

## U, R, S, I.

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IN MEMORIAM  
PIERRE MISME

C'est avec une profonde tristesse que nous avons le devoir de vous annoncer le décès de Pierre Misme, survenu le 8 février 1989, à l'âge de 68 ans.

Ingénieur en chef de la Météorologie Française, Pierre Misme avait été détaché au Centre National d'Etudes des Télécommunications depuis 1955 jusqu'à sa retraite.

Pierre Misme a tenu dans la vie de l'URSI une place à la mesure de l'importance qu'il attachait à l'Union. Il a participé à toutes les Assemblées générales depuis celle de Boulder (1957) jusqu'à celle de Florence (1984) et y a tenu un rôle actif, principalement dans la Commission II (Radioélectricité et Troposphère), devenue l'actuelle Commission F.

Il en fut Secrétaire de 1963 à 1969, Vice-Président de 1969 à 1972 et Président de 1972 à 1975. Il fut également, en tant que représentant de l'UGGI, membre de la Commission inter-Unions de Radiométéorologie à partir de 1966 et représentant de l'URSI à la Commission inter-Unions pour l'Etude de la Lune de 1972 à 1975. Durant toute cette longue période, il joua le rôle d'un lien actif entre l'URSI et la Commission d'études V (Propagation dans les milieux non ionisés) du CCIR dont il fut Président d'un groupe de travail permanent. Il accepta en outre plusieurs missions comme expert des Nations Unies.

L'apport scientifique de Pierre Misme tant à la Commission F qu'à la Commission d'études V du CCIR fut considérable. Il a su, d'une manière impressionnante, concilier le réalisme du météorologiste confronté à des phénomènes naturels complexes et souvent mal élucidés, la rigueur du radioélectricien et le pragmatisme de l'ingénieur.

Ceux qui ont pu observer Pierre Misme présidant l'une ou l'autre assemblée ont parfois pu être surpris par sa manière directe d'aborder les problèmes et d'écarter rapidement les difficultés peu significatives. Ceux qui y ont regardé de plus près ont reconnu en lui un homme d'une clairvoyance remarquable,

très conscient des intérêts à long terme de l'URSI dans sa fonction internationale. Enfin, ceux qui ont su l'écouter et l'observer en marge de sa fonction officielle, lorsqu'il se transformait tantôt en humaniste et tantôt en étudiant gouaillieur, ont découvert une personne soucieuse de créer une atmosphère amicale entre des hommes que l'aridité de la science ne contribue pas toujours à rapprocher; c'est bien dans cet esprit qu'il amorça, comme organisateur de l'inoubliable Colloque de La Baule en 1977, la tradition des chaleureux symposia triennaux de la Commission F.

Ils sont nombreux les scientifiques de l'URSI à penser, parodiant un chanteur qu'il aimait, "Adieu Pierre, on t'aimait bien, tu sais..." et à dire à Madame Misme et à sa famille combien ils partagent leur peine.

P.D.

## MARIO BOELLA

It is with deep regret that we announce the death, on 16 February 1989, of Professor Mario Boella, Vice-President of URSI from 1966 to 1969, and President of the Italian URSI Committee for many years. An Obituary will appear in the June issue of the Bulletin.

## SAUL ROSENTHAL

The sad news has reached the URSI Secretariat of the death, on 18 January 1989, of Professor Saul Rosenthal, Chairman of the URSI Working Group on Interaction of Electromagnetic Fields with Biological Systems, since its creation in 1975. An Obituary will appear in the June issue of the Bulletin.

## PROFESSOR HENRY G. BOOKER

Professor Henry G. Booker, an Honorary President of URSI, died on 1st November 1988. An obituary notice has already appeared in the December 1988 issue of the URSI Bulletin. I have been asked to supply some further details about Booker's work in England up to 1948 when he moved to the U.S.A.

Booker was a mathematics scholar at Christ's College Cambridge in 1930-33, and was a wrangler in the Mathematical Tripos in 1933. He then started research in the Faculty of Mathematics at Cambridge. In 1935 he was awarded the Smith's Prize in the University of Cambridge for an essay entitled "The propagation of wireless waves in the ionosphere." In 1936 he received the Cambridge Ph.D. degree.

When he started research in 1933 he worked closely with the radio group in the Cavendish Laboratory, Cambridge, under J.A. Ratcliffe. His work was theoretical and concerned with the magnetoionic theory which Sir Edward Appleton had recently formulated. He published four papers which were models of clear exposition and helped us to understand the physics of radio waves when they enter the ionosphere. The final paper of the group (Booker, 1939) is still useful reading for students and has been hailed as one of the most important papers ever written on radio wave propagation. It deals with the physics of at least three important concepts, (i) the dispersion relation in a stratified medium expressed as a quartic equation, now called the Booker quartic; (ii) the idea that a radio ray can be regarded as the path of a wave packet, and following from this (iii) a method of ray tracing in an anisotropic stratified medium known as the Booker method of ray tracing.

Ratcliffe regarded our subject as a branch of physics, and rarely used complicated mathematics. He did not want the mathematics to obscure the physics, he wanted it to illuminate the physics. Even though Booker was educated as a mathematician, he adopted the same philosophy. He taught students to try to understand the physics of every line of mathematics that they write down and never unnecessarily to show off the mathematics that they happen to know.

From 1935 to 1937 Booker gave several lecture courses at

Cambridge on radio propagation topics. These included the magnetoionic theory, and the theory of propagation over a partly conducting ground. He dealt with Sommerfeld's famous paper (1909) on this subject and was later to make important new contributions to it by interpreting it in terms of a diffraction process. These lectures were outstandingly clear and they inspired an interest in the subject and a conviction that it is worth taking trouble to achieve clear exposition.

In 1937-1939 Booker worked at the Department of Terrestrial Magnetism of the Carnegie Institute in Washington D.C. Here he became interested in several new topics, including irregularities in the F region of the ionosphere and the phenomenon of spread F, the Lorentz polarisation term and possible ways of deciding experimentally whether it should be included in magnetoionic theory.

During the war he was head of the mathematics group in the British radar research establishment, best known as the Telecommunications Research Establishment (TRE), but now called the Royal Radar Establishment. Here he worked on several subjects concerned with antennae and propagation, and in particular on the phenomenon known as "anomalous propagation" or "super-refraction". In some conditions the troposphere can act as a reflector of radio waves and with the earth's surface it forms a wave guide, in which radio waves can travel to abnormally large distances. The paper by Booker and Walkinshaw (1946) extended the theory to deal with other types of guided wave propagation and is about the best of many papers written at that time on this subject. Booker maintained his interest in guided waves and published further papers on these topics.

In 1945-1948 Booker returned to Cambridge and again worked in close collaboration with Ratcliffe's group in the Cavendish Laboratory. His interests included the effect of irregularities in the ionospheric plasma and before he left Cambridge he worked with Ratcliffe on this subject. The paper by Booker, Ratcliffe and Shinn (1950) is an important early contribution. Booker was later to contribute many further papers in this subject area.

In 1938 Booker married Adelaide McNish whom he had met during his sabbatical leave in Washington D.C. in 1937-1938. In 1948 they moved to the U.S.A. where he became Professor of Electrical Engineering at Cornell University. His later work is covered by the obituary in the December 1988 issue of this

Bulletin.

Cavendish Laboratory  
Cambridge, U.K.

K.G. BUDDEN

January 1989

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## URSI AWARDS

A Circular Letter, signed jointly by the President and the Secretary General of the Union, was sent out in January 1989 to the Member Committees of URSI and to the Chairmen and Vice-Chairmen of Commissions, inviting nominations for the four URSI Awards to be presented next year at the occasion of the XXIII General Assembly in Prague, Czechoslovakia. The Awards are as follows:

- Balth. van der Pol Gold Medal,
- John Howard Dellinger Gold Medal,
- Appleton Prize,
- Issac Koga Gold Medal.

At its meeting in July 1988, the Board of Officers decided to ask the founders of the awards whether they would agree to widen the group of nominators by including the former laureates of an URSI Award. Approval has been obtained, and the Rules have been modified accordingly.

Another slight modification has been introduced in the procedure, namely nominations will have to be submitted using standard forms available at the URSI Secretariat.

The Rules for the URSI Awards are reproduced below.

### RULES FOR THE AWARD OF THE BALTH. VAN DER POL AND J.H. DELLINGER GOLD MEDALS

1. The Balth. van der Pol and the J.H. 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 considerably greater or 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 nominations 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, 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 considerably greater or 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 considerably greater or 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. No member of the URSI Board of Officers shall be eligible. 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 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 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 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, 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.

XXIII GENERAL ASSEMBLY, PRAGUE 1990  
YOUNG SCIENTISTS PROGRAMME

Some background material has been included in the accompanying Newsletter by Professor E.V. Jull, Vice-President of URSI in charge of the Young Scientists Programme. The organizers of the Prague Assembly hope to host up to 100 Young Scientists from developed and developing countries, and provide them with room, board and other facilities. The Member Committees, Commission Chairmen and Vice-Chairmen have received the information necessary to generate and process nominations. Efforts are under way to obtain travel support for our young colleagues from developing countries.

## NEWS FROM MEMBER COMMITTEES

### GIOVANNI GIORGI MEETING

As already announced in *URSI Information Bulletin* No 247 (December 1988), an historical Meeting entitled "Giovanni Giorgi and his Contribution to Electrical Metrology" was held at the Politecnico di Torino in September 1988, to celebrate the 50th anniversary of the confirmation of the Giorgi System.

Renowned scientists took part in the Meeting, with lectures covering the various historical aspects and the development of the System.

The Proceedings of the Meeting are now being drafted and should be printed by next Summer.

A free copy of the Proceedings will be sent by surface mail to any person applying not later than one month after receipt of the present issue of the Bulletin. In case an overseas air mail parcel is requested, a contribution of US\$20 will be required.

