

U.R.S.I.

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IN MEMORIAM

LADISLAV KRATENA, 1932-1991

Dr. Ladislav Kratena, Secretary of the Czechoslovak Member Committee for many years, died on 3 June 1991 after a short illness. He was born on 12 January 1932 in Světla in Eastern Bohemia. In 1951 he started his studies at the Electrotechnical Faculty of the Czech Technical University in Prague. In 1953 he left for the Soviet Union to continue his studies at the Radiotechnical Faculty of the Electrotechnical Institute in Leningrad, from which he graduated in 1959. After his return to Czechoslovakia he worked first on the development of dosimetric instruments. In 1961 he joined the Institute of Radio Engineering and Electronics (IREE) of the Czechoslovak Academy of Sciences where he worked in the Department of Quantum Electronics. During the period from 1964 to 1968 he worked on his PhD degree, which he obtained after defending a thesis on paramagnetic resonance of gadolinium in CdWO_4 monocrystals.

The scientific activities of L. Kratena during his stay at the IREE concentrated primarily on the study of optical properties of IIIIBV semiconductors, and in particular on the effect of point defects and dislocation in these materials. His approach was interdisciplinary, his aim being to find relations among the properties of the material, the parameters of the manufacturing process, and the characteristics of the optoelectronic components.

Dr. Kratena authored (or co-authored) 50 publications that were mainly devoted to optoelectronic materials. He co-authored the monograph "Optoelectronics" (published in Czech), which was the first book published in Czechoslovakia in this field, and has become a useful aid to specialists as well as students.

In 1970 he spent a long leave of absence at the Institute of Semiconductors of the Soviet Academy of Sciences in Kiev, and in 1979 he worked two months at the University of Manchester in England, where he was concerned with the measurement of deep impurities in

electroluminescent diodes made of GaP. In 1983 he spent ten months in Professor Mimily's laboratory at the Research Centre in Mexico City, where he studied impurities in GaAs.

Dr. L. Kratena was an experienced and exceptionally devoted organizer of scientific meetings. His numerous contacts with people abroad enabled him to invite to Czechoslovakia a number of distinguished personalities in the field of optoelectronics.

In 1970 he became Secretary of the Czechoslovak Member Committee and successfully carried out his duties until the XXIII General Assembly in Prague. As Secretary of the latter he was one of the key workers on the Organizing Committee. He fulfilled his tasks with remarkable intensity and efficiency.

His sudden death interrupted a brilliant scientific career, as well as the many organizational activities which he carried out with such devotion.

The Czechoslovak Member Committee greatly regrets the passing away of its long-time and devoted Secretary.

THE CZECHOSLOVAK URSI COMMITTEE

ABDEL-SAMIE M. HUSSEIN

The URSI Committee in Egypt regrets to announce the death of Professor Abdel-Samie M. Hussein on 15 September 1991.

The late Professor A.M. Hussein was the former Dean of the Faculty of Engineering of Alexandria University, Emeritus Professor at the same faculty, Professor at Beirut University, President of the URSI Committee in Egypt, Member of the Egyptian National Council, Fellow of the IEEE, and laureate of the National Appreciation Award. He presided a broad array of Committees of Academic and University research centres. He supervised hundreds of M.Sc theses and Ph.D. dissertations. He influenced many young colleagues by inspiring them to achieve new and higher goals.

THE EGYPTIAN URSI COMMITTEE

PROFILE OF MEMBER COMMITTEES

THE UNITED KINGDOM

The U.K. radioscientists have been in the forefront of early efforts to promote international cooperation in the fields of Radio Science. Together with colleagues from Austria, Belgium, France, Germany and the Netherlands, they launched the "Commission Internationale de Télégraphie sans Fil Scientifique" in 1914, the ancestor of URSI. The U.K. representative at the time was Professor W. Duddell.

After the 1914-8 war the U.K. very naturally became one of the founding members of URSI. Its (national) Member Committee has since played an outstanding role in the history of our Union, some of its main efforts being the organization of the 1960 General Assembly in London, and the creation of the Appleton Prize, one of the major Awards of our Union.

Professor Clarricoats reports on the present activities of the URSI community in the U.K. :

"The UK Panel for URSI (formerly known as the British National Committee for Radio Science) comprises delegates to URSI representing Commissions A-K, three members representing national laboratories and a Chairman who is normally the Chief Delegate to the URSI General Assembly. The current Chairman is Professor Peter Clarricoats (who is also Chairman of the URSI Publications Committee) and the Honorary Secretary is Professor David Olver (who is also Vice-Chairman of Commission B). Members of the Panel come from University and national laboratories. There are also ex-officio members, namely Professor Alex Cullen, immediate Past-President of URSI, and Professor Peter Matthews, Chairman of Commission C.

The Panel meets formally twice between General Assemblies at the Royal Society in London, which is the adhering member to URSI. There are also annual meetings of an informal nature on the occasion of the National Radio Science Colloquia which have been held since 1984. The two-day

event covers the full range of radio science activities. The 1991 NRSC was held at the University of Leicester under the Chairmanship of Professor Tudor Jones. It has been reported in the September 1991 Bulletin. These annual events are complementary to the conferences and colloquia organized by the IEE and other UK bodies. They are normally residential and have a low registration fee, which makes them especially attractive to younger research workers. They provide an excellent opportunity for informal interaction.

A number of members of the Panel are also active in the IEE and IEEE, thereby enabling strong interactive links between events organized by URSI and those organized by the above societies. An example is the IEE biennial International Conference on Antennas and Propagation, which is co-sponsored by URSI.

As mentioned earlier, the UK Panel for URSI is a direct successor to the British National Committee for URSI which was founded by the Royal Society in 1921 and whose Chairmen have included Sir Edward Appleton (Nobel Laureate), Dr. R.L. Smith Rose, Sir Granville Beynon and Professor Alex Cullen, all of whom have served as URSI Presidents. Other famous committee names have included Sir Robert Watson-Watt, Dr. Jack Ratcliffe and Professor Tony Hewish (Nobel Laureate). Today the Panel includes a number of younger members of the UK radio science community, ensuring a positive input to URSI well into the next century!"

PETER CLARRICOATS

Some additional comments have been contributed by Professor A.L. Cullen, President of URSI from 1987 to 1990.

"Peter Clarricoats has set out above with characteristic clarity the present status of the UK Panel, but modesty has evidently forbidden him from relating the major role he personally played in its creation. As he has explained, the U.K. affairs of URSI were once the responsibility of the British National Committee for Radio Science, acting for the Royal Society. There was quite an elaborate committee structure, in fact, with twenty-seven other committees, each acting for one of the ICSU Unio

all coordinated by a National Committee for ICSU. It worked well. On the other hand, since each committee met at least once a year, and since travelling expenses were met by the Royal Society, and since the committees were fairly large - fifteen to twenty members, typically - the cost was considerable. The Royal Society Council, examining its expenditure, came to the conclusion that just possibly the money spent on all these committees might be better spent on the direct support of science. It therefore decided to abolish all of the Union committees as soon as possible. To those of us a little lower down the scale, the announcement of this policy had much the same effect as an announcement that the world would shortly come to an end. Panic set in in some quarters. Not with our chairman, however. Rallying swiftly, he made the point that, unlike e.g. chemistry, for which the Royal Society of Chemistry was a natural home for future URSI activities, radio science, with its ever-widening scope and inter-disciplinary nature, had no such refuge. The point was accepted, as it was for a few other Committees in similar case. It was agreed that Radio Science should have its own Panel, and that the Royal Society would provide a meeting room as required, and would even help to a limited extent financially. But secretarial help would no longer be provided. Sadly, we had to say farewell to Chris Argent, who had been so helpful to so many Chairmen of the National Committee for Radio Science, and has taken such an interest in our work.

What to do? Help came from a totally unexpected quarter. Professor David Olver, a colleague of Peter Clarricoats at Queen Mary and Westfield College, offered to serve as Honorary Secretary of the Panel. The offer was unexpected since we all knew that David had a heavy load of College and professional responsibilities - including that of Vice-Chairman of Commission B of URSI. So we snapped up the offer before he had time to think. As a result, we now have a smoothly-running and efficient Panel taking over from the former Committee, with scarcely a ripple on the surface though with a lot of paddling going on down below. I felt that the huge debt of gratitude we owe Peter and David should not go unreported, and Peter could hardly report it himself! This brief note is the result.

Now that I have started processing words, perhaps I may be allowed to process a few more, stimulated by Peter's mention of a few Chairmen of the former Committee.

I had the pleasure of serving under Sir Granville Beynon, whose genial manner always seemed to smooth away all difficulties. Though I remember one occasion when he courteously allowed us a break in the meeting so that we could watch the procession along the Mall for the State Opening of Parliament, and then had immense difficulty in getting us back into the meeting room again! In random order, other Chairmen I served under include my predecessor in the Pender Chair at UCL, Harold Barlow, who always made it seem as though he could think of no more delightful way of passing the time, Jack Ratcliffe - that superb lecturer, so helpful to me in so many ways - and John Saxton, who succeeded Ratcliffe at the Appleton Laboratory. I once appeared in error just before a meeting of the Committee which John was to chair, having forgotten that I had already served my allotted term. Without even blinking, John found a little loophole in the rules which not only permitted me to stay, but made my continued presence on the Committee practically essential! Very sadly these three superb scientists are no longer with us. I also served under Graham Smith, before his richly-deserved knighthood. In getting through the business of our meetings in the shortest time - without seeming to rush - Graham holds the record. But Peter is doing very well ; perhaps he'll break the record....?

URSI AWARDS

A letter was sent out in January 1992 to the Member Committees of URSI, the Chairmen and Vice-Chairmen of Commissions, and the former Laureates of an URSI Award, inviting nominations for the four URSI Awards to be presented next year at the occasion of the XXIV General Assembly in Kyoto.

The Awards are :

- the Balthasar van der Pol Gold Medal
- the John Howard Dellinger Gold Medal
- the Appleton Prize
- the Issac Koga Gold Medal

Nominations are by the persons and Committees mentioned above, and are to be submitted using standard forms available from the URSI Secretariat.

The Rules for the URSI Awards are reproduced below.

Rules for the Award of the Balthasar van der Pol and John Howard Dellinger Gold Medals

1. The Balthasar van der Pol and the John Howard Dellinger Gold Medals honour the memory of two scientists who were closely associated with URSI for many years. The awards are made normally at intervals of three years on the occasion of the General Assembly of URSI. If the interval between two General Assemblies is either considerably greater or considerably less than three years, the Board of Officers is authorized to modify the date on which the next Medals will be awarded, the period referred to in Art. 2, and the dates referred to in Arts. 3 and 4.
2. The Medals are awarded to outstanding scientists whose achievements in any of the branches of science covered by the Commissions of URSI have been particularly valuable. No member of the URSI Board of Officers shall be eligible. The work to which an award refers must have been carried out mainly during the six-year period ending one year before the General Assembly at which the award is to be made.
3. The names of not more than two candidates may be submitted by any Member Committee of URSI, URSI Commission Chairman or Vice-Chairman, or former laureate of any URSI award. The names of the candidates must be received by the Secretary General of URSI not later than 15 August of the year preceding that of the General Assembly at which the award is to be made.

