

## Table des matières - Contents

	pages
J.A. Ratcliffe.....	i
XXII General Assembly of URSI:	
Resolutions and Recommendations of the Council.....	1
Resolutions and Recommendations of Commissions.....	21
XXIIe Assemblée générale de l'URSI:	
Résolutions et recommandations du Conseil.....	44
Résolutions et recommandations des Commissions.....	66
News from Member Committees:	
4th National URSI Colloquium in the United Kingdom.	92
43th Meeting of the A.S. Popov Society.....	92
Report of URSI Working Group on Mapping of Characteristics at the Peak of the F2 Layer.....	94
International Workshop on Ionospheric Informatics.....	97
8th European Conference on Circuit Theory and Design..	101
Solar-Terrestrial Energy Programme 1990-1995.....	103
Prise en charge du Temps Atomique International.....	108
Announcements of Meetings and Symposia:	
XII General Assembly of EGS.....	109
4th International Conference on HF Radio Systems and Techniques.....	109
1988 IEEE AP-S International Symposium and URSI/USNC Radio Science Meeting.....	110
18th European Microwave Conference.....	111
2nd Asia-Pacific Microwave Conference.....	112
1988 International Geoscience and Remote Sensing Symposium.....	113
8th International Zurich Symposium on Electromagnetic Compatibility.....	114
1989 International Symposium on Antennas and Propagation, Japan.....	115
Symposium on Artificial Modification of the Ionosphere.....	116
List of Future Symposia and Meetings.....	117

## URSI Officers and Officers of Member Committees:

Honorary Presidents.....	127
Board of Officers.....	127
URSI Secretariat.....	127
URSI Standing Committees.....	127
URSI ad hoc Groups.....	129
URSI Commissions.....	130
Joint Working Groups.....	140
Inter-Commission Working Group.....	141
Inter-Union Working Groups.....	141
URSI representatives on other organizations.....	142
URSI Member Committees.....	143
Alphabetical Index and Addresses.....	145

## CHANGE OF ADDRESS

Please note that the URSI Secretariat has been transferred to the following address:

URSI Secretariat  
 c/o Observatoire Royal de Belgique  
 3 avenue Circulaire  
 B-1180 Brussels, Belgium.



( i )

J.A. RATCLIFFE

The sad news has reached the URSI Secretariat of the death, on 25 October 1987, of Mr. J.A. Ratcliffe, C.B., C.B.E., F.R.S., Honorary President of URSI. An "In Memoriam" devoted to this regretted personality of our Union will appear in the March 1988 issue of the Information Bulletin.



XXII GENERAL ASSEMBLY OF URSI  
RESOLUTIONS AND RECOMMENDATIONS

The Resolutions and Recommendations adopted by the Council and the Commissions of URSI are reproduced below. A full account of the Opening and Closing Meetings, and of the business transacted by the Council and the Commissions will appear in 1988 in Volume XXI of the *Proceedings of URSI General Assemblies*.

RESOLUTIONS AND RECOMMENDATIONS  
OF THE COUNCIL

U.1 URSI Scientific Commissions

The URSI Council,

*noting* that the nine URSI Scientific Commissions had been asked to review their titles, sub-titles and terms of reference during the XXII General Assembly in Tel Aviv;

*having considered* the recommendations submitted by each of the Commissions;

*approves* the titles, sub-titles and terms of reference for the next triennium, as given in the Annex.

Annex

1. Commission A - ELECTROMAGNETIC METROLOGY. Electromagnetic measurements and standards, and interaction between electromagnetic fields and biological systems.

*Terms of Reference:*

- (a) Time and frequency measurements and standards, including infrared and optical frequencies.
- (b) Time domain measurements.
- (c) Frequency domain measurements.
- (d) Telecommunication measurements.
- (e) Laser measurements.
- (f) Quantum metrology and electrical methods in fundamental constants.

- (g) Microwave to submillimeter measurements and standards.
- (h) Measurements of the effects of electromagnetic fields on biological systems.

2. Commission B - FIELDS AND WAVES. Electromagnetic theory and practice, including antennas and waveguides.

*Terms of Reference:*

Deals with the theory of electromagnetic fields and waves in a general sense. Of particular interest are analytical and numerical methods for solving problems of

- (a) scattering by objects;
  - (b) propagation in complicated media or over complicated surfaces;
  - (c) transient phenomena;
  - (d) inverse scattering;
  - (e) guiding structures;
  - (f) antennas.
3. Commission C - SIGNALS AND SYSTEMS. Communications systems and system theory (including circuits); information theory and signal processing (including stochastic problems).

4. Commission D - ELECTRONIC AND OPTICAL DEVICES AND APPLICATIONS.

*Terms of Reference:*

- (1) To promote research and to review new developments in electronic and optical devices and their applications with particular reference to radio science and telecommunications. Emphasis will be placed on generation, detection, storage and processing of electromagnetic waves and signals at all frequencies.
  - (2) To arrange scientific sessions and meetings drawing the attention of other Commissions to such of these developments which may be of particular interest to them.
5. Commission E - ELECTROMAGNETIC NOISE AND INTERFERENCE.

*Terms of Reference:*

- (a) Terrestrial and planetary noise of natural origin; man-made noise.
- (b) The composite noise environment.
- (c) The effects of noise on system performance.

- (d) The lasting effects of transients on equipment performance (this includes the Nuclear Electromagnetic Pulse).
- (e) The scientific basis of noise and interference control.
- (f) Spectrum utilization.

*Note:* Many of the subjects mentioned are treated under the common denominator: Electromagnetic Compatibility.

6. Commission F - WAVE PROPAGATION AND REMOTE SENSING (including radio-meteorology, radio-oceanography and remote sensing of non-ionized media).

*Terms of Reference:*

- (1) To study all aspects of wave propagation at all frequencies in a non-ionized environment:
  - (i) wave propagation over the Earth's surface,
  - (ii) wave propagation in, and interaction with, the neutral atmosphere,
  - (iii) wave interaction with the Earth's surface, oceans, land and ice,
  - (iv) wave propagation through, and scattering by, the sub-surface medium,
  - (v) characterization of the environment as it affects wave phenomena;
- (2) to encourage the application of the results of these studies, particularly in the areas of remote sensing and communications;
- (3) to develop the required cooperation with other URSI Commissions and other relevant organizations.

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

*Terms of Reference:*

Deals with the study of the ionosphere in order to provide the broad understanding of this medium necessary to radio communications. Included are the morphology of the ionosphere, its structure and variations, and the tools needed to measure its properties.

8. Commission H - WAVES IN PLASMAS

*Terms of Reference:*

Deals with waves in plasmas in the broadest sense, and the

interaction between these waves and charged particles. Included are electrostatic waves in interplanetary, planetary and laboratory plasmas.

9. Commission J - RADIO ASTRONOMY (including remote sensing of celestial objects).

*Terms of Reference:*

- (1) The activities of the Commission shall be concerned with:
  - (a) radio sources in space, particularly radio emission from the quiet and active sun, from the solar system, from the galaxy and from discrete sources in the Universe;
  - (b) the study of meteors, the sun, moon, planets and other objects in the solar system by the radio echo technique.
- (2) The Commission shall study and promote the development of technical methods in relation to the above and shall endeavour to protect the observations from interference.
- (3) In connection with (1) the Commission will aim:
  - (i) to work jointly with other Commissions of URSI where there are common interests;
  - (ii) to work jointly with Commission 40 of the International Astronomical Union in convening symposia on Radio Astronomy;
  - (iii) to cooperate with Commission 40 of IAU on the choice of topics for discussion in order to prevent any undesirable overlapping.
- (4) The Commission shall formulate recommendations appropriate to URSI on any subjects in relation to the above for consideration by other URSI Commissions and other international bodies.

U.2 Membership of URSI

The URSI Council,

*noting*

- (a) the various suggestions regarding the URSI membership made at the Corsendonk Meeting (March 1987);
- (b) the recommendations made in the report of the ad hoc Group appointed at the General Assembly, and chaired by Prof. S. Okamura;

*resolves*

1. to establish a new category of membership, the Associate Member Committees, for Committees considering membership of URSI or having some difficulties in paying the annual contribution to the Union;
2. to include in the URSI Statutes provisions defining the conditions under which Associate Member Committees will be admitted to the Union;
3. to ask the Standing Committee on Membership to consider other possible categories of membership, such as individual membership and affiliate membership for professional societies and industry, and to report to the URSI Member Committees, possibly for a vote by mail before the next General Assembly;
4. to appoint the following as members of the Standing Committee on URSI Membership:  
Chairman: M. Petit (France)  
Members : Yu-Kai Chen (China, SRS)  
          E.V. Jull (Canada)  
          S. Okamura (Japan)  
          S. Serafimov (Bulgaria)  
          J. Shapira (Israel).

U.3 Revision of URSI Statutes

The URSI Council,

*considering* that some of the decisions made at the present General Assembly require a revision of the URSI Statutes, in particular Article 1 (Objects) and Articles 2 to 12 (Members);

*resolves*

1. that the Drafting Committee be instructed to prepare a revised version of the URSI Statutes before the end of 1987;
2. that the URSI Secretariat be instructed
  - (i) to circulate the draft revised version of the Statutes to the Member Committees for approval by correspondence;
  - (ii) upon adoption of this new version by the Member Committees, to provide for its publication.

#### U.4 URSI Finances and Membership of Standing Finance Committee

The URSI Council,

*noting* the recommendations contained in the Report of the Standing Finance Committee, dated 31 August 1987;

*considering* that the Standing Finance Committee should include representatives of various membership categories of URSI;

*resolves*

1. to approve the audited accounts of the Union for the years ending 31 December 1984, 1985 and 1986;
2. to approve the Income and Expenditure Budgets (Model B) as given in Annex 1 to the Minutes of the 4th Meeting of the URSI Council, Tel Aviv (31 Aug 1987);
3. to adopt the unit contributions proposed in Budget Model B, namely \$610 in 1988, \$740 in 1989 and \$860 in 1990;
4. to authorize the Board of Officers to adjust the unit contribution, as expressed in dollars, to keep its purchasing power consistent with the budget;
5. to publish the Report of the Standing Finance Committee in Volume XXI of the *Proceedings of URSI General Assemblies*;
6. to appoint the following as members of the Standing Finance Committee for the next triennium:

Chairman: F. Gardiol (Switzerland)

Members: C.M. Butler (USA)  
K. Géher (Hungary)  
J.G. Lucas (Australia)  
J.B.H. Peek (Netherlands)  
S. Radicella (Argentina)  
W.D. Ryan (Ireland).

#### U.5 Publications Committee

The URSI Council,

*noting* the recommendations contained in the Report of the Publications Committee, dated 31 August 1987;

*considering* the great importance of the publications programme for the credibility and visibility of the Union;



*resolves*

1. to adopt recommendations 1, 2, 3, 4, 5 and 8 of the Report, with some minor modifications;
2. to publish the Report of the Publications Committee in Volume XXI of the *Proceedings of URSI General Assemblies*;
3. to establish the Publications Committee on a permanent basis;
4. to appoint the following as members of the Standing Publications Committee for the next triennium:

Chairman: R.L. Dowden (New Zealand)

Members: P.J.B. Claricoats (UK)  
G. Hyde (USA)  
B. Picinbono (France)  
Ch.-U. Wagner (GDR).

#### U.6 Standing Committee on Developing Countries

The URSI Council,

*having considered*

- (a) the report submitted by the Standing Committee on Developing Countries on its activities during the last triennium;
- (b) the proposed plan for action for 1988-1990;

*resolves*

1. to congratulate the Committee on the successful completion of its programme in the last three years;
2. to express its appreciation to Dr. A.P. Mitra and his colleagues for their work in preparing the *Handbook of Radio Propagation in Tropical and Subtropical Countries*;
3. to approve in principle the programme of activities for the next triennium as outlined in the Report of the Committee, subject to approval of the budget;
4. to appoint the following as members of the Committee:

Chairman: S. Radicella (Argentina)

Members: Feng Shizhang (China, CIE)  
F. Mopfouma (Congo Brazzaville)

J.O. Oyinloye (Nigeria)  
B.M. Reddy (India)  
J. Voge (France).

U.7 Standing Committee on Future General Assemblies

The URSI Council,

*considering* the importance of the task devolved on the Committee on Future General Assemblies in seeking invitations from the Member Committees for the organization of the General Assemblies of the Union;

*resolves*

1. to maintain this Committee for the next triennium;
2. to appoint the following as members of the Committee:

Chairman: V. Zima (Czechoslovakia)

Members: T.B.A. Senior (USA)  
J. Shapira (Israel)  
R. Woodman (Peru)  
M.E. Zhabotinskij (USSR).

U.8 XXIII General Assembly 1990

The URSI Council,

*having considered* the invitations for the XXIII General Assembly, which had been submitted by the URSI Member Committees in Czechoslovakia, in Sweden and in the United Kingdom;

*resolves*

1. to accept the invitation of the Czechoslovak URSI Committee to hold the XXIII General Assembly in Prague in the second half of 1990;
2. to record its thanks to the URSI Committees in Sweden and in the United Kingdom for their invitations.

U.9 URSI-CCIR-CCITT Liaison Committee

The URSI Council,

*noting*

- (a) the recommendation of the Corsendonk Meeting (March 1987) that it is essential that the liaison between URSI and the Consultative Committees of the International Telecommunications Union (ITU) be reinvigorated;
- (b) that the URSI-CCIR-CCITT Liaison Committee already provides a structure and a mechanism which should facilitate achieving that objective;

*resolves*

1. to maintain the URSI-CCIR-CCITT Liaison Committee for the next triennium;
2. to instruct the Committee to make every effort to strengthen the cooperation between URSI and the Consultative Committees of the ITU;
3. to appoint the following as members of the Committee for the next triennium:

Chairman: G. Hagn (USA)

Vice-Chairmen: W.A. Gambling (UK)  
F.L. Stumpers (Netherlands)

Members:

Commission A - S. Leschiutta (Italy)  
Commission B - D. Bem (Poland), R.M. Bevensee (USA)  
Commission C - J.G. Lucas (Australia)  
Commission D - T. Okoshi (Japan)  
Commission E - A.D. Spaulding (USA)  
Commission F - A. Blomquist (Sweden), L. Boithias (France),  
F. Fedi (Italy), M.P.M. Hall (UK)  
Commission G - L.W. Barclay (UK)  
Commission J - R.H. Frater (Australia), R. Wielebinski (FRG).

U.10 Coordination of URSI Scientific Programme

The URSI Council,

*noting*

- (a) that the Steering Group for the Coordination of URSI

Scientific Programme had been created at a time when it was not possible, for financial reasons, to convene a meeting of the Coordinating Committee in the year preceding the General Assembly;

- (b) that the need for this Steering Group has now disappeared since the resources of the Union will permit a meeting of the Coordinating Committee to be held in the Spring of 1989 to discuss and finalize the scientific programme for the XXIII General Assembly in 1990;
- (c) that, nevertheless, there is a need for centralizing the whole operation;

*resolves*

1. to terminate the Steering Group for the Coordination of the URSI Scientific Programme;
2. to appoint Dr. P. Bauer as Coordinator, and Prof. J. Bach Andersen as Associate Coordinator for the XXIII General Assembly;
3. to express its appreciation to Dr. Bauer and to the members of the Steering Group for their efforts in preparing the scientific programme for this 1987 General Assembly.

#### U.11 Procedure for Election of URSI Officers

The URSI Council,

*considering*

- (a) that the Member Committees should be fully informed on the candidates for members of the Board, Chairmen and Vice-Chairmen of Commissions;
- (b) that there is lack of uniformity in the procedure for the election of Vice-Chairmen in the various URSI scientific Commissions, and that the Member Committees should be more involved in that procedure;

*decides*

1. to instruct the URSI Secretariat to circulate biographical summaries of candidates for the various offices in URSI to Member Committees ahead of the General Assembly;
2. to authorize the Board of Officers to define a single procedure to be applied in all the Commissions, bearing

in mind that the Member Committees should be involved in the whole operation.

U.12 Inter-Union Commission on Allocation of Frequencies to Radio Astronomy and Space Science

The URSI Council,

*considering*

- (a) that the activities of the International Telecommunications Union (ITU) continue to grow in size and complexity with the consequence that the needs for spectrum space for radio astronomy and space research must, more than ever, be assessed with care and stated with clarity;
- (b) that, as the use of the radio spectrum grows, so also do the dangers of serious damage to scientific research by other users of the radio spectrum;

*resolves*

1. to approve the Report submitted by Dr. J.W. Findlay, Chairman of IUCAF;
2. to implement the recommendations contained in that report, namely:
  - (i) to facilitate the establishment of closer links with radio astronomers in the various parts of the world;
  - (ii) to increase from two to four the number of URSI members in the Inter-Union Commission, and to recommend to the International Astronomical Union (IAU) to act likewise;
  - (iii) to make every effort to ensure that the very important activities of the Inter-Union Commission on the Allocation of Frequencies to Radio Astronomy and Space Science are properly supported and funded.

U.13 Inter-Commission Working Group on Coordination of URSI's Activities at Optical Wavelengths for Communication, Sensing and Processing

The URSI Council,

*noting* that the report presented by Prof. W.A. Gambling, Chair-

man of the Inter-Commission Working Group on Coordination of URSI's Activities at Optical Wavelengths for Communication, Sensing and Processing indicates that the problems which required the intervention of the Working Group have now disappeared;

*resolves*

1. to terminate this Inter-Commission Working Group;
2. to express its deep thanks to Prof. W.A. Gambling for the successful completion of the task of the Working Group.

U.14 Inter-Commission Working Group on Time Domain Waveform Measurements

The URSI Council,

*considering*

- (a) the report on the work of the Inter-Commission Working Group on Time Domain Waveform Measurements during the present General Assembly;
- (b) the recommendations made by the Working Group regarding its programme of activities for the next triennium;

*resolves*

1. to maintain the Inter-Commission Working Group, with the same terms of reference;
2. to reappoint N.S. Nahman (USA) and T. Sarkar (USA) as Chairman and Vice-Chairman of the Working Group respectively.

U.15 Inter-Commission Coordinating Group on Remote Sensing

The URSI Council,

*considering*

- (a) that remote sensing activities are covered by the terms of reference of Commission F;
- (b) that this Commission can achieve coordination both inside URSI, in consultation with the Coordinating Committee, and with other organizations, such as the International Association of Meteorology and Atmospheric Physics (IAMAP) and

the IEEE Geoscience and Remote Sensing Society (GRS);

*resolves*

1. to terminate the Inter-Commission Coordinating Group on Remote Sensing;
2. to express its appreciation to Prof. J.F.R. Gower for his work as Chairman of this Coordinating Group.

U.16 International Geosphere-Biosphere Programme: A Study of Global Change

The URSI Council,

*noting*

- (a) that the International Council of Scientific Unions (ICSU) has launched a major interdisciplinary cooperative programme, under the title "International Geosphere-Biosphere Programme: A Study of Global Change", which will contribute to the understanding of the interactive physical, chemical and biological processes that regulate the total Earth system;
- (b) that a Special Committee has been established by ICSU to provide for the development and correlation of the scientific programme;
- (c) that the operational phases of the programme will start in the early 1990's;

*expresses* the willingness of URSI to participate in this major enterprise;

*resolves*

1. to form an ad hoc Group on the Geosphere-Biosphere Programme, the task of which will be to identify the areas where the Union can make useful contributions;
2. to appoint the following as members of the ad hoc Group:

Chairman: P. Delogne (Belgium)

Members: F. Fedi (Italy)  
V.V. Migulin (USSR)  
R. Wielebinski (FRG)  
G. Valenzuela (USA).

U.17 International Space Year (ISY)

The URSI Council,

*noting*

- (a) that an International Space Year has been proposed for 1992 in celebration of the 500th Anniversary of Columbus' voyage and the 35th Anniversary of the launching of the first spacecraft;
- (b) that the ICSU Committee on Space Research (COSPAR) has formed a committee to support the scientific content of the International Space Year;
- (c) that the International Council of Scientific Unions (ICSU) has established a Coordinating Committee to consider the components of the ISY;

*expresses* the willingness of URSI to contribute to the International Space Year programme;

*resolves* to appoint an ad hoc Group for the ISY with the following membership:

Chairman: W.E. Gordon (USA)

Members: M. Tiuri (Finland)

P. Bauer (France)

a representative from the USSR to be designated.

U.18 Ad hoc Group on Environmental Consequences of Nuclear War (ENUWAR)

The URSI Council,

*considering*

- (a) the vital importance of the task of the Working Group on Environmental Consequences of Nuclear War (ENUWAR) of the ICSU Committee on Problems of the Environment (SCOPE);
- (b) the valuable contribution which URSI has made in the form of a Statement on Nuclear Electromagnetic Pulse (NEMP) and Associated Effects, prepared by the Group set up in Florence (1984);



*resolves*

1. to express its appreciation to Mr. M. Wik for the remarkable work performed by the Group;
2. to maintain the ad hoc Group on ENUWAR during the next triennium, with Mr. M. Wik as Chairman, and two members to be selected by the Board of Officers in consultation with the Chairman.

U.19 Natural Noise from Lightning

The URSI Council,

*considering*

- (a) that Commission E promotes scientific research in the field of the electromagnetic environment, including natural noise from lightning;
- (b) that, as part of a forthcoming meteorological satellite being planned by the European Space Agency (ESA), continuous recording of lightning on a world-wide basis could lead to significant improvement in long-term and short-term radio noise predictions;
- (c) that optical observations could be made with high accuracy in location, time and in amplitude level and, when correlated to radio observations, could be used as input data for propagation-based models of radio noise;
- (d) that it is expected that such studies of lightning would also contribute to the study of whistlers and might even contribute to the geophysical aspects relating to the magnetosphere and to the Earth-ionosphere waveguide and its boundaries;
- (e) that, in view of the high competence of URSI Commissions E and H, it would be a great advantage if URSI could participate in the planning of LFD data processing, data interpretation and application;
- (f) that URSI has stressed the importance of scientific data pertinent to reliable communications for our society and to geophysical studies, and agrees that a satellite-based lightning flash mapper would contribute to this objective;

*noting* that the results of such a project would be of strong interest to the International Telecommunications Union (ITU), and its technical advisory body, the International Radio Consultative Committee (CCIR);

*recommends* strongly that the potentialities of the proposed lightning flash detector should be evaluated and given serious consideration for inclusion in a meteorological satellite.

#### U.20 World-Wide Ionosonde Network

The URSI Council,

*noting*

- (a) the recommendation of Commission G on Ionospheric Radio and Propagation regarding the importance of an operating world-wide ionosonde network;
- (b) the important contributions made for many years by the ionosonde stations of the New Zealand network in both the scientific and communications fields;
- (c) the important contributions made for many years by the ionosonde station at De Bilt, Netherlands;
- (d) the need to achieve world-wide coverage by the ionosonde network;

*expresses* its great concern at the proposed closing of the ionosonde stations of the New Zealand network and at the proposed closing of the ionosonde station at De Bilt;

*urges*

1. the responsible authorities in New Zealand to reconsider this decision and to continue the operation of the stations;
2. the responsible authorities in the Netherlands to reconsider their decision and to continue the operation of the station at De Bilt and the associated observatory at Wileveen;

*encourages* the Chilean authorities to install and operate an ionosonde on Easter Island, which would be a most valuable contribution to the World Ionosphere/Thermosphere Study (WITS), and would also fill a notable gap in the world-wide network of ionosondes, thus providing essential input to the scientific and communications data base on which forecasts are made.

## U.21 Incoherent Scatter and ST Radar Facility in Antarctica

The URSI Council,

*noting* the joint recommendation of Commissions G on Ionospheric Radio and Propagation and H on Waves in Plasmas;

*considering*

- (a) that URSI has supported the establishment of large research facilities (such as large incoherent-scatter radars) when it has been apparent that they have valuable and unique contributions to make;
- (b) that an opportunity now exists to establish a modern incoherent scatter (IS) and stratospheric/tropospheric (ST) radar facility in Antarctica;
- (c) that the expected scientific results of such a facility include filling the void in South hemisphere investigations of differences in the atmospheric energy and momentum budget and the atmospheric response; details of the coupled thermospheric-ionospheric system; information on tropospheric-stratospheric dynamics pertaining to changes in ozone concentration in the lower stratosphere and geographic/geomagnetic asymmetries;
- (d) that, if the Antarctic facility is magnetically conjugate to a large Northern hemisphere radar, it would make possible extensive studies of magnetic conjugacy, hence topology of magnetospheric particles and fields;

*recommends* that the establishment of an incoherent scatter stratospheric-tropospheric (IS-ST) radar facility in Antarctica be encouraged.

## U.22 Possible Interference to Incoherent Scatter Facilities

The URSI Council,

*noting* the joint recommendation of Commissions G on Ionospheric Radio and Propagation and H on Waves in Plasmas;

*considering*

- (a) that incoherent scatter radars (ISR) are most suitable tools to study the Earth's upper atmosphere, particularly in polar regions;

- (b) that the EISCAT-ISR constitutes one of the essential links in the global network of ISRs;
- (c) that data from the ISR network are provided to the international scientific community through the NCAR ISR data base;
- (d) that the increasing spectrum congestion resulting from the expansion of existing radio services and the development of new communication systems may cause harmful interference to these valuable scientific facilities;
- (e) specifically, that the imminent deployment through the Nordic countries of cellular radiotelephone services in frequency bands overlapping that of the EISCAT is expected to have a critical impact on the EISCAT operation;

*resolves* to inform the international bodies (i.e. the International Telecommunication Union (ITU), the International Frequency Registration Board (IFRB), the International Radio Consultative Committee (CCIR)), as well as the national Nordic telecommunication authorities about this problem, and to urge them to undertake appropriate measures to mitigate or eliminate any interference problems occurring at EISCAT and at other ISR facilities to ensure their continued operation.

#### U. 23 Active Experiments

The URSI Council,

*noting* the joint recommendation of Commissions G on Ionospheric Radio and Propagation and H on Waves in Plasmas;

*considering*

- (a) that both COSPAR and URSI have Working Groups on Active Experiments overlapping in many fields and providing similar services (advance notices of active experiments for observing scientists);
- (b) that a single URSI/COSPAR Joint Working Group would serve these needs more efficiently and effectively than the present two separate Working Groups, and would lead to better co-ordinated symposia in this field;

*resolves* to invite COSPAR to form with URSI such a Joint Working Group on Active Experiments consisting of four Co-chairmen, two appointed by COSPAR and two by URSI (URSI

Co-chairmen: W.E. Gordon, USA; Santimay Basu, USA).

U.24 Measurement of 10.7 cm flux

The URSI Council,

*noting* the recommendation of Commission G on Ionospheric Radio and Propagation;

*considering* that the termination of the long-standing 10.7 cm solar flux measurement by the Canadian National Research Council is a major setback to ionospheric modelling and prediction work;

*urges* the Canadian Administration to renew its support of the routine measurement of the 10.7 cm solar flux.

U.25 Recognition of Merits of Prof. V.V. Migulin

The URSI Council,

*considering*

- (a) the important role played by Prof. V.V. Migulin in the activities of URSI and, in particular his administrative work in the Board of Officers, and his scientific work in Commission G;
- (b) the very successful symposia on Artificial Modification of the Ionosphere, organized by him in Suzdal, USSR, in 1983 and 1986;
- (c) the decision of Commission G to organize a series of such symposia in future;

*noting* that Prof. Migulin's help and advice will be available to URSI in various ways, including the series of symposia;

*resolves* that Prof. Migulin be appointed Honorary Chairman of the URSI series of Symposia on Artificial Modification of the Ionosphere.

U.26 UNESCO Subvention

The URSI Council,

*considering* that the annual subventions received from UNESCO, via ICSU and through direct contracts, have greatly contri-

buted to the success of the URSI Young Scientists Programme and of its activities in the fields of publications and of assistance to developing countries;

*resolves* to convey to UNESCO its warmest thanks and appreciation for the valuable support thus provided.

U.27 Young Scientists Programme

The URSI Council,

*noting* that forty Young Scientists could be invited to attend the General Assembly in Israel, eleven of whom coming from developing countries;

*resolves* to convey its thanks to the organizations which so generously contributed to the financial support of this Programme:

The International Council of Scientific Unions (ICSU),  
The ICSU Committee on Science and Technology in Developing Countries (COSTED),  
The United Nations Educational, Scientific and Cultural Organization (UNESCO),  
The Royal Society of London,  
The URSI Committee in Israel,

U.28 Vote of Thanks to the Israeli URSI Committee

The URSI Council,

*noting* that the Israeli Organizing Committee spared no effort to make this XXII General Assembly of the Union a very successful event;

*resolves* to express its gratitude and appreciation

1. to the Israeli URSI Committee and to the Israel Academy of Sciences and Humanities for the invitation to hold the XXII General Assembly in Tel Aviv and, in particular to Dr. J. Shapira, President of the URSI Member Committee in Israel;
2. to the members of the Organizing Committee for the successful completion of the detailed arrangements for the Assembly.

RESOLUTIONS AND RECOMMENDATIONS OF  
COMMISSIONS AND COMMITTEES

COMMISSION A - ELECTROMAGNETIC METROLOGY

A.1 Time Comparisons

Commission A,

*considering*

- (a) that there is a scientific need for additional time and frequency comparisons between the national time scales and the new frequency standards under development;
- (b) that there is a deficiency between the available comparison accuracies and the capabilities of the best atomic frequency standards and clocks, which could be available to any interested laboratories;
- (c) that a number of time and frequency comparison methods are in the process of being evaluated, including VLBI, one-way and two-way pseudo random noise signals and LASER techniques on ground and in satellites;

*recommends*

- 1. that investigations on all the proposed or new time comparison methods should be actively pursued;
- 2. that simultaneous campaigns of mutual comparisons should be performed;
- 3. that the relevant activities be coordinated and the results be published under the auspices of the Bureau International des Poids et des Mesures (BIPM).

A.2 Future Editions of the URSI Register of National Standards Laboratories

Commission A,

*considering* that the URSI Register of National Standards Laboratories provides helpful information on world-wide calibration facilities for electromagnetic quantities;

*recommends* that future editions of this Register should be

formally adopted as URSI documents (as opposed to Commission A documents) and that they should be printed and sold by a commercial publisher;

*instructs* the Chairman of the Working Group for the Register to negotiate a suitable commercial arrangement with a publisher, for approval by the URSI Council.

*Note:* Referred to the Standing Publications Committee.

#### A.3 Updating of the URSI Register of National Standards Laboratories

Commission A,

*considering* the new arrangements for the publication of the URSI Register of National Standards Laboratories, resulting from the recommendations in Recommendation A.5 (Florence, 1984) and Recommendation A.2 (Tel Aviv, 1987);

*recommends* that the next updated edition of the Register should appear in 1988 and that updating should take place at intervals of four years thereafter;

*instructs* its Official Members to submit to the Chairman of the Working Group, by 31 December 1987 and at 4-year intervals thereafter, information updating the entry for their country in the document (or a nil return).

#### A.4 Quantum Metrology Standards and Fundamental Constants

Commission A,

*considering*

- (a) that standards of physical measurements, in particular those related to basic and derived electrical units, are the basis for the accurate measurements of important parameters in radio science;
- (b) that changes are taking place in the implementation of these standards, through the use of quantum phenomena;
- (c) that the knowledge of the exact values of selected fundamental constants is necessary for the implementation of these standards;
- (d) the need to realize the meter according to its SI defi-



nition, with frequencies in the visible range;

- (e) the importance of optical frequency measurements for the determination of fundamental constants and the fact that optical frequency measurements are carried out only in a few laboratories;
- (f) that decisions are going to be made by the Comité International des Poids et Mesures (CIPM) in the near future regarding electrical units;

*recommends* that all National Standards Laboratories involved in that field be encouraged to

1. continue actively their work on the exact determination of fundamental constants;
2. continue actively their work on the implementation of practical quantum metrology standards;
3. support the development of methods which permit the measurement of visible frequencies with an accuracy equivalent to that currently reached with primary frequency standards;
4. make their results known to other organizations, especially to the Bureau International des Poids et des Mesures (BIPM).

#### A.5 Improvements of RF Standards at Millimetre to Submillimetre Wavelengths

Commission A,

*considering*

- (a) the increasing importance of the region of millimetre to submillimetre wavelengths for various technical and scientific applications, such as communication and data transfer, radar, remote sensing, environmental research, radio astronomy and nuclear fusion, and also its importance to electromagnetic compatibility;
- (b) the need for improved standards and metrological support for these applications in order to provide reliable measurements
  - (i) of the basic RF quantities: power, noise temperature and scattering coefficients,
  - (ii) of the permittivity and permeability of RF materials to be used in this frequency range,

(iii) for both guided-wave and free-field modes of operation;

*recommends* that increased emphasis should be placed on fundamental and applied research on advanced RF standards and measuring methods, and on material measuring methods, in the range of the millimetre to submillimetre wavelengths.

A.6 Working Group on Interaction of Electromagnetic Fields with Biological Systems and Related Measurements

Commission A,

*considering* the recommendations adopted at the XVIII, XIX, XX and XXI General Assemblies of URSI, which recognize the interest of URSI in the biological effects of electromagnetic fields and the need for international cooperation among physical scientists, biological and medical scientists and organizations, in order to increase the knowledge of interaction of electromagnetic fields with biological systems;

*noting* that this discipline is of interest to several URSI Commissions;

*recommends*

1. that a Working Group on the Interaction of Electromagnetic Fields with Biological Systems and Related Measurements should be maintained, with a Chairman and two Vice-Chairmen, one representing Commission A and the other representing the other URSI Commissions;
2. that the members of the Working Group shall be nominated by the Working Group Chairman, in consultation with the Member Committees;
3. that the Commissions of URSI should be invited to appoint a representative in the Working Group;
4. that the Working Group should be asked to continue its efforts toward:
  - (i) convening of symposia covering the interaction of electromagnetic fields and biological systems;
  - (ii) cooperating with other organizations in the planning and convening of such symposia;
  - (iii) lending active support to international organizations that are concerned with matters of health and safety

- as these relate to electromagnetic fields and waves, and
- (iv) promoting related scientific activities in its field of interest.