Address for orders: Prof. Claudio Egidi  
Politecnico di Torino  
Dipartimento di Elettronica  
Corso Duca degli Abruzzi 24  
I - 10129 Torino, Italy.

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### CONFERENCE GIOVANNI GIORGI

Comme déjà annoncé dans le *Bulletin d'Information de l'URSI* No 247 (décembre 1988), une Conférence à caractère historique intitulée "Giovanni Giorgi et sa contribution à la métrologie électrique" s'est tenue en septembre 1988 au Politecnico di Torino, pour célébrer le 50<sup>e</sup> anniversaire de la confirmation du Système Giorgi.

Au cours de la Conférence, d'éminents scientifiques ont

présenté des communications sur les différents aspects historiques et sur le développement du Système Giorgi.

Les Actes de la Conférence sont en cours de préparation et seront publiés pendant l'été 1989.

Un exemplaire gratuit de ces Actes sera envoyé à toute personne qui en fera la demande dans un délai d'un mois après réception du présent numéro du Bulletin. Pour les expéditions par voie aérienne, une contribution de 20 dollars sera demandée.

Les demandes sont à adresser au

Prof. Claudio Egidi  
Politecnico di Torino  
Dipartimento di Elettronica  
Corso Duca degli Abruzzi 24  
I-10129 Torino, Italie.



## COURSE ON BASIC TELECOMMUNICATION SCIENCE

Trieste, Italy, 9 January - 3 February 1989

This Course was organized by the International Centre for Theoretical Physics (ICTP), which provided facilities and the quasi-totality of the financial support, and URSI, which took care of the scientific content of the Course. The some 60 participants, about half of whom of Young Scientist age, belonged to 31 different developing countries.

The first half of the Course was devoted to the following topics: impulse and Fourier responses of linear systems, DFT, FFT, telecommunication systems, ISDN, noise and probability, baseband pulse transmission, analogue modulation, FM, bandpass signals and noise, radio systems path loss, digital modulation, error rates, broadcasting, coding, detection of coded signals, spread spectrum techniques, speech coding, encryption, ITU, CCIR, CCITT, EBU, ABU, radio relays.

The directors were, for the first week, Prof. Dutta Roy, Indian Institute of Technology, New Delhi and, for the second week, Prof. Matthews, University of Leeds, UK, Vice-Chairman of URSI Commission C on Signals and Systems.

They were assisted by the following lecturers:

Prof. Lucas, University of Sydney, Australia;  
Prof. Prasad, Indian Institute of Technology, New Delhi, India;  
Prof. Palazzo, Universidad Estadual de Campinas, Brazil;  
Dr. Strużak (Poland), CCIR, Geneva, former Vice-Chairman of URSI Commission E on Electromagnetic Noise and Interference.

When the material of the Course was being prepared it had been assumed that most students would have some knowledge of the basic theory concerned with the description of signals and modulation techniques. This knowledge was reinforced during the first week by lectures on signals, systems, and analogue modulation. During the first week the students were also introduced to the use of the personal computers in the Informatics Laboratory of the Centre and to the use of the DFT and FFT as fundamental mathematical tools for signal processing. Problems

related to transmission lines and the fundamental properties of antennas used in telecommunications systems were also reviewed.

During the Course students were introduced to several computer packages which were contributed by the lecturers. These included packages for the simulation of signal waveforms in systems, for ionospheric prediction, and for calculations of the performance of microwave link and satellite communication systems. The various programmes were mounted on the personal computer network so that they could be used by a number of students simultaneously. This work was undertaken enthusiastically by students some of whom had little or no access to computing facilities in their own universities.

The second half of the Course, encompassing the 3rd and 4th weeks, was devoted to the following topics: refresher course in electromagnetic theory (in which some 14 items were discussed), optical fibres, light emitting devices, detectors, special optical sensors and amplifiers, optical fibre lasers, antenna systems, wave propagation in a rainy environment, propagation effects in the clear atmosphere, elements of ionospheric propagation, introduction to satellite communications and systems, link design, earth station technology, earth observation systems, remote sensing physics, space missions, present earth observation missions, data dissemination.

The director for the second half of the Course was Prof. Van Bladel, Secretary General of URSI, who lectured together with

Prof. Gambling, University of Southampton, UK, past Chairman of URSI Commission D on Electronic and Optical Devices and Applications;

Dr. Moupfouma, Avions Marcel Dassault, France;

Mr. Bartholomé (Belgium), European Space Research and Technology Centre, Noordwijk, Netherlands;

Dr. Marelli (Italy), ESRIN, Frascati, Italy;

Dr. De Zutter, University of Ghent, Belgium.

The accommodation and documentation facilities provided by the International Centre for Theoretical Physics (ICTP) were excellent. The Centre was founded in 1964 by the International Atomic Energy Agency (Vienna, Austria) with financial help from the Government of Italy and a building made available by the City of Trieste and the Region of Friuli-Venezia Giulia.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris, France, joined with the IAEA in 1970 as a full partner in the financing as well as in the scientific and administrative management of the Centre. The largest part of the annual budget is provided by the Government of Italy.

The response by students to material presented on the Course was most rewarding for the staff. After a quiet start the students responded well as they became accustomed to the lecturers and other members of the Course so that by the second week they responded well to the lectures. Some said that they were tired out by the end of the day by studying the material presented to them but all seemed to be willing to talk well into the evening about the work.

The Course administration was well handled by the staff from ICTP who were most helpful in dealing problems and making arrangements required during the Course. The computer network was organized by Christopher Heller who must be thanked for his help. Thanks are particularly due to Ms Ave Lusenti and Ms Sessi, secretaries for the Course for their invaluable help during the organization of the Course and whilst the Course was being given. Thanks are also given to the various people in Hewlett-Packard from Sydney to Scotland who arranged the loan of demonstration equipment and teaching material.

In conclusion, the Course was followed with great enthusiasm by the participants, who were particularly happy about the contacts they were able to make with fellow scientists from developing countries. Most participants remained in Trieste for the following 3-week Course, a "College on theoretical and experimental radio propagation physics", on which Prof. Radicella will report in the June issue of the *URSI Information Bulletin*. Plans for possible further editions of the Telecommunications Course, emphasizing more extensive experimental training, are under consideration.

# THE WORLD ADMINISTRATIVE TELEGRAPHIC AND TELEPHONE CONFERENCE 1988 (WATTC-88)

Melbourne, Australia, 28 November-9 December 1988

## 1. Introduction

The last set of Regulations were made some fifteen years ago at WATTC-73. In order to cope with the technological developments which have occurred since then it was clear that vast changes were necessary. In the opening statement to the Conference considerable emphasis was placed on the "importance" of the new Regulations not stifling the continued developments in the whole telecommunications area during the next two decades.

A Preparatory Committee has been working for the three years prior to this meeting preparing a draft set of Regulations for consideration at WATTC-88. This provided a working document for the conference which was extensively revised during the proceedings.

## 2. The Principal Issues

These new Regulations have to be crafted to suit both Regulated and Deregulated countries. Most of the major "developed" countries are in the process of or have already legislated to deregulate their NATIONAL telecommunications. In other words in those places private industry is taking over all aspects of the provision of telecommunications services and free enterprise and competition is being highly encouraged. Needless to say private industry does not see itself being limited by any border or even more importantly by any technique. Thus, any new breakthroughs which are commercially viable and can beat "the competition" are "good" for business. When this competitive approach starts to spread across national borders this of course begins to tread into the whole area of ITU and the relevance of the CCITT recommendations. There was no doubt that many held the view that the new Regulations should be absolutely minimal.

On the other hand the "developing countries" have typically a 'modest' telecommunications service within their nation and are doing everything in their power to expand that coverage

The services which exist are typically being provided through rugged and inhospitable domains and are capital cost intensive. During the last few years with the introduction of satellites it has been possible for private companies to set up international links and offer attractive "value added" communications services to customers who were willing to pay. A typical example might be the banking system.

These 'value added' services are becoming the top money makers in telecommunications and the developing nations see these services 'by-passing' the local network completely and thus not providing any income with which to support and expand their own telecommunications network. The developing countries were determined that all such services should be covered by the Regulations and be 'controlled' by each national Government - National Sovereignty was a real issue here.

The developing countries also see immense problems if there is not a standard protocol agreed to - in contrast to the deregulated members who want to allow all possible further developments. The developing countries have to purchase virtually all of their communication equipment from overseas at a very high relative cost and they are adamant that it should still work after at least a decade. If new technologies are allowed in with new speeds, new codes etc. they cannot see how they can ever catch up. They were very concerned that the large developed countries have in recent years started to become "nationalistic" in looking after their own interests without any regard to the effects that such actions cause to small nations in Africa for example.

The developing countries also point to the complete unavailability of frequency space for them to 'share' as they continue to develop.

In spite of all the conflicting requirements WATTC-88 did succeed in developing a new set of International Telecommunication Regulations.

### 3. Conclusion

In recent times URSI has been discussing how it might interact more closely with the CCI's and the future developments of Telecommunications in a general way. The clearest observation at this conference was the immense difference in ability between the 'Developed' and the 'Developing' countries.

It seems to me that URSI is directly addressing that problem by providing the Basic Course in Telecommunications (Trieste, January 1989) which is very clearly an excellent step in the right direction.

What the developing countries need in addition is more technology based instruction. If a course could be provided which would teach them HOW to design telecommunications equipment and how to actually construct perhaps some basic requirements, I believe it, would be absolutely invaluable. I would venture to say that most of those developing countries do not have the expertise to properly specify the equipment which they need and can properly make use of.

A course of this sort is not a trivial matter to implement but I would recommend that URSI give serious consideration to such a possibility.