4. The name of each candidate must be accompanied by a nomination form (supplied by the URSI Secretary General) providing information on, *inter alia*,
 - (a) a general summary of the candidate's career and scientific activities;
 - (b) a review of the candidate's recent achievements, including references to the most important papers of which the candidate is the sole or a joint author published during the six-year period referred to in Article 2;
 - (c) an outline of the reasons for the nomination of the candidate.
5. As soon as possible after 15 August, copies of the nomination forms referred to in Article 4 shall be sent to the Awards Advisory Panel by the Secretary General. The members of the Awards Advisory Panel shall be determined by the President of URSI, in consultation with the Board of Officers. The Panel is authorized, when necessary, to consult non-members regarding the merits of the candidates before submitting its own considered views to the Board of Officers not later than 1 March of the year of the General Assembly.
6. The Board of Officers has full authority to select the candidates to whom the awards will be made. In doing so it will take into account the information provided by the proposers of the candidates and also the views expressed by the Awards Advisory Panel. The Board of Officers will bear in mind that it is desirable to make the awards to candidates working in different branches of radio science, and that the J.H. Dellinger Gold Medal should be awarded preferably for work in the field of radio wave propagation.
7. The Board of Officers has full authority to withhold one or both awards if, in the opinion of the members, there is an insufficient number of qualified candidates.

Rules for the Award of the Appleton Prize

1. The Appleton Prize is awarded by the Council of the Royal Society of London and honours the memory of Sir Edward Appleton, F.R.S., President of URSI from 1934 to 1952. The Prize of £250 is awarded normally at intervals of three years on the occasion of the General Assembly of URSI. If the interval between two General Assemblies is either considerably greater or considerably less than three years, the Board shall consult the Royal Society before modifying the date on which the next award will be made, and the dates referred to in Articles 3, 5 and 6 below. The Council of the Royal Society reserves the right to discontinue the award.
2. The Appleton Prize is awarded for outstanding contributions to studies in ionospheric physics. The work to which the award refers must have

been carried out mainly during the six-year period ending one year before the General Assembly at which the award is to be made. No member of the URSI Board of Officers shall be eligible.

3. Candidates may be nominated by any Member Committee of URSI, URSI Commission Chairman or Vice-Chairman or former laureate of any URSI award including the Appleton Prize, but not more than one candidate may be nominated by any one Committee or individual. The names of the candidates must be received by the Secretary General of URSI not later than 15 August of the year preceding that of the General Assembly at which the award is to be made.
4. The name of each candidate must be accompanied by a nomination form (supplied by the URSI Secretary General) providing information on, inter alia,
 - (a) a general summary of the candidate's career and scientific activities;
 - (b) a review of the candidate's recent achievements, including references to the most important papers of which the candidate is the sole or a joint author published during the six-year period referred to in Article 2;
 - (c) an outline of the reasons for the nomination of the candidate.
5. As soon as possible after 15 August, copies of the nomination forms referred to in Article 4 shall be sent by the Secretary General to the Awards Advisory Panel, the members of which shall be determined by the President of URSI in consultation with the Board of Officers. The Panel is authorized to seek additional advice from outside its membership, regarding the merits of the candidates, before submitting its own considered views to the Board of Officers not later than 1 March of the year of the General Assembly.
6. After considering the views submitted by the Awards Advisory Panel, the Board of Officers shall submit a short list of candidates in order of preference, with reasons for the order, to the Royal Society by 1 May of the year of the General Assembly and advise the Royal Society of the total number of candidates.
7. The Council of the Royal Society has full authority to select the candidate to whom the Prize will be awarded or to withhold it if, in its opinion, there is no sufficiently qualified candidate.

Rules for the Award of the Issac Koga Gold Medal

1. The Issac Koga Gold Medal honours the memory of a scientist who was closely associated with URSI for many years. The award is made normally at intervals of three years, on the occasion of the General Assembly of URSI. If the interval between two General Assemblies is either considerably greater or considerably less than three years, the

Board of Officers is authorized to modify the date on which the next Medal will be awarded, the period referred to in Article 2, and the dates referred to in Articles 3 and 5.

2. The Medal is awarded to a Young Scientist, of age not more than 35 on 30 September of the year preceding the General Assembly of URSI, who has made an outstanding contribution to any of the branches of science covered by the Commissions of URSI. The work to which the award refers must have been carried out mainly during the six-year period ending one year before the General Assembly at which the award is to be made. The Medal will be presented at the General Assembly.
3. The name of not more than one candidate may be submitted by any Member Committee of URSI, URSI Commission Chairman or Vice-Chairman of former laureate of any URSI Award. The names of the candidates must be received by the Secretary General of URSI not later than 15 August of the year preceding that of the URSI General Assembly.
4. The name of each candidate must be accompanied by a nomination form (supplied by the URSI Secretary General) providing information on, *inter alia*,
 - (a) a general summary of the candidate's career and scientific activities;
 - (b) a review of the candidate's recent achievements, including references to the most important papers of which the candidate is the sole or a joint author published during the six-year referred to in Article 2;
 - (c) an outline of the reasons for the nomination of the candidate.
5. As soon as possible after 15 August, copies of the nomination forms referred to in Article 4 shall be sent to the Awards Advisory Panel by the Secretary General. The members of the Awards Advisory Panel shall be determined by the President of URSI in consultation with the Board of Officers. The Panel is authorized, when necessary, to consult non-members regarding the merits of the candidates, before submitting its own considered views to the Board of Officers not later than 1 March of the year of the General Assembly.
6. The Board of Officers has full authority to select the candidate to whom the Award will be made. In doing so it will take into account the information provided by the proposers of the candidate, and also the views expressed by the Awards Advisory Panel.
7. The Board of Officers has full authority to withhold the award if, in the opinion of the members, there is not a qualified candidate.

THE URSI YOUNG SCIENTIST PROGRAMME

Preparations are now under way to organize the Young Scientist Programme after the Kyoto General Assembly. President Jull wrote a few lines to outline the essentials of the Programme.

"With about 100 Young Scientists supported at the Prague General Assembly, URSI can claim the largest such programme in the ICSU family of scientific unions. Rather than be satisfied with this size of programme your URSI Board promptly decided to try to further increase its scale at the next General Assembly. Our Japanese hosts have responded generously, arranging places for up to 120 Young Scientists from abroad at Kyoto as well as up to 80 from Japan. They will also arrange funds for travel expenses of some Young Scientists from developing countries.

Recruitment, selection, arrangements and support of a Young Scientist programme on this scale is a time-consuming effort for all concerned, particularly the URSI Secretariat. Why should we do all this? Professor S. Silver, who initiated the URSI Young Scientist programme at the 1969 General Assembly gave as his reason URSI's responsibility to spread radio science and technology (see December 1991 Bulletin, p. 62). A later URSI President, Dr. A.P. Mitra, committed URSI to encouraging radio science in developing countries. The Young Scientist Programme is an important way to do this. With the recent dramatic political changes in the world we have compelling additional reasons. Numerous colleagues in socialist or former socialist countries are now free to attend our conferences and anxious to do so, but cannot because their finances are not convertible. The time is critical. Unless we can do something when they need our help, URSI will be less than it might have been in the eyes of our young colleagues.

As before, cooperation of the Member Committees and scientific commissions in distributing the application forms is being requested. The forms should be conspicuously available at all URSI sponsored conferences in 1992. Copies will also be mailed to colleagues in

developing countries which are not URSI members. It will be very helpful if the Member Committees rank their applicants. This ranking will generally be adhered to and will assist greatly the selection process.

As before funds will be solicited for the travel expenses of Young Scientists from developing countries. ICSU, the Royal Society of London and the Commonwealth Science Council will again be approached as will other agencies providing funds in 1990. URSI will contribute some of its funds as well. New funding arranged by the Member Committees would be very helpful. This could take the form, for example, of providing the travel costs of a student from a developing country doing his graduate work in the country of the donor agency. In this way we may increase or at least maintain the proportion of Young Scientists from developing countries in our programme."

A reduced version of the application form is printed on p. 13 and 14, for information. Copies of the forms can be obtained from the Secretariat. As seen on the form, applications for Kyoto will be received up to 15 January 1993.



UNION RADIO-SCIENTIFIQUE INTERNATIONALE
INTERNATIONAL UNION OF RADIO SCIENCE

AWARDS FOR YOUNG SCIENTISTS CONDITIONS

These awards are intended to assist young scientists from both developed and developing countries to attend the **General Assembly of URSI**.

To qualify for an award the applicant :

1. Must be less than 35 years old on September 1 of the year of the URSI General Assembly.
2. Should have a paper, of which he or she is the principal author, submitted for presentation at a regular session of the general assembly, or be willing to present a paper at a special session organized for young scientists.
3. Should hold a Ph.D. if older than 28 years, or have equivalent research experience as evidenced by a list of publications or contributions to conferences. This condition may be waived in the case of some applicants from developing countries.

Applicants should also be interested in promoting contacts between developed and developing countries.

All successful applicants are expected to participate fully in the scientific activities of the general assembly. They will receive free registration, and financial support for board and lodging at the general assembly. Limited funds will also be available for part of all the travel costs of young scientists from developing countries.

Applications will be received up to **15 January** of the year of the general assembly through the applicant's local URSI Committee, if there is one, otherwise directly to the Secretary General :

Prof. J. Van Bladel
URSI, c/o University of Ghent (LEA)
St.-Pietersnieuwstraat 41
B-9000 GENT
BELGIUM

APPLICATION FOR AN URSI YOUNG SCIENTIST AWARD

I wish to apply for an award to attend the XXIV General Assembly of the International Union of Radio Science in Kyoto, Japan, August 25 - September 3, 1993.

Name _____

Address _____

Date of birth : Year _____ Month _____ Day _____ Sex : M F

Studying/Employed at : _____

Academic qualifications, with date(s) obtained : _____

I wish to present a paper entitled : _____

in a regular session of the general assembly

in a Young Scientist Special Session

Please attach the Abstract of the paper you wish to present (in the standard format laid down in the Call for Papers), and a brief (one or two page) curriculum vitae, including a list of publications.

Date : _____ Signed _____

Return this form to the URSI Secretary General (address see over page) to arrive not later than **15 January 1993**, through the applicant's local URSI Committee, if there is one, otherwise directly to the URSI Secretariat.

For applicants from developing countries only :

I estimate the cheapest return fare to the URSI meeting is \$ _____ .

For Graduate Students only - Supervisor's endorsement : I support the application for an award to enable this young scientist to attend the forthcoming General Assembly of URSI for the following reasons : _____

Supervisor's Name & Title : _____

Address : _____

Date : _____ Signed _____

CORSENDONK - FIVE YEARS LATER

A few months before the General Assembly in Tel Aviv a Conference on the future of URSI was held in the Priory of Corsendonk, located in the woods a few miles from the Belgian city of Turnhout. The idea of such a Conference originated with President Mitra and Past-President Gordon. The meeting, which lasted from 8 to 10 March 1987, was attended by twenty URSI Officials, together with representatives of CCIR, CCITT, ESTEC, IEEE, IAGA, TWAS (Third World Academy of Sciences), BIPM and Alcatel-Thomson. In his introduction President Mitra wrote :

"What is the rationale behind this special effort of bringing in senior people from the URSI Community as well as from organizations outside? The main reason is that as URSI grew, and new areas of radio science emerged, its linkages with organizations concerned with the operational and implementation aspects of radio science (especially on telecommunications) began to dwindle. This is an inevitable consequence, I believe, of a situation where both science and technology are developing rapidly. In a gathering of this kind one need not point out the symbiotic relationship between science and technology and the dangers of ossification in both from lack of rapport and linkage. This is particularly unfortunate in the case of developing countries, where telecommunication is a vital part of development, and frequently operates on borrowed technology without appropriate and adequate scientific back-up. This, therefore, raises two questions : (1) how does one restore the symbiotic relationship that existed in the past between science organizations of the kind that URSI represents, and the technological organizations of the kind that ITU or professional bodies like IEEE represent. (2) what can organizations like URSI do in clear terms that would enhance original scientific thinking in developing countries that would help in its national and technological development?"

