GPS/GLONASS)

Dr F. Solheim (USA) had agreed to be the Commission F representative and was named in Resolution U13, which established the continuity of Working Group AFG1.

6.3 Others

Commission F felt there was no need for a Working Group with Commission C on Personal and Mobile Communications, as there were already proposals for joint sessions and possibly a joint symposium.

7. Representatives to other organisations

7.1 IGBP (International Geosphere Biosphere Programme)

Prof. Moore said this enormous organisation produced vast quantities of paper that were difficult to keep up with - no direct representation was felt necessary. URSI interests are looked after by Prof R.K. Rainey.

7.2 SCOR (Scientific Committee on Oceanic Research)

Commission F interests are looked after by Prof. D.T. Gjessing.

7.3 SCAR (Scientific Committee on Antarctic Research)

Commission F interests are looked after by Prof. M.J. Rycroft.

7.4 IUCAF (Inter-Union Committee on Frequency Allocations for Radioastronomy and Space Research

Prof. W. Keydel and Mr J.P.V. Poiares Baptista agreed to represent Commission F; they were anxious to see frequencies reserved for remote sensing (of atmosphere and ground, both active and passive) in addition to those for radio astronomy. The Working Group plans to meet during the next triennium to discuss frequency allocations. Remote sensing interests should be stressed, possibly by a change of words in the terms of reference.

7.5 COSPAR (Committee on Space Research)

Mr J.P.V. Poiares Baptista looks after Commission F interests. Mention was made of a resolution from COSPAR about preservation of spectrum for astronomical radio science and atmospheric environmental science. (This was later adopted as Resolution U22 after addition of remote sensing of the Earth's surface.)

7.6 SCT (Scientific Committee for Telecommunications)

Copies of SCT questions were handed out; no changes or additions were proposed. Dr K.A. Hughes said these were guidelines and could easily be changed as necessary. Mr Hall commented on an SCT meeting held on 30 August which was attended by Prof. Moore, Prof. M.S. Assis, Dr K.A. Hughes, Dr V. Kvicera and himself. Consideration had been given to Terms of Reference and Guidelines, to URSI having a stronger voice in ITU-R, to Commsphere, to putting the current list of questions on both the URSI and ITU-R www pages outlining topics of mutual interest, to the value of new URSI handbook on propagation in developing countries, etc. Formal technical inputs to ITU-R Study Groups should formally be through Commission Chairmen.

The Council subsequently agreed to endorse a new Intercommission Working Group on Wireless Communication (Resolution U11), but to terminate the SCT. The SCT actions of intent to Commission F, as outlined in Resolution U12, were transferred to the new Working Group.

7.7 Contact persons for GWEX (Global Energy and Water Exchange), GPCP (Global Precipitation Climatology Project), etc.

It was not felt necessary to formally identify people to look after Commission F interests, but Mr J.P.V. Poiares Baptista is strongly involved.

8. Publications

8.1 Review of Radio Science

It was agreed to continue the policy of having review chapters corresponding to most General Assembly session topics and for the session co-ordinators to write the chapters. Prof P.A. Watson noted that the number of chapters may depend on the Council decision

on the duration of the next General Assembly. It was agreed that the new Vice-Chairman be the Editor for Commission F.

8.2 Disk

Prof Moore expressed appreciation for the work undertaken by Prof. Y. Hosoya and the National Representatives in preparing the disk of reference. Prof P.A. Watson said Prof. Hosoya had made the job relatively easy for the National Representatives. Those representatives present agreed to undertake the work again for 1999. Copies of the first page were distributed for information. Only four persons present said they made use of the disk, but it was felt useful. An overwhelming number felt it useful to have the content available of the URSI www pages. (This was later agreed by Dr W.R. Stone.) (Outside the meeting, Dr R.L. Olsen agreed to be Disk Editor for Commission F.)

9. Any other business

Prof. G.O. Ajayi drew attention to the recent handbook entitled *Radiopropagation Related to Satellite Communications in Tropical and Subtropical Countries*, which had been produced by the URSI Standing Committee on Developing Countries - it had particular relevance to Commission F.

Commission G - Ionospheric Radio and Propagation

Chair: Dr. K .Schlegel (Germany)
Vice-Chair: Professor B. Reinisch (U.S.A.)

Report on the Open Commission meetings (Business Meetings)

The Commission held three Open Commission meetings (Business meetings), respectively on 29 and 30 August and on 3 September 1996.

First Open Commission Meeting (Thursday 29 August 1996, 5.20 p.m.)

1. Election of Vice-Chairman for 1996-1999

Five candidates have been nominated: W. Kofman (France), R. Leitinger (Austria), S. Pulinets, A. Shirochkov (Russia) and P. Wilkinson (Australia). 24 ballot sheets have been received by mail, 8 have been collected at the meeting. As a result of the vote P. Wilkinson was suggested to the Council as new Vice-Chair of Commission G.

2. Review of Commission G activities 1993-1996

The Chair gave a report about these activities, including the financial situation These reports are attached as Appendices A1 and A2.

3. Working Groups within Commission G

The following Working Groups existed during the last triennium:

G.1 Ionosonde Network Advisory Group (INAG)
G.2 Studies of the Ionosphere using Beacon Satellites
G.3 Incoherent Scatter
G.4 Ionospheric Informatics
GF.1 Radio Occultation Observations of the Ionosphere and Atmosphere
GF.2 Middle Atmosphere
COSPAR-URSI: International Reference Ionosphere
URSI-IAGA: VLF/ELF Remote Sensing of the Ionosphere and Magnetosphere (VERSIM)

Most of the officers of these Working Groups had previously submitted written reports on the activities. The reports were distributed during the meeting. The summary of these reports is attached as Appendix B. Proposals of continuation during the 1996-99 triennium were received from most Working Groups. (see Agenda item 3.2).

4. Commission G Resolutions

The received resolutions were read to the audience. A formal vote was taken under item 3.1 on the third Business Meeting.

5. Review of Radio Sciences and the Disk

The Chair thanked the Commission Editor P. Wilkinson for his excellent work in editing the Commission G part of the RRS and in preparing the Disk. Commission G decided not to participate in future issues of the Disk, because it was expressed that the information it contains can also be found elsewhere.

6. Any other business

Some issues for the round table discussion were collected.

Second Open Commission Meeting (Friday 30 August 1996, 5.20 p.m.)

This meeting was held together with Commission H.

1. Joint Working Groups

The following joint Working Groups existed during the last triannum:
GH.1 Active Experiments in Plasmas
GH.2 Computer Experiments, Simulations and Analysis of Wave-Plasma Processes
CGH.1 Wave and Turbulence Analysis
EGH.1 EM Effects Associated with Seismic Activity

Most of the officers of these Working Groups had submitted written reports which were distributed on the meeting. They are included in Appendix B.

2. Suggestions for joint activities 1996-1999

The following joint Working Groups have been approved by the respective Commissions to continue their duties, in some cases new officers have been appointed:

GFA.1: Radio Occultation Observations of the Ionosphere and Atmosphere

Co-Chair for Commission G: P. Hoeg (Danmark)
Co-Chair for Commission F: F. Solheim (USA)

This is the former Working Group AFG.1. The title was changed to make the objectives of

this Working Group more clear. Since most of the activitities come from Commission G, the "G" was put in the first place.

GF.2 : Middle Atmosphere

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

This is the former Working Group FG.1. Since most of the activities come from Commission G, the order of the letters was reversed.

GH.1 : Active Experiments in Plasmas

Co-Chair for Commission G: Sa. Basu (USA)
Co-Chair for Commission H: T. Leyser (Sweden)

GH.2 : Computer Experiments, Simulations and Analysis of Wave-Plasma Processes

Co-Chair for Commission G: H. Thiemann (Germany)
Co-Chair for Commission H: H. Matsumoto (Japan)

CGH.1 : Wave and Turbulence Analysis

Co-Chair for Commission G: A.W. Wernik (Poland)
Co-Chair for Commission H: F. Lefeuvre (France)

EGH.1 : EM Effects Associated with Seismic Activity

Co-Chair for Commission G: O.A. Pokhotelov (Russia)
Co-Chair for Commission H: M. Parrot (France)

For the General Assembly in 1999 the following joint symposia have been suggested:

1. Electromagnentic Scattering in Gases and Plasmas (G: C. Hanuise, H: t.b.a.)
2. Ionospheric Modification with high Power Radio Waves (H: T. Leyser, G: Sa. Basu)
3. Theory and Simulations of Nonlinear kinetic Processes in Space Plasmas (H: Y.Omura, M.A. Abdalla, G: t.b.a.)
4. Sounders in Space, new and old (H: G. James, R.F. Benson; G: B. Reinisch)
5. Wave Propagation: Observations and Data Analysis (H: F. Lefeuvre, K. Hashimoto, G: t.b.a.)
6. Lightning-Ionosphere Interactions (H: Nunn; G: Inan)
7. Electromagnetic Coupling incl. Seismic Activity between the Ground and the upper Ionosphere and Magnetosphere (H: Molchanov; G: t.b.a.)

3. Joint Resolutions

The accepted resolutions are printed elsewhere in this volume.

Third Open Commission Meeting (Thursday 3 September, 5 p.m.)

1. Resolutions

The resolutions which have been adopted are printed elsewhere in this volume.

2. Commission G Working Groups for 1996-1999

All the following Working Groups have been approved by Commission G to continue their duties. They are listed here together with the new officers:

G.1 : Ionosonde Network Advisory Group (INAG)

Chair: R. Conkright (USA)
Secretary: P. Wilkinson (Australia)

G.2 : Studies of the Ionosphere using Beacon Satellites

Chair: R. Leitinger (Austria)
Vice-Chairs: J.A. Klobuchar (USA), P.V.S. Rama Rao (India)

G.3 : Incoherent Scatter

Chair: A.P. van Eyken (Norway)
Vice-Chair: W. Swartz (USA)

G.4 : Ionospheric Informatics

Chair: S. Radicella (Argentina)
Vice Chair: R. Hanbaba (France)

COSPAR-URSI: International Reference Ionosphere

Chair: D. Bilitza (USA)
Vice Chair (COSPAR): K.I. Oyama (Japan)
URSI Commission G Representative: B. Reinisch (USA)

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

URSI Commission G Representative: A.J. Smith (UK)
URSI Commission H Representative: U.S. Inan (USA)

3. Review of Commission G Programme at Lille

The following issues were raised during the discussion:
- invited papers should be more of a review type;
- some papers were poorly presented and contained not much new science, high standards need to be maintained;
- the schedules of Commissions G and H should be better adjusted;
- some rooms did not have the proper standard for presentations;
- a session summary at the end of each session is higly desirable;
- high quality of poster session was acknowledged.

4. Suggestions for Scientific Sessions at the General Assembly in 1999

The following topics have been suggested:
1. Ionosphere and Atmosphere Profiling using Radio Occultation Observations (P. Hoeg, F. Solheim)
2. Ionospheric Data and Models on WWW (D. Bilitza)
3. Unusual Radio Methods for Ionospheric Sounding (Y. Yampolski)
4. Recent Radio Systems and Scientific Highlights in Polar Ionosphere and Polar Middle Atmosphere Research (t.b.a.)
5. Digital Techniques in HF Communications (M. Haines)
6. Ionospheric Storms and Substorms: Obserations and Modelling (A. Shirochkov, J. Hargreaves)
7. Equatorial Ionosphere: Impacts on Systems (Su. Basu, Sa. Basu)
8. Upward Effects on the Ionosphere from the lower Atmosphere and Earth Surface (S. Pulinets, S. Radicella)

9. Assessment of Atmospheric Effects on Earth-Space Systems/Propagation (B.M. Reddy)
10. Open Session and Latest Results (Schlegel)

There was a long discussion, since the number of sessions was regarded as too high, particularly if the seven proposed joint sessions with Commission H are also taken into account. A reduction has to be worked out by the new Chairman in collaboration with the proposers and suggested convenors of the sessions.

5. Symposia and Workshops to be considered for Comm. G Sponsorship in 1996-1999.

- International Reference Ionosphere (IRI), 1997 Workshop, Kühlungsborn, Germany, 26-31 May 1997, W. Singer, D. Bilitza.
- IRI Task Force Act. 1997, ICTP, Trieste, Italy, June 1997, S. Radicella.
- International Symposium on Radio Propagation, Qingdao, China, 12-16 August 1997, Sha Zong.
- Mesosphere & Stratosphere Troposphere Radars (MST8), Bangalore, India, December 1997, J. Röttger, C.H. Liu.
- COSPAR 1998, Lower Ionosphere, IRI and Theoretical Models, Nagoya, Japan, Summer 1998, K.I. Oyama.
- Beacon Satellite Sympos., Sopron, Hungary, 30 June-5 July, 1997, P.Bencze
- (ESGAP) II, Ukraine, Summer 1997, C.Hanuise.
- 5th ISSS, Kyoto/Japan, 13 - 19 March 1997, H Matsumoto.
- Radio Methods for studying Turbulence, Aussois, France, 1998, A. Wernik, F. Lefeuvre.
- International Conference on Dusty Plasmas, Goa, India, 21-25 Oct. 1996, P. Shukla.

6. Any other Business

The following suggestions were made for future activities and new URSI officers:

a) a Tutorial on general types of ionospheric radars at the next General Assembly, to be given by J. Röttger (Sweden);
b) C. Hanuise (France) as new Commission G Editor for RRS;
c) C. Haldoupis as Associate Editor of the Radio Science Bulletin;
d) a general lecture for the next General Assembly with the topic "Space Weather", to be given by L. Lanzerotti (USA);
e) further Commission G representatives:
   - Committee on IGPB : P. Bauer (France),
   - URSI-IAGA (VERSIM) : A. J. Smith (UK),
   - URSI-COSPAR (IRI) : B. Reinisch (USA),
   - COSPAR : W. Kofman (France) (for G and H),
   - FAGS and ICSU Panel on World Data Centres : H. Rishbeth (UK),
   - IUCAF : A.P. van Eyken (Norway),
   - ISES (IUWDS) : S. Pulinets (Russia),
   - SCAR : M.J. Rycroft (UK),
   - SCOSTEP : A.W. Wernik (Poland),
   - STEP : Su Basu (USA).

7. Address by the new Chairman B. Reinisch

The Chair, Kristian Schlegel, thanked all colleagues for their support and collaboration during the past triennum and left the floor to the new Chair, Bodo Reinisch, who gave a short address to the audience.

Here is a summary of the technical sessions held during this General Assembly :

Session G1 : Ionospheric Models and Indices. Convenor D. Bilitza (USA). This session consisted of sixteen oral presentations, six posters and was attended by 40-60 participants. The invited speakers addressed the topics of common geomagnetic indices, like Dst and AE, special disturbance indices and indices for low latitudes. Further invited talks concentrated on the effective use of indices, and special means of characterising certain ionospheric regions. The contributed presentations dealt with the variability of the ionosphere, modelling ionospheric features, non-linear behaviour and the use of neural networks for ionospheric predictions. The latter topic seems to bear a great potential for the future. New developments in the IRI model were also addressed.

Session G2 : Ionospheric HF Propagation and Telecommunication. Convenor: B. Reinisch (USA). The session consisted of nine oral presentations, fifteen posters and was attended by about 30-50 participants. The topic of this session is a "classical" item in ionospheric research. Nevertheless there are still several poorly understood effects which affect the HF wave propagation, like influence of TIDs, substorms, spread F, sporadic E. These and other problems were addressed in several talks. On the other hand modern developments and techniques were discussed, like novel digital HF communication techniques, direction finding and trans-ionospheric propagation. Several improvements in modelling and prediction were also treated.

Session G3 : Troposphere-Stratosphere-Ionosphere Studies using the GPS/GLONASS System. Convenors: P. Hoeg (Denmark), F. Solheim (USA). This session which was organised jointly with commission F comprised twelve oral presentations and seven posters, it was attended by about 90 colleagues. The interest in the use of the satellites of global positioning systems in atmospheric and ionospheric research has greatly increased in recent years and therefore this topic attracted a considerable number of scientists. The presentations covered the basic techniques but also advanced methods to derive atmospheric and ionospheric parameters like temperature, neutral and ion densities, and minor constituents. Also a successful analysis of special effects like gravity waves or ionospheric irregularities using these satellites has been demonstrated as well as the possibility to study the plasmasphere. Radio occultation methods seem to be very promising in all these studies. The advantage that the satellites in question are permanently available, opens the possibility of long term monitoring of atmospheric and ionospheric parameters.

Session G4 : Observation and Modeling of High-Latitude E and F region Ionospheric Structures. Convenor: A.V. Shirochkov (Russia). The session consisted of ten oral presentations, sixteen posters, and was attended by more than 100 participants. The study of the phenomena addressed in this session is interesting from the geophysical as well as from the plasmaphysical point of view. The invited speakers reviewed topics like polar cap studies, F-region issues, storm effects and recent modeling results. Improved techniques to study the processes in question were addressed using digital ionosondes, imaging riometer, HF sounders, satellites, rockets and incoherent scatter radars. Besides several talks dealing with special experimental studies (ionospheric plasma outflow, sporadic E, solar flare effects, trough phenomena, two stream instability), also papers on new theoretical ideas (e.g. proton transport) and modeling were presented.

