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U.R.S.I.

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OBITUARY

HENRY GEORGE BOOKER

1910-1988

It is our sad duty to record the death, on 1 November 1988 in Ja Jolla, California, of Professor Henry G. Booker, Honorary President of URSI. Before describing the career of this eminent scientist, it seems appropriate to first evoke his long association with URSI, and the many offices he performed with devotion and distinction.

In the *Proceedings of URSI General Assemblies*, the name of Henry G. Booker appeared for the first time in Volume V (Venice, 1938) as co-author, with O.H. Gish, of a paper on "Non-existence of continuous intense ionization in the troposphere and lower stratosphere". This was the first of a long series of contributions presented at URSI meetings. In 1948, Professor Booker was one of the Reporters in the Commission on Radio Wave Propagation and, from 1948 to 1954, he was Vice-Chairman of the Commission on Radio and Troposphere.

The General Assemblies in London (1960) and Tokyo (1963) were marked by extensive discussions on the future role and activities of the Union. As a member of the ad hoc Committee on the organization of URSI and as Chairman of a Working Group to consider the fields covered by the Commissions on the Ionosphere, the Magnetosphere, and Radio Noise of Terrestrial Origin, Professor Booker contributed most actively to the definition of the basic objectives of URSI. He was co-author, with M. J. Voge, of the "Booker-Voge Proposal" which lead up, in 1975 in Lima, to Council Resolution I which redefined the goals of URSI, in particular with respect to telecommunications, restructured the scientific Commissions, and broadened the scope of the General Assemblies by including Open Symposia in the programme.

At the General Assembly in Tokyo in 1963, the URSI Council had decided to form a new Commission on the Magnetosphere, and Professor Booker was elected as its first Chairman, an office he held until 1969. From 1969 to 1975, as Vice-President of the Union, he participated in all the meetings of the Board

of Officers in Brussels, and the very clear and realistic statements he made on these occasions were much appreciated by his colleagues.

In 1978 the Council conferred the title of Honorary President on Professor H.G. Booker, in view of the outstanding services rendered to the Union. At the 60th Anniversary Ceremony of URSI, held at the Royal Academy in Brussels, he presented a review paper on "Acoustic gravity waves, travelling ionospheric disturbances, spread F and ionospheric scintillation". The last General Assembly he attended was that in Florence, in 1984. The state of his health did not allow him to attend the General Assembly in Tel Aviv last year. Nevertheless, he contributed, with J.W. Tao, a paper entitled: "Modelling the fluctuations of HF radio waves returned from the ionospheric F region".

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Dr. Booker was a renowned and highly respected educator and scientist. He was born in Barking, Essex, England in 1910. Excelling in mathematics, he gained entrance to Cambridge University, where he received a B.A. Degree in 1933 and a Ph.D. Degree in 1936, specializing in pure and applied mathematics and ionospheric physics. He was awarded the Smith prize in 1935 and thereafter became a Research Fellow of Christ's College.

Dr. Booker first travelled to the United States in 1937 as a Visiting Scientist at the Carnegie Institution in Washington, D.C. While there, he met and married Adelaide Mary McNish from San Francisco. They celebrated their 50th wedding anniversary on 9 July of this year in the company of their entire family and many friends.

During World War II, Dr. Booker was in charge of theoretical research at the Telecommunications Research Establishment in England, where he was involved in the development of new ideas in antennas and electromagnetic wave propagation, including radar systems, which were critical to the defense of Britain. Also, he conducted radio meteorological investigations in England, India, Australia and New Zealand.

After the war Dr. Booker returned to Christ's College; but in 1948 he moved to Cornell University in Ithaca, New York. There, he built up the research programme in radio science

and co-founded the radio telescope in Arecibo, Puerto Rico. From 1959 to 1963 he was Director of the School of Electrical Engineering and Associate Director of the Cornell Center for Radiophysics and Space Research. From 1962 to 1965, he was the IBM Professor of Engineering and Applied Mathematics. Additionally, he spent sabbaticals at Cambridge University in 1954-55 and at Stanford Research Institute, Menlo Park, California in 1962-63. He also became a consultant for the Rand Corporation, Santa Monica, California beginning in 1959. He became a naturalized citizen of the United States in 1954.

In 1965 Dr. Booker moved to the new campus of the University of California at San Diego, where he was the first chairman of the Department of Applied Physics and Information Science. He served in this capacity until 1971 and then continued as Professor of Applied Physics until 1978, when he became an Emeritus Professor. Also, he served on several national and international scientific committees, and he was a Visiting Scientist at the Groupe de Recherches Ionosphériques, Saint-Maur, France in 1972 and Stanford Research Institute in 1977, and a Visiting Professor at Wuhan University, China in 1981.

Besides publishing numerous papers on radio wave propagation in the ionosphere and in the troposphere, Dr. Booker authored a classic textbook entitled *An Approach to Electrical Science* (McGraw-Hill, 1959) and three other books entitled *A Vector Approach to Oscillations* (Academic Press, 1965), *Energy in Electromagnetism* (Peregrinus, 1982), and *Cold Plasma Waves* (Nijhoff, 1984, also translated into Chinese).

Dr. Booker received many awards and national and international recognition during his career for his academic and scientific achievements. Additionally, he was elected a Fellow of the Institute of Electrical and Electronics Engineers in 1953 and a member of the US National Academy of Sciences in 1960.

Throughout his life, Professor Booker was most dedicated to the education of undergraduate and graduate students, many of whom are now eminent scientists and educators in their own right. In 1979 he was honoured by his former students, colleagues, and friends with the establishment of a fellowship in his name at the National Academy of Sciences to support participation of "a young scientist of promise" at the General Assembly of the International Union of Radio Science. As

Emeritus Professor, he continued to teach full time and conduct research at the University of California and to consult with the Rand Corporation until the last few months of his life.

Professor Booker was an extremely creative scientist. In the 1930's he applied the magno-ionic theory to the propagation of radio waves in the ionosphere. During and immediately after World War II he developed the mode theory of tropospheric refraction explaining anomalous propagation of radio waves particularly over water. He wrote a series of classic papers in the late 1940's dealing with Sommerfeld theory, diffraction and antenna patterns.

The Booker-Gordon theory of radio scattering in the troposphere (1950) opened a new era in beyond-the-horizon radio communication. This was extended to radio scattering in the ionosphere (1952) and in the stratosphere (1957), each making a major contribution. Radio wave propagation in and through turbulent media continued as an important interest to him for the rest of his life.

Through his research, Professor Booker inspired graduate students for more than fifty years. His students and colleagues will be grieved by his loss but find continuing stimulation from his creative ideas.His presence will be greatly missed in the URSI community.

Fifty Years Ago

The 6th General Assembly of URSI was held in Venice and Rome in September 1938. The list of speakers is full of interest, and will probably awake nostalgic memories in the hearts of the older members of the URSI Community. We quote at random: Appleton, Berkner, Booker, Bureau, Burrows, Dellinger, Dieminger, Giorgi, Goubau, Gundlach, Jouaust, Koga, Manneback, Moulin, Mumford, Norinder, Pontecorvo, Ratcliffe, Rayner, Smith-Rose, Southworth, van der Pol, Watson-Watt..... The international situation was tense: September 1938 was the month of the Sudeten crisis and of the Munich agreements. Some of the participants would soon be separated for years, and not meet each other until the 1946 General Assembly in Paris. Space does not permit to reproduce the list of papers, but some of the words which appear in the titles are worth quoting: magnetrons, quartz crystal oscillators, ultra-short wave propagation, the ionosphere, thermoionic tubes, metal pipes, geometrical optics,..... The birth of microwaves, evident from the programme, would soon play a major role in the conflict to come.

J.V.B.

ANNOUNCEMENTS

We take pleasure in informing the readers of the "URSI Information Bulletin" that

Prof.W.E. GORDON, President of URSI 1981-1984, has been elected Vice-President of the International Council of Scientific Unions (ICSU) at the General Assembly in Beijing, China in September 1988;

Prof. Dr.-Ing. H.-G. UNGER, Chairman of URSI Commission B 1981-1984, received the Heinrich Hertz Award of the IEEE, at the IEEE Region 8 Meeting in Munich, FRG in October 1988, in recognition of his great contribution to the theory of guided waves in the microwave, millimetre wave and optical parts of the radio-frequency spectrum;

Prof. K.I. GRINGAUZ, Official Member of the Soviet Committee in URSI Commission G, received the Award for Outstanding Contributions to Space Science at the COSPAR Plenary Meeting in Espoo, Finland in July 1988.

THE URSI LOGO

At its July 1988 meeting, the URSI Board of Officers discussed the possibility of associating high-level professional periodicals more closely with the Union. Interested periodicals would benefit from the moral support and scientific sponsorship provided by URSI. To make such move possible, the following text has been approved.

"Some international journals in some or all aspects of radio science may be sponsored by URSI where these share with URSI the same ideals and high standards of scientific endeavour. In recognition of this sponsorship the journal would be published under the aegis of the URSI logo and would include words like ".....and under the sponsorship of URSI" in the usual box giving the publisher and policy. URSI would assist in extending the international character of the journal such as the seeking of regional editors. An essential condition is that the journal be within the reach of both the readers and authors in Third World Countries. Therefore, if the journal asks page charges, these should not be mandatory, and if they are not honoured, publication should nevertheless be ensured in a reasonable time. A quota of unpaid few pages per issue and/or author-supplied camera-ready copy are acceptable solutions".

Correspondence concerning the logo should be addressed to the URSI Secretariat in Brussels.

STANDING COMMITTEE ON URSI MEMBERSHIP

The document reproduced below has been circulated on 1 December 1988 to the URSI Member Committees by the Chairman of the Standing Committee on URSI Membership. In his covering letter, Dr. M. Petit invites Member Committees to consider the issues discussed in that document and to submit their comments to the URSI Secretariat in Brussels before 15 April 1989, in time for consideration by the Board of Officers at its May 1989 meeting. In view of the importance of the questions raised for the future of the Union, the readers of the "URSI Information Bulletin" are also invited to send their opinions to the URSI Secretariat.

PROPOSED NEW URSI MEMBERSHIP CATEGORIES

During the General Assembly in Tel Aviv in 1987, the URSI Council discussed the proposal to create new membership categories. A positive decision was made concerning the creation of an Associate Member Committee Category. This category is limited in time to a maximum of 6 years, and is intended for Committees which contemplate adhering to the Union and are not yet in a position to do so, or for regular Member Committees experiencing difficulties in paying their dues.

The proposal to create an individual membership category and an affiliate membership category was transmitted to the Standing Committee on URSI Membership for further study. Moreover, it was decided to circulate a questionnaire to all Member Committees in order to collect information on their internal structure, thus allowing a proper evaluation of the impact the suggested steps would have. The results of that enquiry are presented in Annex 1. In addition, excerpts from the Statutes of the Nigerian Member Committee are reproduced in Annex 2 because the internal organization of that Committee provides an interesting model which could possibly be envisaged for the Union.

Professor A.L. Cullen, President of URSI, enquired about the membership categories in two Unions: the International

Union of Crystallography (IUCr) and the International Union of Pure and Applied Chemistry (IUPAC), and provided the following information.

IUCr has neither individual nor affiliate membership. It has Scientific Associates, defined as international scientific organizations whose interests are in harmony with those of the Union, and Regional Associations, defined as regional organizations of crystallographers having substantially the same aims and activities as the Union.

IUPAC has a full set of membership categories:

- National Adhering Organizations: similar to URSI Member Committees;
- Observer Countries: corresponding roughly to the new Associate Membership Category in URSI;
- Associated Organizations: international organizations whose aims and activities are in harmony with those of the Union, but neither duplicate nor are in conflict with the legitimate functions of the Union. These Organizations pay no subscription to the Union and have no voting rights. The continuance of their membership is reviewed by the IUPAC Council at each General Assembly;
- Company Associates: industrial companies, research and development institutions and laboratories, or any other body interested in the activities of the Union (about 150 at present) which pay $350 per year, plus $25 service charge to cover the cost of documents sent to them. A Company Associate can, if it wishes, take two or more units at $350. The Company Associates can influence IUPAC through a Standing Committee for Chemistry and Industry.
- Affiliate Members: The Scheme was launched in 1986 in order to maximize the participation of chemists throughout the world in the affairs of IUPAC, and some support has been received for this purpose from UNESCO and from ICSU. It is only possible to become an IUPAC Affiliate through a National Adhering Organization or a National Chemical Society. The Affiliate subscription varies slightly from country to country, depending on a number of factors, including mailing costs and currency exchange rates. Chemists in a number of countries, particularly developing countries, which have no formal links with the Union may also become Affiliates under certain conditions. A limited number of sponsored(free)

Affiliate memberships is available for third world chemists aged 35 years or less. The benefits to Affiliate Members are receipt of "Chemistry International", 25% off most IUPAC publications, and a 10% reduction in IUPAC sponsored conference fees. By the end of 1987, there were over 7,800 chemists from about 90 countries.

The Chairman of the URSI Standing Committee on Membership has also examined the Statutes and Bylaws of the International Astronomical Union (IAU), and extracted the following relevant information.