COMMISSION B - FIELDS AND WAVES

B.1 Symposium on Electromagnetic Wave Theory

Commission B,

*considering*

- (a) that the URSI Symposia on Electromagnetic Wave Theory have been held at intervals of three years for over 30 years;
- (b) that these Symposia are major events which represent an important activity of Commission B between Assemblies;
- confirms* that the next Symposium in the series will be held in Stockholm, Sweden, in August 1989.

B.2 Co-sponsorship of International Conferences

Commission B,

*considering* that various forthcoming international conferences are of direct interest to the Commission;

*recommends* that URSI co-sponsor the following conferences:

1. the three annual European Microwave Conferences in 1988, 1989 and 1990 (the Conference to be held in Stockholm, Sweden, from 12 to 17 september 1988 will be the eighteenth in the series);
2. the Symposium on Antennas and Electromagnetic Field Theory, to be held in Shanghai, China, 29 August - 1 September 1989;
3. the 9th Colloquium on Microwave Communication (MICROCOLL) to be held in Budapest, Hungary, in 1990;
4. the International Conference on Antennas and Propagation (ICAP '89).

B.3 Working Group on Inverse Scattering

Commission B,

*considering*

- (a) the rapidly growing interest in inverse scattering in a wide variety of fields;
- (b) the need for adequate communication between those employing inverse scattering techniques for different applications;
- (c) the success of the two-day Open Symposium on Inverse Scattering held at the present General Assembly;

*recommends* that its Working Group on Inverse Scattering continue its activities under the chairmanship of Prof. D.L. Jaggard (USA).

B.4 Inter-Commission Working Group on Time Domain Waveform Measurements

Commission B,

*considering* the activity of the Working Group on Time Domain Waveform Measurements during the past triennium and, in particular, the two scientific sessions joint between all Commissions held at the present General Assembly;

*recommends* that the Inter-Commission Working Group on Time Domain Waveform Measurements (IWG-TDWM) be continued.

COMMISSION C - SIGNALS AND SYSTEMS

C.1 URSI Publications

Commission C

*recommends*

- 1. that the "URSI Information Bulletin" should be continued in its present form;
- 2. that the publication of the "Review of Radio Science" at the occasion of the General Assemblies of the Union should continue;
- 3. that the initiative regarding an URSI Journal on Signals,

Systems and Electronics should be supported.

## C.2 Sponsorship of Conferences

Commission C

*recommends* URSI sponsorship for the following conferences:

1. URSI Symposium on Signals, Systems and Electronics, to be organized jointly with Commission D in 1989;
2. 9th Colloquium on Microwave Communication (MICROCOLL) to be held in Budapest, Hungary, in 1990 following the XXIII General Assembly of URSI;
3. European Conference on Optical Communication (ECOC), in 1988, 1989 and 1990;
4. European Conference on Circuit Theory and Design, London, UK, September 1989;
5. International Zurich Seminar on Digital Communication, 1988 and 1990.

## C.3 Commission C Editor for "Review of Radio Science 1987-89"

Commission C

*resolves* to appoint Prof. J.G. Lucas as Editor for the next issue of the "Review of Radio Science".

## C.4 Commission C Representatives

Commission C

*resolves* to appoint

1. Prof. J.G. Lucas as its representative on the URSI-CCIR-CCITT Liaison Committee;
2. Prof. S. Halme as its representative on the Inter-Commission Working Group on Time Domain Waveform Measurements;
3. Prof. J.L. Lacoume as its representative on the Joint Working Group of Commissions C and H on Wave Analysis.

COMMISSION D - ELECTRONIC AND OPTICAL DEVICES

AND APPLICATIONS

D.1 "Review of Radio Science"

Commission D,

*considering* that it is desirable to devise a mechanism whereby

- (a) the huge gaps that can be left in the "Review of Radio Science" when some Member Committees fail to send their contributions to the Commission Editor would be avoided;
- (b) the authoritative character of the Review would be ensured;

*recommends* that the soliciting of material for the "Review of Radio Science" should follow the pattern adopted experimentally by Commission D in 1981, that is

1. to invite expert specialists to review selected topics within the range of activities of each Commission,
2. to request the Official Members of the Commission to submit material from their countries in the usual way, these submissions to be sent to the specialist reviewers by the Commission Editor.

D.2 Commission D Editor for "Review of Radio Science 1987-89"

Commission D

*resolves* to appoint Mrs J. Hénaff as Commission D Editor for the 1990 issue of "Review of Radio Science".

D.3 Proposed New Journal on Signals, Systems and Electronics

Commission D,

*considering* the proposal for a new journal on Signals, Systems and Electronics;

*recommends*

1. that a careful study of existing journals covering these topics be made before any decision is taken;
2. that, if it is decided to proceed with such a journal, the

journal should concentrate initially on review articles mainly, until the reputation of the journal is fully established.

#### D.4 Aid to Developing Countries

Commission D,

*considering* the suggestion made of providing aid to developing countries by proposing speakers and programmes for seminars and workshops;

*recommends*

1. that an approach be made to the Third World Academy of Sciences (TWAS) seeking their formal views on the suggestion, and a mechanism for providing this aid;
2. that a similar approach be made to the International Telecommunication Union (ITU).

#### D.5 Sponsorship of the European Conferences on Optical Communication

Commission D

*recommends*

1. that URSI co-sponsor the European Conferences on Optical Communication (ECOC) in 1988, 1989 and 1990;
2. that Prof. W.A. Gambling, Vice-Chairman of the Organizing Committee, be appointed as URSI representative for the 1988 Conference.

#### D.6 Joint Working Group with Commission E

Commission D

*recommends* the formation of a Joint Working Group with Commission E for the topic of Susceptibility of integrated circuits and semi-conductor devices to damage by transients, with Dr. T. Itoh (USA) as its representative.

D.7 URSI-CCIR-CCITT Liaison Committee

Commission D

*resolves* to appoint Prof. T. Okoshi (Japan) as its representative on the URSI-CCIR-CCITT Liaison Committee.

COMMISSION E - ELECTROMAGNETIC NOISE AND INTERFERENCE

E.1 Working Groups

Commission E

*resolves*

1. to maintain its Working Groups, as follows, for the next triennium:
  - E.1 Man-made Noise (Chairman: A.D. Spaulding, USA),
  - E.2 Natural Noise (Chairman: J. Hamelin, France),
  - E.3 Damaging Effects of Transients on Equipment (Chairman: V. Scuka, Sweden),
  - E.4 Scientific Basis of Noise and Interference Control (Chairman: C. Baum, USA);
2. to form, jointly with Commission D, a Working Group on Effects of Transients on Integrated Circuits, Transistors, Computers, etc. with V. Scuka (Sweden) as Co-chairman for Commission E and T. Itoh (USA) as Co-chairman for Commission D, and to arrange a first meeting of the Group in conjunction with the Zurich Symposium on Electromagnetic Compatibility in March 1989.

E.2 Wrocław and Zurich Series of Symposia on Electromagnetic Compatibility

Commission E

*recommends* that URSI continue its fruitful co-sponsorship of the Symposia on Electromagnetic Compatibility in the Zurich and Wrocław series.

---



### E.3 Radio Noise

Commission E,

*considering*

- (a) that CCIR Report 322 (1964) providing world-wide maps of atmospheric noise levels resulting from lightning, was developed originally and revised in 1984 without the benefit of much data from the Southern hemisphere;
- (b) that CCIR Report 258 on man-made noise was developed using data from the USA taken over 20 years ago;

*recommends*

1. that atmospheric noise data should be acquired at quiet locations to check the new CCIR Report 322 predictions for a period of at least two years using equipment of the type specified by the URSI Commission E Working Group on Natural Noise, with priority being given to data in the Southern hemisphere;
2. that data on man-made noise should be acquired in locations in various parts of the world, with priority being given to data outside the USA;
3. that the URSI Standing Committee on Developing Countries should play a leading role in coordinating the measurement of noise in developing countries, with priority being given to the Southern hemisphere for atmospheric noise from lightning.

### E.4 Spectrum Management

Commission E,

*considering*

- (a) that developing countries have needs for information on the scientific and technical approaches to spectrum management, problems of data bases, analytical modelling and measurements;
- (b) that URSI has some knowledge of the scientific and technical aspects of spectrum management and the supporting disciplines;

(c) that the International Radio Consultative Committee (CCIR) and the International Frequency Registration Board (IFRB) have continuing studies in spectrum management;

*recommends* that URSI cooperate with the CCIR and the other ITU organs to make the appropriate information available in the form of video cassettes of tutorial lectures, visiting lecturers, etc., and that this cooperation be coordinated by the URSI-CCIR-CCITT Liaison Committee.

## COMMISSION F - RADIO PROPAGATION AND REMOTE SENSING

### F.1 Cooperation with IGARSS

Commission F

*resolves*

1. to continue to be actively involved in the organization of the annual International Geoscience and Remote Sensing Symposia (IGARSS) by asking its Chairman to designate, in consultation with the Commission Official Member of the Member Committee in the country where the Symposium is held, an adequate number of URSI representatives;
2. to keep the URSI Book of Abstracts separated from the Proceedings of the Symposia;
3. to keep its role restricted to the study of the interaction of em waves with the medium (including the related instrumental problems).

### F.2 "Review of Radio Science"

Commission F

*resolves* to appoint Dr. G. Brussaard, incoming Vice-Chairman of the Commission, as Editor for the next issue of "Review of Radio Science".

### F.3 URSI-CCIR-CCITT Liaison Committee

Commission F,

*noting with satisfaction* the continuing traditional cooperation with the International Radio Consultative Committee

(CCIR), in particular with Study Group 5,

*resolves* to designate the following as its representatives on the URSI-CCIR-CCITT Liaison Committee: A. Blomquist (Sweden), L. Boithias (France), F. Fedi (Italy) and M.P.M Hall (UK).

#### F.4 Inter-Commission Working Group on Time Domain Waveform Measurements

Commission F

*resolves* to designate Dr. Hans Liebe (USA) as its representative on the Inter-Commission Working Group on Time Domain Waveform Measurements.

#### F.5 Symposia and Meetings 1988-1990

Commission F

*recommends* the organization or co-sponsorship, as appropriate, of the following events:

1. International Geoscience and Remote Sensing Symposia (IGARSS) as follows:
  - 1988 - 13-16 September, Edinburgh, UK,
  - 1989 - 27 June -1 July, Vancouver, Canada,
  - 1990 - Europe;
2. Commission F Open Symposium on Wave Propagation and Remote Sensing, Fall 1989, Nice, France (Chairman: J.P. Mon, France);
3. Microwave Signatures in Remote Sensing, Spring 1990, Massachusetts, USA (Chairman: C. Swift, USA);
4. School on Atmospheric Radar (joint with Commission G), November 1988, Kyoto, Japan (Chairman: S. Kato, Japan);
5. Radio Science Methods in the Study of the Terrestrial Subsurface (Chairman: D. Gjessing, Norway).

COMMISSION G - IONOSPHERIC RADIO AND PROPAGATION

G.1 High Resolution Observations of Ionospheric Electron Density

Commission G,

*considering* the need for accurate knowledge of the ionospheric electron density with high spatial and temporal resolution for radio wave propagation predictions;

*noting*

- (a) that the incoherent scatter radars (ISR) are operating during several incoherent scatter radar coordinated world day periods per year collecting electron density and temperature data;
- (b) that these ISR operation periods form an integral part of world-wide coordinated projects within the World Ionosphere/Thermosphere Study (WITS);
- (c) that a large number of vertical incidence (VI) ionosondes exists which can provide rapid sequences of electron density profiles which could calibrate the ISR profiles for co-located stations;
- (d) that the study of effects of gravity waves on the electron density distribution requires better E/F valley information;

*recommends* that world-wide campaigns with rapid (5 min) ionogram sequences be organized to cover the incoherent scatter radar coordinated periods.

G.2 Satellite Monitoring System

Commission G,

*considering*

- (a) that empirical mapping of the peak parameters of the terrestrial ionosphere is of great interest for radio wave propagation predictions, for empirical modelling of the electron density in the International Reference Ionosphere (IRI) and for aeronomic investigations;
- (b) that such maps derived from satellite observations could only recently be obtained via direct world-wide

observations, e.g. with the Japanese ISS-b satellite and with the Soviet Intercosmos 19;

*noting* that the maps obtained by one satellite cover a large time period so that seasonal and diurnal variations are inter-mixed;

*recommends* the establishment of a satellite monitoring system, consisting of several polar orbiting satellites, that generates a global map within a short time interval.

### G.3 HF Field Strength and Radio Noise Measurements

Commission G,

*considering* the proposed programme of activities of the Standing Committee on Developing Countries;

*supports* the proposal made by this Committee to organize and coordinate a project of HF field strength and radio noise measurements at selected frequencies in different tropical and subtropical countries;

*declares* its willingness to cooperate with the Committee in the planning of such project.

### G.4 Working Groups

Commission G

*resolves*

1. to maintain the following Working Groups:

G.1 Ionosonde Network Advisory Group (INAG)  
(Chairman: J.A. Gledhill, South Africa),

G.2 Studies of the Ionosphere Using Beacon Satellites  
(Chairman: R. Leitinger, Austria);

2. to form Working Groups as follows:

G.3 Ionospheric Modelling  
(Chairman: C. Rush, USA)

Terms of reference: To promote methods of developing empirical and physical models of the ionosphere of use to communications and radio science;

G.4 Ionospheric Informatics  
(Chairman: B.W. Reinisch, USA)

Terms of reference: To promote the application of information theory to the acquisition, processing, archiving and distribution of ionospheric data;

G.5 Low Latitude Ionospheric Studies  
(Chairman: S.M. Radicella, Argentina)

Terms of reference: To promote international cooperation in studying the low latitude ionosphere, particularly for applications to communication.

G.5 Joint Working Groups with Commission H

Commission G

*resolves* to maintain the following joint Working Groups with Commission H:

GH.1 Incoherent Scatter

(Co-chairmen: V.B. Wickwar, USA; K. Schlegel, FRG);

GH.2 Computer Experiments, Simulation and Analysis of Wave Plasma Processes

(Co-chairmen for Commission H: H. Matsumoto, Japan;  
M. Abdalla, USA);

Co-chairman for Commission G: S. Ossakow, USA).

G.6 Joint Working Group with COSPAR

Commission G

*resolves* to maintain the URSI/COSPAR Working Group on the International Reference Ionosphere (IRI), with L. Bossy (Belgium) as Chairman.

G.7 Symposia 1987-1990

Commission G

*recommends* the organization of the following symposia to be sponsored and financially supported by URSI:

1. Symposium on Large Scale Processes in the Ionosphere and Thermosphere, December 1989, Boulder, CO, USA (Organizers:

- V.B. Wickwar and A. Richmond, USA). Joint with Commission H.
2. Symposium on Artificial Modification of the Ionosphere, 1988 or 1989 (Organizers: V.V. Migulin, USSR; W.E. Gordon, USA). Joint with Commission H.
  3. Ionospheric Studies Using Satellite Beacons, 18-22 April 1988, Xinxiang, Henan, China (Organizers: Huang Xuegin and Gao Chong, China; Convener: R. Leitinger, Austria).
  4. International School on Atmospheric Radar, 24-28 November 1988, Kyoto, Japan (Organizer: S. Kato, Japan). Joint with Commission F.

#### COMMISSION H - WAVES IN PLASMAS

##### H.1 Sponsorship of Symposia and Meetings

Commission H

*recommends* sponsorship by URSI of the following events:

1. URSI-WIPP 1989: Wave-Induced Particle Precipitation and Wave Particle Interactions, Dunedin, New Zealand, 5-11 February 1989 (Organizers: R.L. Dowden, New Zealand; H. Matsumoto, Japan; U.S. Inan, USA) under Mode C;
2. ISSS-4: Fourth International School for Space Simulations, Kyoto, Japan, November 1989 (Organizer: H. Matsumoto, Japan) under Mode B;
3. ICPiG-XIX: 19th International Conference on Phenomena in Ionized Gases, Belgrade, Yugoslavia, 10-14 July 1989 (Organizer: J. Purić, Yugoslavia) under Mode B.

##### H.2 Joint Working Groups with IAGA

Commission H

*resolves*

1. to maintain URSI/IAGA Working Group 1 on Passive Electromagnetic Probing of the Magnetosphere (Co-chairman for URSI: U.S. Inan, USA);
2. together with Commission G, to maintain URSI/IAGA Working Group 2 on Wave Instabilities in Plasmas (Co-chairman for

Commission H: T. Sato, Japan; Co-chairman for Commission G:  
S. Ossakow, USA).

### H.3 Joint Working Groups with other Commissions of URSI

#### Commission H

*resolves* to maintain the following Joint Working Groups with other URSI Commissions:

#### CH.1 Wave Analysis

(Co-chairman for Commission H: D. Jones, UK);

#### GH.1 Incoherent Scatter

(Co-chairmen: V.B. Wickwar, USA; K. Schlegel, FRG);

#### GH.2 Computer Experiments, Simulation and Analysis of Wave Plasma Processes

(Co-chairmen for Commission H: H. Matsumoto, Japan;

M. Abdalla, USA;

Co-chairman for Commission G: S. Ossakow, USA).

### JOINT COMMISSIONS G AND H RESOLUTION

#### G/H.1 "Review of Radio Science 1987-1989"

#### Commissions G and H

*resolve* to appoint a single Editor for the joint Commissions G and H triennial report to be included in the 1990 edition of "Review of Radio Science", and

*recommend* to the Editor to appoint seven sub-editors to prepare international reviews on the following topics:

- (1) Techniques
- (2) Plasma environments of Earth and planets
- (3) Physics of wave propagation
- (4) Applications of wave propagation
- (5) Plasma instabilities
- (6) Active experiments
- (7) Wave-particle interactions.



COMMISSION J - RADIO ASTRONOMY

---

J.1 Joint Israeli/Egyptian VLBI Telescope

Commission J,

*recognizing*

- (a) that very-long-baseline interferometry (VLBI) is important in astronomy and astrophysics, and in the study of the motions of the Earth and its crust;
- (b) that radio astronomical measurements provide an excellent training ground for young scientists and engineers;
- (c) that VLBI is inherently an international activity which fosters communication and exchange among scientists from many countries;

*noting*

- (d) that the Israeli radio astronomy community has expressed interest in building and operating a VLBI telescope, and has proposed to the URSI Committee in Egypt to make it a joint project;
- (e) that such a telescope in this geographical area would significantly improve the performance of the European VLBI Network (EVN) by providing baselines of the order of 3000 km in length, which increases the resolution and quality of the images of cosmic radio sources;
- (f) that such a telescope would occupy a strategic position for geodetic studies of the fractured crustal plates in the Mediterranean region;

*recommends* that this telescope should have the following characteristics:

- (1) the telescope should have a diameter in the range 25-40 m, to provide adequate sensitivity,
- (2) the telescope and its receiving equipment should be compatible with other elements of the EVN and with VLBI telescopes world-wide,
- (3) the telescope should be capable of operation at frequencies up to at least 23 GHz;

*urges* the appropriate agencies to provide the requisite support to establish and complete this project.

## J.2 Sponsorship of Symposia

Commission J

*recommends* that URSI should support the following symposia to be held during the next three years:

1. VLBI Summer School for Young Scientists, September 1988, Bologna, Italy (Organizers: M. Felli, Italy; R.E. Spencer, UK);
2. Radioastronomical Seeing, May 1988, Beijing, China (Organizer: J. Baldwin, UK);
3. Limits of Observational Astronomy, August/September 1989, Sydney, Australia (Organizer: R.H. Frater, Australia);
4. Submillimetre Radio Astronomy, September 1988, Hawaii (Organizer: T. Phillips, USA).

## J.3 "Review of Radio Science 1987-1989"

Commission J

*resolves* that the next issue of "Review of Radio Science" should be prepared by a group of reviewers, each dealing with an area of specialisation, with the Chairman of the Commission as Editor-in-Chief.

## J.4 Inter-Union Commission on the Allocation of Frequencies to Radio Astronomy and Space Science (IUCAF)

Commission J,

*noting* the serious threats to radio astronomy in the next three-year period;

*recommends*

1. that the URSI membership of the Inter-Union Commission on the Allocation of Frequencies to Radio Astronomy and Space Science (IUCAF) be increased to four members;
2. that URSI should provide whatever financial support is possible for IUCAF during this crucial three-year period.

J.5 URSI-CCIR-CCITT Liaison Committee

Commission J

*resolves*

1. to appoint Dr. B.J. Robinson (Australia) as its representative on the URSI-CCIR-CCITT Liaison Committee;
2. to invite the Chairman of the Commission to appoint a second representative on that Committee.

URSI-CCIR-CCITT LIAISON COMMITTEE

1. Cooperation with the URSI Standing Committee on Developing Countries

The URSI-CCIR-CCITT Liaison Committee,

*considering*

- (a) that the URSI Standing Committee on Developing Countries has initiated studies and research, the first phase of which has produced:
  - Handbook on Radio Propagation for Tropical and Sub-tropical Countries, 1987;
  - Biregional Latin American/African Workshop on Radio Propagation Research and Applications (including spectrum management), Buenos Aires, 1987 (190-page Proceedings) with recommended further research areas including: ionospheric data acquisition; sporadic E phenomena; scintillation; low latitude studies; refractivity studies; rainfall attenuation; electromagnetic compatibility; spectrum management;
- (b) that the Standing Committee on Developing Countries has asked the assistance of the URSI-CCIR-CCITT Liaison Committee in facilitating the implementation of these recommendations;
- (c) that the International Radio Consultative Committee (CCIR), in the conduct of its activities, has a need for the results of measurements made in developing countries on the topics identified by the Standing Committee on

Developing Countries;

*recommends*

1. that the appropriate URSI Commissions consider each of these topics with a goal of recommending priorities from a scientific standpoint, standardization of equipment and measurement methods, and durations of measurements required to obtain meaningful data;
2. that the CCIR should be asked to suggest priorities to URSI;
3. that the Standing Committee on Developing Countries and the appropriate URSI Commissions should coordinate with the appropriate CCIR Study Groups for planning measurement campaigns in developing countries and, where appropriate, hold joint meetings or symposia on topics of current interest (e.g. rainfall rate and attenuation);
4. that working contacts between the Standing Committee on Developing Countries and pertinent CCIR Interim Working Parties (IWP) be established, including participation in CCIR to facilitate coordination;
5. that URSI should offer some financial support to the Standing Committee on Developing Countries for participation in coordination and planning meetings.

2. Cooperation with the International Telecommunication Union (ITU)

The URSI-CCIR-CCITT Liaison Committee,

*noting* the recommendation made by the Corsendonk Conference (March 1987) regarding the desirability of reinvigorating the cooperation between URSI and the technical Committees of the International Telecommunications Union (CCIR, CCITT and IFRB);

*recommends* the following programme of activities for the next three-year period:

1. a workshop at the 1989 Zurich EMC Symposium reviewing selected CCIR documents pertinent to noise and interference (F.L. Stumpers, Netherlands);
2. a possible URSI Commission E and CCIR joint session on spectrum management at the 1989 Zurich EMC Symposium

(R.D. Parlow, USA);

3. a possible Commission F/URSI Standing Committee on Developing Countries/CCIR planning meeting on available data and the measurement of rainfall rate and attenuation (R.K. Crane, USA; S. Radicella, Argentina);
4. a possible workshop on URSI scientific inputs to long-range telecommunication strategic planning (J. Shapira, Israel);
5. the attendance by an URSI representative at the 1988 CCITT Plenary Assembly in Melbourne, Australia (J.G. Lucas, Australia);
6. meetings of the URSI-CCIR-CCITT Liaison Committee at other symposia of opportunity;
7. an URSI Commission E submission to CCIR Study Group 6 on recommended equipment for radio noise measurements;
8. an URSI Commissions A and F submission of ground constants data at HF to CCIR Study Group 5 (G. Hagn, USA);
9. encouragement of URSI authors to submit papers to the ITU Journal;
10. consideration of video taping of selected URSI lectures to be provided to the Consultative Committees of ITU for training.

## XXII<sup>e</sup> ASSEMBLÉE GÉNÉRALE DE L'URSI

### RÉSOLUTIONS ET RECOMMANDATIONS

Les Résolutions et Recommandations adoptées par le Conseil et les Commissions de l'URSI sont reproduites ci-dessous. Le compte rendu des Séances d'ouverture et de clôture ainsi que des activités du Conseil et des Commissions sera publié en 1988 (Volume XXI des *Comptes Rendus des Assemblées générales de l'URSI*).

#### RESOLUTIONS ET RECOMMANDATIONS DU CONSEIL

##### U.1 Les Commissions scientifiques de l'URSI

Le Conseil de l'URSI,

*notant* que les neuf Commissions scientifiques de l'Union ont été invitées à revoir, pendant la XXII<sup>e</sup> Assemblée générale à Tel Aviv, leurs titres, sous-titres et mandats,

*ayant examiné* les recommandations soumises par chacune des Commissions,

*approuve*, pour les trois années à venir, les titres, sous-titres et mandats des Commissions figurant en annexe.

#### Annexe

1. Commission A - METROLOGIE ELECTROMAGNETIQUE. Mesures et étalons électromagnétiques, et interaction entre les champs électromagnétiques et les systèmes biologiques.

*Mandat:*

- (a) Mesures et étalons de temps et de fréquence, y compris les fréquences infrarouges et optiques.
- (b) Mesures dans le domaine temporel.
- (c) Mesures dans le domaine des fréquences.
- (d) Mesures dans les télécommunications.
- (e) Mesures laser.
- (f) Métrologie quantique et méthodes électriques dans le domaine des constantes fondamentales.
- (g) Mesures et étalons dans la gamme allant des hyperfréquences aux ondes submillimétriques.

(h) Mesures des effets des champs électromagnétiques sur les systèmes biologiques.

2. Commission B - ONDES ET CHAMPS. Théorie électromagnétique et applications, y compris les antennes et les guides d'ondes.

*Mandat:*

Etude de la théorie des ondes et des champs électromagnétiques au sens général, avec un intérêt particulier pour les méthodes numériques et analytiques permettant de résoudre les problèmes suivants:

- (a) diffusion par les objets,
- (b) propagation dans des milieux complexes ou au-dessus de surfaces complexes,
- (c) phénomènes transitoires,
- (d) inversion de la diffusion,
- (e) structures guides,
- (f) antennes.

3. Commission C - SIGNAUX ET SYSTEMES. Systèmes de communication et théorie des systèmes (y compris les circuits); théorie de l'information et traitement du signal (y compris les problèmes stochastiques).

4. Commission D - DISPOSITIFS ELECTRONIQUES ET OPTIQUES ET APPLICATIONS.

*Mandat:*

- (1) Promouvoir les recherches et faire le point des nouveaux développements dans le domaine des dispositifs électroniques et optiques et de leurs applications, particulièrement en ce qui concerne la radioélectricité scientifique et les télécommunications. L'accent sera mis sur la production, la détection, le stockage et le traitement des ondes et signaux électromagnétiques à toutes les fréquences.
- (2) Organiser des séances et conférences scientifiques destinées à attirer l'attention des autres Commissions sur les développements susceptibles de présenter pour elles un intérêt particulier.

5. Commission E - BRUITS ET BROUILLAGES ELECTROMAGNETIQUES

*Mandat:*

- (a) Bruits terrestres et planétaires d'origine naturelle; bruits artificiels.
- (b) Bruits composites ambiants.
- (c) Effets des bruits sur la qualité des systèmes.
- (d) Effets durables des phénomènes transitoires sur la qualité des équipements (incluant l'impulsion électromagnétique nucléaire).
- (e) Base scientifique des bruits et maîtrise des brouillages.
- (f) Utilisation du spectre.

*Note:* Nombre des sujets précités sont traités sous le dénominateur commun de Compatibilité électromagnétique.

6. Commission F - PROPAGATION DES ONDES ET TELEDETECTION

(y compris la radio-météorologie, la radio-océanographie et la télé-détection des milieux non ionisés).

*Mandat:*

- (1) Etudier tous les aspects de la propagation des ondes à toutes les fréquences dans un milieu non ionisé:
  - (i) propagation des ondes au-dessus de la surface de la Terre,
  - (ii) propagation des ondes dans l'atmosphère neutre et interaction des ondes avec l'atmosphère neutre,
  - (iii) interaction des ondes avec la surface de la Terre: océans, sol et glace,
  - (iv) propagation et diffraction des ondes en milieu souterrain,
  - (v) caractérisation de l'environnement en ce qu'il affecte les phénomènes ondulatoires;
- (2) encourager l'application des résultats de ces études, en particulier dans les domaines de la télé-détection et des communications;
- (3) développer une collaboration appropriée avec les autres Commissions de l'URSI et les organisations concernées.



7. Commission G - RADIOELECTRICITE IONOSPHERIQUE ET PROPAGATION  
(y compris les communications ionosphériques et la télé-  
détection des milieux ionisés).

*Mandat:*

Etude de l'ionosphère ayant pour but la compréhension générale de ce milieu nécessaire aux radiocommunications. Sont compris la morphologie de l'ionosphère, sa structure et ses variations, ainsi que les outils nécessaires à la mesure de ses caractéristiques.

8. Commission H - ONDES DANS LES PLASMAS.

*Mandat:*

Etude des ondes dans les plasmas, au sens le plus large, et des interactions entre ces ondes et les particules chargées. Sont incluses les ondes électromagnétiques et électro-  
statiques des plasmas interplanétaire, planétaire et de laboratoire.

9. Commission J - RADIOASTRONOMIE (y compris la télé-détection des objets célestes)

*Mandat:*

1. Les activités de la Commission concernent:

- a) les radiosources dans l'espace, en particulier les émissions radioélectriques du Soleil calme et du Soleil actif, du système solaire, de la galaxie et des sources discrètes dans l'Univers;
- b) l'étude des météores, du Soleil, de la Lune, des planètes et autres objets du système solaire par la technique des échos radioélectriques.

2. La Commission étudiera et tendra à promouvoir le développement des méthodes techniques en relation avec les sujets ci-dessus, et s'efforcera de protéger les observations contre les interférences.

3. En relation avec le paragraphe 1. , la Commission se propose:

- (i) de travailler conjointement avec les autres Commissions de l'URSI dans le domaine de leurs intérêts communs,

- (ii) de travailler conjointement avec la Commission 40 de l'Union Astronomique Internationale (UAI) pour l'organisation de symposia sur la radioastronomie,
  - (iii) de coopérer avec la Commission 40 de l'UAI vis-à-vis du choix des matières à discuter, afin d'éviter les doubles emplois indésirables.
4. La Commission formulera pour l'URSI les recommandations appropriées sur tout sujet lié aux matières évoquées ci-dessus en vue de leur examen par les autres Commissions de l'URSI et les autres organismes internationaux.

## U.2 Membres de l'URSI

Le Conseil de l'URSI,

*ayant pris connaissance*

- (a) des différentes suggestions relatives aux catégories de membres de l'Union émises lors de la Conférence de Corsondonk (mars 1987);
- (b) des recommandations formulées dans le rapport du groupe ad hoc formé pendant l'Assemblée générale sous la présidence du Prof. S. Okamura,

*décide*

1. d'instaurer une nouvelle catégorie de membres, les Comités Membres associés, à l'intention des Comités envisageant d'adhérer à l'URSI, ou bien éprouvant quelque difficulté à payer la contribution annuelle à l'Union;
2. d'inclure dans les Statuts de l'URSI les dispositions définissant les conditions d'admission des Comités Membres associés;
3. d'inviter le Comité permanent pour l'adhésion à l'URSI à étudier la possibilité d'établir d'autres catégories de membres comme, par exemple, des membres individuels ou des membres affiliés, sociétés professionnelles ou firmes industrielles, et à faire rapport aux Comités Membres sur ce point, en vue d'un éventuel vote par correspondance avant la prochaine Assemblée générale;
4. de désigner les personnalités suivantes comme membres du Comité permanent pour l'adhésion à l'URSI:

Président: M. Petit (France)

Membres : Yu-Kai Chen (Chine, SRS)  
E.V. Jull (Canada)  
S. Okamura (Japon)  
K. Serafimov (Bulgarie)  
J. Shapira (Israël).

### U.3 Revision des Statuts de l'URSI

Le Conseil de l'URSI,

*considérant* que certaines des décisions prises pendant l'Assemblée générale entraînent la modification des Statuts de l'URSI et, plus spécialement de l'Article 1 (Buts) et des Articles 2 à 12 (Membres),

*décide*

1. de charger le Comité de rédaction de préparer la version modifiée des Statuts avant la fin 1987;
2. de charger le Secrétariat de l'URSI
  - (i) de diffuser la version modifiée des Statuts aux Comités Membres pour approbation par correspondance,
  - (ii) une fois cette version approuvée par les Comités Membres, d'en assurer la publication.