Session G5 : Computer Aided Processing of Ionograms and Ionosonde Records. Convenor: P. Wilkinson (Australia). The session comprised nine oral presentations, nineteen posters and was attended by about 70 participants. Ionosondes, particular digital sounders, are still a relatively inexpensive but powerful tool for ionospheric investigations. It is therefore a continuing issue within URSI to improve the data processing and to facilitate the exchange

of data. PCs seem to be suitable tools for the data processing and storing. The automatisation of this data reduction was an important issue of this session as well as the reduction of systematic errors in the analysis. Further topics were filtering methods, fine structure in the density profile, analysis of topside and oblique soundings, the use of neural networks, treatment of spread-F.

Session G6 : Radio Tomography of the Ionosphere. Convenor: R. Leitinger (Austria). In this session nine oral papers and two posters were presented, it was attended by about 80 participants. The topic of this session had some relationships with session G3. Invited speakers reviewed the current status of tomography, the possibilities and limitations and the relevant algorithms. Improvements towards a three dimensional tomography were presented as well as papers which addressed problems of special geophysical conditions (storms, high latitudes). Several comparisons with additional data showed the reliability of tomographic results.

Session G7 : Open Session and Latest Results. Convenor: N. Matuura (Japan). The session comprised sixteen oral presentations, fifteen posters and was attended by about 80-100 participants on two days. Open sessions are very important to present topics which cannot be classified into the scheme of the other sessions. A very broad spectrum therefore characterised the presentations here. While it is impossible to mention every single paper, some general scopes can be summarised. Several papers addressed gravity waves, ionospheric storms, plasma instabilities and corresponding irregularities, comparisons of remote sensing and in-situ measurements, coherent and incoherent scatter, direction finding, wave propagation, sporadic E. Other papers dealt with new experimental facilities, measuring campaigns, and new theoretical developments.

Session G8 : Advanced Radar Studies of the Ionosphere and the Middle Atmosphere. Convenor: J. Röttger (Sweden). This session consisted of only invited oral papers (ten) and eighteen posters, the number of attendants was between 50 and 80. Radars are the most advanced tools for ionospheric studies and provide many important parameters simultaneously. The invited speakers reviewed therefore new developments in radar techniques. Specifically treated was the SUPERDARN system, radar interferometry, passive radar methods, the EISCAT Svalbard radar, new incoherent scatter radar signal processing schemes and new designs of ST and MST radars. The posters addressed various other aspect of modern radars, like special new analysis methods for incoherent scatter radars, turbulence and irregularity measurements, novel VHF-, HF-, and MF-radar observations.

Commission H - Waves in Plasmas

Chair : Dr. F. Lefeuvre (France)

Vice-Chair : Dr. V. Fiala (Czech Republic)

Report on the Open Commission meetings (Business Meetings)

The Commission held three open Commission meetings, respectively on 29 and 30 August and 3 September 1996. The second meeting was held jointly with Commission G.

First Open Commission Meeting (29 August 1996)

1. Approval of the agenda

The chairman started the meeting by acknowledging the loss of Prof. Alpert (Russia) and Prof. Woolliscroft (UK), who passed away during the last triennium. He announced that a paper on L.J.C. Woolliscroft's work on waves in plasmas would be presented at the beginning of the session Les was organising at the time of his death (HCJ). The agenda of the meeting was presented. It was circulated earlier via the Commission's Newsletters. Points concerning the Young Scientist programme and the registration fees were added.

2. Election of a Vice-chair

Three candidates had been nominated : Dr. H.G. James (Canada), Dr. G. Mann (Germany) and Dr. D. Nunn (UK). The Chair received 21 valid voting forms from official members before the General Assembly. No change in the voting was requested during the Business Meetings. The number of first, second and third votes were counted in order to be communicated to the Council. All candidates received a reasonable amount of votes. The first ranked candidate was Dr. H.G. James.

3 Review of the activities during the past three years

3.a. Commission H newsletter

Three Commission H newsletters were sent to the active Commission members (session conveners, WG Chairs and Vice-Chairs, National Commission Chairs) between the Kyoto and the Lille General Assembly. The interest for continuing these newsletters was discussed. The majority of the attendants voted for a continuation. Commission members who wish to be on the mailing list must contact Dr. V. Fiala (fiala@ufa.cas.cz).

3.b Working group activities

The Chairs from the five Working groups briefly presented their activity reports : P. Bernhardt for GH.1 (Active experiments in space plasmas), H. Matsumoto for HG.2 (Computer experiments, simulations and analysis of wave plasma process), F. Lefeuvre for CGH.1 (Wave and turbulence analysis), A.J. Smith for the Inter-Union (URSI/IAGA) Working Group VERSIM (VLF/ELF remote sensing of the ionosphere and magnetosphere), M. Parrot for EGH.1 (Electromagnetic effects associated with seismic activity). The attendants were encouraged to read the written reports of the Working Groups before the second Business Meeting.

3.c Sponsorship of meetings

The Chair reported on the sponsorships given by Commission H in the past triennium, based on recommendations made at the Kyoto General Assembly :

- in Mode B (with financing) :
  - Electromagnetic scattering from gases and plasmas, Aussois, France, 20-25 March 1994,
  - COSPAR session, Hamburg, Germany, 16-21 July, 1994,
  - Suzdal symposium on modification of the ionosphere, Uppsala, Sweden, 15-20 August 1994,
  - STEP-GAPS workshop on non-linear processes, Warsaw, Poland, 24-28 April 1995,
  - Since no formal application was sent to URSI, the ICPIG'95 conference (held in College Park, USA) was not supported.

- in Mode A (without financing)
  - 8th Int. symposium on solar-terrestrial physics, Sendai, Japan, 5-10 June, 1994
  - Int. school for space simulations, 1995
  - Int. Conference on radio-science, Beijing, China, 10-12 August 1995

Two requests arrived after the Kyoto meeting. One was accepted in Mode B : *Satellite studies of ionospheric and magnetospheric processes*, Moscow, Russia, January 1996, the other in Mode A : *International conference on plasma physics*, Nagoya, Japan, September 1996.

An application was received for the Int. conference on the physics of dusty plasmas, Goa, India, 21-25 October 1996. Mode A support was promised, but mode B was put for discussion during the Business Meeting (see point 2).

3.d RRS and reference disk

F. Lefeuvre thanked the Commission H Editors for the Review of Radio Science (V. Fiala) and for the reference disk (W. Calvert). It was noted that the Japanese contribution had been omitted in the reference disk.

3.e Commission H sessions

The list of Sessions at the Assembly inluding the number of papers (invited, contributed, poster), was recapitulated for the Commission's archives :

H1 Whistler-mode waves and their effects on the radiation belts (3, 8, 9),
H2 Active experiments in space observed by in situ and remote sensors (2, 7, 6),
H3 Plasma wave observations by multiple spacecraft in geospace (7, 2, 11),
H4 Nonlinear theory and computer simulations on waves and particle in geospace plasmas (11, 0, 32),
H5 Open session on latest results (0, 10, 25),
HCJ Signal processing techniques with space radio and plasma wave data (3, 7, 5),
HEG EM coupling between the ground (including seismic activity) and the upper ionosphere and the magnetosphere (1, 11, 14),
HG1 Computer simulation of multi scale processes in space plasmas (7, 0, 11),
HG2 Effects of lightnings and VLF waves on the ionosphere (4, 6, 15),
HG3 Ionospheric modification by high-power HF waves: coupling of plasma processes (10, 3, 26),
HGCJ (Turbulence and wave analysis for non-gaussian signals (6, 2, 4),
HJ Observations and interpretations of interplanetary emissions (1, 10, 9).

It was noted :

- that the number of papers on propagation and wave analysis techniques (19) submitted in session H5 shows that a session on that subject shoould be organised at the next General Assembly.

- that sessions H2, HG1, HCJ and HGJC were too specialised, the two last having not received the expected support from Commission C.

4. Proposals for the next three years

4.1 Terms of reference

After discussion, the proposal to broaden the charter of Commission H to activity in electromagnetic waves in the Earth crust, in sea water and in the solid Earth, was rejected. As a conclusion the terms of reference remain as they were.

4.2 On the importance of plasma wave research

R.F. Benson introduced a discussion on communicating the importance of plasma-wave research to the scientific community, as well as to the man in the street. Actions were left to the 3 September Business Meeting.

4.3 Working Groups

The decision on possible joint Working Groups with Commission G was left to the second Business Meeting. The idea of a Group on the Physics of the dusty plasmas was discussed. The authors were encouraged to contact Commission E members and to submit a proposal at the 3 September Business Meeting.

4.4 Workshops and meetings

After a discussion on the drawbacks of spreading the commission funding over too many meetings, it was decided to give first priority to proposals coming from the Commission H members and discussed during the General Assembly. The received proposals were presented. Final decisions were left to the 3 September Business Meeting.

4.5 Editors for the RRS and the Reference Disk

The interest of having the Vice-Chair acting as the RRS editor was confirmed. O. Santolik (Czech Republic) volunteered for the Reference Disk. He was advised to discuss the matter with W. Calvert (the past Editor) before taking a final decision. The Commission members emphasised their wish to have the Reference Disk on Internet. The Japanese contributions, which had been omitted in the 1996 issue, will be made available on WEB.

4.6 Tutorial and General Lectures

Commission H members were asked to make proposals by 3 September.

4.7 Sessions for next General Assembly.

Several proposals were discussed. The decision was postponed until the 3 September Business Meeting.

4. 8 Resolutions

Several resolutions were discussed. The authors were asked to reformulate them, and to present their revised versions at the second Business Meeting (for joint resolutions with Commission G) or at the third Business Meeting (for joint resolutions with Commission H).

5. Any other business

Commission H sent relatively few Young Scientist applications to URSI. The information did not circulate properly in all Member Committees. Local chairmen should be more alert in that matter at the occasion of the next General Assembly. The level of the registration fees in Lille was justified by the amount of money given to the Young Scientist Programme and by the need to choose buildings allowing participants to commute easily from one session to the other. It was suggested to finance part of the future Young Scientist programme from the budget of the symposia and workshops, and to relax the constraints on the proximity of the Commission lecture rooms for next G.A.

Second Open Commission Meeting (30 August)

Common activities (Working Groups, meetings and workshops, joint sessions, joint resolutions) were discussed. The details are reported in the Commission G minutes. Conclusions appear in the report of the Third Open Commission Meeting and in the Council resolutions. Commission H members were asked to vote on the optimum length of future General Assemblies (a similar vote was already held in Commission G). A large majority voted for having the General Assemblies cover two weeks, the present situation, and not to shorten it one week.

Third Open Commission Meeting (3 September)

1. Approval of the agenda

The proposed agenda was approved.

2. Commission H resolutions

2.1 Vice-Chairman

The election of Dr. H.G. James had been confirmed by the Council.

2.2 Working Groups

No proposal on "Physics of dusty plasmas" was received. Resolutions on the other Working Groups were voted (see the Resolutions and recommendations of Commissions).

2.3 Workshops and meetings to be sponsored

Subject to receipt of proper requests from the organisers, the following sponsorships were recommended:

Mode B (with financing)

- Fifth international school/symposium for space simulations (ISS-5), Kyoto (Japan), spring 1997, proposed by Commissions H and G, Commission H representative : Prof. H. Matsumoto (Japan),
- Radio methods for studying turbulence, Aussois (France), first half of 1998, proposed by Commissions E, F, G, H, J, Commission H representative : Dr. F. Lefeuvre (France),
- Electromagnetic scattering in gases and plasma, Ukraine, summer 1997, proposed by Commissions H and G, Commission H representative : A. Hamza (Canada),
- International conference on phenomena in ionised gases (ICPG), Toulouse (France), 17-22 July 1997, contact person : Dr. H. Brunet (France).

Mode A (without financing) :

- International conference on the physics of dusty plasmas, Goa (India), 21-25 Oct. 1996, contact person : Dr Shukhla (Germany).

2.4 Editors for the RRS, the Disk and the Radio Science Bulletin

Drs. H.G. James and O. Santolik confirmed their willingness to respectively serve as Commission H editors for the RRS and for the Reference Disk. Dr. P. Bernhardt accepted to be the Radio Science Bulletin Associated Editor.

3. General resolutions

Joint resolutions with Commission G were confirmed. Being supported by two Commissions or more they had been proposed (and accepted) as Council resolutions. One H resolution was voted. It is included in the Resolutions and recommendations of the Commissions.

4. Participation to standing committees

The list of standing committees was reviewed. No recommendation was made.

5. H sessions for the Toronto General Assembly.

The following proposals were discussed:

- H1 Active experiments involving space plasmas (W.J. Raitt),
- H2 Wave particle interactions: quantitative comparison between observations, theory and simulations (R.R. Anderson, I. Nagano, D. Nunn),
- H3 Pitch angle scattering (and acceleration) of trapped particles by waves in the magnetosphere,(A. Smith, J. Lemaire, U.S. Inan,
- H4 Open session and latest results (V. Fiala)
- HG1 Theory and simulation of non-linear kinetic processes in space plasmas, (H: Y. Omura, M. Ashour- Abdalla, G: S. Ossakow),
- HG2 Sounders in space, new and old (H: H.G. James, R.F. Benson, G: B. Reinisch),
- HG3 Wave propagation : observations and data analysis (H: F. Lefeuvre, K. Hashimoto, G: K. Mahajan),
- HG4 Comparative studies of space and laboratory plasmas (H: to be determined, G: C. Hanuise)
- HG5 Ionospheric modification with high power radio waves (H: T. Leyser, G: Sa. Basu)
- H1 Electromagnetic phenomena in rotating planetary plasma envelopes (H: Y. Chugunov), subject to approval by Commission E.

COMMISSION J - RADIO ASTRONOMY

Chair: Prof. Y.N. Parijskij (Russia)

Vice-Chair: Prof. R.S. Booth (Sweden)

REPORT ON THE OPEN COMMISSION MEETINGS (BUSINESS MEETINGS)

The commission held two Open Commission Meetings, respectively on 30 August and 3 September 1996. The discussion and resolutions are summarised as follows:

1. Terms of reference

No changes were proposed.

2. Election of Vice-Chair

Two nominations were received and final voting took place at the General Assembly (GA), although those votes received before the GA from National delegates not present at the GA were also accepted. However, delegates expressed their concern that one of the nominees was not present at the GA. Results were, in order of preference:

1. Prof. Jacqueline Hewitt (USA)
2. Prof. S. Ananthakrishnan (India)

3. Inter-Union Programmes

3.1. Inter-Union Commission on the Allocation of Frequencies for Radio Astronomy and Space Science (IUCAF)

URSI nominates four (now six) members of IUCAF. Each member has a six year term, with two members rotating at each General Assembly. At the time of the GA, the Commission J members of IUCAF were J. Whiteoak (Australia), who replaced B.J. Robinson in 1995, W. Baan (USA) - Chairman, R.J. Cohen (UK) and H.C. Kahlmann (Netherlands). Kahlmann retired at the GA and the Commission recommended that he should be replaced by K. Ruf (Germany). It was also suggested that Whiteoak should continue until the next GA.

These recommendations have been communicated to the President and General Secretary.

3.1.1. IUCAF Resolutions

The IUCAF chairman's report expressed serious worries about interference in wavebands allocated to Radio Astronomy. Proposals for cloud-sensing radar at mm wavelengths and mobile communications systems (such as the Motorola Iridium project) are specific examples. The underlying problem is that regulatory mechanisms are being subverted by multi-national corporations that cause enormous monetary value to be attached to all pieces of the electromagnetic spectrum without allowance for passive users with ultrasensitive measurement requirements. Our resolutions, summarised below, reflect these worries.

a) Interference to Radio Astronomy from Satellites. This resolution calls on the ITU, and affiliated national and regional administrations to encourage the use of modulation schemes that minimise harmful interference, to require pre-flight testing of satellite transmission systems, to devise rulemaking that prevents new users from disrupting existing users, and to require electro-magnetic environmental impact statements before operation is authorised.

b) Protection of Existing Passive Use of the Millimetric and Sub-Millimetric Portions of the Radio Spectrum. Because of the lack of filter technology at mm-wave frequencies, the ITU and national administrations are asked to take great care in frequency allocation and possibly to defer active use until such technology is available.

c) Protection of Passive Services in the Shielded Zone of the Moon. This is the same resolution that was adopted at the 1994 GA of the International Astronomical Union in The Hague.

d) Inter Commission Working Group on Radio Interference. This resolution calls for the establishment of ICWG to study all technical aspects of harmful interference, to invite two members from all URSI Commissions to participate, and to establish a cooperation mechanism with the ITU-R Study Groups.

e) The restatement of the resolution accepted at the 1993 GA calling on the ITU to allocate spectrum only to those services which must radiate electromagnetic energy.

3.2 ICSU Working Group on Adverse Environmental Impacts on Astronomy

J. Cohen (UK) was re-nominated as the Commission J member on this Working Group.

3.3. FAGS

Prof. Roy Booth agreed to succeed Prof. R. Wielebinski as the Commission J representative on FAGS (the Federation of Astronomical and Geophysical Data Analysis Services).

4. Review of Radio Science

The Commission Editor, Dr. T. Tzioumis, reported on the Review. Commission J continues to support the Review but again voted against the Disk, essentially for the reasons given in the previous report.

Dr. Richard Strom (Netherlands) was appointed as Commission Editor for the 1999 issue of the Review.

5. Communications

The commission was keen to see better communications between General Assemblies. It was agreed that a www page, linked to the URSI page, would be established, as recommended by the Secretariat.