The IAU is composed of

- corporate members (Adhering Countries): corresponding to URSI Member Committees;
- individual members (Members) who are admitted to the Union by the Executive Committee, on the proposal of a corporate member or the President of a scientific Commission, with regard to their achievements in some branch of astronomy, and their desire to assist in the fulfilment of the aims of the Union. The applications are considered by a Nominating Committee consisting of one representative of each Adhering Country, before decision by the Executive Committee. The individual members may be appointed as members of one or more Commissions of IAU. They pay no subscription and are entitled to receive the publications of the Union free of charge or at reduced prices.

It seems worth while to mention here that the astronomers value very much, and attach importance to, their being admitted as Individual Members of the Union.

The Union may also admit the affiliation of international non-governmental organizations which contribute to the development of astronomy. An affiliated organization may participate in the work of the Union as mutually agreed between the organization and the IAU Executive Committee.

Coming back now to the proposed two new membership categories in URSI, a number of issues should be considered.

1. Individual Membership Category

The creation of such a category would certainly increase the participation of radio scientists throughout the world in the affairs of the Union, and would also permit the

dissemination of information on its activities to a wider audience.

The benefits to individual members could include: receipt of the "URSI Information Bulletin" and reduced fees at URSI-sponsored conferences. But, would this be incentive enough? Giving to individual members voting rights in the Commission business sessions, possibly including the nomination of Commission Chairmen and Vice-Chairmen (who are elected by the Council bearing in mind a fair geographical distribution) would require a restructuring of the Commissions, which are at present composed of Official Members representing each a Member Committee and having each one vote. However, such a scheme would probably be more attractive and would increase the quality of the topics selected for the scientific programme of the General Assembly and for symposia. The nominations for Commission Officers would be based on a larger number of proposals.

From the financial point of view, the income from subscriptions would probably cover the handling and managing costs, but it seems very doubtful whether the URSI financial situation would be significantly improved through such a scheme.

A major difficulty would be probably the additional workload on the URSI Secretariat. However, this could be transferred to a very large extent to the Member Committees, by using a scheme similar to that of IUPAC, where individual subscriptions are collected at a national level.

2. Affiliate Membership Category

As suggested, this category would include scientific or professional organizations and industrial companies. Are, for example, the major telecommunications companies ready to contribute financially to URSI? If so, what return would they expect from such contributions? Could we get fruitful suggestions for our scientific activities from scientific and professional organizations on the one hand, from industrial companies on the other?

It is to be noted that up to now no approach has been made and these questions have not yet been studied in depth.

In order to prepare for the decisions which should be made during the next General Assembly in 1990, I would like to suggest that the Member Committees and the scientists interes-

ted in URSI activities should consider the following questions:

1) Are radio scientists eager to be more involved in the Commission official business (selection of topics for scientific meetings, selection of conveners, nomination of the Commission Chairmen and Vice-Chairmen, creation of Working Groups)?

2) Would radio scientists feel more inclined to attend General Assemblies if they were individual members of the Union?

3) Are the Member Committees ready to operate the individual membership scheme?

4) Should we implement a scheme whereby: a) scientists from developing countries would become individual members more or less free of charge; b) scientists from countries where there is no URSI Member Committee could become individual members of the Union?

5) Would each Member Committee get in touch with the major industries in its country, potentially interested in URSI activities, to explore their actual interest, and willingness to pay a significant fee?

6) Should we devise a scheme whereby industrial companies would have a limited but real say in URSI activities?

7) Should we create a membership category for scientific and professional organizations distinct from the one for industrial companies?

Responses to these questions and any comments on the more general problem of membership which Member Committees and individual scientists might have will be highly appreciated. They should be sent as soon as possible to the URSI Secretariat in Brussels.

Thank you for your cooperation.

Michel PETIT
Chairman, URSI Standing
Committee on Membership.

A N N E X 1

Brief Survey of the Replies to the Questionnaire Circulated to Member Committees by the Standing Committee on Membership (29/4/88)

Up to the present date (1 October 1988), 26 Member Committees, out of 39, have returned the Questionnaire to the URSI Secretariat. These are the Committees in:

Australia, Belgium, Canada, China (CIE, Beijing), China (SRS, Taipei), Czechoslovakia, Denmark, Egypt, Finland, France, German Democratic Republic, Federal Republic of Germany, Hungary, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Nigeria, Norway, South Africa, Switzerland, United Kingdom, USA and USSR.

1. Structure of Member Committees

1.1 All Committees which have responded were established by the Academy of Sciences or a similar institution, with three exceptions:

- Finland, where the Committee has been formed by 12 organizations concerned with research in radio science or with applications of radio science;
- Netherlands, where the Committee has been established by the Dutch Electronics and Radio Society;
- Nigeria, where the Committee has been established by members interested in radio science.

1.2 Regarding membership categories, these cover a wide range of possibilities: full members, ordinary members, honorary members, ex officio members, individual members, associate members, consulting members, representatives of scientific institutions, corresponding members.

The case of the "Nigerian Association of Radio Science" is rather interesting. The Committee includes Ordinary Members, (scientists, engineers, etc.); Associate Members (individuals interested in radio science); Student Members (from post-secundary institutions); Corporate Members (professional and learned societies, educational institutions, public or private corporations and firms interested in fostering the objectives of the Association); Life Members (a title which is conferred by the Association).

In the smaller countries, the URSI Committees are usually formed with members appointed or approved by the Academy of Sciences or an equivalent institution. In the larger countries, the structure of the Committees follows more or less that of the international URSI, and members are selected according to different schemes.

1.3 The numbers of members in URSI Committees vary from 6 (New Zealand) to 932 (USA). Except in larger countries where the Member Committees seem to reach considerable numbers of radio scientists, the participation in URSI activities is restricted to a small number of individuals appointed by the Academy.

Appendix I shows, for each Member Committee, the categories of membership, the mode of selection and the numbers of members.

2. Meetings of Member Committees

2.1 URSI Committees hold at least one administrative meeting per year. In Israel, there are three administrative meetings and in Nigeria six administrative meetings per year. Nine Committees have indicated that they combine administrative meetings with scientific meetings.

2.2 Scientific Meetings. Some examples are given below, but these are not exhaustive.

- The Canadian Committee organizes Radio Science Meetings with the US Committee.
- The Danish Committee holds an URSI-Day every few years.
- The Finnish Committee organizes an Annual National Symposium.
- In Israel, Commissions organize symposia, once a year in most cases.
- The Committee in the Federal Republic of Germany organizes the annual Kleinheubach meeting which lasts for one week.
- In Japan, there are 3 to 10 scientific meetings per year.
- The Nigerian Committee holds two scientific meetings in a year.
- An Annual National Symposium is organized by the Committee in the United Kingdom.

- The Soviet Committee organizes combined administrative/ scientific meetings twice a year.
- The US Committee sponsors the four-day National Radio Science Meeting which is held annually. Several US Commissions meet with the IEEE Antenna and Propagation Society at jointly sponsored symposia.

3. Finances

3.1 For all the Committees which have responded to the Questionnaire, the annual contribution is paid by the Academy of Sciences or a similar institution. Exceptions are: Netherlands (companies, official organizations and universities); Nigeria (subscriptions by members and government subvention); and Norway (National Telecommunication Administration).

3.2 Support for the activities of the Committees is provided in most cases by the Academies of Sciences. Such support is provided in China (SRS, Taipei) by the Directorate of Telecommunications, in Czechoslovakia and Denmark by the institutions of the members of the Committee, in France by scientific organizations, in Nigeria by Government establishments, in the German Democratic Republic by Universities and some official organizations. In the Federal Republic of Germany, registration fees cover the cost of the annual meetings. In Egypt, Israel and the USA, registration fees collected at scientific meetings are also a source of support.

3.3 The following Committees have a bank account: Finland, France, China (SRS, Taipei), Israel, Japan, Netherlands, Nigeria, Switzerland.

4. Cooperation with National Organizations

In general, there is formal cooperation with academic organizations through the Academies of Sciences. Cooperation with professional bodies and industrial organizations is not direct, but rather through the individual members of the Committees.

The Canadian and US Committees organize joint symposia with IEEE; the Chinese (SRS, Taipei) Committee has relations with the Chinese Institute of Electrical Engineers; the Israeli Committee occasionally co-organizes seminars and symposia with IEEE, IPS and the Israel Optical and Electro-optical Society. In USSR and Nigeria, there is a cooperation with

industrial organizations, whereas such cooperation does not exist yet in the USA. In Italy there are links with AEI, SIF and IEEE.

Note that the membership of the Finnish Committee (15 members) includes 3 representatives of Universities, 4 representatives of professional bodies and 4 representatives of state agencies. In Nigeria the category of Corporate Members includes "public or private corporations and firms interested in fostering the objectives" of the Committee.

5. Bylaws and Terms of Reference

The activities of the following Committees are governed by formal texts:

Belgium, Canada, Denmark, Finland, France, German Democratic Republic, Federal Republic of Germany, Hungary, Israel, Japan, Netherlands, Nigeria, South Africa, United Kingdom, USA.

6. Delegations to URSI General Assemblies

In most cases the Committees appoint a formal delegation to the General Assemblies of URSI, and they receive partial support from the Academies of Sciences.

Some examples:

- France: special subventions are provided also by scientific organizations and by the Ministry of Foreign Relations.
- German Democratic Republic: funds are provided by the Institutes which send delegates to the Assembly.
- Israel: the Commission Chairmen are the official delegates, but there is no financial support.
- Nigeria: the delegation includes the Chairman or Secretary of the Committee and those who contribute accepted papers.
- USSR: the formal delegation includes all national participants to the Assembly and the expenses are supported by the Academy of Sciences and other departments.
- Belgium, Denmark, Finland, Ireland, Japan, New Zealand, Norway and Switzerland: the President of the Member Committee is the only official delegate and he represents his Committee on the URSI Council; expenses are funded by the Academies of Sciences.

- USA: there is a rather complicated procedure, whereby the Committee determines how many delegates may be sent from each Commission, depending on the activities and size of the given Commission. Then each Commission elects its delegates to fill its allocated quota. Financial support comes from USNC's private funds (derived from meetings) and the National Science Foundation via a grant to the US National Academy of Sciences.

7. Review of Radio Science

In almost all cases, the information to be provided to the Editors of the various chapters of the Review is collected by the Official Members of the Commissions (note that in larger Committees where the structure is similar to that of the international URSI, the Official Members are called National Chairmen). In Nigeria, scientists working in the area of radio science are requested to submit short summaries of their activities, including publications; a member of the Committee is nominated to collate all the submissions in a suitable form for transmission to the Editor of the Review.

The Australian Committee issues a Directory of Radio Science in Australia, which contains a listing of Radio Science Research Groups in Australia by Commission with full contact details and a Reference List of Australian publications during the period under consideration. The groups listed in the Directory are requested to provide contributions for the Review of Radio Science.

8. Special Features

- In Australia, the various Committees corresponding to the Scientific Unions are in charge of maintaining international contacts.
- In Finland, as already mentioned, the Committee is composed of representatives of various organizations.
- The URSI Committees in Canada, in Italy and in Japan produce national reports which are distributed at the General Assembly.
- The US Committee sponsors a student paper competition each year.
- In three cases, the URSI Committees are sub-committees of a larger organization:

a) New Zealand: appointed by the Royal Society of New Zealand, and responsible for communication with URSI and SCOSTEP.

b) Ireland: established as a sub-committee of the National Committee for Engineering Sciences of the Royal Irish Academy.

c) Nigeria: the Nigerian Association of Radio Science is part of the Nigerian Union of Planetary and Radio Sciences.

- Nigeria: according to the Constitution of the Nigerian Committee, annual subscriptions are payable by the Members. The amount of the subscriptions depends on the membership category.

9. Comments

9.1 The Hungarian Committee recommends that the results of the present enquiry should be published.

9.2 The Swiss Committee stresses the fact that most fields of interest to URSI are covered by meetings organized by technical societies and Institutes of technology. The Committee does not organize scientific meetings in order to avoid duplication.

Appendix I

Member Committee in:	Categories of Membership and Numbers of Members	Method of Selection of Members
AUSTRALIA	A. Members of the Committee of Radio Science (about 8) B. Individuals who take particular Commission responsibilities (about 3) C. Radio Science contacts throughout Australia (about 60)	By invitation
BELGIUM	A. Full members (16) B. Honorary members (6) C. Associate members (22)	Approval by the Committee of individuals presented by Committee members
CANADA	A. Chairman, Vice-Chairman, Commission Chairmen plus ex officio and special members (12) B. Each Commission has a list of names of interested scientists (20 to 100 per Commission)	-The Committee nominates its replacement. The National Research Council of Canada's Associate Committee on International Relations (CISTA) chooses from the nominations. -List of names of interested scientists is the responsibility of the Commission Chairman.
CHINA (CIE)	-No independent membership. All CIE members can participate in the activities of the URSI Committee. -The Committee is composed of a Chairman, a Secretary and 9 Official Members of Commissions.	- The Chairman and Secretary are selected by the Board of Directors of the CIE. -The 9 Official Members are selected by the Chairman of the Committee with CIE related societies.
CHINA (SRS)	Individual membership category (169)	-Members are appointed by the Academia Sinica. -The President and Official Members are elected by the Standing Committee. -The Executive Secretary is appointed by the President.
CZECHOSLOVAKIA	Ordinary members (14)	-On recommendation of the Member Committee, approved by the Czechoslovak Academy of Sciences.
DENMARK	9 members representing the URSI Commission; one of them being the President of the Committee.	Three members are elected each year, on proposal by Committee members.
EGYPT	All members are associates invited to join the Committee (24)	Members are approved by the Council of the Academy of Scientific Research and Technology; they represent most of the engineering and science faculties and research centres in Egypt.