14 February 1989

Dr. J.G. Lucas  
The University of Sydney  
NSW 2006, Australia.

## ANNOUNCEMENTS OF MEETINGS AND SYMPOSIA

### IGARSS'89/12th CANADIAN SYMPOSIUM ON REMOTE SENSING

Vancouver, Canada, 10-14 July 1989

The theme of the meeting, "Quantitative Remote Sensing: An Economic Tool for the Nineties", emphasizes the increasing capabilities of remote sensing to provide economically valuable information. The meeting will survey the full range of applications in all aspects of resource and environmental management.

Technical sessions will be coordinated to provide a balanced programme of submitted and invited papers covering all aspects of remote sensing of the earth's surface and atmosphere. URSI sessions will also address complementary topics in microwave and optical propagation and scattering. The topics listed below are intended as suggestions.

#### A. ENVIRONMENTAL PROCESSES

Land surface, climatology; Vegetation and models; Crops; Spectral signatures; Forests; Cartography; Geology; Coastal, oceans; Hydrology, atmosphere.

#### B. PROCESSING

Techniques for multi-dimensional data sets; Artificial intelligence and expert systems; GIS/Data integration; DTMs from radar; Segmentation, texture and morphology; Accuracy assessment; 3D Vision and surface extraction; Image processing and classification; Data processing and analysis; Parallel processing; Systems and media for image recording.

#### C. RADIO SCIENCE (URSI Sessions)

Urban and digital communication; Millimetre waves; Polarization techniques; Electrical methods of geophysical prospecting; Propagation and scattering models; Satellite rain measuring missions; Ground-based rain measuring systems;

Ground-based wind profiling; Sub-surface propagation; Inversion techniques; HF radar techniques.

#### D. SYSTEMS AND PROGRAMMES

Global change; Radarsat; EOS (Polar Orbiter); EOS (International); SPOT; ERS-1; MOS-1; Other satellite programmes; Economic opportunities, legal factors.

#### E. SENSORS

Radar altimetry; SAR Application and calibration; SAR Processing; Microwave instrument; Passive microwave; Lidar, IR, colour; Imaging spectroscopy; Optical instrumentation.

#### F. ICE/OCEANS/AIR

Polar ocean research; Marginal ice zones; Ice motion and classification; SAR/waves; Fisheries applications; Sea surface topography; Ocean thermal and colour; Ocean sonar imaging; Atmospheric remote sensing; Atmospheric correction.

In order to improve opportunities for display and discussion, the organizers of the meeting plan to arrange that most papers will be presented both orally and as posters.

Proceedings of the conference will be printed in advance and will be available at the meeting.

Address requests for further information to:

ICARSS'89/12th Canadian Symposium  
on Remote Sensing  
Suite 801-750 Jarvis Street  
Vancouver, B.C. V6E 2A9  
Canada.

Telephone: (604) 681-5226  
FAX: (604) 681-2503  
Telex: 04-352848 VCR.

#### 19th EUROPEAN MICROWAVE CONFERENCE

The 19th European Microwave Conference will be held at the Wembley Conference Centre, London, England from 4 to 7 September 1989. Workshops will be held on 8 September. The



Conference is organized in cooperation with EUREL, IEE, IEEE Region 8 and URSI, and in association with Microwave Exhibitions and Publishers Ltd. The Chairman of the Technical Programme Committee is C.S. Aitchison, ERA Technology Ltd, UK.

All areas of microwaves will be considered and special emphasis will be placed on the following aspects:

1. Semiconductor devices
2. Hybrid + monolithic active circuits
3. CAD and modelling
4. Antennas and phased arrays
5. Field theory
6. Measurements
7. Gigabit logic
8. Millimetre techniques
9. Passive circuits
10. Terrestrial and satellite communications (including DBS)
11. Radar and remote sensing
12. Broadband circuit techniques
13. Industrial and medical applications.

Further information available from:

Microwave Exhibitions and Publishers Ltd  
90 Calverley Road, Tunbridge Wells  
Kent TN1 2UN, United Kingdom.

Telephone: 892 44027  
Telex: 95604  
Fax: 892 41023.

#### 15th EUROPEAN CONFERENCE ON OPTICAL COMMUNICATION (ECOC'89)

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This Conference, to be held from 10 to 14 September 1989 in Gothenburg, Sweden, has already been announced in *URSI Information Bulletin* No 246 (September 1988, p.33).

The deadline for submission of papers is 20 March 1989.

The Conference Programme will include a session of post-deadline papers. These must be received by the ECOC'89 Secretariat before 4 September 1989. The acceptance of post-deadline papers will be announced during the Conference. The address of

the ECOC'89 Secretariat is as follows:

ECOC'89  
Congress Göteborg  
Box 5222  
S-402 24 Gothenburg, Sweden.  
Telephone: +(46) 31 109 100  
Telex: 20600 maessan s  
Fax: +(46) 31 182 400.

SOLAR-TERRESTRIAL PREDICTIONS WORKSHOP

A Solar-Terrestrial Predictions Workshop, organised by the International Ursigram and World Days Service (IUWDS), will be held in Sydney, Australia during the period 16-20 October 1989. This Workshop follows similar workshops in Boulder (1979) and Meudon (1984). The Workshop will focus on the following topic areas:

- The nature and origin of the solar cycle
- Solar cycle forecasting
- Evolution of active regions
- Solar flare prediction techniques
- Solar radiance at radio, UV and X-ray wavelengths
- The transmission of disturbances in the solar wind
- The origin of geomagnetic disturbances
- Geomagnetic disturbance indices
- Quiet and disturbed day forecasting
- The terrestrial effects of geomagnetic disturbances
- Satellite anomalies
- Ionospheric modelling
- Ionospheric storms
- Applications of ionospheric models.

Papers may be submitted to the Workshop either as extended abstracts for consideration at the meeting or as full papers for publication in the Workshop Proceedings. Extended abstracts should be received by the local organising committee by 1 May 1989. Full papers must be received by the first day of the Workshop, 16 October 1989.

Papers and extended abstracts are welcomed from people

who are not able to attend the Workshop.

For further information and publication details, please contact:

Local Organising Committee  
c/o Dr. Richard Thompson  
IPS Radio and Space Services  
P.O.Box 702  
Darlinghurst NSW 2010  
Australia.

2nd BIREGIONAL AFRICAN - LATIN AMERICAN CONFERENCE ON RADIO  
PROPAGATION AND SPECTRUM MANAGEMENT

6-8 November 1989

and

INTERNATIONAL WORKSHOP ON ADVANCES IN COMMUNICATION  
PHYSICS AND TECHNIQUES

9-14 November 1989

The 2nd Biregional African-Latin American Conference on Radio Propagation and Spectrum Management is being organized under the auspices of the URSI Standing Committee on Developing Countries as part of its approved programme for the triennium 1987-1990. The conveners are Prof. S.M. Radicella (Argentina) and Prof. J.O. Oyinloye (Nigeria). The Biregional Conference will evaluate the status of research efforts and identify future priority directions for regional collaboration in the general subject area of radio propagation and spectrum management.

The International Workshop on Advances in Communication Physics and Techniques is being organized by the Department of Physics of the University of Ilorin, Nigeria. The convener is Prof. J.O. Oyinloye. The Workshop will provide a forum to acquaint scientists and workers in the communication industry with recent advances in the field and it will also provide an opportunity towards the creation of international links. It

will consist primarily of lectures but with room for participant presentations and open discussion. Distinguished guest lecturers drawn from a list of eminent research scientists working in Africa, America and Europe will present the course lectures.

Grants obtained from the International Centre for Theoretical Physics (ICTP), Trieste, Italy, and the International Union of Radio Science (URSI), as well as support from other agencies have enabled the Physics Department of the University of Ilorin to make arrangements for the two events at the same venue.

The working language of the Conference and the Workshop is English.

The Conference Programme will include the presentation of invited review papers, contributions from participants, a poster session and an open discussion session on biregional collaborative efforts.

The Workshop Programme includes lectures on the following topics:

- (1) Electromagnetic spectrum in communications
- (2) Radio propagation
  - (a) Ionospheric propagation and predictions
  - (b) Tropospheric propagation and predictions
- (3) Optical communications
  - (a) Trends in optical communications
  - (b) Atmospheric effects on optical communications
  - (c) Developments in optical communication system
- (4) Satellite communication
  - (a) Satellite communication propagation environment
  - (b) Communication satellite technology
- (5) Communication systems and devices
- (6) Digital techniques in communications
- (7) Electromagnetic noise and interference
- (8) Space physics: recent developments for communication, and a discussion session on communications in national development and regional collaboration.

Limited funds are available for some support for a few qualified participants and young scientists. Participants who are able to secure their own travel funds stand a better chance of some support.

The venue is the Department of Physics, University of Ilorin, Main Campus, Ilorin, Nigeria.

Registration for the Conference commences on 6 November 1989. Registration for the Workshop commences on 9 November 1989. The registration fee per participants is ₦25.00 for one activity and ₦30.00 for both.

For participation forms, to be submitted by 30 April 1989, apply to:

Dr. C.O. Akoshile  
The Secretary, Biregional Radio Propagation  
Conference/International Communications  
Workshop  
Department of Physics  
University of Ilorin  
Ilorin, Nigeria.

URSI COMMISSION F SYMPOSIUM ON SIGNATURE PROBLEMS

IN MICROWAVE REMOTE SENSING OF THE SURFACE OF THE EARTH

16-18 May 1990, Sheraton Hyannis, Hyannis, Massachusetts, USA

CALL FOR PAPERS

This Symposium on Remote Sensing and Wave Propagation is sponsored by URSI Commission F. The General Co-Chairmen are Prof. C.T. Swift and Dr. C. Mätzler, and the Technical Programme Chairman is Prof. R.E. McIntosh.