6. Reports of the Working Groups

6.1 Global VLBI

This Working Group, formed at the Prague GA to coordinate Global VLBI developments, has been actively supporting the Space VLBI missions. It was decided to recommend the continuation of the Group's activities until the launch of those missions. Prof. Roy Booth (Sweden), now Commission Chair, will resign as Chairman after the launch of the Japanese VSOP mission and it was unanimously agreed to nominate Prof. Richard Schilizzi (Netherlands) to take over the Chairmanship in mid 1997. The commission thanked Prof. Booth for his work on their behalf.

6.2 Large Telescope Working Group

The Chairman, Dr R. Braun (Netherlands), reported on a series of meetings of this Group and the continuing definition of the needs and plans for such an instrument. Groups in the Netherlands and in China were actively working on different but complementary ideas. The working group will continue its activities.

6.3 Working Group for a 'Large Millimetre/Submillimetre Array'

Three groups, in the US, Japan and Europe, are working on separate projects to build arrays in the southern hemisphere and, although much collaborative work has been done, particularly in the area of site testing, it has been difficult to achieve much discussion on combining these projects into one single array. The co-chairmen, Prof. Ishiguro (Japan) and Prof. Booth (Sweden) felt that they were perhaps too close to the projects, being individually involved with the Japanese and European studies, respectively, and decided to stand down. It was agreed that Dr Jaap Baars (Germany) should become the next Chairman.

7. Review of the Lille General Assembly

7.1 Scientific Programme

Commission J members thought that the scientific content of the J programme was good but that there were too many sessions (all slots were filled), leaving too little time to attend meetings of other Commissions.

General Lectures are a good idea but two of the three Lille efforts were not very interesting

Tutorials are also a good idea but since there were always other Commission meetings at the same time, making it difficult to get a general audience, some of the point of the tutorial was lost.

7.2 More general issues

7.2 1 Length of the General Assembly

There was a preference for a shorter General Asssembly, say a continuous six day programme of scientific sessions, but with a wish to keep the General Lectures, Tutorials and Open Business Meetings.

7.2.2 Young Scientists

Commission J noted that there were not many young radio astronomers at the GA. They also noted that Radio Astronomy fared relatively poorly in Young Scientist Awards, and agreed to publicise the Young Scientist Award Programme more widely before the next GA. Since it is the young scientists who hold the key to the future of URSI it was felt that conveners should leave more slots in their programmes for contributed papers, giving young people more opportunities to submit papers. Often institutions will only support members of staff to attend a meeting if they are giving a paper.

8. Symposia for Commission sponsorship in 1996 - 1999

8.1 VLBI: Galactic and Extragalactic

Contact: A. Zensus .

Location: Socorro, New Mexico. Date: April 1997.

8.2 The Universe at Metre Wavelengths

Contact: G. Swarup. Location: India. Date: 1997/98.

8.3 50 Years of Radio Galaxies

Contact: R. Ekers. Location: Australia. Date: 1999.

Commission J organised eight Scientific Sessions:

J1 Measurements of the Cosmic Microwave Background
Convener: R.D. Davies (UK)

J2 Pulsars and Interstellar Matters
Convener: V. Radhakrishnan (India)

J3 Millimetre and sub millimetre astronomy
Convener: S. Guilloteau (France)

J4 Next generation millimetre/sub millimetre arrays- technical and observational challenges
Conveners: R.S. Booth (Sweden), M. Ishiguro (Japan)
J5 Next generation large cm/decimetre telescopes
Convener: R. Braun (Netherlands)
J6 New developments in VLBI
Convener: C. Walker (USA)
J7 Highlights of the past 3 years
Convener: R. Ekers (Australia)
J8 Observatory reports (oral)
Convener: T. Wilson (Germany)

Poster sessions
P1 Observatory Reports
Convener: T. Wilson (Germany)
P2 New Results
Convener: R. Ekers (Australia)

The Commission will also help organise the following Joint Sessions :
JB1 Focal Plane Arrays
Convener for Com. J. : N. Whyborn (Sweden)
JB2 New Antenna Technology
Convener for Com. J. : P. Napier (USA)
JH1 Kilometre Wave Radio Emission Generated by Coherent Processes from the Sun and Planets
Convener for Com. J. : M. Kundu (USA)
JCE1 Interference Problems in Radio Astronomy and Communications- or Cosmic Ecology
Convener for Com. J. : J. Whiteoak (Australia)

Tutorial Lecture

Dr. James Moran (USA) : Cosmic MASERS - an important tool in Radio Astronomy

Guest Lecture

Nobel Laureate, Prof. Joe Taylor, also of Comm. J, gave a public lecture: Radio Science, Pulsars and General Relativity

Commission K - Electromagnetic in Biology and Medicine

Chair : Prof. P. Bernardi (Italy)

Vice-Chair : Prof. J.C. Lin (U.S.A.)

Report on the Open Commission meetings (Business Meetings)

The Commission held a single Open Commission Meeting, on 3 September. 14 member representatives and several observers were present at the meeting. The chairman welcomed the members and briefed the representatives on the activities of the Commission during the past three years. Among the decisions were: (1) election of Prof. Shoogo Ueno of

Japan as Vice Chair for 1996-1999; (2) inclusion of a new term of reference for Commission K, which reads, "g. Electromagnetic field interference with medical devices either implanted or connected to the human body." (3) Organisation and sponsorship of the "Third International Symposium on Electromagnetics in Medicine" to be held in Chicago, USA on 3-5 November 1997. The meeting was concluded with a vote of thanks to Prof. Paolo Bernardi for his excellent service as Commission Chair for 1993-1996.

SCIENTIFIC PROGRAMME

There were four sessions organised by Commission K and three sessions organised jointly with Commissions A, B, and E. The four Commission K sessions consisted of 14 invited presentations, 25 contributed papers and 29 poster papers. The topics were: biological effects and mechanisms of interaction, safety of ELF and LF Fields, safety of wireless communications, and medical applications of EM waves. The joint sessions had 17 invited presentations, 10 contributed papers and 2 posters on the topics of human exposure assessment and related measurement, EM modelling in bioelectromagnetics, and characterisation of EM sources and design to minimise coupling to human body. In addition, Commission K was the sponsor of a tutorial lecture and it was attended by an estimated 600 participants. The number of participants at each session varied somewhat, but it was very high, and was estimated to range from 60 - 140. Clearly, the sessions were well attended and the participants were enthusiastic.

Resolution:

Commission K was instrumental in the URSI Council's adoption of a resolution to establish an Inter-Commission Working Group on the Safety of Medical Devices in the Presence of Electromagnetic Fields. The resolution notes that there is now increasing evidence that electromagnetic fields from wireless communication devices may affect the operation of some medical devices - either implanted or connected to the human body - and as a result may pose a problem to the operation of these devices and therefore to health. The Working Group will consist of representatives from Commissions K and E. It aims to study the specific behaviour of implanted equipment: the characteristics of connected medical equipment, modeling methods, specific measurements, and influence of the person on electromagnetic interference.

Commission K organised four Scientific Sessions, namely :

K1 Biological Effects and Mechanisms of Interactions (I+C+P)
A. Chiabrera (Italy) and B. Veyret (France)

K2 Safety of ELF and LF Applications (I+C+P)
C. Polk (USA) and L. D. Szabo (Hungary)

K3 Safety of Wireless Communication (I+C+P)
N. Kuster (Switzerland) and J. C. Lin (USA)

K4 Medical Applications of EM Waves (Diagnostic and Therapeutic) (I+C+P)
K. M. Reineck (South Africa) and S. Ueno (Japan)

The Commission also participated in the following joint sessions :

KA Human Exposure Assessment and Related Measurements (I+C+P)
K: L.E. Paulsson (Sweden) and A: S. Tofani (Italy)

KB Electromagnetic Modelling in Bioelectromagnetics (I+C+P)
K: O. P. Gandhi (USA) and B: P. Excell (UK)

EK Characterisation of EM-sources and design of equipment for minimum coupling with the human body. (I+P)
E: R. De Leo (Italy) and K: H. Korniewicz (Poland)

Resolutions and Recommendations of the Council

U.1 URSI Scientific Commissions

The URSI Council,

noting
1. that, according to Resolution C.1 (Lima, 1975), the topics covered by the Commissions should be reviewed at each General Assembly;
2. that Commissions C, D, F, G, H and J do not feel it necessary to modify their terms of reference as stated in the Annex to Resolutions U.1 (Kyoto, 1993);
3. that Commissions A, B, E and K have requested small modifications to their terms of reference;

confirms or approves, as appropriate, the titles and terms of reference of the Commissions as given in the Annex.

Annex

1. Commission A - ELECTROMAGNETIC METROLOGY, Electromagnetic measurements and standards.
   The Commission promotes research and development in :
   (a) Measurements and standards in time and frequency, including infrared and optical frequencies;
   (b) Measurements in the time domain;
   (c) Measurements in the frequency domain;
   (d) Measurements in telecommunications;
   (e) Measurements using lasers;
   (f) Quantum metrology and electrical methods in fundamental constants;
   (g) Measurements and standards from dc to optical frequencies.

2. Commission B - FIELDS AND WAVES, Electromagnetic theory and applications. The Commission promotes research and development into fields and waves, encompassing theory, analysis, computation, experiments, and validation. Areas of emphasis are:
   (a) Time-domain and frequency-domain phenomena;
   (b) Scattering and diffraction;
   (c) General propagation including waves in specialised media;
   (d) Guided waves;
   (e) Antennas and radiation;
   (f) Inverse scattering.
   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.

3. Commission C - SIGNALS AND SYSTEMS.
The Commission promotes research and development in :
(a) Telecommunication systems;
(b) Spectrum and medium utilisation;
(c) Modulation and coding;
(d) Signal and image processing;
(e) Circuit theory and design;
(f) Information theory.
The design of effective telecommunication systems requires the balance of scientific, engineering and economic factors. The Commission emphasises research into the scientific factors, and provides expertise in other areas of radio science required for system design.

4. Commission D - ELECTRONICS AND PHOTONICS.
The Commission promotes research and development in :
(a) Electronic devices and applications;
(b) Photonic devices and applications;
(c) Physics, materials, CAD, technology and reliability of electronic and photonic 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, covering all frequencies, including those in the microwave and optical domains.

5. Commission E - ELECTROMAGNETIC NOISE AND INTERFERENCE.
The Commission promotes research and development in :
(a) Terrestrial and planetary noise of natural origin; man-made noise;
(b) The composite noise environment;
(c) The effects of noise on system performance;
(d) The lasting effects of transients on equipment performance;
(e) The scientific basis of noise and interference control;
(f) Spectrum management/utilisation and wireless telecommunication;
(g) Geo-electric and -magnetic fields and seismic associated electromagnetic fields.
Note: Many of the subjects mentioned are treated under the common title of Electromagnetic Compatibility.

6. Commission F - WAVE PROPAGATION AND REMOTE SENSING
(including radio-meteorology, radio-oceanography and remote sensing of non-ionised media).
The Commission promotes research and development in :
(a) The study of all aspects of wave propagation at all frequencies in a non-ionised environment :
    (i) wave propagation over the Earth's surface,
    (ii) wave propagation in, and interaction with, the neutral atmosphere,
    (iii) wave interaction with the Earth's surface, oceans, land and ice,
    (iv) wave propagation through, and scattering by, the subsurface medium,
    (v) 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 cooperation with other URSI Commissions and other relevant organisations.

7. 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 for radio communications.
The Commission promotes research and development in :
(a) Global morphology and modelling of the ionosphere;
(b) Ionospheric space-time variations;
(c) Development of tools and networks needed to measure ionospheric properties and trends;
(d) Theory and practice of radio propagation via the ionosphere;
(e) Application of ionospheric information to radio communications.
To achieve these objectives, the Commission cooperates with other URSI Commissions, corresponding bodies of the ICSU family (IUGG, IAU, COSPAR, SCOSTEP, etc) and other organisations (ITU, IEEE, etc.).

8. Commission H - WAVES IN PLASMAS (including space and laboratory plasmas).
The goals of the Commission are :
(a) To study waves in plasmas in the broadest sense and, in particular :
  (i) the generation (i.e. plasma instabilities) and propagation of waves in plasmas,
  (ii) the interaction between these waves, and wave-particle interactions,
  (iii) plasma turbulence processes and chaos,
  (iv) spacecraft-plasma interactions ;
(b) To encourage the application of the results of these studies, particularly in the areas of solar/planetary plasma interactions, and the increased exploitation of space as a research laboratory.

9. Commission J - RADIO ASTRONOMY (including remote sensing of celestial objects).
(a) The activities of the Commission are concerned with observation and interpretation of all radio emissions and reflections from celestial objects.
(b) Emphasis is placed on :
  (i) the promotion of technical means for making radio-astronomical observations and data analysis,
  (ii) support of activities to protect radio-astronomical observations from harmful interference.

10. Commission K - ELECTROMAGNETICS IN BIOLOGY AND MEDICINE
The Commission promotes research and development in :
(a) physical interactions of electromagnetic fields with biological systems;
(b) biological effects of electromagnetic fields;
(c) mechanisms of the effects;
(d) human exposure assessment;
(e) experimental exposure systems;
(f) medical and biological applications;
(g) electromagnetic interferences with medical devices, either implanted or connected to the human body.
The Commission emphasises its interdisciplinary character and fosters research co-operation among various disciplines.

U.2 Membership

The URSI Council,

having considered the applications for membership submitted, and the status of membership dues expected from Member Committees,

resolves
1. to accept the following new Member Committee : the Academy of Sciences of Mexico;
2. to welcome the reinstatement of the following Member Committee to full membership: the URSI Committee in Peru;
3. to transfer the Academy of Sciences of Uzbekistan to the class of Associate Member;
4. to maintain the URSI Committee in Nigeria as a full Member and the URSI Committees in Belarus, Chile and Khazakhstan as Associate Members;
5. to accept the following new Member Committee as an Associate Member: the Serbian Academy of Sciences of Yugoslavia.

U.3 Network of Correspondents

The URSI Council,

resolves to maintain the Network of Correspondents with the following provisions :
1. Any scientist attending a General Assembly or an URSI Symposium will become a Correspondent for the three-year period following the Assembly, the cost financed by a special fee included in the registration fee;
2. Other scientists may seek inclusion in the Network of Correspondents for the same three-year period by applying directly to the URSI Secretariat and paying the special fee;
3. The Board may decide to waive the special fee for a scientist, indicated in resolves 2, above, who requests this dispensation;
4. Correspondents will be issued a numbered card allowing reduced registration fees at certain URSI-sponsored symposia and conferences, and will receive the Radio Science Bulletin;
5. Correspondents will have no voting rights, but will be allowed to express their views in the Commissions on matters of a scientific nature.

U.4 Standing Committee on URSI Membership

The URSI Council,

having considered the recommendations contained in the Report of the Standing Committee on URSI Membership, and in particular the analysis devoted to the need to increase contacts with individual members of the URSI community,

resolves
1. to approve the recommendations of the Standing Committee on URSI Membership;
2. to appoint the following as members of the Standing Committee on URSI Membership for the next triennium :

Chair :	F. Fedi (Italy)
Members :	N.A. Armand (Russia)
	Yinn-Nien Huang (China, SRS)

U.5 URSI Finances and Membership of the Standing Finance Committee

The URSI Council,

having considered the recommendations contained in the Report of the Standing Finance Committee, dated 3 September 1996,

resolves
1. to accept the recommendations of the Standing Finance Committee;
2. to approve the audited accounts of the Union for the years ending 31 December 1993, 1994 and 1995;
3. to publish the Report of the Treasurer and the Report of the Standing Finance Committee in Volume XXIV of the Proceedings of URSI General Assemblies;
4. to appoint the following as members of the Standing Finance Committee for the next triennium :

Chair :	K. Schlegel (Germany)
Members :	L. Nagy (Hungary)
	S.M. Radicella (Argentina)
	F.W. Sluijter (Netherlands)

U.6 URSI Publications and Membership of the Standing Publications Committee

The URSI Council,

having considered the remarks and recommendations contained in the Report of the Standing Publications Committee, dated 3 September 1996,

resolves
1. to approve the recommendations of the Standing Publications Committee;
2. to publish the Report of the Standing Publications Committee in Volume XXIV of the Proceedings of URSI General Assemblies;
3. to appoint the following as members of the Standing Publications Committee for the next triennium :

Chair :	W.R. Stone (U.S.A.)
Members :	P.J.B. Clarricoats (U.K.)
	P. Delogne (Belgium)
	R.L. Dowden (New Zealand)
	K. Geher (Hungary)
	R.D. Hunsucker (U.S.A.)
	P. Sobieski (Belgium)

U.7 Standing Committee on Developing Countries

The URSI Council,

having considered
1. the Report of the Standing Committee on Developing Countries for the 1993-6 triennium,
2. the proposals for future activities of the Committee,

resolves

1. to approve the Report and the proposals of the Standing Committee on Developing Countries;
2. to appoint the following as members of the Standing Committee on Developing Countries for the next triennium :

Chair :	G. Swarup (India)
Secretary :	S.M. Radicella (Argentina)
Members :	G.O. Ajayi (Nigeria)
	P. Chooncharoen (Thailand)
	S. Feng (China, CIE)
	I. Kimura (Japan)
	I.A. Salem (Egypt)

U.8 Standing Committee on Future General Assemblies

The URSI Council,

considering

1. that the optimal length of the scientific programme of a General Assembly has been discussed extensively in Council;
2. that the optimal period of the year in which to hold a General Assembly is a function, not only of local needs, but also of more general factors, such as conflicts with other major events;

resolves

1. to ask the Standing Committee on Future General Assemblies to make recommendations concerning the points referred to above;
2. to appoint the following as members of the Standing Committee on Future General Assemblies for the next triennium :

Chair :	P. Degauque (France)
Members :	J.W. Klein (Germany)
	A.M. Scheggi (Italy)
	G. Swarup (India)

U.9 Standing Committee on Young Scientists

The URSI Council,

having considered the recommendations contained in the Report of the Standing Committee on Young Scientists,

resolves

1. to approve the Report and the recommendations of the Standing Committee on Young Scientists;
2. to appoint the following as members of the Standing Committee on Young Scientists;

Chair :	F. Lefeuvre (France)
Members :	S. Feng (China, CIE)
	E.V. Jull (Canada)

V. Khaikin (Russia)
Z. Popovic (USA)
J. Van Bladel (Belgium)
L. Zombory (Hungary)

U.10 Long Range Planning Committee

The URSI Council,

having considered the remarks and recommendations contained in the Report of the Long Range Planning Committee, dated 29 August 1996,

resolves :
1. to approve the Report and the proposals of the Long Range Planning Committee;
2. to appoint the following as members of the Long Range Planning Committee for the next triennium :

Chair :	H. Matsumoto (Japan)
Members :	P. Bernardi (Italy)
	P. Delogne (Belgium)
	W.E. Gordon (U.S.A.)
	J. Hewitt (U.S.A.)
	T. Itoh (U.S.A.)
	H. Hallikainen (Finland)
	D. Skellern (Australia)
	W.R. Stone (USA)
	A.D. Olver (UK)
	P.H. Wittke (Canada)

U.11 Recommendations by the Long Range Planning Committee

The URSI Council,

considering
1. that the issues raised within the Long Range Planning Committee, both by correspondence and at the Lille meeting have been concerned with a general vision related to the role of URSI in a changing world, the visibility of URSI, and activities between General Assemblies;
2. the need to strengthen the URSI role, the visibility and activity of URSI;

recommends
1. setting up an intercommission working group on Wireless Communications (see preamble p. 152) with representatives from industry and regulatory agencies with further 5action to be taken by the Board with respect to the appropriate Commissions;
2. that financial support for Working Groups activities be provided, according to an agreed budget;
3. that URSI pursue the electronic possibilities of the distribution of information as much as possible and encourage the establishment of active 'electronic' Working Groups, interacting between the General Assemblies;

4. that the Board consider the possibility of having a vision meeting, such as the Corsendonk in 1987, in connection with the meeting of the Coordinating Committee in the spring of 1998.