Member Committee in:	Categories of Membership and Numbers of Members	Method of Selection of Members
FINLAND	Ordinary members representing 12 organizations (15)	-The appointment of Official Members of Commissions is based on discussions between experts in the various areas, during the annual meeting. -Other members elected by voting at the annual meeting.
FRANCE	A. Members of the Board of the Committee (8) B. Members designated by a number of correspondents (3 per Commission) (27) (Correspondents appointed by Gen.Ass.) C. ex officio members (members of the URSI Board of Officers and Chairmen or Vice-Chairmen of international Commissions during their term of office) D. Members designated by, and representing, scientific organizations (8)	-The members of the Board are elected by the General Assembly of the Committee. -Other members: see B. and D.
GERMAN DEMOCRATIC REPUBLIC	A. Members (20-25) B. Permanent guests (5-10)	-On proposal by others members or by organizations active in URSI fields. -The Chairman and Vice-Chairman of the Committee are appointed by the Secretary General of the Academy of Sciences.
GERMANY, FEDERAL REPUBLIC OF	A. Honorary members (6) B. Members (188) C. Consulting members (with reduced activity but with full voting rights) (23)	-Members are proposed individually and elected on the basis of their published contributions to science and URSI meetings. -Officials are elected at intervals of 3 years at the General Assembly of the Committee.
HUNGARY	Individual members (28)	Appointed by the Hungarian Academy of Sciences
IRELAND	Ordinary members (9)	Appointed by the National Committee for Engineering Sciences
ISRAEL	A. Members (28) B. Candidates (temporary status) (2)	-Member candidates are recommended by an ad hoc Committee on the basis of their merits, and selected by a vote. -Officials are elected by the Committee and

Member Committee in:	Categories of Membership and Numbers of Members	Method of Selection of Members
ITALY	Official members (22)	-Appointed by the Engineering and Architecture and the Physics Advisory Committees. -Officials are elected by the Committee.
JAPAN	A. Regular members (26) B. Internal Commission members (250)	-The Committee members are elected from candidates recommended by each Internal Commission by mail votes of the Internal Commission members. -The President is elected by secret vote of the 26 regular members.
NETHERLANDS	Ordinary members (15)	Proposals for new members are made by the Committee to the Board of the Dutch Electronics and Radio Society (NERG).
NEW ZEALAND	Ordinary members (6)	Appointed by the Council of the Royal Society of New Zealand.
NIGERIA	A. Ordinary members (200) B. Corporate (organizations) members (10) C. Student members (150)	-Members on voluntary basis -Officials by election.
NORWAY	Representatives for each URSI Commission	-Nomination by national Commissions -Appointment by the National Academy.
SOUTH AFRICA	Ordinary members (N/A)	-Selected by the Chairman and the SA ICSU Secretariat after consultation of the research community. -The only official is the Secretary appointed by the Foundation for Research Development of the Council for Scientific and Industrial Research.
SWITZERLAND	Ordinary members (14)	On proposal of the Committee members.

Member Committee in:	Categories of Membership and Numbers of Members	Method of Selection of Members
UNITED KINGDOM	A. ex officio members (4) B. Members nominated by organizations represented on the Committee (16) C. Additional members (1)	-ex officio members: UK members of the main executive body of URSI. -The appointment of the members nominated by organizations is confirmed by the Council of the Royal Society. -Additional members are recommended by the Committee to the Council for appointment.
U S A	A. Members (891) B. Associate members (less experienced scientists likely to become full members in due course) (41)	-Members and associate members of each Commission are elected by the members of that Commission. -Officers of the Commissions are elected by the Commissions. -The Chairman, Vice-Chairman and Secretary of the US Committee are elected by the membership of the Committee.
U S S R	Ordinary members (30)	-Selected by scientific organizations and educational institutions, and confirmed by the USSR Academy of Sciences.

NOTE: Almost all the Committees listed have an internal Commission structure.

A N N E X 2

NIGERIAN ASSOCIATION OF RADIO SCIENCE

CONSTITUTION

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3. MEMBERSHIP

3.01 The Association shall comprise:

(a) Ordinary Members

Who shall be scientists, engineers or technologists working in the areas of Radio Science. Qualification shall normally be a first University degree (or its equivalents) in Science or Engineering or other qualifications that the Executive Committee may decide upon.

(b) Associate Members

Who shall be other individuals interested in Radio Science.

(c) Student Members

Who shall be students in relevant disciplines in post-secondary institutions.

(d) Corporate Members

Which shall be professional and learned societies, governmental agencies and departments, foundations and such other organizations, educational institutions, and public or private corporations and firms interested in fostering the objectives of the Association.

(e) Life Members

The Association shall confer life membership upon any reputable and active member who, in the opinion of the Executive Committee, has made outstanding contributions to the advancement of Radio Science both nationally and internationally.

3.02 (a) Application for membership in categories (a) - (d) shall be made on the prescribed form obtainable from the Secretary.

(b) Approval shall be by the Executive Committee.

(c) An enrolment fee of ₦ 5.00 shall be paid after approval of application for membership shall have been communicated to the applicant in writing.

3.03 An individual/corporate member shall cease to be a member of the Association if

(a) he submits a written notice of resignation to the Association;

(b) in the opinion of the Association, he has acted in a manner prejudicial to the good name or interests of the Association.

.....

8. FINANCE

8.01 The funds of the Association shall be

(i) Membership fees
(ii) Annual Subscription
(iii) Donations, proceeds from Conferences, Seminars, Symposia, Workshops, Journals, etc.
(iv) Grants and loans.

8.02 Subject to amendments from time to time, annual subscriptions shall be as follows:

Ordinary and Associate Members	₦ 10.00
Student Members	₦ 4.00
Corporate Members	₦ 200.00
and the membership fee shall be	₦ 5.00

8.03 The annual subscription shall be paid by members either by bankers orders, crossed cheques, or cash.

8.04 The Signatories to cheques shall be the Treasurer, the Chairman and/or Secretary.

.....

NEWS FROM MEMBER COMMITTEES

ALL-UNION SCIENTIFIC SESSION OF THE A.S. POPOV SOCIETY

The Central Administration of the A.S. Popov Scientific Technical Society for Radio Engineering, Electronics and Telecommunication is planning to organize the XLIV All-Union Scientific Session devoted to Radio Day in May 1989 in Moscow.

The Session will last for three days.

It is suggested to discuss, at plenary meetings and in the sections, papers delivered by scientists and engineers in the main branches of radio engineering and electronics to consider the ways of introducing advanced scientific research and engineering experience and their effective use in the national economy.

The following subjects will be discussed at the Conference:

Production mechanization and automation; Waveguides; Measurement in radio techniques and electronics; Microelectronics; Reliability and production quality control; Radio techniques; Radioelectronics in biology and medicine; Transmitters and radio-signal generation technique; Receivers and amplifiers; Quantum radiooptics; Fiber-optic systems and devices; Wave propagation; Information theory; Radio devices production technology; Synchronizers; Economic problems in radio industry and electronics and communication branches; Electronic microscopy; Electronics.

Call for Papers

Final date for submission of papers:	15 December 1988
Time for presentation:	20 minutes
Conference language:	Russian
Registration fee:	$150.

Simultaneous translation into English will be arranged at the Plenary meetings.

Payments should be made by bank transfer to the account: "Radio Days 1989", No 70102565, Vnesheconombank of USSR, 103810 Moscow K-9, Pushkinskaia Str. 4/2, telex 411174.

All persons interested in participation in the Conference are kindly requested to make arrangements through one of the

Intourist accredited agencies.

For further information, please contact:

Central Administration
The A.S. Popov Society
Kuznetskij Most 20
103897 Moscow Centre GSP-3
USSR.

Cable address:	Telephone:
Moscow K-31	921-71-08
Central Administration	924-80-84.
The A.S. Popov Society.	

GIOVANNI GIORGI AND HIS CONTRIBUTION TO ELECTRICAL METROLOGY

FIFTY YEARS AFTER THE CONFIRMATION OF THE GIORGI(MKS) SYSTEM

A Historical two-day Meeting was held at the Politecnico di Torino on 21 and 22 September 1988. The meeting was co-sponsored and supported by the three Electrical Departments of the Politenico di Torino, the National Research Council and the AEI Section of Turin. It was organized under the patronage of BIPM, IEC, CCIR and URSI.The Chairman of the Scientific Committee was Prof. C. Egidi, President of the Italian URSI Committee.

The programme included the following papers:

- Giovanni Giorgi: le savant et son oeuvre, A.M. Angelini;
- Giovanni Giorgi et sa contribution à la métrologie électrique, P. Grivet;
- Giorgi and the International System of Units, J. De Boer;
- Dimensions, units and symbols in electrodynamics: an historical survey, S. D'Agostino;
- Birth and evolution of electrical metrology. From K.F. Gauss to G. Giorgi, C. Egidi;

- The MKS Units in Acoustics, G.G. Sacerdote;
- The Second of SI, Wm. Markowitz;
- John Wennerberg and the Giorgi System, R. Ohlon;
- Progress of the Giorgi's System in the U.K., P. Vigoureux;
- The Giorgi System in the U.S.A., C. Page;
- Aspects of the Introduction of the Giorgi System in Italy, G.B. Stracca;
- Giovanni Giorgi's Jubilee inspires the historical study of the development of metrology in Czechoslovakia, M. Sedivy;
- The success of the Giorgi System in Germany and its development up to the present day, P. Drath and V. Kose;
- Giorgi - Unit of Permeance, S.A. Thulin;
- The Action Unit as a Primary Unit in the SI, B. Catania;
- Significance of Giorgi's innovations for the domains of physics and engineering, L. Gonella;
- Contributions of Politecnico di Torino and IEN "Galileo Ferraris" to the acceptance of Giorgi System, E. Arri, S. D'Emilio, and C. Gentile.

Ionospheric Informatics and Empirical Modelling

The Workshop on Ionospheric Informatics and Empirical Modelling was held in Espoo, Finland during the XXVI COSPAR Plenary Meeting (18-29 July 1988). The two-day session was accompanied by parallel poster sessions.

The main purpose of the Workshop was the release of the new IRI model. IRI-88 includes the fully analytical description of the middle ionosphere developed by K. Rawer with contributions by T. Gulyaeva and S. Radicella. For the determination of the F peak plasma frequency and density the user of IRI-88 has the option to apply either the old CCIR coefficients or the new URSI coefficients proposed by an URSI panel.

In the tradition of earlier Workshops the session talks and posters highlighted analytical representation of profiles, comparisons of IRI and measurements, and applications of IRI of different kind.

The papers will be published in *Advances in Space Research* (editors: K. Rawer and P. Bradley).

In connection with the Workshop business meetings of the Task Group on IRI and of URSI-G4 were held.

The following recommendations were accepted by the Task Group on IRI:

To COSPAR ISC C:

Considering that the existing ionospheric data obtained by space techniques have shown to be inadequate for inclusion into the ground-based data systems, and that the latter data suffer from reduced coverage of the globe,

recommends that, by international cooperation, a system of three topside-sounding satellites using comparable techniques be installed, in a way to obtain best coverage in time and space (for example, two satellites of variable longitude, in hemispherical opposition, and one in a polar orbit).

Internal recommendations:

The Working Group *recommends* that highest priority should be given to the following tasks (project coordinator(s) in parenthesis):

Direct mapping of the ionospheric peak altitude including data from different sources (Anderson, Reinisch);

Data base for top- and bottom-side half-density thicknesses (excluding the polar cap) (Bilitza, Gulyaeva, Reinisch);

Continued effort to resolve the valley problem by critical discussion and new sources of information (reliable in situ measurements and incoherent scatter profiles) (in collaboration with URSI G4);

Study of the possibility to make a combined ionosphere-thermosphere model (in collaboration with WITS)(Ivanov-Kholodny, Serafimov);

New effort to rebuild the ion-composition model using the large amount of rocket and satellite data accumulated during the last decade (Bilitza, Dachev);

Preparation of an IRI-88 to be published as a printed report of NSSDC (USA) (Bilitza).

Authors of partial models who had promised to send their models in computerized shape to the IRI Group (address: Dr. D. Bilitza, NSSDC) are urged to do so (Chasovitin, Rycroft, Smilauer).

Proposed Workshops

IRI Workshop near London (UK) before or after the IAGA meeting in Exeter (last week of July and first week of August 1989) on: Development of IRI-90 (Organizer: P.A. Bradley).

IRI Workshop during the XXVIII Plenary Meeting of COSPAR, The Hague (Netherlands), 1990 on: Enlarged space and ground data base for ionospheric modelling.

URSI Commission G Workshop during the URSI General Assembly, Prague (Czechsolovakia), 1990 a session on: Modelling of longitudinal structure in the F region (Organizer: B.W. Reinisch).

IAU Colloquium No 112
"Light Pollution, Radio Interference, and Space Debris"

A 4-day meeting on the topic of "Light Pollution, Radio Interference, and Space Debris: The Increasing Environmental Impacts on Observational Astronomy" was held in Washington, D.C., USA in mid-August 1988. The meeting was sponsored by the International Astronomical Union (IAU) and co-sponsored by the International Union of Radio Science (URSI), the Committee on Space Research (COSPAR), and the Commission Internationale de l'Eclairage (CIE). 78 papers were presented from among the 120 participants from 19 countries, including the Soviet Union and the People's Republic of China. Attendees included astronomers, illumination and radio engineers, representatives of businesses providing lighting, telecommunications and other services, and Government officials from regulatory agencies.