Experimental and theoretical papers on scattering and emission from terrain, ocean, and ice are welcome. Signature papers are particularly encouraged on the following topics:

- Vegetation
- Soil moisture

- Snow
- Sea ice
- Lake and glacial ice
- Ocean surface and winds
- SAR modelling of ocean backscatter
- Advanced sensors
- Aircraft and satellite instruments.

The meeting will be conducted in a workshop atmosphere with no parallel sessions. Also, the dates selected for this symposium will immediately precede the International Geoscience and Remote Sensing Symposium (IGARSS'90) which will be held 21-24 May 1990. A weekend will separate the two meetings.

Abstracts must be submitted in English and mailed to:

Professor R.E. McIntosh  
Electrical and Computer Engineering Dept  
University of Massachusetts  
Amherst, MA 01003, USA.

The abstract must be limited to one page, including figures. The original and three copies must be submitted in camera-ready form. Since there will be a reduction of about 72% in linear dimensions, letters and symbols should be sufficiently large and clear. Do not include a list of references; a few open literature references may be included parenthetically in the text, for example (A.B. Smith, *Radio Science*, 26, 348-392, 1978).

Abstracts must be received by: 15 November 1989.

Authors will be notified of acceptance of the papers shortly after the deadline. Registration and accommodation information will be mailed with the Advance Programme.

WORKSHOP ON ARTIFICIAL IONIZATION MIRROR

During the URSI Symposium on Ionospheric Modification by High Power Radio Waves held in Tromsø in September 1988, and known to the participants as the "Suzdal Symposium", the group of scientists interested in artificial ionization of the atmosphere agreed that there should be a follow-up workshop on that subject.

The Workshop on Artificial Ionization Mirror is scheduled for 9-12 October 1989 at Kiev, USSR. The co-convenors are Dr. Alex Gurevich (Lebedev Institute of Physics, Moscow, USSR) and Dr. W.T. Armstrong (Los Alamos National Laboratory, Los Alamos, NM, USA). The Workshop will report back to the next URSI Symposium in the Suzdal series to be held in September 1990.

## A REPORT ON IUWDS\* 1988

### 1. Introduction

According to its terms of reference, the International Ursigram and World Days Service (IUWDS) is a permanent service of URSI, IAU and IUGG which "aims to provide information rapidly to the world scientific community to assist in the planning, coordination and conduct of scientific work in relevant disciplines".

Two basic mechanisms have been selected to accomplish this programme. Firstly, IUWDS prepares the *International Geophysical Calendar* each year. This calendar gives a list of "World Days" which scientists are encouraged to use for carrying out their experiments. Secondly, there is the International Ursigram Service for assisting those who need a specific state of solar activity, earth atmosphere or magnetosphere at the time of their experiment. Both programmes are designed to be very flexible and can be easily adjusted to fit the needs of the scientific community.

In addition, on behalf of COSPAR, each month IUWDS summarises the status of satellite circulation around the earth and of space probes in the interplanetary medium in the *Spacewarn Bulletin*. Future launches are announced, actual launches are reported, new satellites receive an international designation, decays in the earth atmosphere are predicted and announced, and finally series of satellites useful for international participation are listed.

The new solar cycle has risen very rapidly with the last available yearly-smoothed sunspot number (May, 1988) being 84. The sunspot number for January 1989 is likely to be in the vicinity of 120. This value is already higher than the long-term average peak amplitude for solar cycles and suggests that the cycle might exceed the amplitude of the last solar cycle - the second largest on record. This possibility emphasises that the services co-ordinated by IUWDS will prove especially valuable during the coming few years.

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\* Prepared for the FAGS Council Meeting, March 1989



## 2. The International Ursigram Service

The International Ursigram Service operates through a number of Regional Warning Centres (RWC) scattered all around the world. Warning Centres are located in: Boulder (USA), Darmstadt (FRG), Moscow (USSR), Paris (France), New Delhi (India), Ottawa (Canada), Prague (Czechoslovakia), Tokyo (Japan), Sydney (Australia) and Warsaw (Poland).

In its own geographic area, each RWC collects all the data and reports available concerning the state of the sun-earth environment. In some cases, these come from observatories operated directly by the Regional Warning Centre. In many cases, they are gathered from regional scientific institutes and universities.

The data accessible by IUWDS are very diverse and are highly regarded by the scientific community. The types of data include:

- spectroheliograms and filtergrams,
- observations of magnetic field structures on the sun,
- observations of solar coronal holes by radio and infra-red techniques,
- quiet sun emission from radio to X-ray wavelengths,
- reports of flares observed by a wide variety of methods,
- solar radio observations, both at fixed frequencies and frequency scans,
- solar X-ray data,
- the flux of solar particles recorded by satellites, by riometers in the polar cap and by neutron monitors,
- geomagnetic activity as measured by 3-hourly K indices and by reports of sudden storm commencements,
- ionospheric data giving critical frequencies of the F and E layers,
- cosmic ray data and reports of Forbush decreases.

These data and reports (about 150 data sets from around 100 Institutes or Observatories) are coded according to the IUWDS code book and distributed daily, on request to users and to other RWCs. Data exchange is generally via a daily, or more frequent, telex message. In the last few years, new modes of communication have developed. Some of these, such as electronic mail and facsimile transmission, will be incorporated into the IUWDS data exchange programme as appropriate.

Information transmitted through the IUWDS network is analysed by Regional Warning Centres which produce a number of "summary" reports and forecasts. The "Geoalert", a forecast of solar-geophysical conditions for the next few days, is a particularly important one of these reports. Each RWC prepares its own forecast ("Geoalert") and sends it to the World Warning Agency (WWA) in Boulder each day. The WWA then issues a Geoalert which is distributed worldwide each day at 0300 UT through the IUWDS network and through the WMO (World Meteorological Organization) network. Many RWCs also relay the WWA Geoalert to users within their own region.

The IUWDS network is also used for the prompt distribution of the preliminary values of the International Sunspot Number which is prepared monthly at the Uccle Observatory. In addition, IUWDS relays the geomagnetic "aa" indices which are computed each week at Meudon from two antipodal stations. IUWDS contributes to the production of these indices by supplying the Uccle Observatory and the "Institut de Physique du Globe" (Paris) with some of the raw data reports.

The present schedule of interchange messages between RWCs is illustrated in Figure 1.

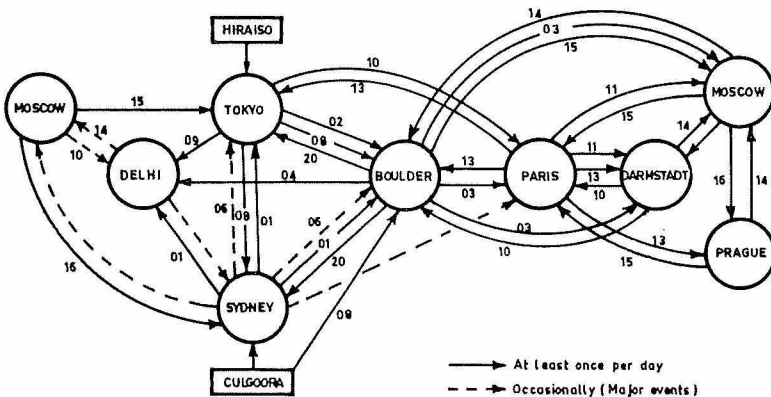


Figure 1 : Daily Schedule of Interchange Messages between RWCs

### 3. Publications

The *International Geophysical Calendar* is distributed free of charge throughout the world. The present distribution is approximately 2000 copies produced at a nominal cost.

The *Spacewarn Bulletin* is also distributed free of charge throughout the world. Approximately 600 copies are produced.

The *Geoalerts* and the abbreviated Calendar records are published monthly in *Solar and Geophysical Data* which is distributed to 2000 users.

The daily Geoalerts and Ursigram messages, distributed daily by telex, are "real-time" information. These are obsolete after a few days and only a summary is printed as the *IUWDS Alert Periods* in the *Solar-Geophysical Data Books* published by World Data Center-A. However, the production and distribution of Ursigrams is a very important part of the current expenses of the RWCs. This expense is borne by the host institutions.

The IUWDS code booklet is updated and reprinted occasionally. The last edition was made in 1973 at a cost of \$3000. This has been followed by several partial updatings made at very low cost.

### 4. IUWDS Activities during 1988

A meeting of the Steering Committee of IUWDS was held in conjunction with the COSPAR Assembly in Helsinki during July 1988. The main issue discussed at the meeting was the need for a revision of IUWDS codes to improve their suitability for computer translation. Gary Heckman presented a draft copy of a new code book which included a standard format to be followed in the revision of existing codes and the design of new codes. The meeting agreed to the new format and decided that all codes should be revised prior to the next IUWDS meeting in 1990. A procedure for the revision of codes was also determined.

The format and distribution of the revised IUWDS code book was discussed at the Steering Committee Meeting. It was decided that the code book should be revised on a regular basis to incorporate changes to codes. Initially, these would take place on a yearly basis as the new codes are included but ultimately less frequent revisions would be required. The distribution of

the code book would be much less widespread than was the case in the past, being basically limited to IUWDS Regional Warning Centres and associated observatories. The use of word processors in the production of the code book and the limited distribution would allow the publication and distribution of a complete book rather than the partial revisions which have occurred in the past.

Richard Thompspon, Chairman of IUWDS, visited the Regional Warning Centres in Boulder and in Paris whilst en route to the COSPAR meeting in Helsinki.

IUWDS is sponsoring a Solar-Terrestrial Predictions Workshop\* to be held in Sydney during the period October 16-20, 1989. Planning for this Workshop is continuing well. It has been decided that the Workshop will consist of sessions of invited talks along with meetings of Working Groups to discuss scientific progress and requirements for future research. At previous Workshops there have been as many as seven Working Groups but for the Sydney meeting this will be reduced to three: Sun and Solar Wind; Geomagnetic and Space Environment; and Ionosphere. The reduction in the number of Working Groups results from a widespread feeling that the subject of solar-terrestrial prediction is becoming more integrated and is best treated in a unified manner.