These guidelines gave birth to lively discussions, which can't be reproduced here by lack of space. The conclusions, however, may be

summarized by quoting the recommendations made at the end of the meeting :

"1. URSI's role is primarily in :

- communications;
- radio probing of land, oceans, atmosphere, biological systems, extraterrestrial objects.

2. In communication, integrated services digital network will be the backbone of the high-capacity system. In this :

- contributions from Commissions C and D will be critical;
- reinvigoration of liaison between URSI and CCIR/CCITT is essential;
- future scenario must keep in view requirements of other scientific efforts, especially radio astronomy.

3. In geophysics and probing areas, the following recommendations were made :

- suggestions regarding the division of scientific fields between URSI and IAGA in areas of interest of Commissions G and H;
- two new exciting areas for Commission J :
 - (a) VLBI from space, requiring liaison with COSPAR;
 - (b) optical interferometry with approach inspired by radio astronomy;
- ad hoc groups to be set up on :
 - (a) interaction of electromagnetic waves with biological systems,
 - (b) remote sensing;
 - (c) radio geodesy.

4. For strengthening the (i) internal operation, (ii) international role, and (iii) visibility of URSI, the following recommendations were made :

- (i) guidelines for the time schedules and procedures for Commissions should be prepared by the present Chairman of the Steering Group;
- (ii) the Review of Radio Science should be prepared by designated individuals, on sub-topics to be decided upon in advance by the respective Commissions at the time of the preceding General Assembly;
- (iii) the existing concept of Official Members of Commissions might have to be dropped;
- (iv) the possibility of introducing non-voting "personal membership" should be examined;
- (v) to strengthen URSI's activities for developing countries, ICTP and TWAS offered opportunities for organizing (a) training courses, (b) round-table discussions, (c) distribution of books and journals sent to

- ICTP by URSI or scientists from any of the member countries, and
- (d) provision of spare parts for equipment;
- (vi) while the URSI logo should not be changed, the explanatory title could include "electronics", "information science" and/or "communications";
 - (vii) to enhance the visibility of URSI, actions are recommended in the following aspects :
 - (a) introduction of an URSI journal (a suggested journal was on "Signals, systems, and electronics");
 - (b) introduction of an URSI Newsletter;
 - (c) distribution of existing URSI publications to selected non-URSI agencies (including CCIR, CCITT, professional societies, etc.).

It is interesting to comment briefly on a few selected moves which have resulted from these recommendations. With respect to **2** :

- (a) Commissions C and D have had extended (and particularly successful) programmes at the General Assemblies of Tel Aviv and Prague. More importantly, perhaps, they have started a triennial International Symposium on Signals, Systems and Electronics. The first one was held in Erlangen in September 1989. The second one will be organized in Paris in September 1992.
- (b) to strengthen URSI's involvement in Telecommunications, a Scientific Committee on Telecommunications has been created in Prague. One of its responsibilities is to improve the collaboration between URSI, CCIR and CCITT.

With respect to **3** :

- (a) a new Commission, Commission K, has been created in Prague to develop the area mentioned as "interaction of electromagnetic waves with biological systems";
- (b) we are now co-sponsoring, to express our concern with remote sensing, the yearly International Geoscience and Remote Sensing Symposium (IGARSS).

With respect to **4** :

- (a) individual URSI membership has been discussed extensively in Tel Aviv and Prague. The main result has been the creation of a network of "correspondents". A pragmatic move to start this network is underway. It consists of replacing surface bulk mailing of the Bulletin to the Member Committees by individual air-mailing on the basis of a list of persons provided by the Member Committees. These persons

are the first "correspondents". The Secretariat (for which the new approach represents a major effort) hopes to have the system fully operational by the middle of 1992.

- (b) the contents of the "Review of Radio Science" will be strongly modified in 1993. The Review, edited by Dr. R. Stone, will now consist of three to four articles per Commission, each article providing a review of advances and research in a field of interest of the Commission which has been of significant importance in the three previous years. The Review will be published, and distributed, by Oxford University Press.
- (c) proposals to modify the title of our Union by including terms such as "electronic", "information science" and/or "communications" were defeated at the Tel Aviv General Assembly.
- (d) the introduction of an URSI journal, a very risky enterprise indeed, has not materialized. The proposed "URSI Newsletter", however, has started under the impulse of Professor Dowden. Some ten issues have appeared before Prague. The Newsletter has now been replaced by a more ambitious quarterly : "The Radioscientist". It is distributed by air mail, in most cases together with the Bulletin.
- (e) strengthening URSI's activities for Developing Countries (D.C.) has remained one of the main concerns of our Union. The support of Young Scientists (Y.S.) at General Assemblies and at Conferences has been particularly successful. Since 1981 we have supported some 300 Y.S., 120 of whom belonged to Developing Countries. This programme is often quoted as an example in ICSU circles. We have also organized several courses for scientists from Developing Countries in Trieste, in cooperation with TWAS and ICTP, the main organizers. A biennial series on Telecommunications, in particular, has been started in 1989. The some 60 participants to these Colleges (about half of whom were Young Scientists) receive free copies of URSI books, such as the Review of Radio Science. In addition, TWAS is willing to distribute URSI books to selected libraries in Developing Countries. The 1987-9 Review of Radio Science, for example, has been mailed, free of charge, to some 150 libraries.

The findings of the Corsendonk 'thinktank" remain very important guidelines for present-day URSI Officials. They are particularly relevant for the members of the "Long Range Planning Committee", who are scheduled to make recommendations on a variety of topics at the 1993 Kyoto General Assembly.

J. VAN BLADEL

NEWS FROM THE COMMISSIONS

COMMISSION A

Jacques Vanier, Chairman of the Commission, sent the following newsletter to the Official Members of Commission A in early November 1991. The intent was to obtain feedback from the Members. Dr. Vanier first discussed a few administrative matters, such as a general check of addresses, and then made the following comments :

"Review of Radio Science (RRS)

As you know the format is being changed. It will consist of review articles highlighting what has been accomplished during the last cycle in a few pre-chosen specific fields. Each Commission will contribute four or five articles. Dr. Ross Stone is the editor-in-chief of the RRS. Dr. P.I. Somlo, our Vice-Chairman, has volunteered to be editor for Commission A. He is now actively working on selecting the topics and the authors. As soon as the plans are finalized we will inform you.

Reference Diskettes

As you also know, the list of references pertinent to the work of Commission A during the three year cycle will now be collected on disk. This will create a complete database. Mr. Yell has accepted to undertake this job. You should be contacted soon with precise instructions as to what is needed regarding the disk format, language, subjects, extent of coverage, etc.

Joint Committee URSI-CCIR

As you also probably know a joint committee has been created to identify subjects of common interest to URSI and CCIR, with the intention of stimulating interaction, discussion and possibly work on these subjects of interest. The Committee is called "Scientific Committee on Telecommunications (SCT)" and is composed of the chairmen of URSI Commissions and of representatives of CCIR. The chairman is Mr. L.W. Barclay, assisted by Professor P. Delogne. If you have any comments or

suggestions that you feel could be of interest to the committee, please do not hesitate to contact me.

Programme for the General Assembly

Finally my last item (but not the least) is concerned with the programme of the next General Assembly. We have to decide on subjects and conveners. The 1990 Prague programme appeared to me to be approximately of the right size, with 8 Commission A sessions, 5 joint sessions and 1 tutorial. Unless I receive suggestions contrary to this, I will keep the programme approximately that length. I have also attached a list of subjects that could form the programme of the next General Assembly. I would appreciate any comments or suggestions you may have. Furthermore I would also appreciate suggestions for conveners. I am planning to have a chairman (convener) as well as a vice-chairman (co-convener) for each session, to ensure presence at the General Assembly as well as a broad view of a given subject. Papers presented will in principle all be by invitation from the conveners.

Proposed Subjects for the Scientific Programme of the 1993 General Assembly

Tutorial

Lecture on frontier or state of the art communication techniques, from radio waves to optical fibres (the lecture would be coloured by the need for sophisticated measurement techniques).

Sessions

- 1) New progress and developments in frequency standards : ion trap, atom traps, atom and ion cooling
- 2) Solid state lasers : applications in communication systems
- 3) Lasers : their application in electromagnetic metrology
- 4) Microwave standards
- 5) Progress in millimetre standards
- 6) Communication satellites : requirements for standards and testing
- 7) Accurate navigation systems : from the sextant to GPS, or requirements on time and frequency standards
- 8) Communication systems and optical fibres
- 9) Quantum metrology and fundamental constants.

Joint Session

Suggestion from Commission K :

"Exposure assessment / Measurement in complex environment"

Others :

Laser stabilization (with Commission D)

Time Domain metrology (with Commission B)

Pulsar properties (with Commission J)

High T_c Superconductors (with Commission D)

COMMISSION E

Dr. J. Hamelin, Chairman of the Commission, organized meetings of the Commission's Working Groups at the March 1991 Zurich Symposium on EMC. He intends to follow the same policy at the 25-27 May, 1992, Symposium on EMC in Beijing, and at the 2-4 September, 1992, Wroclaw Symposium. He prepared a report on the March 1991 meetings, from which we quote a few excerpts :

W.G. E.1. Spectrum management and utilization (Chair : R.D. Parlow)

The Chairman of Working Group E1 provided a background briefing regarding (1) current events and recent spectrum management studies, (2) technical trends in the field of radiocommunications, and (3) a proposed work programme, which includes participation in several international conferences.

Of particular interest is a report, released in February 1991 by NTIA, the U.S. National Telecommunications and Information Administration. This report, entitled "U.S. Spectrum Management Policy : Agenda for the Future", makes specific proposals and recommendations in five key areas :

Regulatory Issues

The report examined the regulatory process of the NTIA and the Federal Communications Commission (FCC) and made recommendations

regarding the federal government spectrum management process, efficiency and speed, associated long range planning, and coordination of international spectrum issues.

The Block Allocation System and Flexibility

Fundamental concerns exist about the rigidity of the block allocation system. The report suggests that additional flexibility be introduced into the allocation system through increased spectrum sharing by the various users, increased flexibility in technical standards, and increased choices for users in employing their frequency assignments.

Market-Based Spectrum Management

The report proposes that greater reliance on market principles be used in distributing the spectrum resource ; this is especially appropriate when considering competing and incompatible users. Specific recommendations call for the introduction of competitive bidding after comments are received from users and other interested individuals or groups.

Spectrum Use and Efficiency

The report examines how spectrum use and efficiency can be quantified. It recommends increased use of advanced engineering techniques and data bases for this purpose.