### U.4 Finances de l'URSI et composition du Comité permanent des finances

Le Conseil de l'URSI,

*ayant pris connaissance* des recommandations formulées dans le Rapport du Comité des finances, en date du 31 août 1987,

*considérant* qu'il serait souhaitable que le Comité permanent des finances comprenne des représentants de plusieurs catégories d'adhésion à l'URSI,

*décide*

1. d'approuver les comptes de l'Union certifiés pour les années prenant fin au 31 décembre 1984, 1985 et 1986;
2. d'approuver les prévisions budgétaires (Modèle B) figurant à l'Annexe 1 du Procès-verbal de la 4e réunion du Conseil (Tel Aviv, 31 août 1987);

3. d'adopter, pour la contribution annuelle, les montants proposés dans le Modèle B des prévisions budgétaires, à savoir 610 dollars pour 1988, 740 dollars pour 1989 et 860 dollars pour 1990;
4. d'autoriser le Bureau à ajuster le montant en dollars de l'unité de contribution annuelle de façon à ce que son pouvoir d'achat reste conforme aux prévisions budgétaires;
5. de publier le Rapport du Comité permanent des finances dans le Volume XXI des *Comptes Rendus des Assemblées générales de l'URSI*;
6. de désigner les personnalités suivantes comme membres de ce Comité:

Président: F. Gardiol ( Suisse)

Membres : C.M. Butler (EUA)  
K. Géher (Hongrie)  
J.G. Lucas (Australie)  
J.B.H. Peek (Pays-Bas)  
S. Radicella (Argentine)  
W.D. Ryan (Irlande).

#### U.5 Comité des Publications

Le Conseil de l'URSI,

*ayant pris connaissance* des recommandations formulées dans le Rapport du Comité des publications, en date du 31 août 1987,

*considérant* que le programme des publications revêt une grande importance pour ce qui concerne la crédibilité et le rayonnement de l'Union,

*décide*

1. d'adopter les recommandations 1, 2, 3, 4, 5 et 8 de ce Rapport, moyennant quelques modifications de caractère mineur;
2. de publier le Rapport du Comité des publications dans le Volume XXI des *Comptes Rendus des Assemblées générales de l'URSI*;
3. de donner au Comité des publications le statut de Comité permanent;

4. de désigner les personnalités suivantes comme membres du Comité permanent des publications:

Président: R.L. Dowden (Nouvelle Zélande)

Membres: P.J.B. Clarricoats (Royaume-Uni)  
G. Hyde (EUA)  
B. Picinbono (France)  
Ch.-U. Wagner (RDA).

U.6 Comité permanent pour les pays en développement

Le Conseil de l'URSI,

*ayant pris connaissance*

- (a) du rapport présenté par le Comité permanent pour les pays en développement sur ses activités au cours des trois années écoulées;

- (b) du programme d'action proposé pour la période 1988-1990,

*décide*

1. d'adresser au Comité ses félicitations pour avoir mené à bien le programme fixé pour les trois dernières années;
2. d'exprimer au Dr. A.P. Mitra et à ses collaborateurs sa gratitude pour le travail accompli dans le mise au point du *Handbook of Radio Propagation in Tropical and Sub tropical Countries*;
3. de donner son accord de principe au programme d'activités pour les trois années à venir figurant dans le rapport du Comité, sous réserve de l'approbation des prévisions budgétaires;
4. de désigner les personnalités suivantes comme membres du Comité permanent pour les pays en développement:

Président: S. Radicella (Argentine)

Membres : Feng Shizhang (Chine, CIE)  
F. Mopfouma (Congo Brazzaville)  
J.O. Oyinloye (Nigeria)  
B.M. Reddy (Inde)  
J. Voge (France).

U.7 Comité permanent pour les Assemblées générales de l'URSI

Le Conseil de l'URSI,

*considérant* l'importance de la tâche dévolue au Comité pour les Assemblées générales de l'URSI, laquelle consiste à rechercher auprès des Comités Membres des invitations pour l'organisation des Assemblées générales futures de l'Union,

*décide*

1. de maintenir ce Comité pendant les trois années à venir;
2. de désigner les personnalités suivantes comme membres du Comité:

Président: V. Zima (Tchécoslovaquie)

Membres : T.B.A. Senior (EUA)  
J. Shapira (Israël)  
R. Woodman (Pérou)  
M.E. Zhabotinskij (URSS).

U.8 XXIIIe Assemblée générale, 1990

Le Conseil de l'URSI,

*ayant examiné* les invitations présentées par les Comités Membres en Tchécoslovaquie, en Suède et au Royaume-Uni pour l'organisation de la XXIIIe Assemblée générale,

*décide*

1. d'accepter l'invitation du Comité tchécoslovaque de l'URSI d'organiser la XXIIIe Assemblée générale à Prague dans la deuxième moitié de 1990;
2. d'exprimer aux Comités Membres en Suède et au Royaume-Uni ses remerciements pour leurs invitations.

U.9 Comité de liaison URSI-CCIR-CCITT

Le Conseil de l'URSI,

*notant*

- (a) que, parmi autres recommandations, la Conférence de Corsondonk (mars 1987) a estimé essentiel de relancer la coopération entre l'URSI et les Comités Consultatifs de l'Union Internationale des Télécommunications (UIT);

- (b) que le Comité de liaison URSI-CCIR-CCITT offre une structure et un mécanisme susceptibles de faciliter la réalisation de cet objectif,

*déci de*

1. de maintenir le Comité de liaison URSI-CCIR-CCITT pendant les trois années à venir;
2. d'inviter le Comité à mettre tout en oeuvre pour renforcer la collaboration entre l'URSI et les Comités Consultatifs de l'UIT;
3. de désigner les personnalités suivantes comme membres du Comité pour les trois années à venir:

Président: G. Hagn (EUA)

Vice-Présidents: W.A. Gambling (Royaume-Uni)  
F.L.H.M. Stumpers (Pays-Bas)

Membres:

Commission A - S. Leschiutta (Italie)

Commission B - D. Bem (Pologne), R.M. Bevensee (EUA)

Commission C - J.G. Lucas (Australie)

Commission D - T. Okoshi (Japon)

Commission E - A.D. Spaulding (EUA)

Commission F - A. Blomquist (Suède), L. Boithias (France),  
F. Fedi (Italie), M.P.M. Hall (Royaume-Uni)

Commission G - L.W. Barclay (Royaume-Uni)

Commission J - R.H. Frater (Australie), R. Wielebinski (RFA).

U.10 Coordination du programme scientifique de l'URSI

Le Conseil de l'URSI,

*notant*

- (a) que le Groupe pour la coordination du programme scientifique de l'URSI fut créé à une époque où, pour des raisons d'ordre financier, il était impossible de réunir le Comité de coordination dans l'année précédant l'Assemblée générale;
- (b) que les ressources actuelles de l'Union permettront la convocation du Comité de coordination au printemps de 1989, pour examiner et mettre au point le programme scientifique de la XXIIIe Assemblée générale de 1990 et que, dès lors, la raison d'être du Groupe a disparu;

- (c) qu'il est néanmoins nécessaire de centraliser l'ensemble de cette opération,

*décide*

1. de dissoudre le Groupe pour la coordination du programme scientifique de l'URSI;
2. de désigner le Dr. P. Bauer comme Coordonnateur et le Prof. J. Bach Andersen comme Coordonnateur associé pour la XXIIIe Assemblée générale;
3. d'exprimer au Dr. P. Bauer et aux membres du Groupe sa gratitude pour leur travail de préparation du programme scientifique de la présente Assemblée générale.

U.11 Procédure pour l'élection des membres du Bureau et des Vice-Présidents des Commissions

Le Conseil de l'URSI,

*considérant*

- (a) que les Comités Membres devraient disposer de tous renseignements utiles sur les candidats au Bureau et à la vice-présidence des Commissions;
- (b) qu'il y a manque d'uniformité quant à la procédure appliquée par chacune des Commissions pour l'élection de son Vice-Président et, en outre, que les Comités Membres devraient être davantage impliqués dans cette procédure,

*décide*

1. de charger le Secrétariat de l'URSI de diffuser aux Comités Membres des notices biographiques sur les candidats aux différentes fonctions au sein de l'URSI, et ce avant l'Assemblée générale;
2. d'autoriser le Bureau à définir une procédure unique, à appliquer par toutes les Commissions, pour l'élection des Vice-Présidents en gardant à l'esprit que les Comités Membres doivent prendre une part plus active dans le déroulement de la procédure.



U.12 Commission inter-Unions pour l'attribution de fréquences à la radioastronomie et à la science spatiale (IUCAF)

Le Conseil de l'URSI,

*considérant*

- (a) que, vu l'ampleur et la complexité croissantes des activités de l'Union Internationale des Télécommunications (UIT), il est nécessaire, plus que jamais, d'évaluer avec soin et de définir en toute clarté les besoins en bandes de fréquences de la radioastronomie et de la science spatiale;
- (b) que le danger de voir la recherche scientifique sérieusement affectée par les autres utilisateurs augmente parallèlement à l'utilisation toujours plus large du spectre radioélectrique,

*décide*

1. d'approuver le rapport présenté par le Dr. J.W. Findlay, Président de la Commission inter-Unions pour l'attribution de fréquences à la radioastronomie et à la science spatiale (IUCAF);
2. de mettre en oeuvre les recommandations formulées dans ce rapport, à savoir:
  - (i) faciliter l'établissement de contacts plus étroits avec les radioastronomes dans les différentes parties du monde;
  - (ii) faire passer de deux à quatre le nombre des représentants de l'URSI au sein de la Commission inter-Unions, et inviter l'Union Astronomique Internationale (UAI) à faire de même;
  - (iii) prendre toutes les mesures possibles pour appuyer et financer de façon appropriée les très importantes activités de la Commission inter-Unions pour l'attribution de fréquences à la radioastronomie et à la science spatiale.

U.13 Groupe de travail inter-Commissions pour la coordination des activités de l'URSI pour les communications, la détection et le traitement des données dans la gamme optique

Le Conseil de l'URSI,

*ayant pris connaissance* du rapport présenté par le Prof. W.A. Gambling, Président du Groupe de travail inter-Commissions pour la coordination des activités de l'URSI pour les communications, la détection et le traitement des données dans la gamme optique, qui indique que les problèmes qui avaient requis l'intervention du Groupe de travail se trouvent actuellement résolus,

*décide*

1. de dissoudre ce Groupe de travail inter-Commissions;
2. d'exprimer au Prof. W.A. Gambling sa profonde gratitude pour avoir mené à bien la mission de ce Groupe de travail.

U.14 Groupe de travail inter-Commissions sur la mesure des formes d'ondes dans le domaine temporel

Le Conseil de l'URSI,

*ayant pris connaissance*

- (a) du rapport présenté par le Groupe de travail inter-Commissions sur la mesure des formes d'ondes dans le domaine temporel;
- (b) des recommandations formulées par le Groupe de travail concernant son programme de travail pour les trois années à venir,

*décide*

1. de maintenir ce Groupe de travail inter-Commissions et de confirmer son mandat;
2. de désigner N.S. Nahman (EUA) et T. Sarkar (EUA) respectivement comme Président et Vice-Président du Groupe de travail.

U.15 Groupe de coordination inter-Commissions sur la télé-détection

Le Conseil de l'URSI,

*considérant*

- (a) que le domaine de la télédétection est couvert de façon adéquate par le mandat de la Commission F;
- (b) que cette Commission est à même d'assurer la coordination nécessaire tant au sein de l'URSI, en consultation avec le Comité de coordination, qu'avec d'autres organismes, tels que l'Association Internationale de Météorologie et de Physique de l'Atmosphère (IAMAP) et la Société de Géoscience et de Télédétection (GRS) de l'IEEE,

*décide*

1. de dissoudre le Groupe de coordination inter-Commissions sur la télédétection;
2. d'adresser au Prof. J.F.R. Gower ses remerciements pour son action en tant que Président de ce Groupe.

U.16 Programme International Géosphère-Biosphère: Etude globale de leur évolution

Le Conseil de l'URSI,

*notant*

- (a) que le Conseil International des Unions Scientifiques (CIUS) a lancé un programme de coopération inter-disciplines d'importance primordiale sous le titre "Programme International Géosphère-Biosphère: Etude globale de leur évolution", lequel contribuera à la compréhension des interactions des processus physiques, chimiques et biologiques qui régissent l'ensemble du système terrestre;
- (b) que le CIUS a établi un Comité spécial chargé de suivre le développement et d'assurer la coordination du programme scientifique;
- (c) que la phase opérationnelle du programme commencera au début des années 1990,

*exprime* la volonté de l'URSI de participer à cette entreprise

capitale,

*décide*

1. de former un Groupe ad hoc pour le programme Géosphère-Biosphère avec pour mission de déterminer dans quels domaines l'Union pourra apporter une contribution utile;
2. de désigner les personnalités suivantes comme membres du Groupe ad hoc:

Président: P. Delogne (Belgique)

Membres : F. Fedi (Italie)  
V.V. Migulin (URSS)  
G. Valenzuela (EUA)  
R. Wielebinski (RFA).

#### U.17 Année Internationale de l'Espace (AIE)

Le Conseil de l'URSI,

*notant*

- (a) qu'il a été proposé d'organiser en 1992 une Année Internationale de l'Espace (AIE) pour célébrer le 500e anniversaire du voyage de Christophe Colomb et le 35e anniversaire du lancement du premier engin spatial;
- (b) que le Comité du CIUS pour la Recherche spatiale (COSPAR) a formé un Comité chargé de promouvoir le contenu scientifique de l'AIE;
- (c) que le CIUS a formé un Comité chargé d'examiner les différentes composantes du programme de l'Année Internationale de l'Espace,

*exprime* la volonté de l'URSI de participer au programme de l'AIE,

*décide* de désigner un Groupe ad hoc pour l'AIE, composé comme suit:

Président: W.E. Gordon (EUA)

Membres : M. Tiuri (Finlande)  
P. Bauer (France)  
un représentant qui sera désigné par le  
Comité Membre de l'URSI en URSS.

U.18 Groupe ad hoc sur les Conséquences d'une guerre nucléaire pour l'environnement (ENUWAR)

Le Conseil de l'URSI,

*considérant*

- (a) l'importance capitale de la tâche dévolue au Groupe de travail sur les conséquences pour l'environnement d'une guerre nucléaire du Comité sur les Problèmes de l'environnement (SCOPE) du CIUS;
- (b) l'importante contribution apportée par l'URSI sous la forme du chapitre relatif à l'impulsion électromagnétique nucléaire et les effets associés, préparé par le Groupe créé à Florence (1984),

*décide*

1. d'exprimer à M.M. Wik sa gratitude pour le remarquable travail accompli par son Groupe;
2. de maintenir pour les trois années à venir le Groupe ad hoc sur les conséquences pour l'environnement d'une guerre nucléaire, lequel sera présidé par M. M. Wik et comprendra deux membres désignés par le Bureau en consultation avec le Président du Groupe.

U.19 Bruits radioélectriques d'origine naturelle dus aux orages

Le Conseil de l'URSI,

*considérant*

- (a) que la mission de la Commission E est de promouvoir la recherche scientifique dans le domaine des bruits électromagnétiques ambiants, bruits naturels dus aux décharges orageuses inclus;
- (b) que le projet de l'Agence Spatiale Européenne (ASE) d'adjoindre à l'un des futurs satellites météorologiques un système permanent d'analyse, à l'échelle du globe, de l'activité orageuse serait susceptible d'améliorer de façon significative les prévisions à court et long terme des bruits radioélectriques;
- (c) que des observations optiques de haute précision portant sur la localisation, l'heure et l'amplitude, mises en corrélation avec des observations radioélectriques,

pourraient être utilisées comme données complémentaires dans l'élaboration de modèles spatio-temporels des bruits radioélectriques;

- (d) qu'il est estimé que l'étude des bruits naturels dus aux orages contribuerait également à l'étude des siffleurs, de même qu'aux aspects géophysiques concernant la magnéto-sphère et le guide d'ondes Terre-Ionosphère ainsi qu'à ses limites;
- (e) que, vu la haute compétence de ses Commissions E et H, il serait très avantageux que l'URSI participe à l'élaboration des projets portant sur le traitement, l'interprétation et l'application des données issues du détecteur de décharges orageuses;
- (f) que l'URSI a souligné l'importance de données scientifiques pertinentes afin de disposer, pour notre société, de systèmes de communications fiables et de contribuer à la recherche géophysique et qu'elle estime qu'un instrument, monté sur satellite, de cartographie des décharges orageuses contribuerait à la réalisation de cet objectif,

*notant* que les résultats d'un projet de ce genre présenteraient le plus vif intérêt pour l'Union Internationale des Télécommunications (UIT) et son organe technique, le Comité Consultatif des Radiocommunications (CCIR),

*recommande instamment* que les possibilités offertes par ce projet de détecteur de décharges orageuses soient évaluées et que son intégration à un satellite météorologique soit sérieusement examinée.

#### U.20 Réseau mondial d'ionosondes

Le Conseil de l'URSI,

*notant*

- (a) la recommandation de la Commission G concernant l'importance du bon fonctionnement du réseau mondial d'ionosondes;
- (b) les importantes contributions apportées pendant de nombreuses années par les stations ionosphériques du réseau néo-zélandais, tant dans le domaine de la recherche scientifique que dans celui des communications;
- (c) les importantes contributions apportées pendant de nombreuses années par la station ionosphérique de De Bilt,

Pays-Bas;

(d) la nécessité que toutes les parties du monde soient couvertes par le réseau d'ionosondes,

*exprime* son inquiétude suite aux propositions de fermer les stations ionosphériques du réseau néo-zélandais et la station ionosphérique de De Bilt,

*demande instamment*

1. aux autorités responsables de Nouvelle Zélande de revoir leur décision et d'assurer le fonctionnement continu des stations;
2. aux autorités responsables des Pays-Bas de revoir leur décision et d'assurer le fonctionnement de la station de De Bilt et de l'observatoire de Wileveen qui lui est associé,

*encourage* les autorités du Chili à installer une ionosonde dans l'Ile de Pâques, ce qui constituerait une contribution considérable à l'Etude mondiale Ionosphère-Thermosphère (WITS), comblerait une des lacunes importantes du réseau mondial d'ionosondes et fournirait ainsi un apport essentiel à la base des données scientifiques et relatives aux communications servant à l'élaboration des prévisions.

#### U.21 Installation en Antarctique d'un radar strato-troposphérique et à diffusion incohérente

Le Conseil de l'URSI,

*notant* la recommandation conjointe de la Commission G (Radioélectricité ionosphérique et propagation) et de la Commission H (Ondes dans les plasmas),

*considérant*

- (a) que, dans le passé, l'URSI a encouragé l'installation de grands systèmes de recherche (tels que les grands radars à diffusion incohérente) lorsqu'elle estimait ceux-ci susceptibles de produire des résultats importants et originaux;
- (b) que la possibilité existe actuellement d'installer un radar moderne strato-troposphérique et à diffusion incohérente dans l'Antarctique;
- (c) que les résultats scientifiques escomptés d'un tel système comprendraient : comblement du vide existant dans les

recherches menées dans l'hémisphère Sud sur les différences dans le bilan des transferts d'énergie et de moment critique et dans la réponse de l'atmosphère; détails sur le système couplé thermosphère-ionosphère; données sur la dynamique de la troposphère-stratosphère affectant les variations dans la concentration d'ozone dans la basse stratosphère ainsi que les asymétries géographiques-géomagnétiques;

- (d) que, si le système dans l'Antarctique était situé en un point magnétique conjugué par rapport à un grand système de l'hémisphère Nord, il permettrait l'étude approfondie de la conjugaison magnétique, et donc aussi de la topologie des particules et champs de la magnétosphère,

*recommande* que l'installation d'un système de radar strato-troposphérique et à diffusion incohérente dans l'Antarctique soit encouragée.

#### U.22 Risques de brouillages pour les systèmes à diffusion incohérente

Le Conseil de l'URSI,

*notant* la recommandation conjointe des Commissions G (Radio-électricité ionosphérique et propagation) et H (Ondes dans les plasmas),

*considérant*

- (a) que le radar à diffusion incohérente constitue un outil très approprié pour l'étude de la haute atmosphère terrestre, en particulier dans les régions polaires;
- (b) que le système européen EISCAT constitue l'un des chaînons essentiels du réseau global des radars à diffusion incohérente;
- (c) que les données en provenance du réseau de radars à diffusion incohérente sont fournies à la communauté scientifique internationale par l'intermédiaire de la base de données établie au Centre National de Recherche Atmosphérique (NCAR) à Boulder;
- (d) que la congestion croissante du spectre, entraînée par l'expansion grandissante des services radio existants et le développement de nouveaux systèmes de communication pourrait provoquer des brouillages nocifs à ces précieux



instruments scientifiques;

- (e) plus spécifiquement, que la mise en oeuvre imminente, dans les pays nordiques, de services de radiotéléphonie cellulaire dans les bandes de fréquence débordant sur la bande du système EISCAT aura, selon toutes probabilités, des conséquences critiques sur le fonctionnement du système,

*décide* de porter ce problème à la connaissance des organismes internationaux (Union Internationale des Télécommunications (UIT), Bureau International d'Enregistrement des Fréquences (IFRB), Comité Consultatif International des Radiocommunications (CCIR)), mais aussi des administrations nationales des télécommunications des pays nordiques, et de les inviter instamment à prendre les mesures appropriées pour éliminer, ou tout au moins atténuer, les problèmes de brouillage concernant EISCAT et les autres systèmes de radar à diffusion incohérente de façon à assurer la continuité de leur fonctionnement.

#### U.23 Expériences actives

Le Conseil de l'URSI,

*notant* la recommandation conjointe des Commissions G (Radio-électricité ionosphérique et propagation) et H (Ondes dans les plasmas),

*considérant*

- (a) que le COSPAR et l'URSI ont tous deux des Groupes de travail sur les expériences actives, lesquels font double emploi dans de nombreux domaines et assurent des services analogues (notification des expériences actives à l'intention des scientifiques faisant des observations);
- (b) qu'un Groupe de travail commun au COSPAR et à l'URSI remplirait cette mission de façon plus efficace que les deux Groupes séparés actuels et permettrait de mieux coordonner les colloques sur ce sujet,

*décide* d'inviter le COSPAR à former en commun avec l'URSI un Groupe de travail sur les expériences actives, lequel comprendrait 4 co-présidents, dont deux désignés par le COSPAR et deux par l'URSI (co-présidents pour l'URSI: W.E. Gordon (EUA), Santimay Basu (EUA)).

U.24 Mesures de l'intensité du bruit solaire sur 10,7 cm

Le Conseil de l'URSI,

*notant* la recommandation de la Commission G (Radioélectricité ionosphérique et propagation),

*considérant* que la décision du Conseil National de Recherches du Canada de mettre fin à la longue série de mesures de l'intensité du bruit solaire sur 10,7 cm porte une atteinte sérieuse aux travaux de prévision et d'élaboration de modèles ionosphériques,

*invite instamment* l'Administration canadienne à renouveler son soutien aux mesures régulières de l'intensité du bruit solaire sur 10,7 cm.

U.25 Hommage au Professeur V.V. Migulin

Le Conseil de l'URSI,

*considérant*

- (a) le rôle important joué par le Professeur V.V. Migulin dans les activités de l'URSI, aussi bien sur le plan administratif en tant que membre du Bureau que sur le plan scientifique, au sein de la Commission G;
- (b) le grand succès rencontré par les colloques sur la Modification artificielle de l'ionosphère qu'il a organisés à Suzdal en 1983 et en 1986;
- (c) la décision de la Commission G de tenir à l'avenir une série de colloques consacrés à ce même sujet,

*notant* que l'URSI pourra continuer de bénéficier de l'assistance et des conseils du Professeur Migulin sous différentes formes et, notamment, pour l'organisation de cette série de colloques,

*décide* de conférer au Professeur V.V. Migulin le titre de Président d'honneur de la série des colloques sur la Modification artificielle de l'ionosphère.

U.26 Subventions de l'UNESCO

Le Conseil de l'URSI,

*considérant* que les subventions annuelles accordées par

l'UNESCO, par l'intermédiaire du CIUS ou sous forme de contrats directs, ont grandement contribué au succès du Programme des Jeunes Scientifiques de l'Union, ainsi qu'à ses activités dans le domaine des publications et de l'assistance aux pays en développement,

*décide* de transmettre à l'UNESCO ses plus vifs remerciements pour l'appui considérable qui lui est ainsi fourni.

#### U.27 Programme des Jeunes Scientifiques

Le Conseil de l'URSI,

*notant* que l'Union a pu inviter 40 jeunes scientifiques, dont 11 venant de pays en développement, à participer aux travaux de l'Assemblée générale en Israël,

*décide* de transmettre l'expression de sa gratitude aux organisations qui ont si généreusement contribué à ce Programme par leur appui financier:

- le Conseil International des Unions Scientifiques (CIUS),
- le Comité du CIUS pour la Science et la Technologie dans les pays en développement (COSTED),
- l'Organisation des Nations Unies pour l'Education, la Culture et la Science (UNESCO),
- la Royal Society de Londres,
- le Comité israélien de l'URSI.

#### U.28 Remerciements au Comité israélien de l'URSI

Le Conseil de l'URSI,

*notant* que le Comité organisateur israélien n'a pas épargné ses efforts pour assurer le succès de la XXIIe Assemblée générale de l'Union,

*décide* de transmettre l'expression de sa gratitude

1. au Comité israélien de l'URSI et à l'Académie des Sciences et Humanités d'Israël pour leur invitation à tenir la XXIIe Assemblée générale à Tel Aviv et, en particulier, au Dr. J. Shapira, Président du Comité israélien;
2. aux membres du Comité organisateur pour la qualité des dispositions pratiques mises en oeuvre pour cette Assemblée.

RÉSOLUTIONS ET RECOMMANDATIONS DES  
COMMISSIONS ET COMITÉS

COMMISSION A - METROLOGIE ELECTROMAGNETIQUE

A.1 Comparaisons de temps

La Commission A,

*considérant*

- (a) qu'il est nécessaire, du point de vue scientifique, de procéder à des comparaisons de précision supplémentaires en temps et en fréquence entre les échelles de temps nationales et les nouveaux étalons de fréquence en cours de développement;
- (b) qu'il y a une inadéquation entre la précision des comparaisons qu'on peut effectuer et les possibilités des meilleurs étalons de fréquence et horloges atomiques, lesquels pourraient être accessibles à tout laboratoire intéressé;
- (c) qu'il est procédé actuellement à l'évaluation d'un certain nombre de méthodes de comparaison de temps et de fréquence, y compris l'interférométrie à très grande base, la transmission de signaux de bruit pseudo-aléatoires sur trajet simple et aller-retour, et les techniques LASER au sol et par satellite;

*recommande*

1. que les études sur toutes les méthodes de comparaison de temps, déjà proposées ou nouvelles, soient activement poursuivies;
2. que des campagnes de comparaisons mutuelles simultanées soient organisées;
3. que ces activités soient coordonnées et que les résultats en soient publiés sous les auspices du Bureau International des Poids et Mesures (BIPM).

A.2 Editions futures du Registre de l'URSI des Laboratoires nationaux d'étalons

La Commission A,

*considérant* que le Registre de l'URSI des Laboratoires nationaux d'étalons fournit des informations utiles sur les établissements qui, de par le monde, s'occupent de systèmes d'étalonnage des quantités électromagnétiques,

*recommande* que les futures éditions du Registre soient considérées comme des documents officiels de l'URSI (et non pas seulement propres à la Commission A) et qu'elles soient imprimées et distribuées par une firme d'édition commerciale,

*charge* le Président du Groupe de travail sur les Laboratoires nationaux d'étalons de négocier les termes d'un contrat approprié avec une Maison d'édition, pour approbation par le Conseil de l'URSI.

*Note:* Cette recommandation est renvoyée au Comité permanent des publications.

A.3 Mise à jour du Registre de l'URSI des Laboratoires nationaux d'étalons

Le Conseil de l'URSI,

*considérant* les nouveaux arrangements proposés pour la publication du Registre de l'URSI des Laboratoires nationaux d'étalons, lesquels découlent des Recommandations A.5 (Florence 1984) et A.2 (Tel Aviv 1987),

*recommande* que la prochaine édition révisée du Registre soit publiée en 1988 et qu'il soit ensuite procédé à sa mise à jour à intervalles de quatre ans,

*invite* ses Membres officiels à communiquer au Président du Groupe de travail toutes informations utiles (ou un état néant) pour la mise à jour de la rubrique concernant leur Pays, et cela pour le 31 décembre 1987 et, ultérieurement, à intervalles de quatre ans.

A.4 Étalons de métrologie quantique et constantes  
Fondamentales

La Commission A,

*considérant*

- (a) que les étalons de mesures physiques, en particulier les étalons relatifs aux unités électriques fondamentales et dérivées, constituent le fondement de la mesure précise de paramètres importants en radioélectricité scientifique;
- (b) que l'utilisation des phénomènes quantiques entraîne actuellement des changements dans la réalisation de ces étalons;
- (c) qu'il est nécessaire de connaître la valeur exacte de certaines constantes fondamentales en vue de la réalisation de ces étalons;
- (d) qu'il est nécessaire de concrétiser le mètre selon la définition qui en est donnée dans le Système International à partir des fréquences de la gamme visible;
- (e) que les mesures de fréquences optiques sont importantes pour la détermination des constantes fondamentales et que seul un nombre restreint de laboratoires pratiquent ces mesures;
- (f) que le Comité International des Poids et Mesures (CIPM) doit prendre dans un proche avenir des décisions sur les unités électriques,

*recommande* que tous les laboratoires nationaux d'étalons soient encouragés

1. à poursuivre activement leurs travaux sur la détermination exacte des constantes fondamentales,
2. à poursuivre activement leurs travaux en vue de la réalisation d'étalons de métrologie quantique pratiques,
3. à favoriser le développement de méthodes permettant la mesure des fréquences visibles avec une précision équivalente à celle qui est actuellement atteinte par les étalons de fréquence primaires,
4. à communiquer leurs résultats aux autres organisations intéressées, et plus spécialement au Bureau International des Poids et Mesures (BIPM).

A.5 Amélioration des étalons de fréquence radioélectrique dans la région allant des longueurs d'onde millimétriques aux longueurs d'onde submillimétriques

La Commission A,

*considérant*

- (a) l'importance croissante que la région allant des longueurs d'onde millimétriques aux longueurs d'onde submillimétriques revêt pour diverses applications scientifiques et techniques, telles que la communication et le transfert de données, le radar, la télédétection, la recherche sur l'environnement, la radioastronomie et la fusion nucléaire, ainsi que pour la compatibilité électromagnétique;
- (b) la nécessité de disposer de meilleurs étalons et méthodes métrologiques pour ces applications, afin de réaliser des mesures fiables
  - (i) des quantités de base aux radiofréquences: puissance, température de bruit et coefficients de diffusion,
  - (ii) de la permittivité et de la perméabilité des matériaux utilisés aux radiofréquences,
  - (iii) tant pour l'utilisation de modes guidés que de modes libres,

*recommande* de consacrer une attention accrue aux recherches fondamentale et appliquée sur les étalons de fréquence radioélectrique et les méthodes de mesure, ainsi que sur les méthodes de mesure des matériaux, des longueurs d'onde millimétriques aux submillimétriques.

A.6 Groupe de travail sur les interactions entre champs électromagnétiques et systèmes biologiques, et mesures correspondantes

La Commission A,

*considérant* les recommandations adoptées lors des XVIIIe, XIXe, XXe et XXIe Assemblées générales de l'URSI, lesquelles expriment l'intérêt de l'Union pour les effets des champs électromagnétiques sur les systèmes biologiques, et soulignent la nécessité de la collaboration internationale des physiciens,

des biologistes et des médecins et de leurs organisations pour améliorer la connaissance des interactions entre systèmes biologiques et champs électromagnétiques,

*notant* que cette discipline présente de l'intérêt pour plusieurs autres Commissions de l'URSI,

*recommande*

1. que le Groupe de travail sur les Interactions entre champs électromagnétiques et systèmes biologiques, et les mesures correspondantes soit maintenu avec, à sa tête, un Président et deux Vice-Présidents dont l'un représentant la Commission A et l'autre les autres Commissions de l'URSI;
2. que les membres du Groupe de travail soient désignés par son Président, en consultation avec les Comités Membres de l'Union;
3. que les autres Commissions de l'URSI soient invitées à désigner chacune un représentant au sein du Groupe de travail;
4. que le Groupe de travail soit invité à poursuivre ses efforts
  - (i) pour organiser des colloques ayant pour sujet les interactions entre les champs électromagnétiques et les systèmes biologiques,
  - (ii) pour collaborer avec d'autres organismes dans la planification et l'organisation de ces colloques,
  - (iii) pour fournir un appui actif aux organisations internationales qui s'occupent des influences des champs électromagnétiques sur la santé et des problèmes de sécurité qui s'y rattachent,
  - (iv) pour promouvoir les activités scientifiques dans son domaine d'intérêt.



COMMISSION B - ONDES ET CHAMPS

B.1 Colloque sur la Théorie des ondes électromagnétiques

La Commission B,

*considérant*

- (a) que les colloques de l'URSI sur la Théorie des ondes électromagnétiques se sont succédé à intervalles de trois ans depuis plus de 30 ans;
- (b) que ces colloques revêtent une importance majeure et représentent l'essentiel des activités de la Commission B entre les Assemblées générales,

*confirme* que le prochain colloque de cette série aura lieu à Stockholm (Suède) en août 1989.