There were numerous expressions of concern at the meeting that ground-based astronomical observatories around the world and future space observatories are jeopardized because of the proliferation of outdoor lighting; the burgeoning uses of radio telecommunications, particularly with space systems; and the growing amount of orbital debris generated by space activities.

LIGHT POLLUTION: Urban sky glow at some optical astronomy observatories is now at such a high level that closure is considered. Even many observing sites with presently dark skies will be seriously threatened over the next few decades. Speakers addressed the causes and solutions to light pollution as it affects astronomy. Much of the problem can be attributed to poor quality lighting. The solutions include using the correct amount of light for the task, well shielded fixtures, and low pressure sodium light sources whenever feasible. Achieving the solutions requires very extensive interaction between astronomers and lighting fixture suppliers, utilities, urban planners, and local government officials.

RADIO INTERFERENCE: Radio astronomers are interested in and have the capability of observing at frequencies ranging from approximately 20 MHz to 600 GHz from ground-based facilities.

This range can be further extended by the use of radio telescopes in space. In order to study the faint cosmic emissions, radio-quiet frequency bands are required. While there are international organizations that regulate the allocation of radio frequency bands and govern the assignment of frequencies to transmitters, commercial and other pressures for the use of such frequencies is so high that it is becoming increasingly difficult to preserve radio-quiet in those frequency bands considered most important to radio astronomers. Space-borne interference is an especially serious threat to radio astronomy because of its global character; there is little possibility of isolating an observatory at a remote location.

The frequency band from 1 to 3 GHz is of most concern to radio astronomers at the moment. Because of the transparency of the atmosphere, this band is ideally suited for satellite transmissions, and several systems, which are potentially quite severe threats to radio astronomy, are in various stages of development or operation. The Soviet Union's Global Navigation Satellite System (GLONASS) is currently viewed as the number one global interference problem faced by radio astronomers. Its emissions interfere with observations of an important line of the hydroxyl molecule near 1600 MHz.

SPACE DEBRIS: It was stated that the number of pieces of space debris already exceeds the number of meteoroids, and the amount of space junk is growing with time. At present only 5% of those objects in space larger than a meter or so in diameter are operational satellites. The rest of the objects are spent vehicles or space debris. By the 1990s, the debris population will become so large that collisions among the debris will be frequent, creating more fragments and more collisions. Space debris is an obvious threat to the health of orbiting observatories because of the danger of collisions. Orbiting objects also impact ground-based observatories; it was stated that practically every photograph taken with certain fundamental survey telescopes is marred by light streaks due to satellites or space debris. Because of the danger to active space missions, there is reason to believe that the space-faring nations will take steps to control satellite debris for purely operational reasons.

It was generally concluded that through its own activities humankind is losing its view of the universe. Sensitivity to environmental issues such as light pollution, radio inter-

ference, and space debris must be heightened, just as the environmental impacts of air pollution, water pollution, and toxic waste and the protection of natural resources have been publicized and solutions sought. Problems in the three areas covered by this meeting are viewed as controllable, at least in principle; but pressures on the astronomical environment is incessant.

The Proceedings of the meeting are to be published in 1989.

(This report is based on the paper Summary of International Astronomical Union Colloquium No 112 "Light Pollution, Radio Interference, and Space Debris" *given by Thomas E. Gergely and D.L. Crawford at the 39th Congress of the International Astronautical Federation, 8-15 October 1988, Bangalore, India).*

5 Oct.1988 Vernon Pankonin

XXVII Plenary Meeting of COSPAR and Associated Activities

The XXVII Plenary Meeting of COSPAR and associated activities were held in Espoo, Finland from 18 to 29 July 1988. The COSPAR community was honoured by the high patronage of the President of the Republic of Finland accorded to the XXVII Meeting, which was officially opened by the Prime Minister of Finland.

During the Opening Ceremony, the COSPAR Awards and Medals were handed by the President of COSPAR, Prof. W.I. Axford, to:

- Prof. C. de Jager: International Cooperation Medal;
- Prof. K.I. Gringauz: Award for Outstanding Contributions to Space Science;
- Prof. S.I. Mandelshtam: Award for Outstanding Contributions to Space Science;
- Dr. S.I. Rasool: William Nordberg Medal for Distinguised Contribution to the Application of Space Science.

The number of scientific events organized during the meeting was the highest in COSPAR history. The organization and preparation of the overall programme was ensured by Prof. E. Thrane, Chairman of the General Programme Committee. The Chairman of the Local Organizing Committee was Prof. M. Tiuri.

In addition to the COSPAR business meetings, various organizations benefited from the occasion to hold their own meetings.

The Scientific Programme included 16 Specialized Symposia, 26 Specialized Workshops and 23 Topical Meetings. URSI co-sponsored the Symposium on the Middle Atmosphere after MAP; the Workshops on Recent Incoherent Scatter Research, on Reference Models of Trace Constituents of the Middle Atmosphere and Lower Thermosphere and Recent Data, and on Ionospheric Informatics and Empirical Modelling.

There was also a Special Session of SCOSTEP on the Solar-Terrestrial Energy Programme (STEP).

About 1350 participants from 38 countries took part in the COSPAR Meeting in Espoo. The number of registered accompanying persons was about 200.

It is planned that the Proceedings of all Symposia, Workshops and Topical Meetings will be published in Volumes 8, 9 and 10 of the COSPAR Journal, Advances in Space Research by Pergamon Press.

The XXVIII Plenary Meeting of COSPAR will take place in The Hague, Netherlands during the period 25 June - 7 July 1990. The XIX Meeting will be held in 1992 in the United States.

The following decisions were adopted at the Joint Final Session of the COSPAR Executive Council and Plenary.

Decision No 1/88, proposed by ISC A

Considering that the WCRP's International Satellite Cloud Climatology Project has since 1983 been forwarding extremely valuable data in a form accessible to the scientific research community;

considering that this data set not only is providing a baseline cloud climatology but will also be of great use in ocean and land surface climate studies, and in general in studies of Global Change,

requests the Joint Scientific Committee (WMO-ICSU) of the WCRP to express its concern to the agencies participating in the ISCCP that, at present, continuation of this project is not assured beyond 1990, and

further requests that appropriate steps be taken to assure the continued production of the ISCCP data sets, which is extremely valuable to research groups all over the world in their studies of global change.

Decision No 2/88, proposed by ISC B

Noting

1) the great scientific interest of the international community in the exploration of Mars,
2) that full involvement of most scientific disciplines is required for the next stage in this exploration,
3) that a number of space agencies are now discussing new methods and objectives of studying this planet,
4) that the mission will involve the use of novel and sophisticated techniques such as for example means of returning

samples to Earth and roving vehicles to survey the surface, it is becoming clear that combining resources of many countries will be necessary.

Accordingly COSPAR *recommends* that a fully international, comprehensive and interdisciplinary scientific study be undertaken and *requests* interested national institutions and agencies to consider the implementation of such an international project on a broad collaborative basis, and *believes* that it is timely to initiate preparatory work.

Decision No 3/88, proposed by ISC E

Recognizing the value of a co-ordinated scientific study of the physical processes and mechanisms leading to solar active phenomena and flares, most of these being common to a large variety of astrophysical objects and, within the solar-terrestrial environment, responsible for interplanetary phenomena which affect the terrestrial environment,

noting that a comprehensive study of all the processes related to solar activity exceeds the capabilities of any single country, further *noting* that several countries, like the USA, USSR and People's Republic of China, already have plans for co-ordinated studies during the next solar maximum, and have expressed the will to participate in a co-ordinated international campaign,

COSPAR *resolves* to support, by offering its cosponsorship, the FLARES 22 programme, to be in effect during the maximum of solar cycle 22 under the umbrella of SCOSTEP's Solar-Terrestrial Energy Programme (STEP) and will appoint a member of ISC-E to the FLARES 22 Steering Committee.

URSI Suzdal Symposium on Ionospheric Modification by Powerful Radio Waves

This Symposium was held in Tromsø, Norway from 16 to 20 September 1988. Fifty-six scientists participated in the Symposium offering fifty-two papers and lively discussion. One day of the Symposium was devoted to a visit to EISCAT and the MPI Heater near Tromsø to observe the operations of these important facilities.

The scientific sessions concentrated on the recent experimental results from the major observatories compounding the puzzling discrepancies in the observations at high latitudes with those at low latitudes. The underlying theory based on weak turbulence that has been used to "explain" observations and guide experiments for more than a decade was given a jolting challenge. To deal with this challenge will require new observations not only at high and low latitudes but also at intermediate latitudes. Soviet experimenters can fill in some of the needed observations.

At a short business session the participants agreed that the next Symposium in the series should be at Suzdal, the week of 10 September 1990, immediately after the URSI General Assembly in Prague. They also passed a resolution regarding the importance of continued operation of the Heater at EISCAT and forwarded the resolution to the Director of EISCAT.

V.V. Migulin, W.E. Gordon
Co-Chairmen.

REPORT ON ICSU MEETINGS

The General Assembly of the International Council of Scientific Unions (ICSU) held in Beijing, China in September 1988 produced resolutions, new officers and changes in dues. The details are given in Annex.

The International Geosphere-Biosphere Programme, a major new initiative of ICSU will be the subject of week-long discussions (24-28 October 1988) in Stockholm at the meeting of the Scientific Advisory Committee - a loose collection of national representatives, Union representatives and other interested in global change. The General Assembly included a seminar and discussions in the Union Cluster meetings but the Stockholm meeting will bring perhaps two hundred people together for focused discussion on the IGBP.

The free circulation of scientists and scientific information continues to be a sensitive issue with regard to meeting locations. The General Assembly reaffirmed (Resolution 3) that ICSU rejects and condemns all forms of racial, political or sex discrimination.

URSI's attention is invited to Resolutions 1)Development; 2) International Space Year; 3) Non-discrimination; 4)Accounts held in non-convertible currencies; 5) Ethical Problems of Science; 8) Access to data; and 9) International Decade for National Disaster Reduction.

ICSU dues for 1990 will increase by 8% and for 1991 by 5-8% at the discretion of the Executive Board.

The names of the new officers are given in the Annex.

W.E. Gordon

A N N E X

I. Officers

President	M.G.K. Menon
Past President	J.C. Kendrew
Vice-President	W.E. Gordon
Secretary General	J.W.M. la Rivière
Treasurer	K. Thurau

II. Resolutions

1. Fundamental Scientific Research for Development

Taking into account the important role of fundamental scientific research: 1) for the advancement of human knowledge; 2) for cultural, economic and social development; 3) for the protection of the environment; and

Recognizing ICSU's catalysing role in development and the need to increase it substantially;

Invites the Executive Board to promote the generation of proposals for cooperative research from Unions and Committees on "Fundamental Scientific Research". Particular attention should be paid to projects of high scientific level, of great importance for development and that consider regional and local scientific priorities; and

Recommends that the first set of suggested projects be considered at the meeting of the General Committee in 1989 and that the possibility of organizing a symposium on this subject at the General Assembly in 1990 also be considered.

2. International Space Year

Noting the Report of the Coordinating Committee for the Planning of the International Space Year (ISY);

Expresses its appreciation to the Chairman of the Committee, R.M. West, and to the other members for their report;

Concurs with the Report that: "i) a special effort should be made to include scientists from nations that do not normally engage in space activities, and ii) public education and

MATUURA, Prof. N., Research Institute of Atmospherics, Nagoya University, Toyokawa, Aichi 442, Japan.

MIYAUCHI, Prof. K., Department of Electrical and Electronic Engineering, Tokyo College of Science, 1-3 Kagurazaka, Shinjuku-ku, Tokyo 162, Japan.

TENG, Mr. Yuan-Cheng, Chief Research Engineer, Applied Research Laboratory, Telecommunication Laboratories, MOC, P.O.Box 71, Chung-Li, Taiwan.

WU, Prof. Tien-Shou, Department of Electrical Engineering, National Cheng Kung University, Tainan, Taiwan.

List of URSI Officers and Officers of Member Committees: Amendments

Amendments to the List published in the December issue of the "URSI Information Bulletin" are listed below.

1. Member Committees

IRAQ

President: Dr. Ali M. Al-Mashat, Director General, Space Research Centre, P.O.Box 2441 Baghdad, Iraq.

USA

President: Prof. S.A. Bowhill, Head, Department of Electrical Engineering, University of Lowell, 1 University Avenue, Lowell, MA 01854, USA.

Secretary: Dr. D.C. Chang, Chairman, Electrical and Computer Engineering Department, University of Colorado, Boulder, CO 80309, USA.

2. Commissions

Commission E on Electromagnetic Noise and Interference

Switzerland: Dr. G.V. Meyer, Paul-Reinhard Strasse 11, CH-8570 Weinfelden, Switzerland.

Commission J on Radio Astronomy

China (SRS): Prof. Wei-Tou Ni, Department of Physics, National Tsing Hua University, Hsin-Chu, Taiwan.

3. Change of Address

CHEN, Mr. Yu-Kai, c/o Telecommunication Training Institute, MOC, 168 Min-Chu Road, Pan-Chiao, Taipei Hsien, Taiwan.