Planning and Forecasting

The report emphasizes the importance of long-range planning, not to micro-manage spectrum use, but to anticipate user needs and conflicts among proposed uses.

The report states that the combination of reforms and new techniques presented in the study - some regulatory, some market based, some process oriented, some technical - will create an improved spectrum management system for the United States.

W.G. E.2. Non-Gaussian Noise in Communications (Chair : A.D. Spaulding)

The objectives of the working groups are to assure the availability of appropriate statistical-physical models of the real-world interference

environment ; to determine the effects of the noise and interference environment on telecommunication system performance ; to develop and/or track the development of means of overcoming the degrading effects of noise and interference ; to investigate means of optimum detection and estimation ; and to specify appropriate needed measurements.

At the Zurich Working Group meeting three basic areas were reviewed :

1. The real-world interference environment;
2. The performance of "standard" telecommunication systems in this environment, and
3. The development of telecommunication systems which are "optimum" in the real-world environment.

It was noted that Gaussian noise is the "worst" possible noise and that its information destroying capacity is maximum. Some like to say that Gaussian noise is the "most random". This means that if the actual nature of the interference is properly taken into account in receiver design, improvements (sometimes very large improvements) can be made over the existing receivers (designed to be optimum in Gauss). Examples of this were shown for both basic types of real-world interference. Class A : characterized by being caused by waveforms with bandwidths less than the receiver bandpass, thus producing no or ignorable transients in the receiver (e.g. collections of interfering signals) and Class B : characterized by being caused by broadband waveforms (e.g. impulses) producing collections of overlapping impulse responses in the receiver (e.g. atmospheric and various forms of man-made noise). Both types are "impulsive" when compared to Gaussian noise in that they both have high energy - low probability "tails".

W.G. E.3. High Power Electromagnetics (Chair : R.L. Gardner)

Dr. Gardner could not be present and Dr. C.E. Baum and Dr. D.V. Giri served as his replacements. There were 12 participants at this Open Meeting.

Presentations were made dealing with the subjects of EMP, Lightning and HPM (High Power Microwave). Analytical and experimental results from

open literature were presented and discussed. Some aspects of transient radars were also presented. In this context, Dr. Baum's paper on radiating systems for impulse-like functions was discussed. Such systems consist of either a large TEM wave launcher with a lens at its open end, or reflector antennas Fed by TEM wave launchers. It was recognized that developments over many decades in the EMP fields can be useful in emerging areas of HPM and transient radars. Dr. Baum also provided an outline of a paper titled "From the Electromagnetic Pulse to High Power Electromagnetics".

W.G. E.4. Terrestrial and planetary electromagnetic noise (Chair : M. Hayakawa)

Dr. Hayakawa explained the general subjects relevant to the group on the basis of the first issue of the working group's newsletter in December 1990. They include, (1) study of general characteristics of terrestrial and planetary noise (of both natural and man-made origins) ; (2) physical processes and mechanisms involved in the generation of such noise and (3) their effect on telecommunications. The items listed here only indicate the research area covered by the working group, and it is quite certain that the latter's research field is extremely wide.

Typical topics for (1) and (2) are :

- Direction finding (location) of natural (and man-made) radio noises;
In order to have further understanding on the characteristics of terrestrial and planetary EM noise, the direction finding would be of great potential. The accurate location of natural radio noise direction of lightning (nearby and distant) and of ionospheric (and magnetospheric) radio noises will be strongly required. Location techniques of man-made noises should also be explored.
- Detailed characteristics of natural radio noises based on the sophisticated measurements including direction findings.
- Lightning and the associated radio noise on other planets and their comparison with the characteristics on Earth. A comparison of this study with the corresponding terrestrial one would also contribute strongly to the further understanding of terrestrial lightning and radio noise environments.
- Earthquake-associated radio emissions (and the prediction of earthquakes).

As one of the current topics in the field of terrestrial radio noise, we would like to choose the above subject. More coordinated and sophisticated measurements on the precursor radio emissions associated with earthquakes will definitely be required in order to study the generation and propagation mechanism of earthquake-associated radio emissions in a wide frequency range (ULF to HF).

Collaboration with another working group was discussed with some colleagues (including the chairman of E.2., Dr. Spaulding). We can list one research item here : "Global distribution of atmospheric radio noise".

In the CCIR # 322 report dealing with the global distribution of radio noises, it is well known that there are not many data concerning atmospheric radio noise in the southern hemisphere because of the limited number of observing stations there. Hence it is strongly required to establish more stations in the southern hemisphere. The satellite measurements at different frequencies (10 kHz to 30 MHz) would also be of great potential in this study. Updating the CCIR # 322 report is very important not only for the Working Group, but also for the study of the effect of atmospheric radio noise on telecommunications.

W.G. E.5. Interaction with, and protection of, complex electrical systems
(C. Baum, P. Degauque and M. Ianoz, report by P. Degauque)

This Working Group is an extension of a previous one entitled "Scientific basis of noise and interference control". Many research centres, universities and laboratories have already made important advances in this field, which concerns the coupling of electromagnetic waves to structures and the protection concept. During the Zurich Symposium a presentation of the various aspects to be covered has been made. The main topics and objectives were the effect of ground, coupling to structures, and coupling of high-frequency waves.

W.G. E.6. Effects of transients on Equipment (V. Scuka and B. Demoulin, report by P. Degauque)

During the last URSI General Assembly (Prague, Aug. 1990), it was decided to propose a Working Group on Electromagnetic Compatibility entitled "Effects of transients on equipment".

This Working Group E.6. deals with a naturally expanded subject treated in the earlier Working Group on the "Lasting effects of transients on equipment" and now covering a more general class of problems, associated with the electromagnetic waves (radiated and conducted), and the interaction with equipment. Typical topics of interest are:

- Determination of the equivalent disturbing sources
- Impedance presented by the device
- Response of the device
- Intrinsic characteristics of the device
- Response of an electronic circuit or an equipment
- Device excited by an EMI
- Radiofrequency disturbances by non-linearity
- Tests on electronic circuits or on equipments.

COMMISSION G

In a 27 December 1991 Newsletter Professor Wernik gives a fourth version of the Commission's proposed programme for the Kyoto General Assembly.

The list of proposed sessions is given below.

As a tutorial the Commission suggests "Ionospheric Modelling", to be presented by Dr. D.N. Anderson. With respect to the contribution of the Commission to the Review of Radio Science, it was decided to keep the main headings as in the previous edition of RRS, i.e. : 1. Ionospheric Techniques, 2. Ionospheric Structure and Modelling, 3. Ionospheric Radio Propagation : Theory and Experiment. For each of these topics there will be a review article. The following people have kindly agreed to write the reviews : 1. R. Hunsucker, 2. G.S. Ivanov-Kholodny, 3. S. Franke.

As far as the reference disk is concerned it will be compiled based on the input from the official Commission G representatives in each URSI member committee.

<i>Topics</i>	<i>Convener</i>
1. Broadband signals propagation in the ionosphere (C, F, G)	K.C. Yeh
2. Non-linear wave theories and observations in space (H, G)	Bo Thidé
3. Recent results of coordinated campaigns	Su. Basu
4. Active experiments in space plasma (G, H)	P. Stubbe
5. Ionosphere : middle and lower atmosphere interactions	J. Röttger
6. Observations and modelling of solar-terrestrial relationships	E.P. Szuszcwicz
7. Ionospheric prediction and modelling	B. Reinisch
8. New results from coherent and incoherent scatter experiments	S. Fukao
9. Ionosonde networks and stations	P.J. Wilkinson
10. Progress in understanding ionospheric irregularities: techniques, observations and theory	C. Hanuise
11. Open session and latest results	A.P. Mitra

REPORTS ON URSI-SPONSORED MEETINGS

1991 INTERNATIONAL GEOSCIENCE AND REMOTE SENSING SYMPOSIUM

Helsinki, 3-6 June 1991

This IEEE meeting was co-sponsored by URSI under Mode C. It was held at the Helsinki University of Technology, and its main themes were Remote Sensing and Global Monitoring for Earth Management.

The General Chairman was Professor Martti Hallikainen (HUT/Laboratory of Space Technology), and the Technical Programme Chairmen were Professor Martti Tiuri for IEEE and Professor Ismo Lindell (HUT/Laboratory of Space Technology) for URSI.

A total of 740 participants from 30 countries registered, the main delegations being the USA(140), Finland (100), Germany (85), France (70), the United Kingdom (40), Japan (40), the Netherlands (35), Canada (30), Norway (30), the Soviet Union (25), Sweden (20).

The programme featured 670 contributions (624 oral, 46 posters), distributed in 13 parallel sessions. Distribution among topics : Instrumentation (120), Data analysis and handling (150), Applications (atmosphere, oceans, sea, ice , land, forests, snow, Global Change, geology, hydrology and pollution) (340). Logistic support was given by the Ministry of Education, the Technology Development Center, Finnair, the Helsinki University of Technology, Hollming Ltd Electronics, NASA, and the Office of Naval Research.

The next IGARSS Symposia will be held in Houston in 1992, Tokyo in 1993 and Los Angeles in 1994.

INTERNATIONAL CONFERENCE ON PHENOMENA IN IONIZED GASES

Il Ciocco, Barga, Italy, 8-12 July 1991

The main features of this Conference were :

1. ICPIG XX was attended by 440 participants (plus 150 accompanying persons), coming from 37 countries all over the world.
2. The Local Organizing Committee of ICPIG XX supported, with the help of several sponsors, 18 participants from the Soviet Union, East European and Third World nations.
3. The Workshop on Plasma Technology and Applications, which was held from 5 to 6 July, was attended by 80 participants, of whom 15 came from various industries.
4. During the two round-table sessions arranged in the Workshop to discuss close cooperation between scientific and industrial personnels, several academic and industrial aspects were investigated in detail. The need to bridge the gap between the expertise of the two groups was emphasized.
5. Among the accepted Contributed Papers, about 350 (a large proportion for a total of 752) were submitted by Soviet scientists, while only about 45 of these (including 10 Invited Speakers for the Workshop and the Conference) were present at the Conference. This fact, which was reflected in numerous empty boards in the poster sessions, gave rise to worried discussions at the meetings of the Conference Committees. In any case the diffusion of the scientific results from the Soviet Union has been assured by the Proceedings of the Conference but, unfortunately, the direct contact with the authors was missed.
6. Lectures were delivered by 10 General Invited Speakers on different areas of general interest, while 35 Topical Invited Speakers discussed various topics of specific interest.
7. The Proceedings of the Conference (6 volumes, comprising about 1500 pages of contributed papers) were distributed to the participants. The book containing the papers of the Invited Speakers will be sent to these distinguished colleagues at a later date.

It was the opinion of the organizers that numerous important and high level scientific contributions were presented in both the Workshop and the ICPIG XX, and that they were discussed in a very satisfactory manner.

M. VASELLI

THIRD SUZDAL URSI SYMPOSIUM ON MODIFICATION OF THE IONOSPHERE BY POWERFUL RADIO WAVES

Suzdal, USSR, 9-13 September 1991

The purpose of the Third International Suzdal URSI Symposium was to summarize the scientific results obtained after the Second Symposium (Tromsø, Norway, 16-20 September, 1988), and to outline the prospects of modification of the Earth's ionosphere by powerful radio waves.