B.2 Copatronage de conférences internationales

La Commission B,

*considérant* que certaines conférences internationales à venir présentent un intérêt direct pour la Commission,

*recommande* que l'URSI accorde son copatronage aux conférences suivantes:

1. les trois Conférences européennes annuelles sur les Hyperfréquences en 1988, 1989 et 1990 (la Conférence qui se tiendra à Stockholm, Suède, du 12 au 17 septembre 1988 sera la 18e de la série);
2. le Colloque sur les Antennes et la théorie des champs électromagnétiques, Shanghai, Chine, 29 août - 1er septembre 1989,
3. le 9e Colloque sur les communications en hyperfréquences (MICROCOLL), Budapest, Hongrie, 1990,
4. la Conférence internationale sur les antennes et la propagation (ICAP 1989).

B.3 Groupe de travail sur l'inversion de la diffusion

La Commission B,

*considérant*

- (a) l'intérêt sans cesse grandissant pour les problèmes d'inversion de la diffusion dans une vaste gamme de domaines;
- (b) la nécessité de contacts appropriés entre les chercheurs qui utilisent les méthodes d'inversion pour différentes applications;
- (c) le succès rencontré par le colloque sur l'inversion de la diffusion, qui s'est tenu pendant deux jours au cours de la présente Assemblée générale,

*recommande* que le Groupe de travail sur l'inversion de la diffusion soit maintenu, sous la présidence du Prof. D.L. Jaggard (EUA).

B.4 Groupe de travail inter-Commissions sur la mesure des formes d'onde dans le domaine temporel

La Commission B,

*considérant* les activités développées par le Groupe de travail sur la mesure des formes d'onde dans le domaine temporel au cours des trois dernières années, et en particulier les deux séances communes à toutes les Commissions organisées au cours de la présente Assemblée générale,

*recommande* le maintien de ce Groupe de travail inter-Commissions pendant les trois années à venir.

COMMISSION C - SIGNAUX ET SYSTEMES

C.1 Publications de l'URSI

La Commission C

*recommande*

- 1. que le "Bulletin d'Information de l'URSI" continue de paraître sous sa forme actuelle;

2. que la "Review of Radio Science" continue d'être publiée à l'occasion des Assemblées générales de l'URSI;
3. que l'initiative concernant une revue de l'URSI sur les signaux, les systèmes et l'électronique soit soutenue.

## C.2 Copatronage de conférences

La Commission C

*recommande* le patronage par l'URSI des conférences suivantes:

1. Colloque de l'URSI sur les Signaux, les systèmes et l'électronique, qui sera organisé en commun par les Commissions C et D en 1989,
2. le 9e Colloque sur les Communications en hyperfréquences (MICROCOLL), Budapest, Hongrie, en 1990 à la suite de la XXIIIe Assemblée générale de l'URSI,
3. les Conférences européennes sur les communications optiques (ECOC) en 1988, 1989 et 1990,
4. la Conférence européenne sur la théorie et la conception des circuits, Londres, Royaume-Uni, septembre 1989,
5. la Conférence sur le Traitement numérique des signaux, Florence, Italie, 1990,
6. les Séminaires internationaux de Zurich sur les Communications numériques en 1988 et 1990.

## C.3 "Review of Radio Science 1987-1989"

La Commission C

*décide* de désigner le Prof. J.G. Lucas comme rédacteur de la Commission pour la prochaine édition de "Review of Radio Science".

## C.4 Représentants de la Commission C

La Commission C

*décide* de désigner ses représentants comme suit:

1. le Prof. J.G. Lucas au Comité de liaison URSI-CCIR-CCITT,
2. le Prof. S. Hälme au Groupe de travail inter-Commissions sur

- la mesure des formes d'onde dans le domaine temporel,
3. le Prof. J.L. Lacoume au Groupe de travail commun des Commissions C et H sur l'Analyse des ondes.

COMMISSION D - DISPOSITIFS ELECTRONIQUES ET OPTIQUES

ET APPLICATIONS

D.1 "Review of Radio Science"

La Commission D,

*consi dérant* qu'il est souhaitable de mettre au point un mécanisme qui permettra

- (a) d'éviter les lacunes considérables qui interviennent lorsque certains Comités de l'URSI omettent d'envoyer leurs contributions aux rédacteurs des différentes Commissions;
- (b) d'assurer la valeur de référence de la "Review of Radio Science",

*recommande* que, lors de l'appel aux contributions, la procédure adoptée à titre expérimental par la Commission D pour l'édition de 1981 de la "Review of Radio Science" soit appliquée, à savoir:

1. inviter d'éminents spécialistes à faire le point d'un certain nombre de sujets sélectionnés du domaine d'activité de chacune des Commissions,
2. selon la pratique actuelle, inviter les Membres Officiels des Commissions à présenter les contributions de leurs pays, lesquelles seront envoyées aux spécialistes par le rédacteur de la Commission.

D.2 "Review of Radio Science 1987-1989"

La Commission D

*décide* de désigner Mme J. Hénaff comme rédacteur de la Commission pour la prochaine édition de la "Review of Radio Science".

D.3 Proposition relative à une nouvelle Revue sur les signaux, les systèmes et l'électronique

La Commission D,

*ayant pris connaissance* de la proposition de lancer une nouvelle revue sur les signaux, les systèmes et l'électronique, *recommande*

1. qu'une analyse soignée des revues existant dans ce domaine soit effectuée avant toute prise de décision à ce sujet;
2. que, dans le cas où il serait décidé de lancer la nouvelle revue, celle-ci contienne principalement et dans un premier stade, des articles de synthèse, et cela jusqu'à ce que la réputation de la revue soit bien assise.

D.4 Assistance aux pays en développement

La Commission D,

*considérant* la suggestion de fournir une assistance aux pays en développement en proposant des conférenciers et des programmes pour des séminaires et ateliers, *recommande*

1. que l'Académie des Sciences du Tiers Monde soit officiellement consultée à propos de cette suggestion, ainsi que sur les modalités de cette assistance;
2. que l'Union Internationale des Télécommunications soit consultée de manière analogue.

D.5 Copatronage des Conférences européennes sur les communications optiques

La Commission D

*recommande*

1. le copatronage par l'URSI des Conférences européennes sur les communications optiques (ECOC) en 1988, 1989 et 1990;
2. la désignation du Prof. W.A. Gambling, Vice-Président du Comité d'organisation, comme représentant de l'URSI pour la Conférence de 1988.

D.6 Groupe de travail commun des Commissions D et E

La Commission D

*recommande* la formation d'un Groupe de travail commun aux Commissions D et E sur la susceptibilité des circuits intégrés et des dispositifs semi-conducteurs aux dommages causés par les phénomènes transitoires, avec le Dr. T. Itoh (EUA) comme représentant de la Commission D.

D.7 Comité de liaison URSI-CCIR-CCITT

La Commission D

*décide* de désigner le Prof. T. Okoshi (Japon) comme représentant de la Commission au Comité de liaison URSI-CCIR-CCITT.

COMMISSION E - BRUITS ET BROUILLAGES ELECTROMAGNETIQUES

E.1 Groupes de travail

La Commission E

*décide*

1. de maintenir, pendant les trois années à venir, les Groupes de travail suivants:
  - E.1 Bruits artificiels (Président: A.D. Spaulding, EUA)
  - E.2 Bruits naturels (Président: J. Hamelin, France)
  - E.3 Effets nocifs des phénomènes transitoires sur les équipements (Président: V. Scuka, Suède)
  - E.4 Fondement scientifique de la maîtrise des bruits et des brouillages (Président: C. Baum, EUA);
2. de former, en commun avec la Commission D, un Groupe de travail sur les Effets des phénomènes transitoires sur les circuits intégrés, les transistors, les ordinateurs, etc., (Co-Président pour la Commission E: V. Scuka, Suède, Co-Président pour la Commission D: T. Itoh, EUA) et d'organiser la première réunion de ce Groupe en conjonction avec le Symposium de Zurich sur la Compatibilité électromagnétique en mars 1989.

## E.2 Colloques sur la Compatibilité électromagnétique des séries de Zurich et de Wrocław

La Commission E

*recommande* que l'URSI continue d'accorder son copatronage aux colloques sur la Compatibilité électromagnétique des séries de Zurich et de Wrocław, cette collaboration s'étant avérée fructueuse.

## E.3 Bruits radioélectriques

La Commission E,

*considérant*

- (a) que le Rapport 322 (1964) du CCIR, qui contient les cartes mondiales des niveaux de bruits atmosphériques dus aux orages, a été établi, et révisé en 1984, en l'absence d'un nombre suffisant de données de l'hémisphère Sud;
- (b) que le Rapport 258 du CCIR sur les bruits artificiels a été établi sur base des données acquises aux Etats-Unis il y a plus de 20 ans,

*recommande*

- 1. que, dans le but de vérifier les prévisions du nouveau Rapport 322 du CCIR, il soit procédé à l'acquisition de données sur les bruits atmosphériques, et cela en des sites calmes et sur une période d'au moins deux ans, en utilisant les équipements du type spécifié par le Groupe de travail de la Commission E sur les bruits naturels, et que priorité soit donnée à l'hémisphère Sud;
- 2. qu'il soit procédé à l'acquisition de données sur les bruits artificiels dans les différentes régions du monde, et que priorité soit donnée aux sites autres que les Etats-Unis;
- 3. que le Comité permanent de l'URSI pour les pays en développement joue un rôle prépondérant dans la coordination des mesures de bruits dans les pays en développement, et que priorité soit donnée à l'hémisphère Sud pour ce qui concerne les bruits atmosphériques dus aux orages.

#### E.4 Gestion du spectre

La Commission E,

*considérant*

- (a) qu'il est nécessaire d'informer les pays en développement sur les aspects scientifiques et techniques de la gestion du spectre, sur les problèmes des bases de données, les mesures et l'établissement de modèles analytiques;
- (b) que l'URSI jouit d'une certaine compétence pour ce qui concerne les aspects scientifiques et techniques de la gestion du spectre et les disciplines connexes;
- (c) que le Comité Consultatif International des Radiocommunications (CCIR) et le Bureau International d'Enregistrement des Fréquences (IFRB) poursuivent sans discontinuer leurs études sur la gestion du spectre,

*recommande* que l'URSI collabore avec le CCIR et les autres organes de l'Union Internationale des Télécommunications (UIT) pour rendre toutes les informations appropriées disponibles sous forme de cassettes vidéo, de conférences magistrales, de conférenciers itinérants, etc., et que cette collaboration soit coordonnée par le Comité de liaison URSI-CCIR-CCITT.

### COMMISSION F - PROPAGATION DES ONDES ET TELEDETECTION

#### F.1 Collaboration avec l'IGARSS

La Commission F

*décide*

1. de continuer de collaborer activement à l'organisation des colloques internationaux annuels de Géoscience et de Télé-détection (International Geoscience and Remote Sensing Symposia (IGARSS)), en invitant son Président à désigner un nombre adéquat de représentants de l'URSI, en consultation avec le Membre officiel du Comité Membre de l'Union dans le pays où se tient le colloque;
2. de faire en sorte que les résumés de l'URSI soient publiés dans un volume distinct de celui des Actes du colloque;
3. de restreindre son rôle à l'étude de l'interaction des ondes électromagnétiques avec le milieu (y compris les



problèmes relatifs aux instruments).

F.2 "Review of Radio Science 1987-1989"

La Commission F

*décide* de désigner le Dr. G. Brussaard, Vice-Président de la Commission, comme rédacteur pour la prochaine édition de la "Review of Radio Science".

F.3 Comité de liaison URSI-CCIR-CCITT

La Commission F,

*notant avec satisfaction* la poursuite de sa collaboration traditionnelle avec le Comité Consultatif International des Radiocommunications (CCIR), en particulier avec la Commission d'Etudes 5 de ce Comité,

*décide* de désigner les personnalités suivantes comme représentants au Comité de liaison URSI-CCIR-CCITT: A. Blomquist (Suède), L. Boithias (France), F. Fedi (Italie) et M.P.M. Hall (Royaume-Uni).

F.4 Groupe de travail inter-Commissions sur la mesure des formes d'onde dans le domaine temporel

La Commission F

*décide* de désigner le Dr. Hans Liebe (EUA) comme représentant au Groupe de travail inter-Commissions sur la mesure des formes d'onde dans le domaine temporel.

F.5 Colloques et Conférences 1988-1990

La Commission F

*recommande* l'organisation ou le copatronage, selon le cas, des conférences suivantes:

1. Colloque International de Géoscience et de Télédétection (IGARSS):

- 1988 - 13-16 septembre, Edimbourg, Royaume-Uni
- 1989 - 27 juin - 1er juillet, Vancouver, Canada
- 1990 - Europe;

2. Symposium de la Commission F sur la Propagation des ondes et la télédétection, automne 1989, Nice, France (Président: J.P. Mon, France);
3. Problèmes de signature en télédétection, printemps 1990, Massachusetts, EUA (Président: C. Swift, EUA);
4. Ecole de radar atmosphérique (en commun avec la Commission G), novembre 1988, Kyoto, Japon (Président: S. Kato, Japon);
5. Méthodes radioélectriques pour l'étude du sous-sol terrestre (Président: D. Gjessing, Norvège).

COMMISSION G - RADIOELECTRICITE IONOSPHERIQUE

ET PROPAGATION

G.1 Observations à haute résolution de la densité électronique de l'ionosphère

La Commission G,

*considérant* la nécessité d'acquérir des données exactes à haute résolution temporelle et spatiale de la densité électronique de l'ionosphère pour les prévisions de propagation des ondes radioélectriques,

*notant*

- (a) que les radars à diffusion incohérente sont mis en service chaque année pendant plusieurs périodes de journées mondiales coordonnées et rassemblent des données sur la densité électronique et la température;
- (b) que ces périodes de service des radars à diffusion incohérente font partie intégrante de programmes coordonnés dans le cadre de l'Etude mondiale Ionosphère-Thermosphère (WITS);
- (c) qu'il existe un grand nombre d'ionosondes à incidence verticale susceptibles de fournir des séquences de profils rapides de la densité électronique, lesquelles permettent d'étalonner les profils obtenus au moyen des radars à diffusion incohérente installés dans les mêmes stations;
- (d) que, pour l'étude des effets des ondes de gravité sur la distribution de la densité électronique, il est nécessaire de disposer de données plus exactes sur la "vallée" entre

les couches E et F,

*recommande* que soient organisées des campagnes mondiales pour la production de séquences d'ionogrammes rapides (5 min.) qui couvriraient les périodes d'observations coordonnées prévues pour les radars à diffusion incohérente.

## G.2 Système de surveillance par satellite

La Commission G,

*considérant*

- (a) que la cartographie empirique des paramètres d'ionisation maximale de l'ionosphère terrestre présente un grand intérêt pour les prévisions de propagation des ondes radio-électriques, l'élaboration de modèles empiriques de la densité électronique dans le cadre de l'Ionosphère Internationale de Référence (IRI) et les recherches aéronomiques;
- (b) que des cartes de ce genre, dérivées des observations par satellite, n'ont pu être obtenues que tout récemment par des observations directes à l'échelle mondiale, par exemple au moyen du satellite japonais ISS-b et du satellite soviétique Intercosmos 9,

*notant* que les cartes obtenues au moyen d'un satellite couvrent une longue période de temps de sorte que les variations saisonnières et les variations diurnes se trouvent entremêlées,

*recommande* l'établissement d'un système de surveillance par satellite, composé de plusieurs satellites en orbite polaire, qui pourra fournir un atlas global dans un bref intervalle de temps.

## G.3 Mesures du champ et des bruits radioélectriques en ondes décamétriques

La Commission G,

*considérant* le programme d'activités proposé par le Comité permanent pour les pays en développement,

*appuie* la proposition de ce Comité d'organiser et de coordonner, dans différents pays tropicaux et subtropicaux, un programme de mesures du champ et des bruits radioélectriques

en ondes décimétriques sur des fréquences sélectionnées, exprime sa volonté de collaborer avec le Comité pour les pays en développement dans la planification de ce programme.

#### G.4 Groupes de travail

La Commission G

décide

1. de maintenir les Groupes de travail suivants:

G.1 Groupe conseil du réseau d'ionosondes (INAG)  
(Président: J.A. Gledhill, Afrique du Sud),

G.2 Etude de l'ionosphère au moyen de satellites à balise  
(Président: R. Leitinger, Autriche);

2. de former les Groupes de travail suivants:

G.3 Elaboration de modèles ionosphériques  
(Président: C. Rush, EUA)

Mandat: Promouvoir les méthodes d'élaboration de modèles physiques et empiriques de l'ionosphère à utiliser pour les communications et la radioélectricité scientifique;

G.4 Informatique ionosphérique  
(Président: B.W. Reinisch, EUA)

Mandat: Promouvoir l'application des méthodes de la théorie de l'information à l'acquisition, au traitement, au stockage et à la distribution des données ionosphériques;

G.5 Etudes ionosphériques aux basses latitudes  
(Président: S.M. Radicella, Argentine)

Mandat: Promouvoir la collaboration internationale dans l'étude de l'ionosphère de basse latitude, en particulier pour les applications dans le domaine des communications.

#### G.5 Groupes de travail communs aux Commissions G et H

La Commission G

*décide* de maintenir les Groupes de travail communs aux Commissions G et H comme suit:

- GH.1 Diffusion incohérente  
(Co-Présidents: V.B. Wickwar, EUA, K. Schlegel, RFA);
- GH.2 Expériences, simulation et analyse par ordinateur des processus d'ondes dans les plasmas  
(Co-Présidents pour la Commission H: H. Matsumoto, Japon,  
M. Abdalla, EUA,  
Co-Président pour la Commission G: S. Ossakow, EUA).

#### G.6 Groupe de travail commun à la Commission G et au COSPAR

La Commission G

*décide* de maintenir le Groupe de travail URSI-COSPAR sur l'Ionosphère Internationale de Référence (IRI) avec, comme Président, L. Bossy, Belgique.

#### G.7 Colloques 1987-1990

La Commission G

*recommande* que l'URSI accorde son patronage et son appui financier aux colloques suivants:

1. Colloque sur les Processus à grande échelle dans l'ionosphère et la thermosphère, décembre 1989, Boulder, CO, EUA (Organisateurs: V.B. Wickwar et A. Richmond, EUA), en commun avec la Commission H;
2. Colloque sur la Modification artificielle de l'ionosphère, 1988 ou 1989 (Organisateurs: V.V. Migulin, URSS et W.E. Gordon, EUA), en commun avec la Commission H;
3. Etude de l'ionosphère au moyen de satellites à balise, 18-22 avril 1988, Xinxiang, Henan, Chine (Organisateurs: Huang Xuegin et Gao Chong, Chine; coordonnateur: R. Leitinger, Autriche);
4. Ecole internationale de radar atmosphérique, 24-28 novembre 1988, Kyoto, Japon (Organisateur: S. Kato, Japon), en commun avec la Commission F.

COMMISSION H - ONDES DANS LES PLASMAS

H.1 Patronage de colloques et de conférences

La Commission H,

*recommande* que l'URSI accorde son patronage aux conférences suivantes:

1. Précipitation de particules induite par les ondes et interaction entre les ondes et les particules (URSI-WIPP 1989), Dunedin, Nouvelle Zélande, 5-11 février 1989 (Organisateurs: R.L. Dowden, Nouvelle Zélande, H. Matsumoto, Japon et U.S. Inan, EUA), Mode C;
2. 4e Ecole internationale pour les simulations dans l'espace, Kyoto, Japon, novembre 1989 (Organisateur: H. Matsumoto, Japon), Mode B;
3. 19e Conférence internationale sur les phénomènes dans les gaz ionisés, Belgrade, Yougoslavie, 10-14 juillet 1989 (Organisateur: J. Purić, Yougoslavie), Mode B.

H.2 Groupes de travail inter-Unions URSI-IAGA

La Commission H

*décide*

1. de maintenir le Groupe de travail URSI/IAGA.1 sur le Sondage électromagnétique passif de la magnétosphère (Co-Président pour l'URSI: U.S. Inan, EUA);
2. de maintenir, en commun avec la Commission G, le Groupe de travail URSI/IAGA.2 sur les Instabilités des ondes dans les plasmas (Co-Président pour la Commission H: T. Sato, Japon, Co-Président pour la Commission G: S. Ossakow, EUA).

H.3 Groupes de travail communs

La Commission H

*décide* de maintenir les Groupes de travail communs suivants:

- CH.1 Analyse des ondes (Co-Président pour la Commission H: D. Jones, Royaume-Uni);

- GH.1 Diffusion incohérente (Co-Présidents pour la Commission H: V.B. Wickwar, EUA et K. Schlegel, RFA);
- GH.2 Expériences, simulation et analyse par ordinateur des processus d'ondes dans les plasmas (Co-Présidents pour la Commission H: H. Matsumoto, Japon et M. Abdalla, EUA, Co-Président pour la Commission G: S. Ossakow, EUA).

#### RESOLUTION CONJOINTE DES COMMISSIONS G ET H

##### GH.1 "Review of Radio Science 1987-1989"

Les Commissions G et H

*décident* de désigner un seul rédacteur pour la préparation du rapport commun des Commission G et H qui sera inclus dans l'édition de 1990 de la "Review of Radio Science",

*recommandent* que le Rédacteur désigne sept rédacteurs adjoints qui prépareront des rapports de synthèse internationaux sur les sujets suivants:

- (1) Techniques
- (2) Plasmas environnant la Terre et les planètes
- (3) Physique de la propagation des ondes
- (4) Applications de la propagation des ondes
- (5) Instabilités dans les plasmas
- (6) Expériences actives
- (7) Interactions entre les ondes et les particules.

#### COMMISSION J - RADIOASTRONOMIE

##### J.1 Télescope israélo-égyptien d'interférométrie à très grande base

La Commission J

*reconnaisant*

- (a) que l'interférométrie à très grande base revêt une importance considérable en astronomie et en astrophysique, ainsi que dans l'étude des mouvements de la Terre et de l'écorce

terrestre;

- (b) que la pratique des mesures radioastronomiques constitue une excellente base pour la formation des jeunes scientifiques et ingénieurs;
- (c) que, par définition, l'interférométrie à très grande base est une activité internationale qui favorise les contacts et les échanges entre scientifiques de nombreux pays;

*notant en outre*

- (d) que la communauté des radioastronomes israéliens a marqué son intérêt pour la construction et l'exploitation d'un télescope d'interférométrie à très grande base, et a proposé au Comité égyptien de l'URSI de s'associer à ce projet;
- (e) que, de par sa situation géographique, ce télescope permettrait d'augmenter de manière significative le rendement du Réseau européen d'interférométrie à très grande base (EVN) en ménageant des lignes de l'ordre de 3000 km de long, lesquelles apporteraient une amélioration de la résolution et de la qualité des images des sources radio-électriques cosmiques;
- (f) que ce télescope occuperait une position stratégique pour l'étude géodésique des plaques tectoniques fracturées dans la région de la Méditerranée,

*recommande* les caractéristiques suivantes pour ce télescope:

- (1) le diamètre serait de l'ordre de 25-40 m pour assurer une sensibilité satisfaisante,
- (2) le télescope et les appareils de réception seraient compatibles avec les éléments du Réseau européen et des autres télescopes d'interférométrie à très grande base de par le monde,
- (3) le télescope fonctionnerait sur des fréquences allant jusqu'à au moins 23 GHz,

*invite instamment* les agences concernées à fournir tout l'appui nécessaire à l'adoption et à la mise en oeuvre de ce projet.

## J.2 Patronage de colloques

La Commission J

*recommande* que l'URSI patronne les colloques suivants qui



seront organisés au cours des trois années à venir:

1. Ecole d'été d'interférométrie à très grande base pour jeunes scientifiques, septembre 1988, Bologne, Italie (Organisateurs: M. Felli, Italie et R.E. Spencer, R.-U.);
2. "Radioastronomical Seeing", mai 1988, Beijing, Chine (Organisateur: J. Baldwin, R.-U.);
3. Limites de l'astronomie observationnelle, août-septembre 1989, Sydney, Australie (Organisateur: R.H. Frater, Australie);
4. Radioastronomie en ondes submillimétriques, septembre 1988, Hawaii (Organisateur: T. Phillips, EUA).

### J.3 "Review of Radio Science 1987-1989"

La Commission J

*décide* que le rapport de la Commission pour la prochaine édition de la "Review of Radio Science" sera établi par un groupe de rédacteurs, chacun traitant un sujet spécialisé, et le Président de la Commission comme Rédacteur en chef.

### J.4 Commission inter-Unions pour l'attribution de fréquences à la radioastronomie et à la science spatiale (IUCAF)

La Commission J,

*notant* les sérieuses menaces qui pèseront sur la radioastronomie au cours des trois années à venir,

*recommande*

1. que le nombre de représentants de l'URSI au sein de la Commission inter-Unions pour l'attribution de fréquences à la radioastronomie et à la science spatiale (IUCAF) soit porté à quatre;
2. que l'URSI fournisse le plus large appui financier possible à l'IUCAF pendant cette période cruciale.

J.5 Comité de liaison URSI-CCIR-CCITT

La Commission J

*décide*

1. de désigner B.J. Robinson (Australie) comme représentant au Comité de liaison URSI-CCIR-CCITT;
2. d'inviter son Président à désigner un deuxième représentant à ce Comité.

COMITE DE LIAISON URSI-CCIR-CCITT

1. Collaboration avec le Comité permanent pour les pays en développement

Le Comité de liaison URSI-CCIR-CCITT,

*considérant*

- (a) que le Comité permanent de l'URSI pour les pays en développement a pris l'initiative d'études et de recherches dont la première phase a produit les résultats suivants:
  - "Handbook on Radio Propagation for Tropical and Subtropical Countries", 1987;
  - Atelier régional Amérique latine/Afrique sur la recherche en propagation des ondes et les applications (y compris la gestion du spectre), Buenos Aires, Argentine, 1987 (Actes comprenant 190 pages), lequel a recommandé de nouveaux domaines d'étude dont: acquisition des données ionosphériques, phénomènes de E sporadique, phénomènes de scintillation aux basses latitudes, réflectivité, atténuation due aux précipitations, compatibilité électromagnétique, gestion du spectre;
- (b) que le Comité permanent pour les pays en développement a sollicité l'assistance du Comité de liaison URSI-CCIR-CCITT pour le seconder dans la mise en oeuvre de ces recommandations;
- (c) que les résultats des mesures effectuées dans les pays en développement dans les domaines définis par le Comité permanent pour les pays en développement sont nécessaires

au CCIR pour la conduite de ses travaux,  
*recommande*

1. que les Commissions compétentes de l'URSI examinent chacun de ces sujets afin de recommander des priorités du point de vue scientifique, ainsi que les méthodes de normalisation des équipements et de mesure et la durée des observations nécessaires pour conférer une valeur réelle aux données;
  2. que le CCIR soit invité à proposer des priorités à l'URSI;
  3. que le Comité permanent pour les pays en développement et les Commissions appropriées de l'URSI collaborent avec les Commissions d'études du CCIR pour programmer les campagnes de mesures dans les pays en développement et, lorsqu'il sera jugé opportun, organiser des réunions ou des colloques communs sur des sujets d'intérêt courant (par exemple, taux des précipitations et atténuation);
  4. que le Comité permanent des pays en développement établisse des contacts de travail avec les Groupes de travail intérieurs du CCIR et participe si besoin à leurs travaux pour faciliter la coordination des études;
  5. que l'URSI fournisse au Comité permanent pour les pays en développement un appui financier pour lui permettre de prendre part aux réunions de coordination et de programmation.
2. Collaboration avec l'Union Internationale des Télécommunications (UIT)

Le Comité de liaison URSI-CCIR-CCITT,

*notant* la recommandation formulée par la Conférence de Corsendonk (mars 1987) selon laquelle il est souhaitable de relancer la collaboration entre l'URSI et les Comités techniques de l'Union Internationale des Télécommunications (CCIR, CCITT et IFRB),

*recommande* la mise en oeuvre, au cours des trois années à venir, du programme d'activités ci-dessous:

1. l'organisation d'un atelier, dans le cadre du Colloque de Zurich sur la Compatibilité électromagnétique en 1989, pour passer en revue les documents du CCIR relatifs aux

- bruits et aux brouillages (F.L. Stumpers, Pays-Bas);
2. l'organisation éventuelle, dans le cadre du Colloque de Zurich sur la Compatibilité électromagnétique en 1989, d'une séance commune Commission E de l'URSI / CCIR consacrée à la gestion du spectre (R.D. Parlow, EUA);
  3. l'organisation éventuelle d'une réunion, impliquant la Commission F, le Comité pour les pays en développement de l'URSI et le CCIR, pour examiner la question des données disponibles et la mesure du taux de précipitations et de l'atténuation (R.K. Crane, EUA, S. Radicella, Argentine);
  4. l'organisation éventuelle d'un atelier consacré à la contribution scientifique de l'URSI dans le domaine des stratégies à appliquer pour la planification à long terme des télécommunications (J. Shapira, Israël);
  5. la participation d'un représentant de l'URSI à l'Assemblée plénière du CCITT à Melbourne, Australie en 1988 (J.G.Lucas, Australie);
  6. réunions du Comité de liaison URSI-CCIR-CCITT dans le cadre de colloques appropriés;
  7. une contribution de la Commission E de l'URSI, à soumettre à la Commission d'études 6 du CCIR, sur les équipements qui sont recommandés pour la mesure des bruits radioélectriques;
  8. une contribution commune des Commissions A et F de l'URSI, à soumettre à la Commission d'études 5 du CCIR, sur les données relatives aux constantes fondamentales en ondes décimétriques (G. Hagn, EUA);
  9. encourager les scientifiques associés à l'URSI à soumettre des articles pour publication dans le "Journal des Télécommunications";
  10. fournir aux Comités Consultatifs de l'UIT, aux fins de formation, des cassettes vidéo d'exposés sélectionnés faits par des conférenciers de l'URSI,

## NEWS FROM MEMBER COMMITTEES

### 4th NATIONAL URSI COLLOQUIUM IN THE UNITED KINGDOM

Sheffield, 9 - 10 - July 1987

The 4th National URSI Colloquium convened by the British Committee for Radio Science was a 2-day meeting held at the University of Sheffield. It was attended by 87 registered delegates from Academic, Governmental, Industrial and other Scientific and Engineering Establishments in the United Kingdom. The parallel sessions covered most of the subject areas of the Commissions in the following ways:

- UK Space Science Projects;
- Ionospheric Propagation;
- The Earth's Magnetosphere;
- Remote Sensing and Propagation in the Troposphere;
- Signals, Systems and Noise;
- Integrated Optics I and II;
- Electromagnetic Metrology I and II.

The last two topics were chosen to reflect special local activities in the Department of Electronic and Electrical Engineering.

These annual meetings, instigated by the National Committee for Radio Science of the Royal Society, have become an established feature of the national URSI activity. The 5th National Colloquium will be held at King's College London, 11-12 July 1988.

### 43th MEETING OF THE A.S. POPOV SOCIETY

Prof. V.I. Siforov, Chairman of the A.S. Popov Society, invites the URSI community to participate in the 43th Meeting, to be held in Moscow on 24-26 May 1988. The following topics of interest to URSI will be discussed in plenary and sectional sessions, with the general purpose of considering ways of introducing advanced scientific research and engineering

experience and their effective use in the national economy:

- Automatic switching and communication networks
- Analogue-digital computer techniques and machine modelling
- Information management systems and telemechanics
- Methods for computer-oriented solutions of marginal problems
- Multichannel communication
- Scientific and technical information
- Scientific organization of work and management of communication enterprises
- Mail communication
- Radio broadcasting, electroacoustics and magnetic recording
- Data transmission and teleprocessing
- Television
- Teletraffic theory
- Theory and technique of discrete signal transmission
- Information storage systems.

Time for presentation: 20 min.

Conference language: Russian.

Two copies of the paper, mentioning the chosen section, should be sent to the address below as soon as possible.

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

Cable address: Moscow K-31  
Central Administration  
The A.S. Popov Society

Telephone: 221-71-08  
924-80-84.

All persons interested in participating in the Sessions are kindly requested to make arrangements through one of the Intourist accredited agencies.

## REPORT OF URSI WORKING GROUP G.5 ON MAPPING OF CHARACTERISTICS AT THE PEAK OF THE F2 LAYER

K. Davies (Chairman)

At the business meeting of Commission G at the XXI General Assembly in Florence in 1984, URSI Working Group G.5 was set up: "to make improvements in the present CCIR (International Radio Consultative Committee) maps of F2-layer characteristics through theory and observation and, in particular, to investigate the possibility of incorporating space data".

The members of the Working Group were:

P.A. Bradley, UK  
N.P. Danilkin, USSR  
K. Davies, USA, Chairman  
N. Matuura, Japan  
L. McNamara, Australia  
K. Rawer, FRG  
C. Rush, USA

The Working Group restricted its activities to the stable features of the global distribution of foF2. Thus it was decided not to include features such as the auroral zone, troughs, travelling ionospheric disturbances, and ionospheric storm effects.

The Working Group established an objective of producing a new set of numerical maps of foF2 based on available 'observed' and 'theoretical' data. The term "numerical map" is used to denote a function of three variables -- latitude, longitude, and time -- which represents the world-wide geographic and diurnal variations of an ionospheric characteristic. A numerical map is defined by a set of coefficients. In the CCIR (1967) maps, originally adopted in 1966, a set of 988 coefficients were used for each map.

The number of coefficients employed is a compromise between economy and degree of detail in the map. In the presence of noise in the data, the higher coefficients tend to represent noise rather than the parameter. Hence, above certain orders of coefficients, the series is truncated. This truncation is an important feature because it sets a limit on

the spatial gradients in the map and establishes a lower limit on the spatial sizes of structures in the map. Numerical maps have several advantages compared with hand-drawn maps, such as: (a) adaptability to computer use, (2) ease by which they can be updated as new data become available.