U.12 Strengthening the URSI and ITU relationship

The URSI Council,

considering
1. that URSI should play a role in the advancement of telecommunications science in general;
2. that the activities of URSI include the study of topics relevant to the advancement of telecommunications, some of which are of direct interest to ITU;

resolves
that the Board shall :
1. identify those areas which may influence the evolution of telecommunications in the long term;
2. keep the URSI community informed on specific problems raised by the evolution of telecommunications;
3. keep the ITU informed on scientific results and conclusions of importance to telecommunications;
4. work with ITU in the identification of precise topic areas of mutual concern;
5. by stimulating studies and symposia, prepare URSI statements on such topics in an appropriate form;
6. establish task groups, or other mechanisms as appropriate, to undertake the above tasks.

U.13 Inter-Commission Working Group on the Safety of Medical Devices in the Presence of Electromagnetic Fields

The URSI Council,

noting
that there is now increasing evidence that electromagnetic fields from wireless communication devices may affect the operation of some medical devices - either implanted or connected to the human body - and as a result may pose a problem to the safety of the operation of these devices and therefore to health,

resolves
to establish an Inter-Commission Working Group on the Operation of Safety Devices in the Presence of Electromagnetic Fields, with representatives of Commissions K and E, to study :
1. what is the specific behaviour of implanted medical equipment;
2. what are the characteristics of connected medical equipment;
3. modelling methods;
4. specific measurements;
5. influence of the person on the EMI;
with the intention of organising a joint session at the next General Assembly, a workshop or special session at EMC'98 Roma, and a workshop in between the two General Assemblies.

U.14 Inter-Commission Steering Committee for ISSSE

The URSI Council,

noting
that Commissions C and D have had three successful ISSSE conferences, respectively in 1989, 1992 and 1995,

resolves
that a Steering Committee for ISSSE be created with the following terms of reference :
1. to maintain long term continuity of both administrative and technical aspects,
2. to put in place conference guidelines in keeping with URSI requirements, and
3. to receive and evaluate proposals and select the conference site.

Membership will comprise up to three representatives from each commission. In addition, Commission Chairs will serve as Ex Officio members. The Coordinator for the Steering Committee will be selected for a three year term and will be the point of contact.

U.15 Committee on the International Geosphere-Biosphere Programme (IGBP)

The URSI Council,

noting
1. the numerous activities of the various Committees of the IGBP,
2. the difficulties of interfacing with these activities, but also the need to keep contact with the Programme,

resolves
to re-appoint a Committee on the IGBP for the next triennium, formed as follows :

Chair :	R.K. Raney (U.S.A.)
Members :	J.P.V. Baptista (ESA, Netherlands)
	H. Hallikainen (Finland)

U.16 Inter-Union Commission on Frequency Allocation to Radio Astronomy and Space Science (IUCAF)

The URSI Council,

considering
1. the Report of the meeting held by the IUCAF delegation on 29 August and 3 September 1995,
2. the efficiency with which IUCAF defended the interests of the scientific community during the 1995 World Radio Conference (WRC95), and the need for continuous vigilance in the struggle to keep parts of the radio spectrum free for scientific observations,

resolves
1. to approve the Report and the recommendations contained therein;
2. to continue URSI's financial support of the activities of IUCAF;
3. to appoint the following as URSI members of the Commission :

W.A. Baan (U.S.A.) (Chair)
J.P.V. Baptista (ESA, the Netherlands)
R.J. Cohen (U.K.)
W. Keydel (Germany)
K. Ruf (Germany)
A.P. van Eyken (Norway)
J.B. Whiteoak (Australia).

U.17 Inter-Union Working Group on Adverse Environmental Impacts on Astronomy

The URSI Council,

noting
1. the need to maintain optimal conditions under which scientific space and astronomical research may be carried out,
2. the dangers represented by increasing electromagnetic interference, increasing amounts of space debris and, more recently, plans to start "advertising in space",

resolves
1. to approve participation of URSI in the Inter-Union Working Group on Adverse Environmental Impacts on Astronomy;
2. to propose R.D. Parlow (USA, Commission E) and J. Cohen (UK, Commission J) as Members of the Working Group.

U.18 The need for Radio Frequency Spectrum for radio science

The URSI Council,

noting that
the requirements for increased telecommunications systems (e.g. fixed, mobile, and intersatellite) will be addressed at the ITU World Radiocommunication Conference in 1997, and

taking into account that
1. electromagnetic emissions, particularly in the centimetre and millimetre wave range, can be used to obtain information on the state and composition of the atmosphere and other objects of scientific interest, and that measurements both from the ground and from space are of the utmost importance in determining the amount of water vapour, molecular oxygen and trace gases present; and hence are important for weather forecasting and long-range climate monitoring;
2. radio astronomy observations from the ground and from space, spanning the whole radio spectrum, from metre- to sub-millimetre-wavelenghts, are used to derive information on the formation and evolution of the Universe and all types of astronomical phenomena from planets to galaxies, require interference-free spectral windows;

resolves
1. that it is vitally important to preserve an adequate spectrum range for astronomical radio science and for atmospheric and earth-surface environmental science and its applications;
2. to call upon each Member Committee to act upon the resolution in its territory.

U.19 Use of the Frequency Spectrum

The URSI Council,

urges the ITU and its members :
1. to recognise that the electromagnetic spectrum is a unique and limited natural resource, and;
2. to allocate spectrum only to those services which must use free-space propagation, and;
3. to avoid allocating spectrum in cases where other technologies, such as guided-waves, could be used.

U.20 On Free Access to Environmental Data

The URSI Council,

noting the idea growing in some quarters of considering environmental data as a market commodity,

recognising that such consideration could be acceptable when data are to be used for a commercial purpose,

urges agencies that archive this data to provide the access to environmental information for scientific purpose free of charge, or at marginal cost.

U.21 Importance of Preserving Old Geophysical Data Sets and Transforming Them to Digital Formats

The URSI Council,

considering
1. the importance of extensive continuous data sets for investigating long term trends and variations of ionospheric/magnetospheric parameters;
2. the inability to reproduce such existing data sets;
3. the imminent danger of losing some of these data sets through deterioration and/or disposal;

resolves
that the attention of national administrations be drawn to the importance of preserving these data sets and transforming them into modern digital formats that will be more amenable to analysis.

U.22 Support for the Analysis of STP-Data

The URSI Council,

considering
1. that the International Solar Terrestrial Physics (ISTP) programme goals for the total understanding of the flow of mass, momentum, and energy from the sun to the Earth's surface remain an important objective of the international scientific community;
2. that great strides have been made towards achieving these goals using the fleet of spacecraft and ground-based instruments developed for the ISTP programme;

3. that these efforts to achieve the ISTP goals should be continued;
4. that recommendation U.29 supports the rebuilding of a suite of spacecraft to carry out the CLUSTER goals of multi-point measurements in support of the ISTP goals;

recommends
that the appropriate science and research agencies adequately support the continued mission operations and data analysis efforts of the existing fleet of ISTP spacecraft and of ground-based instruments.

U.23 CLUSTER-like Missions

The URSI Council,

considering
1. that the future of research into the magnetosphere requires coordinated multi-point measurements, with many spacecraft, many ground based instruments, and with satellites in formation, a four-point constellation being the minimum necessary to achieve a 3D (vectorial) view;
2. that the CLUSTER mission which was to carry out four-point measurements on different spatial scales in the magnetosphere and solar wind, would have given the scientific communities a unique and unprecedented possibility to solve a number of problems in space plasma physics, in particular in the study of waves in plasmas;
3. that these communities around the world had organised and trained themselves and planned for a coordinated use of the mission data, and remain in need of those data;

recommends
that an international cooperative effort must be carried on urgently to help the recovery of the CLUSTER objectives before or around the year 2000.

U.24 Inter Commission Working Group on Radio Interference

The URSI Council,

considering
1. that many radio services are increasingly affected by harmful interference;
2. that demand for spectrum is increasing rapidly to accomodate new applications of radio;
3. that ever higher frequencies are being brought into use for these applications;

resolves
1. to establish an Inter-Commission Working Group to study all technical aspects of the matter of harmful interference;
2. to invite Commissions of the Union to appoint up to two of their members to participate in the work of the I-CWG;
3. to invite the URSI Board to establish a mechanism for cooperation on technical matters with ITU.

U.25 Radio Science in High Schools and Universities

The URSI Council,

considering

1. the success of the educational programme INSPIRE (Interactive NASA Space Physics Ionosphere Radio Exeriments) to actively involve students and teachers in radio space experiments;
2. the scientific and educational objectives of INTMINS (INTERBALL-MIR-INSPIRE) programme based on active experiments performed on the MIR space station;
3. additional initiatives taken in other countries - as presented at the Lille General Assembly;

recommends
that the attention of all URSI commissions be drawn to the importance of :
1. encouraging links between scientists, students and teachers through active participation in radio science, technology and space experiments;
2. reporting on such educational activities in the Radio Science Bulletin.

U.26 Continuation of OMEGA Stations

The URSI Council,

considering
1. that the FAA (Federal Aviation Agency) recently completed its review of Omega navigation requirements for the U.S. aviation industry and notified the Coast Guard that most users will complete the conversion to GPS technology by September 1997, and that based on this study, the FAA concurred with the proposed FRP (Federal Radionavigation Plan) termination date of 30 September 1997 for the Omega system;
2. that the Omega signals have been used for various important scientific purposes and provided unique and indispensable opportunites of measurements in our research fields, such as :
   - satellite measurements for the determination of global electron density distribution in the plasmasphere,
   - measurements of TRIMPI effects corresponding to lightning induced electron precipitation,
   - measurements of earthquake-associated phase anomalies which have recently been discovered;

recommends
that the FAA should take action to extend the operation of a few of the Omega stations, including Tsushima, Japan, at least until the end of 1998.

U.27 Electromagnetic Measurements in Connection with Earthquakes

The URSI Council,

considering
that there is now increasing evidence that there are a variety of electric and magnetic variations associated with the changes taking place in the Earth immediately preceding earthquakes, and that these variations are important for short-term prediction,

recommends
that studies should be undertaken of the relationship between electric and magnetic field changes and earthquakes, with emphasis on the electromagnetic changes taking place immediately preceding earthquakes.

U.28 Incoherent scatter radars at Resolute Bay, Northwest Territories, Canada, and Gakona, Alaska

The URSI Council,

considering
1. the importance of observations in the high latitude arctic regions for studying the physics of the middle atmosphere, ionosphere, thermosphere, and magnetosphere and the effects of artificial modification of the ionosphere;
2. the potential for synoptic coverage of the entire polar cap at F-region heights and the extended coverage of the auroral circle at E- and F-region heights;
3. the opportunities for simultaneous observation of polar atmospheric phenomena by multiple radars;
4. the potential for monostatic and bistatic observations by multiple radar facilities;

recommends
that state-of-the-art, steerable incoherent scatter radar facilities be established at Resolute Bay and Gakona; and that Commissions G and H should foster joint programmes using the existing facilities in preparation for the unique and exciting scientific opportunities that the new facilities will provide.

U.29 XXVIth General Assembly

The URSI Council,

having considered
the invitations for the XXVIth General Assembly which had been submitted by the URSI Member Committees in Canada (Toronto), China (Beijing), and India (New Delhi),

resolves
1. to accept the invitation of the Canadian URSI Committee to hold the XXVIth General Assembly in Toronto in August 1999;
2. to record its thanks to the Member Committees in China (CIE) and in India for their invitations.

U.30 UNESCO and ICSU Subventions

The URSI Council,

considering
1. that an important part of the activities of URSI consists in the organisation of international scientific symposia and other meetings, in the issuing of publications, and in its Young Scientist Programme;
2. that the subventions from UNESCO and from ICSU have been used to cover part of the cost of these activities;

resolves to convey to these organisations its warm thanks and appreciation for the valuable support thus provided.

U.31 Vote of Thanks to the French URSI Committee

The URSI Council,

resolves unanimously to record its warm appreciation of the invitation extended to it by the French URSI Committee to hold the XXVth General Assembly in Lille.

Resolutions, Recommendations and Opinions of Commissions

Commission A- Electromagnetic Metrology

A.1. Conference on Precision Electromagnetic Measurements (CPEM)

Commission A,

considering the charter for CPEM,

recommends that URSI continue to sponsor the international Conference on Precision Electromagnetic Measurements.

A.2. Comité International des Poids et Mesures (CIPM)

Commission A,

noting the recent information on the regional basis of metrological organisations,

recognising the importance and interest of a widespread diffusion of precision standards and of advanced methods of calibration,

expresses the opinion that the activities of the new organisations should be aligned with the decisions of CIPM and its consultative committees.

Commisson D - Electronics and Photonics

D.1. Bibliographic disk produced in conjunction with the Review of Radio Science

Commission D,

considering
1. that the area of interest of the Commission is so wide that the time and effort required to produce an exhaustive annotated reference list would not be justified;
2. that well organised databases are already accessible from computer networks;

resolves
that Commission D will not participate in the preparation of the Disk of Reference for the triennium 1996-1999.

D.2. The International Commission on Optics (ICO)

Commission D,

considering the overlapping interests in optical phenomena of the Commission and the ICO,

recommends
1. that the ICO and URSI Commission D should keep each other informed of their respective activities.
2. that the URSI President initiate appropriate actions to promote and enhance cooperation between ICO and URSI, and initiate whatever actions are needed to provide an Inter Union Commission status to ICO, if they so desire.

COMMISSION E - ELECTROMAGNETIC NOISE AND INTERFERENCE

E.1. Working Groups

Commission E,

considering the reports of its various Working Groups;

resolves
1. to establish, with Commissions G and H, a Joint Working Group EGH.2 entitled "Electromagnetic Effects Associated with Seismic Activity", with Professor T. Yoshino (Japan) as Co-Chair for Commission E;
2. to establish the following Working Groups within Commission E :
   E.1. Spectrum Management/Utilisation, and Wireless Telecommunication
   Co-Chairs : R.D. Parlow (USA) and R. Struzak (Switzerland);
   E.2. Non-Gaussian Noise in Communication
   Chair : J. Pawelec (Poland);
   E.3. High Power Electromagnetics
   Chair : R.L. Gardner (USA);
   E.4. Terrestrial and Planetary Lightning including the Generation of Electromagnetic Noise
   Co-Chairs : Z. Kawasaki (Japan) and V. Cooray (Sweden);
   E.5. Interaction with, and Protection of, Complex Electronic Systems
   Co-Chairs : C. Baum (USA), P. Degauque (France) and M. Ianoz (Switzerland);
   E.6. Effects of Transients on Equipment
   Co-Chairs : V. Scuka (Sweden), and B. Demoulin (France);
   E.7. Extra-Terrestrial and Terrestrial Meteorologic-Electric Environment with Noise and Chaos
   Co-Chairs : H. Kikuchi (Japan) and S. Moiseev (Russia);
   E.8. Terrestrial Electric and Magnetic Fields, Propagation, Global Circuit and Geomagnetically Induced Currents
   Co-Chairs : R. Pirjola (Finland) and D.Ll. Jones (United Kingdom);
   E.9. Interference and Noise at Frequencies above 30 MHz
   Chair : J. Gavan (Israel);
3. to establish a Joint Commission K and Commission E Working Group KE.1, entitled "EMI with Medical Equipment" :
   Co-Chair for Commission E : S. Alfas (Denmark).