Local organisation for the Workshop is being undertaken by IPS Radio and Space Services, a programme in the Australian Government Department of Administrative Services. The venue for the Workshop is "Leura Resort" in the scenic Blue Mountains area two hours by train to the west of Sydney. This location will allow the participants to gather together in conditions that are ideal to further the aims of the Workshop.

An initial brochure to promote the Workshop was distributed in June. The response to this brochure has been encouraging with 200 people indicating an interest in the meeting. Approximately, 120 people have indicated that they expect to attend and a considerable number of others said that they 'hoped' to attend. A number of people have indicated that, whilst they would be unable to attend the meeting, they wished to produce a paper for discussion at the meeting and publication in the Workshop Proceedings.

\* See announcement on page 24.

An international organising committee has been established for the Workshop. The membership of this committee, drawn mainly from IUWDS Regional Warning Centres, is as follows: Thompson (RWC Sydney); Coles (ARWC Ottawa); Danilov (RWC Moscow); Heckman (RWC Boulder); Kikuchi (RWC Tokyo); Klos (ARWC Warsaw); Lantos (RWC Paris); Reddy (ARWC New Delhi); Shea (AFGL Massachusetts); Suessman (RWC Darmstadt) and Triska (ARWC Prague).

A number of Chairmen and Vice-Chairmen have been selected to make the three Working Groups function as well as possible and to plan a comprehensive programme of invited talks. The following people have accepted a role as one of these Working Groups leaders:

Sun/Solar Wind

Principal Chairman: Lantos (France)  
Vice-Chairmen: Neidig (USA), Wilson (Australia), Ai (China),  
McIntosh (USA).

Geomagnetic/Space Environment

Principal Chairman: Rodger (UK)  
Vice-Chairmen: Hruska (Canada), Joselyn (USA), Marubashi  
(Japan).

Ionosphere

Principal Chairman: Szuszczewicz (USA)  
Vice-Chairmen: Reddy (India), Danilov (USSR), Damboldt (FRG).

5. IUWDS Steering Committee Membership

The present list of IUWDS officers and representatives is as follows:

IUWDS Chairman	R. Thompson	RWC Sydney
IUWDS Secretary/ Secretary for Ursigrans	G. Heckman	RWC Boulder
IAU Representative	Helen Coffey	NOAA Boulder
FAGS Representative	E.A. Tandberg-Hanssen	NASA/MSFC
IUGG Representative/ Secretay for World Days	H. Coffey	NOAA Boulder
URSI Representative	B.M. Reddy	ARWC New Delhi

J. Himan (RWC Boulder), P. Suessman (RWC Darmstadt),

S.I. Avdiushin (RWC Moscow), A.D. Danilov (RWC Moscow), B.M. Reddy (ARWC New Delhi), R. Coles (ARWC Ottawa), P. Lantos (RWC Paris), P. Triska (ARWC Prague), D. Cole (RWC Sydney), T. Tsuyoshi (RWC Tokyo), H. Mori (RWC Tokyo), Z. Klos (ARWC Warsaw), J. Vette (WDC-A Rockets and Satellites).

6. IUWDS Regional and Associate Regional Warning Centres

Dr. P. Suessman, Regional Warning Centre, Forschungsinstitut der DBP, P.O.Box 5000, D-6100 Darmstadt, Federal Republic of Germany.

Dr. Z. Klos, Associate Regional Warning Centre, Space Research Centre, Ordonna 21, 01 237 Warszawa, Poland.

Dr. P. Lantos, Regional Warning Centre, Ursigrammes DASOP, Observatoire de Paris, F-92195 Meudon Principal Cedex, France

Dr. B.M. Reddy, Associate Regional Warning Centre, National Physical Laboratory, Dr. K.S. Krishnan Road, New Delhi 110012, India.

Dr. R. Coles, Associate Regional Warning Centre, Geophysics Division, Geological Survey of Canada, 1 Observatory Crescent, Ottawa, Canada K1A 0Y3.

Mr. P. Triska, Associate Regional Warning Centre, Geophysical Institute, Bocni II, 141 31 Praha 4 - Sporilov, Czechoslovakia.

Dr. A.D. Danilov, Regional Warning Centre, Hydrometeorological Service, 6 Pavlika Morozova St., Moscow, USSR.

Mr. T. Ishimine, Regional Warning Centre, Communications Research Laboratory, Radio Science Division, Min. of Posts and Telecommunications, 2-1, Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184, Japan.

Mr. G.R. Heckman, Regional Warning Centre, Space Environment Services Centre, SEL/SESC/R/E/SE2 NOAA, 325 Broadway, Boulder, CO 80303, USA.

Dr. R.J. Thompson, Regional Warning Centre, IPS Radio and Space Services, P.O.Box 702, Darlinghurst NSW 2010, Australia.

## 7. Concluding Remarks

IUWDS, which was among the founders of FACS is, however, a special case among the FACS Services.

Of course, IUWDS is fully involved in data analysis, but the emphasis is on real-time information. To obtain this prompt information most of the reports received in the RWCs are provisional data which cannot be used in a final publication. However, all these preliminary data are good enough for many kinds of technical forecasts (ionospheric propagation, satellite drag and many others) and for the planning or the co-ordination of experiments (for instance the cooperative study of solar events, the international programme of incoherent scatter ionospheric sounders, etc.).

The operation of the RWCs relies entirely on national funds but IUWDS needs support from FACS for improving the "international domain" of the Service. This international aspect includes the improvement and expansion of the current data exchange programme. It also includes the establishment of temporary cooperation between RWCs to support international or even national programmes. This international aspect is furthered by meetings of RWCs representatives, particularly during meetings of the Steering Committee held in conjunction with the COSPAR Assembly. It is also furthered by visits to RWCs by the IUWDS Chairman and by the publication of the code booklet.

Another field of concern for the IUWDS is the development of prediction techniques. Progress in this field is encouraged by the organisation of Workshops devoted to this topic. Very few scientists are involved in these problems and no alternate body can contribute to the improvements in this field. The first Solar Terrestrial Prediction Workshop was held at Boulder in 1979, the second at Meudon in 1984, and another one is to take place in Australia in 1989. It is clear that the support of such technical meetings is among the responsibilities of the IUWDS.

Richard Thompson  
IUWDS Chairman.

INTERNATIONAL ASTRONOMICAL UNION  
XXTH GENERAL ASSEMBLY

The XXth General Assembly of the International Astronomical Union was held in Baltimore, Maryland, USA from 2 to 11 August 1988. Prof. Y. Kozai (Japan) and Dr. D. McNally (UK) were elected President and Secretary General of the Union respectively. Prof. V. Radhakrishnan, former Chairman of URSI Commission J on Radio Astronomy, was elected as one of the Vice-Presidents.

The General Assembly of IAU adopted 19 resolutions, some of which are reproduced below, in view of their interest for the URSI community.

Resolution A2: Adverse Environmental Impacts on Astronomy

The XXth General Assembly of the International Astronomical Union,

*noting with grave concern*

the increasing impact of light pollution, radio interference, space debris, and other environmental factors that adversely affect observing conditions from the ground and in space;

*reaffirms*

the special importance of the resolutions adopted by previous General Assemblies that relate to the protection of observatories (ground-based and in space) and of observing conditions including:

(1961)Resolutions No 1 and 2,	Transactions IAU XI
(1964)Resolutions No 3 and 5,	Transactions IAU XIIIB
(1969)Resolution No 2,	Transactions IAU XIIIIB
(1972)Resolution No 10,	Transactions IAU XIVB
(1976)Resolutions No 8 and 9,	Transactions IAU XVIB
(1979)Resolution No 3,	Transactions IAU XVIIB
(1982)Resolution No R9,	Transactions IAU XVIIIB
(1985)Resolutions No B4, B5 and B7,	Transactions IAU XIX;

*strongly urges*

(a) that all astronomers request civil authorities and others



in their countries to implement solutions to preserve the quality of observing conditions,

- (b) that all national organisations bring these concerns to the notice of adhering organisations, space agencies, and others in their countries;

*notes with special appreciation* those agencies, communities, organisations, and individuals who have become aware of the issues and have begun to help; and

*encourages* all others, everywhere, to become aware of the need to minimize the impact on the environment of light pollution, radio frequency interference, and space debris, which are causing increasingly severe impact on observing conditions for astronomy and which will compromise mankind's view of Universe;

*and requests* through ICSU that SCOPE (Scientific Committee on Problems of the Environment) should study the nature and extent of this threat and advise the IAU of its findings.