There are two distinct aspects of mapping that can lead to improvements. They are: (a) the mathematical functions used to represent the characteristic on a spherical surface, called the basis functions, and (b) the quality, quantity, and location of the input data. The Working Group concentrated its efforts on aspect (b).

The input data come from the ionospheric sounding network of about 150 ionosonde stations. The locations of some of these stations have changed over the years. While some areas, e.g. Europe, have relatively dense networks, there are large areas, such as over oceans, where the data are sparse or non-existent. This uneven distribution leads to erroneous values over unsounded areas. Furthermore, some sounding stations have been operated for limited periods; extrapolation in time is necessary to represent conditions for sunspot numbers of 0 and 100.

The most comprehensive data base of F2 critical frequencies is that of Fox and McNamara (1986), who have collected all available data and developed procedures for rejecting and fitting data for interpolation/extrapolation.

To include realistic data over the oceans in middle latitudes, Rush et al. (1984) introduced "theoretical data". This was accomplished by the use of a physical model of the ionosphere that included ion production and loss and, in particular, effects of winds. Using data for stations with little or no magnetic declination, the meridional neutral wind was adjusted for agreement between observation and theory. The meridional wind was used at a station with a magnetic declination, and the zonal wind adjusted for agreement between theory and observations. This wind system was then used in similar latitudes and different declinations to obtain "theoretical" values of foF2 for latitudes above + 25°. Combining their data base with the theoretical data, Fox and McNamara (1986) produced a set of maps which are in basic agreement with the Japanese maps based on ISS-B (1980) maps.

It is the opinion of the Working Group that the Fox-McNamara maps give the best existing representation of the



global distribution of foF2. They differ from the widely used CCIR maps: (1) in the number of coefficients used, and (2) in the fact that the maps are for given local times rather than universal times. The Working Group decided to produce a set of maps based on the Fox-McNamara maps, which are compatible with the CCIR maps. The coefficients which define these maps are available from Dr. C.M. Rush, National Telecommunications and Information Administration, Department of Commerce, 325 Broadway, Boulder, Colorado 80303, USA. Tests of the Working Group G.5 maps against satellite soundings indicate that they are preferable to the existing CCIR maps.

### Recommendations

- (1) The existence of these new maps should be drawn to the attention of interested organizations, such as CCIR.
- (2) That the present Working Group be dissolved and, if appropriate, a new group be formed.

A new Working Group might address the following topics, for example:

(a) Make intercomparisons between existing maps and new data, especially over ocean areas. Sources of such data may include: satellite soundings, oblique ionograms, and theoretical results. Testing procedures should be standardized.

(b) Investigate the possibilities of using techniques, other than the Jones-Gallet (1962) basis functions, for the construction of the maps; for example, a system in which numerical values are assigned at grid points. Finer grids could be used in regions of high gradients.

(c) Consider the introduction of specific features such as auroral ovals, troughs, sunrise gradients, etc.

(d) Examine the need to update maps of other F2 characteristics such as:  $M(3000)F_2$ ,  $h_{max}F_2$ , gradients in foF2, minimum foF2, daily ionospheric data, and day-to-day variabilities and, possibly, to introduce new parameters as recently proposed by Working Group G.4 at the Novgorod Workshop.

(d) Study how to improve hmF2 as derived from  $M(3000)F_2$ .

(e) Examine physical models of the ionosphere which might be helpful in areas where measured data are sparse.

REFERENCES

- CCIR, 1967, Report 340, CCIR Atlas of Ionospheric Characteristics, International Telecommunication Union, Geneva.
- FOX, M.W, and L.F. McNAMARA, 1986, Improved empirical world maps of foF2 1. The method, Tech. Report IPS-TR-86-03, IPS Radio and Space Services, Australia.
- ISS-B, 1980, Atlas of Ionospheric Critical Frequency (foF2) Obtained from Ionosphere Sounding, Satellite-b Observation, Part 2, Radio Res. Labs., Tokyo.
- JONES, W.B., and R.M. GALLET, 1962, Representation of diurnal and geographical variations of ionospheric data by numerical methods, Radio Sci. 1, 419 (J. Res. NBS 66D, 419).
- RUSH, C.M., M. POKEMPNER, D.N. ANDERSON, J. PERRY, F.G. STEWART, and R.K. REASONER, 1984, Global maps of foF2 derived from observations and theoretical values, U.S. Dept. of Commerce NTIA Report 84-140.

## INTERNATIONAL WORKSHOP ON IONOSPHERIC INFORMATICS

25 - 29 May 1987

It appears that realistic simulations of the natural Earth environment might become available by bringing all relevant knowledge (data, models, etc.) into a unique system making diligent use of modern informatics. In view of this, 120 scientists from 11 countries met at Novgorod, USSR, at a Workshop which was sponsored by URSI, COSPAR and the USSR Academy of Sciences.

"Ionospheric Informatics" means a new scientific field which might be described as an 'intersection' of ionospheric research with informatics, including measuring techniques, signal and data processing, data collection and archiving in data banks, synopsis and computerized investigations using these. Computer networks not only yield new possibilities of dissemination and combination but also make the use of data independent of their original sources. So informatics opens new prospects in all fields of human knowledge, in particular in that of ionospheric research.

The organizers intended to reach a useful definition of the scope of this new field of research, establish a survey of the most important efforts undertaken in different countries and direct future work in the field.

At the meeting the following areas were considered: upgrading of the existing vertical sounding network by the installation of digital ionosondes with real-time data processing, introduction of additional data obtained by rocket and satellite measurements, by optical observations (e.g. airglow), by applying the 'incoherent scatter' and other more recent techniques potentially including artificial modification experiments. Modelling and prediction of the terrestrial ionosphere is one of the most important goals in the context.

The contributions covered the following four subject areas:

### 1. Data Gathering Techniques and Primary Data Analysis

The (rather expensive) incoherent scatter technique (IS) provides an important amount of information not accessible to the classical techniques. However, since in the world-wide IS network the number of stations is less than 10% of that of

of the 'vertical incidence' (VI) network and average operation time uses to be less than 1 day per week, the VI network in which measurements are carried out permanently at least in view of world-wide descriptions, continues to be of first importance. The actual VI network comprises about 150 ionosondes, 50 of which are digital or digitalized and use mini-computers. Plans were communicated for the nearest future to establish a world-wide network of 30 American digisondes of type "256" having a capability for real-time electron density profile generation.

Beside in situ measurement results obtained in the IS network have first importance for investigations concerning the energetics of the ionosphere, thermospheric structure and atmospheric dynamics. As for the latter field the main problems might be indicated by notions like: general circulation - gradients - gravity field, etc.

Facilities for ground-based artificial heating have been installed near three IS facilities: Arecibo (Puerto Rico), EISCAT (Northern Scandinavia) and Kharkov (USSR). The two latter were represented at Novgorod.

Space-based active experiments were not discussed at the Workshop. It was, however, felt that these cannot reasonably be planned or evaluated without a reliable background of general knowledge, i.e. a reference ionosphere model. The regular, uninterrupted measurements provided by the monitoring VI network have great importance in this context. They give the background information which is needed when, for example, evaluating ionospheric disturbances or when formulating predictions based on actual observations with the more advanced methods.

The Workshop accepted a resolution in favour of combined VI and IS observations when and where this can be arranged.

## 2. Ionospheric Data Base

Fair progress was reported in the field of electron density profile computation from ionograms. Based on either analogous or digital data, such techniques are (at least occasionally) applied in Argentina, Belgium, the DDR, France, India, USA and USSR. Access methods and used sources of information were reviewed by WDC specialists. General principles after which useful data bases should be established were discussed as well as their use in studies concerned with the structure

and dynamics of the ionosphere. Another subject was the implementation of data input from such bases into application systems, for example mapping, modelling or predictions. As an alternative to the well known mapping methods using spherical harmonics field expansions in terms of 'natural orthogonal functions' were proposed and their (regional or global) utility was discussed.

### 3. Modelling the Ionosphere

A number of empirical, semi-empirical and theoretical models of the ionosphere were discussed. Semi-empirical models (also called 'hybrid') combine theoretically obtained knowledge with measured data sets. A few yet tentative relations were indicated by which 'inner parameters' needed in the modelling process could be deduced from more easily accessible 'outer parameters' (e.g. hmF2). Influences from outside the ionosphere (of solar, geomagnetic or aeronomical nature) were discussed as well as the role of the interplanetary magnetic field onto the polar ionosphere. It appeared that the role of geophysical 'invariants' needs further discussion as well as that of the solar activity indicators (in particular under conditions of high activity when most of these parameters show 'saturation').

Particular consideration was given to the International Reference Ionosphere (IRI). It is intended to update the mathematical description so that in a near future it yields more flexibility when additional empirical inputs ('inner' or 'outer' parameters) shall be activated. Broadening of the amount of input information seems an interesting goal. Classical measurements like traditional (analogous) VI sounding, "total electron content" data, airglow observations were discussed in the context.

### 4. Ionospheric Information Base

The Workshop adopted a recommendation asking for the development of a computer-accessible library of data sources and references. Use of key words is recommended in order to facilitate searching. The desired system is seen as part of the future activity of the WDCs. In a future state this software could eventually be linked with the IRI computer programme so that synoptical application of this latter could be reached. A few retrospective efforts in that direction were presented. The proposed library could become an important

contribution to the "International Space Year" planned for 1992.

The idea is that contributions from data bases might be linked with the IRI so producing 'second generation' models which could be more easily adapted to the instantaneous geophysical conditions.

The participants were eager to become acquainted with the new possibilities and greeted the expectation to reach a larger and better usable, fully flexible system for information interchange in an international computer network. They appreciated also the help of the Novgorod Polytechnical Institute and, in particular, that of Dr. G.M. Emeljanov who acted as host. Work on automatic analysis of ionograms is actively promoted in his laboratory.

The Proceedings of the Workshop are to be published in a future issue of the COSPAR journal "Advances in Space Research". Another (URSI-COSPAR-IAGA sponsored) Workshop on Ionospheric Informatics and Modelling is to be held in July 1988 at Helsinki as part of the COSPAR Plenary Meeting.

T.L. Gulyaeva

## 8TH EUROPEAN CONFERENCE ON CIRCUIT THEORY AND DESIGN (ECCTD 87)

The 8th European Conference on Circuit Theory and Design was held in Paris, France, at the Ecole Nationale Supérieure des Télécommunications from 1 to 4 September 1987.

The Conference was sponsored by URSI and its Member Committee in France (CNFRS), by the French section of IEEE, and by the Société des Electriciens et des Electroniciens (SEE).

The Technical Programme consisted of 161 invited or contributed papers and four courses. The papers, 20 or 40 minutes long, were presented in parallel sessions in four lecture rooms. The main themes were:

- Digital techniques for signal processing
- Non-linear circuits and systems
- Analog circuits
- Integrated circuits.

Each Course consisted of four lectures given at the rate of one lecture per day of the Conference, before or after the Paper Sessions. The four Courses dealt with the following topics:

- Adaptive digital filtering, by M. Bellanger
- Steady-state behaviour of non-linear circuits and systems, by L.O. Chua
- Computer-aided circuit design, by P. Dewilde
- An introduction to the modern theory of positive functions and some of its today applications to signal processing, circuits and systems problems, by Y. Genin.

The Conférence was attended by 218 participants from 30 countries.

The Conference Proceedings and the Lecture Notes (published under the title "Advances in Modern Circuit Theory and Design") can be ordered from:

- CNFRS, 38 rue du Général Leclerc, F-92131 Issy-les-Moulineaux (France) for French speaking countries (France, Switzerland, Belgium, Canada).

- North Holland, P.O.Box 1991, NL-1000 BZ Amsterdam (The Netherlands) for other countries.

The next ECCTD will be held in 1989 in the United Kingdom.



## SOLAR-TERRESTRIAL ENERGY PROGRAMME 1990-1995

The document reproduced below has been submitted by Dr. J. Roederer, President of the Scientific Committee on Solar-Terrestrial Physics, to the International Council of Scientific Unions for endorsement.

### FACT SHEET ON THE SOLAR-TERRESTRIAL ENERGY PROGRAMME 1990-1995

---

#### SUMMARY

As humankind becomes more dependent on space technology and as it moves itself, its observatories, and its colonies outward into space, the need for an accurate prediction of "weather and climate in space" becomes increasingly important. On the other hand, as scientists begin to probe systematically the response of the global terrestrial system to natural and anthropogenic influences, all external energy input variations must be monitored and their causes and effects understood. STEP is designed to provide many of the needed scientific answers.

STEP is planned as an international cooperative study of energy production, transfer, storage and dissipation throughout the solar-terrestrial system. The operational phase of STEP is scheduled for 1990-1995 and will consist of:

- Ground-based, aircraft, balloon and rocket experiments coordinated with satellite missions flown by NASA, ESA, ISAS, INTERCOSMOS and other space agencies;
- State-of-the-art data and information systems;
- Theoretical studies, numerical modelling and computer simulations.

#### RATIONALE FOR A COMPREHENSIVE STUDY OF ENERGY TRANSFER IN THE SOLAR-TERRESTRIAL ENVIRONMENT

Solar-terrestrial research is passing through a critical point. From the phase of exploration and study of the individual components of the solar-terrestrial system, we are now entering the phase of understanding how these components are coupled to

each other and how the solar-terrestrial system works as a single whole.

Science and society can expect many benefits from such an integrated study. For instance, the study of the solar-terrestrial system allows us to probe and measure a wide variety of plasma processes as they occur in nature. Let us not forget that we live in a plasma universe! As early as 100,000 years after the "Big Bang" the laws of plasma physics started contributing crucially to the dynamics, distribution, aggregation and dispersion of mass in the universe. Many exciting questions about the recent puzzling discoveries in astrophysics await answers to which solar-terrestrial research can contribute significantly. Some of these answers may come from the study of solar oscillations; effects of solar magnetic fields on solar irradiance; generation of the solar wind; acceleration mechanisms in flares; shocks in interplanetary space; entry, storage and release of plasma in the magnetosphere; and magnetosphere-ionosphere coupling, to list just a few.

At the same time, solar-terrestrial research plays a fundamental role in the solution of scientific problems much closer to "home", and as such it has many important practical applications. Regarding the latter, we must remember that space, in particular near-earth space, has assumed a crucial role as a technological resource. Indeed, satellite systems for communications, weather prediction, navigation and remote sensing of natural resources today are supporting in an essential way many facets of societal operations. The problem is that the medium in which earth-orbiting spacecraft operate is hostile. Far from a perfect vacuum, it is made up of high-temperature gas and corpuscular radiation of varying density and intensity. These solar-activity controlled variations can reach proportions dangerous to orbital stability, to electronic systems performance, to controlled space vehicle re-entry, even to the life of humans in orbit. Prediction of "weather and climate" in space is rapidly becoming an economic necessity, and solar-terrestrial research can help improve this predictability.

Regarding the significance of solar-terrestrial research for the understanding of our own planet we must recognize the fact that the upper atmosphere is a dynamically active "input processing" region, in which energy and mass received from above and below lead to changes whose effects, in turn, propagate downwards to lower altitudes, "sideways" to other

latitudes and longitudes, and upwards into space. Some of the upward-directed effects are considerable -- for instance, the upper atmosphere is now recognized as an important source of magnetospheric plasma, with atmospheric oxygen ions found in abundance as far away as hundreds of thousands of kilometers in the geomagnetic tail. Some downward-propagating effects are important for human activity, such as magnetic-storm-induced interruptions of radio communications and electric power grid blackouts caused by magnetospheric induction currents. By and large, however, most of the solar disturbance effects propagating downwards are subtle and their study poses a particular challenge to the participating scientists.

Finally, like other parts of the terrestrial environment, the upper atmosphere and near-earth space have become prone to pollution of anthropogenic origin. Industrial effluents transported upwards, orbiting debris, electromagnetic waves emitted by electric power grids and high-power radio transmitters, jet and rocket engine exhaust, and effects on the ionosphere by shock waves from powerful explosions on the ground are all examples of currently known "space pollutants". Some pose a potential threat to the long-term integrity of the upper atmosphere and its protective ozone layer; others may increasingly endanger technological systems and future human activities in near-earth space. The scientific understanding to be gained from STEP may go a long way toward helping plan strategies to mitigate hazards for the twenty-first century society.

#### SCIENTIFIC OBJECTIVES

SCOSTEP has successfully conducted a number of major international programmes in solar-terrestrial research, and several such cooperative studies are underway.

Until now, each SCOSTEP programme was focused on one specific component of the "solar-terrestrial chain" (the system comprising the Sun, corona, solar wind, magnetosphere, thermosphere, ionosphere and middle atmosphere). The scientific aim usually was to achieve a quantitative understanding of the physical mechanisms operating within that particular region and governing its behaviour and response to external forcing.

For instance, the International Magnetospheric Study 1976-79 (IMS) was one major programme that brought together hundreds of scientists from 26 countries for a closely coordinated study of the magnetosphere, the Earth's comet-shaped

plasma envelope. Several new international service systems were established for the IMS: the Satellite Situation Centre (SSC); the Central Information Exchange Office (IMSCIE); the Data Acquisition and Display System (SELDADS); and the Coordinated Data Analysis Workshops (CDAW). Most of these systems continue to serve the scientific community at the present time.

Following the successful model of the IMS, STEP will take a realistic and cost-conscious approach in formulating recommendations that emphasize the coordination of already existing or planned facilities and missions. The principal difference will be given by the much wider disciplinary range of the programme. Indeed, STEP will focus on the solar-terrestrial environment as a complex interactive system whose total behaviour often drastically departs from the simple superposition of its parts. The main goal of the STEP studies will be to advance a quantitative understanding of the coupling mechanisms between the regions of the solar-terrestrial system, responsible for the transfer of energy and mass from one region to another.

To accomplish this goal, STEP will involve ground-based, aircraft, balloon and rocket experiments; theory, modelling and simulation studies; and dedicated data and information systems. STEP will be built around a core of solar-terrestrial science missions approved by the Inter-Agency Consultative Group as the next cooperative project of NASA, ESA, ISAS, and INTERCOSMOS, and it also will take into account other relevant satellite missions.

Specific scientific objectives that so far have been formulated for STEP are as follows:

#### Solar Physics:

Solar interior structure and differential rotation; luminosity variations and links to solar oscillations and solar activity; interactions of solar plasmas with strong magnetic fields in active regions; processes determining mass and energy balance in the solar atmosphere.

#### Physics of the Heliosphere:

Generation, structure and variability of the solar wind; three-dimensional properties; plasma processes regulating solar wind flow and particle acceleration; interactions of dust and other material of cometary and meteoritic origins with solar radiation and the terrestrial environment.

### Magnetospheric and Ionospheric Physics

Transport of energy, momentum and mass across the bow shock and magnetopause, through the magnetosphere, ionosphere and into, or out of, the upper atmosphere; storage and release of energy in the magnetospheric tail; local sources and sinks of plasma; physical and chemical processes controlling coupling to the atmosphere.

### Atmospheric Physics:

Radiative energy balance and interrelations with chemistry and dynamics of the thermosphere, mesosphere and stratosphere; vertical interactions and energy transport to atmospheric regions below and above; global effects of solar variability on the thermosphere and middle atmosphere; the role of the global electric field in atmospheric transport and chemistry.

To plan this major programme, SCOSTEP has established a Steering Committee. The principal scientific projects for STEP will be defined at the next SCOSTEP Council Meeting in Helsinki in 1988. A special symposium entitled "STEP: Major Scientific Problems" will be held during the 1988 COSPAR meeting and will provide the basic scientific framework for this international programme.

The STEP Steering Committee is co-chaired by G. Rostoker (Canada) and V. Troitskaya (USSR). The URSI Representative on the Committee is S. Kato (Japan).

## PRISE EN CHARGE DU TEMPS ATOMIQUE INTERNATIONAL

La 18e Conférence Générale des Poids et Mesures, réunie en octobre 1987, a approuvé la prise en charge du TAI par le Bureau International des Poids et Mesures (BIPM) et a adopté la résolution suivante:

### Résolution 3

La Dix-huitième Conférence Générale des Poids et Mesures,

*considérant* l'importance des mesures de temps et en particulier de l'échelle de Temps atomique international, laquelle a déjà fait l'objet de la Résolution 2 de la Quatorzième Conférence Générale des Poids et Mesures et des Résolutions 4 et 5 de la Quinzième Conférence Générale,

*ayant pris connaissance* des résolutions adoptées par les Unions internationales concernées, Union Astronomique Internationale, Union Géodésique et Géophysique Internationale et Union Radio-Scientifique Internationale,

*rend hommage* au Bureau International de l'Heure et à son organisme-hôte, l'Observatoire de Paris, pour la création du Temps atomique international et pour la qualité des travaux accomplis pour l'établir et le diffuser,

*approuve* les décisions du Comité International qui ont eu pour effet la prise en charge par le Bureau International des Poids et Mesures de l'établissement et de la diffusion du temps atomique internationale,

et *recommande* aux institutions nationales concernées de poursuivre avec le Bureau International des Poids et Mesures leur collaboration pour l'établissement et l'amélioration du Temps atomique international.

## ANNOUNCEMENTS OF MEETINGS AND SYMPOSIA

### EUROPEAN GEOPHYSICAL SOCIETY

#### XIII GENERAL ASSEMBLY

The XIII General Assembly of the European Geophysical Society will be held in Bologna, Italy over the period 21-25 March 1988. The programme contains many sessions which are of interest to the URSI community, e.g. on the magnetosphere and ionosphere of the Earth, magnetosphere field line reconnection in space plasmas, incoherent scatter data analysis, etc.

The detailed programme of the Assembly may be obtained from:

Prof. A. Speranza  
Department of Physics  
Via Irnerio 46  
I-40126 Bologna, Italy.

Tel: (39)-51-244190  
Tx: 520634 infnbo i

The deadline for receipt of abstracts is 1 January 1988.

Registration forms may be obtained from:

Viaggi Salvadori S.R.L.  
Via Ugo Bassi 13  
I-40121 Bologna, Italy.

Tel: (39)-51-225686  
Tx: 510532.

### 4th INTERNATIONAL CONFERENCE ON HF RADIO SYSTEMS

#### AND TECHNIQUES

The 4th International Conference on HF Radio Systems and Techniques will be held from 11 to 14 April 1988 at the Institution of Electrical Engineers, Savoy Place, London WC2, United Kingdom.

The programme will include sessions on the following

topics:

- System design control and networking
- Antennas
- Noise, interference and modelling
- Propagation
- RF equipment and techniques
- HF radar
- Signal design and processing.

For information, contact:

Conference Services  
The Institution of Electrical Engineers  
Savoy Place  
London WC2R 0BL  
United Kingdom.

Tel: (44) 1- 240 1871 Ext:222

Tx: 261176 IEE LDN G.

1988 IEEE AP-S INTERNATIONAL SYMPOSIUM AND

URSI/USNC RADIO SCIENCE MEETING

The 1988 International Symposium and Radio Science Meeting, sponsored jointly by the IEEE Antennas and Propagation Society and the Commissions A, B, E and F of the URSI Member Committee in the United States, will be held at the Sheraton University Inn, Syracuse University, N.Y. from 6 to 10 June 1988. The technical sessions for IEEE AP-S and URSI will be coordinated to provide a comprehensive and well balanced programme. Authors are invited to submit papers on all topics of interest to the AP-S and URSI membership. The topics listed below are intended as suggestions; consideration will be given to other subjects. Enquiries regarding the technical programme may be directed to Tapan K. Sarkar, Chairman of the Technical Programme Committee. Further information regarding the Symposium may be obtained from

A.T. Adams  
General Chairman  
111 Link Hall, Syracuse University  
Syracuse, N.Y. 13244-1240.



Suggested topics for AP-S

Adaptive antennas; Antenna measurements and metrology; Antenna theory; Environmental effects on waves; Feeds and radiating elements; Microstrip antennas; Millimeter waves; Numerical methods; Phased arrays; Propagation; Reflector antennas; Remote sensing; Scattering and diffraction; Wave propagation theory; Imaging radar.

Suggested topics for URSI/USNC

Commission A (Electromagnetic Metrology):

EM measurements using satellites; Field and antenna measurements; Microwave and millimeter wave measurements; System identification measurements; Time domain measurements.

Commission B (Fields and Waves):

Antenna theory; EM theory; Guided waves; Inverse scattering; Interface effects; Numerical techniques; Random/non-linear media; Scattering and diffraction; Transient fields.

Commission E (Electromagnetic Noise and Interference):

Characterization and modelling of noise; Interference and its suppression; Spectrum utilization and management; System performance in non-Gaussian noise.

Commission F (Remote Sensing and Propagation):

Propagation through random media; Radio meteorology; Remote sensing; Tropospheric effects.

18th EUROPEAN MICROWAVE CONFERENCE

The 18th European Microwave Conference will be held from 12 to 15 September 1988 at Folkets Hus in Stockholm, Sweden. Workshops will be held on 16 September.

The Chairman of the Technical Programme Committee is Prof. P. Weissglass.

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

Radar systems; Communication systems; Industrial, medical and scientific applications; Remote sensing; Solid state devices; Monolithic circuits; Mixers and low noise front

ends; Passive components; Antennas; Measurements; Modelling and CAD; Propagation; mm-waves.

The deadline for the submission of summaries of contributions is 29 February 1988.

Further information may be obtained from:

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

Tel: (44) 892 44027

Tx: 95604.

2nd ASIA-PACIFIC MICROWAVE CONFERENCE (APMC'88)

The Second Asia-Pacific Microwave Conference will be held at the Chang Chun Yuan Hotel in Beijing, China, from 26 to 28 October 1988. The Conference is co-sponsored by the Academia Sinica and by some national and international organizations. It is organized by the Institute of Electronics of the Academia Sinica.

The objective of the Conference is to provide an international forum for the presentation of results of recent research in the field of microwaves and to promote international intercourse and cooperation in the Asia-Pacific region and the world.

Papers describing original work in the field of microwaves are welcome. The main topics will be as follows:

Solid state devices and IC's; Passive components; Communication systems; Applications of microwaves; High power devices Propagation studies; Remote sensing; Millimeter and sub-millimeter wave technology; Computer-aided design; Electromagnetic field theory; Microwave measurements; Biological and medical effects; Optical fibre and its application; Microwave tubes; Antennas and arrays; Radar system.

The deadline for submission of summaries by authors is 31 January 1988.

Further information may be obtained from:

Limited funds will be available on a competitive basis to assist students and younger scientists attending IGARSS'88, provided they are the first author of any paper that has been accepted by the Technical Programme Committee and also members of either the RRS or the IEEE GRS-S or URSI.

All enquiries should be addressed to:

IGARSS'88 Office  
Dr. J.A.T. Young  
Department of Geography  
University of Edinburgh  
Drummond Street  
Edinburgh EH8 9XP  
Scotland, UK.

Tel: (44) 31-667 1011 Ext. 4294/4266  
Tx: 727442 UNIVED G.

8th INTERNATIONAL ZURICH SYMPOSIUM AND TECHNICAL

EXHIBITION ON ELECTROMAGNETIC COMPATIBILITY

The 8th International Symposium on Electromagnetic Compatibility will be held at the Swiss Federal Institute of Technology in Zurich, Switzerland from 7 to 9 March 1989. The Symposium is sponsored by the Swiss Electrotechnical Association and organized by the Institute for Communication Technology of the Swiss Federal Institute of Technology Zurich; it is co-sponsored by URSI.

The programme of the Symposium will include the following topics: Social and economical impact of EMC; Electromagnetic pollution, control and enforcement; Spectrum economy and management; National and international cooperation in EMC; Immunity of electronic systems; Electromagnetic compatibility of communications, electric power and automation; EMC hazards to ordnance and vital safety systems; Compatibility of medical electronics; Biological effects of RF energy; Interference propagation, source-to-receptor coupling; Nuclear and lightning electromagnetic pulse (NEMP/LEMP) impact; Regulation, limits, standards and specifications; Measuring methods and instrumentation,

Prof. Zhou Wenbiao  
Institute of Electronics  
Academia Sinica  
P.O.Box 2702  
Beijing, China.

1988 INTERNATIONAL GEOSCIENCE AND REMOTE SENSING SYMPOSIUM

(IGARSS'88)

The 1988 International Geoscience and Remote Sensing Symposium (IGARSS'88) will be held at the University of Edinburgh, Scotland, United Kingdom from 13 to 16 September 1988. It is co-sponsored by the IEEE Geoscience and Remote Science Society, the Remote Sensing Society, the British National Space Centre and URSI.

The main IGARSS'88 programme will be preceded by a day of tutorials on Monday 12 September. These tutorials will provide intending participants with both an introduction to and update on applications of microwave technologies.

The programme includes topics on remote sensing in the broadest terms: aims; methods; tools; research; operation; assimilation and presentation; dissemination to world users; commercial and legal.

The URSI Commission F Specialist Topics include: microwave surface and volume scattering; single and multiple scattering models; ocean scattering; passive microwave observation techniques; speckle noise reduction; ocean wave spectra; SAR imaging, technology and calibration; scatterometers technology and applications; microwave remote sensing of rain and other tropospheric phenomena; complementary roles of ground and space based sensors.

The deadlines for the submission of abstracts are as follows:

- |                     |                   |
|---------------------|-------------------|
| - early submission  | 15 December 1987  |
| - non UK submission | 29 January 1988   |
| - UK submission     | 26 February 1988. |

production testing; Computers in EMC, prediction and analysis; Design of compatible equipment, suppression methods and devices; Special techniques: spread-spectrum, fibre optics; EMC education.

The deadline for submission of abstracts and summaries is 4 March 1988.

Further information may be obtained from:

Prof. Dr. T. Dvorak  
ETH Zentrum-IKT  
CH - 8092 Zurich  
Switzerland.  
Tel: (411) 256-2790.

1989 INTERNATIONAL SYMPOSIUM ON ANTENNAS  
AND PROPAGATION, JAPAN

The 1989 International Symposium on Antennas and Propagation, Japan (ISAP'89, Japan) will be held at the Nippon Toshi Center in Tokyo, Japan, from 22 to 25 August 1989. This Symposium is sponsored and organized by the Institute of Electronics, Information and Communication Engineers. It is supported by URSI and several other organizations.

The Programme will include sessions on the following subjects:

- Antennas and related topics
- Propagation and related topics
- Electromagnetic wave theory.

In addition, five special topics have been selected by the Steering Committee to treat new trends of research and developments in antennas and propagation. These are:

- Large deployable and inflatable space antennas
- Very small Earth station antennas for satellite communications and broadcasting
- Active array and monolithic integrated antennas
- EM computation techniques using supercomputers
- Digital mobile radio system design techniques related to antennas and propagation.

The final Call for Papers will be issued in August 1988.  
The deadline for submission of papers is 1 March 1989.

For further information write to:

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

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

SYMPOSIUM ON ARTIFICIAL MODIFICATION OF THE IONOSPHERE

The Symposium on Artificial Modification of the Ionosphere will be held at Scandic Hotel in Tromsø, Norway from 19 to 23 September 1988. The Symposium is sponsored by URSI Commissions G and H and the Honorary Chairman is Prof. V.V. Migulin. It is the third symposium in the URSI series started at Suzdal in 1983.

Information on the scientific programme is available from

Prof. V.V. Migulin  
USSR Academy of Sciences  
Prospekt Marksa 18  
103907 Moscow Centre  
USSR

or

Prof. W.E. Gordon  
Rice University  
Space Physics and Astronomy Department  
Houston, TX 77251  
USA.

Information on local arrangements may be obtained from:

Dr. Afgeir Brekke, Institutt Matematisk Realfag, Aurora Observ-  
atory, P.O. Box 953, N-9001, Tromsø, Norway.

## LIST OF FUTURE SYMPOSIA AND MEETINGS

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

XIII General Assembly of the European Geophysical Society,  
Bologna, Italy, 21-25 March 1988.

Contact address: Prof. A. Speranza  
Department of Physics  
Via Irnerio 46  
I-40126 Bologna  
Italy.  
  
Tel: (39) 51-244 190  
Tx: 520634 infnbo i  
Fax: (39) 51-247 244.

International Non-Ionising Radiation Workshop  
Melbourne, Australia, 5-8 April 1988.

Contact address: Dr. C. Roy  
NIR Section  
Australian Radiation Laboratory  
Lower Plenty Road  
Iallambie VIC 3085  
Australia.

4th International Conference on HF Radio Systems and Techniques  
London, United Kingdom, 11-14 April 1988.

Contact address: Conference Services  
The Institution of Electrical Engineers  
Savoy Place  
London WC2R OBL  
United Kingdom.  
  
Tel: (44) 1-240 1871 Ext. 222  
Tx: 26LL76 IEE LDN G  
Fax: (44) 1-240 7735.

International Symposium on Radio Propagation (ISRP'88)\*  
Beijing, China, 18-21 April 1988.

Contact address: Prof. Sha Zong  
China Research Institute of Radio  
Wave Propagation  
P.O.Box 138/88  
Xinxiang, Henan  
China.

Ionospheric Studies Using Satellite Beacons\*  
Xinxiang, Henan, China, 5-8 April 1988.

Contact address: Prof. R. Leitinger  
Karl-Franzens-Universität Graz  
Institut für Meteorologie und Geophysik  
Halbärthgasse 1  
A-8010 Graz, Austria.

43th All-Union Scientific Session of the A.S. Popov Society  
Moscow, USSR, 24-26 May 1988.

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

10th Microwave Technology and Optical Communication Conference  
(MTOC-88)  
Varna, Bulgaria, 26-28 May 1988.