The Symposium was organized by the URSI Committee in the USSR, the Scientific Council on the Problem of Radio Wave Propagation and the Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation of the Academy of Sciences of the USSR, with financial support by URSI.

The Symposium was attended by more than 105 scientists from the USSR, the USA, Germany and Sweden.

The programme included 15 invited review papers and 83 original poster presentations on the following topics :

- investigations of the atmosphere and the lower ionosphere by active methods;
- modifications of the upper (F region) ionosphere;
- effects of the LF emission on the upper ionosphere and the magnetosphere;
- modulation of the electrojets, and geophysical effects;
- modifications of the Earth's atmospheric plasma by radio emission from space-crafts (satellites, rockets, etc).

At all sessions review papers were presented with a view towards the analysis of the state of the problem and prospects for further investigations. A great number of investigations were carried out in the above mentioned countries, while important scientific results on the physics of artificial ionosphere modification were obtained at the Tromsø, Nizhny Novgorod and Arecibo facilities. The majority of papers

concentrated on the new experimental results obtained by different methods to diagnose artificial disturbances in the near Earth atmosphere produced by powerful vertical and oblique radio emissions.

The depth of the conducted investigations, and the desire of scientific groups from different countries to combine their efforts for joint complex experimental and theoretical investigations, were clearly revealed by the discussions.

During the Symposium further ways to investigate the physical processes in the lower and upper near Earth Atmosphere, and the peculiarities of radio wave propagation depending on artificial influence on the atmosphere by powerful radio emission, were discussed, and plans were approved for the next 3 year period.

The Fourth Suzdal Symposium will be held in Sweden, in 1994.

The participants are very grateful to URSI for the financial support the Union provided, and thank the URSI Committee in the USSR, together with the Programme and Organizing Committees, for the high level of preparation and leadership they provided.

Proceedings of the third Suzdal URSI Symposium are available from IZMIRAN at the following address :

Dr. BOCHKAREV
IZMIRAN
Moscow Region,
142092 TROITSK
USSR

G.S. BOCHKAREV

IRI WORKSHOP - ADVANCES IN GLOBAL AND REGIONAL DESCRIPTION OF IONOSPHERIC PARAMETERS

Athens, Greece, 1-4 October 1991

The meeting was attended by 29 participants from 10 countries (Belgium, Bulgaria, Germany, Greece, Italy, Japan, U.K., U.S.A., U.S.S.R., Yugoslavia), who presented 36 talks.

The discussions focussed on the following problems :

1. New Options in IRI :

Dr. Rower stressed the importance of clearly specifying which particular option is used in a certain application of IRI. The following nomenclature was accepted and will be implemented in the IRI-91 computer programme.

- (0) foF2 : URSI or CCIR or Input
- (1) Ne from E to F layer : analytical LAY version IRI-LAY
- (2) ion composition : Danilov & Yaichnikov model IRI-D&Y
- (3) bottomside, BO : Gulyaeva model IRI-H0.5
- (4) below 200 km : Chasovitin et al. model IRI-H<200

It was decided that the standard model, which does not use any of the options (1) to (4), will use the URSI foF2 model, as recommended by the former URSI mapping Group (Chairman : K. Davies). Dr. Bradley suggested to allow user-provided input values also for parameters other than foF2 and hmF2. However, further discussion is necessary to clarify this point. Singer's recommendation to allow input of M(3000)F2 was accepted; the user-provided value would then be used for calculating hmF2.

2. Indices describing solar and magnetic conditions :

Discussions focussed on the possible use of ionospheric solar activity indices, like IF2, IG, or T, instead of solar sunspot number for the F region. These indices are derived from ionosonde foF2 measurements at different locations. IF2 and IG consider only noon values, whereas T

considers all times. Only IF2 and IG are published periodically by ITU/CCIR. Disadvantages of these ionospheric indices are the fact that they mix solar response with dynamic behaviour (Anderson) and that they are geared towards the CCIR maps (Bradley). The group did not feel comfortable with a recommendation at this time. Bradley agreed to write a short note about the ionospheric indices for the Proceedings of this meeting. Similarly, Dr. Mikhailov will provide a short write-up about the interpolation between low and high solar activity.

At present IRI does not describe the variation due to magnetic disturbances. In preparation of future inclusion of such dependences, Dr. Gulyaeva agreed to write a brief note on magnetic indices and their appropriateness for ionospheric modelling.

3. Magnetic field coordinate system :

At present IRI uses a magnetic field model (IGRF-75) only at 300 km. The magnetic inclination (dip) at this altitude is needed for the CCIR/URSI maps. Magnetic coordinates are also necessary for representing parameters in the plasmasphere (model by Dr. Rycroft and Dr. Jones), and would be a better choice than vertical height in the topside (Dr. Rawer). Inclusion of a multipole magnetic field model, like IGRF, and of the necessary field line tracing subroutines, would, however, considerably increase the volume and run-time of the IRI computer code. Discussions concentrated on a geocentric (or shifted) tilted dipole and the Apex coordinate system, following a written suggestion by Mr. Van Zandt, who in 1972 introduced this system specifically for ionospheric applications. In this system the ~~three~~ coordinates of a point in space are : (1) the apex radius or latitude of the field line on which A is located, (2) the apex longitude, and (3) the height of A above Earth.

4. Topside/Plasmasphere

Dr. Bilitza agreed to test the Apex coordinate system for the representation of the topside electron density. He will also implement the plasmaspheric model, that was developed for IRI by Dr. Rycroft and Dr. Jones. It was

noted that Dr. Gallagher at MSFC, USA is developing an empirical plasmaspheric model based on Dynamics Explorer (DE) data. Comparisons of the two models may help to introduce the large DE data base into IRI.

5. Mapping

As a member of CCIR Working Party 6, Dr. Bradley informed the participants, that after the restructuring of the CCIR, there will be no more working parties. He also noted that there are no plans for a CCIR recommendation to replace the present CCIR foF2 maps with the newer URSI maps. CCIR felt that overall the URSI maps did not provide a clear improvement.

Direct mapping of hmF2 is one of the goals of the URSI Working Group on Ionospheric Informatics (WGII, Chairman : Dr. B. Reinisch). The result could replace the present IRI hmF2 model, which is based on the CCIR maps for the propagation factor $M(3000)F_2$. As a precursor WGII now studies the reliability of hmF2 obtained with digisonde hmF2 measurements, after comparative studies with simultaneously obtained incoherent scatter data at Millstone Hill.

6. Valley

Assumptions about the E-region valley are of great importance for the reduction of ionograms. Again this is an area of close cooperation with URSI-WGII. Dr. Gulyaeva confirmed that the valley width calculated with her formula should be corrected. Her formula is based on ionosonde data and thus on the assumptions made about the valley region. BIBL volunteered to study the valley formula with data first from Millstone Hill and later from other incoherent scatter radars.

Dr. Mahajan has used the readily accessible incoherent scatter data from Arecibo to study the diurnal variation of valley parameters.

Comprehensive studies in a similar fashion with profiles from the other incoherent scatter facilities would be of great value for IRI. Beside valley

parameters these studies could also help better to describe the ratio between half-density height and hmF2 (G-factor) that was introduced by Dr. Gulyaeva for a better representation of the bottomside F region. (Dr. Rawer will contact the European groups).

7. Total Electron Content

Prof. S.M. Radicella and his team at ICTP in Trieste will study TEC and IRI with a large data base of TEC measurements accumulated by Dr. Spalla over Italy. Dr. Rawer reported about his effort together with Dr. Thieman to obtain high latitude TEC for ESA from a parameterization of theoretical values obtained with the Utah ionospheric model. The same theoretical model is used by Dr. Andersen and his colleagues at AFGL for the Parameterized Ionospheric Specification Model (PRISM).

8. Proceedings

Dr. Rawer informed the participants that the papers presented at the last IRI Workshop in The Hague (COSPAR'90) had just been published in *Advances in Space Research*, Volume, 11, Number 10, 1991. All papers given at the present workshop will also be published in *Advances in Space Research* (Editors : Dr. Rawer, Dr. Piggot, Dr. Paul). The draft version should be sent to Dr. Rawer before the end of the year.

9. Future workshops

The next IRI Workshop will take place on September 3, 1992 in Washington, D.C., during the World Space Congress, and is entitled "Verification and New Development of International Reference Ionosphere". Prof. Bossy distributed the special abstract forms, which have to be used to submit a paper. The deadline is 1 December 1991.

Prof. S.M. Radicella invited the working group to have its 1993 meeting at ICTP in Trieste, Italy, from October 26 to 29. ICTP recently adopted radiopropagation as one of the topics in its general line of research and teaching.

10. Bottomside / F1 Region

It was decided to include Prof. Radicella's inflection point as additional point constraint in the LAY version of IRI.

Revisions of the present model for the occurrence probability of foF1 were discussed, but it was felt that not enough new information is available at this time to justify any changes.

D-region : an improved description of solar activity variations is expected from a renewed effort by Dr. Ramanamurty to use LAY-functions in representing Dr. Singer's absorption results. Dr. Friedrich's compilation of rocket data could also provide valuable information about the dependence on solar zenith angle, seasonal and solar activity. Dr. Paul reminded the group that some time ago Dr. McNamara had compiled a WDC-A-STP book of D-region profiles, which may be useful for this purpose.

11. Ion Composition

It was decided to implement the modeling scheme based on transition heights that was proposed by Dr. Bilitza. Dr. Kutiev agreed to re-evaluate the (in IRI) presently-used light ion ratio (helium to hydrogen) with measured and theoretical values.

12. Ion Drift

Dr. Kazimirovsky and his colleagues at Sibizmiran, USSR, have developed a ion drift model for IRI based on ground observations. Their code is included in the IRI-90 book, but not in the IRI-90 computer programme. Dr. Rawer will contact Dr. Kazimirovsky to inquire about the possibility of getting the model programme and coefficients on tape or diskette, and also to get more information about the data source and the measurement technique used. After Dr. Kazimirovsky's model is implemented, comparison with incoherent scatter data are encouraged.

13. Disturbances

At high latitude disturbances are the rule rather than the exception, thus making empirical modelling a very difficult undertaking. But features, like for example the auroral oval and the nighttime trough, appear in such a consistent manner that they should be represented in future ionospheric models. Regional modelling and input of theoretical values may be the avenues of progress in this area. Dr. Reinisch noted that disturbances at high latitudes are best described by their dependence on the IMF.

Sporadic E :

Dr. Paul indicated that the present data base is not large enough to describe the temporal and spatial variation of the occurrence probability of Sporadic E. The topic will be a future subject of URSI-WGII.

Spread F :

Future probability statistics of Spread F may be possible after more digisondes are distributed worldwide. Using ISS-b topside sounder data Dr. Maruyama and Prof. Matuura have established a global statistical occurrence model for Spread F. They have indicated their willingness to contribute this model for IRI.

Winter Absorption Anomaly :

More measurements are needed. Data from European campaigns, as presented at this workshop, may be helpful (Widdel).

Electron Temperature Enhancement :

An electron temperature enhancement is observed consistently at sub-auroral latitudes during nighttime. Magnitude and location of the temperature enhancement have been studied extensively with Dynamics Explorer data (Brace, Kozyra) and could be included in IRI.