#### Resolution A5: Cooperation to Save Hydroxyl Bands

The XXth General Assembly of the International Astronomical Union,

*noting*

- (a) the long standing concern of the International Astronomical Union for protecting radio astronomy from interference, particularly through resolutions passed at the General Assemblies in 1979, 1982 and 1985;
- (b) the increasing levels of harmful interference to radio astronomy, particularly from space and airborne transmitters, which diminish the advantages of locating observatories at remote sites;
- (c) the particularly high levels of harmful interference experienced consistently in the sub-band 1610.6-1613.8 MHz from navigation satellites which make observations of an astrophysically important hydroxyl line increasingly difficult;
- (d) that the 1612 MHz hydroxyl line has assumed greatly increased importance since the 1979 World Administrative Radio Conference due particularly to the discovery of numerous OH/IR stars which have been used for absolute distance determination in the Galaxy and for understanding

stellar evolution;

- (e) that the World Administrative Radio Conference for the Mobile Services (WARC MOB-87) has also allocated the band 1610-1626.5 MHz to the radio-determination satellite service (RDSS), subject of footnote 743E of the Radio Regulations, which states that in Regions 1 and 3 harmful interference shall not be caused to the radio astronomy service (RAS), and that in Region 2 several administrations have agreed to limited protection for the RAS;
- (f) that the WARC MOB-87 in Resolution PLEN/1 has invited the CCIR to continue its studies in order to obtain more precise results concerning the conditions of sharing in the bands 1610-1625.5 MHz and 2483.5-2500-2516.5 MHz between the RDSS on the one hand and the RAS, among other services, on the other;

*urges*

1. that national administrations cooperate with IUCAF to examine means to prevent harmful interference to observations in the band 1610.6-1613.8 MHz from global navigation satellite systems, particularly in designing changes to existing systems and planning new systems;
2. that administrations adhering to the International Astronomical Union and the International Telecommunication Union strive for improved protection of the RAS in the 1610.6-1613.8 MHz band by upgrading the allocation status of the RAS to that of primary service in this sub-band at the next competent World Administrative Radio Conference;
3. that IUCAF, representing the IAU, respond rapidly to the invitation to continue studying in Study Group 2 of the CCIR the conditions for successfully sharing the band 1610-1626.5 MHz and examine the problems of second harmonic emission from RDSS transmitters in the band 2483.5-2500 MHz which could affect the RAS in the band 4800-5000 MHz;
4. that administrations operating satellites or satellite systems in the aeronautical navigation satellite service at 1.5/1.6 GHz frequencies protect the RAS from harmful interference by appropriately filtering unwanted emissions;

*and instructs the President* to bring this Resolution to the attention of the Secretary General of the International Telecommunication Union.

Resolution A6: Sharing Hydroxyl Band with Land Mobile  
Satellite Services

The XXth General Assembly of the International Astronomical Union,

*considering*

- (a) that the 1660-1660.5 MHz band is allocated to the Radio Astronomy Service on a shared, primary basis, and is used to observe hydroxyl lines, which are of the highest astro-physical importance, in many galaxies in the nearby Universe;
- (b) that the World Administrative Radio Conference for the Mobile Services (WARC MOB-87) has also allocated the 1660-1660.5 MHz band to the land mobile satellite service;
- (c) that WARC MOB-87 has added Footnote 730A to the Radio Regulations, allowing administrations to authorize aircraft stations and ship stations to communicate with space stations in the land mobile satellite service in the 1660-1660.5 MHz band;
- (d) that CCIR Study Group 8 has established Interim Working Party 8/14, to study, among other characteristics of mobile satellite systems, the necessary criteria for frequency sharing between the various mobile satellite systems and the other services allocated the same bands;

*urges*

1. that IUCAF, in representation of the International Astronomical Union, interact, as a matter of urgency, with the Interim Working Party of CCIR Study Group 8 and with Study Group 2 to work out the necessary criteria under which the Radio Astronomy Service, and the land mobile satellite service and services authorized under Footnote 730A, may share the 1660-1660.5 MHz band;
2. that administrations adhering to the International Astronomical Union and to the International Telecommunications Union bear in mind at the next competent WARC the importance of the primary allocation to the radio astronomy service in the band 1660-1660.5 MHz;

*and instructs the President* to request the Director of CCIR to bring this Resolution to the attention of the Chairman of Interim Working Party 8/14.

Resolution A7: Revision of Frequency Bands for Astrophysically Significant Lines

The XXth General Assembly of the International Astronomical Union,

*recalling*

- (a) resolutions passed by the International Astronomical Union in 1979 and 1982 recommending the provision by national administrations of frequency bands for the astrophysically most important spectral lines;
- (b) the need expressed in those resolutions to protect these frequency bands from in-band, band-edge and sub-harmonic emissions, especially from space-borne transmitters;
- (c) the documentation of Study Group 2 of the CCIR in Recommendation 314 and Reports 224 and 697 concerning harmful interference to the Radio Astronomy Service;

*and considering* the careful reviews by the International Astronomical Union in the period 1983-1988 of the astrophysically most important spectral lines;

*recommends* that the International Astronomical Union take note of the revision of the frequencies of the astrophysically most important spectral lines listed in Tables 1 and 2 below;

*and instructs the President* to bring the resolution to the attention of the Secretary General of the International Telecommunications Union.

TABLE 1 - Radio frequency lines of the greatest importance to radio astronomy at frequencies below 275 GHz

<u>Substance</u>	<u>Rest Frequency</u>
Deuterium (DI)	327.384 MHz
Hydrogen (HI)	1420.406 MHz
Hydroxyl radical (OH)	1612.231 MHz
Hydroxyl radical (OH)	1665.402 MHz
Hydroxyl radical (OH)	1667.359 MHz
Hydroxyl radical (OH)	1720.530 MHz
Methyladyne (CH)	3263.794 MHz
Methyladyne (CH)	3335.481 MHz
Methyladyne (CH)	3349.193 MHz

Formaldehyde ( $H_2CO$ )	4829.660 MHz
Methanol ( $CH_3OH$ )	12.178 GHz
Formaldehyde ( $H_2OH$ )	14.488 GHz
Cyclopropenyliidene ( $C_3H_2$ )	18 343 GHz
Water vapour ( $H_2O$ )	22.235 GHz
Ammonia ( $NH_3$ )	23.694 GHz
Ammonia ( $NH_3$ )	23.723 GHz
Ammonia ( $NH_3$ )	23.870 GHz
Silicon monoxide ( $SiO$ )	42.821 GHz
Silicon monoxide ( $SiO$ )	43.122 GHz
Carbon monosulphide ( $CS$ )	48.991 GHz
Deuterated formylium ( $DCO^+$ )	72.039 GHz
Silicon monoxide ( $SiO$ )	86.243 GHz
Formylium ( $H^{13}CO^+$ )	86.754 GHz
Ethynyl radical ( $C_2H$ )	87.3 GHz
Hydrogen cyanide ( $HCN$ )	88.632 GHz
Formylium ( $HCO^+$ )	89.189 GHz
Hydrogen isocyanide ( $HNC$ )	90.664 GHz
Diazenylium ( $N_2H^+$ )	93.17 GHz
Carbon monosulphide ( $CS$ )	97.981 GHz
Carbon monoxide ( $C^{18}O$ )	109.782 GHz
Carbon monoxide ( $C^{13}CO$ )	110.201 GHz
Carbon monoxide ( $C^{17}O$ )	112.359 GHz
Carbon monoxide ( $CO$ )	115.271 GHz
Formaldehyde ( $H_2^{13}CO$ )	137.450 GHz
Formaldehyde ( $H_2CO$ )	140.840 GHz
Carbon monosulphide ( $CS$ )	146.969 GHz
Water vapour ( $H_2O$ )	183.310 GHz
Carbon monoxide ( $C^{18}O$ )	219.560 GHz
Carbon monoxide ( $C^{13}CO$ )	220.399 GHz
Carbon monoxide ( $CO$ )	230.538 GHz
Carbon monosulphide ( $CS$ )	244.953 GHz
Hydrogen cyanide ( $HCN$ )	265.886 GHz
Formylium ( $HCO^+$ )	267.557 GHz
Hydrogen isocyanide ( $HNC$ )	271.981 GHz

TABLE 2 - Radio frequency lines of the greatest importance to radio astronomy at frequencies between 275 GHz and 900 GHz (not allocated to Radio Astronomy in the Radio Regulations)

Substance	Rest Frequency GHz
Diazenylium ( $N_2H^+$ )	279.511
Carbon monoxide ( $C^{18}O$ )	329.330
Carbon monoxide ( $C^{13}CO$ )	330.587
Carbon monosulphide (CS)	342.883
Carbon monoxide (CO)	345.796
Hydrogen cyanide (HCN)	354.484
Formyl ion ( $HCO^+$ )	356.734
Diazenylium ( $N_2H^+$ )	372.672
Water vapour ( $H_2O$ )	380.197
Carbon monoxide ( $C^{18}O$ )	439.088
Carbon monoxide ( $C^{13}CO$ )	440.765
Carbon monoxide (CO)	461.041
Heavy water (HDO)	464.925
Carbon (CI)	492.162
Water vapour ( $H_2^{18}O$ )	547.676
Water vapour ( $H_2O$ )	556.936
Ammonia ( $NH_3$ )	572.113
Ammonia ( $NH_3$ )	572.498
Hydrochloric acid (HCl)	625.918 *
Carbon monoxide (CO)	691.473
Hydrogen cyanide (HCN)	797.433
Formyl ion ( $HCO^+$ )	802.653
Carbon monoxide (CO)	806.652
Carbon (CI)	809.350

\* Central line of a group of three.

Resolution C8: Need for Accurate Time

Commission 31

*considering* that there is a scientific need for accurate time and frequency comparisons between the national time scales and the new frequency standards under development; and

that at the moment, it is not possible to compare accurately the best available atomic frequency standards; and

that methods for time and frequency comparisons are now in the process of being evaluated, for example, VLBI, one-way and two-way pseudo-random noise signals, laser techniques on ground and in satellites, and TV signals;

*recommends* that investigations on all the proposed or new time comparison methods should be actively pursued;

that simultaneous campaigns of mutual comparison should be performed; and

that the relevant activities be coordinated by, and results be published under the auspices of, the BIPM.

#### Resolution C9: IAU Contribution to FAGS

Commissions 19 and 31

*considering* the importance of the development of the International Earth Rotation Service (IERS) for many fields in astronomy, geodynamics, and astrophysics, and the necessity for this Service, as well as for the other astronomical services of the Federation of Astronomical and Geophysical Data Analysis Services (FAGS) which foster the participation of new countries, coordinate international and intertechnique activity in observation and analysis, and disseminate worldwide high precision data; and

*recognising* that the support of FAGS provides a unique possibility for developing such activities;

*recommend* that the Presidents of Commissions 19 and 31, in collaboration with the Presidents of other IAU Commissions involved in services supported by FAGS, propose a report to the IAU Executive Committee by June 1989, recommending an increased contribution to FAGS.