E.2. Symposia

Commission E,

considering the proposals for the next triennial period,

resolves
1. to support, in mode A, the following conferences :
   - International Symposium on Electromagnetic Environment and Consequences (EUROEM), Haifa, Israel, 1996;
   - International Conference on Lightning Protection, Firenze, Italy, 1996;
2. to support, in mode B, the following conferences :
   - EMC Roma, Roma, Italy, 1996;
   - Zurich International Symposium and Exhibition on Electromagnetic Compatibility, Zurich, Switzerland, February 1997;
   - International Wroclaw Symposium and Exhibition on EMC, Wroclaw, Poland, 1998

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COMMISSION G - IONOSPHERIC RADIO AND PROPAGATION

G.1. Night-time E Region

Commission G,

considering that the night-time values of the E-region electron densities are largely unknown,

recommends :
1. that vertical ionogram observations should be conducted at different longitudes and latitudes with frequency scans starting at 100 kHz;
2. that the E region critical frequencies at night should be measured as function of time, season and solar activity.

G.2. Equatorial Observations

Commission G,

considering that
1. the equatorial atmosphere is closely coupled with other parts of the Earth atmosphere and therefore has a significant influence on the global weather and climate;
2. a variety of observations have been conducted without proper coordination;
3. the MST community has a vast potential to contribute to this research activity;

recommends
that the relevant URSI commissions should endeavour to establish effective international collaboration in this important area.

G.3. Polar Atmosphere-Ionosphere Radar Observations

Commission G,

considering:
1. the unique dynamical and chemical processes which occur in the polar middle atmosphere, and
2. that this region is influenced by coupling from above and below;

recommends
that MST and MF radars become part of the incoherent scatter facilities now being deployed at high latitudes.

G.4. Useful Frequency Licenses for Ionosonde Stations

Commission G

considering :
1. that real-time assessment of the status of the ionosphere is required in support of ground and aircraft based HF communication, ground-satellite radio links, over-the-horizon radar, calibration of incoherent scatter radar facilities, and scientific research;
2. that a large part of this assessment is provided by ionospheric HF sounders (ionosondes) which require using transmission of 'all' frequencies between 0.1 to 30 MHz without frequency gaps that are larger than 0.1 MHz (allowing for occasional larger gaps of not more than 0.25 MHz);
3. that modern ionosondes use lower transmit power, i.e. less than 500 Wpeak, and have improved transmission spectra;

recommends
that member committees make every effort to persuade their frequency allocation/licensing authorities to issue useful frequency licences on a non-interference basis to ionosonde stations.

G.5. Interference-free Incoherent Scatter Observations

Commission G

considering
1. the importance of long term incoherent scatter measurements of the ionosphere and magnetosphere,
2. the small number and high value of such facilities,
3. the need for undisturbed frequency channels in which to operate,

recommends
that member committees make every effort to persuade their frequency allocation/licensing authorities to provide an interference free zone within 200 km of all the incoherent scatter radar sites.

G.6. Monitoring Solar Ionising Radiation

Commission G

considering
1. the importance of solar ionising radiation (EUV and soft X-ray) on the upper atmosphere,
2. the effect of solar disturbances on technological systems,

recommends that support be given to the creation of a permanent Space Patrol for monitoring these radiations as proposed by the International Science and Technology Centre (Moscow).

COMMISSION H - WAVES IN PLASMAS

H.1. Working Groups

Commission H,

considering the reports submitted by its various Working Groups,

resolves
1. to continue the Inter-Union (URSI/IAGA) Working Group 1 VLF/ELF Remote Sensing of the Ionosphere and Magnetosphere (VERSIM), with M. Parrot (France) as Co-Chair for Commission H;
2. to continue, with Commissions C and G, the Joint Working Group CGH.1 on "Wave and Turbulence Analysis", with F. Lefeuvre (France) as Co-Chair for Commission H;
3. to continue, with Commission G, the Joint Working Group GH.1 on "Active Experiments in Plasmas", with J. Raitt (USA) as Co-Chair for Commission H;
4. to continue, with Commission G, the Joint Working Group GH.2 on "Computer Experiments, Simulation and Analysis of Wave Plasma Processes", with H. Matsumoto (Japan) and M. Ashour-Abdalla (USA) as Co-Chairs for Commission H;
5. to continue, with Commissions E and G, a Joint Working Group EGH.1 on "Electromagnetic Effects Associated with Seismic Activity", with M. Parrot (France) as Co-Chair for Commission H.

H.2. Sponsorship of Symposia and Meetings

Commission H,

recommends the sponsorship by URSI of the following meetings during 1996-1999 in Mode A or Mode B, subject to receipt of proper requests from organisers:
1. International Conference of the Physics of Dusty Plasmas, Goa, India, 21 - 25 October 1996, (Mode A), (P.K. Shukla, Germany);
2. (with Commission G) Fifth International School/Symposium for Space Simulations (ISS-5), Kyoto, Japan, spring 1997, (Mode B), (H : H. Matsumoto, Japan);
3. (with Commissions E, F, G, J) Radio Methods for studying turbulence, Aussois, France, first half of 1998, (Mode B), (H : F. Lefeuvre, France);
4. (with Commission G) Electromagnetic Scattering in Gases and Plasmas, Ukraine, summer 1997 (Mode B), (H : A. Hamza, Canada);
5. (with Commission G) International Conference on Phenomena in Ionised Gases (ICPIG), Toulouse, France, 17-22 July 1997, (Mode B), (H. Brunet, France).

J.1. Millimetre - Submillimetre Array Working Group

Commission J,

considering
1. that the time has come for millimetre/submillimetre astronomy to consider the next generation telescope, which will require high angular resolution and an order of magnitude increase in sensitivity over present day telescopes;
2. that such a telescope will be very expensive and will demand international collaboration;

recommends that URSI should establish a Working Group on the "Large Millimetre/ Submillimetre Array", with the following terms of reference :
1. To study the main scientific objective for the beginning of the next century;
2. To coordinate and evaluate the "radio-seeing" data for site evaluation and observation strategy;
3. To study new designs for telescopes and instrumentation;
4. To investigate potential international partnerships.

J.2. Large Telescope Working Group

Commission J,

considering
1. the strong scientific case for a new, internationally accessible radio telescope with one to two orders of magnitude greater sensitivity than that of any existing or planned facility,
2. the need for innovative technical developments to realise such a facility at an affordable price,
3. the likely need for international collaboration to allow the realisation of this facility,

resolves to establish a Working Group with the following terms of reference :
1. To explore the range of scientific problems to be addressed by the instrument;
2. To discuss the technical specifications and general design considerations needed to maximise the scientific return of such a facility;
3. To identify and, in so far as possible, solve the major technical challenges to the realisation of an affordable radio telescope with the required sensitivity.

J.3. Protection of Passive Services in the Shielded Zone of the Moon

Commission J,

considering that
1. radiocommunication systems between the Moon and the Earth, on the surface of the Moon, and in the surrounding environment of the Moon, are expected to be required in support of space research activities, including radio astronomy observations;
2. some radiocommunication will be required within the shielded zone of the Moon (szm) as defined by RR ARTICLE 29, Sect VI;
3. by the use of certain radio frequency bands the requirements for such radiocommunication can be accomodated while at the same time providing the protection for radio astronomy intended by RR Article 29, Sect VI;

4. in the shielded zone of the Moon, it is necessary to preserve as much of the spectrum as possible free from emissions;
5. in assigning frequencies to the necessary transmissions it is important to avoid bands that:
   - are of great astronomical importance,
   - are difficult to observe from Earth because of interference or absorption in the atmosphere or ionosphere,
   - are important for interferometry between the Earth and the Moon;
6. that the bands noted in 5. include:
   - all frequencies below 2 GHz,
   - frequencies of the most important spectral lines (the International Astronomical Union list), with bandwidth to cover essential red and blue shifts,
   - radio astronomy allocations used on Earth for continuum observations, with allowance for greater bandwidth to improve sensitivity;

urges
that two alternative bands be allocated to the necessary active services in the shielded zone of the Moon to retain accesss by the passive services to the whole spectrum, on a time-coordinated basis.

J.4. Protection of Existing Passive Use of the Millimetric and Sub-Millimetric Portions of the Radio Spectrum

Commission J,

considering that
1. the International Telecommunication Union (ITU) and national administrations allow access to the radio spectrum on the basis of allocation by frequency;
2. allocation by frequency is predicated on the possibility of achieving the physical separation of signals by the use of filters;
3. the lowest noise receivers in the millimetric and sub-millimetric wavelength parts of the spectrum become non-linear and saturate even in the case of exceptionally low signal levels;
4. such receivers are extensively used for passive scientific observations;
5. presently available technology does not provide the means to construct filters of adequately low insertion loss and adequately high skirt selectivity to precede such receivers;

urges
1. ITU-R to conduct studies of the current state of filter technology, with a view to taking it into account when allocating frequencies to the various passive and active radio services, particularly in the millimetre wavelength range of the spectrum;
2. national administrations to defer authorising further active use of the millimetric and sub-millimetric parts of the radio spectrum until filter technology becomes available sufficient to protect existing passive use from harmful interference.

J.5. Interference to Radio Astronomy from Satellites

Commission J,

considering that

1. radio astronomical observations are extremely vulnerable to harmful interference from transmitters on-board satellites;
2. instances of such harmful interference are increasing;
3. demand for spectrum is also increasing to accomodate new radio applications for satellites;
4. such demand is leading to the use of ever higher frequencies;
5. the technical means to separate signals by frequency are not available with the neccessary performance at millimetre wave frequencies;
6 modulation schemes are known, which result in minimal unwanted emissions;

urges the ITU and affiliated national and regional administrations:
1. to encourage the use of modulation schemes and satellite transmission schemes which minimise unwanted emissions;
2. to require thorough pre-flight testing of satellite transmission systems for emissions harmful to other users of the radio spectrum;
3. to devise rulemaking that will prevent new users of the spectrum from disrupting operations of existing users;
4. to require prospective users of the spectrum to provide and publish an electro-magnetic environmental impact statement before being granted authority to operate.

J.6. Global VLBI Working Group

Commission J,

considering
the activities and success of the Global VLBI Working Group, and the need to continue these activities until the launch of the Space VLBI missions,

resolves
to continue the Working Group until 1999, with a membership which includes representation from the Space VLBI missions (NASA, ISAS, Lebedev Institute).

Commission K - Electromagnetics in Biology and Medicine

K.1. Wireless Communication

Commission K,

considering
1. that there is a rapid development of new technologies such as wireless local area networks (LAN's), cellular phones, low earth orbiting satellite communication networks (LEO's, e.g. Iridium), personal communication services (PCS), cordless telephones, etc... and that their wide spread is anticipated;
2. that there exists scientific uncertainty about the potential impact on human health of electromagnetic fields from wireless communication;
3. that there is public concern about the health effects of all electromagnetic systems;

recommends
that broadbased research programmes should be established nationally and internationally to address the following key questions :

1. What are the interaction mechanisms, with living systems, of weak electromagnetic fields of various characteristics;
2. What biological effects - and particularly potentially harmful effects - are caused, and under what exposure conditions;
3. How to evaluate the exposures through proper measurements and dosimetric modelling.

The Commission gratefully acknowledges the promised support of Commission A in the area of the measurements, and of Commission B in the area of the dosimetric modelling.

INTER-COMMISSION RESOLUTION

X.1. Importance of the Terrestrial Ionosphere/Magnetosphere System as a Plasma Laboratory

The URSI Commissions,

considering

1. that the terrestrial ionosphere/magnetosphere system is the most readily accessible space plasma for cost-effective in situ and remote investigation;
2. that many processes operating in this system have similar counterparts elsewhere in astrophysical plasmas;
3. that there are basic questions in plasma physics that can be better addressed in the natural plasma laboratory provided by this system than in ground-based laboratories;

resolves
that the attention of national administrations be drawn to the importance of conducting controlled active experiments - both in situ and remote - in the ionosphere/magnetosphere system, with the purpose of investigating basic problems in plasma physics as well as processes giving rise to naturally occurring space phenomena.

PROPOSAL TO CREATE AN URSI WORKING GROUP ON WIRELESS COMMUNICATION

Preamble

Advances in wireless and information technology are changing the way we live, the way we work, and the way we play. The impacts of these advances may be compared with those of the invention of the printing press or the industrial revolution.

Cellular telephones and global positioning systems are two examples of new wireless technologies whose remarkable features are not just their economic impacts, spawning new services, businesses, and jobs, but also the rapid rate of development of the technologies. "The success of cellular telephony and other mobile communication products and services, such as messaging and personal digital assistants, has pointed to a fundamental shift in communications in the U.S." (and the world, WEG) "Personal Communications Services - from voice and video to people on the move, rather than to places will be the norm." (T.P. Stanley at COMMSPHERE 95).

The Personal Communication System (PCS) has shown the commercial value of small bands in the radio spectrum, formerly allocated in the U.S.A. by a political process, and now auctioned for ten billion plus (US) dollars. PCS competing with the highly successful cellular phones will connect people and exchange voice and data messages.

Radio advances are driven by information technologies, the globalisation of industries and banking, and by the creativity of bright minds in the right place, at the right time, and with the proper preparation. Secrets of the universe are uncovered in part by radio observations that are being swamped by the interference that grows as technologies advance. Prudent regulation on an international basis is essential. URSI participation at the national and international levels is required.

A working group on wireless communication and regulation, composed of commission representatives as appropriate and one or more representatives of the industry and the regulatory agencies, should be established by URSI and charged with:

1) Encouraging participation in URSI sponsored radio science meetings of representatives from industry and from regulatory agencies to add (a) a problem-oriented aspect to URSI, (b) interactions between the Commissions and the engineering technologies, and (c) provision of a 'home' for open discussions for the constituencies: radio scientists, industry and regulation agencies.
2) Organising meeting sessions focused on problems (e.g. PCS, GPS) with participation by all relevant commissions, and with the session preparations being provided primarily by the working group.
3) Encourage participation in the General Assembly and in COMMSPHERE.
4) Strengthen the URSI and ITU relation.
   The committee further recommends that financial support for the working group's activities be provided by the Board.
5) The working group will terminate after six years.

Resolutions et Recommandations du Conseil

U.1 Les commissions scientifiques de l'URSI

Le Conseil de l'URSI,

notant

1. qu'aux termes de la Résolution C.1 (Lima, 1975), les Commissions sont tenues de réexaminer leur objet d'étude à l'occasion de chaque assemblée générale ;
2. que les Commissions C, D, F, G, H et J n'estiment pas nécessaire de modifier leurs mandats tels qu'ils figurent à l'annexe de la Résolution U.1 (Kyoto, 1993) ;
3. que les Commissions A, B, E et K désirent modifier quelque peu leurs mandats par quelques mots ;

confirme ou approuve, *selon le cas, les titres et mandats des Commissions reproduits en annexe.*

Annexe

1. Commission A - METROLOGIE ELECTROMAGNETIQUE, Mesures et étalons électromagnétiques.
   La Commission tend à promouvoir les recherches et les développements dans les domaines suivants:
   (a) mesures et étalons de temps et de fréquence, y compris les infrarouges et le domaine optique ;
   (b) mesures dans le domaine temporel ;
   (c) mesures dans le domaine des fréquences ;
   (d) mesures dans les télécommunications ;
   (e) mesures au moyen du laser ;
   (f) métrologie quantique et méthodes électriques dans le domaine des constantes fondamentales ;
   (g) mesures et étalons du continu aux fréquences optiques.

2. Commission B - ONDES ET CHAMPS. Théorie électromagnétique et applications, y compris les antennes et les guides d'ondes.
   La Commission tend à promouvoir les recherches et les développements dans les domaines des champs et des ondes, et englobe la théorie, l'analyse, le calcul, les expériences, et leur confirmation, l'accent étant mis sur les sujets suivants :
   (a) phénomènes dans les domaines temporel et fréquentiel ;

(b) diffusion et diffraction ;
(c) propagation générale y compris les ondes dans les mileux spécifiques ;
(d) ondes guidées ;
(e) antennes et rayonnement ;
(f) méthodes inverses appliquées à la diffusion.

La Commission encourage les études ayant pour but de créer, de développer et d'affiner les méthodes numériques et analytiques susceptibles d'améliorer la compréhension de ces phénomènes. Elle préconise l'esprit d'innovation et s'efforce d'appliquer des concepts et méthodes pluridisciplinaires.

3. Commission C - SIGNAUX ET SYSTEMES.

La Commission tend à promouvoir les recherches et les développements dans les domaines suivants :

(a) systèmes de télécommunications ;
(b) utilisation du spectre et des milieux de transmission ;
(c) modulation et codage ;
(d) traitement du signal et de l'image ;
(e) théorie et conception des circuits ;
(f) théorie de l'information.

La conception de systèmes de télécommunications efficaces requiert un équilibre entre les considérations liées à l'ingénierie scientifique et les facteurs économiques. La Commission met l'accent sur la recherche scientifique et fournit l'expérience nécessaire à la conception des systèmes dans d'autres domaines de la radioélectricité scientifique.