L. BOSSY

AN INTERESTING ICSU MEETING

THE ASCEND CONFERENCE

The United Nations Conference on Environment and Development (UNCED) will be held in Brazil in June 1992. ICSU has been recognized as the main scientific adviser for this most important event. In preparation to the Conference, ICSU organized, in collaboration with TWAS (the Third World Academy of Sciences), ASCEND-21, the Agenda of Science for Environment and Development into the 21st Century. This international conference was convened in Vienna from 25 to 29 November 1991. Its main results may be summarized as follows :

"ASCEND 21 stressed a new commitment on the part of the international scientific community as a whole to work together so that improved and expanded scientific research, and the systematic assessment of scientific results, combined with a prediction of impacts, would enable policy options in environment and development to be evaluated on the basis of sound scientific facts.

Furthermore, it forcefully asserted the responsibility of science (encompassing the natural, social, engineering and health sciences), to provide independent explanations of its findings to individuals, organizations and governments. In this context, ASCEND underlined the central importance of the precautionary principle, according to which any disturbances of an inadequately understood system as complex as the Earth system should be avoided.

Members of the scientific community participating in ASCEND agreed on the nature of the major problems that affect the environment and hinder sustainable development, and identified a number of specific areas through which the scientific community could begin to tackle those problems considered by ASCEND as being of the highest scientific priority : population and per capita resource consumption, depletion of agricultural/land resources, inequity and poverty, climate change, loss of

biological diversity, industrialization and waste, water scarcity, energy consumption.

ASCEND recommended :

- intensified research into natural and anthropogenic forces and their inter-relationships, including the carrying capacity of the Earth and ways to slow population growth and reduce over-consumption;
- strengthened support for international global environment research and observation of the total Earth system;
- research and studies at the local and regional scale on : the hydrological cycle, impacts of climate change, coastal zones, loss of biodiversity, vulnerability of fragile ecosystems, impacts of changing land use, of waste and of human attitudes and behaviour,
- research on transition to a more efficient energy supply and use of materials and natural resources,
- special efforts in education and in building up of scientific institutions as well as involvement of a wide segment of the population in environment and development problem-solving,
- regular appraisals of the most urgent problems of environment and development and communication with policy-makers, the media and the public,
- establishment of a forum to link scientists and development agencies along with a strengthened partnership with organizations charged with addressing problems of environment and development,
- a wide review of environment ethics.

In his closing speech at the ASCEND Conference, the President of ICSU announced ICSU's intention to : consolidate the cooperation between and coherence of ICSU's major international research programmes, strengthen ICSU's role in the evolving partnership among science government, IGOs, business and industry, strengthen ICSU's capacity to prepare objective scientific assessments, report on scientific issues to the general public and decision-makers, strengthen its own activities in capacity building and help review the performance of Agenda 21 after the UNCED.

MEETING ANNOUNCEMENTS

SOLAR-TERRESTRIAL PREDICTIONS WORKSHOP

18-22 May 1992, Ottawa, Canada

Three previous solar-terrestrial predictions workshops have been organized by the International Ursigram and World Days Service (IUWDS). The first was in Boulder in 1979, the second in Meudon in 1984, and the third in Leura, near Sydney, Australia, in 1989. The purpose of this series of workshops is to bring together scientists in the field of solar-terrestrial physics, forecasters of solar-terrestrial conditions, and users affected by the solar-terrestrial environment. These workshops provide a stimulating setting where these three groups can share their problems and concerns, and can help to provide directions for research and development in the future.

The local organization is being undertaken primarily by the Geological Survey of Canada (part of the Government Department of Energy, Mines and Resources), with assistance from the Department of Earth Sciences of Carleton University and from the Communications Research Centre of the Government Department of Communications. The Ottawa Associate Regional Warning Centre (ARWC Ottawa), part of the IUWDS network, is a component of the Geomagnetism programme of the Geological Survey of Canada (GSC). ARWC Ottawa, in conjunction with the other parts of the Geomagnetism Programme of the GSC, provides advice and forecasts to those affected by the solar-terrestrial services.

To foster the communications between researchers, forecasters and users, a new feature of this workshop will be a Users Day. Keynote speakers from affected industries will be invited to present their experiences and their user requirements from solar-terrestrial forecasting services.

The Conference is supported by :

- International Ursigram and World Days Service (IUWDS)
- Geological Survey of Canada (GSC)
- Carleton University (CU)
- Communications Research Centre (CRC)
- Union Radio-Scientifique Internationale (URSI)
- International Union of Geodesy and Geophysics (IUGG)

The International and Local Organizing Committees are chaired by respectively J. Hruska and R. Coles. Some data about the programme :

The first, second, fourth and fifth days of the workshop will consist of two sessions. The morning sessions will be plenary sessions, with invited speakers covering the whole range of solar-terrestrial phenomena related to forecasting. The afternoon sessions will be devoted to meetings of the Working Groups, and will include invited speakers, posters, and discussions. The scheduling of these afternoon sessions will be arranged by the Chairman of the Working Groups. The third day of the Workshop will be a Users Day. Four Working Groups have been selected : Solar WG, Magnetosphere and Interplanetary Space WG, Ionosphere WG, Geomagnetism WG.

For further details, contact :

Dr. Richard COLES
STP Workshop, ARWC Ottawa
Geomagnetism, Geophysics Division, GSC
1 Observatory Crescent
OTTAWA, K1A 0Y3
CANADA

SIXIEME COLLOQUE INTERNATIONAL ET EXPOSITION SUR LA COMPATIBILITÉ ELECTROMAGNÉTIQUE

2-4 juin 1992, Ecully (Lyon), France

Ce colloque est organisé par le Laboratoire d'Electrotechnique de Lyon à l'Ecole Centrale de Lyon, sous le patronage

- du Comité National Français de Radioélectricité Scientifique (CNFRS),
Section Française de l'Union Radio Scientifique Internationale (URSI);
- de la Société des Electriciens, Electroniciens et Radioélectriciens (SEE).

auxquels s'est jointe l'URSI. Notons le soutien des organismes suivants :

- Centre National de la Recherche Scientifique (CNRS);
- Ministère de la Défense (DGA-DRET);
- Electricité de France (EDF-DER);
- Centre National d'Etudes des Télécommunications (CNET);
- Ministère de la Recherche et de la Technologie (MRT).

Après Lille, Trégastel, Clermont-Ferrand, Limoges et Evian, le Colloque international en langue française sur la CEM sera à Lyon lors de sa 6^{ème} édition. Le succès des sessions précédentes a pleinement démontré l'importance et la nécessité d'une telle manifestation, qui permet de regrouper pendant trois jours environ 400 spécialistes de la CEM, aussi bien universitaires qu'industriels.

1992 verra la mise en œuvre de la nouvelle directive européenne sur la CEM des matériels et équipements ; la prise en compte de la CEM est aujourd'hui indispensable dans un domaine de plus en plus vaste. Ceci implique une sensibilisation accrue des concepteurs comme des utilisateurs: la juxtaposition de sessions scientifiques et d'une large exposition trouvera plus que jamais sa justification, en favorisant des discussions approfondies et des débats fructueux entre chercheurs, formateurs, et industriels de différents secteurs, tant civils que militaires.

Le sujet général du colloque est l'analyse des causes et effets de tous les phénomènes électromagnétiques indésirables, ainsi que la détermination et la mise en œuvre des moyens de réduire ces effets ou ces causes.

Les grands thèmes précédemment abordés demeurent d'actualité ; mais on mettra aussi l'accent sur la montée en puissance et en fréquence des sources artificielles, la vulnérabilité et la susceptibilité des systèmes et des circuits, la CEM et l'électronique de puissance, ainsi que les problèmes de CEM dans les véhicules - terrestre ou spatiaux -.

Les thèmes généraux sont :

- A. Sources de bruits naturels et artificiels : analyse, effets
- B. Couplages avec les structures et les systèmes
- C. Techniques et systèmes de mesure
- D. Modélisations numériques en CEM
- E. Méthodes et moyens de protection (équipements et transmissions)

80 communications scientifiques originales, orientées soit vers la recherche, soit vers les applications industrielles innovantes, ont été sélectionnées par le Comité Scientifique.

L'exposition permanente, constituée de plus de 40 stands industriels en parallèle avec le Colloque, prendra en compte l'élargissement et les nouvelles orientations des thèmes scientifiques. Elle s'articulera, dans le domaine de la CEM, autour des rubriques suivantes :

- composants, équipements et systèmes
- matériels et moyens d'essai et de mesure
- moyens et systèmes de protection
- prestations de services et d'études

Le Président du Colloque est le Professeur P. Auriol. Pour tous renseignements, s'adresser au :

Laboratoire d'Electrotechnique de Lyon
Ecole Centrale de Lyon
B.P. 163
F-69131 ECULLY CEDEX
FRANCE
Tél. (33) 7833 8127 poste 4692
Fax (33) 7843 3717

**COMMISSION F OPEN SYMPOSIUM ON "WAVE
PROPAGATION AND REMOTE SENSING"**

8-11 June, 1992, Ravenscar, North Yorkshire, U.K.

This meeting will be devoted to the topics

- Application of radiowave propagation studies to telecommunications and remote sensing
- Remote sensing of the lower and middle atmospheres
- Studies of scattering from the Earth's surface, oceans, land and ice
- Characterization of radio propagation for terrestrial and satellite communications systems
- Radiowave propagation studies for mobile communications
- Radar meteorology
- Regional factors in radiowave propagation

The Technical Programme Committee consists of P.A. Watson (Chairman), G. Brussaard (Chairman Commission F), R.K. Moore (Vice-Chairman Commission F), R.K. Crane, F. Dintelmann, F. Fedi, Y. Furuhashi, MPM Hall, MT Hallikainen, Y. Hosoya, J.P. Mon, R.R. Rogers.

For details, please contact :

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Tel. (44) 274-733 466 Ext. 4002

Fax (44) 274-305 340

E-Mail "P.A. Watson@UK.AC.Bradford"

URSI INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC THEORY

17-20 August 1992, Sydney, Australia

Planning for the Symposium is now well-advanced. The Technical Programme Committee has met and from the abstracts submitted, nearly 240 papers (representing 31 countries) have been accepted. Each day will begin with a plenary session in which there will be presented invited talks on selected subjects. This is followed by three groups of four parallel sessions covering a wide range of topics in applied electromagnetic theory. The Symposium is to end with a Keynote Address.

The subjects of the invited talks are : chiral media, nonlinear guided waves, computational electromagnetics, bioelectromagnetic effects, phase retrieval and satellite antenna developments. Each invited talk is followed on the same day by one or two related sessions that have been specifically prepared by the invited speaker. Other topics in the programme include mobile communications, numerical methods, antennas & waveguides, scattering & diffraction, high frequency techniques, equivalent current technique, microwave integrated circuits, microstrip discontinuities, microstrip antennas, fractals & turbulent media, rough surfaces, inverse scattering, random media, diffraction gratings, electrodynamics, planar transmission lines, propagation.

The social programme includes a reception at the Sydney Opera House, drama and opera theatre parties, a Sydney Harbour dinner cruise, and a visit to the Powerhouse Museum. Numerous local tours are also available.