#### Resolution C10: Needed History on BIH and IPMS

Commissions 19 and 31

*noting* the significant impact and contribution that the BIH and IPMS have made to astronomy and geodesy over the years of their existence; and

*recognising* that a suitable history of their activities does not exist;

*ask* that the Presidents of the IAU, the IAG, and URSI request B.Guinot and S.Yumi to write a history of the two Services.

STEP  
SOLAR-TERRESTRIAL ENERGY PROGRAMME 1990-1995  
A FRAMEWORK FOR ACTION

EXECUTIVE SUMMARY

INTRODUCTION

During the past decade, SCOSTEP has aided the scientific community by organizing many proposed studies of the solar-terrestrial environment into coherent programmes of international scientific cooperation and by establishing special data, and information services for these programmes. These programmes were focused largely on individual regions of the solar-terrestrial system: the sun, the solar wind, the magnetosphere, the ionosphere-thermosphere, and the middle atmosphere.

Solar-terrestrial research has attained a point in its evolution where it is desirable to put more emphasis on the comprehensive study of the mutual linkages between the various regions of space from the sun to the earth, in addition to the traditional study of the individual regions themselves. STEP will focus on the solar-terrestrial environment as a complex interactive system whose overall behaviour often drastically departs from the simple superposition of its parts.

*The main goal of STEP will be to advance the quantitative understanding of the coupling mechanisms that are responsible for the transfer of energy and mass from one region of the solar-terrestrial system to another.*

STEP will involve ground-based, aircraft, balloon, rocket and satellite experiments; theory and simulation studies; and dedicated data and information systems. Integral to the success of STEP is the set of solar-terrestrial spacecraft missions approved by the Inter-Agency Consultative Group as the next cooperative project of NASA, ESA, ISAS, and INTERCOSMOS. The programme will also take advantage of results obtained by other relevant spacecraft missions. STEP is expected to begin in 1990 and terminate in 1995; however, an extension of the STEP interval may be envisaged if some key spacecraft missions



are delayed.

## PRIORITY AREAS AND THEIR PRINCIPAL GOALS

The basic framework of STEP will consist of Priority Areas, each one with a comprehensive goal of scientific understanding of the interaction mechanisms controlling energy and mass transfer between specific regions of the solar-terrestrial system.

### 1. The Sun as a Source of Energy and Disturbance:

To achieve an understanding of the principal source mechanisms for electromagnetic and corpuscular emissions on the sun and in the solar environment, and to formulate physical models for improving the predictability of short-term perturbations (minutes to days) and long-term variability (years to decades).

### 2. Energy and Mass Transfer through the Interplanetary Medium and the Magnetosphere-Ionosphere System:

To achieve an understanding of the energy, momentum and mass transfer mechanisms across shocks and the boundaries that separate the distinct plasma regions of the solar-terrestrial system, and to study the acceleration, diffusion and convection processes and large-scale instabilities that distribute and modify the complex corpuscular flows and fields in that system.

### 3. Ionosphere-Thermosphere Coupling and Response to Energy and Momentum Inputs:

To achieve an understanding of the global processes which determine the coupling and interactions among the neutral and ionized species in the ionosphere-thermosphere system, and to study the response of the system to changes in solar input, and to energy and momentum transfer by particles, fields and waves from adjacent regions.

### 4. Middle Atmosphere Response to Forcing from Above and Below

To achieve an understanding of the response of the middle atmosphere to changes in solar and near-space inputs and to volcanic, tectonic, meteorological, biospheric and anthropogenic activity, and to study the extent to which this response feeds back to the regions of the geosphere below and above.

## 5. Solar Variability Effects in Regions Adjacent to the Earth's Surface:

To determine the influences of solar variability on the physical and chemical properties and the large-scale behaviour of the lower atmosphere, on man-made technological systems, on earth currents and on biota, and to formulate, test and study mechanisms responsible for these effects.

### WORKING GROUPS AND PANELS

The actual scientific research will be organized into a limited number of well-defined cooperative projects proposed by the scientific communities of the participating countries. These projects may deal with subjects entirely within a Priority Area, or cut across two or more of them. To define, plan and implement the research coordination, Working Groups and Panels have been established.

The activities in the above Priority Areas will be coordinated by *Science Working Groups*, one for each Area. In addition to these Working Groups, the science support and service activities will be defined and coordinated by several *Programmatic Panels*.

Two major panels, a Panel on Informatics and a Panel on Long-Term Measurements, will have the responsibility of formulating recommendations regarding the establishment and operation of dedicated research support centres and monitoring networks, as well as coordinating the activities of these centres and networks with individual STEP projects.

Two other panels will become active mainly when the specific STEP research projects have been defined. They will serve as forums for the scientific discussion of topics of common interest to several of these projects: a Panel on Common Mechanisms in the Solar-Terrestrial System, and a Panel on Experimental Techniques.

Other panels may be established as the need arises. For instance, a *Panel on Modelling and Simulation* may be set up to test quantitative models of the solar-terrestrial environment and methods of numerical simulation, and to formulate recommendations on the use of standard models and simulation techniques.

STEP Steering Committee

Co-Chairmen:

G. Rostoker	V.A. Troitskaya
Earth and Planetary Physics	Soviet Geophysical Committee
University of Alberta	Molodezhnaya 3
Edmonton Alta. T6G 2J1	Moscow
Canada.	USSR.

Members:

M.A. Geller (SCOSTEP), USA; T.E. Holzer (IAU), USA; S. Kato (URSI), Japan; K. Labitzke (IAMAP), F.R. of Germany; M.E. Machado (SCOSTEP), Argentina; D. Rees (IAGA), UK; P. Simon (IAU), Belgium; O. Vaisberg (COSPAR), USSR.

Ex Officio Members:

S.A. Bowhill (MAP), USA; K.D. Cole (WITS), Australia; H. Oya (PAD), Japan; M.A. Shea (MONSEE), USA; E.J. Smith (SIV), USA.

## INTERNATIONAL UNION OF CRYSTALLOGRAPHY

### NOMINATIONS FOR THE EWALD PRIZE

The International Union of Crystallography is pleased to invite nominations for the Ewald Prize for outstanding contributions to the science of crystallography. The Prize is named after Professor Paul P. Ewald, in recognition of his significant contributions to the foundations of crystallography and to the founding of the IUCr. Professor Ewald was the President of the Provisional International Crystallographic Committee from 1946 to 1948, the first Editor of the Union's publication *Acta Crystallographica* from 1948 to 1959 and the President of the Union from 1960 to 1963.

The Prize consists of a medal, a certificate and a financial award. It is presented once every three years during the triennial International Congresses of Crystallography. The first Prize was presented at the XIV Congress at Perth, Australia, in 1987. The second Prize, for which nominations are now being invited, will be presented at the XV Congress in Bordeaux, France, in July 1990.

Scientists who have made contributions of exceptional distinction to the science of crystallography are eligible for the Ewald Prize, irrespective of nationality, age or experience. The only exceptions are the current members of the Prize Selection Committee and the President of the Union, none of whom are eligible. No restrictions are placed on the time or the means of publication of the nominee's contributions. The Prize may be shared by more than one contributor to the same scientific achievement.

Nominations for the Ewald Prize should be submitted in writing, preferably using the Ewald Prize Nomination Form and accompanied by supporting documentation, to the Executive Secretary of the IUCr, 5 Abbey Square, Chester CH1 2HU, England, from whom copies of the Nomination Form, the names of the Selection Committee and advice on the submission of nominations may be obtained. The closing date for nominations is 31 August 1989.

M. Nardelli  
President

A.I. Hordvik  
General Secretary.

## NEWS FROM CCIR

### COMPUTER PROGRAMMES FOR RADIO FREQUENCY MANAGEMENT

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

Recently, the Secretariat has received a computer programme from the PTT Research Institute of Prague (Czechoslovakia). Enquiries concerning the programme should be addressed to the submitting Administration/Organization or to the Director, CCIR, ITU, Place des Nations, CH-1211 Geneva 20, Switzerland.

A complete list of computer programmes announced earlier has been included in *CCIR Handbook on Spectrum Management and Computer-Aided Techniques*, the revised version of which was published in 1987. An example has been included in the December 1988 issue of *URSI Information Bulletin*.

## IUCAF AND FREQUENCIES FOR RADIO ASTRONOMY

Following the publication of Dr. J.W. Findlay's article on "IUCAF and Frequencies for Radio Astronomy" in the September issue of the *URSI Information Bulletin*, Prof. F.L. Stumpers sent some comments to the URSI Secretariat, as follows:

"With regard to the CCIR meeting in Los Angeles, I do not remember that there was any IAU document brought before that meeting. In fact a paper by the Netherlands (prepared by the Dutch PTT with the help of our astronomers) was at the base of what later became CCIR Recommendation 314. I had to defend it in the meeting and it got widespread support (against the expectation of Dr. Findlay, as he may well remember). When the WARC finished rather successfully, I received a beautiful photograph of a spiral galaxy and a letter of thanks from the Presidents of COSPAR, IAU and URSI (van de Hulst, Oort and Berkner) for my part in getting the Recommendation passed by CCIR".

The paper by Dr. Findlay shows abundantly the importance of the CCIR Recommendation.

## TRAITEMENT DE LA PAROLE

Les progrès réalisés dans le domaine du traitement de la parole viennent de faire l'objet de deux numéros spéciaux du *Journal des Télécommunications*, la revue mensuelle de l'Union Internationale des Télécommunications (UIT).