Contact address: Faculty of "Communication Technology"  
Chair "Radiotechnika"  
room 1440  
Darvenitza, VMEI  
Sofia 1156  
Bulgaria.  
Tel: 62 90 74 for X NSTC MTOC'88.

Radioastronomical Seeing\*  
Beijing, China, May 1988.

Contact address: Dr. J. Baldwin  
Cavendish Laboratory  
Cambridge CB3 0HE, United Kingdom.



Conference on Precision Electromagnetic Measurements (CPEM'88)\*  
Tsukuba Science City, Japan, 7-10 June 1988.

Contact address: CPEM'88 Secretariat  
Dr. Toshio Nemoto  
c/o Business Center for Academic  
Societies, Japan  
Conference Department  
40-14, Hongo 2-chome, Bunkyo-ku  
Tokyo 113, Japan.

9th International Wrocław Symposium on Electromagnetic  
Compatibility\*  
Wrocław, Poland, 28-30 June 1988.

Contact address: Mr. W. Moron  
EMC Symposium  
Box 2141  
51 645 Wrocław 12  
Poland.

XXVIIIth Plenary Meeting of COSPAR and Associated Activities  
Espoo-Helsinki, Finland, 18-29 July 1988.

S.6 The Middle Atmosphere after MAP\*

W.V Recent Incoherent Scatter Research\*

W.XI Reference Models of Trace Constituents of the Middle  
Atmosphere and Lower Thermosphere and Recent Data\*

W.XII Ionospheric Informatics and Empirical Modelling\*

TM.C.1 Localised Response of the Lower Thermosphere and  
Ionosphere at High Latitude\*

Contact address: COSPAR Secretariat  
51 boulevard de Montmorency  
F-75016 Paris  
France.  
Tel: (33) 1-4525 0679.  
Tx: 630553 ICSU F ATTN COSPAR.

Increased Environmental Impacts on Observational Astronomy\*  
Washington, D.C., 15-18 August 1988.

Contact address: Dr. D.L. Crawford  
KPNO/NOAO  
Box 26732  
Tucson, AZ 85726  
USA.  
  
Tel: (1) 602 325-9346  
Tx: 0666-484 AURA-NOAO-TUC.

4th European Signal Processing Conference (EUSIPCO-88)  
Grenoble, France, 5-8 September 1988.

Contact address: EUSIPCO-88 Secretariat  
CEPHAG-ENSIEG  
B.P. 46  
F-38402 St-Martin d'Hères Cedex  
France.  
  
Tel: (33) 76 51 83 41  
Tx: 320 205 F.

European Conference on Optical Communication (ECOC'88)\*  
Brighton, United Kingdom, 12-15 September 1988.

Contact address: ECOC'88 Secretariat  
Conference Services, IEE  
Savoy Place  
London WC2R OBL  
United Kingdom.  
  
Tel: (44) 1-240 1871, Ext: 255  
Tx: 261176 IEE LDN G  
Fax: (44) 1-240.7735.

18th European Microwave Conference\*  
Stockholm, Sweden, 12-17 September 1988.

Contact address: Microwave Exhibitions and Publishers Ltd  
90 Calverley Road  
Tunbridge Wells, Kent TN1 2UN  
United Kingdom.  
  
Tel: (44) 892 44027  
Tx: 95604  
Fax: (44) 892 41023.

International Geoscience and Remote Sensing Symposium  
(IGARSS'88)\*

Edinburgh, United Kingdom, 13-16 September 1988.

Contact address: IGARSS'88 Office

Dr. J.A.T. Young  
Department of Geography  
University of Edinburgh  
Drummond Street  
Edinburgh EH8 9XP  
Scotland, United Kingdom.

Tel: (44) 31-667 1011, Ext.4294/4266

Tx: 727442 Unived G.

Symposium on Artificial Modification of the Ionosphere\*  
Tromsø, Norway, 19-23 September 1988.

Contact address: Dr. A. Brekke

Institutt Matematisk Realflag  
Aurora Observatory  
Box 953  
N-9001 Tromsø  
Norway.

VLBI Summer School for Young Scientists\*  
Bologna, Italy, 19-30 September 1988.

Contact address: Dr. M. Felli

Arcetri Observatory  
Firenze  
Italy.

International Symposium on Submillimeter Wave Astronomy\*  
Kona, Hawaii, 26-30 September 1988.

Contact address: Dr. T.G. Phillips

California Institute of Technology, 320-47  
Pasadena, CA 91125  
USA.

39th International Astronautical Congress,  
Bangalore, India, 8-15 October 1988.

Contact address: International Astronautical Federation

3-5 rue Mario-Nikis  
F-75015 Paris  
France.

2nd Asia-Pacific Microwave Conference (APMC-88)<sup>\*</sup>  
Beijing, China, 26-28 October 1988.

Contact address: Prof. Zhou Wenbiao  
Institute of Electronics  
Academia Sinica  
P.O.B. 2702  
Beijing, China.

International School on Atmospheric Radar<sup>\*</sup>  
Kyoto, Japan, 24-28 November 1988.

Contact address: Prof. S. Kato  
Radio Atmospheric Science Center  
Kyoto University  
Gokanoshō, Uji  
Kyoto 611  
Japan.

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

Contact address: Prof. R.L. Dowden  
Physics Department  
University of Otago  
Dunedin  
New Zealand.  
  
Tel: (64) 24-771640  
Tx: NZ 5618 CPO DN  
Fax: (64) 24-741607.

8th International Zurich Symposium and Technical Exhibition on  
Electromagnetic Compatibility<sup>\*</sup>  
Zurich, Switzerland, 6-9 March 1989.

Contact address: Prof. T. Dvorak  
ETH Zentrum-IKT  
CH-8092 Zurich  
Switzerland.  
  
Tel: (41) 1-256 2790.

International Symposium on Electromagnetic Metrology\*  
Beijing, China, September 1989.

Contact address: Dr. Qiao Shiqiong  
Institute of Electromagnetic Metrology  
Ministry of Space Technology  
P.O.Box 3930  
Beijing  
China.

International Geoscience and Remote Sensing Symposium  
(IGARSS'89)\*  
Vancouver, Canada, 27 June - 1 July 1989.

Contact address: Dr. G.F. Tomlins  
Vice-Chairman, Organizing Committee  
BC Research  
3650 Wesbrook Mall  
Vancouver, B.C.  
Canada V6S 2L2.

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

Contact address: J. Purić.

URSI Symposium on Electromagnetic Theory\*  
Stockholm, Sweden, 14-18 August 1989.

Contact address: Prof. S.E. Ström  
Royal Institute of Technology  
Division of Electromagnetic Theory  
S-10044 Stockholm 70  
Sweden.

Symposium on Antennas and Electromagnetic Field Theory\*  
Shanghai, China, 29 August - 1 September 1989.

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

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

Contact address: Dr. Takashi Katagi  
Mitsubishi Electric Corporation  
325 Kamimachiya, Kamakura  
247 Japan.  
Tel: (467) 44-8862  
Tx: 3862-165 MELCO J  
Fax: (467) 47-2005.

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

Contact address: Prof. R.H. Frater  
CSIRO Division of Radiophysics  
P.O.Box 76  
Epping, N.S.W. 2121.  
Australia.

Commission F Open Symposium on Wave Propagation and Remote  
Sensing\*  
Nice, France, Fall 1989.

Contact address: Dr. J.P. Mon  
CNET/PAB/RPE/ETP  
38 rue du Général Leclerc  
F-92131 Issy-les-Moulineaux  
France.

URSI Symposium on Signals, Systems and Electronics\*  
University Erlangen-Nürnberg, 19-21 September 1989 (provisional)

Contact address: Prof. R. Saal  
Technische Universität München  
Lehrstuhl für Netzwerktheorie und  
Schaltungstechnik  
Arcisstrasse 21  
D-8000 München 2  
Federal Republic of Germany.

European Conference on Optical Communication (ECOC'89)\*  
Göteborg, Sweden, 11-15 September 1989.

Contact address: ECOC'89 Secretariat  
Department of Electrical Measurements  
Research Laboratory of Electro-Optics  
and Lasers  
Chalmers University of Technology  
S-412 96 Göteborg  
Sweden.  
  
Tel: (46) 31-721 601  
Tx: 2369 chalbib s  
Fax: (46) 31-721561.

4th International School for Space Simulations\*  
Kyoto, Japan, November 1989.

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

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

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

Microwave Signatures in Remote Sensing\*  
Massachusetts, USA, Spring 1990.

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

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

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

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

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

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

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



## URSI OFFICERS AND OFFICERS OF MEMBER COMMITTEES

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

### HONORARY PRESIDENTS

Sir Granville Beynon (UK)  
Prof. H.G. Booker (USA)  
Prof. W.N. Christiansen (Australia)  
Prof. W. Dieminger (FRG)

### BOARD OF OFFICERS

President: Prof. A.L. Cullen (UK)  
Past President: Dr. A.P. Mitra (India)  
Vice-Presidents: Dr. H.J. Albrecht (FRG)  
Prof. R.L. Dowden (New Zealand)  
Prof. E.V. Jull (Canada)  
Prof. V. Zima (Czechoslovakia)  
Secretary General: Prof. J. Van Bladel (Belgium)

### URSI SECRETARIAT

Secretary General: Prof. J. Van Bladel  
Assistant Secretary General: Prof. P. Delogne  
Executive Secretary: Mrs Y. Stevanovitch

### URSI STANDING COMMITTEES

#### Standing Finance Committee

Chairman: Prof. F. Gardiol (Switzerland)  
Members: Prof. C.M. Butler (USA)  
Prof. K. Géher (Hungary)  
Dr. J.G. Lucas (Australia)  
Prof. J.B.H. Peek (Netherlands)  
Prof. S. Radicella (Argentina)  
Prof. W.D. Ryan (Ireland)

Standing Publications Committee

Chairman: Prof. R.L. Dowde (New Zealand)

Members: Prof. P.J.B. Clarricoats (UK)  
Dr. G. Hyde (USA)  
Prof. B. Picinbono (France)  
Prof. Ch.-U. Wagner (GRD)

Standing Committee on URSI Membership

Chairman: Dr. M. Petit (France)

Members: Dr. Yu-Kai Chen (China, SRS)  
Prof. E.V. Jull (Canada)  
Prof. S. Okamura (Japan)  
Prof. S. Serafimov (Bulgaria)  
Dr. J. Shapira (Israel)

Standing Committee on Future General Assemblies

Chairman: Prof. V. Zima (Czechoslovakia)

Members: Prof. T.B.A. Senior (USA)  
Dr. J. Shapira (Israel)  
Dr. R. Woodman (Peru)  
Prof. M.E. Zhabotinskij (USSR)

Standing Committee on Developing Countries

Chairman: Prof. S. Radicella (Argentina)

Members: Prof. Feng Shizhang (China, CIE)  
Dr. F. Mopfouma (Congo Brazzaville)  
Prof. J.O. Oyinloye (Nigeria)  
Dr. B.M. Reddy (India)  
Mr. J. Voge (France)

URSI-CCIR-CCITT Liaison Committee

Chairman: Dr. G. Hagn (USA)

Vice-Chairmen: Prof. W.A. Gambling (UK)  
Prof. F.L. Stumpers (Netherlands)

Members:

Commission A - Prof. S. Leschiutta (Italy)  
Commission B - Dr. D. Bem (Poland), Dr. R.M. Bevenssee (USA)  
Commission C - Dr. J.G. Lucas (Australia)

Commission D - Prof. T. Okoshi (Japan)  
Commission E - Prof. A.D. Spaulding (USA)  
Commission F - Mr. A. Blomquist (Sweden), Mr. L. Boithias  
(France), Dr. F. Fedi (Italy), Dr. M.P.M. Hall  
(UK)  
Commission G - Dr. L.W. Barclay (UK)  
Commission J - Prof. R.H. Frater (Australia),  
Dr. R. Wielebinski (FRG)

URSI AD HOC GROUPS

ad hoc Group on the International Geosphere-Biosphere Programme

Chairman: Prof. P. Delogne (Belgium)

Members: Dr. F. Fedi (Italy)  
Prof. V.V. Migulin (USSR)  
Dr. G. Valenzuela (USA)  
Dr. R. Wielebinski (FRG)

ad hoc Group on International Space Year

Chairman: Prof. W.E. Gordon (USA)

Members: Dr. P. Bauer (France)  
Prof. M. Tiuri (Finland)  
a representative to be designated by  
the URSI Committee in the USSR

ad hoc Group on Environmental Consequences of Nuclear War

Chairman: Mr. M. Wik (Sweden)

Members: to be designated by the URSI Board  
of Officers

Scientific Programme for XXIII URSI General Assembly

Coordinator: Dr. P. Bauer (France)

Associate Coordinator: Prof. J. Bach Andersen (Denmark)

URSI COMMISSIONS

COMMISSION A - ELECTROMAGNETIC METROLOGY

Chairman: Prof. S. Leschiutta (Italy)

Vice-Chairman: Dr. J. Vanier (Canada)

Official Members:

Argentina:

Australia: Dr.

Austria: Hofrat Dipl. Ing. W. Dewam

Belgium: Dr. P. Paquet

Brazil: Eng. Paulo Mourilhe da Silva

Bulgaria:

Canada: Dr. J. Vanier

China

CIE (Beijing): Dr. Qiao Shiqiong

SRS (Taipei): Mr. Yuan-Cheng Teng

Czechoslovakia: Dr. J. Tolman

Denmark: Dr. T. Guldbrandsen

Egypt: Prof. A.L. Elsayed

Finland: Prof. K. Kalliomäki

France: M. P. Bouchareine

German D.R.: Dr. K. Möbius

Germany, R.F.: Dr. V. Kose

Greece:

Hungary: Dr. M. Kenderessy

India: Dr. B.S. Mathur

Iraq: Dr. Safa A. Hadad

Ireland: Prof. B.K.P. Scaife

Israel: Mr. Y. Siev

Italy: Prof. S. Leschiutta

Japan: Dr. Y. Saburi

Netherlands: Mr. R. Kaarls

New Zealand: Mr. A.C. Corney

Nigeria: Dr. L.A. Buraimoh Igbo

Norway: Dr. B. Landmark

Peru:

Poland: Prof. S. Hahn

Portugal: Mr. A.C. Mendonça Caetano

South Africa: Dr. R. Turner

Spain: Dr. Rivas Martinez

Sweden: Mr. P.O. Lundbom

Switzerland: Dr. O. Piller

Thailand:

United Kingdom: Dr. O.C. Jones

USA: Dr. N.S. Nahman

USSR: Dr. A.I. Mekhannikov

Working Group on National Standards Laboratories

Chairman: Mr. A.E. Bailey (UK)

Working Group on Interaction of Electromagnetic Fields  
with Biological Systems and Related Measurements

COMMISSION B - FIELDS AND WAVES

Chairman: Prof. T.B.A. Senior (USA)

Vice-Chairman: Prof. F. Gardiol (Switzerland)

Official Members:

Argentina:

Australia: Prof. A.E. Karbowski

Austria: Univ. Prof. Dr. E. Ledinegg

Belgium: Prof. A.S. Vander Vorst

Brazil: Prof. J.T. Senise

Bulgaria: Prof. I. Geliazkov

Canada: Dr. L. Shafai

China

CIE (Beijing) Dr. Huang Hung-Chia

SRS (Taipei) Prof. Chun-Hsiung Chen

Czechoslovakia: Prof. Dr. O. Benda

Denmark: Dr. Bach

Egypt: Prof. S.F. Mahmoud

Finland: Assoc. Prof. I.V. Lindell

France: M. W. Tabbara

German D.R.: Prof. Dr.-Ing. M. Kummer

Germany, F.R.: Prof. Dr. H. Lindenmeier

Greece:

Hungary: Dr. Gy Veszely

India: Ms Bharti Batt

Iraq: Mr. Ali M.A. Shaban

Ireland: Prof. B.K.P. Scaife

Israel: Dr. E. Heyman

Italy: Dr. G. Gerosa

Japan: Prof. S. Adachi

Netherlands: Prof. Dr. A.T. de Hoop  
New Zealand: Dr. A.G. Williamson  
Nigeria: Dr. L.B. Kolawole  
Norway: Prof. A. Tonning  
Peru:  
Poland: Prof. D. Bem  
Portugal: Prof. Dr. Joao Figanier  
South Africa: Prof. J.H. Cloete  
Spain: Prof. M. Rodriguez Vidal  
Sweden: Prof. S. Ström  
Switzerland: Prof. F. Gardiol  
Thailand:  
United Kingdom: Prof. A.P. Anderson  
USA: Dr. A. Ishimaru  
USSR: Prof. L.D. Bakhrakh

Working Group on Inverse Scattering

Chairman: Dr. D.L. Jaggard (USA)

COMMISSION C - SIGNALS AND SYSTEMS

Chairman: Prof. R. Saal (FRG)  
Vice-Chairman: Prof. P.A. Matthews (UK)

Official Members:

Argentina:  
Australia: Dr. J.G. Lucas  
Austria:  
Belgium: Prof. P. Delogne  
Brazil: Dr. Max H.M. Costa  
Bulgaria: Prof. B. Shishkov  
Canada: Dr. M.S. Suthers  
China  
CIE (Beijing): Dr. Wu Youshou  
SRS (Taipei) : Dr. Shyue-Ching Lu  
Czechoslovakia: Prof. J. Chmurny  
Denmark: Mr. E. Mortensen  
Egypt: Prof. Abdel Samie Moustafa Houssein  
Finland: Prof. E. Heikkilä  
France: M. M. Joindot  
German D.R.: Prof. Dr. Ing. F. Wiegmann  
Germany, F.R.: Prof. Dr.-Ing. R. Saal  
Greece:

Greece: Prof. E. Protonotarios  
Hungary: Prof. K. Géher  
India: Prof. S.C. Dutta Roy  
Iraq: Dr. Saleh R. Al-Araji  
Ireland: Prof. J.O. Scanlan  
Israel: Prof. I. Cederbaum  
Italy: Prof. G. Tartara  
Japan: Dr. K. Miyauchi  
Netherlands: Prof. Dr. J.P.M. Schalwijk  
New Zealand: Prof. R.H.T. Bates  
Nigeria: Dr. A.A. Nwabuzor  
Norway: Prof. G. Stette  
Peru; Dr. R. Woodman  
Poland: Prof. M. Piekarski  
Portugal: Prof. Dr. J.M. Fonseca de Moura  
South Africa: Prof. G.J. Kühn  
Spain: Dr. J.E. de Salamanca  
Sweden: Dr. H. Schefte  
Switzerland: Prof. Dr. F. de Coulon  
Thailand:  
United Kingdom. Prof. P.A. Matthews  
USA: Dr. J.W. Schwartz  
USSR: Prof. V.I. Siforov

COMMISSION D - ELECTRONIC AND OPTICAL

DEVICES AND APPLICATIONS

Chairman: Prof. T. Okoshi (Japan)

Vice-Chairman: Dr. J. Hénaff (France)

Official Members:

Argentina:

Australia: Prof. G.A. Rigby

Austria:

Belgium: Prof. J.L. Van Eck

Brazil: Dr. R.D.P.K.C. Ranvaud

Bulgaria: Prof. J. Slavova

Canada: Dr. J.N.D. Cheeke

China

CIE (Beijing): Dr. Wang Shoujue

SRS:(Taipei) : Prof. Tien-Shou Wu

Czechoslovakia: Dr. I. Kneppo

Denmark: Dr. K.S. Stubkjaer

Egypt: Prof. E.A.F. Abdellah  
Finland: Prof. J. Heleskivi  
France: M. J. Nicolas  
German D.R.: Prof. Dr. J. Auth  
Germany, F.R.: Prof. Dr.-Ing. J.W. Klein  
Greece:  
Hungary: Dr. L. Zombory  
India: Dr. B.R. Nag  
Iraq: Dr. Saleh R. Al-Araji  
Ireland: Prof. W.D. Ryan  
Israel: Prof. J. Shappir  
Italy: Prof. A.-M. Scheggi  
Japan: Prof. T. Okoshi  
Netherlands: Dr. M.E.J. Jeuken  
New Zealand: Mr. R.A. Morris  
Nigeria: Prof. R.I. Salawu  
Norway: Prof. K. Bløtekjaer  
Peru:  
Poland: Dr. B. Mroziejewicz  
Portugal: Prof. Dr. Rogerio Silva Sousa Nunes  
South Africa: Prof. J.S. Vermaak  
Spain: Prof. D.E. Munoz Merino  
Sweden: Prof. O. Nilsson  
Switzerland: Prof. Dr. H. Melchior  
Thailand:  
United Kingdom: Prof. J. Lamb  
USA: Prof. A.A. Oliner and Dr. K.J. Button  
USSR: Prof. M.E. Zhabotinskij

COMMISSION E - ELECTROMAGNETIC NOISE AND INTERFERENCE

Chairman: Prof. H. Kikuchi (Japan)  
Vice-Chairman: Dr. J. Hamelin (France)

Official Members:

Argentina: Prof. V.H. Padula-Pintos  
Australia: Mr. D.J. Newnham  
Austria:  
Belgium: Prof. R. Gonze  
Brazil: Prof. J.J. Angerami  
Bulgaria: Mr. N. Kombakov  
Canada: Prof. T.J. Pavlasek



China

CIE (Beijing): Dr. Shen Haoming

SRS (Taipei) : Prof. Chun-Ming Huang

Czechoslovakia:

Denmark: Mr. H.G. Nissen

Egypt: Prof. S.M. Mahrour

Finland: Dr. R. Pirjola

France: M. P. Degauque

German D.R.: Dr. B. Schäning

Germany, F.R.: Prof. Dr. W. Harth

Greece:

Hungary: Dr. P. Szemerédy

India: Dr. M.K. Rao

Iraq: Mr. Ali M.A. Shaban

Ireland: Prof. J.O. Scanlan

Israel: Mr. O. Hartal

Italy: Prof. E. Nano

Japan: Dr. M. Hayakawa

Netherlands: Mr. A. de Jong

New Zealand: Dr. R. Barr

Nigeria: Dr. G.O. Ajayi

Norway: Mr. K.N. Stokke

Peru:

Poland: Prof. A. Wojnar

Portugal: Ing. J.J. de Sousa Marques

South Africa: Mr. R.W. Vice

Spain: Dr. E. Used Aznar

Sweden: Dr. V. Scuka

Switzerland: Dr. T. Dvorak

Thailand:

United Kingdom: Dr. F. Horner

USA: Dr. J.M. Morris

USSR: Dr. Ya. I. Likhter

Working Groups

E.1 Man-made Noise

Chairman: Prof. A.D. Spaulding(USA)

E.2 Natural Noise

Chairman: Dr. J. Hamelin (France)

E.3 Damaging Effects of Transients on Equipment

Chairman: Dr. V. Scuka (Sweden)

E.4 Scientific Basis of Noise and Interference Control

Chairman: Dr. C. Baum (USA)

COMMISSION F - WAVE PROPAGATION AND REMOTE SENSING

Chairman: Prof. R.K. Crane (USA)  
Vice-Chairman: Dr. G. Brussaard (Netherlands)

Official Members:

Argentina:  
Australia: Dr. W.G. Williamson  
Austria: Univ. Prof. W. Riedler  
Belgium: Prof. A. Guissard  
Brazil: Prof. Mauro Soares Assis  
Bulgaria: Mr. M. Michalev  
Canada: Dr. J.F.R. Gower  
China  
CIE (Beijing): Dr. Sha Zong  
SRS (Taipei) : Dr. Shi-Fu Den  
Czechoslovakia: Prof. J. Prokop  
Denmark: Prof. P. Gudmandsen  
Egypt: Prof. S.M. Ali  
Finland: Dr. T. Haikonen  
France: M. J.P. Mon  
German D.R.: Dr. U. Kühn  
Germany, F.R.: Dipl.-Phys. A. Ochs  
Greece:  
Hungary: Dr. I. Bozsoki  
India: Prof. O.P.N. Calla  
Iraq: Dr. Shaker A. Abdulla  
Ireland: Mr. K. O'Connell  
Israel: Dr. J. Mass  
Italy: Dr. G. d'Auria  
Japan: Dr. T. Oguchi  
Netherlands: Dr. L.P. Ligthart  
New Zealand: Dr. D.C. Thompson  
Nigeria: Prof. I.E. Owolabi  
Norway: Prof. D. Gjessing  
Peru:  
Poland: Dr. W. Pawłowski  
Portugal: Prof. J.S. Neves  
South Africa: Mr. R.W. Vice  
Spain:

Sweden: Mr. A. Blomquist  
Switzerland: Dr. J. Joss (Dr. Ch.Mätzler, alternate)  
Thailand:  
United Kingdom: Prof. E.D.R. Shearman  
USA: Prof. R.K. Moore  
USSR: Dr. N.A. Armand

COMMISSION G - IONOSPHERIC RADIO AND PROPAGATION

Chairman: Dr. H. Rishbeth (UK)  
Vice-Chairman: Dr. A.W. Wernik (Poland)

Official Members:

Argentina:  
Australia: Dr. D.G. Cole  
Austria: Prof. Dr. W. Riedler  
Belgium: Prof. L. Bossy  
Brazil: Dr. I.J. Kantor  
Bulgaria: Academician K. Serafimov  
Canada: Dr. H.G. James  
China  
CIE (Beijing): Dr. Huang Xuegin  
SRS (Taipei) : Prof. Yinn-Nien Huang  
Czechoslovakia: Dr. J. Lastovicka  
Denmark: Dr. E. Ungstrup  
Egypt: Prof. I.A. Salem  
Finland: Assoc. Prof. A. Tauriainen  
France: M. R. Hanbaba  
German D.R.: Dr. Jürgen Bremer  
Germany, F.R.: Dr. K. Schlegel  
Greece:  
Hungary: Dr. P. Bencze  
India: Dr. A.K. Sen  
Iraq: Dr. Safa A. Hadad  
Ireland: Prof. M.C. Sexton  
Israel: Prof. C. Altman  
Italy: Prof. P. Dominici  
Japan: Dr. Y. Hakura  
Netherlands: Mr. H. Kelder  
New Zealand: Dr. J.E. Titheridge  
Nigeria: Prof. J.O. Oyinloye  
Norway: Prof. O. Holt  
Peru:  
Poland: Dr. A.W. Wernik

Portugal: Prof. A.R. Alves Moreira  
South Africa: Prof. J.A. Gledhill  
Spain: Rvdo P.E. Galdon Mateo  
Sweden: Prof. B. Hultqvist  
Switzerland: Dr. B. Hoegger  
Thailand:  
United Kingdom: Dr. H. Rishbeth  
USA: Dr. J.C. Yeh  
USSR: Dr. K.I. Gringauz

Working Groups

G.1 Ionosonde Network Advisory Group (INAG)

Chairman: Prof. J.A. Gledhill (South Africa)

G.2 Studies of the Ionosphere Using Beacon Satellites

Chairman: Prof. R. Leitinger (Austria)

G.3 Ionospheric Modelling

Chairman: Dr. C. Rush (USA)

G.4 Ionospheric Informatics

Chairman: Dr. B.W. Reinisch (USA)

G.5 Low Latitude Ionospheric Studies

Chairman: Prof. S. Radicella (Argentina)

COMMISSION H - WAVES IN PLASMAS

Chairman: Prof. H. Matsumoto (Japan)  
Vice-Chairman: Dr. D. Jones (UK)

Official Members:

Argentina

Australia: Prof. D.B. Melrose

Austria: Prof. S.J. Bauer

Belgium: Prof. L. Bossy

Brazil: Dr. J.A. Bittencourt

Bulgaria: Dr. I. Kutiev

Canada: Dr. H.G. James

China

CIE (Beijing): Dr. Zhang Xunjie

SRS (Taipei) : Prof. Kwang-Hong Pai

Czechoslovakia: Dr. V. Fiala  
Denmark: Dr. T. Stockflet Jørgensen  
Egypt: Prof. M.E.A. Aziz  
Finland: Prof. J. Kangas  
France: Dr. F. Lefeuvre  
German D.R.: Prof. Ch .-U. Wagner  
Germany, F.R.: Prof. Dr. K. Suchy  
Greece:  
Hungary: Prof. J. Bakos  
India: Dr. A.G. Das  
Iraq: Dr. Shaker A. Abdulla  
Ireland: Prof. M.C. Sexton  
Israel: Prof. C. Altman  
Italy: Dr. G. Fiocco  
Japan: Prof. H. Matsumoto  
Netherlands: Prof. M. Weenink  
New Zealand: Prof. R.L. Dowden  
Nigeria: Dr. J. Akinrimisi  
Norway: Dr. B. Maehlum  
Peru:  
Poland: Dr. A. Turski  
Portugal: Prof. Dr. A.L. Esteves Brinca  
South Africa: Prof. A.D.M. Walker  
Spain:  
Sweden: Prof. C.-G. Fälthammar  
Switzerland: Dr. B. Hoegger  
Thailand:  
United Kingdom: Dr. D. Jones  
USA: Dr. K.J. Harker  
USSR: Dr. V.I. Aksenov

COMMISSION J - RADIO ASTRONOMY

Chairman: Prof. R.H. Frater (Australia)

Vice-Chairman: Dr. R. Ekers (USA)

Official Members:

Argentina: Dr. E. Bajaja  
Australia: Assoc. Prof. A.G. Little  
Austria: Prof. J. Pfleiderer  
Belgium: Prof. R. Gonze  
Brazil: Prof. P. Kaufmann  
Bulgaria: Dr. G. Nestorov  
Canada: Dr. T. Landecker

China

CIE (Beijing): Dr. Wu Shenhyin  
SRS (Taipei) : Prof. Nan-Hung Kuo  
Czechoslovakia: Dr. A. Tlamicha  
Denmark: Dr. J. Knude  
Egypt: Dr. B.B. Baghouz  
Finland: Prof. M. Tiuri  
France: M. A. Baudry  
German D.R.: Dr. A. Krüger  
Germany, F.R.: Dr. B.H. Grahl  
Greece:  
Hungary: c/o Dr. L. Zombory  
India: Dr. S. Ananthakrishnan  
Iraq: Dr. Aziz K. Sadik  
Ireland: Dr. S. McKenna-Lawlor  
Israel: Dr. Z. Huminer  
Italy: Prof. G. Tomassetti  
Japan: Prof. S. Enomé  
Netherlands: Mr. H.C. Kahlmann  
New Zealand: Dr. W.J. Baggaley  
Nigeria: Dr. S.E. Okoye  
Norway: Assoc. Prof. Øystein Elgarøy  
Peru:  
Poland: Prof. S. Gorgolewski  
Portugal: Eng. A.A. Sanches de Magalhaes  
South Africa: Dr. G.D. Nicolson  
Spain: Dr. J. Gomez Gonzalez  
Sweden: Prof. B. Höglund  
Switzerland: Dr. A. Magun  
Thailand:  
United Kingdom: Prof. D.H. Martin  
USA: Prof. W.J. Welch  
USSR: Prof. V.S. Troitskij

JOINT WORKING GROUPS

C/H.1 Wave Analysis

Co-Chairman for Commission C: Prof. J.L. Lacoume (France)  
Co-Chairman for Commission H: Dr. D. Jones (UK)

D/E.1 Effects of Transients on Integrated Circuits, Transistors, Computers, etc.

Co-Chairman for Commission D: Dr. T. Itoh (USA)

Co-Chairman for Commission E: Dr. V. Scuka (Sweden)

G/H.1 Incoherent Scatter

Co-Chairmen: Dr. V.B. Wickwar (USA), Dr. K. Schlegel (FRG)

G/H.2 Computer Experiments, Simulation and Analysis of Wave Plasma Processes

Co-Chairmen for Commission H: Prof. H. Matsumoto (Japan)

Dr. M. Abdalla (USA)

Co-Chairman for Commission G: Dr. S. Ossakow (USA)

INTER-COMMISSION WORKING GROUP

Time Domain Waveform Measurements

Chairman: Dr. N.S. Nahman (USA)

Vice-Chairman: Dr. T. Sarkar (USA)

INTER-UNION WORKING GROUPS

Commission G/COSPAR: International Reference Ionosphere (IRI)

Chairman: Prof. L. Bossy (Belgium)

Commissions G and H/COSPAR: Active Experiments

(proposed to COSPAR)

Co-Chairmen for URSI: Prof. W.E. Gordon  
(USA)

Dr. Santimay Basu  
(USA)

Commission H/IAGA: Passive Electromagnetic Probing of the Magnetosphere

Co-Chairman for URSI: Dr. U.S. Inan (USA)

Commissions G and H/IAGA: Wave Instabilities in Plasmas

Co-Chairman for Commission G: Dr. S. Ossakow  
(USA)

Co-Chairman for Commission H: Dr. T. Sato (Jap)

URSI REPRESENTATIVES ON OTHER ORGANIZATIONS

IUCAF (Inter-Union Commission on Frequency Allocation for  
Radio Astronomy and Space Science):

Dr. J.W. Findlay (USA), Dr. B. Robinson (Australia)

ICSU (International Council of Scientific Unions):

Prof. A.L. Cullen (UK)

FAGS (Federation of Astronomical and Geophysical Services):

Dr. J.C. Ribes (France), Dr. R. Wielebinski (FRG)

COSPAR (Committee on Space Research):

Dr. P. Bauer (France)

SCOSTEP (Scientific Committee on Solar-Terrestrial Physics):

Dr. R. Woodman (Peru)

SCAR (Scientific Committee on Antarctic Research):

Dr. G. Pillet (France)

SCOR (Scientific Committee on Oceanic Research):

Dr. G. Valenzuela (USA)

COSTED (Committee on Science and Technology in Developing  
Countries):

Prof. Feng Shizhang (China, CIE)

IUWDS Steering Committee (International Ursigram and World  
Days Service):

Dr. B.M. Reddy (India)

MAP Steering Committee (Middle Atmosphere Programme):

Dr. R.A. Vincent (Australia), Dr. T.E. Van Zandt (USA)

WITS (World Ionosphere/Thermosphere Study):

Dr. A.P. Mitra

CPM (Conference on Precision Electromagnetic Measurements):

The Chairman of Commission A ex officio.