DEN, Dr. Chi-Fu, Vice-Chairman, National Science Council, 106 Hoping East Road Section II, Taipei, Taiwan.

information, taken in the broadest sense, offer great possibilities in connection with an ISY and should be used to improve public awareness of the practical utility of science and technology in general, and of space science in particular";

Notes that representatives of seventeen space agencies have established a Space Agency Forum for the ISY (SAFISY);

Recognizes the potential importance of the ISY to many ICSU bodies, and particularly to the SC-IGBP, COSPAR, SCOSTEP and to many ICSU activities proposed within the framework of the International Decade for Natural Disaster Reduction;

Encourages these and other interested members of the ICSU family to take account of the ISY in their programmes in the relevant period; and

Authorizes the Executive Board to establish any suitable scientific or administrative framework related to the ISY as may seem appropriate.

3. Non-Discrimination

Noting that discrimination hinders the free communication and exchange of ideas among scientists of all countries and thereby blocks progress in science, which, like other forms of scholarship, requires the collective international efforts of scientists without regard to national boundaries;

Reaffirms that ICSU rejects and condemns all forms of racial, religious, political or sex discrimination;

Noting further that:

i. the Working Group on the Interpretation and Practical Application of ICSU's Principles of Non-Discrimination in the Context of the Contemporary World has provided a valuable report to the Executive Board with suggestions for practical measures (see below); and

ii. the Standing Committee on the Free Circulation of Scientists has accepted the report;

Recommends that the Standing Committee on the Free Circulation of Scientists:

i. adopt the following practical measures proposed by the Working Group:

a) the nomination of a correspondent within each ICSU

organization for liaison with the Standing Committee on the Free Circulation of Scientists (SCFCS);

b) the reporting by the local organizers of all ICSU-supported activities due to take place in any country to the ICSU National Member in that country at an early stage of the planning;

c) early exploration by the National Member concerned of the appropriate channels for issuing visas and engaging in any necessary negotiations with the governmental authorities;

d) noting the problems that might arise from the attitudes of both local and governmental bodies and of non-governmental organizations, and the taking of appropriate measures;

e) the inclusion of a reference to Statute 5 in all announcements of ICSU-sponsored meetings and a reference to the Resolution of the 6th Meeting of the Executive Board (Monaco 1966) in which ICSU demands of its adhering bodies that politics be excluded from meetings;

f) the reporting to the SCFCS of all problems concerning entry visas and the free flow of information, even after the event;

g) the revision of the presentation of the material contained in the SCFCS handbook and its wide dissemination, for example by the inclusion of the essential parts of it in the ICSU Year Book; and

ii. implement them in its regular procedures;

Invites all ICSU family members to nominate a correspondent to the SCFCS;

Taking account of the discussions in the General Assembly,

Requests the Executive Board to study further the application and implementation of ICSU's principle of non-discrimination and universality; and

Further requests the Executive Board to study the possibility of reinforcing ICSU's activities to safeguard the pursuit of science.

4. Accounts held in Non-Convertible Currencies

Noting that ICSU and some Scientific Unions and Committees hold accounts in non-convertible currencies which are restricted in their use;

Urges National Members in countries with such restrictions to provide mechanisms to permit the use of these funds for ICSU and Union activities, for example for local expenses of meetings and the purchase of international tickets on the national airline in the country concerned and, where possible, to pay local expenses in other countries of the region.

5. Standing Committee on the Ethical Problems of Science

Conscious of the need for ICSU to keep under review the ethical aspects of developments in science and in scientific research;

Resolves to create a Standing Committee on the Ethical Problems of Science (CEPS) with the following initial terms of reference:

i. to keep under review contemporary ethical problems related to scientific research and developments in science;

ii. to examine such developments in order to try to anticipate problems before they arise;

iii. to create, when needed, Study Groups composed of interested and/or concerned scientists to study potential problem areas and to prepare reports and public statements for general release at an appropriate time;

Accepts the suggestion that CEPS take over the function of the Study Group on the Biological, Medical and Physical Effects of the Large-Scale Use of Nuclear Weapons, which will thereupon cease to exist as a separate body; and

Requests the Executive Board to establish the Committee as soon as possible and to report on progress to the 23rd session of the General Assembly.

8. Access to Data

Noting that:

i. the success of international cooperative programmes in science depend on an unprecedented sharing of scientific data and information;

ii. ICSU has a longstanding commitment to the free circulation of scientists and access to scientific data and information; and

iii. processes of data and information handling and dissemination are rapidly becoming technically more sophisticated and potentially more expensive for those who provide and use these services;

Recommends all ICSU members to support the fundamental principle of open exchange of data and information for scientific purposes by strongly urging public and private organizations in all countries to facilitate access to scientific information and data needed to address the research objectives of ICSU programmes; and

Further recommends that the Executive Board establish a mechanism to monitor the implementation of this principle and take action on problems that may arise.

9. International Decade for Natural Disaster Reduction

Noting that:

i. the International Decade for Natural Disaster Reduction (IDNDR), timed for the 1990s, has been initiated by the United Nations;

ii. the goal of IDNDR is to reduce the damage inflicted by natural disasters on populations, economies and the environment;

iii. the importance of this goal for humankind, given the increasing vulnerability of modern society to natural disasters;

Realizing that:

i. this goal will include both research and application in areas where there are gaps in scientific knowledge;

ii. participation in IDNDR falls within the scope of the

ICSU charter and objectives;

Recalling that an Ad hoc Group on Natural Disaster Reduction (NDR) has been created by the Executive Board of ICSU "to identify the fundamental scientific problems connected with natural disasters";

Urges all members of the ICSU family:

i. to help initiate or enhance participation by their organizations and/or countries in the scientific activities within the IDNDR;

ii. to submit to the Ad hoc NDR Group specific suggestions and projects for participation in the IDNDR programme; and

Recommends that the Executive Board take appropriate action to develop a coherent programme.

BUREAU INTERNATIONAL DE L'HEURE: 75 ANS AU SERVICE DE L'HEURE UNIVERSELLE

Le numéro de septembre 1988 du *Bulletin d'Information de l'URSI* contient un historique du Bureau International de l'Heure, et le texte de la Résolution de la Conférence Générale des Poids et Mesures qui recommande aux Institutions nationales concernées de poursuivre avec le Bureau International des Poids et Mesures leur collaboration pour l'établissement et l'amélioration du Temps Atomique International. L'article décrit aussi les activités du Service International de la Rotation de la Terre, qui reprend les activités du BIH dans ce domaine.

Le 8 novembre 1988 s'est tenue à Paris une journée scientifique consacrée à la commémoration de l'action du BIH. Cette réunion, organisée sous les auspices de l'Académie des Sciences par le Bureau des Longitudes et l'Observatoire de Paris, a été ouverte par des allocutions de Monsieur Fehrenbach, Président du Bureau des Longitudes, Monsieur Charvin, Président de l'Observatoire de Paris, et des Secrétaires généraux des trois Unions qui patronnaient le BIH, à savoir l'URSI et les Unions d'Astronomie et de Géodésie et Géophysique. Ces allocutions furent suivies d'un programme scientifique fourni et de grand intérêt, qui comprenait les conférences suivantes:

- Le BIH de 1911 à 1964: le temps astronomique et la naissance du temps atomique.
  B. Guinot, Directeur du BIH, Bureau International des Poids et Mesures.
- Le BIH de 1964 à 1987: temps atomique et géodynamique globale, évolution et réorganisation.
  P. Pâquet, Président du Comité Directeur du BIH, Observatoire Royal de Belgique.
- Un laboratoire national de temps et de fréquence en 1988: le Laboratoire Primaire de l'Observatoire de Paris.
  M. Granveaud, Observatoire de Paris.
- Echelles de temps: élaboration, distribution et usages.
  S. Leschiutta, Politecnico di Torino.

- De nouveaux étalons astronomiques pour le temps et l'espace: les pulsars milliseconde.
  J.-F. Lestrade, Bureau des Longitudes.
- Cause géophysique des irrégularités de la rotation terrestre.
  J.-L. Le Mouël, Institut de Physique du Globe de Paris.
- Mouvements actuels de la croûte terrestre dans les régions de collision continentale: importance de la géodésie.
  P. Tapponier, Institut de Physique du Globe de Paris.
- Rôle des repères célestes extragalactiques.
  J. Kovalevsky, Centre d'Etudes et de Recherches Géodynamiques et Astronomiques, Observatoire de la Côte d'Azur.

Après une allocution de clôture de Monsieur Fehrenbach, les participants furent invités à une réception offerte par le Directeur de l'Observatoire dans les élégants salons de cette vénérable Institution.

J. VAN BLADEL

COMPUTER PROGRAMMES FOR RADIO FREQUENCY MANAGEMENT

Note: The text reproduced below (Addendum 2 to A.C. 290, dated 20 October 1988) has been received at the URSI Secretariat.

The XVIth Plenary Assembly of the CCIR (Dubrovnik, 1986) in its Resolution 88 decided that the Director, CCIR should be requested to prepare and publish, by means of Administrative Circulars and also in the *Telecommunication Journal*, summary information about computer programmes for radio frequency management submitted to the CCIR Secretariat by Administrations and Organizations which have such programmes.

Recently, the Secretariat received a computer programme from the Frequency Planning Division, Radio Department, Telecommunications Bureau, Ministry of Posts and Telecommunications (Japan). Annex 1 to this letter contains the information submitted. Its publication does not imply any form of endorsement and/or recommendation.

Enquiries concerning the programme should be addressed to the submitting Administration/Organization (see under "Source") or to the Director, CCIR, ITU, Place des Nations, CH-1211 Geneva 20, Switzerland.

A complete list of computer programmes made available earlier has been annexed to CCIR Administrative Circular No A.C./277 of 11 August 1986, and published in *CCIR Handbook on Spectrum Management and Computer-Aided Techniques*", the revised version of which was published in 1987.

Richard Kirby
Director

ANNEX 1

Title of the programme: M-LINK

Sub-title of the programme: Radio-relay link propagation path design

Source: Frequency Planning Division, Radio Department
Telecommunications Bureau
Ministry of Posts and Telecommunications
1-3-2, Kasumigaseki, Chiyoda-ku
Tokyo 100-90, Japan.

Description

This programme is used for calculating microwave relay link propagation path parameters such as propagation loss, diffraction loss, reflecting point, reflection loss, interference between terrestrial stations and earth stations, path clearance using geographical profile and circuit drop-out rate of the month.

Programming language

IBM-AT/IBM-XT/IBM-PS/2 Basic

Mode of operation

Interactive

Input requirements

Transmitting frequency, transmitting power, path length, geographical data, propagation constant and parameters of other related stations.

Data output

Propagation path profiles, propagation loss, quantity of clearance and interference, and total judgment of the proposed microwave link.

Output medium

CRT display and hard copy

Reference

Document IWP 1/2-214.

COMPUTER-AIDED DESIGN IN RADIO SCIENCE, WITH EMPHASIS ON MICROELECTRONICS

One of the Open Symposia at the General Assembly in Tel Aviv (Aug/Sept 1987) was devoted to "Computer-aided Design in Radio Science, with emphasis on Microelectronics". The contents of the July-August 1988 issue of the *Annales des Télécommunications* are based on the programme of this Open Symposium. Under the editorship of Mrs J. Hénaff, Vice-Chairman of URSI Commission D on Electronic and Optical Devices and Applications, the issue encompasses the following articles, which focus on the physics and modelling of microoptoelectronic components:

- Some properties of semiconductor superlattices, M. VOOS
- Photodétecteurs pour transmission par fibre optique à 1,3 µm - 1,55 µm: état de l'art, S. MOTTET, J.E. VIALLET, C. BOIS-ROBERT, A. SCAVENNEC
- Les semiconducteurs II-VI. Particularités et applications, J.Y. LE TRAON
- Numerical techniques for planar and quasi-planar millimeter wave passive components, R. SORRENTINO
- Modelling of submicrometer gate GaAs field effect transistors, G. SALMER, R. FAUQUEMBERGUE, M. LEFEBVRE, A.CAPPY
- Effect of carrier injection into MESFET substrates: comparison of MESFET on a semi-insulating buffer, MESFET on a P substrate, and substrate-less MESFET, S. EL-GHAZALY, T. ITOH
- The modelling of semiconductor laser diodes, R. BAETS, J.P. VAN DE CAPELLE, P. VAN KWIKKELBERGHE
- Conception assistée par ordinateur des circuits intégrés monolithiques hyperfréquences, C. RUMELHARD, Y. ARCHAMBAULT, I. TELLIEZ
- Le diagnostic des circuits intégrés par faisceau d'électrons, J.M. FOURNIER, Y.J. VERNAY
- Holographie conoscopique. Reconstructions numériques, D. CHARLOT, G. SIRAT, E. DUFRESNE, A. MARUANI.

The issue may be ordered from

CNET-DIT-SMG
Service des abonnements
38 rue du Général Leclerc
F-92131 Issy-les-Moulineaux
France.

The price is 94 French francs.

Books Published by URSI Personalities

I. KNEPPO, (Chairman of Czechoslovak URSI Commission D)

Microwave Measurements by Comparison Methods

(Studies in Electrical and Electronic Engineering, 32)
published by Elsevier Science Publishers,
Amsterdam, North-Holland, 1988, 304 pages.
ISBN: 0-444-98S_8-5.