4. Commission D - ELECTRONIQUE ET PHOTONIQUE.

La Commission tend à promouvoir les recherches et à faire le point des nouveaux développements dans les domaines suivants :

(a) dispositifs électroniques et applications ;
(b) dispositifs photoniques et applications ;
(c) physique, matériaux, CAO, technologie et fiabilité des dispositifs électroniques et photoniques

présentant un intérêt particulier pour la radioélectricité scientifique et les télécommunications.

La Commission étudie les dispositifs pour la production, la détection, le stockage et le traitement des signaux électromagnétiques, ainsi que leurs applications à toutes les fréquences, y compris les hyperfréquences et les fréquences optiques.

5. Commission E - BRUITS ET BROUILLAGES ELECTROMAGNETIQUES.

La Commission tend à promouvoir les recherches et les développements dans les domaines suivants :

(a) bruits terrestres et planétaires d'origine naturelle, bruits artificiels ;
(b) bruits composites ambiants ;
(c) effets des bruits sur la qualité des systèmes ;
(d) effets durables des phénomènes transitoires sur la qualité des équipements ;
(e) base scientifique des bruits et maîtrise des brouillages ;
(f) utilisation et gestion du spectre et télécommunications sans fil ;
(g) Champs géoélectriques et géomagnétiques et ondes électromagnétiques sismiques associées.

Note : Nombre des sujets précités sont traités sous le titre commun de compatibilité électromagnétique.

6. Commission F - PROPAGATION DES ONDES ET TELEDETECTION
(y compris la radiométéorologie, la radioocéanographie et la télédétection des milieux non ionisés).
La Commission tend à promouvoir les recherches et les développements dans les domaines suivants:
   (a) l'étude de tous les aspects de la propagation des ondes à toutes les fréquences dans un milieu non-ionisé:
      (i) propagation des ondes au-dessus de la surface de la Terre,
      (ii) propagation des ondes dans l'atmosphère neutre et interaction des ondes avec l'atmosphère neutre,
      (iii) interaction des ondes avec la surface de la Terre : océans, sol et glace,
      (iv) propagation et diffusion des ondes en milieu souterrain,
      (v) caractérisation de l'environnement en ce qu'il affecte les phénomènes ondulatoires ;
   (b) l'application des résultats de ces études, en particulier dans les domaines de la télédétection et des communications ;
   (c) le développement d'une collaboration appropriée avec les autres Commissions de l'URSI et les organisations concernées.

7. Commission G - RADIOELECTRICITE IONOSPHERIQUE ET PROPAGATION (y compris les communications ionosphériques et la télédétection des milieux ionisés).
La Commission s'occupe de l'étude de l'ionosphère ayant pour but la compréhension générale de ce milieu nécessaire aux radiocommunications. Elle s'intéresse plus spécifiquement aux sujets suivants :
   (a) morphologie globale et modélisation de l'ionosphère ;
   (b) variations spatio-temporelles de l'ionosphère ;
   (c) développement des outils et réseaux nécessaires à la mesure des caractéristiques et des facteurs d'évolution de l'ionosphère ;
   (d) théorie de la propagation radioélectrique par l'intermédiaire de l'ionosphère, et applications ;
   (e) application aux radiocommunications de la connaissance de l'ionosphère.
   Pour atteindre ces objectifs, la Commission collabore avec d'autres Commissions de l'URSI, les organismes concernés du CIUS (UGGI, UAI, COSPAR, SCOSTEP, etc.) ainsi qu'avec d'autres organisations internationales (UIT, IEEE, etc.).

8. Commission H - ONDES DANS LES PLASMAS (y compris les plasmas spatiaux et de laboratoire).
La Commission a pour buts :
   (a) d'étudier les ondes dans les plasmas au sens le plus large et, en particulier, les sujets suivants :
      (i) la génération (instabilités dans les plasmas) et la propagation des ondes dans les plasmas,
      (ii) les interactions onde-onde et les interactions onde-particule,
      (iii) les processus de turbulence dans les plasmas et le chaos,
      (iv) les interactions entre les plasmas et les engins spatiaux;
   (b) d'encourager l'application des résultats de ces études, en particulier dans les domaines suivants : interactions entre plasmas solaires et planétaires et utilisation accrue de l'espace comme un laboratoire de recherche.

9. Commission J - RADIOASTRONOMIE (y compris la télédétection des objets célestes).
   (a) Les activités de la Commission concernent l'observation et l'interprétation de toutes les émissions et réflexions radioélectriques en provenance d'objets célestes.
   (b) L'accent est mis sur :
      (i) la promotion de moyens techniques pour les observations et l'analyse des données radioastronomiques,
      (ii) l'appui des démarches ayant pour but d'obtenir la protection des observations radioastronomiques contre les brouillages nuisibles.

10. Commission K - ELECTROMAGNETISME EN BIOLOGIE ET MEDECINE
   La Commission tend à promouvoir les recherches et les développements dans les domaines suivants:
   (a) interactions physiques entre champs électromagnétiques et systèmes biologiques;
   (b) effects biologiques des champs électromagnétiques;
   (c) mécanismes des effects;
   (d) évaluation des expositions humaines;
   (e) systèmes d'exposition expérimentaux;
   (f) applications médicales et biologiques;
   (g) interférences électromagnétiques avec des appareillages médicaux implantés ou reliés au corps humain.

   La Commission met l'accent sur son caractère interdisciplinaire, et encourage la coopération des diverses disciplines de recherche qui sont de son domaine.

U.2. Membres

Le Conseil de l'URSI,

*ayant examiné l*es candidatures présentées et l'état des cotisations des Comités Membres,

décide
1. d'accepter le nouveau Comité Membre suivant : Académie des Sciences du Mexique ;
2. d'accueillir favorablement la réintroduction du Comité Membre suivant en tant que Membre de plein droit : Comité URSI du Pérou ;
3. de transférer l'Académie des Sciences de l'Ouzbekistan dans la catégorie des Membres associés ;
4. de maintenir le Comité URSI du Nigéria en tant que Membre de plein droit et dëaccorder le statut de Membre associé aux Comités URSI de Belarus, du Chili et du Kazakstan ;
5. d'accepter le nouveau Comité Membre suivant en tant que Membre associé : Académie serbe des Sciences (Yougoslavie).

U.3 Réseau de Correspondants

Le Conseil de l'URSI,

décide de maintenir le Réseau de Correspondants avec les provisions suivantes :
1. tout scientifique participant à une Assemblée générale de l'Union deviendra correspondant pour la période de trois ans suivant l'Assemblée, grâce à une cotisation incluse dans le droit d'inscription;

2. d'autres scientifiques peuvent adhérer au réseau de correspondants pour la même période de trois ans, en s'adressant directement au Secrétariat de l'URSI et en versant la cotisation mentionnée en (1);
3. le Bureau peut, sur demande de l'intéressé, exonérer un scientifique mentionné en (2) du versement de la cotisation;
4. les scientifiques membres du réseau recevront gratuitement le périodique "Radio Science Bulletin", ainsi qu'une carte numérotée leur accordant des réductions sur les droits d'inscription à certains Symposia et Conférences parrainés par l'URSI;
5. les Correspondants n'auront pas droit de vote, mais seront autorisés à émettre leur avis sur les questions à caractère scientifique discutées au sein des Commissions.

U.4 Comité permanent pour l'adhésion à l'URSI

Le Conseil de l'URSI,

ayant pris connaissance des recommandations formulées dans le rapport du Comité permanent pour l'adhésion à l'URSI, et en particulier de celles consacrée au désir d'augmenter les contacts individuels avec les membres de la communauté URSI;

décide
1. d'accepter les recommandations du Comité permanent pour l'adhésion à l'URSI;
2. de désigner les personnalités suivantes comme membres du Comité permanent pour l'adhésion à l'URSI pour les trois années à venir :

Président : F. Fedi (Italie)
Membres : N.A. Armand (Russie)
Yinn-Nien Huang (Chine, SRS)

U.5 Finances de l'Union et composition du Comité permanent des finances

Le Conseil de l'URSI,

ayant pris connaissance des recommandations formulées dans le rapport du Comité permanent des finances, en date du 3 septembre 1996 ;

décide
1. d'accepter les recommandations du Comité permanent des finances ;
2. d'approuver les comptes certifiés de l'Union pour les exercices prenant fin au 31 décembre 1993, 1994 et 1995 ;
3. de publier les rapports du Trésorier et du Comité des finances dans le Volume XXIV des Comptes Rendus des Assemblées générales de l'URSI ;
4. de désigner les personnalités suivantes comme membres du Comité permanent des finances pour les trois années à venir :

Président : K. Schlegel (Allemagne)
Membres : L. Nagy (Hongrie)
S.M. Radicella (Argentine)
F.W. Sluijter (Pays-Bas)

U.6 Publications de l'URSI et composition du Comité permanent des publications

Le Conseil de l'URSI,

ayant pris connaissance des remarques et recommandations formulées dans le rapport du Comité permanent des publications en date du 3 septembre 1996 ;

décide

1. d'approuver les recommandations du Comité permanent des publications ;
2. de publier le rapport du Comité permanent des publications dans le Volume XXIV des Comptes Rendus des Assemblées générales de l'URSI ;
3. de désigner les personnalités suivantes comme membres du Comité pour les trois années à venir :

Président :	W.R. Stone (EUA)
Membres :	P.J.B. Clarricoats (Royaume-Uni)
	P. Delogne (Belgique)
	R.L. Dowden (Nouvelle Zélande)
	K. Géher (Hongrie)
	R.D. Hunsucker (EUA)
	P. Sobieski (Belgique)

U.7 Comité permanent pour les pays en développement

Le Conseil de l'URSI,

ayant pris connaissance

1. du rapport d'activités 1993-1996 du Comité permanent pour les pays en développement;
2. des propositions faites par ce Comité concernant ses futures activités ;

décide

1. d'approuver le rapport et les propositions du Comité permanent pour les pays en développement ;
2. de désigner les personnalités suivantes comme membres du Comité pour les trois années à venir :

Président :	G. Swarup (Inde)
Secrétaire :	S.M. Radicella (Argentine)
Membres :	G.O. Ajayi (Nigeria)
	P. Chooncharoen (Thailande)
	S. Feng (Chine, CIE)
	I. Kimura (Japon)
	I.A. Salem (Egypte)

U.8 Comité permanent pour les Assemblées générales de l'URSI

Le Conseil de l'URSI,

considérant

1. que la durée optimale du programme scientifique d'une Assemblée Générale a été longuement discutée au Conseil ;

2. que la période de l'année qui se prête le mieux à l'organisation d'une Assemblée Générale dépend non seulement des conditions locales, mais aussi de facteurs plus généraux, comme la possibilité de conflits temporels avec d'autres conférences ;

décide
1. de demander au Comité de formuler des recommandations quant aux points susmentionnés;
2. de désigner les personnalités suivantes comme membres du Comité pour les trois années à venir :

Président :	P. Degauque (France)
Membres :	J.W. Klein (Allemagne)
	A.M. Scheggi (Italie)
	G. Swarup (Inde).

U.9 Comité permanent pour les jeunes scientifiques

Le Conseil de l'URSI,

ayant pris connaissance des recommandations formulées dans le rapport du Comité permanent pour les jeunes scientifiques;

décide
1. d'approuver le rapport et les recommandations du Comité permanent pour les jeunes scientifiques;
2. de désigner les personnalités suivantes comme membres du Comité pour les trois années à venir:

Président :	F. Lefeuvre (France)
Membres :	S. Feng (Chine, CIE)
	E.V. Jull (Canada)
	V. Khaikin (Russie)
	Z. Popovic (EUA)
	J. Van Bladel (Belgique)
	L. Zombory (Hongrie)

U.10 Comité de réflexion sur la politique à long terme de l'URSI

Le Conseil de l'URSI,

ayant pris connaissance du rapport du Comité de réflexion sur la politique à long terme de l'URSI, qui s'est réuni le 29 août 1996;

décide
1. d'approuver le rapport et les propositions du Comité de réflexion sur la politique à long terme de l'URSI;
2. de désigner les personnalités suivantes comme membres du Comité pour les trois années à venir:

Président : H. Matsumoto (Japon)
Membres : P. Bernardi (Italie)
P. Delogne (Belgique)
W.E. Gordon (EUA)
J. Hewitt (EUA)
T. Itoh (EUA)
H. Hallikainen (Finlande)
D. Skellern (Australie)
W.R. Stone (EUA)
A.D. Olver (Royaume-Uni)
P.H. Wittke (Canada)

U.11. Recommandations du Comité de planification à long terme

Le Conseil de l'URSI

considérant
1. que les questions soulevées par le Comité de planification à long terme, aussi bien par correspondance que lors de la réunion de Lille s'inscrivent dans une vision générale concernant le rôle de l'URSI dans un univers en mutation; la visibilité de l'URSI et les activités entreprises entre les Assemblées générales;
2. la nécessité de renforcer le rôle de l'URSI ainsi que la visibilité et les activités de l'URSI;

recommande
1. la création d'un groupe de travail inter-commissions sur les communications sans fil (voir annexe) comprenant des représentants de l'industrie et des représentants des Autorités réglementaires, afin d'étudier les actions futures à prendre par le Bureau, en concertation avec les différentes commissions;
2. d'accorder un soutien financier aux activités des groupes de travail, sur base d'un budget convenu;
3. que l'URSI étudie dès que possible les potentialités d'une distribution électronique de l'information et encourage la création de groupes de travail communiquant par des moyens électroniques entre les Assemblées générales ;
4. que le Bureau envisage la possibilité d'organiser une réunion prospective, semblable au Corsendonck 1987, en conjonction avec la réunion du Comité de coordination prévue au printemps de 1998.

U.12 Renforcement des relations entre l'URSI et l'UIT

Le Conseil de l'URSI

considérant
1. que l'URSI devrait jouer un rôle dans la promotion des sciences des télécommunications en général;
2. que les activités de l'URSI incluent l'étude des questions liées à la promotion des télécommunications, dont certaines présentent un intérêt direct pour l'UIT.

décide que le Bureau doit
1. identifier les domaines susceptibles d'influencer l'évolution à long terme des télécommunications,
2. informer en permanence la Communauté URSI sur les problèmes spécifiques découlant de l'évolution des télécommunications;
3. informer régulièrement l'UIT des résultats et conclusions scientifiques présentant une importance pour les télécommunications;
4. travailler avec l'UIT à l'identification de thèmes précis d'intérêt commun;
5. préparer des prises de position de l'URSI, dans la forme appropriée, en stimulant des études et colloques;
6. établir des groupes de travail, ainsi que d'autres mécanismes appropriés pour mener à bien ces tâches.

U.13. Groupe de travail inter-commissions sur la Sécurité des équipements médicaux en présence de champs électromagnétiques

Le Conseil de l'URSI

note qu'il est de plus en plus démontré que les champs électromagnétiques générés par des appareils de communication sans fil peuvent influencer le fonctionnement de certains équipements médicaux implantés ou connectés au corps humain - et donc, poser un problème quant à la sécurité d'exploitation de ces équipements et, par conséquent, quant à la santé,

décide de créer un Groupe de travail inter-commissions sur l'exploitation des dispositifs de sécurité médicaux en présence de champs électromagnétiques, composé de représentants des commissions K et E, afin d'étudier:
1. le comportement spécifique des équipements médicaux implantés;
2. les caractéristiques des équipements médicaux connectés;
3. les méthodes de modélisation;
4. les mesures spécifiques;
5. l'influence du corps humain sur les interférences EM

dans le but d'organiser une session conjointe lors de la prochaine Assemblée générale, un atelier ou une séance de travail spéciale lors de l'EMC'98 Rome, et un atelier entre les deux assemblées générales.

U.14. Comité directeur inter-commissions pour l'ISSSE (Symposium international sur les signaux, les systèmes et l'électronique)

Le Conseil de l'URSI

note que les Commissions C et D ont organisé avec succès trois conférences ISSSE, en 1989, 1992 et 1995.

décide de créer un Comité directeur pour l'ISSSE, avec le mandat suivant:
1. assurer un suivi à long terme tant des aspects administratifs que techniques;
2. préparer des guides et instructions pour ces conférences, en conformité avec les besoins de l'URSI, et
3. recevoir et évaluer les propositions et choisir le lieu de la conférence.

Le Comité directeur comprendra trois représentants maximum de chaque Commission. De plus, les Président(e)s des Commissions siégeront en tant que membres Ex-officio. Le Coordonnateur du Comité directeur sera désigné pour un mandat de trois ans et en sera le point de contact.

U.15 Comité pour le Programme International Géosphère-Biosphère (IGBP)

Le Conseil de l'URSI,

notant
1. les activités nombreuses des divers Comités de l'IGBP;
2. les difficultés que l'URSI éprouve à participer efficacement à ces activités, mais aussi son désir de conserver un contact suffisant avec le Programme;

décide
de renouveler le mandat du Comité pour le Programme international géosphère-biosphère, et de le constituer comme suit pour les trois années à venir :

Président : R.K. Raney (EUA)
Membres : J.P.V. Baptista (ESA, Pays-Bas)
H. Hallikainen (Finlande)

U.16 Commission inter-Unions pour l'attribution de fréquences à la radioastronomie et à la science spatiale (IUCAF)

Le Conseil de l'URSI,

notant
1. le rapport des réunions de la délégation de l'IUCAF tenues le 29 août et le 3 septembre 1995
2. l'efficacité avec laquelle l'IUCAF a défendu les intérêts de la communauté scientifique lors de la Conférence Mondiale des Radiocommunications (WRC95), et le besoin permanent de lutter pour la protection des fréquences nécessaires aux observations scientifiques;

décide
1. d'approuver le rapport et les recommandations de la Commission;
2. de maintenir le soutien financier que l'URSI accorde à l'IUCAF;
3. de désigner les personnalités suivantes comme membres URSI de l'IUCAF:

W.A. Baan (EUA) (Président)
J.P.V. Baptista (ESA, Pays-Bas)
R.J. Cohen (Royaume-Uni)
W. Keydel (Allemagne)
K. Ruf (Allemagne)
A.P. van Eyken (Norvège)
J.B. Whiteoak (Australie).