URSI MEMBER COMMITTEES

ARGENTINA	President: Ing. A.M. Andreu Secretary: Prof. V.A. Padula-Pintos
AUSTRALIA	President: Dr. J.G. Lucas
AUSTRIA	President: Prof. S.J. Bauer
BELGIUM	President: Prof. P. Lagasse Secretary: Prof. A. Laloux
BRAZIL	President: Dr. A.B. Carleial Secretary: Prof. P. Kaufmann
BULGARIA	President: Prof. K. Serafimov Secretary: Dr. A. Spasov
CANADA	President: Prof. P.H. Wittke Secretary: Mr. R.F. Clark
CHINA	
CIE (Beijing)	President: Prof. Feng Shizhang Secretary: Dr. Zheng Wenhao
SRS (Taipei)	President: Mr. Yu-Kai Chen Secretary: Dr. Yinn-Nien Huang
CZECHOSLOVAKIA	President: Prof. V. Zima Secretary: Dr. L. Kratena
DENMARK	President: Dr. T. Stockflet Jørgensen
EGYPT	President: Prof. Abdel Samie Moustafa Houssein Secretary: Dr. I.A.M. Salem
FINLAND	President: Prof. M. Tiuri Secretary: Dr. M.H. allikainen
FRANCE	President: Prof. B. Picinbono Secretary: Dr. G. Pillet

GERMAN D.R.	President: Prof. Ch.-U. Wagner Secretary: Dr. A. Iwainisky
GERMANY, F.R. of	President: Dr. H.J. Albrecht Secretary: Dr. Th. Damboldt
GREECE	
HUNGARY	President: Prof. K. Géher Secretary: Dr. L. Zombory
INDIA	President: Dr. G. Swarup Secretary: Dr. S. Ananthakrishnan
IRAQ	President: Dr. Aziz R. Sadik
IRELAND	President: Prof. J.O. Scanlan Secretary: Prof. B.K.P. Scaife
ISRAEL	President: Dr. J. Shapira Secretary: Dr. J. Politch
ITALY	President: Prof. C. Egidi Secretary: Ing. E. Bava
JAPAN	President: Prof. T. Okoshi Secretary: Dr. N. Matuura
NETHERLANDS	President: Prof. J.B.H. Peek Secretary: Dr. H.C. Kahlmann
NEW ZEALAND	President: Prof. R.L. Dowden Secretary: Mr. W. Ireland
NIGERIA	President: Prof. J.O. Oyinloye Secretary: Dr. G.O. Ajayi
NORWAY	President: Prof. D. Gjessing Secretary: Ms. E. Rødsrud
PERU	President: Dr. R. Woodman
POLAND	President: Prof. A. Smolinski Secretary: Dr. T. Kosito

PORTUGAL	President: Mr. J.F. Patricio
SOUTH AFRICA	c/o Mrs E. du Plessis South African ICSU Secretariat
SPAIN	
SWEDEN	President: Dr. P. Weissglass Secretary: Dr. B. Öhman
SWITZERLAND	President: Prof. Dr. F.E. Gardiol Secretary: Dr. P. Kartaschoff
THAILAND	c/o Dr. M. Chantrangkurn
UNITED KINGDOM	President: Prof. P.J.B. Clarricoats Secretary: Dr. P.T. Warren
USA	President: Prof. R.K. Crane Secretary: Prof. C.M. Butler
USSR	President: Prof. V.V. Migulin Secretary: Dr. V.N. Gubankov

## ALPHABETICAL INDEX AND ADDRESSES

*Note: The figures in parenthesis at the end of the entries indicate the pages on which references to individuals will be found.*

ABDALLA, Dr. M., IGPP/UCLA, USA (141).

ABDELLAH, Prof. E.A.F., c/o Prof. I.A. Salem, Academy of Scientific Research and Technology, 101 Kasr El Ainy St., Cairo, Egypt (134).

ABDULLA, Dr. Shaker A., Astronomy and Space Research Center, P.O.Box 255, Jadiryah, Baghdad, Iraq (136, 139).

ADACHI, Prof. S., Department of Electrical Engineering, Faculty of Engineering, Tohoku University, Aoba, Aramaki, Sendai-shi 980, Japan (131).

AJAYI, Dr. G.O., Department of Electronic and Electrical Engineering, University of Ife, Ile-Ife, Nigeria (135,144).

AKINRIMISI, Dr. J., Department of Physics, University of Lagos, Yaba, Lagos, Nigeria (139).

AKSENOV, Dr. V.I., Institute of Radioengineering and Electronics, Ac.Sci., Prospekt Marksa 18, 103907 Moskva K-9, USSR (139).

AL-ARAJI, Dr. Saleh R., Department of Electrical Engineering College of Engineering, Baghdad University, Baghdad, Iraq (133, 134).

ALBRECHT, Dr.-Ing. H.J., Postfach 21 01 43, D-5300 Bonn 2, FR of Germany, Tel.: 228-85 22 23 (127, 144).

ALI, Prof. S.M., c/o Prof. I.A. Salem, Academy of Scientific Research and Technology, 101 Kasr El Ainy St., Cairo, Egypt (136).

ALTMAN, Prof. C., Faculty of Physics, Technion, Haifa 32000, Israel (137, 139).

ANANTHAKRISHNAN, Dr. S., Radio Astronomy Centre, Tata Institute of Fundamental Research, Ootacamund 643 001, India (140, 144).

- ANDERSON, Prof. A.P., Department of Electronic and Electrical Engineering, The University, Mappin Street, Sheffield S1 3JD, United Kingdom (132).
- ANDREU, Dr. A.M., President CORCA, Julian Alvarez 1218, 1414 Buenos Aires, Argentina (143).
- ANGERAMI, Prof. J.J., Escola Politecnica, Universidad de Sao Paulo, Departamento de Electricidade, C.P. 61548, 01000 Sao Paulo, S.P., Brazil (134).
- ARMAND, Dr. N.A., Institute of Radioengineering and Electronics Ac. Sci., Prospekt Marksa 18, 103907 Moskva K-9, USSR (137).
- ASSIS, Prof. Mauro Soares, Embratel, Depto de Treinamento, rua Senador Pompeu 27, 20080 Rio de Janeiro, R.J., Brazil (136).
- AUTH, Prof. Dr. J., Humboldt-Universität zu Berlin, Sektion Physik, Hessischestr.2, DDR-104 Berlin, GDR (134).
- AZIZ, Prof. M.E.A., c/o Prof. I.A. Salem, Academy of Scientific Research and Technology, 101 Kasr El Ainy St., Cairo, Egypt (139).
- AZNAR, Dr. Enrique Used, Centro de Investigacion y Estudios, Compania Telefonica Nacional de Espana, Avda de José Antoni num. 32, Madrid 13, Spain (135).
- 
- BACH ANDERSEN, Prof. J., Aalborg University Centre, Fr.Bajers Vej 7, DK-9220 Aalborg East, Denmark. Tel. (45) 8-154811, Fax: (45) 8-156740 (129).
- BACH, Dr. H., Electromagnetics Institute, Bldg 348, Technical University, DK-2800 Lyngby, Denmark (131).
- BAGGALEY, Dr. W.J., Physics Department, University of Canterbury, Christchurch, New Zealand (140).
- BAGHOUZ, Dr. B.B., Helwan Institute of Astronomy and Geophysics, Egypt (140).

- BAILEY, Mr. A.E., Foxgloves, New Valley Road, Milford-on-Sea,  
Lymington, Hampshire SO4 OSA, United Kingdom (131).
- BAJAJA, Dr. E., Instituto Argentino de Radioastronomia, Casilla  
de Correo No 5, 1894 Villa Elisa, Prov. de B.A.,  
Argentina (139).
- BAKHRAKH, Prof. L.D., Institute of Radioengineering and Elec-  
tronics, Ac. Sci., Prospekt Marksa 18, 103907 Moskva K-9,  
USSR (132).
- BAKOS, Prof. J., Central Physical Research Institute, c/o  
Dr. L. Zombory, Technical University of Budapest, H-1521  
Budapest, Hungary (139).
- BARCLAY, Dr. L.W. Department of Trade and Industry, DRT, Room  
515, Waterloo Bridge House, Waterloo Road, London SE1 8UA,  
United Kingdom (129).
- BARR, Dr. R., Physics and Engineering Laboratory, Geophysical  
Observatory, P.O. Box 2111, Christchurch, New Zealand (135)
- BASU, Dr. Santimay (141).
- BATES, Prof. R.T.H., Department of Electrical Engineering,  
University of Canterbury, Private Bag, Christchurch,  
New Zealand (133).
- BAUDRY, M. A., Observatoire de Bordeaux, B.P. 21, F-33270,  
Floirac, France (140).
- BAUER, Dr. P., CNRS, Service Aéronomie, B.P.3, F-91370,  
Verrières-le-Buisson, France. Tel: (33) 1-6920 0183; Tx:  
692400 F Aeron; Fax: (33) 1-6920 2999 (129, 142).
- BAUER, Prof. S.J., Institut für Meteorologie und Geophysik,  
Universität Graz, Halbärthgasse 1, A-8010 Graz, Austria  
(138, 143).
- BAUM, Dr. C.E., Air Force Weapons Laboratory, Kirtland Air  
Base, New Mexico 87117, USA (136).
- BAVA, Ing. E., Istituto Elettrotecnico Nazionale "Galileo  
Ferraris", Strada delle Cacce 91, I-10135 Torino,  
Italy (144).
- BEM, Prof. D., ul. Bacciarellego 24, m.12, 51649 Wrocław,  
Poland (128, 132).

- BENCZE, Dr. P., H.O.D., Geophysical Research Lab. of HAS,  
c/o Dr. L. Zombory, Technical University of Budapest,  
H-1521 Budapest, Hungary (137).
- BENDA, Prof. Dr. O., Slovak Technical University, Vazozova 5,  
880-19 Bratislava, Czechoslovakia (131).
- BEVENSEE, Dr. R.M.(128).
- BEYNON, Sir Granville, Department of Physics, University  
College of Wales, Penglais, Aberystwyth SY23 3BZ,  
United Kingdom (127).
- BHARTI BHATT, Ms., Indian Institute of Technology, Hauz Khas,  
New Delhi 110 016, India (131).
- BITTENCOURT, Dr. J.A., INPE, S.P. 515, 12200 Sao José dos  
Campos, S.P. Brazil (138).
- BLOMQUIST, Mr. A., Research Institute of National Defence,  
Dept. 3, Box 1165, S-581 11 Linköping, Sweden (129, 137).
- BLØTEKJAER, Prof. K., Institutt for Fysikalsk Elektronikk,  
Universitetet i Trondheim, N-7034 Trondheim NTH, Norway  
(134).
- BOITHIAS, Dr. L., CNET, 38 rue du Général Leclerc, F-92131  
Issy-les-Moulineaux, France (129).
- BOOKER, Prof. H.G., Applied Physics and Information Science  
Department, University of California, Code 014, La Jolla,  
CA 92093, USA (127).
- BOSSY, Prof. L., Université Catholique de Louvain, 174 avenue  
Winston Churchill, B-1180 Bruxelles, Belgium (137, 138,  
141).
- BOUCHAREINE, M. P., Institut National de Métrologie, 292 rue  
St-Martin, F-75141 Paris Cedex 03, France (130).
- BOZSOKI, Dr. I., c/o Dr. L. Zombory, Technical University of  
Budapest, H-1521 Budapest, Hungary (136).
- BREMER, Dr. J., Zentralinstitut für Solar-Terrestrische Physik  
(H.H. Institut), Observatorium für Ionosphärenforschung,  
DDR-2565 Kühlungsborn, Mitschurinstrasse 4, GDR (137).
- BRINCA, Prof. Dr. Armando Larcher Esteves, Instituto Superior  
Tecnico de Lisboa, Lisboa, Portugal (139).

- BRUSSAARD, Dr. G., ESA-ESTEC, P.O. Box 299, NL-2200 AG  
Noordwijk, Netherlands. Tel: (31) 1719-83936; Tx: 39098;  
Fax: (31) 1719-17401 (136).
- BUTLER, Prof. C.M., College of Engineering, Clemson University,  
102 Riggs Hall, Clemson, South Carolina 29634-0915, USA  
(127, 145).
- BUTTON, Dr. K.J., Massachusetts Institute of Technology,  
Francis Bitter National Magnet Laboratory, 170 Albany  
Street, Cambridge, MA 02139, USA (134).
- CAETANO, M. Armindo Custodio Mendonça, Lisbon Astronomical  
Observatory, Lisbon, Portugal (130).
- CALLA, Prof. O.P.N., Space Applications Centre, SAC PO, Jodhpur  
Tekra, Ahmedabad 380053, India (136).
- CARLEIAL, Dr. A.B., INPE, C.P. 515, 12200 San José dos Campos,  
S.P. Brazil (143).
- CEDERBAUM, Prof. I., Faculty of Electrical Engineering,  
Technion, Haifa 32000, Israel (133).
- CHANTRANGKURN, Dr. M., Post and Telegraph Department, Bangkok,  
Thailand (145).
- CHEEKE, Dr. J.M.D., Département de Physique, Université de  
Sherbrooke, Québec J1K 2R1, Canada (133).
- CHEN, Prof. Chun-Hsiung, Department of Electrical Engineering,  
National Taiwan University, Taipei, Taiwan (131).
- CHEN, Mr. Yu-Kai, Vice-Minister, Ministry of Communications,  
No 2, Section 1, Chang-Sha Street, Taipei, Taiwan (128,  
143).
- CHMURNY, Prof. J., Slovak Technical University, Vazozova 5,  
880 19 Bratislava, Czechoslovakia (132).



- CHRISTIANSEN, Prof. W.N., c/o Mount Stromlo Observatory,  
Private Bag, Canberra ACT 2606, Australia (127).
- CLARK, Mr. R.F., Physics Division, Building M-36, National  
Research Council of Canada, Montreal Road, Ottawa K1A 0R8,  
Canada (143).
- CLARRICOATS, Prof. P.J.B., Department of Electronic and Elec-  
trical Engineering, Queen Mary College, Mile End Road,  
London E1 4NS, United Kingdom (128, 145).
- CLOETE, Prof. J.H., Department of Electrical and Electronic  
Engineering, University of Stellenbosch, 7600 Stellen-  
bosch, South Africa (132).
- COLE, Dr. D.G., Ionospheric Prediction Service, P.O.Box 702,  
Darlinghurst N.S.W. 2010, Australia (137).
- CORNEY, Mr. A.C., Physics and Engineering Laboratory, DSIR,  
Private Bag, Lower Hutt, New Zealand (130).
- COSTA, Dr. Max H.M., INPE, C.P. 515, Sao José dos Campos, S.P.,  
Brazil (132).
- CRANE, Prof. R.K., Thayer School of Engineering, Dartmouth  
College, Hanover NH 03755, USA. Tel: (1) 603-646 3843; Tx:  
1930372 RPOUI; Fax: (1) 603-646-2384 (136, 145).
- CULLEN, Prof. A.L., Department of Electrical Engineering,  
University College London, Torrington Place, London WC1E  
7JE, United Kingdom. Tel: (44) 1-387 7050; Tx: 296273  
UCLENG G (127, 142).
- DAMBOLDT, Dr. Th., FI 34, Forschungsinstitut der DBP beim FTZ,  
Postfach 5000, D-6100 Darmstadt, FR of Germany (144).
- DAS, Dr. A.G., Physical Research Laboratory, Navrangpura,  
Ahmedabad 380 009, India (139).
- D'AURIA, Dr. G., Istituto di Eletttronica, Facolta d'Ingegneria,  
Via Eudossiana 18, I-00184 Roma, Italy (136).

- DE COULON, Prof. Dr. F., Chemin du Couchant 18, CH-1007  
Lausanne, Switzerland (133).
- DEGAUQUE, M. P., Université des Sciences et Techniques de Lille  
1 (UER Informatique-Electronique-Electrotechnique-  
Automatique), F-59655 Villeneuve d'Ascq Cedex, France(135)
- DE HOOP, Prof. Dr. A.T., Technische Hoogeschool, Afdeling  
Elektrotechniek, Postbus 5031, NL-2600 GA Delft,  
Netherlands (132).
- DE JONG, Mr. A., Dr. Neher Laboratorium, St.Paulusstraat 5,  
NL-2264 XZ Leidschendam, Netherlands (135).
- DELOGNE, Prof. P., Laboratoire de Télécommunications, Bâtiment  
Maxwell, B-1348 Louvain-la-Neuve, Belgium. Tel: (32) 10-  
472 307 (127, 129, 132).
- DE MAGALHAES, Eng. Antonio Amandio Sanches, Astronomical  
Observatory, University of Porto, Porto, Portugal (140).
- DEN, Prof. Chi-Fu, Engineering and Applied Sciences Division,  
National Science Council, Taipei, Taiwan (136).
- DE SALAMANCA, Dr. J.E., Standard Electrica S.A., José Ortega  
y Gasset num 22, Madrid 6, Spain (133).
- DE SOUSA MARQUES, Ing. José Joaquim, Instituto Nacional de  
Meteorologia e Geofisica, Lisboa, Portugal (135).
- DEWAM, Hofrat Dipl. Ing. W., Bundesamt für Eich- und Ver-  
messungswesen, Abt E3, Arltgasse 35, A-1160 Wien,  
Austria (130).
- DIEMINGER, Prof. Dr. W., Berlinerstrasse 14, D-3411 Nörten-  
Hardenberg, FR of Germany (127).
- DOMINICI, Prof. P., Istituto Nazionale di Geofisica, Via  
Ruggero Bonghi, 11/B, I-00184 Roma, Italy (137).
- DOWDEN, Prof. R.L., Physics Department, University of Otago,  
Dunedin, New Zealand. Tel: (64) 24-771 640; Tx: NZ 5618  
TELCODN; Fax: (64) 24-741 607 (127, 128, 139, 144).
- DU PLESSIS, Ms E.P., South African ICSU Secretariat, CSIR,  
P.O.B. 395, 0001 Pretoria, South Africa (145).
- DUTTA ROY, Prof. S.C., Department of Electrical Engineering,  
Indian Institute of Technology, Hauz Khas, New Delhi  
110 016, India (133).

DVORAK, Dr. T., Weidelacherstrasse 11, CH-8143 Stallikon,  
Switzerland (135).

EGIDI, Prof. C., Centro di studio per la televisione, CNR,  
c/o Istituto Elettrotecnico Nazionale "Galileo Ferraris",  
Strada delle Cacce 91, I-10135 Torino, Italy (144).

EKERS, Dr. R., National Radio Astronomy Observatory, P.O.Box 0,  
Socorro, NM 87801, USA. Tel: (1) 505-772 4297; Fax:  
TWX 910-988-1710 (139).

ELGARØY, Dosent Ø, Astrofysisk Institutt, Universitetet i Oslo,  
Postbus 1029, Blindern, Oslo 3, Norway (140).

ELSAYED, Prof. A.L., c/o Prof. I.A. Salem, Academy of Scientific  
Research and Technology, 101 Kasr El-Ainy St., Cairo,  
Egypt (130).

ENOME, Prof. S., Research Institute of Atmospherics, Nagoya  
University, 3-13 Honohara, Toyokawa-shi 442, Japan (140).

EDB  
FA

FALTHAMMAR, Prof. C. G., Royal Institute of Technology,  
S-100 44 Stockholm 70, Sweden (139).

FEDI, Dr. F., Fondazione "Ugo Bordoni", via B. Castiglione 59,  
I-00142 Roma, Italy (129).

FENG SHIZHANG, Prof., Chief Engineer of China Academy of Elec-  
tronic Technology, P.O.Box 134, Beijing, China (128,  
142, 143).

- FIALA, Dr. V., Geophysical Institute, Czechoslovak Academy of Sciences, Bocni II-1a, 141 31 Praha 4, Czechoslovakia (139).
- FIGANIER, Prof. Dr. Joao, Instituto Superiore Tecnico de Lisboa Lisboa, Portugal (132).
- FINDLAY, Dr. J.W., National Radio Astronomy Observatory, Edgemont Road, Charlottesville, VA 22901, USA (142).
- FIOCCO, Dr. G., Istituto di Fisica, Universita di Roma, P. delle Scienze 5, I-00185 Roma, Italy (139).
- FONSECA DE MOURA, Prof. Dr. José Manuel, Instituto Superior Tecnico de Lisboa, Lisboa, Portugal (133).
- FRATER, Prof. R.H., CSIRO Division of Radiophysics, P.O.Box 76, Epping, N.S.W. 2121, Australia. Tel: (61) 2-868 0220; Tx: 26230 Astro; Fax: (61) 2-868 0457 (129, 139).
- 
- GALDON MATEO, Rvdo P.E., Observatorio del Ebro, Roquetes-Tortosa, Tarragona, Spain (138).
- GAMBLING, Prof. W.A., Department of Electronics, The University, Southampton SO9 5NH, United Kingdom (128).
- GARDIOL, Prof. Dr. F., LEMA, Ecole Polytechnique Fédérale, Ecublens, CH-1015 Lausanne, Switzerland. Tel: (41) 21- 472 670; Tx: 454062 EPFUDCH; Fax: (41) 21-474 660 (127, 131, 132, 145).
- GEHER, Prof. K., Technical University of Budapest, Stoczek u.2, H-1111 Budapest, Hungary (127, 133, 144).
- GELIAZKOV, Prof. I., Faculty of Physics, Sofia University, Bul. Anton Ivanov 5, 1126 Sofia, Bulgaria (131).
- GEROSA, Dr. G., Istituto di Elettronica, Facolta d'Ingegneria, Via Eudossiana 18, I-00184 Roma, Italy (131).

- GJESSING, Prof. D., NTN/PFM, Postboks 25, N-2007 Kjeller, Norway (136, 144).
- GLEDHILL, Prof. J.A., Department of Physics and Electronics, Rhodes University, P.O.Box 94, Grahamstown 6140, South Africa (138).
- GONZALEZ GOMEZ, Dr. Jesus, Observatorio Astronomico Nacional, Yebes (Guadalajara), Spain (140).
- GONZE, Prof. R., Observatoire Royal de Belgique, avenue Circulaire 3, B-1180 Bruxelles, Belgium (134, 139).
- GORDON, Prof. W.E., Rice University, P.O.Box 1892, Houston, Texas 77251, USA (129, 141).
- GORGOLEWSKI, Prof. S., Katedra Radioastronomii, Uniwersytet M. Kopernika, ul.Chopina 12/18, 87-100 Toruń, Poland (140).
- GOWER, Dr. J.F.R., Institute of Ocean Sciences, Patricia Bay, POB 6000, Sidney BS V8L 4B2, Canada (136).
- GRAHL, Dr. B.H., Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, D-5300 Bonn 1, FR of Germany (140).
- GRINGAUZ, Dr. K.I., Institute of Space Research, Ac. Sci., 88 Profsovnaya ul., Moskva K-485, USSR (138).
- GUBANKOV, Dr. V.N., Institute of Radioengineering and Electronics, Ac. Sci., Prospekt Marksa 18, 103907 Moskva K-9, USSR (145).
- GUDMANDSEN, Prof. P., Electromagnetics Institute, Bldg 348, Technical University of Denmark, DK-2800 Lyngby, Denmark (136).
- GUISSARD, Prof. A., Laboratoire de Télécommunications, Bâtiment Maxwell, Place du Levant 3, B-1348 Louvain-la Neuve, Belgium (136).
- GULDBRANDSEN, Dr. T., Physics Lab.III, Technical University of Denmark, DK-2800 Lyngby, Denmark (130).

- HADAD, Dr. Safa A., Department of Electrical Engineering,  
University of Technology, P.O.Box 745 Tel-Mohamed,  
Baghdad, Iraq (130, 137).
- HAGN, Mr. G.H. , SRI International, 1611 North Kent Street,  
Arlington, Virginia 22209, USA. Tel: (1) 703-524 2053  
(128).
- HAHN, Prof. S., Instytut Radioelektroniki, Politechnika War-  
szawska, Nowowiejska 15/19, 00-665 Warszawa, Poland (130).
- HAIKONEN, Dr. T., Administration of Posts and Telegraphs,  
Radio Department, P.O.Box 511, SF-00101 Helsinki, Finland  
(136).
- HAKURA, Prof. Y., Department of Electrical Engineering,  
Faculty of Engineering, Saitama University, 255 Shimo-  
Ohkubo, Urawa-shi 338, Japan (137).
- HALL, Dr. M.P.M., Rutherford Appleton Laboratory, Chilton  
Didcot, Oxfordshire OX11 0QX, United Kingdom (129).
- HALLIKAINEN, Dr. M., Helsinki University of Technology,  
E.E. Department, Otakaari 5A, SF-02150 Espoo 15,  
Finland (143).
- HAMELIN, Dr. J., ESA/ESTEC, Postbus 299, NL-2200 AG Noordwijk,  
Netherlands. Tel: (31) 1719-84 517; Tx: 39098; Fax:  
(31) 1719-17401 (134, 135).
- HANBABA, M. R., CNET/LAB/MER/SPI, route de Trégastel, F-22301  
Lannion Cedex, France (137).
- HARKER, Dr. K.J., Stanford University, Star-Lab, Durand 207,  
Stanford, CA 94305, USA (139).
- HARTAL, Mr. O., POB 2250, Haifa 31021, Israel (135).
- HARTH, Prof. Dr. W., Fachschule Köln, Fachbereich 8, Reitweg 1,  
D-5000 Köln 21, FR of Germany (135).
- HAYAKAWA, Dr. M., Research Institute of Atmospherics, Nagoya  
University, 3-13 Honohara, Toyokawa-shi 442, Japan (135).
- HEIKKILA, Prof. E., Technical Research Centre of Finland,  
Division for Information Technology, Vuorimiehentie 5,  
SF-02150 Espoo, Finland (132).

- HELESKIVI, Prof. J., Technical Research Centre of Finland,  
Semiconductor Laboratory, Otakaari 7 B, SF-02150 Espoo,  
Finland (134).
- HENAFF, Dr. J., CNET/DICET, 38 rue du Général Leclerc, F-92131  
Issy-les-Moulineaux, France. Tel: (33) 1-4529 4871; Tx:  
250317 F; Fax: (33) 1-4736 8924 (133).
- HEYMAN, Dr. E., Faculty of Engineering, Tel Aviv University,  
Tel Aviv, Israel (131).
- HOEGGER, Dr. B., Route des Charbonnières 13, CH-1723 Marly,  
Switzerland (138, 139).
- HOGLUND, Prof. B., Chalmers Institute of Technology, S-402 20  
Göteborg 5, Sweden (140).
- HOLT, Prof. O., Nordlysobservatoriet, Universitetet i Tromsø,  
N-9000 Tromsø, Norway (137).
- HORNER, Dr. F., 10 Clarence Drive, Egham Sy TW20 ONL, United  
Kingdom (135).
- HOUSSEIN, Prof. Abdel Samie Moustafa, Faculty of Engineering,  
Electronics and Communications Eng., Alexandria, Egypt  
(132, 143).
- HUANG, Prof. Chun-Ming, Department of Electrical Engineering,  
National Taiwan University, Taipei, Taiwan (134).
- HUANG, Dr. Hung-chia, Shanghai University of Science and Tech-  
nology, Shanghai, China (131).
- HUANG, Dr. Xueqin, Institute of Wave Propagation, Xin Xiang,  
P.O.Box 138, Henan Province, China (137).
- HUANG, Dr. Yinn-Nien, Telecommunication Training Institute,  
MOC, 168 Min-Chu Road, Pan. Chiao, Taipei Hsien, Taiwan  
220044 (137, 143).
- HULTQVIST, Dr. B., Kiruna Geophysical Institute, Box 704,  
S-981 27 Kiruna, Sweden (138).
- HUMINER, Dr. Z., Radio Observatory, POB 911, Haifa 31008,  
Israel (140).
- HYDE, Dr. G., COMSAT Laboratories, 22300 Comsat Drive, Clarks-  
burg, MD 20871, USA. Tel: (1) 301-428 4000; Tx: 197800  
(128).

- IGBO, Dr. L.A.B., Department of Electronic and Electrical Engineering, University of Ife, Ile-Ife, Nigeria (130).
- INAN, Dr. U., Stanford University, Star-Lab, Durand 321, Stanford, CA 94305, USA (141).
- IRELAND, Mr. W., Physics and Engineering Laboratory, Dept. of Scientific and Industrial Research, Private Bag, Lower Hutt, New Zealand (144).
- ISHIMARU, Dr. A., Department of Electrical Engineering, University of Washington, FT-10, Seattle, Wash. 98195, USA (132).
- ITOH, Dr. T., Department of Electrical Engineering, University of Texas at Austin, Austin, TX 78712, USA (141).
- IWAINSKY, Dr. A., Akademie der Wissenschaften, Zentralinstitut für Kybernetik und Informationsprozesse, Kurstrasse 33, DDR-1080 Berlin, GDR (144).
- JACGARD, Dr. D.L., The Moore School of Electrical Engineering D2, University of Pennsylvania, Philadelphia, PA 19104, USA (132).
- JAMES, Dr. H.G., Communications Research Centre, POB 11490, Station H, Ottawa, Ontario K2H 8S2, Canada (137, 138).
- JEUKEN, Dr. M.E.J., Technische Hogeschool, Afdeling Elektrotechniek, Postbus 513, NL-5600 MD Eindhoven, Netherlands (134).
- JOINDOT, M.M., CNET/LAB/MER, route de Trégastel, F-22301 Lannion, France (132).



- JONES, Dr. D., British Antarctic Survey, Madingley Road,  
Cambridge CB3 0ET, United Kingdom. Tel: (44) 223-61188  
ext. 335; Tx: 817725 BASCAM G; Fax= (44) 223-62616  
(138, 139, 140).
- JONES Dr. O.C., Division of Electrical Science, National  
Physical Laboratory, Teddington, Middlesex, United Kingdom  
(131).
- JOSS, Dr. J., Motto, CH-6655 Intragna, Switzerland (137).
- JØRGENSEN, Dr. T.S., Geophysics Department, Danish Meteorolo-  
gical Institute, Lyngbyvej 100, DK-2100 Copenhagen Ø,  
Denmark (139, 143).
- JULL, Prof. E.V., Department of Electrical Engineering, Uni-  
versity of British Columbia, 2356 Main Hall, Vancouver,  
B.C. V6T 1W5, Canada. Tel: (1) 604-228 3282; Fax:  
(1) 604-228 7006 (127, 128).
- KAARLS, Mr. R., Van Swinden Laboratorium, Postbus 654, NL-2600  
AR Delft, Netherlands (130).
- KAHLMANN, Mr. H.C., Radiosterrewacht Westerbork, Schattenberg,  
NL-9433 TA Zwiggelte, Netherlands(140, 144).
- KALLIOMAKI, Prof. K., University of Oulu, E.E. Department,  
Linnanmaa, SF-90570 Oulu, Finland (130).
- KANGAS, Dr. J., University of Oulu, Institute of Physics,  
Linnanmaa, SF-90570 Oulu, Finland (139).
- KANTOR, Dr. I.J., INPE, C.P. 515, Sao José dos Campos, 122000  
SP, Brazil (137).
- KARBOWIAK, Prof. A.E., Department of Electrical Engineering,  
University of New South Wales, Box 1, Kensington 2033,  
NSW Australia (131).
- KARTASCHOFF, Dr. P., La Pistoule 28, CH-2036 Cormondrèche,  
Switzerland (145).

- KAUFMANN, Prof. P., INPE, C.P. 515, Sao José dos Campos, 122000 SP, Brazil (139, 143).
- KELDER, Mr. H., KNMI, Postbus 201, NL-3730 AE De Bilt, Netherlands (137).
- KENDERESSY, Dr. M., Research Institute for Telecommunications, c/o Dr. L. Zombory, Technical University of Budapest, H-1521 Budapest, Hungary (130).
- KIKUCHI, Prof. H., Nihon University, Kanda Surugadai, 1-chome Chiyoda-ku, Tokyo 101, Japan. Tel: (81) 3-293 3251 ext. 370; Tx: J 29496 NICHIDAI (134).
- KLEIN, Prof. Dr. Ing. J.W., Ruhruniversität Bochum, Postfach 102148, D-4630 Bochum 1, FR of Germany (134).
- KNEPPO, Dr. I., Electrotechnical Institute, Slovak Academy of Sciences, Dubravska cesta 4a, 809 32 Bratislava, Czechoslovakia (133).
- KNUDE, Dr. Jens, University Observatory, Øster Voldgade 3, DK-1350 Copenhagen, Denmark (140).
- KOLAWOLE, Dr. L.B., Department of Physics, University of Ife, Ile-Ife, Nigeria (132).
- KOMBAKOV, Mr. N., Institute of Communications, Haidushka Poliana St. 8, 1612 Sofia, Bulgaria (134).
- KOSE, Prof. Dr. V., Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-3300 Braunschweig, FR of Germany (130).
- KOSIŁO, Dr. T., Instytut Radioelektroniki, Politechnika Warszawska, Nowowiejska 15/19, 00 665 Warszawa, Poland (144).
- KRATENA, Dr. L., Institute of Radioengineering and Electronics, Czechoslovak Academy of Sciences, Lumumbova 1, 180 88 Praha 8, Czechoslovakia (143).
- ..
- KRUGER, Dr. A., Zentralinstitut für Solar-Terrestrische Physik, Rudower Chaussee 5, DDR-1199 Berlin-Adlershof, GDR (140).
- ..
- KUHN, Dr. G.J., Department of Electronic Engineering, University of Pretoria, 0002 Pretoria, South Africa (133).
- ..
- KUHN, Dr. U., Rundfunk- und Fernsehtechnische Zentralamt, DDR-1601 Kolberg Krs. Königs-Wusterhausen, GDR (136).
- KUMMER, Prof. Dr.-Ing. M., Technische Hochschule Ilmenau, DDR-63 Ilmenau, GDR (131).