INTERNATIONAL EARTH ROTATION SERVICE

Since the start of its operation on 1 January 1988, the International Earth Rotation Service (IERS) has distributed Bulletins which continue earlier services. Bulletin A, prepared by the IERS Radpid Service sub-bureau, is the continuation of the NEOS Bulletin, while Bulletin B, prepared by the Central Bureau of IERS, is the continuation of the BIH Circulars B/C and D. With the new service have come changes in data and format. For this reason, IERS Bulletins A and B may not be what was originally requested. Questionnaires are available for those who wish to go on receiving these Bulletins. These questionnaires, when returned, will allow the IERS to update its mailing lists, determine what data from its Bulletins are most useful, and let it know if there are any further services it can provide for the scientific community.

Write to:

IERS/CB
Observatoire de Paris
61, avenue de l'Observatoire
F-75014 Paris, France.

INTERNATIONAL GEOPHYSICAL CALENDAR 1989

The International Ursigram and World Days Service (IUWDS) is a permanent service of the International Union of Radio Science, with the participation of the International Astronomical Union and the International Union of Geodesy and Geophysics. It adheres to the Federation of Astronomical and Geophysical Data Analysis Services (FAGS) of ICSU. The IUWDS coordinates the international aspects of the world days programme and rapid data interchange. One of its tasks is the annual publication of the *International Geophysical Calendar*.

The Calendar reproduced on pp.58-59 continues the series begun for the IGY years 1957-58, and is issued annually to recommend dates for solar and geophysical observations which cannot be carried out continuously. Thus, the amount of observational data in existence tends to be larger on Calendar days. The recommendations on data reduction and especially the flow of data to World Data Centers (WDCs) in many instances emphasize Calendar days. The Calendar is prepared by IUWDS with the advice of spokesmen for the various scientific disciplines. For some programmes, greater detail concerning recommendations appears from time to time published in *IAGA News*, *IUGG Chronicle*, *URSI Information Bulletin* or other scientific journals or newsletters.

The definitions of the designated days remain as described on previous Calendars. Universal Time (UT) is the standard time for all world days. Regular Geophysical Days (RGD) are each Wednesday. Regular World Days (RWD) are three consecutive days each month (always Tuesday, Wednesday and Thursday near the middle of the month). Priority Regular World Days (PRWD) are the RWD which fall on Wednesdays. Quarterly World Days (QWD) are one day each quarter and are the PRWD which fall in the World Geophysical Intervals (WGI). The WGI are fourteen consecutive days in each season, beginning on Monday of the selected month, and normally shift from year to year. In 1989 the WGI will be February, May, August and November.

The Solar Eclipses are:

a) 7 March 1989 (partial) beginning in the Hawaiian Islands,

northwestern North America, Greenland, extreme N.E. Asia, Arctic regions. Maximum magnitude 0.83. Eclipse begins at 1616.8 UT N17 W149, is greatest at 1807.7 UT N61 W169, and ends at 1958.2 UT N73 W44.

b) 31 August 1989 (partial) beginning in extreme southeastern Africa, Madagascar, part of Antarctica. Maximum magnitude 0.63. Eclipse begins at 0333.6 UT S22 E40, is greatest at 0530.8 UT S61 E23, and ends at 0727.6 UT S74 E124.

Meteor Showers (selected by P.M. Millman, Ottawa)include important visual showers and also unusual showers observable mainly by radio and radar techniques. The dates for Northern Hemisphere meteor showers are: Jan 3, 4; Apr 21-22; May 3-4; Jun 8-12; Jul 27-29; Aug 10-13; Oct 20-21; Nov 1-4, 16-18; Dec 12-15, 21-22, 1989; and Jan 2-4, 1990. The dates for Southern Hemisphere meteor showers are: May 3-4; Jun 8-12; Jul 27-30; Oct 20-21; Nov 1-4, 16-18; and Dec 5-7, 12-15, 1989.

The occurrence of unusual solar or geophysical conditions is announced or forecast by the IUWDS through various types of geophysical ALERTS (which are widely distributed by telegram and radio broadcast on a current schedule). Stratospheric warmings (STRATWARM) are also designated. The meteorological telecommunications network coordinated by WMO carries these world-wide Alerts once daily soon after 0400 UT. For definitions of Alerts see IUWDS "Synoptic Codes for Solar and Geophysical Data, Third Revised Edition 1973" and its amendments. Retrospective World Intervals are selected and announced by MONSEE and elsewhere to provide additional analyzed data for particular events studied in the ICSU Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) programmes.

RECOMMENDED SCIENTIFIC PROGRAMMES

OPERATIONAL EDITION

(The following material was reviewed in 1988 by spokesmen of IAGA, WMO and URSI as suitable for coordinated geophysical programmes in 1989).

Airglow and Aurora Phenomena. Airglow and auroral observatories operate in their full capacity around the New Moon periods. However, for progress in understanding the mechanism of many phenomena, such as low latitude aurora, the coordinated

use of all available techniques, optical and radio, from the ground and in space is required. Thus, for the airglow and aurora 7-day periods on the Calendar, ionosonde, incoherent scatter, special satellite or balloon observations, etc., are especially encouraged. Periods of approximately one week's duration centered on the New Moon are proposed for high resolution of ionospheric, auroral and magnetospheric observations at high latitudes during northern winter.

Atmospheric Electricity. Non-continuous measurements and data reduction for continuous measurements of atmospheric electric current density, field, conductivities, space charges, ion number densities, ionosphere potentials, condensation nucleii, etc.,; both at ground as well as with radiosondes, aircraft, rockets; should be done with first priority on the RGD each Wednesday, beginning on 4 January 1989 at 0000 UT, 11 January at 0600 UT, 18 January at 1200 UT, 25 January at 1800 UT, etc. (beginning hour shifts six hours each week, but is always on Wednesday). Minimum programme is at the same time on PRWD beginning with 18 January at 1200 UT. Data reduction for continuous measurements should be extended, if possible, to cover at least the full RGD including, in addition, at least 6 hours prior to indicated beginning time. Measurements prohibited by bad weather should be done 24 hours later. Results on sferics and ELF are wanted with first priority for the same hours, short-period measurements centered around the minutes 35-50 of the hours indicated. Priority weeks are the weeks which contain a PRWD; minimum priority weeks are the ones with a QWD. The World Data Centre for Atmospheric Electricity, 7 Karbysheva, Leningrad 194018, USSR, is the collection point for data and information on measurements.

Geomagnetic Phenomena. It has always been a guiding principle for geomagnetic observatories that operations should be as continuous as possible and the great majority of stations undertake the same programme without regard to the Calendar.

Stations equipped for making magnetic observations, but which cannot carry out such observations and reductions on a continuous schedule are encouraged to carry out such work at least on RWD (and during times of MAGSTORM Alert).

Ionospheric Phenomena. Special attention is continuing on particular events which cannot be forecast in advance with reasonable certainty. These will be identified by

Retrospective World Intervals. The importance of obtaining full observational coverage is therefore stressed even if it is possible to analyze the detailed data only for the chosen events. In the case of vertical incidence sounding, the need to obtain quarter-hourly ionograms at as many stations as possible is particularly stressed and takes priority over recommendation (a) below when both are not practical.

For the vertical incidence (VI) sounding programme, the summary recommendations are: (a) All stations should make soundings on the hour and every quarter hour; (b) On RWDs, ionogram soundings should be made at least every quarter hour and preferably every five minutes or more frequently, particularly at high latitudes; (c) All stations are encouraged to make f-plots on RWDs; f-plots should be made for high latitude stations, and for so-called "representative" stations at lower latitudes for all days (i.e., including RWDs and WGIs) (Continuous records of ionospheric parameters are acceptable in place of f-plots at temperate and low latitude stations); (d) Copies of hourly ionograms with appropriate scales for QWDs are to be sent to WDCs; (e) Stations in the eclipse zone and its conjugate area should take continuous observations on solar eclipse days and special observations on adjacent days. See also recommendations under Airglow and Aurora Phenomena.

For the incoherent scatter observation programme, every effort should be made to obtain measurements at least on the Incoherent Scatter Coordinated Observation Days, and intensive series should be attempted whenever possible in WGIs or the Airglow and Aurora Periods. The need for collateral VI observations with not more than quarter-hourly spacing at least during all observation periods is stressed. Special programmes: Dr. V. Wickwar, Utah State University, Center for Atmospheric and Space Sciences, Logan, UT 84322-4405, USA, URSI Working Group G.5. Phone: (801)750-3641.

For the ionospheric drift or wind measurement by the various radio techniques, observations are recommended to be concentrated on the weeks including RWDs.

For travelling ionosphere disturbances, propose special periods for coordinated measurements of gravity waves induced by magnetospheric activity, probably on selected PRWD and RWD.

For the ionospheric absorption programme half-hourly observations are made at least on all RWDs and half-hourly tabulations sent to WDCs. Observations should be continuous on

solar eclipse days for stations in eclipse zone and in its conjugate area. Special efforts should be made to obtain daily absorption measurements at temperate latitude stations during the period of Absorption Winter Anomaly, particularly on days of abnormally high or abnormally low absorption (approximately October-March, Northern Hemisphere; April-September, Southern Hemisphere).

For back-scatter and forward-scatter programmes, observations should be made and analyzed on all RWDs at least.

For synoptic observations of mesospheric (D region) electron densities, several groups have agreed on using the RGD for the hours around noon.

For ELF noise measurements involving the earth-ionosphere cavity resonances any special effort should be concentrated during the WGIs.

It is recommended that more intensive observations in all programmes be considered on days of unusual meteor activity.

Meteorology. Particular efforts should be made to carry out an intensified programme on the RGD -- each Wednesday, UT. A desirable goal would be the scheduling of meteorological rocketsondes, ozone sondes and radiometer sondes on these days, together with maximum-altitude rawinsonde ascents at both 0000 and 1200 UT.

During WGI and STRATWARM Alert Intervals, intensified programmes are also desirable, preferably by the implementation of RGD-type programmes (see above) on Mondays and Fridays, as well as on Wednesdays.

Solar Phenomena. Observatories making specialized studies of solar phenomena, particularly using new or complex techniques, such that continuous observation or reporting is impractical, are requested to make special efforts to provide to WDCs data for solar eclipse days, RWDs and during PROTON/FLARE ALERTS. The attention of those recording solar noise spectra, solar magnetic fields and doing specialized optical studies is particularly drawn to this recommendation.

Solar Interplanetary Variability Programme (SIV). Sponsored by SCOSTEP, focusses on observations of the transition phenomena from solar minimum to solar maximum (1988-1989). 1990 will emphasize analysis and interpretation of the

observations. For details, contact Dr. E.J. Smith, JPL, Mail Stop 169/506, 4800 Oak Grove Dr., Pasadena, CA 91109, USA.

Space Research, Interplanetary Phenomena, Cosmic Rays, Aeronomy. Experimenters should take into account that observational effort in other disciplines tends to be intensified on the days marked on the Calendar, and schedule balloon and rocket experiments accordingly if there are no other geophysical reasons for choice. In particular it is desirable to make rocket measurements of ionospheric characteristics on the same day at as many locations as possible; where feasible, experimenters should endeavour to launch rockets to monitor at least normal conditions on the Quarterly World Days (QWD) or on RWDs, since these are also days when there will be maximum support from ground observations. Also, special efforts should be made to assure recording of telemetry on QWD and Airglow and Aurora Periods of experiments on satellites and of experiments on spacecraft in orbit around the Sun.

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This Calendar for 1989 has been drawn up by H.E. Coffey, of the IUWDS Steering Committee, in association with spokesmen for the various scientific disciplines in SCOSTEP, IAGA and URSI. It is published for the International Council of Scientific Unions and with financial assistance of UNESCO.