U.17 Groupe de travail inter-Unions sur les effets néfastes de l'environnement sur les observations astronomiques

Le Conseil de l'URSI,

notant
1. la nécessité d'assurer aux recherches spatiales et astronomiques les conditions qui leur permettent de se développer de façon optimale;
2. les dangers que représentent (a) la croissance de l'interférence électromagnétique et du nombre de débris spatiaux, (b) le projet récent de créer un système de publicité spatiale;

décide
1. d'approuver la participation de l'URSI au Groupe de travail inter-Unions sur les effets néfastes de l'environnement sur les observations astronomiques;
2. de proposer R.D. Parlow (EUA, Commission E) et J. Cohen (Royaume-Uni, Commission J) comme membres de ce Groupe de travail.

U.18. Besoin d'accès au spectre de fréquences radio électrique pour les sciences radioélectriques

Le Conseil de l'URSI

notant
que l'accroissement des services de télécommunications (fixes, mobiles et intersatellitaires) entraîne de nouveaux besoins qui seront traités par la Conférence mondiale des Radiocommunications de l'UIT, en 1997,

considérant
1. que les émissions électromagnétiques, en particulier dans les gammes d'ondes centimétrique et millimétrique peuvent être utilisées pour obtenir des informations sur l'état et la composition de l'atmosphère et sur d'autres domaines d'intérêt scientifique; que les mesures effectuées à partir du sol et de l'espace sont de la plus haute importance pour la détermination de la vapeur d'eau, de l'oxygène moléculaire et des gaz à l'état de trace, et jouent donc un rôle important dans les prévisions météorologiques et la surveillance de l'évolution climatique à long terme;
2. que les observations radio-astronomiques faites à partir du sol et de l'espace et couvrant l'ensemble du spectre radioélectrique, depuis les longueurs d'ondes métriques jusqu'aux longueurs d'ondes submillimétriques, sont utilisées pour obtenir des informations sur la formation et l'évolution de l'univers et sur tous les types de phénomènes astronomiques, des planètes aux galaxies, nécessitent des fenêtres spectrales exemptes d'interférences;

décide
1. qu'il est primordial de préserver une gamme spectrale appropriée pour la radio-astronomie et les sciences environnementales, dans l'atmosphère et à la surface de la terre, et leurs applications ;
2. d'inviter chaque Comité Membre à appliquer la résolution sur son territoire.

U.19 Utilisation du spectre radioélectrique

Le Conseil de l'URSI,

demande instamment
à l'Union Internationale des Télécommunications (ITU) et ses membres :
1. de reconnaître le caractère unique de la ressource naturelle limitée constituée par le spectre électromagnétique;
2. de limiter l'attribution de fréquences aux services qui, pour remplir leur rôle, doivent utiliser la propagation en espace libre;
3. d'éviter d'attribuer des fréquences aux services qui peuvent utiliser d'autres technologies, par exemple celle des ondes guidées.

U.20 Sur le libre accès aux données environnementales

Le Conseil de l'URSI,

conscient de l'idée qui se fait progressivement jour, dans certains milieux, de considérer les données environnementales comme des produits de marché ;

reconnaissant que ce point de vue peut être défendable quand ces données sont utilisées à des fins commerciales ;

demande instamment aux organisations qui ressemblent ces données d'en garantir l'accès gratuit (ou du moins à prix coûtant) dès qu'elles sont utilisées à des fins scientifiques.

U.21 Sur l'importance de sauvegarder les données géophysiques du passé, et de leur donner un format digital

Le Conseil de l'URSI,

ayant considéré
1. l'importance de disposer de données continues et abondantes dans l'étude des variations des paramètres ionosphériques/magnétosphériques, ainsi que de leurs tendances évolutives à long terme;
2. l'impossibilité de dupliquer de tels ensembles de données;
3. le danger imminent de perte de certaines bases de données par suite de leur dégradation, ou même de leur élimination;

décide
d'attirer l'attention des administrations nationales sur l'importance de sauvegarder ces données, et de les mettre sous une forme numérique moderne qui les rendra plus adaptées à l'analyse.

U.22. Soutien à l'analyse des données STP

Le Conseil de l'URSI

considérant
1. que les objectifs du Programme International de Physique Solaire Terrestre (ISTP) pour la compréhension des transferts de masse, de la quantité de mouvement et de l'énergie

depuis le soleil jusqu'à la Terre restent des objectifs importants de la communauté scientifique internationale;
2. que des progrès majeurs ont été réalisés pour atteindre ceux-ci par l'utilisation de toute la gamme de satellites et d'installations au sol développées pour le programme ISTP ;
3. que ces efforts, visant les objectifs ISTP, doivent être poursuivis ;
4. que, à l'appui des objectifs ISTP, la résolution U.23 recommande la reconstruction de plusieurs satellites destinés à réaliser le programme de mesure multipoints CLUSTER;

recommande
que les agences scientifiques et de recherche compétentes apportent leur soutien efficace à la poursuite des missions et des analyses de données effectuées par la gamme actuelle de satellites ISTP et de leurs équipements au sol.

U.23. Missions de type CLUSTER

Le Conseil de l'URSI

considérant
1. que l'avenir de la recherche dans la magnétosphère nécessite des mesures multi-points coordonnées, grâce à de nombreux vaisseaux spatiaux et instruments au sol, ainsi qu'avec des satellites en formation, étant donné qu'une constellation à 4 points constitue le minimum nécessaire pour obtenir une image (vectorielle) en 3 dimensions;
2. que la mission CLUSTER, dont le but était dëeffectuer des mesures à quatre points sur différentes échelles spatiales, dans la magnétosphère et le vent solaire, aurait donné à la communauté scientifique une possibilité unique et sans précédent de résoudre plusieurs problèmes inhérents à la physique des plasmas, notamment en ce qui concerne l'étude des ondes dans les plasmas;
3. que la communauté scientifique mondiale s'était organisée, formée et préparée en vue d'une utilisation coordonnée des données résultant de cette mission, et a toujours besoin de ces informations;

recommande
qu'un effort de collaboration international soit entrepris d'urgence afin de relancer le programme CLUSTER avant ou aux environs de l'an 2000.

U.24. Groupe de travail inter-commissions sur les brouillages radioélectriques

Le Conseil de l'URSI

considérant
1. que de nombreux services radio sont de plus en plus perturbés par des brouillages;
2. que la demande de spectre augmente rapidement, au bénéfice des nouvelles applications radio;
3. que des fréquences de plus en plus hautes sont utilisées pour ces applications;

décide
1. de créer un Groupe de travail inter-commissions chargé d'étudier tous les aspects techniques des perturbations dues aux brouillages;

2. d'inviter les Commissions de l'Union à nommer deux de leurs Membres pour participer aux travaux de ce Groupe de travail;
3. d'inviter le Bureau de l'URSI à mettre en place un mécanisme de coopération avec l'UIT, en ce qui concerne les aspects techniques.

U.25. Sciences Radio dans les Ecoles supérieures et les Universités

Le Conseil de l'URSI

considérant
1. le succès enregistré par le programme éducatif INSPIRE (Interactive NASA Space Physics Ionosphere Radio) et la participation active des étudiants et des enseignants aux expériences radio dans l'espace ;
2. les objectifs scientifiques et pédagogiques du programme INTMINS (INTERBALL-MIR-INSPIRE) basé sur des expériences actives effectuées dans la station spatiale MIR;
3. les initiatives complémentaires d'autres pays décrites lors de l'Assemblée générale de Lille;

recommande
d'attirer l'attention de toutes les Commissions de l'URSI sur l'importance des actions visant à:
1. encourager les contacts entre les scientifiques, les étudiants et les enseignants grâce à une participation active à des expériences radio scientifiques, technologiques et spatiales;
2. présenter ces activités éducatives dans le Bulletin des Radio-sciences.

U.26. Poursuite des stations OMEGA

Le Conseil de l'URSI

considérant
1. que la FAA (Agence Fédérale de l'Aviation) a récemment achevé sa revue des besoins du système de navigation Omega pour l'industrie aéronautique U.S. et notifié aux autorités garde-côtes que la plupart des utilisateurs auront terminé leur conversion aux technologies GPS au mois de septembre 1997 et que sur base de cette étude, la FAA a accepté la date du 30 septembre 1997 proposée dans le FRP (Plan fédéral de Radionavigation) pour l'arrêt du système Omega ;
2. que les signaux Omega ont été utilisés pour diverses t,ches scientifiques majeures et ont offert des possibilités uniques et irremplaÁables d'effectuer des mesures dans nos domaines de recherche, par exemple:
   - mesures satellitaires en vue de la détermination de la distribution globale de la densité d'électrons dans la plasmasphère;
   - mesures des effets TRIMPI correspondant à une précipitation d'électrons induite par la foudre;
   - mesures des anomalies de phase associées à des séismes, lesquelles ont été découvertes récemment;

recommande
que la FAA adopte des actions pour prolonger l'exploitation de certaines stations Omega, y compris Tsushima (Japon) au moins jusqu'à la fin de l'année 1998.

U.27. Mesures électromagnétiques en rapport avec les séismes

Le Conseil de l'URSI

considérant
qu'il est de plus en plus établi que toute une série de variations électriques et magnétiques sont associées aux changements qui se produisent dans la Terre immédiatement avant les séismes, et que ces variations sont importantes pour les prévisions à court terme.

recommande
que des études soient entreprises sur les rapports qui existent entre les modifications du champ électrique et magnétique et les séismes, en insistant sur les changements électromagnétiques qui précèdent immédiatement les séismes.

U.28. Radars à diffusion incohérente à Resolute Bay, territoires du nord-ouest du Canada et Gakona, Alaska

Le Conseil de l'URSI

considérant
1. l'importance des observations faites dans les régions arctiques de latitude élevée pour l'étude de la moyenne atmosphère, de l'ionosphère, de la thermosphère et de la magnétosphère, et des effets des modifications artificielles de l'ionosphère ;
2. la possibilité d'assurer la couverture synoptique de toute la calotte polaire à des altitudes correspondant à la région F ainsi que la couverture élargie du cercle auroral, à des altitudes correspondant aux régions E et F;
3. la possibilité d'observer simultanément les phénomènes atmosphériques polaires, par radars multiples ;
4. la possibilité d'effectuer des observations monostatiques et bi-statiques, avec des équipements radar multiples;

recommande
que des stations radar à diffusion incohérente des plus performantes soient installés à Resolute Bay et à Gakona; que les Commissions G et H encouragent des programmes conjoints faisant appel aux dispositifs en place, afin de se préparer aux possibilités uniques et enthousiasmantes qui seront offertes par les nouvelles installations.

U.29 XXVe Assemblée générale

Le Conseil de l'URSI,

ayant examiné les invitations présentées par les Comités Membres de l'URSI en Canada (Toronto), Chine (CIE, Pékin), et en Inde (New Delhi) pour la tenue de la XXVIe Assemblée générale;

décide
1. d'accepter l'invitation du Comité canadien d'organiser la XXVIe Assemblée générale à Toronto, en août 1999;
2. d'exprimer ses remerciements aux Comités en Chine (CIE) et Inde pour leurs aimables invitations.

U.30 Subventions de l'UNESCO et du CIUS

Le Conseil de l'URSI,

considérant
1. que l'Union consacre une part considérable de ses activités à l'organisation de réunions et de colloques scientifiques internationaux, à la production de publications et à son Programme de jeunes scientifiques;
2. que les subventions accordées à l'URSI par l'UNESCO et le CIUS permettent de couvrir en partie les frais de ces activités;

décide d'exprimer à ces deux organisations sa vive gratitude pour le précieux appui qui lui est ainsi fourni.

U.31 Remerciements au Comité français de l'URSI

Le Conseil de l'URSI,

décide à l'unanimité d'exprimer sa très sincère gratitude au Comité français de l'URSI pour l'invitation de tenir la XXVe Assemblée générale à Lille.

Resolutions, Recommandations et Avis des Commissions

Commission A - Métrologie électromagnétique

A1. Conférence sur les mesures électromagnétiques de précision (CPEM)

La Commission A,

considérant des statuts de la CPEM;

recommande que l'URSI continue à parrainer la Conférence internationale sur les mesures électromagnétiques de précision.

A.2. Comité international des Poids et Mesures (CIPM)

La Commission A,

note les informations récentes concernant les bases régionales des organisations de métrologie,

reconnaît l'importance et l'intérêt d'une large diffusion des étalons exacts et des méthodes avancées d'étalonnage,

estime que les activités des nouvelles organisations devraient être alignées sur les décisions du CIPM et de ses comités consultatifs.

Commission D - Electronique et Photonique

D.1. Disque bibliographique produit en conjonction avec la revue de Radio-Science

La Commission D

considérant

1. que le champ d'intérêt de la Commission est tellement vaste que le temps et les efforts nécessaires pour dresser une liste de référence complète et annotée ne sont pas justifiés;
2. que des bases de données correctement structurées sont déjà accessibles par les réseaux informatiques;

décide

que la Commission D ne participera pas à la préparation du disque bibliographique pour la période triennale 1996-1999.

D.2. La Commission internationale d'Optique (CIO)

La Commission D

considérant le chevauchement des intérêts portés aux phénomènes optiques par la Commission et la COI,

recommande
1. que la COI et la Commission D de l'URSI s'informent réciproquement de leurs activités;
2. que le Président de l'URSI engage des actions appropriées afin d'encourager et d'améliorer la coopération entre la COI et l'URSI, et entreprenne, si ces organisations le souhaitent, toutes les actions nécessaires afin de conférer à la COI le statut de Commission Inter Unions.

COMMISSION E - BRUITS ET BROUILLAGES ELECTROMAGNÉTIQUES

E.1. Groupes de travail

La Commission E

considérant les rapports de ses différents groupes de travail;

décide
1. de créer avec les Commission G et H, un Groupe de travail mixte EGH.2 intitulé "Effets électromagnétiques associés à une activité sismique", dirigé avec le Professeur T. Yoshino (Japon) comme co-président pour la Commission E;
2. de créer les Groupes de travail suivants de la Commission E:
   - E.1. Gestion et utilisation du spectre et Télécommunications sans fil
     Co-présidents : R.D. Parlow (USA) et R. Struzak (Suisse) ;
   - E.2. Bruits non gaussiens dans les communications
     Président : J. Pawelec (Pologne)
   - E.3. Electromagnétique de haute puissance
     Président : R.L. Gardner (USA)
   - E.4. Décharges orageuses terrestre et planétaire y compris génération de bruits électromagnétiques
     Co-présidents : Z. Kawasaki (Japon) et U. Cooray (Suède)
   - E.5. Interaction et protection des systèmes électroniques complexes
     Co-présidents : C. Baum (USA), P. Degauque (France) et M. Ianoz (Suisse)
   - E.6. Effets des transitoires sur les équipements
     Co-présidents : U. Scuka (Suède) et B. Demoulin (France)
   - E.7. Environnement électrique et météorologique extra-terrestre et terrestre avec bruit et chaos
     Co-présidents : H. Kikuchi (Japon) et S. Moiseev (Russie)
   - E.8. Champs électriques et magnétiques terrestres, propagation, circuit global et courants induits par le géomagnétisme
     Co-présidents : R. Pirjola (Finlande) et D.L.I . Jones (Royaume Uni)
   - E.9. Brouillages et bruits à des fréquences supérieures à 30 MHz
     Président : J. Gavan (Israël)
3. de créer un groupe de travail mixte KE.1 entre la Commission K et la Commission E intitulé : "Brouillages EM avec les équipements médicaux"
   Co-président pour la Commission E : S. Alfas (Danemark)

E.2. Symposia

La Commission E,

considérant les propositions de symposia pour les trois prochaines années;

décide
1. d'apporter, en mode A, son soutien aux conférences :
   - International Symposium on Electromagnetic Environment and Consequences (EUROEM), Haifa, Israel, 1996;
   - International Conference on Lightning Protection, Firenze, Italy, 1996;
2. d'apporter, en mode B, son soutien aux conférences :
   - EMC Roma, Roma, Italie, 1996;
   - International Zurich Symposium and Technical Exhibition on Electromagnetic Compatibility, Zurich, Suisse, février 1997;
   - International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Pologne, 1998.

Commission G - Radioélectricité Ionosphérique et Propagation

G.1. Région E nocturne

La Commission G

considérant que les valeurs nocturnes des densités électroniques de la région E sont largement inconnues

recommande
1. que des sondages ionosphériques verticaux soient effectués à différentes longitudes et latitudes, avec une analyse fréquentielle commençant à 100 kHz ;
2. que les fréquences critiques nocturnes de la région E soient mesurées en fonction du temps, de la saison et de l'activité solaire.

G.2. Observations équatoriales

La Commission G

considérant
1. que l'atmosphère équatoriale est étroitement couplée à d'autres régions de l'atmosphère terrestre et exerce par conséquent, une influence considérable sur le temps et le climat global ;
2. que plusieurs observations ont été effectuées sans coordination adéquate ;
3. que la communauté MST est à même d'assurer un rôle majeur dans cette activité de recherche ;

recommande
que les Commissions compétentes de l'URSI entreprennent d'établir une coopération internationale efficace dans cet important secteur.