Ces deux numéros spéciaux contiennent 8 articles rédigés par d'éminent spécialistes. La liste de ces articles est reproduite ci-dessous:

### Numéro de novembre 1988

- Activités du CCITT dans le domaine de la normalisation du traitement de la parole: F. Bigi et M. Decina;
- Codage MICDA des signaux vocaux: M. Taka;
- Codage audiofréquence à 7 kHz à un débit inférieur ou égal à 64 kbit/s: X. Maître;
- Codage de la parole à 16 kbit/s et moins: R. Pietroiusti.

### Numéro de décembre 1988

- Méthodes permettant d'évaluer la qualité du codage de la parole: J.R. Rosenberger;
- Aspects du traitement de la parole touchant à l'équipement: G.K. Helder;
- Nouveaux défis posés par l'EMCN: M. Onufry;
- Etudes théoriques sur le traitement de la parole: R. Carré et M. Mrayati.

Ces deux numéros spéciaux peuvent être commandés au Service des ventes de l'UIT, Place des Nations, CH-1211 Genève 20, Suisse, au prix de 15 francs suisses pour les deux numéros, par poste ordinaire. Le *Journal des Télécommunications* fait l'objet de trois éditions en anglais, en français et en espagnol.

## BOOKS PUBLISHED BY URSI PERSONALITIES

F.E. GARDIOL (President of the Swiss URSI Committee and  
Vice-Chairman of URSI Commission B)

*LOSLIN: Lossy Line Calculation Software and User's Manual*

published by Artech House, January 1989.

ISBN: 0-89006-347-8.

J. VANIER (Vice-Chairman of URSI Commission A) and  
C. AUDOUIN (former French Official Member of Commission A)

*The Quantum Physics of Atomic Frequency Standards*

published by Adam Hilger, April 1989 (2 vols).

ISBN: 0-85274-434-X.

J.R. WAIT (Recipient of the Balh, van der Pol Gold Medal 1978)

*Electromagnetic Radiation from Cylindrical Structures*

IEE Books, 1988 reprint.

ISBN: 0-86341-141-X.



LIST OF URSI OFFICERS AND OFFICERS OF MEMBER  
COMMITTEES: AMENDMENTS

Amendments to the List published in No 247 (December) of the *URSI Information Bulletin* are listed below.

1. Commissions

A. Commission on Electromagnetic Metrology

Netherlands: Dr. J. de Vreede, van Swinden Laboratorium,  
Postbus 654, NL-2600 AR Delft, Netherlands.

South Africa: Dr. F. Hengstberger, Division of Production Technology, CSIR, P.O. Box 395, 0001 Pretoria, South Africa.

B. Fields and Waves

United Kingdom: Prof. A.D. Olver, Department of Electronic and Electrical Engineering, Queen Mary College, Mile End Road, London E1 4NS, UK.

C. Signals and Systems

South Africa: Prof. D.C. Baker, Laboratory for Advanced Engineering, P.O.Box 30536, 0132 Sunnyside, South Africa.

Switzerland: Prof. Dr. G.S. Moschytz, Im Sträler 17, CH-8047 Zürich, Switzerland.

United Kingdom: Prof. B.G. Evans, Department of Electronic and Electrical Engineering, Surrey University, Guildford, Surrey GU2 5XH, UK.

D. Electronic and Optical Devices and Applications

Switzerland: Prof. Dr. W. Bächtold, Erlenweg 4, CH-8135 Langnau a.A., Switzerland.

United Kingdom: Dr. A.J. Seeds, Department of Electronic and Electrical Engineering, University College London, Torrington Place, London WC1E 7JE, UK.

E. Electromagnetic Noise and Interference

Netherlands: Ir. A. Mawira, Dr. Neher Laboratorium/PTT, Postbus 421, NL-2260 AK Leidschendam, Netherlands.

United Kingdom: Dr. K.C. Shotton, Radiocommunications Division,  
DTI, Waterloo Bridge House, Waterloo Road, London  
SE1 8UA, UK.

#### F. Wave Propagation and Remote Sensing

German D.R.: Dipl.-Geophys. Mrs Trommer, Rundfunk- und Fernseh-  
technisches Zentralamt, Aussenstelle Kolberg, DDR-  
1601 Kolberg, German Democratic Republic.

South Africa: Mr. R. Seeber, Division of Microelectronics and  
Communications Technology, CSIR, P.O.Box 395,  
0001 Pretoria, South Africa.

United Kingdom: Mr. M.P.M. Hall, Rutherford Appleton Laborato-  
ry, Chilton, Didcot, Oxon OX11 0QX, UK.

#### G. Ionospheric Radio and Propagation

Netherlands: Prof. Dr. F.W. Sluyter, Technische Hoogeschool,  
Afd. Natuurkunde, Postbus 513, NL-5600 MB  
Eindhoven, Netherlands.

South Africa: Dr. J.P.S. Rash, Department of Physics, Univer-  
sity of Natal, King George V Avenue, 4001 Durban,  
South Africa.

United Kingdom: Prof. T.B. Jones, Department of Physics, The  
University, Leicester Road, Leicester LE1 7RH, UK.

#### H. Waves in Plasmas

South Africa: Dr. J.P.S. Rash, Department of Physics, Univer-  
sity of Natal, King George V Avenue, 40001 Durban,  
South Africa.

#### J. Radio Astronomy

United Kingdom: Dr. R.J. Cohen, Nuffield Radio Astronomy Labs,  
Jodrell Bank, Macclesfield, Cheshire SK11 9DL, UK.

## 2. Additions

- a) The representative of the URSI Committee in the USSR on the ad hoc Group on International Space Year is

Professor V.V. Migulin, IZMIRAN, 142092 Troitsk, Moscow Region, USSR.

- b) The following name and address have been omitted inadvertently from the Alphabetical List on p.118:

PILLET, Dr. G., CNET/DICET, 38 rue du Général Leclerc,  
F-92131 Issy-les-Moulineaux, France (93, 95).

## 3. Change of Address

NICOLSON, Dr. G.D., Hartebessthoek Radio Astronomy Observatory,  
CSIR, P.O.Box 443, 1740 Krugersdorp, South Africa.

VICE, Mr. R.W., Division of Microelectronics and Communications  
Technology, CSIR, P.O. Box 395, 0001 Pretoria, South Africa.

ZHANG, Prof. Xunjie, Wuhan Ionospheric Observatory, Wuhan  
Institute of Physics, P.O.Box 415, Wuchang, Hubei, China.

## 4. Change in Telex number

The following corrections under Dr. G. Hyde's listing on page 109 of Bulletin No 247 should be made:

Telex: 90-8753  
Telex (Wang): 44-0696  
Fax: 301-428-7747.

## 5. Inter-Commission Working Group on Time Domain Waveform Measurements

Chairman: Dr. Norris S. Nahman, Picosecond Pulse Labs, Inc.,  
P.O.Box 44, Boulder, Colorado 80306, USA.

Vice-Chairman: Prof. Tapan Sarkar, E.E. Department, Syracuse  
University, Syracuse, New York 13210, USA.

### Commission A - Electromagnetic Metrology

Prof. Tapan Bose, Université de Québec à Trois Rivières, C.P.  
500, Trois-Rivières, Québec, Canada G9A 5H7.

Dr. Eng. Tatsutoku Honda, Director, Development Department,  
Optoelectronic Industry and Technology Development  
Association, 29th Mari Bldg. 7-4, Nishi Shimbashi  
2-chome, Minato-ku, Tokyo 105, Japan.

Prof. Sedki M. Riad, E.E. Department, Virginia Polytechnical  
Institute and State University, East Blacksburg,  
Virginia 24061, USA.

Dr. K. Schon, Physikalisch-Technische Bundesanstalt, Postfach  
3345, 3300 Braunschweig, Fed. Rep. of Germany.

Dr. S.S. Stuchly, Department of Electrical Engineering, Univer-  
sity of Ottawa, Ottawa, Ontario, Canada K1N 6N5.

Commission B - Fields and Waves

Dr. Karl J. Langenberg, Dept. of Electrical Engineering, FB 16,  
University of Kassel, Wilhelmshoher Allee 73, Fed.  
Rep. of Germany.

Dr. Ross Stone, IRT Corporation, 1446 Vista Claridad, La Jolla  
CA 92037, USA.

Commission C - Signals and Systems

Prof. Seppo J. Halme, Communications Laboratory, Helsinki Uni-  
versity of Technology, Otakaari 5 A, SF-02150 Espoo  
15, Finland.

Commission D - Electronic and Optical Devices and Applications

Dr. André Scavannec, Centre National d'Etudes des Télécommuni-  
cations, Groupement PEC-196, rue de Paris, F-92220  
Bagneux, France.

Commission E - Electromagnetic Noise and Interference

Dr. Carl Baum, Air Force Weapons Laboratory, Kirtland Air  
Force Base, New Mexico 87117, USA.

Dr. A.A. Giordano, GTE Products Corporation, Sylvania Systems  
Group, Communication Systems Division, 77 A Street,  
Needham Heights, Massachusetts 02194, USA.

Commission F - Wave Propagation and Remote Sensing

Dr. A.R. Webster, Faculty of Engineering Science, Electrical  
Engineering, The University of Western Ontario,  
London, Canada N6A 5B9.

Commissions G and H - Ionospheric Radio and Propagation and  
Waves in Plasmas

Dr. Wally Campbell, USGS MS 964, Box 25046, Denver, Colorado  
80225, USA.

Dr. François Lefevre, Physique et Chimie de l'Environnement,  
CRPE, Avenue de la Recherche Scientifique, F - 45045  
Orléans Cedex, France.

Commission J - Radio Astronomy

Dr. J. Richard Fisher, National Radio Astronomy Observatory,  
Post Office Box 2, Green Bank, West Virginia 24944,  
USA.