Additional copies are available upon request to

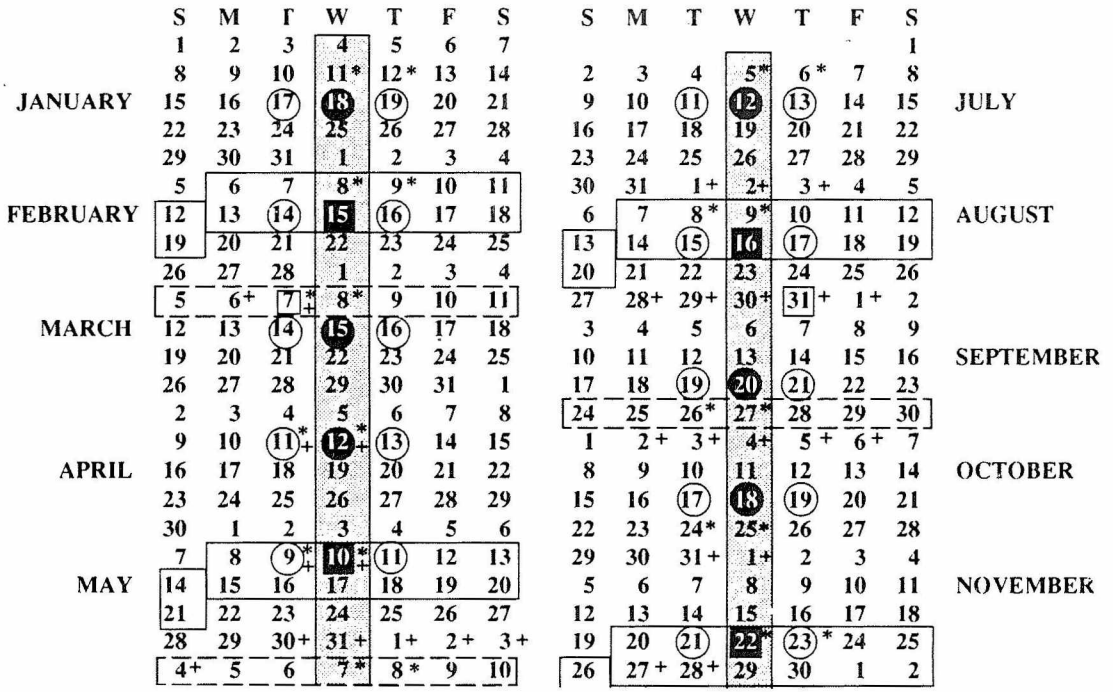
Dr. R. Thompson
IUWDS Chairman
IPS Radio and Space Services
Department of Science
P.O.Box 702
Darlinghurst, NSW 2010 Australia,

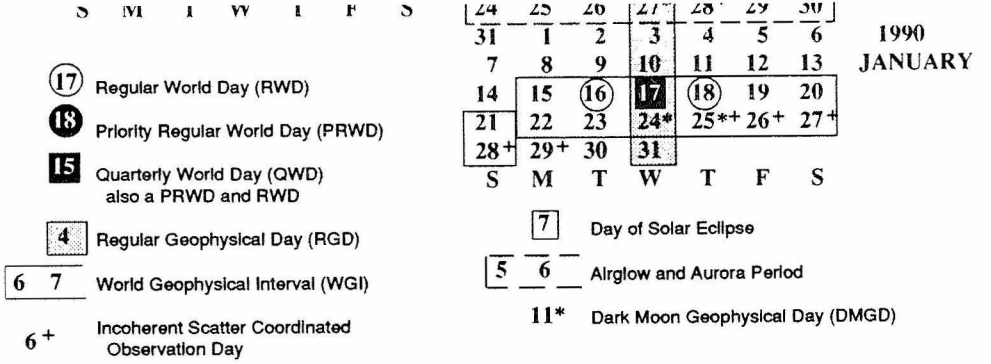
or

Miss H.E. Coffey
IUWDS Secretary for World Days
WDC-A for Solar-Terrestrial Physics
NOAA E/GC2
325 Broadway
Boulder, Colorado 80303
USA.

International Geophysical Calendar
1989

(See other side for information on use of this Calendar)





NOTES:

1. Days with unusual meteor shower activity are: Northern Hemisphere Jan 3,4; Apr 21-22; May 3-4; Jun 8-12; Jul 27-29; Aug 10-13; Oct 20-21; Nov 1-4, 16-18; Dec 12-15, 21-22, 1989; Jan 2-4, 1990. Southern Hemisphere May 3-4; Jun 8-12; Jul 26-30; Oct 20-21; Nov 1-4, 16-18; Dec 5-7, 12-15, 1989.

2. Solar Interplanetary Variability (SIV) Observing Program began in 1988 and runs through 1989, with in-depth data analysis in 1990.

3. Day intervals that IMP 8 satellite is in the solar wind (begin and end days are generally partial days): 29 Dec 1988-5 Jan 1989; 10-18 Jan; 24-30 Jan; 5-12 Feb; 18-24 Feb; 2-8 Mar; 15-21 Mar; 27 Mar-3 Apr; 9-16 Apr; 22-29 Apr; 5-11 May; 17-24 May; 30 May-5 Jun; 11-18 Jun; 24-30 Jun; 6-13 Jul; 19-26 Jul; 31 Jul-8 Aug; 13-20 Aug; 26 Aug-2 Sep; 7-15 Sep; 19-27 Sep; 1-10 Oct; 14-22 Oct; 26 Oct-4 Nov; 8-16 Nov; 21-29 Nov; 4-12 Dec; 16-24 Dec; 29 Dec-6 Jan 1990.

   There will not be total IMP 8 data monitoring coverage during these intervals. (Information kindly provided by the WDC-A for Rockets and Satellites, NASA GSFC, Greenbelt, MD 20771 U.S.A.).

4. + Incoherent Scatter programs start at 1600 UT on the first day of the intervals indicated, and end at 1600 UT on the last day of the intervals.

5. Incoherent Scatter world days: 890306-07; 890411-12; 890509-10; 890530-890604 LTCS; 890801-03 GISMOS; 890828-890901 WAGS; 891002-06 GITCAD and SUNDIAL; 891031-891101; 891127-28; 900125-29 GISMOS.

   where GISMOS= Global Ionospheric Simultaneous Measurements of Substorms;
   GITCAD= Global Ionosphere-Thermosphere Coupling and Dynamics;
   LTCS= Lower Thermosphere Coupling Study;
   SUNDIAL= Coordinated study of the Ionosphere/magnetosphere;
   WAGS= Worldwide Acoustics Gravity Wave Study.

OPERATIONAL EDITION, September 1988

ANNOUNCEMENTS OF MEETINGS AND SYMPOSIA

EUROPEAN GEOPHYSICAL SOCIETY

XIV GENERAL ASSEMBLY

The XIV General Assembly of the European Geophysical Society will be held in Barcelona, Spain over the period 13-17 March 1989. The programme contains sessions which are of interest to the URSI community, e.g. on the magnetosphere and ionosphere of the Earth, coherent radar observations of plasma instabilities, etc.

The detailed programme of the Assembly may be obtained from:

EGS Office
Max-Planck-Str. 1
Postfach 49
D-3411 Katlenburg-Lindau
Fed. Rep. Germany

Registration forms may be obtained from:

Wagons-Lits Viajes
Feria de Barcelona
Av. Reina Ma. Cristina s/n
E-08004 Barcelona
Spain.

MEETINGS ORGANIZED BY THE URSI COMMITTEE IN THE USA

The URSI Committee in the USA organizes its traditional National Radio Science Meeting on 4-7 January 1989 at the University of Colorado, Boulder. The programme covers the activities of the nine URSI Commissions. Prizes will be awarded for the three best papers presented by graduate students.

From 26 to 30 June 1989, the US URSI Committee organizes, together with the IEEE Antennas and Propagation Society, a meeting on the theme "New Frontiers in Antenna Applications", to be held in San Jose, California. The technical sessions for IEEE AP-S and URSI will be coordinated to provide a comprehensive, well-balanced programme. Authors are invited to submit papers on all topics of interest to the AP-S and URSI membership. Suggested topics are listed below. Enquiries regarding the technical programme may be directed to Prof. Kenneth K. Mei, Technical Programme Committee Chairman, Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, CA 94720, USA. Information about the Symposium may be obtained from Dr. Ray King, General Chairman, Lawrence Livermore National Laboratory, L-156, Livermore, CA 94550, USA.

Suggested Topics for AP-S

Adaptive antennas; Anisotropic materials in antenna applications; Antenna measurement and metrology; Antenna theory; Biomedical; Electromagnetic theory; Environmental effects on waves; Expert systems for antenna design; Feed and radiating elements; Frequency selective surfaces; High power antennas; Imaging radars; Impulse radars; Microstrip antennas; Microwave components; Millimeter and submillimeter waves; Near-field measurement and theory; Numerical methods; Phased arrays; Propagation; Reflector antennas; Remote sensing; Scattering and diffraction; Time domain measurements; Very small antenna terminals.

Suggested Topics for URSI

Commission A - Electromagnetic Metrology

Analysis of EM signals; Compact and near-field ranges; Measurements and data signal processing; Satellite/earth station measurements.

Commission B - Fields and Waves

Asymptotic and iterative solution methods; Electromagnetic theory; Microwave holographic diagnostics; Modelling EM coupling; Near-field scanning technology; Numerical methods; Optical control of EM devices.

Commission E - Electromagnetic Noise and Interference

Noise measurements and modelling; Protection of electronic equipment; Spectrum management and utilization.

Commission F - Wave Propagation and Remote Sensing

Atmospheric sensing and profiling; Millimeter wave remote sensing; Satellite and aircraft remote sensing; Scattering and emission from the earth.

Commission H - Waves in Plasmas

Active experiments from space borne platforms; Space borne radar: ionospheric effects affecting performance; Electrodynamic tethers and their interaction with the ionosphere; Latest theoretical and experimental developments in spacecraft charging phenomena.

6th SCIENTIFIC ASSEMBLY OF IAGA

The 6th Scientific Assembly of the International Association of Geomagnetism and Aeronomy will be held at the University of Exeter, Exeter, United Kingdom, from 24 July to 4 August 1989.

All correspondence relating to the submission of papers for presentation should be with the Division Chairmen. The deadline for submission of abstracts is 15 March 1989.

The Local Organising Committee set up by the Royal Society of London has been charged with making all local arrangements. All correspondence to the LOC should be addressed to the Secretary:

Dr. Roy Jady
Secretary LOC IAGA 1989
Department of Mathematics
University of Exeter
Exeter EX4 4QE
United Kingdom.

Telephone: (44) 392 263989
Fax: (44) 392 263108
Telex: 42894 EXUNIV G.

INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC METROLOGY

The International Symposium on Electromagnetic Metrology (ISEM 89) will be held in Beijing, China from 19 to 22 August 1989. It is organized by the Chinese Society for Measurement and cosponsored by URSI, the Asia/Pacific Metrology Programme and the Chinese Institute of Electronics.

The scientific programme will cover the following topics:

1. Time/frequency measurement and standard
   - Atomic time and frequency standard
   - Measurement on frequency and its stability
   - Measurement on time interval and instant
   - Time/frequency dissemination and intercomparison.
2. RF/Microwave measurement and standard
   - Millimeter and submillimeter wave measurement
   - Multi-port technique
   - Optical fibre parameter measurement
   - Time domain measurement
   - EMC/EMI measurement.
3. Electromagnetic measurement and standard
   - Quantum voltage and resistance standard
   - SQUID and weak signal measuring technique
   - Digital measuring technique
   - Magnetic material measurement.
4. Laser and laser measurement
   - Highly frequency stabilized laser
   - Optical frequency measuring chain
   - Diode laser and colour center laser
   - Laser power and energy standard.
5. Other relevant topics.

All correspondence should be addressed to:

Mr. Zhang Zhihai (ISEM 89)
c/o Chinese Society for Measurement
P.O.Box 1413
Beijing, China.

5ème COLLOQUE ET EXPOSITION SUR LA COMPATIBILITE ELECTROMAGNETIQUE

Ce Colloque international en langue française aura lieu les 12, 13 et 14 septembre 1989 à Evian. Il est organisé par le Laboratoire de Réseaux d'Energie Electrique (LRE) de l'Ecole Polytechnique Fédérale de Lausanne (Suisse) et est placé sous le patronage du Comité français de l'URSI (CNFRS), de la Société des Electriciens, Electroniciens et Radioélectroniciens (SEE) et de l'Association Suisse des Electriciens (ASE).

Le Colloque est organisé par le Prof. A. Germond, Lausanne (président du Colloque), le Dr. M. Ianoz, Lausanne (responsable de l'organisation), le Prof. P. Degauque, Lille et le Dr. P.-A. Chamorel, Lausanne.

Le programme du Colloque comprend les thèmes suivants:

A - Analyse des sources de bruits naturels (foudre, décharges électrostatiques) et leurs effets (harmoniques, micro-coupures, surtensions, etc.).

B - Analyse des sources de bruits artificiels (IEMN, ligne de transport de l'énergie électrique, installations blindées au SF6, etc.) et de leurs effets (harmoniques, microcoupures, surtensions, etc.).

C - Modélisation et simulation expérimentale des sources de bruits, naturels et artificiels.

D - Modélisation numérique en CEM.

E - Techniques et systèmes de mesure.

F - Couplages avec les structures filaires (antenne, lignes, câbles).

G - Pénétration du champ perturbateur dans les systèmes et couplages avec des structures internes.

H - Méthodes de protection (immunisation et antiparasitage).

I - Transmission de signaux en présence de perturbations électromagnétiques (sécurité des systèmes).

J - Optimisation du codage des signaux électriques pouvant être perturbés.

K- CAO et systèmes experts appliqués à la CEM.

L - Gestion du spectre.

O - Normes, recommandations, spécifications.

P - Effets biologiques.

Toute correspondance concernant le Colloque doit être adressée à:

5ème Colloque et Exposition sur la
Compatibilité Electromagnétique
Dr. M. Ianoz
Laboratoire de Réseaux d'Energie Electrique
Ecole Polytechnique Fédérale de Lausanne
CH - 1015 Lausanne, Suisse.

1st COSPAR COLLOQUIUM ON THE PHYSICS OF THE OUTER HELIOSPHERE

This Colloquium will be held in Warsaw, Poland, from 19 to 22 September 1988. It is cosponsored by the International Astronomical Union and the Polish Academy of Sciences. The purpose of the COSPAR Colloquium is to stimulate the study of the outer heliosphere by bringing together scientists interested in spectroscopic studies of the local interstellar medium, galactic and solar cosmic ray populations in the outer heliosphere, and plasma and magnetic field aspects of the distant solar wind.

The Chairman of the Colloquium is D.E. Page (USA), and the Executive Chairman is S. Grzędzielski (Poland).

The list of topics is as follows:

- line-of-sight spectroscopic data to nearby stars;
- XUV galactic radiation background;
- cosmic ray entry into the heliosphere;
- solar UV backscatter on neutral galactic gases;
- interaction of solar wind with external magnetized plasmas;
- filtration of interstellar neutral gases into the heliosphere;
- cosmic ray dynamics in the heliosphere; coupling to the

non-thermal plasma populations;
- distant solar wind plasma and magnetic field;
- recent results and current status of deep space missions.