G.3. Observations radar dans l'ionosphère/atmosphère polaire

La Commission G

considérant
1. les processus dynamiques et chimiques uniques qui existent dans l'atmosphère polaire moyenne ; et que
2. cette région est influencée par des couplages provenant d'altitudes supérieures et inférieures ;

recommande
que des radars MST et MF soient intégrés aux installations à diffusion incohérente en cours de déploiement aux latitudes élevées.

G.4. Autorisations de fréquences aux stations ionosondes

La Commission G

considérant
1. qu'une évaluation en temps réel de l'état de l'ionosphère est requise afin de faciliter les communications HF au sol et embarqués ; les liaisons radio sol-satellite, les radars trans-horizon, l'étalonnage des dispositifs radar à diffusion incohérente, et la recherche scientifique ;
2. que cette évaluation est assurée en grande partie par des sondeurs HF (ionosondes) qui nécessitent la transmission de " toutes " les fréquences entre 0,1 et 30 MHz sans interruption supérieure à 0,1 Mhz (des interruptions occasionnelles plus importantes sont possibles si elle ne dépassent pas 0,25 MHz) ;
3. et que les ionosondes actuelles utilisent une faible énergie de transmission, c'est-à-dire inférieure à 500 W de crête et disposent des spectres de transmission améliorés ;

recommande
que les comités membres déploient tous leurs efforts afin de convaincre les autorités responsables de l'allocation et de l'autorisation de fréquences de la nécessité d'accorder des licences de fréquence, sur une base de non brouillage, aux stations ionosonde.

G.5. Observations par diffusion incohérente exempte de brouillages

La Commission G

considérant
1. l'importance des mesures à long terme par diffusion incohérente de l'ionosphère et de la magnétosphère ;
2. le faible nombre et le coût élevé de ces installations ;
3. la nécessité de disposer de bandes de fréquence exemptes de perturbations, pour pouvoir opérer

recommande
que les membres des comités déploient tous leurs efforts afin de convaincre les autorités responsables de l'allocation et de l'autorisation des fréquences de garantir une zone libre de brouillages dans un rayon de 200 km autour des sites de radars à diffusion incohérente.

G.6. Surveillance des rayonnements solaires ionisants

La Commission G

considérant
1. l'importance des rayonnements solaires ionisants (EUV et rayons X mous) dans la haute atmosphère ;
2. l'effet des perturbations solaires sur les systèmes technologiques

recommande
qu'un soutien soit accordé à la création d'une entité spatiale permanente chargée du contrôle continu de ces rayonnements, comme proposé par le Centre international pour la Science et la Technologie (Moscou).

Commission H - Ondes dans les Plasmas

H.1. Groupes de travail

La Commission H,

considérant les rapports présentés par ses différents Groupes de travail,

décide
1. de maintenir le Groupe de travail inter-Unions URSI/IAGA.1 "Télédétection TBF/EFB de l'ionosphère et de la magnétosphère (VERSIM)". Co-président pour la Commission H : M. Parrot (France) ;
2. de maintenir, avec les Commissions C et G, le Groupe de travail commun CGH.1 "Analyse des ondes et de la turbulence". Co-président pour la Commission H : F. Lefeuvre (France) ;
3. de maintenir, avec la Commission G, le Groupe de travail commun GH.1 "Expériences actives dans les plasmas". Co-président pour la Commission H : J. Raitt (EUA) ;
4. de maintenir, avec la Commission G, le Groupe de travail commun GH.2 "Expériences, simulation et analyse par ordinateur des processus d'ondes dans les plasmas". Co-présidents pour la Commission H : H. Matsumoto (Japon) et M. Ashour-Abdalla (EUA);
5. de maintenir, avec les Commissions E et G, un Groupe de travail commun EGH.1 sur les effets électromagnétiques associés à l'activité sismique. Co-président pour la Commission H : M. Parrot (France).

H.2. Patronage de colloques et de conférences

La Commission H

recommande que l'URSI parraine, en mode A ou en mode B suivant les cas, les colloques suivants pendant la période 1993-1996, sous réserve que les organisateurs soumettent des demandes règlementaires :
1. International Conference of the Physics of Dusty Plasmas, Goa, Inde, 21 - 25 octobre 1996, (Mode A), (P.K. Shukla, Allemagne);
2. (avec la Commission G) Fifth International School/Symposium for Space Simulations (ISSS-5), Kyoto, Japon, printemps 1997, (Mode B), (H : H. Matsumoto, Japon);
3. (avec les Commissions E, F, G, J) Radio Methods for studying turbulence, Aussois, France, première moitié de 1998, (Mode B), (H : F. Lefeuvre, France);

4. (avec la Commission G) Electromagnetic Scattering in Gases and Plasmas, Ukraine, été 1997 (Mode B), (H : A. Hamza, Canada);
5. (avec la Commission G) International Conference on Phenomena in Ionized Gases (ICPIG), Toulouse, France, 17-22 juillet 1997, (Mode B), (H. Brunet, France).

Commission J - Radioastronomie

J1. Groupe de travail pour un Grand réseau millimétrique - submillimétrique

La Commission J,

considérant
1. que l'avenir de l'astronomie aux longueurs d'onde millimétriques et submillimétriques requiert de réfléchir dès maintenant au concept d'un télescope de la prochaine génération, qui devra (i) être doué d'une résolution angulaire élevée (ii) être d'un ordre de grandeur plus sensible que les téléscopes existants ;
2. qu'un téléscope de cette nature sera très onéreux, et que sa construction exigera une forte collaboration internationale ;

recommande
la création d'un Groupe de travail consacré au "Grand réseau millimétrique - submillimétrique", dont le mandat serait :
1. d'envisager les principaux objectifs scientifiques qui seront d'actualité au début du siècle prochain ;
2. de coordonner et d'évaluer les données radio nécessaires à l'évaluation du site et à la stratégie des observations;
3. d'étudier les concepts nouveaux d'instruments et de télescopes;
4. d'étudier sérieusement les possibilités de collaboration internationale.

J2. Groupe de travail pour un Grand Télescope

La Commission J,

considérant
1. que le besoin se fait jour de construire un radiotélescope accessible à la communauté internationale, et possèdant une sensibilité supérieure d'un ou deux ordres de grandeur à celle des instruments existants, ou en projet;
2. que la réalisation à un prix acceptable d'un instrument de cette nature nécessitera la mise en œuvre de techniques innovantes;
3. que la réalisation de cet instrument devra probablement se fonder sur une forte collaboration internationale ;

décide de créer un Groupe de travail ayant le mandat suivant :
1. explorer le champ scientifique devant être couvert par ce télescope;
2. discuter des spécifications techniques et des concepts généraux qui permettront d'optimaliser l'efficacité de l'instrument;
3. identifier, et même résoudre dans la mesure du possible, les problèmes techniques principaux que posera la construction d'un télescope de coût raisonnable, et possèdant la sensibilité requise.

J.3. Protection des services passifs dans la zone protégée de la Lune

La Commission J

considérant que

1. des systèmes de radiocommunication entre la Lune et la terre, à la surface de la Lune et dans l'environnement de celle-ci, seront nécessaires aux activités de recherche spatiale y compris aux observations radio-astronomiques;
2. certaines communications radio seront nécessaires à l'intérieur de la zone protégée de la Lune (szm) telle que définie par l'Article 29 du RR, section VI;
3. grâce à l'utilisation de certaines bandes de fréquence radio, il est possible de tenir compte des besoins inhérents à ces radio-communications tout en assurant simultanément la protection des observations radio-astronomiques mentionnées à l'Article 29 du RR, section VI;
4. dans la zone protégée de la Lune, il est nécessaire de garder une partie du spectre aussi grande que possible sans émissions;
5. lors de l'allocation des fréquences aux transmissions nécessaires, il importe d'éviter les bandes suivantes :
   - bandes ayant une importance astronomique majeure,
   - bandes difficilement observables à partir de la Terre en raison de brouillages ou de leur absorption dans l'atmosphère ou dans l'ionosphère ;
   - bandes importantes pour l'interférométrie entre la Terre et la Lune ;
6. les bandes notées en 5 incluent :
   - toutes les fréquences en-dessous de 2 GHz ;
   - les fréquences des lignes spectrales les plus importantes (liste de l'Union astronomique internationale) dont les largeurs de bande recouvrent les déplacements essentiels rouges et bleus ;
   - les allocations radio-astronomiques utilisées sur terre pour l'observation du continuum, en autorisant une largeur de bande supérieure afin d'améliorer la sensibilité ;

demande instamment que deux bandes alternatives soient attribuées aux services actifs nécessaires, dans la zone protégée de la Lune, afin de garantir l'accès des services passifs à l'ensemble du spectre, sur une base temporelle coordonnée.

J.4. Protection de l'utilisation passive actuelle des segments millimétrique et sous-millimétrique du spectre radioélectrique

La Commission J

considérant que

1. l'Union internationale des Télécommunications (UIT) et les administrations nationales autorisent l'accès au spectre radio sur la base d'une allocation par fréquence ;
2. l'allocation par fréquence est basée sur la possibilité d'assurer la séparation physique des signaux en utilisant des filtres;
3. les récepteurs de bruit les plus bas, dans les régions de longueur d'onde millimétrique et sous-millimétrique du spectre deviennent non linéaires et saturés même lorsque les niveaux des signaux sont exceptionnellement faibles;
4. ces récepteurs sont largement utilisés pour effectuer des observations scientifiques passives;
5. la technologie actuellement disponible ne permet pas de fabriquer des filtres disposant d'une faible perte d'insertion et d'une sélectivité adéquate, pouvant être placés à l'avant de ces récepteurs ;

prie instamment
1. l'UIT-R d'entreprendre des études sur l'état actuel de la technologie des filtres, afin d'en tenir compte lors de l'attribution des fréquences aux services radio passifs et actifs, notamment en ce qui concerne la gamme des ondes millimétriques du spectre ;
2. les administrations nationales d'ajourner l'autorisation de toute utilisation future des parties millimétrique et sous-millimétrique du spectre de radio-électricité, en attendant que la technologie des filtres soit suffisamment avancée pour protéger l'utilisation passive actuelle contre des brouillages nuisibles.

J.5. Interférences des satellites sur la radio-astronomie

La Commission J

considérant que
1. les observations radio-astronomiques sont extrêmement vulnérables à des brouillages provenant des émetteurs placés à bord des satellites ;
2. les cas de brouillages notifiés sont de plus en plus nombreux ;
3. la demande de spectre augmente également pour tenir compte des nouvelles applications radio satellites ;
4. cette demande nécessite l'utilisation de fréquences de plus en plus élevées ;
5. il n'existe pas de moyens techniques permettant de séparer les signaux par fréquence, en garantissant une performance adéquate, aux fréquences d'ondes millimétriques ;
6. des projets de modulation ont été identifiés, qui entraînent un minimum d'émissions indésirables ;

prie instamment l'UIT et ses administrations nationales et régionales affiliées
1. d'encourager l'utilisation de méthodes de modulation et les projets de transmission par satellite qui limitent au maximum les émissions indésirables ;
2. d'exiger une vérification approfondie, avant lancement, des systèmes de transmission satellitaire afin de détecter les émissions préjudiciables aux autres utilisateurs du spectre radio-électrique ;
3. de préparer des règles empêchant les nouveaux utilisateurs de perturber les opérations des utilisateurs actuels ;
4. d'exiger des utilisateurs potentiels du spectre qu'ils fournissent et publient une déclaration d'impact électromagnétique sur l'environnement avant de recevoir l'autorisation d'entrer en exploitation.

J.6. Groupe de Travail VLBI global

La Commission J

note
les activités et le succès du Groupe VLBI global et la nécessité de poursuivre ces activités avant la mise en orbite des missions spatiales VLBI ;

décide
de maintenir le Groupe de travail jusqu'en 1999 ; la composition de ce groupe comprendra des représentations des missions Space VLBI (NASA, ISAS, Institut Lebedev).

K1. Communications sans fil

La Commission K,

considérant
1. que de nouvelles technologies se développent rapidement, notamment celles des réseaux radio locaux, des systèmes téléphoniques cellulaires, des réseaux de satellites de télécommunication sur orbites basses (exemple : Iridium), des services de communication personnels, des téléphones sans fil, et d'autres systèmes qui, selon toute probabilité, auront une large diffusion;
2. que les effets sur la santé des champs électromagnétiques produits par les communications sans fil sont mal connus;
3. que le grand public se préoccupe des effets nocifs possibles des appareillages électromagnétiques auxquels il est exposé;

recommande que d'importants projets de recherches soient consacrés - aux échelles nationale et internationale - à l'étude des problèmes principaux, à savoir :
1. l'appréhension des mécanismes d'interaction des champs électromagnétiques faibles - de caractéristiques diverses - avec les systèmes vivants;
2. l'étude des effets biologiques de ces champs, et en particulier de leur caractère potentiellement nocif, en fonction des conditions d'exposition;
3. l'évaluation précise des taux d'exposition aux champs, basée sur des mesures et des modélisations dosimétriques pertinentes.

La Commission exprime sa reconnaissance pour le soutien que lui ont promis la Commission A, dans le domaine des mesures, et la Commission B, dans celui de la modélisation dosimétrique.

RESOLUTION INTER-COMMISSIONS

X.1. Importance du système Ionosphère/Magnétosphère terrestres en tant que Laboratoire des Plasmas

Les Commission de l'URSI

considérant
1. que le système ionosphère/magnétosphère terrestre constitue le plasma spatial le plus facilement accessible et à moindre coût pour des investigations in situ ou à distance ;
2. que de nombreux processus qui s'y déroulent ont des homologues en astrophysique ;
3. que certaines questions fondamentales de la physique des plasmas peuvent être mieux traitées dans le laboratoire "plasma naturel" fourni par ce système que dans des laboratoires au sol ;

décide d'attirer l'attention des administrations nationales sur l'importance d'organiser des expériences actives contrôlées à la fois in situ et à distance - dans le système ionosphère/magnétosphère, afin d'étudier certains problèmes fondamentaux de la physique des plasmas et les processus résultant dans certains phénomènes spatiaux naturels.

ANNEXE

PROPOSITION VISANT A CREER UN GROUPE DE TRAVAIL URSI SUR LES COMMUNICATIONS SANS FIL

Les progrès réalisés dans le domaine de l'informatique modifient notre mode de vie, notre travail et nos loisirs. L'impact de ces progrès peut être comparé à l'invention de l'imprimerie ou à la révolution industrielle.

Le téléphone cellulaire et les systèmes de positionnement par satellites constituent deux exemples de nouvelles technologies sans fil dont les conséquences ne sont pas uniquement leur impact économique, l'introduction de nouveaux services, commerce et création d'emplois, mais aussi un fort taux de développement technologque. "Le succès des téléphones cellulaires et d'autres produits et services de communication mobile p. ex. messagerie et appareils numériques personnels a provoqué un boulversement radical dans le secteur des communications aux Etats-Unis (et dans le monde, WEG). Les services de communication personnels depuis les dispositifs vocaux jusqu'aux appareils vidéo entre personnes en mouvement, plutÔt qu'entre postes fixes, constitueront la norme, à l'avenir" (T.P. Stanley, COMMSPHÈRE 95).

Le Système de Communication Personnel (PCS) a démontré la valeur commerciale des bandes étroites, dans le spectre radioélectrique. Autrefois, ces bandes étaient affectées, aux Etats-Unis, par un processus politique. Actuellement, ce système est ouvert à la libre concurrence et représente plus de 10 milliards de dollars US. Le PCS, qui est en concurrence avec les téléphones cellulaires, déjà courronnés de succès, permettra de connecter les individus et d'échanger des messages vocaux et des données informatiques.

Les progrès enregistrés par les techniques radio sont tirés par les technologies de l'information, la mondialisation de l'industrie et du secteur bancaire, ainsi que par la créativité humaine, là où il le faut, au moment où il le faut et avec la préparation adéquate. Les secrets de l'Univers sont en partie dévoilés par des observations radio qui sont elles-mêmes soumises à des interférences de plus en plus nombreuses, au rythme des avancées technologiques. Une règlementation prudente s'impose, au niveau international. La participation de l'URSI est nécessaire, aux plans national et international.

L'URSI devrait créer un groupe de travail sur les communications sans fil et la règlementation, composé de représentants de Commisssions appropriées et d'un ou de plusieurs représentants de l'industrie et des autorités chargées de la règlementation, avec le mandat suivant :

1. Encourager la participation, aux réunions scientifiques parrainés par l'URSI, de représentants de l'industrie et des autorités chargées de la règlementation, afin d'ajouter: (a) un aspect appliqué à l'URSI, (b) des interactions entre les Commissions et les sciences de l'ingénierie, (c) un "forum" spécialisé destiné à des discussions ouvertes entre les acteurs concernés : experts en radioélectricité, industrie et agences chargées de la règlementation.
2. Organisation de réunions ciblées sur des problèmes spécifiques (p. ex. PCS, GPS) avec participation de toutes les Commissions compétentes ; la préparation des sessions étant principalement assurée par le groupe de travail ;
3. Encouragement pour la participation à l'Assemblée Générale et à COMMSPHERE.
4. Renforcement des relations entre l'URSI et l'UIT

Le Comité recommande que le Conseil apporte son soutien financier aux activités du groupe de travail et prévoit de dissoudre ce groupe au terme d'une période de six ans.