- KUO, Prof. Nan-Hung, National Chiao Tung University, Hsin-chu, Taiwan (140).
- KUTIEV, Dr. I., Institute of Geophysics, Ac.G. Bontchev St., bl. 3, 1113 Sofia, Bulgaria (138).
- LACOUME, Prof. J.L., CEPHAG/ENSIEG, B.P. 46, F-38402 Saint-Martin d'Hères Cedex, France(140).
- LAGASSE, Prof. P., Laboratorium voor Elektromagnetisme en Acustica, St-Pietersnieuwstraat 41, B-9000 Gent, Belgium (143).
- LALOUX, Prof. A., Laboratoire de Télécommunications, Bâtiment Maxwell, Place du Levant 3, B-1348 Louvain-la-Neuve, Belgium (143).
- LAMB, Prof. J., Department of Electrical Engineering, The University, Glasgow G12 8QQ, United Kingdom (134).
- LANDECKER, Dr. T., Dominion Radio Astrophysical Observatory, P.O. Box 248, Penticton, B.C. V2A 6K3, Canada (139).
- LANDMARK, Dr. B., NTN/R, Gaustadalléen 30D, Postboks 309, Blindern, Oslo 3, Norway (130).
- LASTOVICKA, Dr. J., Geophysical Institute, Czechoslovak Academy of Sciences, Bocni II-1a, 141 31 Praha 4, Czechoslovakia (137).
- LEDINEGG, Univ. Prof. Dr. E., Institut für Theoretische Physik, Technische Universität, Kopernikusgasse 24, A-8010 Graz, Austria (131).
- LEFEUVRE, Dr. F., LPCE/CNRS, av. de la Recherche Scientifique 3 A, F-45071 Orléans Cedex 2, France (139).
- LEITINGER, Dr. F., Karl-Franzens-Universität Graz, Institut für Meteorologie und Geophysik, Halbärthgasse 1, A-8010 Graz, Austria (138).

- LESCHIUTTA, Prof. S., Dipartimento di Elettronica, Corso Duca degli Abruzzi 24, I-10129 Torino, Italy. Tel: (39)11-556 7235; Tx: 220646 POLITO (128, 130).
- LIGTHART, Dr. L.P., Technische Hoogeschool, Afdeling Elektrotechniek, Postbus 5031, NL-2600 GA Delft, Netherlands (136).
- LIKHTEP, Dr. Ya. I., IZMIRAN, 142092 Troitsk, Moscow Region, USSR (135).
- LINDELL, Assoc. Prof. I.V., Helsinki University of Technology, Electromagnetics Laboratory, Otakaari 5.A, SF-02150 Espoo, Finland (131).
- LINDENMEIER, Prof. Dr. H., Hochschule der Bundeswehr, Hochfrequenztechnische Systeme, Werner-Heisenberg-Weg 39, D-8014 Neubiberg, FR of Germany (131).
- LITTLE, Assoc. Prof. A.G., School of Physics, University of Sydney, Sydney 2006, NSW, Australia (139).
- LU, Dr. Shyue-Ching, Telecommunication Laboratories, MOC, POB 71, Chung-Li, Taiwan (132).
- LUCAS, Dr. J.G., Department of Electrical Engineering, University of Sydney, Sydney 2006, NSW, Australia (127, 128, 132, 143).
- LUNDBOM, Mr. P.O., National Testing Instru., Department of Electrotechnics and Physics, P.O.Box 5608, S-11486 Stockholm, Sweden (130).
- MAEHLUM, Dr. B., FFI/E, Postboks 25, N-2007 Kjeller, Norway (139).
- MAHMOUD, Prof. S.E., c/o Prof. I.A. Salem, Academy of Scientific Research and Technology, 101 Kasr El-Ainy St., Cairo, Egypt (131)

- MAHROUS, Prof. S.M., c/o Prof. I.A. Salem, Academy of Scientific Research and Technology, Kasr El-Ainy St. 101, Cairo Egypt (135).
- MAGUN, Dr. A., Halen 66, CH-3037 Stuckishaus, Switzerland (140).
- MARTIN, Prof. D.H., Department of Physics, Queen Mary College, Mile End Road, London E1 4NS, United Kingdom (140).
- MARTINEZ, Prof. Roberto Rivas, Comision de Pesas y Medidas, General Ibanez de Ibero Num 3, Madrid 3, Spain (130).
- MASS, Dr. J., Radio Observatory, P.O.B. 911, Haifa 31008, Israel (136).
- MATHUR, Dr. B.S., Department of Radio Science, National Physical Laboratory, Hillside Road, New Dehli 110 012, India (130).
- MATSUMOTO, Prof. H., Radio Atmospheric Science Centre, Kyoto University, Gokanosho, Uji-shi 611, Japan. Tel: (81) 774-332 532; Tx: 5453665 Rascku J; Fax: (81) 774-318 463 (138, 139, 141).
- MATTHEWS, Prof. P.A., Department of Electrical and Electronic Engineering, The University, Leeds LS2 9JT, United Kingdom. Tel: (44) 532-431 751; Tx: 556473 UNILDS G; Fax: (44) 532-448 005 (132, 133).
- MATUURA, Dr. N., Radio Research Laboratories, 4-2-1 Nukui Kitamachi, Koganei-shi, Tokyo 184, Japan (144).
- MATZLER, Dr. Ch., Staffelweg 30, CH-3302 Moosseedorf, Switzerland (137).
- McKENNA-LAWLOR, Dr. S., c/o Royal Irish Academy, 19 Dawson Street, Dublin 2, Ireland (140).
- MEKHANNIKOV, Dr. A.I., Institute of Radioengineering and Electronics, Ac. Sci., Prospekt Marksa 18, 103907 Moskva K-9, USSR (131).
- MELCHIOR, Prof. Dr. H., Freudenbergstr. 101/F-1, CH-8044 Zurich, Switzerland (134).
- MELROSE, Prof. D.B., Department of Theoretical Physics, University of Sydney, Sydney NSW 2006, Australia (138).
- MERINO, Prof. D. Elias Munoz, ETS de Ingenieros de Telecomunicacion, Ciudad Universitaria, Madrid, Spain (134).

- MICHALEV, Mr. M., Institute of Electronics, Bul. Lenina 72,  
1784 Sofia, Bulgaria (136).
- MIGULIN, Prof. V.V., IZMIRAN, 142092 Troitsk, Moscow Region,  
USSR (129, 145).
- MITRA, Dr. A.P., National Physical Laboratory, Hillside Road,  
New Delhi 110 012, India. Tel: 91-38 3652, 91-38 2108,  
91-58 5298; Tx: 031-65202 CSIR IN, 031-62454 RSD IN  
(127, 142).
- MIYAUCHI, Dr. K., Research Development Centre, NTT Co. Ltd.,  
3-9-11 Midoricho, Musashino-shi 180, Japan (133).
- MOBIUS, Dr. K., Amt für Standardisierung, Messwesen und Waren-  
prüfung, Bereich Messwesen, Wallstr. 16, DDR-102 Berlin,  
GDR (130).
- MON, M. J.P., CNET/PAB/RPE, 38 rue du Général Leclerc, F-92131  
Issy-les-Moulineaux, France (136).
- MOPFOUMA, Dr. F., CNET, 38 rue du Général Leclerc, F-92131  
Issy-les-Moulineaux, France (128).
- MOORE, Prof. R.K., Remote Sensing Laboratory, University of  
Kansas, 2291 Irving Hill Dr., Campus West, Lawrence, Kansa  
66045-2969, USA (137).
- MOREIRA, Prof. Dr. Antonio Restani Alves, Instituto Superior  
Tecnico, Avenida Rovisco Pais, 1036 Lisboa Codex,  
Portugal (138).
- MORRIS, Dr. J.M., Howard University, School of Engineering,  
2300 6th St., NW, Washington D.C. 20059, USA (135).
- MORRIS, Mr. R.A., Physics and Engineering Laboratory, DSIR,  
Private Bag, Lower Hutt, New Zealand (134).
- MORTENSEN, Mr. E., Institute of Circuit Theory and Telecommu-  
nication, Building 343, Technical University of Denmark,  
DK-2800 Lyngby, Denmark (132).
- MOURILHE DA SILVA, Eng. P., Observatorio Nacional, R.Gal. Bruze  
586, Sao Cristovao, 20921 Rio de Janeiro, Brazil (130).
- MROZIEWICZ, Dr. B., Instytut Technologii Elektronowej, Al.  
Lotników 32/46, 02 668 Warszawa, Poland (134).

- NAG, Dr. B.R., Institute of Radio Physics and Electronics,  
University of Calcutta, 92-A.P.C. Road, Calcutta 700 009,  
India (134).
- NAHMAN, Dr. N.S., Picosecond Pulse Labs., P.O.B. 44, Boulder,  
CO 80306, USA (131, 141).
- NANO, Dr. E., Dept. Elettronica, Politecnico di Torino, 24  
Corso Duca degli Abruzzi, I-10129 Torino, Italy (135).
- NESTOROV, Dr. G., Institute of Geophysics, Ac.G. Bontchev St.  
bl. No 3, 1113 Sofia, Bulgaria (139).
- NEVES, Prof. J.S., Universidade de Aveiro, 3800 Aveiro, Portu-  
gal (136).
- NEWNHAM, Mr. D.J., RFM Division, Dept. of Communications,  
P.O. Box 34, Belconnen ACT 2616, Australia (134).
- NICOLAS, M. J., Thomson-CSF, Domaine de Corbeville, B.P. 10,  
F-91401 Orsay, France (134).
- NICOLSON, Dr. G.D., Radio Astronomy Observatory, c/o National  
Institute of Telecommunication Research, P.O.Box 3718,  
Johannesburg 2000, South Africa (140).
- NILSSON, Prof. O., Royal Institute of Technology, S-100 44  
Stockholm, Sweden (134).
- NISSEN, Mr. H.G., Danish Research Centre for Applied Electronics,  
Venlighedvej 4, DK-2970 Hørsholm, Denmark (135).
- NUNES, Prof. Rogerio Silva Sousa, Astronomical Observatory,  
University of Porto, Porto, Portugal (134).
- NWABUZOR, Dr. A.A., Department of Electrical Engineering,  
University of Ilorin, Ilorin, Nigeria (133).

- OCHS, Dipl.-Phys. A., Forschungsinstitut der DBP beim FIZ,  
FI 33, Postfach 5000, D-6100 Darmstadt, FR of Germany (136).
- O'CONNELL, Mr. K., c/o Royal Irish Academy, 19 Dawson Street,  
Dublin 2, Ireland (136).
- OGUCHI, Dr. T., Radio Research Laboratories, 4-2-1 Nukui Kita-  
machi, Koganei-shi, Tokyo 184, Japan (136).
- OHMAN, Dr. B., Swedish Telecommunications Administration,  
S-123 86 Farsta, Sweden (145).
- OKAMURA, Prof. S., 4-12-15 Numabukuro, Nakano-ku, Tokyo 165,  
Japan (128).
- OKOSHI, Prof. T., Director, RCAST, University of Tokyo, 4-6-1  
Komaba, Meguro-ku, Tokyo 153, Japan. Tel: (81) 3-481 4436;  
Tx: J34189 RCA STUT; Fax: (81) 3-485 5135 (129, 133,  
134, 144).
- OKOYE, Prof. N.S., Department of Physics and Astronomy,  
University of Nigeria, Nsuka, Nigeria (140).
- OLINER, Prof. A.A., Polytechnic Institute of New York, 333 Jay  
Street, Brooklyn, NY 11201, USA (134).
- OSSAKOW, Dr. S.L., Plasma Physics Division, Naval Research  
Laboratory, Code 4700, Washington D.C. 21375, USA (141).
- OWOLABI, Prof. I.E., University of Ilorin, Department of  
Electrical Engineering, Ilorin, Nigeria (136).
- OYINLOYE, Prof. O., Department of Physics, University of Ilorin,  
Ilorin, Nigeria (128, 137, 144).
- PADULA-PINTOS, Prof. V.H., Executive Secretary, CORCA, Julian  
Alvarez 1218, 1414 Buenos Aires, Argentina (134, 143).
- PAI, Prof. Kwang, Hong, Department of Electrical Engineering,  
National Taiwan University, Taipei, Taiwan (138).



- PAQUET, Dr. P., Observatoire Royal de Belgique, 3 avenue Circulaire, B-1180 Bruxelles, Belgium (130).
- PATRICIO, Mr. Joaquim Fernandes, Direcçao General de Tele-comunicações, av. Fonte Pereira de Melo 40, 1089 Lisboa Codex, Portugal (145).
- PAVLASEK, Prof. T.J., Department of Electrical Engineering, McGill University, Montreal, Quebec, Canada (134).
- PAWŁOWSKI, Dr. W., Instytut Telekomunikacji, Politechnika Gdańska, ul. Majakowskiego 11/12, 80 952 Gdańsk, Poland (136).
- PEEK, Prof. J.B.H., Natuurkundig Laboratorium Philips, Postbus 80 000, NL-5600 JA Eindhoven, Netherlands (127, 144).
- PETIT, Dr. M., Délégué aux Affaires Internationales, Ministère de la Recherche et de l'Enseignement supérieur, rue Descartes, F-75005 Paris, France (128).
- PFLEIDERER, Prof. J., Institut für Astronomie, Universität Innsbruck, Technikerstrasse 15, A-6020 Innsbruck, Austria (139).
- PICINBONO, Prof. B., Laboratoire des Signaux et Systèmes, Ecole supérieure d'Electricité, Plateau du Moulon, F-91190 Gif-sur-Yvette, France (128, 143).
- PIEKARSKI, Prof. M., Instytut Telekomunikacji i Akustyki, Politechnika Wrocławska, ul. Wybrzeże Wyspiańskiego 27, 50 370 Wrocław, Poland (133).
- PILLER, Dr. O., Aeckerli, CH-1715 Alterswil, Switzerland (130).
- PILLET, Dr. G., CNET/DICET, 38 rue du Général Leclerc, F-92131 Issy-les-Moulineaux, France (142, 143).
- PIRJOLA, Dr. R., Finnish Meteorological Institute, Department of Geophysics, P.O.Box 503, SF-00101 Helsinki, Finland (135).
- POLITCH, Dr. J., Technion, POB 2250, Haifa 31021, Israel (144).
- PROKOP, Prof. Dr. J., Faculty of Electrical Engineering, Czechoslovak Technical University, Suchbatarova 4, 166 27 Praha 6, Czechoslovakia (136).
- PROTONOTARIOS, Prof. E., Department of Electrical Engineering, National Technical University of Athens, 42 October 48th Av., Athens, Greece (133).

- QIAO, Dr. Shiqiong, Institute of Electromagnetic Metrology,  
Ministry of Space Technology, P.O.Box 3930, Beijing,  
China (130).
- RADICELLA, Prof. S., PRONARP, Julian Alvarez 1218, 1414 Buenos  
Aires, Argentina. Tx: 59134 ENTOP AR (127, 128, 138).
- RAO, Dr. M.K., Wireless Planning and Coordination, New Delhi,  
India (135).
- RANVAUD, Dr. R.D.P.K.C., INPE, C.P. 515, Sao José dos Campos,  
SP, Brazil (133).
- REDDY, Dr. B.M., Assistant Director, Radio Science Division,  
National Physical Laboratory, Hillside Road, New Delhi,  
India (128, 142).
- REINISCH, Dr. B.W. (138).
- RIBES, Dr. J.C., Observatoire de Lyon, F-69230 St-Genis-  
Laval, France (142).
- RIEDLER, Univ. Prof. W., Institut für Nachrichtentechnik und  
Wellenausbreitung, Technische Universität, Infeldgasse  
12, A-8010 Graz, Austria (136, 137).
- RIGBY, Prof. G.A., School of Electrical Engineering, P.O.Box 1,  
Kensington, NSW 2033, Australia (133).
- RISHBETH, Dr. H., Rutherford Appleton Laboratory, Chilton  
Didcot, Oxfordshire OX11 0QX, United Kingdom. Tel:  
(44) 703-559 122 ext.2073; Tx: 83159 Ruth1b G Attn: H.  
Rishbeth; Fax: (44) 703-585 813 (137, 138).

- ROBINSON, Dr. B.J., CSIRO Division of Radiophysics, P.O.Box 76, Epping, NSW 2121, Australia (142).
- RODRIGUEZ VIDAL, Prof. M., Director del Instituto de Electricidad, Facultad de Ciencias Fisicas, Ciudad Universitaria, 28040 Madrid, Spain (132).
- RØDSRUD, Ms. E., NTN/PFM, Postboks 25, N-2007 Kjeller, Norway (144).
- RUSH, Dr. C.M., Institute for Telecommunication Sciences, 325 Broadway, Boulder, Colorado 80303, USA (138).
- RYAN, Prof. W.D., c/o Royal Irish Academy, 19 Dawson Street, Dublin 2, Ireland (127, 134).
- 
- SAAL, Prof. Dr. Ing. R., Technische Universität München, Lehrstuhl für Netzwerktheorie und Schaltungstechnik, Arcisstrasse 21, D-8000 München 2, FR of Germany.  
Tel: (49) 89-2105 8501 (132).
- SABURI, Dr. Y., Development Centre, Anritsu Co. Ltd, 1800 Onna, Atsugi-shi 243, Japan (130).
- SADIK, Dr. Aziz R., Astronomy and Space Research Centre, POB 255 Jadiryah, Baghdad, Iraq (140, 144).
- SALAWU, Prof. R.I., Department of Electrical Engineering, University of Lagos, Akoka, Yaba, Lagos, Nigeria (134).
- SATO, Dr. T., Theoretical Research Centre for Nuclear Fusion, Hiroshima University, Hiroshima 730, Japan (141).
- SALEM, Prof. I.A., c/o Academy of Scientific Research and Technology, 101 Kasr El-Ainy St., Cairo, Egypt (137,143).
- SARKAR, Dr. T.K., Department of Electrical and Computer Engineering, Syracuse University, Link Hall, Syracuse N.Y. 13210, USA ( 141).
- SCAIFE, Prof. B.K.P., c/o Royal Irish Academy, 19 Dawson Street, Dublin 2, Ireland (130, 131, 144).

- SCANLAN, Prof. J.O., c/o Royal Irish Academy, 19 Dawson Street,  
Dublin 2, Ireland (133, 135, 144).
- SCHALWIJK, Prof. J.P.M., Technische Hoogeschool, Afdeling  
Elektrotechniek, Postbus 5031, NL-2600 GA Delft,  
Netherlands (133).
- SCHANING, Dr. B., Observatorium für Ionosphärenforschung,  
Mitschurinstrasse 4/6, DDR-2565 Kühlungsborn, GDR (135).
- SCHEFTE, Dr. H., Telefon AB LM Ericsson, DcF, S-126 25  
Stockholm, Sweden (133).
- SCHEGGI, Prof. A.-M., Istituto di Ricerca sulle Onde Elettro-  
magnetiche del CNR, Via Panciatichi 64, I-50127 Firenze,  
Italy (134).
- SCHLEGEL, Dr. K., Max-Planck-Institut für Aeronomie, Postfach  
20, D-3411 Katlenburg-Lindau 3, FR of Germany (137, 141).
- SCHWARTZ, Dr. J.W., AVTEC Systems Inc., 6304 Potomac Avenue,  
Alexandria, VA 22307, USA (133).
- SCUKA, Dr. V., Uppsala University, Institute of High Voltage  
Research, Husbyborg, S-755 90 Uppsala, Sweden (135, 141).
- SEN, Dr. A.K., Institute of Radio Physics and Electronics,  
University of Calcutta, 92-A.P.C. Road, Calcutta 700 009,  
India (137).
- SENIOR, Prof. T.B.A., Radiation Laboratory, Electrical and  
Computer Engineering Department, The University of  
Michigan, Ann Arbor, MI 48109, USA, Tel: (1) 313-764 3317;  
Tx: 4320815 UOFM UI; Fax: (1) 313-936 3492 (128, 131).
- SENISE, Prof. J.T., Instituto Maua de Tecnologia, Sociedade  
Brasiliera de Micro Ondas, Estrado das Lagrimas, 2035  
Sao Caetano do Sul, Brazil (131).
- SERAFIMOV, Acad. K., Secretary General of the Union of Scienti-  
fic Workers of Bulgaria, 35 Oberichte u., 1504 Sofia,  
Bulgaria (128, 137, 143).
- SEXTON, Prof. M.C., c/o Royal Irish Academy, 19 Dawson Street,  
Dublin 2, Ireland (137, 139).
- SHA, Dr. Zong, Chinese Institute of Electronics, P.O.Box 139,  
Beijing, China (136).
- SHABAN, Mr. Ali M.A., Telecommunications Research Establish-  
ment, Al-Jumhuria St., Baghdad, Iraq (131, 135).

- SHAFAI, Dr. L., Department of Electrical Engineering, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada (131).
- SHAPIRA, Dr. J., Department of Electrical Engineering, Technion, POB 2250, Haifa 31021, Israel (128, 144).
- SHAPPIR, Prof. J., Department of Physics, The Hebrew University of Jerusalem, Jerusalem, Israel (134).
- SHEARMAN, Prof. E.D.R., Department of Electronic and Electrical Engineering, The University, P.O.Box 363, Edgbaston, Birmingham B15 2TT, United Kingdom (137).
- SHEN, Dr. Haoming, Institute of Electronics, Academia Sinica, P.O.Box 2702, Beijing, China (134).
- SHISHKOV, Prof. B., Institute of Applied Mathematics and Informatics, Technical University of Sofia, P.O. Box 104, 1618 Sofia, Bulgaria (132).
- SIEV, Mr. J., Bezek, Migdal Shalom, Tel Aviv, Israel (130).
- SIFOROV, Prof. V.I., Institute of Information and Transmission Problems, Ac. Sci., 8a Aviamotornaya ul., Moskva E-24, USSR (133).
- SLAVOVA, Prof. J., Technical University of Sofia, W. Gladstone u. 7, 1421 Sofia, Bulgaria (133).
- SMOLINSKI, Prof. A., Instytut Podstaw Elektroniki, Politechnika Warszawska, ul. Nowowiejska 15/19, 00 665 Warszawa, Poland (144).
- SOMLO, Dr. P.I., Head, RF/Microwave Group, CSIRO, Division of Applied Physics, P.O.Box 218, Lindfield, NSW 2070, Australia (130).
- SPASOV, Dr. A., bld Lenina 72, 1113 Sofia, Bulgaria (143).
- SPAULDING, Dr. A.D., Radio Spectrum Occupancy Group, US Dept. of Commerce, Office of Telecommunications, Boulder, CO 80302, USA (129, 135).
- STETTE, Prof. G., Institutt for teleteknikk, Universitetet i Trondheim, N-7034 Trondheim, Norway (135).
- STEVANOVITCH, Mrs Y., URSI Secretariat, c/o Observatoire Royal de Belgique, 3 avenue Circulaire, B-1180 Bruxelles, Belgium. (Tel: (32) 2-374 13 08 (127)).
- STOKKE, Mr. K.N., Teledirektoratet, Radiotransmisjonskontoret, Postboks 6701, N- Oslo 1, Norway (135).

- STROM, Prof. S., Royal Institute of Technology, S-100 44  
Stockholm, Sweden (132).
- STUBKJAER, Dr. K., Electromagnetics Institute, Bldg 348,  
Technical University of Denmark, DK-2800 Lyngby, Denmark  
(133).
- STUMPERS, Prof. F.L.H.M., Elzentlaan 11, Eindhoven 561 1LG,  
Netherlands (128).
- SUCHY, Prof. K., Institut für Theoretische Physik (II) der  
Universität Düsseldorf, Universitätsstrasse 1, D-4000  
Düsseldorf 1, FR of Germany (139).
- SUTHERS, Dr. M.S., Bell Northern Research, Box 3511, Station C,  
Ottawa, Ontario K1Y 4H7, Canada (132).
- SWARUP, Prof. G., TIFR Centre, Indian Institute of Science  
Campus, P.O.Box 1234, Bangalore 560 012, India (144).
- SZEMEREDY, Dr. P., University Roland Eötvös, c/o Dr. L.  
Zombory, Technical University of Budapest, H-1521 Budapest  
Hungary (135).
- TABBARA, M. W., Laboratoire des Signaux et Systèmes, Ecole  
Supérieure d'Electricité, Plateau du Moulon, F-91190 Gif-  
sur-Yvette, France (131).
- TARTARA, Prof. G., Centro di Studio sulle Telecomunicazioni  
Spaziali del CNR, c/o Dipartimento di Elettronica del  
Politecnico, Piazza Leonardo da Vinci 32, I-20133 Milano,  
Italy (133).
- TAURIAINEN, Assoc. Prof. A., University of Oulu, E.E. Depart-  
ment, Linnanmaa, SF-90570 Oulu, Finland (137).
- TENG, Mr. Yuan-Cheng, Radio Science Laboratory, Telecommuni-  
cation Laboratories, MOC, P.O.Box 71, Chung-Li, Taipei,  
Taiwan (130).
- THOMPSON, Dr. D.C., NZ Meteorological Service, P.O.Box 722,  
Wellington, New Zealand (136).

- TIITHERIDGE, Dr. J.E., Dept. of Physics, Auckland University,  
Private Bag, Auckland, New Zealand (137).
- TIURI, Prof. M., Helsinki University of Technology, E.E. Dept.  
Takoiant 1F, SF-02130 Espoo, Finland (129, 139, 143).
- TLAMICHA, Dr. A., Astronomical Institute, Czechoslovak Aca-  
demy of Sciences, 251 65 Ondrejov u Prahy, Czechoslovakia  
140).
- TOLMAN, Dr. J., Institute of Radioengineering and Electronics,  
Lumumbova 1, 180 88 Praha 8, Czechoslovakia (130).
- TOMASSETTI, Dr. G., Istituto di Radioastronomia del CNR,  
c/o Istituto di Fisica "A. Righi", Universita degli Studi,  
via Irnerio 46, I-40126 Bologna, Italy (140).
- TONNING, Prof. A., Institut for Fysikalsk elektronikk,  
Universitetet i Trondheim, N-7034 Trondheim, Norway (132).
- TROITSKIJ, Prof. V.S., Institute of Radioengineering and  
Electronics, Ac. Sci., Prospekt Marksa 18, 103907  
Moskva K-9, USSR (140).
- TURNER, Dr. R., National Measuring Standards and Metrology,  
National Physical Laboratory, CSIR, P.O.Box 395, 0001  
Pretoria, South Africa (130).
- TURSKI, Dr. A., Instytut Podstawowych Problemów Techniki PAN,  
ul. Świętokrzyska 21, 00 049 Warszawa, Poland (139).
- UNGSTRUP, Dr. E., Danish Space Research Institute, Lundtof-  
tevej 7, DK-2800 Lyngby, Denmark (137).

- VALENZUELA, Dr. G.R., Code 7912 V, Space Sensing Applications,  
Naval Research Laboratory, Washington, D.C. 20375, USA  
(129, 142).
- VAN BLADEL, Prof. J., URSI Secretariat, c/o Observatoire Royal  
de Belgique, 3 avenue Circulaire, B-1180 Bruxelles,  
Belgium. Tel: (32) 2-374 1308; Tx 11344 IBSBIL (127).
- VANDER VORST, Prof. A.S., Laboratoire de Télécommunications et  
d'Hyperfréquences, UCL, Bâtiment Maxwell, B-1348 Louvain-  
la-Neuve, Belgium (131).
- VAN ECK, Prof. J.L., Faculté des Sciences Appliquées, Univer-  
sité Libre de Bruxelles, 50 av. F.D. Roosevelt, B-1050  
Bruxelles, Belgium (133).
- VANIER, Dr. J., Basic Standards Laboratory, Division of Physics  
National Research Council of Canada, Montreal Road, Ottawa  
Ontario K1A 0R6, Canada. Tel: (1) 613-993 9326; Tx 0534322  
Fax: (1) 613-954 7708 (130).
- VAN ZANDT, Dr. T.E., NOAA/ERL/R445, 325 Broadway, Boulder,  
CO 80303, USA (142).
- VERMAAK, Prof. J.S., Department of Physics, University of  
Port Elizabeth, P.O.B. 1600, 6000 Port Elizabeth,  
South Africa (134).
- VESZELY, Dr. Gy., Technical University of Budapest, c/o Dr. L.  
Zombory, Technical University of Budapest, H-1521 Budapest  
Hungary (131).
- VICE, Mr. R.W., Director, National Institute for Telecommuni-  
cations Research, P.O.Box 3718, Johannesburg 2000,  
South Africa (135, 136).
- VINCENT, Prof. R.A., Department of Physics, University of  
Adelaide, Adelaide, Southern Australia, 50001 Australia  
(142).
- VOGE, M. J., avenue A. Bartholomé 5, F-75015 Paris, France  
(128).



- WAGNER, Prof. Ch.-U., Zentralinstitut für Astrophysik, Rosa-Luxemburgstrasse 17a, DDR-1590 Potsdam, GDR (128, 139, 144).
- WALKER, Prof. A.D.M., Department of Physics, University of Natal, King George V Avenue, Durban 4001, South Africa (139).
- WANG, Dr. Shoujue, Institute of Semiconductor, Academia Sinica, P.O.Box 650, Beijing, China (133).
- WARREN, Dr. P.T., The Royal Society, 6 Carlton House Terrace, London SW1Y 5AG, United Kingdom (145).
- WEENINK, Prof. M.P.H., Technische Hoogeschool, Afdeling Elektrotechniek, Postbus 513, NL-5600 MB Eindhoven, Netherlands (139).
- WEISSGLASS, Dr. P., IM, Swedish Institute of Microelectronics, P.O.Box 1084, S-164 21 Kista, Sweden (145).
- WELCH, Prof. W.J., Radio Astronomy Laboratory, University of California at Berkeley, Berkeley, CA 94720, USA (140).
- WERNIK, Dr. A., Space Research Centre, Polish Academy of Sciences Bartyccka 18, 00 716 Warszawa, Poland.  
Tel: (48) 22- 410 041 ext.69; Tx: 815670 CBK PL (137).
- WICKWAR, Dr. V., SRI International, Menlo Park, CA 94025, USA (141).
- WIECMANN, Prof. Dr. Ing. F., Technische Universität Dresden, Sektion Informationstechnik, Monmenstr. 13, DDR-8027 Dresden, GDR (132).
- WIELEBINSKI, Prof. R., Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, D-5300 Bonn, FR of Germany.  
Tel: (49) 228-5251,; Tx: 8 86 440 MPIFR D (129, 142).
- WIK, Mr. M., FMV, Electronics Directorate, S-115 88 Stockholm, Sweden (129).
- WILLIAMSON, Dr. A.G., Department of Electrical and Electronic Engineering, University of Auckland, Private Bag, Auckland, New Zealand (132).
- WILLIAMSON, Dr. W.G., Ass. Dir. of Research, Telecommunication Research Laboratory, 762-772 Blackburn Road, Clayton North, VIC 3168, Australia (136).

- WITTKE, Prof. P.H., Department of Electrical Engineering,  
Queen's University, Kingston, Ontario K7L 3N6, Canada  
(143).
- WOJNAR, Prof. A., al. Sady Żoliborskie 17, m.24, OI 772  
Warszawa, Poland (135).
- WOODMAN, Dr. R., Instituto Geofísico del Peru, Apartado 3747,  
Lima 100, Peru (128, 133, 142, 144).
- WU, Dr. Shengyin, Beijing Astronomical Observatory, Academia  
Sinica, Beijing, China (140).
- WU, Dr. Youzhou, Qing Hua University, Beijing, China (132).
- WU, Prof. Tien-Shou, Science Research Centre, National Cheng  
Kung University, Tainan, Taiwan (133).
- YE, Prof. K.C., Department of Electronic Engineering, Univer-  
sity of Illinois, 1406 West Green Street, Urbana, Illinois  
61801, USA (138).
- ZHABOTINSKI, Prof. M.E., Institute of Radioengineering and  
Electronics, Ac. Sci., Prospekt Marksa 18, 103907  
Moskva K-9, USSR (128, 134).
- ZHANG, Dr. Xunjie, Wuhan University, Wuhan, Hubei Province,  
China (138).
- ZHENG, Dr. Wenhao, Chief of the Academic Division, CIE,  
P.O.Box 139, Beijing, China (143).

ZIMA, Prof. V., Institute of Radioengineering and Electronics,  
Czechoslovak Academy of Sciences, Lumumbova 1, 180 88  
Praha 8, Czechoslovakia. Tel: (42) 2-840 707; Tx: 122 646  
UREP (127, 128, 143).

ZOMBORY, Dr. L., Technical University of Budapest, Egly J.u.13,  
H-1521 Budapest, Hungary (134, 140, 144).

11

12

13

14

15

16