For further information, please contact the Local Organizing Committee:

Professor S. Grzędzielski, Director
Space Research Centre, Polish Academy of Sciences
Ordona 21
01-237 Warsaw, Poland.

Telephone: 36 01 19
Telex: 815670 cbk pl.

INTERNATIONAL SYMPOSIUM ON FIRST RESULTS OF THE PHOBOS MISSION AND FUTURE SPACE EXPLORATION OF MARS

An International Symposium organized by both the Centre National d'Etudes Spatiales (CNES) and Intercosmos is to be held in Paris, France, from 23 to 27 October 1989. The Symposium is to cover the first series of scientific results obtained during the Soviet mission PHOBOS and also future projects for exploring Mars.

The Co-Chairmen of the Scientific Committee are I. Revah (France) and R.Z. Sagdeev (USSR).

For any further information, contact:

C. de Bergh - Observatoire de Paris
F-92195 Meudon Cedex
France.

Telex: 201 571 LAM.

List of Future Symposia and Meetings

Note: Events marked by an asterisk are sponsored or co-sponsored by URSI.

National Radio Science Meeting
Boulder, CO, USA, 4-7 January 1989

Contact address: Prof. S.W. Maley
Department of Electrical Engineering
University of Colorado, Campus Box 425
Boulder, CO 80309
USA.

URSI Conference on Wave-Induced Particle Precipitation and Wave-Particle Interactions (URSI-WIPP'89)*
University of Otago, New Zealand, 5-11 February 1989

Contact address: Prof. R.L. Dowden
Physics Department
University of Otago
Dunedin, New Zealand.

Tel: (64) 24-771640
Tx : NZ 5618 CPO DN
Fax: (64) 24 741607.

8th International Zurich Symposium and Technical Exhibition on Electromagnetic Compatibility*
Zurich, Switzerland, 7-9 March 1989

Contact address: Prof. Dr. T. Dvorak
ETH Zentrum-IKT
CH-8092 Zurich
Switzerland.

Tel: (41) 1-256 2790.

XIV General Assembly of the European Geophysical Society*
Barcelona, Spain, 13-17 March 1989

Contact address: EGS Office
Max-Planck-Strasse 1
Postfach 49
D-3411 Katlenburg-Lindau
Federal Republic of Germany.

Tel: (49) 5556 1440
Tx : 965 564 ZIL D
Fax: (49) 5556 4709.

International Conference on Intelligent Networks*
Bordeaux, France, 14-17 March 1989

Contact address: ADERA
B.P. 48
F-33166 St-Médard-en-Jalles Cedex
France.

Tel: (33) 5605 8424
Fax: (33) 5651 9883.

6th International Conference on Antennas and Propagation (ICAP'89)*
Warwick, United Kingdom, 4-7 April 1989

Contact address: ICAP'89 Secretariat
Conference Services, IEE
Savoy Place
London WC2R OBL
United Kingdom.

Tel: (44) 1-240 1871 Ext.222
Tx : 261176 IEE LDN G
Fax: (44) 1-240 7735.

URSI-IAU Meeting on Radioastronomical Seeing: Tropospheric and Ionospheric Effects*
Beijing, China, May 1989

Contact address: Dr. J.E. Baldwin
Cavendish Laboratory
Madingley Road
Cambridge CB3 OHE
United Kingdom.

Tel: (44) 223-337299
Tx : 81252 CAVLAB.

XLIV All-Union Scientific Session of the A.S. Popov Society
Moscow, USSR, May 1989

Contact address: Central Administration
The A.S. Popov Society
Kuznetskij Most 20
103897 Moscow Centre GSP-3
USSR.

Tel: 921 71 08
924 80 84.

IEEE AP-S International Symposium and URSI Radio Science Meeting: New Frontiers in Antenna Applications, San Jose, CA, USA, 26-30 June 1989

Contact address: Dr. Ray King
General Chairman
Lawrence Livermore Nat. Lab., L-156
Livermore, CA 94550
USA.

Tel: (1) 415-423 2369
Fax: (1) 415-643 8426.

International Geoscience and Remote Sensing Symposium(IGARSS' 89), URSI Commission F and 12th Canadian Symposium on Remote Sensing*
Vancouver, Canada, 10-14 July 1989

Contact address: Conference Secretariat
IGARSS'89 - 12th Canadian Symposium
on Remote Sensing
Suite 801
750 Jervis Street
Vancouver, B.C. V6E 2A9
Canada.

Tel: (1) 604-681 5226
Tx : 04-355599
Fax: (1) 604-273 9830.

19th International Conference on Phenomena in Ionized Gases (ICPIG-XIX)*
Belgrade, Yugoslavia, 10-14 July 1989

Contact address: Prof. J. Purić
Department of Physics and Meteorology
P.O.Box 550
11001 Beograd
Yugoslavia.

Tel: (38) 11-630 152.

6th Scientific Assembly of the International Association of Geomagnetism and Aeronomy (IAGA)
Exeter, United Kingdom, 24 July - 4 August 1989

Contact address: Dr. Roy Jady
Secretary LOC IAGA 1989
Department of Mathematics
University of Exeter
Exeter EX4 4QE
United Kingdom.

Tel: (44) 392-263 989
Tx : 42894 EXUNIV G
Fax: (44) 392-263 108.

Workshop on Development of International Reference Ionosphere 1990
London, United Kingdom, before or after the IAGA General Assembly*

Contact address: Dr. P.A. Bradley
Rutherford Appleton Laboratory
Chilton, Didcot
Oxfordshire OX11 0QX
United Kingdom.

URSI International Symposium on Electromagnetic Theory*
Stockholm, Sweden, 14-17 August 1989

Contact address: Prof. S. Ström
Department of Electromagnetic Theory
Royal Institute of Technology
S - 100 44 Stockholm
Sweden.

Tel: (46) 8-790 8195.

International Symposium on Electromagnetic Metrology*
Beijing, China, 19-22 August 1989

Contact address: Mr. Zhang Zhihai (ISEM'89)
c/o Chinese Society for Measurement
P.O.Box 1413
Beijing, China.

Tel: 444 304
Tx : 210209 SBM CN.

International Symposium on Antennas and Propagation (ISAP'89)*
Tokyo, Japan, 22-25 August 1989

Contact address: Dr. Takashi Katagi
Mitsubishi Electric Corporation
325 Kamimachiya, Kamakura
247 Japan.

Tel: (81) 467-44 8862
Tx : 3862 165 MELCO J
Fax: (81) 467-47 2005.

2nd International Symposium on Antennas and Electromagnetic Theory (ISAE'89)*
Shanghai, China, 29 August - 1 September 1989

Contact address: Prof. Mao Yukuan
Xindian University
2 Taibe Road
Xi'an, China.

Tx: 70034 X DUC CN.

Limits of Observational Astronomy*
Sydney, Australia, August/September 1989

Contact address: Prof. R.H. Frater
Institute of Information and
Communications Technologies
PO Box 93
North Ryde N.S.W.2113
Australia.

Tel: (61) 2-887 8222
Fax: (61) 2-887 2736.

European Conference on Circuit Theory and Design (ECCTD)*
London, United Kingdom, September 1989.

URSI Symposium on Environmental and Space Electromagnetics*
Tokyo, Japan, 4-6 September 1989

Contact address: Dr. M. Hayakawa
Research Institute of Atmospherics
Nagoya University
Toyokawa, Aichi-ken 442
Japan.

19th European Microwave Conference*
London, United Kingdom, 4-7 September 1989

Contact address: Prof. C.S. Aitchison
ERA Techn. Ltd
Cleeve Road
Leatherhead, Surrey KT22 7SA
United Kingdom.

Tel: (44) 372-374 151
Tx : 264045
Fax: (44) 372-374 496.

International Symposium on Recent Advances in Microwave Technology*
Beijing, China, 4-8 September 1989

Contact address: Mr. Zong Sha
The Chinese Institute of Electronics
P.O.Box 139
Beijing, China.

Tx: 22383 MEI CN.

International Conference on Image Processing (ICIP'89)
Singapore, 5-8 September 1989

Contact address: ICIP'89
c/o Meeting Planners Pte Ltd
100 Beach Road, 33-01
Shaw Towers
Singapore 0718, Rep. of Singapore.

Tx: RS40125 MEPLAN
Fax: (65) 296 2670.

15th European Conference on Optical Communication (ECOC'89)*
Göteborg, Sweden, 10-14 September 1989

Contact address: ECOC'89 Secretariat
Department of Optoelectronics and Electrical Measurements
Chalmers University of Technology
S-412 96 Göteborg, Sweden.

Tel: (46) 31-721 601
Tx : 2369 CHALBIB S
Fax: (46) 31-721 561.

URSI Commission F Open Symposium on Wave Propagation: Remote Sensing and Communications*
La Londe-les-Maures, France, 11-15 September 1989

Contact address: Prof. J.P. Mon
CNET/CRPE
38-40 rue du Général Leclerc
F-92131 Issy-les-Moulineaux
France.

Tel: (33) 1-4529 5019
Fax: (33) 1-4529 6052.

5ème Colloque et Exposition sur la Compatibilité Electromagnétique
Evian, France, 12-14 September 1989

Contact address: Dr. M. Ianoz
Laboratoire de Réseaux d'Energie électrique
Ecole Polytechnique Fédérale de Lausanne
CH-1015 Lausanne
Suisse.

Tel: (41) 21-693 2661
Fax: (41) 21-693 4660.

URSI International Symposium on Signals, Systems and Electronics (ISSSE'89)*
Erlangen, Federal Republic of Germany, 18-20 September 1989

Contact address: Mrs U. Arnold
Lehrstuhl für Nachrichtentechnik
Universität Erlangen-Nürnberg
Cauerstrasse 7
D-8520 Erlangen
Federal Republic of Germany.

Tel: (49) 9131 857 100
Tx : TFERL 629755.

First COSPAR Symposium on the Physics of the Outer Heliosphere
Warsaw, Poland, 19-22 September 1989

Contact address: Prof. S. Grzędzielski
Space Research Centre
Ordona 1
01 237 Warsaw
Poland.

Tel: (48) 2-360 119
Tx : 815670 CBK PL.

Solar-Terrestrial Predictions Workshop 1989*
Sydney, Australia, 16-20 October 1989

Contact address: Dr. Richard Thompson
IUWDS Regional Warning Centre
IPS Radio and Space Services
P.O.Box 702
Darlinghurst NSW 2010
Australia.

Tel: (61) 2-269 8555
Tx : 20663 (IPSO)
Fax: (61) 2-269 8612.

International Symposium on First Results of the PHOBOS Mission and Future Space Exploration of Mars
Paris, France, 23-27 October 1989

Contact address: C. de Bergh - Observatoire de Paris
F-92195 Meudon Cedex, France.

Tx: 201 571 LAM.

2nd Biregional African-Latin American Conference on Radio Propagation*
Ilorin, Nigeria, 6-8 November 1989

Contact address: Prof. J.O. Oyinloye
Department of Physics
University of Ilorin
Ilorin, Nigeria.

CNES International Symposium on Space Dynamics
Toulouse, France, 6-10 November 1989

Contact address: Active Communication International
"Le Communica"
2 rue Em. Pelletier
F-31082 Toulouse Cedex, France.

Tel: (33) 6176 6140
Tx : 532442 F
Fax: (33) 6176 6199.

Symposium on Large-Scale Processes in the Ionosphere and Thermosphere*
Boulder, CO, USA, December 1989

Contact address: Dr. V.B. Wickwar
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025
USA.

Colloquium on Microwave Signatures in Remote Sensing*
Massachusetts, USA, Spring 1990

Contact address: Prof. C. Swift
University of Massachusetts
Amherst, MA 01003
USA.

10th International Wrocław Symposium on Electromagnetic Compatibility*
Wrocław, Poland, 1990.

4th International School for Space Simulations (ISSS-4)*
Kyoto, Japan, April 1990

Contact address: Prof. H. Matsumoto
Radio Atmospheric Science Center
Kyoto University
Gokanosho, Uji
Kyoto 611, Japan.

Tel: (81) 774-332 532
Tx : 5453665 RASCKU J
Fax: (81) 774-318 463.

Conference on Precision Electromagnetic Measurements (CPEM'90)*
Ottawa, Canada, 11-14 June 1990.

XXIII General Assembly of URSI*
Prague, Czechoslovakia, 28 August - 5 September 1990

Contact address: Prof. V. Zima
Institute of Radioengineering and Electronics
Czechoslovak Academy of Sciences
182 51 Praha 8
Czechoslovakia.

URSI Suzdal Symposium on Artificial Modification of the Ionosphere*
Suzdal, USSR, 10- September 1990

Contact address: Prof. V.V. Migulin
IZMIRAN
142092 Troitsk
Moscow Region
USSR.

European Conference on Optical Communication (ECOC'90)*
Netherlands, 1990.

International Zurich Seminar on Digital Communication*
Zurich, Switzerland, 1990.

Symposium on Digital Signal Processing*
Florence, Italy, Autumn 1990.

9th Colloquium on Microwave Communication (MICROCOLL)*
Budapest, Hungary, 1990.

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Note: An alphabetical index of names, with addresses and page references, is given at the back of this Bulletin.

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