By early March authors and potential delegates would have received in the mail the Registration Booklet which contains a registration form, a preliminary technical programme, details about the social programme, and general information such as accommodation, pre- and post-Symposium tours, visa requirements, local conditions, etc. If you have not already received this information write or fax to the Symposium Secretariat,

ACTS, at the address given below, requesting a copy of the Registration Booklet. Please send all enquiries to :

EM Theory Symposium
ACTS
GPO Box 2200
CANBERRA, ACT 2601
AUSTRALIA
Fax (61) 6-257 3256

22ND EUROPEAN MICROWAVE CONFERENCE

24-27 August, 1992, Espoo, Finland

This Conference, co-sponsored by URSI, will be held at the Helsinki University of Technology. The main topics are :

1. Novel microwave materials : High-Tc superconductors, magnetic and chiral
2. Millimetre waves
3. Terrestrial and satellite communications
4. New concepts in mobile communications
5. EMC in microwave communications systems
6. Radiowave propagation
7. Antennas
8. Optical/microwave interaction
9. Semi-conductor devices and circuits
10. MMIC and gigabit electronics
11. Passive components
12. CAD and modelling, especially nonlinear modelling
13. Electromagnetic field theory
14. Measurements
15. Radar and remote sensing

16. Industrial, medical and scientific applications
17. Modern microwave education

For further information, contact :

Microwave Exhibitions and Publishers
90 Calvery Road
TUNBRIDGE WELLS
KENT TN1 2UN
UNITED KINGDOM
Tel. (44) 892 544 027
Fax (44) 892 541 023
Telex 95604 MEPNCL G

**10TH INTERNATIONAL ZURICH SYMPOSIUM ON
ELECTROMAGNETIC COMPATIBILITY**

9-11 March 1993, Zurich, Switzerland

Papers may be submitted before March 15, 1992 to the Technical Programme Committee. Young Scientists may apply for URSI support. Inquiries should be directed to :

Dr. G. MEYER
ETH Zentrum - IKT
CH-8092 ZURICH
SWITZERLAND
Tel (41) 1-256-2790
Fax (41) 1-256-0943

Dr. Meyer is the Swiss Official Member of Commission E.

As a reminder, here are some other forthcoming URSI-sponsored meetings :

- International Symposium on Electromagnetic Compatibility, 25-27 May, 1992, Beijing, China
- International Geoscience and Remote Sensing Symposium, 26-29 May, Houston, Texas, USA
- Conference on Precision Electromagnetic Measurements, 9-12 June, 1992, Paris, France (see December 1991 Bulletin)
- Microwave Signature Conference, 1-3 July 1992, Igls-Innsbruck, Austria (see June 1991 Bulletin)
- URSI Radio Science Meeting, IEEE-APS International Symposium and Nuclear EMP meeting, 18-25 July, 1992, Chicago Illinois, USA (see September 1991 Bulletin)
- Radiowave probing of high latitude ionosphere and atmosphere, 10-14 August, 1992, Fairbanks, Alaska, USA
- International Symposium on Signals, Systems and Electronics, 1-4 September, 1992, Paris, France (see June 1991 Bulletin)
- Wroclaw Symposium on Electromagnetic Compatibility, 2-4 September, 1992, Wroclaw, Poland
- 8th International Conference on Electromagnetic Compatibility, 21-24 September, 1992, Edinburgh, U.K.
- International Symposium on Antennas and Propagation, 22-25 September, 1992, Sapporo, Japan
- 18th European Conference on Optical Communication, 27 September - 1 October, 1992, Berlin, Germany (see September 1991 Bulletin)
- Journées Internationales sur les Antennas, 12-14 November, 1992, Nice, France (see September 1991 Bulletin).

REVIEW OF RADIO SCIENCE AND THE ASSOCIATED DISK : STATUS REPORT

W. Ross Stone, Editor-in-Chief

1446 Vista Claridad, La Jolla, CA 92037, USA

Tel. (1-619) 459-8305, Fax (1-619) 459-7140

February 16, 1992

The format of RRS and the disk

As decided by the Council and reported in previous issues of the URSI Bulletin, the Review of Radio Science, 1990-1992 ("RRS") will be published as a book by Oxford University Press. We are targeting a size of 736 pages. Including Preface and other introductory material, Index, Table of Contents, etc., this will leave about 700 pages for the articles. The Publications Committee has decided that these pages will be allocated uniformly among the ten Commissions (note that the new Commission K, on Electromagnetics in Biology and Medicine, will be participating). This means each Commission will have about 70 pages. The Publications Committee has recommended three or four articles per Commission, although some Commissions have chosen to subdivide their page allocation into more articles. It is intended that each article provide a review of advances and research in a segment of the field of interest of the Commission which has been of significant importance for the three years covered. These reviews are intended to be objective - what some refer to as "critical reviews" - in their reporting and analysis. Each review is expected to have its own bibliography. Each article will be peer-reviewed before publication.

A disk (3.5" ASCII in DOS format) will replace and augment the information which was contained in the printed version of RRS in previous years. Although it is not intended to be an exhaustive bibliography for the three years covered, it certainly can be much more complete than the printed versions have been. The Editor from each Commission is responsible for

insuring that there is good international representation, regardless of what member countries may submit. Our experience with producing the "complete references" disk for the last RRS was that there was sufficient space to include all references submitted. Although not an absolute requirement, it was the strong feeling of the Publications Committee that annotations should be added to the references. The disk will be published as just that : a computer-readable disk of references in the topic area of the Commission. An integrated list of references is acceptable. However, many users of the previous "complete references" disk found separation by member country to be very useful, and this is strongly recommended.

Status of the effort

A time table for the various steps in preparing the inputs from the Commissions, along with detailed instructions, has been promulgated. All of the Commissions have appointed Editors, as follows :

Commission	RRS Editor	Disk Editor (if different)
A	Dr. Peter I. Somlo	Mr. R.W. Yell
B	Prof. Staffan Ström	
C	Prof. P.A. Matthews	
D	Prof. T. Itoh	
E	Prof. Pierre Degauque	
F	Prof. Richard K. Moore	
G	Prof. K.C. Yeh	
H	Dr. Françoise Lefevvre	
J	Dr. A. Tzioumis	
K	Prof. Paolo Bernardi	

The Editors were supposed to have identified titles for the articles, obtained authors, and the authors were to have submitted abstracts of their articles to the Editor-in-Chief by January 1, 1992. As of the date of this report (February 16, 1992), Commissions B, G and K are essentially keeping up with the schedule, having obtained written proof that the RRS authors have

begun (e.g. abstracts for each article). They also appear to be well under way with regard to the disk. Commissions D, E and H have authors and topics identified, but have not obtained abstracts. However, it appears that they will have these soon. Commission A and J have identified topics and are attempting to confirm authors. Commission C and F have been quite slow in starting, although Commission F is underway.

Most Editors have chosen to contact the Chairs of the respective Commissions in the Member Committees to provide input to the disk. Anyone active in URSI is encouraged to contact the Official Member of the proper Commission if they are aware of papers which they feel should be included in the disk. They are encouraged to submit their input on disk (in ASCII format) as well as in printed form, and to include several lines of annotation describing the significance of each paper, in terms of its results.

The following are the last dates by which various items are to be received by the Editor-in-Chief :

Review of Radio Science

1. Nov. 1, 1991 Names, addresses, and fax numbers of all Commission Editors received.
2. Jan 1, 1992 Tentative titles, topics, and abstracts of all articles, along with corresponding authors' names, addresses, and fax numbers received.
3. April 1, 1992 Detailed outline of all articles received.
4. July 1, 1992 Names, addresses, and fax numbers of all reviewers for all articles received.
5. Aug 1, 1992 Manuscript of all articles received, and sent by Commission Editors to reviewers.
6. Sept. 1, 1992 Reviewers' and Editor's comments returned to authors.
7. Nov. 1, 1992 Final manuscripts received (hard copy and disk).
8. Feb. 1, 1993 Galleys returned to authors and Editors for correction.
9. Feb. 15, 1993 Corrected galleys returned
10. Mar. 1, 1993 Camera-ready galleys sent to Oxford University Press

Collected References on Disk

1. Nov. 1, 1991 Names, addresses, and fax numbers of all Commission Editors received.
2. Jan 1, 1992 Names, addresses, and fax numbers of all topic-area contributors received.
3. June 1, 1992 Progress report from all topic-area contributors sent to Commission Editor
4. July 1, 1992 Summary report from all Commission Editors received
5. Sept. 1, 1992 Progress report from all topic-area contributors sent to Commission Editor
6. Oct. 1, 1992 Summary report from all Commission Editors received
7. Nov. 1, 1992 Final disks received by Commission Editor
8. Dec. 15, 1992 Final disks from all Commissions received

BOOKS PUBLISHED BY MEMBERS OF THE URSI COMMUNITY

Z TRANSFORM THEORY AND APPLICATIONS

by R. Vich

Published in 1987 by D. Reidel Publishing Company, 246 pages (ISBN 90-277-1917-9). Japanese translation published by Brain Tosho, Matsuyama City 1991, 278 pages (ISBN 89-241-047-0).

The contents of the book are :

1. Discrete signals and systems
2. Properties of the Z Transform
 - 2.1. Fundamental Theorems on the Z Transform
 - 2.2. Inverse Z Transform
 - 2.3. Transform of the Product of Two Sequences
 - 2.4. Two-Sided Z Transform
3. Application of the Z Transform to the Analysis of Linear Discrete Systems
 - 3.1. Solution of Difference Equations
 - 3.2. Transfer Function of a Discrete System
 - 3.3. Application of the Z Transform to the Analysis of Impulse Systems
4. Application of the Z Transform to the Simulation of Continuous Systems
 - 4.1. Simulation in the Time Domain
 - 4.2. Simulation in the Frequency Domain
 - 4.3. Application of the Z Transform in Numerical Calculus
5. Application of the Z Transform to the Analysis of Digital Filters
 - 5.1. Realization of the Transfer Function of a Digital Filter
 - 5.2. Analysis of Digital Filters
6. Application of the Z Transform to the Analysis of Discrete Signals
 - 6.1. Z Transform and the Discrete Fourier Transform
 - 6.2. Restoration of the Input Signal of a System from its Response
7. Appendices

FROM THE ARCHIVES OF URSI

Excerpts from the Bulletins of ten, twenty, thirty and forty years ago.

From the Bulletin of January - February 1952

The Bulletin contains a fairly extensive report on the activities of the URSI Committee in Japan, in particular in the areas of the Ursigrams and Commission II (Propagation). We also note a request by the CCIR for a more extensive collaboration on topics such as :

- Frequency standards
- Wave propagation in the troposphere
- Presentation of ionospheric data
- Exchange of informations on ionospheric perturbations
- Prediction of the Solar activity index
- Non-linear effects in the ionosphere
- Propagation below 1,500 KHz
- Measurement of atmosphere radio noise
- Definition of a unit for the quantity of information

From the Bulletin of March-April 1952

The Bulletin contains a sequel to the report of the Japanese Committee, now covering the areas of Commissions I and VII, and an extensive report by the Committee in India on recent ionosphere researches carried out in that country. The issue also gives information about the preparation of the 1952 General Assembly, with emphasis on the programme of the Commissions. It is perhaps interesting to mention the titles of the Commissions in 1952 :

- I : Measurements and Standardization (President : J.H. Dellinger, USA)
- II : Waves and Troposphere (President : C.R. Burrows, U.S.A.)
- III : Waves and Ionosphere (President : E. Appleton, U.K.)
- IV : Terrestrial Atmospherics (President : H. Norinder, Sweden)
- V : Radioastronomy (President : D.F. Martyn, Australia)
- VI : Waves and Circuits (President : B. van der Pol, Netherlands)
- VII : Electronics (President : G. Lehmann, France)

From the Bulletin of January - February 1962

This issue concentrates on administrative matters. We note an extensive bibliography produced by the Commission on the Ionosphere at the General Assembly of London, held in 1960. Of particular interest is the report of a meeting, held in 1961 in Kyoto, at which it was proposed to merge two previously existing services into the (present-day) IUWDS, the International Ursigrams and World Days Service. The proposal was later adopted by the IAU, the IUGG and URSI. We also find an extensive discussion on the protection of radioastronomy frequencies, in particular with respect to a Space project named West Ford. The project consisted in putting bands of orbiting dipoles, perhaps 60 km long, at an altitude of a few thousand kilometres, in order to explore a possibly reliable, new system of long-range radiocommunication. Radioastronomers expressed the fear that the dipoles might not be short-lived, and therefore develop into a permanent danger to observations.

From The Bulletin of March-April 1962

The emphasis in this issue was on the I.Y.Q.S., the International Year of the Quiet Sun, a geophysical programme coinciding with a period of minimum solar activity (April 1964 to December 1965). This ICSU project was meant to complement the IGY (International Geophysical Year) which coincided with a period of maximum solar activity. Several countries described their national effort : Austria, Belgium, Czechoslovakia, Finland, France, Ireland, Japan, the Netherlands, New Zealand and the U.S.A. Also included were the recommendations of IAU, URSI, SCAR and COSPAR. The issue also featured the report of the Coordinating Committee which met in Brussels in April 1962 to prepare the Programme of the 1963 General Assembly in Tokyo.

From the March 1972 issue

Those of us who followed URSI affairs twenty five years ago may remember heated discussions on a possible re-orientation of URSI's activities. A Working Group on Reorganization had been created to study

the problem ; it met in 1969-1970. The essence of the discussions was summarized as follows in the Bulletin :

"At first sight the scientific interests of the eight URSI Commissions differ considerably from each other. However, all the Commissions have a common interest in research relating to the propagation of electromagnetic radiation and association questions; it is generally agreed also that this community of interests acts as a binding or cohesive force which, at present, has the effect of holding together the different groups of radio scientists in URSI.

The URSI Working Group on Reorganization (1969-1970) recognized this cohesive force and the desirability of maintaining, within ICSU, a single forum for the discussion of all aspects of radio science and its applications. This was one of the reasons underlying the recommendation that URSI should remain as a Union concerned primarily with radio science.

On the other hand, it can not be denied that similar cohesive forces tend to hold together all geophysicists, even though the different aspects of the subjects in which they are interested are divided between several Unions. The same can be said also for astronomers.

Because of historical reasons, associated with the development of science, the pioneers in ionospheric and magnetospheric research were radio scientists and not geophysicists. Also, for obvious reasons, radio astronomy was pioneered by radio scientists before being incorporated later into the main field of astronomical research. In consequence, several of the present URSI Commissions are concerned with these branches of science, and indeed, many of the radio scientists associated with URSI can equally well regard themselves as geophysicists or astronomers. Hence, in addition to the internal cohesion of the radio scientists within URSI, there is an analogous cohesion among the geophysicists in URSI and IUGG and among the astronomers in URSI and IAU.

IUGG and IAU deal respectively with geophysics and astronomy in the broadest sense of these terms; they are concerned not only with the

fundamental problems in these branches of science, but also with the interpretation of observational data acquired by all possible types of experiment, including those depending on the use of radio waves. In URSI, on the other hand, attention is concentrated mainly on, for example, the ionospheric of the magnetospheric plasma as a medium in which electromagnetic radiation can be generated or propagated. Hence radio scientists whose interest extends beyond this limited aspect of the upper atmospheric plasma are increasingly likely to regard IUGG, rather than URSI, as the natural forum for the discussion of ionospheric and magnetospheric physics in general.

If this view is correct, then there will be a gradual dispersion of the radio scientists associated with Commissions III, IV, V and parts of II and VIII and a corresponding decrease in the importance of these Commissions.

It is believed that the development of such a situation could be avoided by the creation of a Union on Electromagnetism and Aeronomy; it is suggested that such a Union should cover not only all the branches of radio science of interest to URSI at the present time, but also aeronomy and the geomagnetic field.

Such a Union would have two important advantages : it would preserve the cohesion of all the radio scientists in URSI and, in addition, it would ensure much easier and closer cooperation between the groups of geophysicists at present divided between URSI and IUGG.

On the other hand, if it is considered preferable, for any reason, to retain URSI as a separate Union, then it would be necessary to transform it in a radical way so that, in future, the activities of Commissions I, VI and VII would form the scientific basis of the reoriented Union."

Professor Booker, vice-president of URSI at the time, made a few interesting remarks :

"(a) in the URSI Commissions concerned with the neutral and ionized atmospheres, the magnetosphere and radioastronomy, radio science is concerned primarily with investigations of the different media by

studying the way in which they affect radio waves propagated through them.

- (b) So long as radio probing techniques remained the principal or the only means of studying the various media, it has been logical to regard URSI as the natural international forum for discussions of the relevant geophysical and astronomical problems. However, as the relative importance of radio methods increases, there will be an increasing trend towards the acceptance of IUGG and IAU as the appropriate Unions for discussions on geophysical and astronomical research respectively.
- (c) As a result of (b), the importance of both geophysical and radioastronomy within URSI will decrease and ultimately the principal responsibilities of the Union will be those aspects of radio science at present covered by Commissions I, VI and VII."

Professor Booker pointed out that the trends referred to in (b) and (c) above will have important consequences for URSI, even if the General Assembly in 1972 decides that there is no need to make any changes. The Union can not continue to exist as it is at present; instead there will be a continued decrease in the importance of the Commissions dealing with geophysics and radioastronomy, and the radio scientists who are interested in these fields will tend to prefer the more broadly based Unions : IUGG and IAU.

Thus the inevitable consequence of taking no action would be the ultimate division of radio scientists into separate groups in several Unions.

In these circumstances, the groups remaining within URSI would consist of those concerned with the more fundamental aspects of radio science, rather than with its applications to research on the environment.

There is some doubt as to whether a Union dealing only with the branches of radio science covered by the present Commissions I, VI and VII would be sufficiently broadly based to be viable. Professor Booker believed that it would be necessary to find a much wider group of scientific activities for a

Union based on the activities of these Commissions. In this connection, he suggested that "Information and communication science" is worth consideration since this field seems likely to retain its importance and to require international cooperation. A Union concerned with this science would not restrict itself to radio techniques alone, but would cover also optical and acoustical communications. It would retain an interest in wave propagation in various media and in such practical questions as communications systems depending on ionospheric and tropospheric propagation.

The final recommendation was that three actions should be considered at the Warsaw General Assembly, to be held in the Summer of 1972.

Action 1 : To leave URSI more or less as it was at present.

- Effect on Radio Science - The present cohesion of radio scientists would be only temporarily preserved.
- Long-term Prospects - Scientists whose research interests extend outside radio science would be increasingly attracted to Unions other than URSI (IUGG for geophysics; IAU for astronomy).

Action 2 : To transform URSI into a Union on Information and Communication Science. This could be done deliberately, or it could be an end-product of Action 1.

- Effect on Radio Science - Radio scientists having an interest in geophysics or astronomy would be separated from those concerned with information and communication science.
- Long-term Prospects - The reoriented URSI would cover all aspects of information and communication science (radio, acoustical and optical). Relations with international engineering organizations would require consideration.

Action 3 : To create - following an agreement between URSI and IUGG - a Union on Electromagnetism and Aeronomy, incorporating radio science (as in URSI) plus geomagnetism and aeronomy (as in IUGG).

- Effect in Radio Science - The present cohesion of radio scientists in URSI would be preserved. Also it would be possible to achieve at

once, and not as a long-term result of Action 1, the desirable cohesion between all the scientists in URSI and IUGG who are concerned in some way with geophysics.

- Long-term Prospects - All the present activities of URSI, without exception, would be preserved in the new Union.

The very rich March 1972 issue also contained a note about the Warsaw General Assembly, and in particular a statement about the Young Scientists Programme there :

"As for the 1969 Ottawa Assembly, several Committees have already stated their intention of including younger scientists in their delegations. In addition, the Board of Officers has made \$10,000 available for the support of about a dozen young scientists who could not otherwise be present. The selection will be made from the candidates already proposed by Member Committees."

Details were also given on EISCAT, the European Ionospheric Scatter Observatory :

"At the XVI General Assembly of URSI in 1969, it was recommended that European research groups be urged to investigate the possibility of establishing an incoherent scatter observatory in the European auroral zone.

It is satisfactory to record that prompt action was taken jointly by Finland, France, Germany, Norway and Sweden whose representatives organized a feasibility study on such a project. The resulting proposal for a European Incoherent Scatter Facility in the Auroral Zone (EISCAT) is contained in a 79-page report, published in June 1971 by the Auroral Observatory, Tromsø, Norway, and presented by F. du Castel (France), O. Holt (Norway), B. Hultqvist (Sweden), H. Kohl (Germany), and M. Tiuri (Finland).

The project envisages a tristatic and a monostatic radar operating near 958 MHz and 240 MHz respectively. The tristatic system would enable three independent velocity components of the moving plasma to be measured and would be of great value in studies of the dynamics of the upper atmosphere. The sensitivity of the EISCAT system for making drift determinations will be significantly better than that of the only present operational multistatic system : St-Santin - Nançay. It is intended to install the UHF transmitter and the complete VHF radar at Tromsø (Norway), Kiruna (Sweden) and Sodankylä (Finland). These stations are situated between the $L = 6$ and $L = 8$ contours at 1,000 km. The magnetic inclination at Tromsø varies from 78° at the ground to 75° at 2,000 km.

The principal technical features of the proposed system are as follows :

frequency : 958 and 240 MHz

power :

- peak pulse : 5 MW
- mean : 150 kW

transmitting antennae :

- Tromsø UHF : 50 m paraboloid
- Tromsø VHF : 100 m x 100 m steerable array

receiving antennae :

- Kiruna : 25 m steerable paraboloid
- Sodenkylä : 30 m steerable paraboloid

Northern Scandinavia appears to be a very appropriate location for an incoherent scatter system because of the already well-established observatories in Finland, Norway and Sweden which have long been very active in high-latitude ionospheric, auroral and geomagnetic research, and in radio wave propagation studies. The existence of the observatories at Sodenkylä, Tromsø and Kiruna will help to minimise the cost and to simplify the operation of the EISCAT.

The proposed envisages that the five countries concerned should share the capital and running costs over a period of 10 years. The prospective member organisations would negotiate a formal agreement envisaging the commencement of operation in 1975."

The March 1982 Bulletin contained only routine administrative matters.

PERSONALIA

Professor D.S. Jones, laureate of the van der Pol Gold Medal in 1981, will celebrate his 70th birthday this year. Upon this occasion the "Twelfth Conference on Ordinary and Partial Differential Equations", which will be held in Dundee on June 22-26, 1992, will be dedicated to him. Requests for further information, and submission of contributions, should be directed to :

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